# Chapter 1 Introduction

## 1.1 Purpose

The Los Angeles Unified School District (LAUSD) prepared this Local Hazard Mitigation Plan (LHMP) update to the 2012 Federal Emergency Management Agency (FEMA) approved LAUSD All Hazard Mitigation Plan. The purpose of this LHMP Update is to guide hazard mitigation planning to better protect the people and property of the District from the effects of hazard events. This LHMP Update demonstrates the District's commitment to reducing risks from hazards and serves as a tool to help decision makers direct mitigation activities and resources. This LHMP Update was also developed, among other things, to ensure LAUSD's continued eligibility for certain federal disaster assistance: specifically, the FEMA Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation Program (PDM), and the Flood Mitigation Assistance Program (FMA).

## 1.2 Background and Scope

Each year in the United States, natural disasters take the lives of hundreds of people and injure thousands more. Nationwide, taxpayers pay billions of dollars annually to help communities, organizations, businesses, and individuals recover from disasters. These monies only partially reflect the true cost of disasters, because additional expenses incurred by insurance companies and nongovernmental organizations are not reimbursed by tax dollars. Many natural disasters are predictable, and much of the damage caused by these events can be reduced or even eliminated.

Hazard mitigation is defined by FEMA as "any sustained action taken to reduce or eliminate long-term risk to human life and property from a hazard event." The results of a three-year, congressionally mandated independent study to assess future savings from mitigation activities provides evidence that mitigation activities are highly cost-effective. On average, each dollar spent on mitigation saves society an average of $6 in avoided future losses in addition to saving lives and preventing injuries (National Institute of Building Science Natural Hazard Mitigation Saves 2017 Interim Report).

Hazard mitigation planning is the process through which hazards are identified, likely impacts determined, mitigation goals set, and appropriate mitigation strategies determined, prioritized, and implemented. This LHMP Update documents LAUSD's hazard mitigation planning process and identifies relevant hazards and vulnerabilities and various strategies the District will use to decrease vulnerability and increase resiliency and sustainability in the LAUSD community.

This 2018 LAUSD LHMP Update is a single-jurisdictional plan that geographically covers the District owned land and buildings within its geographic boundaries (hereinafter referred to as the Planning Area).

This LHMP Update was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 (Public Law 106-390) and the implementing regulations set forth by the Interim Final Rule published in the Federal Register on February 26, 2002, (44 CFR §201.6) and finalized on October 31, 2007. (Hereafter, these requirements and regulations will be referred to collectively as the Disaster Mitigation Act (DMA) or DMA 2000.) While the act emphasized the need for mitigation plans and more coordinated mitigation planning and implementation efforts, the regulations established the requirements that local hazard mitigation plans must meet in order for a local jurisdiction to be eligible for certain federal disaster assistance and hazard mitigation funding under the Robert T. Stafford Disaster Relief and Emergency Act (Public Law 93-288). This planning effort also follows FEMA's 2013 Plan Preparation Guidance. Because the LAUSD Planning Area is subject to many kinds of hazards, access to these programs is vital.

Information in this plan will be used to help guide and coordinate mitigation activities and decisions for LAUSD policies in the future. Proactive mitigation planning will help reduce the cost of disaster response and recovery to the District, staff, students, and families by protecting critical District facilities, reducing liability exposure, and minimizing overall District impacts and disruptions. The Planning Area has been affected by hazards in the past and is thus committed to reducing future impacts from hazard events and maintaining eligibility for mitigation-related federal funding.

## 1.3 LAUSD Profile

Second largest in the nation, the Los Angeles Unified School District (LAUSD) enrolls more than 640,000 students in kindergarten through 12th grade, at over 900 schools, and 187 public charter schools. Founded in 1853, the District, today, counts more than 115 new schools and campuses, thanks to the nation's largest public works project, funded by bond measures, a testament to broad voter support. The District covers an area, totaling 710 square miles. This includes most of the city of Los Angeles, along with all or portions of 26 cities and unincorporated areas of Los Angeles County. About 4.8 million people live within the District's boundaries.

- Cities Entirely Within L.A. Unified
  - ✓ Cudahy Gardena
  - ✓ Huntington Park
  - ✓ Lomita
  - ✓ Maywood
  - ✓ Vernon
  - ✓ San Fernando
  - ✓ West Hollywood

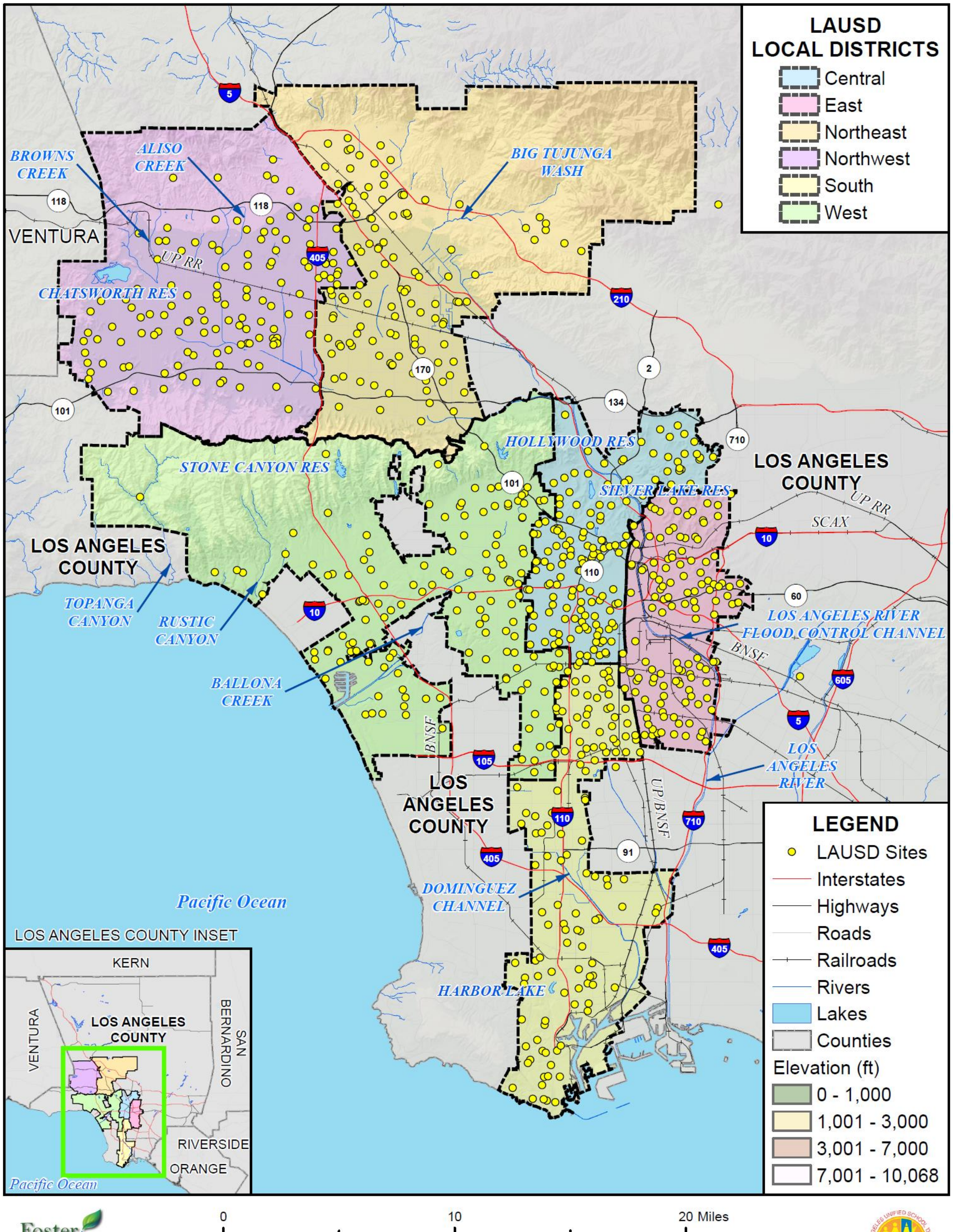
- Cities Partially Within L.A. Unified
  - ✓ Bell
  - ✓ Bell Gardens
  - ✓ Beverly Hills
  - ✓ Calabasas*
  - ✓ Carson
  - ✓ Commerce
  - ✓ Culver City
  - ✓ Hawthorne
  - ✓ Inglewood
  - ✓ Long Beach

- ✓ Los Angeles
- ✓ Lynwood
- ✓ Montebello
- ✓ Monterey Park
- ✓ Rancho Palos Verde
- ✓ Santa Clarita*
- ✓ South Gate
- ✓ Torrance

*Only a few parcels of land generating no enrollment are within L.A. Unified.

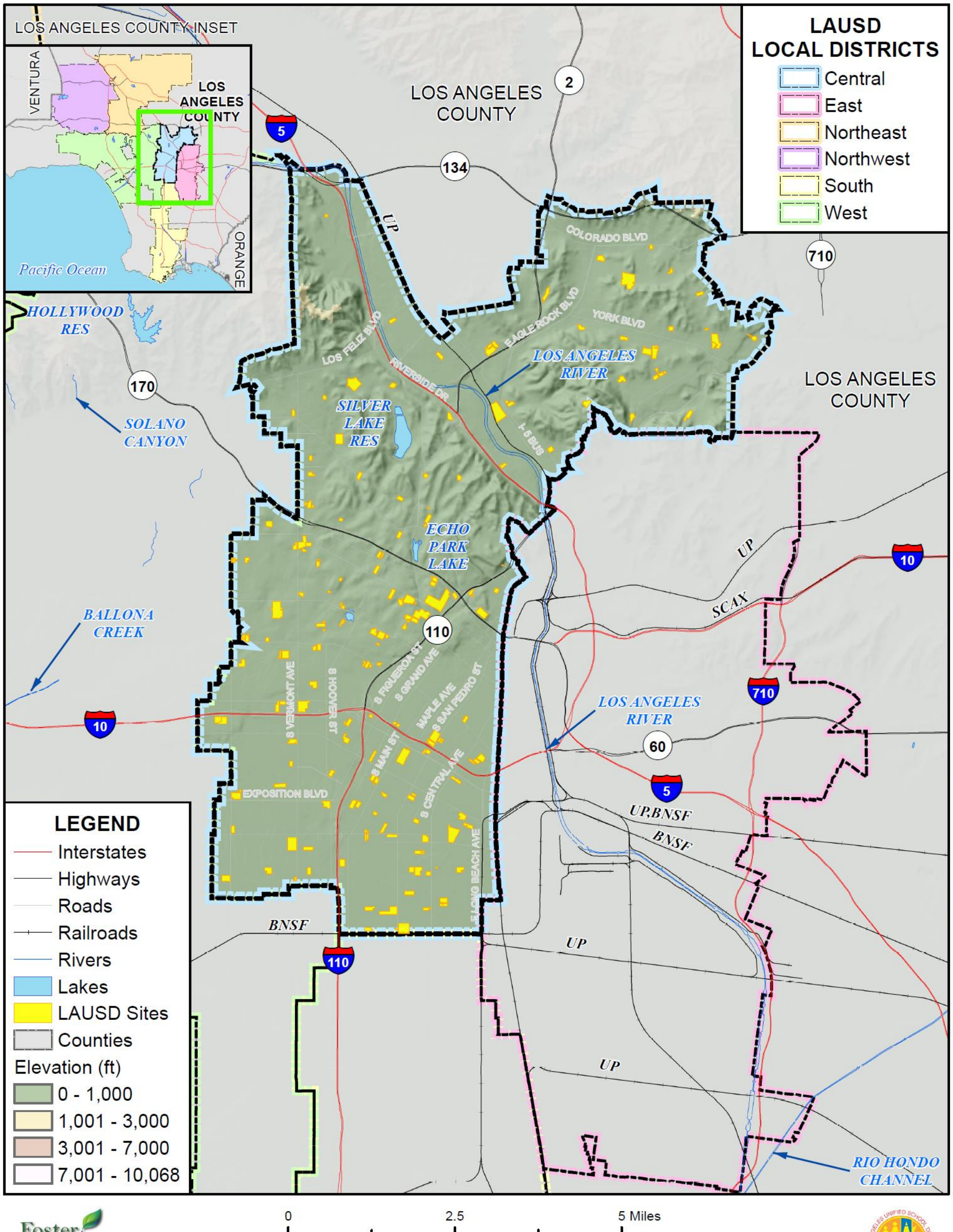
A map of District boundaries is shown in Figure 1-1. Figure 1-2 through Figure 1-7 show a closer view of the individual local districts that make up LAUSD. Figure 1-8 shows the LAUSD boundaries, with cities and LAUSD sites.

*Figure 1-1 LAUSD Planning Area by Local Districts*



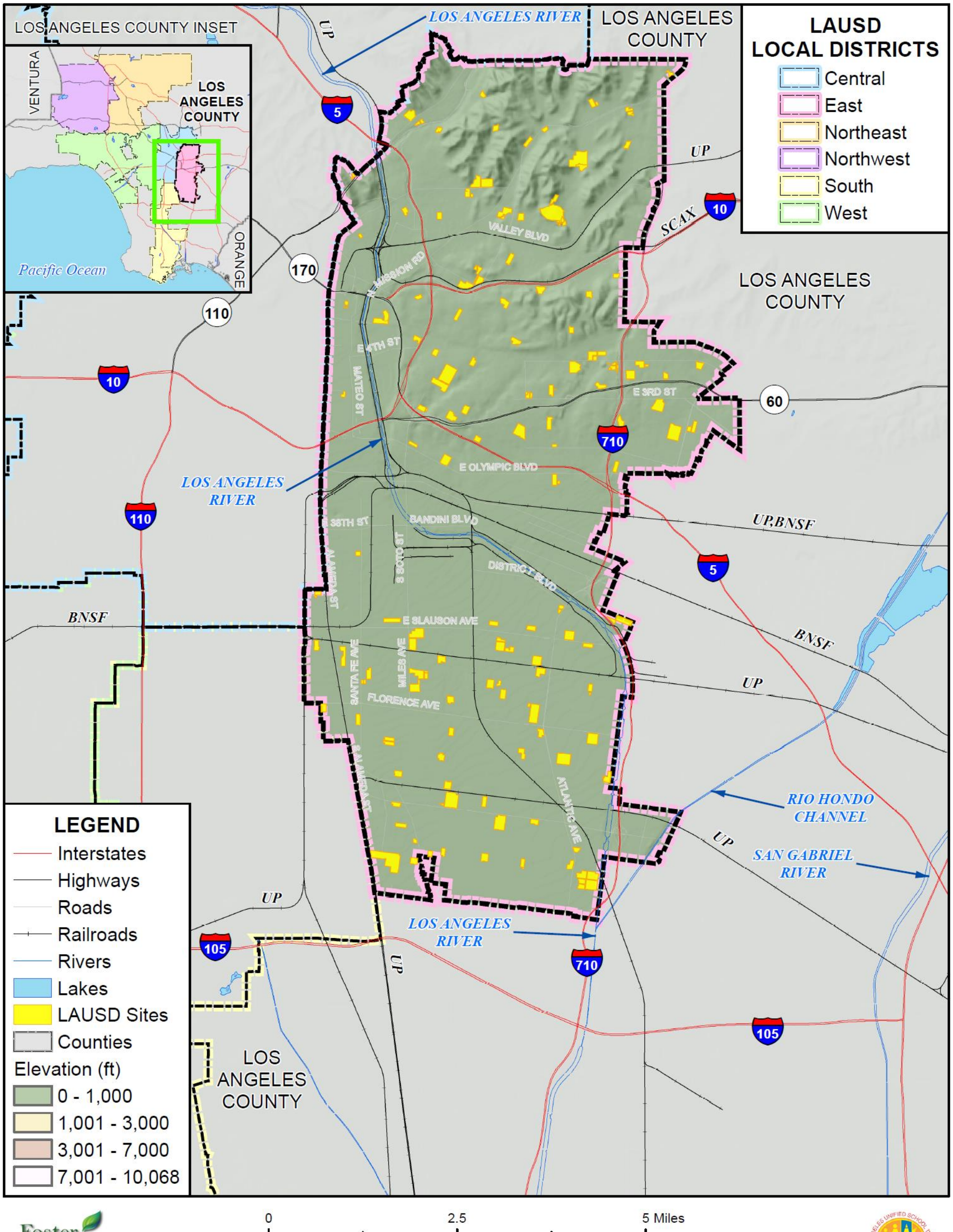

Data Source: LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

*Figure 1-2 LAUSD – Central District Map*



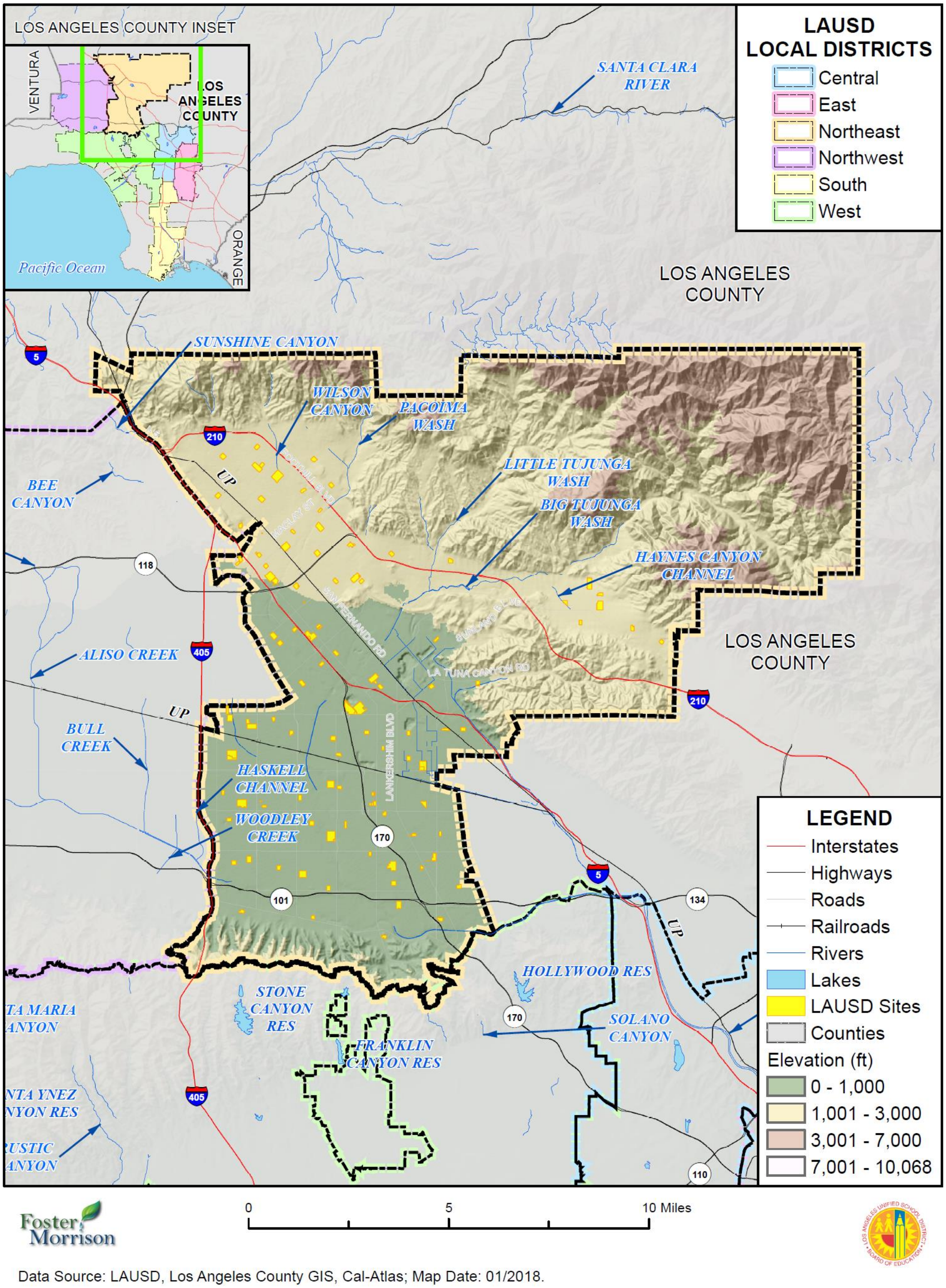

Data Source: LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

*Figure 1-3 LAUSD – East District Map*

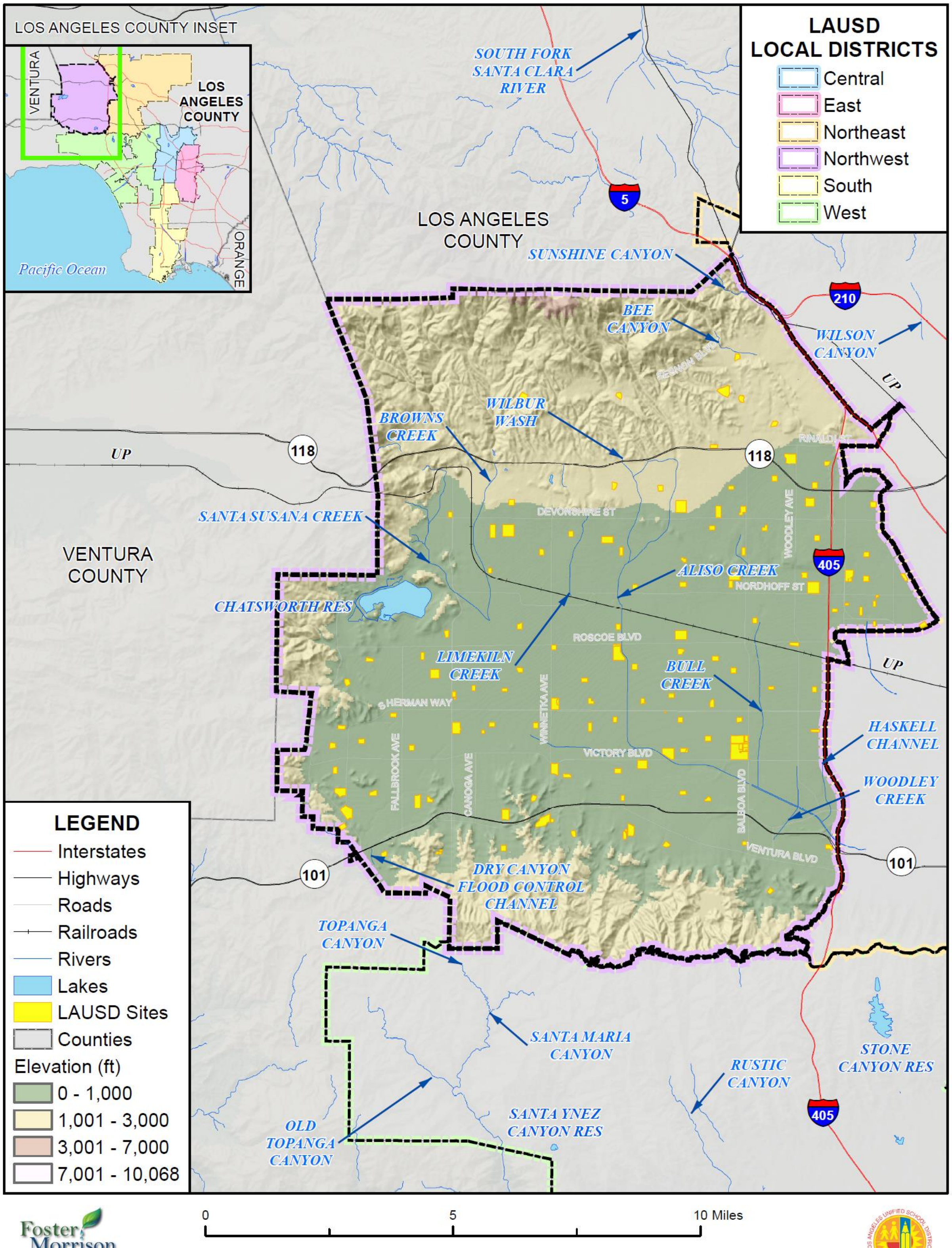



Data Source: LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

*Figure 1-4 LAUSD – Northeast District Map*

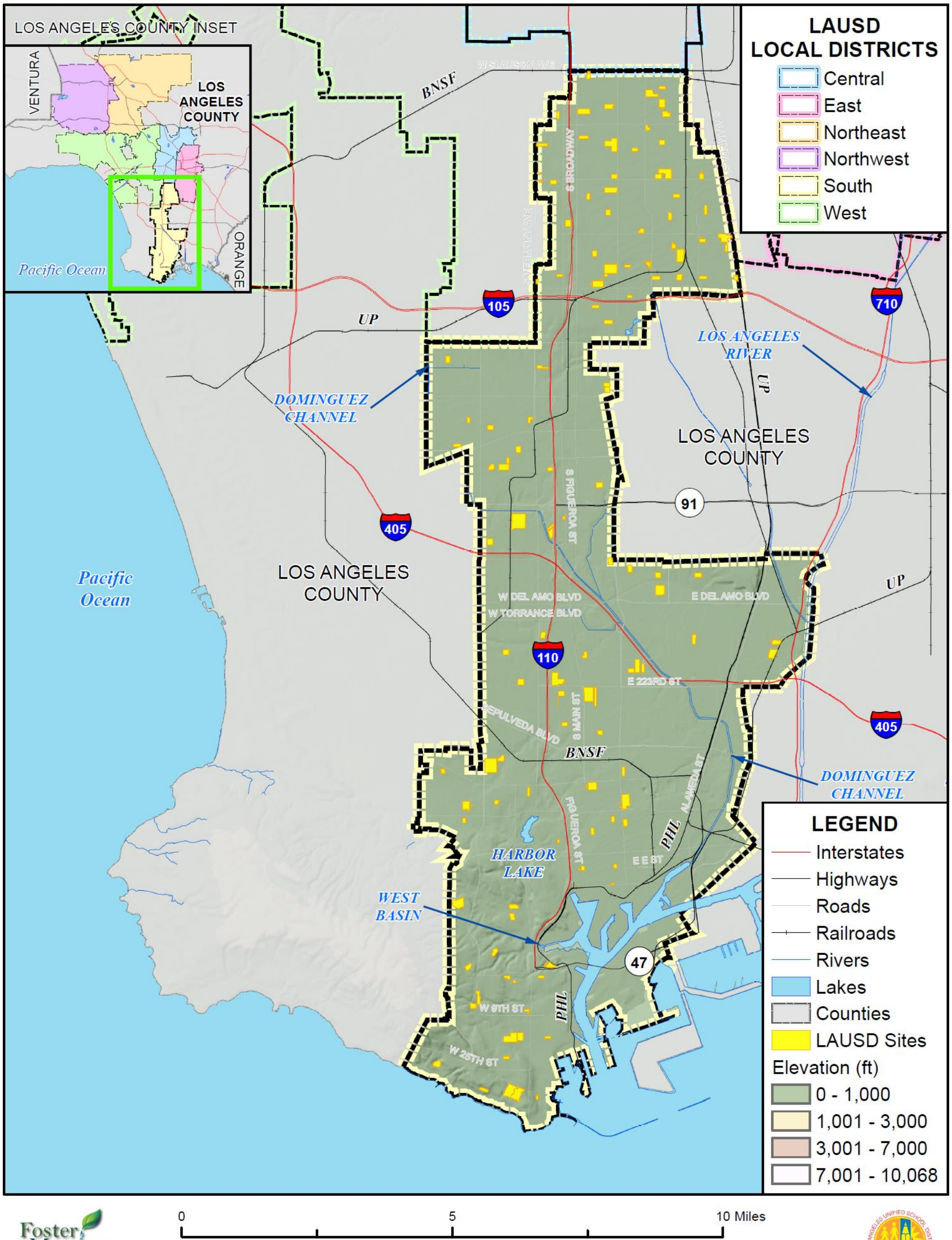


## *Figure 1-5 LAUSD – Northwest District Map*



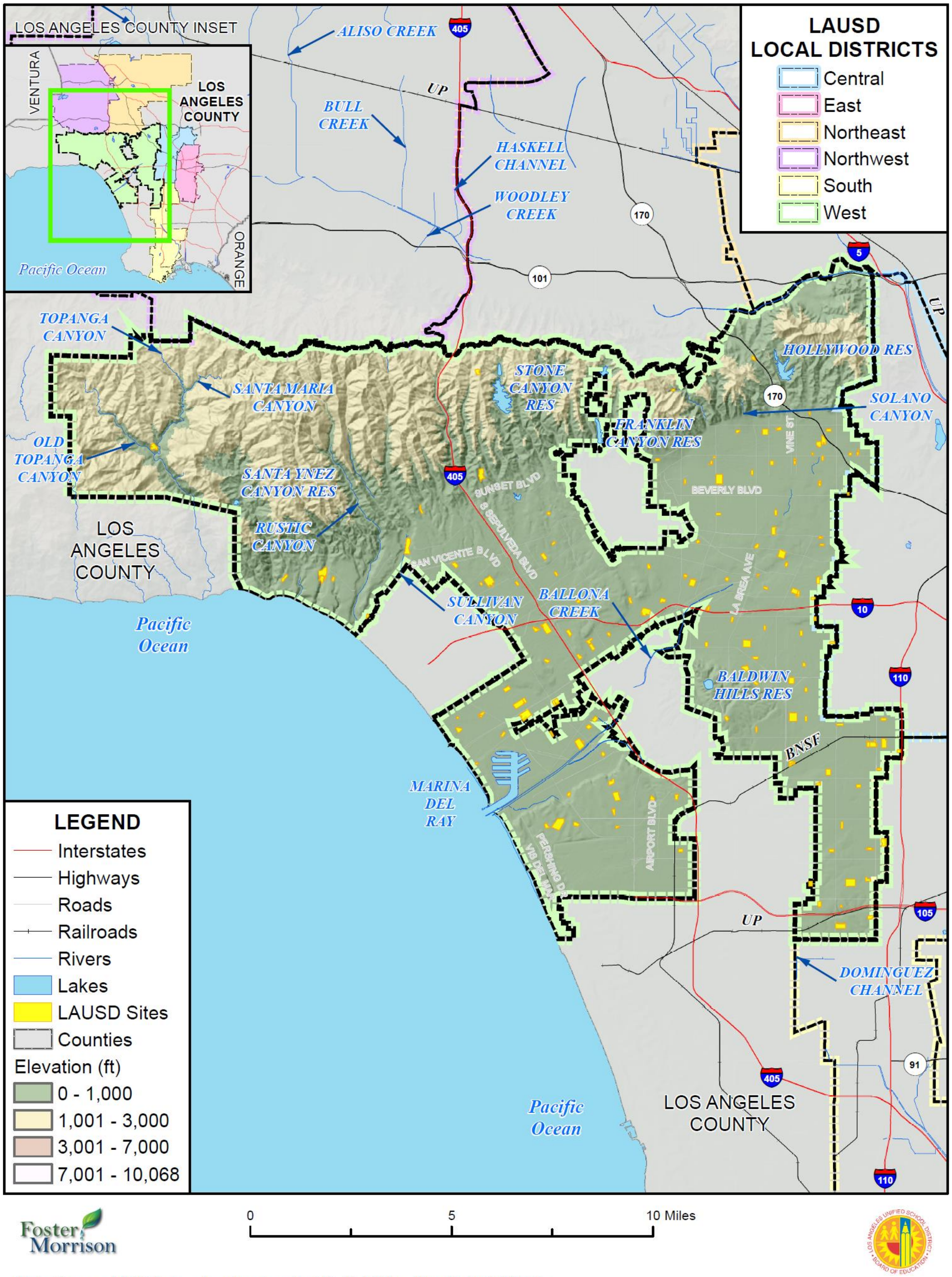

Data Source: LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

*Figure 1-6 LAUSD – South District Map*



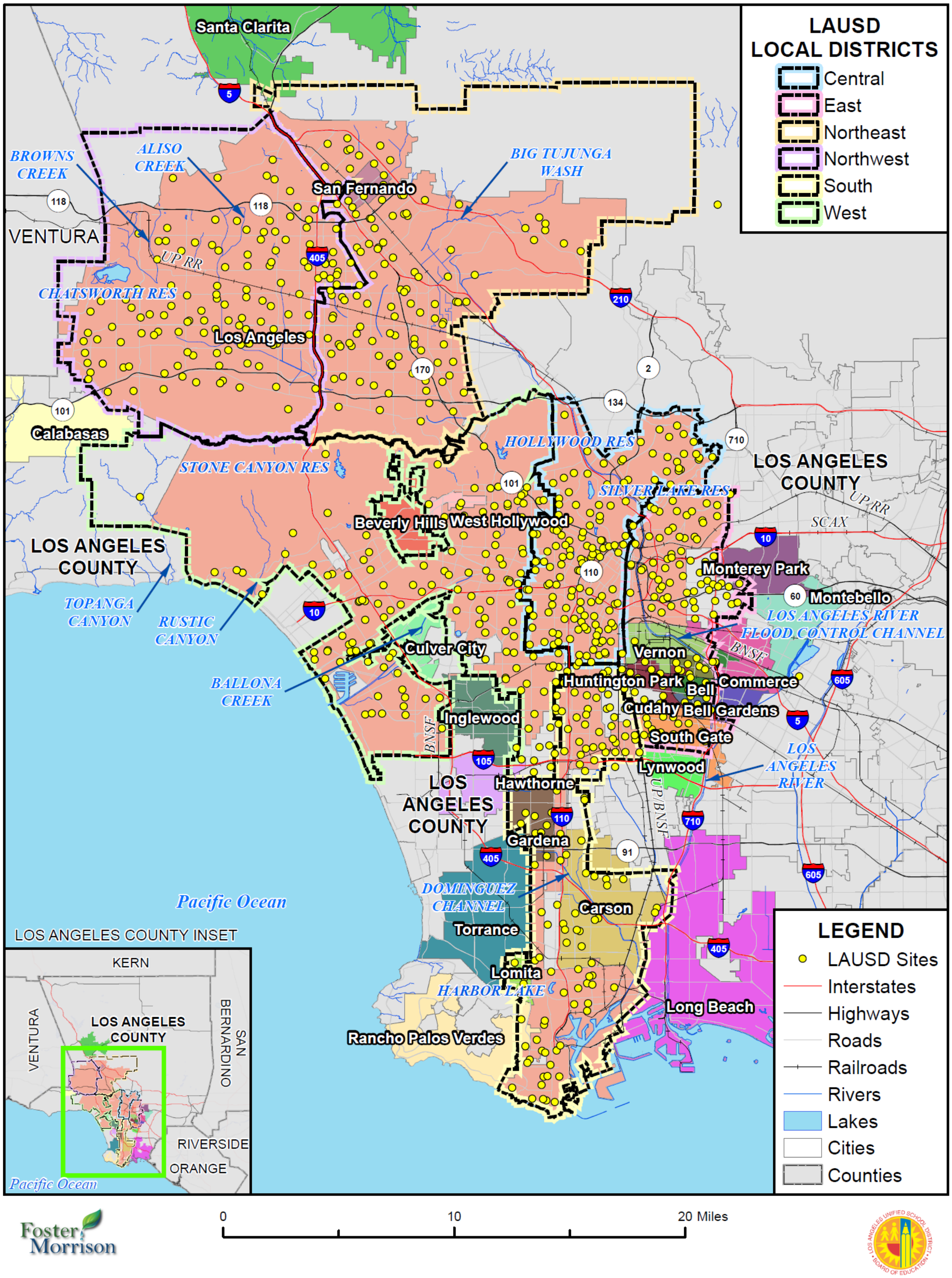

Data Source: LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

*Figure 1-7 LAUSD – West District Map*




Data Source: LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

*Figure 1-8 LAUSD Sites and Cities Map*




Data Source: LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

### 1.3.1. History

The Los Angeles Unified School District was once composed of two separate districts: the Los Angeles City School District, formed on September 19, 1853, and the Los Angeles City High School District, formed in 1890. The latter provided 9–12 educational services, while the former did so for K-8. On July 1, 1961 the Los Angeles City School District and the Los Angeles City High School District merged, forming the Los Angeles Unified School District. MORE HISTORY?

### 1.3.2. Geography and Climate

The terrain within the District can be classified in broad terms as being 75 percent alluvial plain and 25 percent rugged canyons and hills. Elevations range from 5,074 feet at Sister Elsie Peak in the San Gabriel Mountains to nearly mean sea level in the southwestern part of the District.

The topography of the coastal plain on which much of the District lies is gradually sloped from the foothills of the San Gabriel Mountains upstream of the city, to the Pacific Ocean with a few exceptions of rising hills and depressed areas. Ground elevations range from 10,000 feet in the San Gabriel Mountains, to 330 feet near the Arroyo Seco confluence, to mean sea level at the mouth of the Los Angeles River. The District contains numerous steep, developed hillside residential areas. Underlying soils are considered alluvial, and varies from coarse sand and gravel to silty clay and gravel or clay. The land is generally well-drained, with relatively few perched water or artesian areas.

The climate is considered subtropical. The precipitation regime contributing to the Los Angeles area and its surrounding watershed is primarily determined by the course of orographic rainfall associated with extra-tropical cyclones during the months between December and March. Snowfall, common at elevations of 5,000 feet or more, may influence flood events through the occurrence of rapid melting associated with warm weather following a major storm. Major storms consist of one or more frontal systems, which may last up to four or more days each. The fall of precipitation is greatly intensified due to the San Gabriel Mountains, which lie in the path of storms moving from the west or southwest. Steep canyons and gradients in the mountains contribute to rapid concentrations of storm runoff, which may or may not reach the District. The average annual rainfall ranges from 13.8 inches at the ocean to 28.2 inches in the San Gabriel Mountains. Average daily minimum temperature for January is 46.6°F, while the average daily maximum temperature for July is 83.3°F. In the San Gabriel Mountains (elevation 5,580 feet) the average daily minimum in January is 34.3°F with an average daily maximum of 80.2°F in July.

### 1.3.3. Population and Demographics

The 2017-2018 LAUSD Fingertip Facts estimates for population of the District are shown in Table 1-1.

*Table 1-1 LAUSD Enrollments*

| Projected Norm Day Enrollment, including Independent Charters Schools & Affiliated Charters | Number |
|---|---|
| K-3 Enrollment | 194,335 |
| 4-6 Enrollment | 138,540 |
| 7-8 Enrollment | 87,160 |

| Projected Norm Day Enrollment, including Independent Charters Schools & Affiliated Charters | Number |
|---|---|
| 9-12 Enrollment | 168,331 |
| **Total** | **588,696** |
| Special Day Classes in Regular Schools | 23,918 |
| Special Day Classes in Special Education Schools | 2,086 |
| Continuation and Opportunity Schools | 4,270 |
| **Other Enrollment** | **30,274** |
| **Total Graded and Other Enrollment** | **618,970** |
| Early Education | 18,681 |
| Adult Education | 76,220 |
| **Total** | **713,871** |

Enrollment figures from Superintendent's Final Budget 2017-18

In all, 94 languages other than English are spoken in L.A. Unified schools. The District has 157,619 students who are learning to speak English proficiently. Their primary languages are Spanish (92.5% of English learners), Armenian (1.1%), Korean (1%), Tagalog, Cantonese, Arabic, Vietnamese and Russian, each accounting for less than 1% of total. The District also has more than 7,000 foster care students. Enrolments by ethnicity are shown in Table 1-2

*Table 1-2 LAUSD – Student Enrollments by Ethnicity*

| Ethnicity | Percent |
|---|---|
| Latino | 74.0%* |
| White | 9.8% |
| African American | 8.4% |
| Asian | 6.0% |
| Pacific Islander | .04% |
| American Indian/Alaskan Native | .02% |

Source: Superintendent's Final Budget 2016-17. These demographics reflect the most recent percentages available of L.A. Unified schools.

Note: Percentages do not add up to 100 percent. Also, approximately 84% of L.A. Unified students qualify for free- or reduced-price meals.

## 1.4 Plan Organization

This 2018 LAUSD LHMP Update geographically covers the buildings and land owned by the District within its boundaries (i.e., the Planning Area). This 2018 LAUSD LHMP Update is organized into the following chapters:

- Chapter 1: Introduction
- Chapter 2: What's New
- Chapter 3: Planning Process
- Chapter 4: Risk Assessment
- Chapter 5: Mitigation Strategy

- Chapter 6: Plan Adoption
- Chapter 7: Plan Implementation and Maintenance
- Appendices

# Chapter 2 What's New

**Requirements §201.6(d)(3): A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within 5 years in order to continue to be eligible for mitigation project grant funding.**

The 2012 LAUSD All Hazard Mitigation Plan contained detailed descriptions of the planning process, the risk assessment of identified hazards for the LAUSD Planning Area and mitigation strategies for reducing the risk and vulnerability from these hazards. Since approval of this plan by FEMA, progress has been made by the District on implementation of the mitigation strategies. As part of this 2018 LAUSD Local Hazard Mitigation Plan (LHMP) Update, a thorough review and update of the 2012 Plan was conducted to ensure that this Plan Update reflects current District conditions and priorities in order to realign the updated mitigation strategy for the next five-year planning period. This section of the plan includes the following:

- **What's New in the Plan Update**. This section provides an overview of the approach to updating the 2012 LHMP and identifies new analyses, data and information included in this LHMP Update to reflect current District conditions. This includes a summary of new hazard and risk assessment data as it relates to the LAUSD Planning Area as well as information on current and future development trends affecting District vulnerability and related issues. The actual updated data, discussions, and associated analyses are contained in their respected sections within this 2018 LHMP Update.
- **Summary of Significant Changes to Current Conditions, Vulnerabilities, and Hazard Mitigation Program Priorities**. This section provides a summary of significant changes in current conditions, changes in vulnerability, and any resulting modifications to the District's mitigation program priorities since their previous FEMA-approved LHMP.
- **2012 Mitigation Strategy Successes and Status**. This section provides a description of the status of mitigation actions from the 2012 Plan and also indicates whether a project is no longer relevant or is recommended for inclusion in this updated 2018 mitigation strategy. This section also highlights key mitigation success stories of the District since the 2012 LHMP.

This What's New section provides documentation of LAUSD's progress or changes in their risk and vulnerability to hazards and their overall hazard mitigation program. Completion of this 2018 LAUSD LHMP Update further provides documentation of LAUSD's continued commitment and engagement in the hazard mitigation planning.

## 2.1 What's New in the Plan Update

This LHMP Update involved a comprehensive review and update of each section of the 2012 Plan and includes an assessment of the success of LAUSD in evaluating, monitoring, and implementing the mitigation strategy outlined in the 2012 Plan. Only the information and data still valid from the 2012 Plan was carried forward as applicable into this LHMP Update.

Also to be noted, Chapter 7 Implementation and Maintenance of this LHMP Update identifies key requirements for updating future plans:

- Consider changes in vulnerability due to action implementation;
- Document success stories where mitigation efforts have proven effective;
- Document areas where mitigation actions were not effective;
- Document any new hazards that may arise or were previously overlooked;
- Incorporate new data or studies on hazards and risks;
- Incorporate new capabilities or changes in capabilities;
- Incorporate growth and development-related changes to inventories; and
- Incorporate new action recommendations or changes in action prioritization.

These requirements and others as detailed throughout this plan were addressed during this LHMP Update process.

As part of its comprehensive review and update of each section of this Plan, the District recognized that updated data, if available, would enhance the analysis presented in the risk assessment and utilized in the development of the updated mitigation strategy. Highlights of new data used for this LHMP Update is identified below in this section and is also sourced in context within Chapter 4, Risk Assessment. Specific data used is sourced throughout this Plan document. This new data and associated analysis provided valuable input for the development of the updated mitigation strategy presented in Chapter 5 of this Plan.

Highlights of new information and analyses contained in this 2018 LHMP Update includes the following:

- New hazards include climate change, localized flooding, landslides (with mud and debris flows), radon, extreme heat, and heavy rain and storms.
- Climate change has been addressed as a stand-alone hazard as well as within the hazard profiles of each identified hazard to assist the District in considering climate change issues when identifying future mitigation actions for the Planning Area.
- New dam data provided by Cal OES was used for the dam inventory and analysis. A comprehensive dam inventory was developed. This data included an updated hazard classification for identified dams and updated inundation mapping. Values at risk to dam inundation was analyzed. Populations at risk to dams were tabulated.
- DFIRM flood analysis was performed. Assets at risk, populations at risk, and at risk to flooding were analyzed.
- Water shortage impacts were added to the drought hazard for the District, to better align with the State of California Hazard Mitigation Plan and to reflect the significant issues related to drought conditions resulting from the current and ongoing drought within the District and State of California.
- More detailed GIS analysis was performed for earthquake. Information from a 2014 LAUSD earthquake asset analysis was added.
- More detailed GIS analysis was performed for the flooding hazard for both 100- and 500-year floods, including values at risk, population at risk, and general community impacts.
- More detail was added to the levee failure hazard. It was broken out from the flood hazard and given greater attention. Levee maps were added to show areas of vulnerability.
- More detailed GIS analysis was performed for landslides, including values at risk, population at risk, and general community impacts.
- More detailed GIS analysis was performed for the wildfire hazard, including values at risk, population at risk, and general community impacts.
- An entire rework of the risk assessment for each identified hazard. This included reworking the hazard profile and adding new hazard event occurrences; redoing the entire vulnerability analysis to add additional items and updating the vulnerability assessment based on more recent hazard data as well as

using the most current parcel and assessor data and LAUSD facility data for the existing built environment to develop loss estimates.

- A greater study of District mitigation capabilities was added.

## 2.2 Summary of Significant Changes to Current Conditions, LAUSD Vulnerability, and Hazard Mitigation Priorities

TO BE INSERTED BASED ON INPUT DURING FINAL MEETING

## 2.3 2012 LHMP Mitigation Strategy Successes and Status

LAUSD has been successful in implementing actions identified in the 2012 LHMP Mitigation Strategies, thus, working diligently towards meeting their 2012 goals and objectives of:

- Continue to promote disaster-resistant schools.
- Increase public understanding and support for effective hazard mitigation.
- Continue to build and maintain schools making a concerted commitment to become less vulnerable to hazards.
- Enhance hazard mitigation coordination and communication with federal, state, and local governments. Reduce the possibility of damage and losses to existing assets, particularly people, critical facilities/infrastructure, and District-owned facilities, due to:
  - ✓ Earthquake.
  - ✓ Biological & Health Emergencies
  - ✓ Wildland Urban Interface Fires.
  - ✓ Weapons of Mass Destruction and Terrorism.
  - ✓ Severe Weather
  - ✓ Floods
  - ✓ Drought
  - ✓ Other Human-Caused Hazards.

Where possible, LAUSD used existing plans and programs to implement the 2012 mitigation strategies.

### 2.3.1. Success Stories

CAN SUCCESS STORIES FROM BELOW BE DISCUSSED? WHAT WAS ACCOMPLISHED BY THE DISTRICT? CAN THE DISTRICT HIGHLIGHT A COUPLE OF PROJECTS WITH DETAILS ON WHY THEY WERE SUCCESSFUL? PHOTOS WOULD BE GREAT TO ADD HERE!

### 2.3.2. 2012 Mitigation Strategy Update

The 2012 mitigation strategy contained 9 separate mitigation actions. Of these 9 actions, 1 has been completed, 26 are ongoing, 16 have not been started. 10 of the 2012 projects have been identified for inclusion in this Plan Update. Table 2-1 provides a status summary of the mitigation action projects from the 2012 LHMP. Following the table is a description of the status of each project. NEED TABLE FILLED OUT AS WELL AS TEXT BELOW TABLE – WE NEED A STATUS REPORT ON EACH ACTION

*Table 2-1 LAUSD's 2012 LHMP Update: Mitigation Action Status Summary*

| Mitigation Action | Complete | Ongoing | Not Started | Project in 2018 Update |
|---|---|---|---|---|
| Continue development and maintenance of the Multi-Hazard DMA 2000 plan by coordinating all LAUSD Offices, Divisions and Departments as well as all other Stakeholders. | X | | | N |
| Review and update plans that would include coordination with cities, special districts and the County. | | | | |
| Update the LAUSD Safety Plan every three years. | | X | | ? |
| Publicize and encourage the adoption of appropriate hazard mitigation actions. | | | | N |
| Continue to implement all new facility specifications and inspection guidelines to reflect current earthquake standards. | | X | | Y |
| Review and compare existing flood control standards, zoning and building requirements with existing and planned facilities. | | X | | Y |
| Develop a Business Continuity Plan for each LAUSD Office, Division, and Department. | | X | | Y |
| Develop partnerships for a District wide fire prevention program around facilities. | | X | | Y |
| Encourage every school to prepare and maintain a 3-day preparedness kit for the classroom and personal kits for home and work. | X | ? | | ? |

### *Mitigation Action Status*

#### Continue development and maintenance of the Multi-Hazard DMA 2000 plan by coordinating all LAUSD Offices, Divisions and Departments as well as all other Stakeholders.

**Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?)**: This effort was complete with the initiation of the update of this 2012 LHMP. Efforts for implementation of the 2018 LHMP Update will continue throughout the next five years including coordination of all responsible LAUSD offices, divisions, departments, and stakeholders.

#### Review and update plans that would include coordination with cities, special districts and the County.

**Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?)**:

#### Update the LAUSD Safety Plan every three years.

**Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?)**: This has been occurring on an annual basis. Reviews and updates to the LAUSD Safety Plan is a priority initiative of LAUSD and will continue to occur on an annual basis.

#### Publicize and encourage the adoption of appropriate hazard mitigation actions.

**Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?)**: This occurred to some extent on the mitigation actions from the 2012 LAUSD LHMP, with the formal adoption of the 2012 plan and LAUSD efforts to garner support for implementation of additional mitigation actions.

#### Continue to implement all new facility specifications and inspection guidelines to reflect current earthquake standards.

**Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?)**:

#### Review and compare existing flood control standards, zoning and building requirements with existing and planned facilities.

**Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?)**:

### Develop a Business Continuity Plan for each LAUSD Office, Division, and Department.

**Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?)**: As of May 2018, 77 branches have started a Business Continuity Plan, 35 branches have "baselined" their plans and 1 branch has conducted an exercise of their plan.

### Develop partnerships for a District wide fire prevention program around facilities.

**Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?)**:

### Encourage every school to prepare and maintain a 3-day preparedness kit for the classroom and personal kits for home and work.

**Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?)**: Every school has a 3-day preparedness kit customized to the unique needs of the school, staff and students. Further, during LAUSD Safety Fairs, preparedness kits are distributed to LAUSD families and friends for use at home.

# Chapter 3 Planning Process

**Requirements §201.6(b) and §201.6(c)(1): An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:**

**1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;**

**2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and nonprofit interests to be involved in the planning process; and**

**3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.**

**[The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.**

LAUSD recognized the importance and need of the update process for their 2012 Local Hazard Mitigation Plan (LHMP) and initiated its development. After receiving a grant from the Federal Emergency Management Agency (FEMA), which served as the primary funding source for this plan, the District contracted with Foster Morrison Consulting, Ltd. (Foster Morrison) to facilitate and develop the plan. Jeanine Foster, a professional planner with Foster Morrison, was the project manager in charge of overseeing the planning process and the development of this LHMP update. Chris Morrison, also a professional planner with Foster Morrison, was the lead planner for the development of this LHMP Update. Brenna Howell, with Howell Consulting, also supported the planning effort as part of the Foster Morrison team. The Foster Morrison's team's role was to:

- Assist in establishing the Hazard Mitigation Planning Committee (HMPC) as defined by the Disaster Mitigation Act (DMA);
- Meet the DMA requirements as established by federal regulations and following FEMA's planning guidance;
- Support objectives under the National Flood Insurance Program's (NFIP) and the Flood Mitigation Assistance (FMA) program;
- Facilitate the entire planning process;
- Identify the data requirements that HMPC participants could provide and conduct the research and documentation necessary to augment that data;
- Assist in facilitating the public input process;
- Produce the draft and final plan documents; and
- Coordinate with the California Office of Emergency Services (Cal OES) and FEMA Region IX plan reviews.

## 3.1 Local District Participation

LAUSD made a commitment to this 2018 single-jurisdictional LHMP Update, as the primary participating jurisdiction. The DMA planning regulations and guidance stress that each local government (participating jurisdiction) seeking FEMA approval of their mitigation plan must participate in the planning effort in the following ways:

- Participate in the process as part of the HMPC;
- Detail where within the Planning Area the risk differs from that facing the entire area;
- Identify potential mitigation actions; and
- Formally adopt the plan.

For LAUSD, "participation" meant the following:

- Providing facilities for meetings;
- Providing printed materials for meeting attendees;
- Attending and participating in the HMPC meetings;
- Completing and returning the Data Collection Worksheets;
- Collecting and providing other requested data (as available);
- Coordinating information sharing between internal and external agencies;
- Managing administrative details;
- Making decisions on plan process and content;
- Identifying mitigation actions for the plan;
- Reviewing and providing comments on plan drafts;
- Providing hardcopy Draft documents of LHMP for public review;
- Informing the public, local officials, and other interested stakeholders about the planning process and providing opportunity for them to comment on the plan;
- Coordinating, and participating in the public input process; and
- Coordinating the formal adoption of the plan by the District Board of Education.

LAUSD seeking FEMA approval of this LHMP Update met all of these participation requirements. Multiple representatives from the District attended the HMPC meetings described in Table 3-2 and also brought together an internal planning team to help collect data, identify mitigation actions and implementation strategies, and review and provide data on plan drafts. Appendix A provides additional information and documentation of the planning process.

Specific individuals representing LAUSD departments participating in this LHMP Update were actively involved throughout the LHMP Update process as identified in Appendix A in the sign-in sheets for the meetings and as evident through the data, information and input provided by HMPC representatives to the development of this LHMP Update. This Chapter 3 and Appendix A provides additional information and documentation of the planning process and participants to this Plan Update, including members of the HMPC.

## 3.2 The 10-Step Planning Process

Foster Morrison established the planning process for updating the LAUSD 2012 LHMP using the DMA planning requirements and FEMA's associated guidance. This guidance is structured around a four-phase process:

1. Organize Resources;
2. Assess Risks;
3. Develop the Mitigation Plan; and
4. Implement the Plan and Monitor Progress.

Into this process, Foster Morrison integrated a more detailed 10-step planning process used for FEMA's CRS and FMA programs. Thus, the modified 10-step process used for this plan meets the requirements of six major programs: FEMA's Hazard Mitigation Grant Program (HMGP); Pre-Disaster Mitigation (PDM) program; CRS program; FMA Program; Severe Repetitive Loss (SRL) program; and new flood control projects authorized by the U.S. Army Corps of Engineers (USACE).

Table 3-1 shows how the modified 10-step process fits into FEMA's four-phase process. The sections that follow describe each planning step in more detail.

*Table 3-1 Mitigation Planning Processes Used to Develop the LAUSD Local Hazard Mitigation Plan*

| DMA Process | Modified CRS Process |
|---|---|
| **1) Organize Resources** | |
| 201.6(c)(1) | 1) Organize the Planning Effort |
| 201.6(b)(1) | 2) Involve the Public |
| 201.6(b)(2) and (3) | 3) Coordinate with Other Departments and Agencies |
| **2) Assess Risks** | |
| 201.6(c)(2)(i) | 4) Identify the Hazards |
| 201.6(c)(2)(ii) | 5) Assess the Risks |
| **3) Develop the Mitigation Plan** | |
| 201.6(c)(3)(i) | 6) Set Goals |
| 201.6(c)(3)(ii) | 7) Review Possible Activities |
| 201.6(c)(3)(iii) | 8) Draft an Action Plan |
| **4) Implement the Plan and Monitor Progress** | |
| 201.6(c)(5) | 9) Adopt the Plan |
| 201.6(c)(4) | 10) Implement, Evaluate, and Revise the Plan |

This LHMP Update involved a comprehensive review and update of each section of the 2012 plan and includes an assessment of the success of the District in evaluating, monitoring and implementing the mitigation strategy outlined in the initial plan, as previously described in more detail in Chapter 2 and throughout Chapter 4 and Chapter 5.

The process followed to update the plan is detailed in the above table and the sections that follow and is in conformance with the latest DMA planning guidance and the CRS 2017 Coordinator's Manual. As part of this LHMP Update, all sections of the plan were reviewed and updated to reflect new data, processes, and resulting mitigation strategies. Only the information and data still valid from the 2012 Plan was carried forward as applicable into this LHMP Update.

### 3.2.1. Phase 1: Organize Resources

#### *Planning Step 1: Organize the Planning Effort*

With LAUSD's commitment to participate in the DMA planning process, Foster Morrison worked with the LAUSD's Office of Environmental Health and Safety (OEHS), as overall project lead, to establish the framework and organization for development of the plan. An initial meeting was held with key District representatives in September 2017 to discuss the organizational and process aspects of this LHMP Update process.

The initial kick-off meeting was held on January 25, 2018. Invitations to the kickoff meeting was extended to key District departments as well as to other federal, state, and local stakeholders that might have an interest in participating in the planning process. Representatives from the HMPC members to the 2012 Plan, key District departments, and other identified stakeholders were used as a starting point for the invite list, with additional invitations extended as appropriate throughout the planning process. The list of invitees is included in Appendix A.

The HMPC, comprising key District staff and other government and stakeholder representatives developed the plan with leadership from the LAUSD OEHS and facilitation by Foster Morrison. The following participated on the HMPC:

Put HMPC list into bulleted format

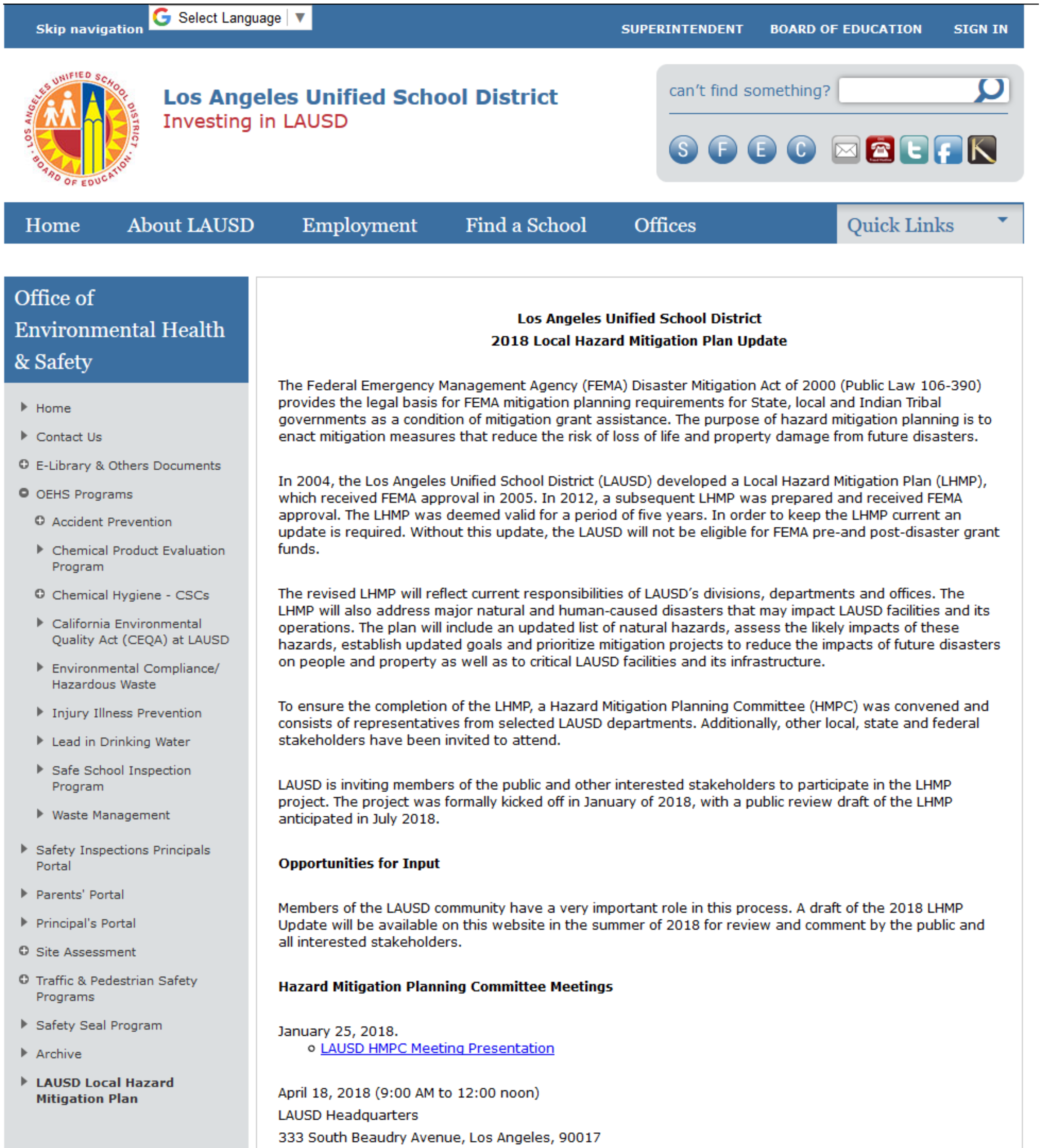
This list includes all HMPC members that attended one or more HMPC meetings detailed in Table 3-2, as well as those who provided key input into the plan development process. In addition to providing representation on the HMPC, the District further formulated an internal planning team to collect and provide requested data and to conduct timely reviews of the draft documents. The internal planning team includes both those participating on the HMPC and other District staff.

##### Meetings

The planning process officially began with an internal project planning meeting held in September 2017 followed by an HMPC kick-off meeting held in LAUSD Headquarters on January 25, 2018. The meetings covered the scope of work and an introduction to the DMA requirements. During the HMPC meetings, participants were provided with data collection worksheets to facilitate the collection of information necessary to support development of the plan. Using FEMA guidance, these worksheets were designed to capture information on past hazard events, identify hazards of concern to each of the participating jurisdictions, quantify values at risk to identified hazards, inventory existing capabilities, record possible mitigation actions, and to capture information on the status of mitigation action items from the 2012 Plan. A copy of the worksheets for this project are included in Appendix A. LAUSD seeking FEMA approval of this LHMP Update completed and returned the worksheets to Foster Morrison for incorporation into this LHMP Update.

During the planning process, the HMPC communicated through face-to-face meetings, email, telephone conversations, Dropbox websites, and through a District developed webpage dedicated to the plan development process. This later website was developed to provide information to the HMPC, the public and all other stakeholders on the LHMP process. Draft documents were also posted on this website so that the HMPC members and the public could easily access and review them. The LHMP website (shown on Figure 3-1) can be accessed at: https://achieve.lausd.net/Page/14638.

*Figure 3-1 LAUSD Hazard Mitigation Plan Update Website*




**Los Angeles Unified School District**
**2018 Local Hazard Mitigation Plan Update**

The Federal Emergency Management Agency (FEMA) Disaster Mitigation Act 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 purpose of hazard mitigation planning is to enact mitigation measures that reduce the risk of loss of life and property damage from future disasters.

In 2004, the Los Angeles Unified School District (LAUSD) developed a Local Hazard Mitigation Plan (LHMP), which received FEMA approval in 2005. In 2012, a subsequent LHMP was prepared and received FEMA approval. The LHMP was deemed valid for a period of five years. In order to keep the LHMP current an update is required. Without this update, the LAUSD will not be eligible for FEMA pre-and post-disaster grant funds.

The revised LHMP will reflect current responsibilities of LAUSD's divisions, departments and offices. The LHMP will also address major natural and human-caused disasters that may impact LAUSD facilities and its operations. The plan will include an updated list of natural hazards, assess the likely impacts of these hazards, establish updated goals and prioritize mitigation projects to reduce the impacts of future disasters on people and property as well as to critical LAUSD facilities and its infrastructure.

To ensure the completion of the LHMP, a Hazard Mitigation Planning Committee (HMPC) was convened and consists of representatives from selected LAUSD departments. Additionally, other local, state and federal stakeholders have been invited to attend.

LAUSD is inviting members of the public and other interested stakeholders to participate in the LHMP project. The project was formally kicked off in January of 2018, with a public review draft of the LHMP anticipated in July 2018.

**Opportunities for Input**

Members of the LAUSD community have a very important role in this process. A draft of the 2018 LHMP Update will be available on this website in the summer of 2018 for review and comment by the public and all interested stakeholders.

**Hazard Mitigation Planning Committee Meetings**

January 25, 2018.
- LAUSD HMPC Meeting Presentation

April 18, 2018 (9:00 AM to 12:00 noon)
LAUSD Headquarters
333 South Beaudry Avenue, Los Angeles, 90017

Source: LAUSD

The HMPC met formally five times during the planning period (January 2018 – August 2018) which adequately covers the four phases of DMA and the 10-Step CRS planning process. The formal meetings held and topics discussed are described in Table 3-2. Invitations, agendas and sign-in sheets for each of the meetings are included in Appendix A.

*Table 3-2 HMPC Meetings*

| Meeting Type | Meeting Topic | Meeting Date(s) | Meeting Location(s) |
|---|---|---|---|
| HMPC #1 Kick-off Meeting | 1) Introduction to DMA and the planning process<br>2) Overview of current LHMP;<br>3) Organize Resources: the role of the HMPC, planning for public involvement, coordinating with other agencies/stakeholders<br>4) Introduction to Hazard Identification | January 25, 2018 | LAUSD Headquarter, Los Angeles |
| HMPC #2 | 1) Risk assessment overview and work session<br>- Assess the Hazard<br>- Assess the Problem | April 18, 2018 | LAUSD Headquarter, Los Angeles |
| HMPC #3 | 1) Review of risk assessment summary<br>2) Review and update of mitigation goals<br>3) Intro to Mitigation Action Strategy<br>- Set Goals<br>- Review possible activities | May 9, 2018 | LAUSD Headquarter, Los Angeles |
| HMPC #4 | 1) Review of mitigation alternatives<br>2) Review and update of mitigation actions from the 2012 plan<br>3) Identify updated list of mitigation actions by hazard<br>4) Review of mitigation selection criteria<br>5) Update and prioritize mitigation actions<br>6) Mitigation Action Strategy Implementation and Draft Action Development<br>- Review possible activities<br>- Draft an Action Plan | May 10, 2018 | LAUSD Headquarter, Los Angeles |
| HMPC #5 | 1) Review of final HMPC, jurisdictional and public comments and input to plan<br>2) Review and documentation of changed conditions, vulnerabilities and mitigation priorities<br>3) Draft an Action Plan<br>4) Plan maintenance and Implementation Procedures | August 16, 2018 | LAUSD Headquarter, Los Angeles |

## *Planning Step 2: Involve the Public*

Up-front coordination discussions with the LAUSD established the initial plan for public involvement. Public involvement activities for this LHMP Update included press releases, social media communications, a stakeholder and public meeting, development of an LHMP webpage and associated website postings, the collection of public and stakeholder comments on the draft plan through a variety of mechanisms. Information provided to the public included an overview of the mitigation status and successes resulting from implementation of the 2012 Plan as well as information on the processes, new risk assessment data, and proposed mitigation strategies for this 2018 LHMP Update. At the planning team kick-off meeting, the HMPC discussed additional strategies for public involvement and agreed to an approach using established public information mechanisms and resources within the District.

## Early Public Outreach Activities

Public outreach for this Plan Update began at the beginning of the plan development process with the development of an LAUSD webpage and outreach on the LHMP development process through a variety of mechanisms as described below:

- Reaching out to the 6 Local LAUSD Districts to upload the outreach document onto their websites
- Posting the outreach document on the Facilities and OEHS Website
- Posting on the District's Principals' Connection
- Posting on District's FaceBook and Twitter pages

Figure ???? provides an example of this outreach on the District's FaceBook page.

***Figure 3-2 Public Outreach Facebook Posting***

Source: LAUSD

## Public Meeting

The first draft of the plan was provided to the HMPC in June of 2018, with a public review draft provided in July 2018. A public meeting was held on August 15, 2018 to present the draft LHMP and to collect public comments on the plan prior to finalization and submittal to Cal OES/FEMA. The public meeting was advertised in a variety of ways to maximize outreach efforts and included an advertisement in local newspapers inviting the public to attend either the formal public meeting or the planning team meeting at their convenience. The advertisement in the local newspapers included information on the date, location and time of the meeting, where the draft plan could be accessed in the community, and how to provide comments on the draft plan. In addition to a copy of the draft plan being placed on the District website in advance of these meetings, hard copies of the draft of the plan were made available to interested parties at four local Public Libraries: locations???.

***Figure 3-3 Public Outreach at LAUSD ???***

Source: LAUSD

Documentation to support the final public meeting can be found in Appendix A. In addition to advertisement for public participation, notices of meetings were sent directly to all persons on the HMPC contact list and also to other agency and key stakeholders with an interest in the LAUSD Planning Area. The majority of these people reside in Los Angeles County. The formal public meeting for this project is summarized in Table 3-3.

*Table 3-3 Public and Stakeholder Meeting*

| Meeting Type | Meeting Topic | Meeting Date | Meeting Locations |
|---|---|---|---|
| Public Meeting on Draft Plan | 1)Overview of DMA and Mitigation Planning; Presentation of Draft LHMP and solicitation of public and stakeholder comments | August 15, 2018 | ??? |

Where appropriate, stakeholder and public comments and recommendations were incorporated into the final plan throughout the plan development process, including the sections that address mitigation goals and strategies. Various public comments were obtained throughout the planning process and prior to plan submittal to Cal OES and FEMA. A table summarizing the formal public comments received and how they were addressed is included in Appendix A. All press releases, newspaper advertisements, website postings, and public outreach efforts are on file with LAUSD OEHS and are included in Appendix A.

The draft plan is currently available online on the LAUSD website at: https://achieve.lausd.net/Page/14638.

## Planning Step 3: Coordinate with Other Departments and Agencies

Early in the planning process, the HMPC determined that data collection, mitigation strategy development, and plan approval would be greatly enhanced by inviting other local, state and federal agencies and organizations to participate in the process. Based on their involvement in hazard mitigation planning, their involvement in the Planning Area, and/or their interest as a neighboring jurisdiction, representatives from the following agencies were invited to participate on the HMPC:

- American Red Cross
- Cal DWR
- Cal Fire
- Cal OES
- Cal Trans
- California Department of Water Resources
- Incorporated communities in Lake County
- Fire Departments
- National Weather Service
- Incorporated Communities and Los Angeles County
- United States Corps of Engineers

Coordination with key agencies, organizations, and advisory groups throughout the planning process allowed the HMPC to review common problems, development policies, and mitigation strategies as well as identifying any conflicts or inconsistencies with regional mitigation policies, plans, programs and regulations. Coordination involved contacting these agencies and informing them on how to participate in the LHMP Update process and if they had any expertise or assistance they could lend to the planning process or specific mitigation strategies. Coordination with these groups includedsending outreach letters or e-mails, some with follow up phone calls; and making phone calls alone to area agencies. These groups and agencies were solicited asking for their assistance and input, telling them how to become involved in the

Plan Update process, and inviting them to HMPC meetings. This coordination with other agencies is documented in Appendix A.

In addition, as part of the overall stakeholder and agency coordination effort, the HMPC coordinated with and utilized input to the LHMP update from the following agencies:

- Cal-Adapt
- CAL OES
- CAL FIRE
- California Department of Conservation
- California Department of Finance
- California Department of Water Resources
- California Geological Survey
- FEMA Region IX
- Library of Congress
- National Oceanic and Atmospheric Association
- National Performance of Dams Program
- National Register of Historic Places
- National Resource Conservation Service
- National Response Center
- National Weather Service
- United States Army Corps of Engineers
- United States Bureau of Land Management
- United States Bureau of Reclamation
- United States Geological Survey
- Western Regional Climate Center

Several opportunities were provided for the groups listed above to participate in the planning process. At the beginning of the planning process, invitations were extended to many of these groups to actively participate on the HMPC. Specific participants from these groups are detailed in Appendix A. Others assisted in the process by providing data directly as requested in the Data Worksheets or through data contained on their websites or as maintained by their offices. Further as part of the public outreach process, all groups were invited to attend the public meeting and to review and comment on the plan prior to submittal to CAL OES and FEMA.

### Other Community Planning Efforts and Hazard Mitigation Activities

Coordination with other community and District planning efforts is also paramount to the success of this plan. Hazard mitigation planning involves identifying existing policies, tools, and actions that will reduce a community's risk and vulnerability to hazards. LAUSD uses a variety of comprehensive planning mechanisms, such as strategic and master plans and state requirements, to guide growth and development. Integrating existing planning efforts and mitigation policies and action strategies into this plan establishes a credible and comprehensive plan that ties into and supports other District programs. The development of this plan incorporated information from the following existing plans, studies, reports, and initiatives as well as other relevant data from neighboring communities and other jurisdictions.

- Cal-Adapt Plans
- CAL FIRE plans

- CAL OES plans
- California Department of Finance demographic documents
- California DWR plans
- Community Wildfire Protection Plans
- Emergency Operations Plans
- FEMA mitigation planning documents
- Flood Insurance Studies
- General Plans
- National Weather Service documents
- US Fish and Wildlife reports
- USGS Reports

Specific source documents are referenced at the beginning of each section of Chapter 4 and in Appendix B. These and other documents were reviewed and considered, as appropriate, during the collection of data to support Planning Steps 4 and 5, which include the hazard identification, vulnerability assessment, and capability assessment. Data from these plans and ordinances were incorporated into the risk assessment and hazard vulnerability sections of the plan. Where the data from the existing studies and reports is used in this LHMP Update, the source document is referenced throughout this Plan. The data was also used in determining the capability of the District in being able to implement certain mitigation strategies. Appendix B, References, provides a detailed list of references used in the preparation of this LHMP Update.

### 3.2.2. Phase 2: Assess Risks

#### *Planning Steps 4 and 5: Identify the Hazards and Assess the Risks*

Foster Morrison led the HMPC in a research effort to identify, document, and profile all the hazards that have, or could have, an impact the LAUSD Planning Area. Starting with the 2012 Plan, natural hazards of concern were added, deleted, and modified for this LHMP Update. Data collection worksheets were developed and used in this effort to aid in determining hazards and vulnerabilities and where the risk varies across the Planning Area. Geographic information systems (GIS) were used to display, analyze, and quantify hazards and vulnerabilities.

The HMPC also conducted a capability assessment to review and document the Planning Area's current capabilities to mitigate risk from and vulnerability to hazards. By collecting information about existing District programs, policies, regulations, ordinances, and emergency plans, the HMPC could assess those activities and measures already in place that contribute to mitigating some of the risks and vulnerabilities identified. A more detailed description of the risk assessment process, methodologies, and results are included in Chapter 4 Risk Assessment.

### 3.2.3. Phase 3: Develop the Mitigation Plan

#### *Planning Steps 6 and 7: Set Goals and Review Possible Activities*

Foster Morrison facilitated brainstorming and discussion sessions with the HMPC that described the purpose and process of developing planning goals and objectives, a comprehensive range of mitigation alternatives, and a method of selecting and defending recommended mitigation actions using a series of selection criteria. This information is included in Chapter 5 Mitigation Strategy. Additional documentation on the process the HMPC used to develop the goals and mitigation strategy is in Appendix C.

#### *Planning Step 8: Draft an Action Plan*

Based on input from the HMPC regarding the draft risk assessment and the goals and activities identified in Planning Steps 6 and 7, a complete first draft of the LHMP Update was developed. This complete draft was provided for HMPC review and comment via a Dropbox web link. HMPC were integrated into the second public review draft, which was advertised and distributed to collect public input and comments. The HMPC integrated comments and issues from the public, as appropriate, along with additional internal review comments and produced a third draft for review and approval by CAL OES and FEMA Region IX, contingent upon final adoption by the District Board of Education.

### 3.2.4. Phase 4: Implement the Plan and Monitor Progress

#### *Planning Step 9: Adopt the Plan*

In order to secure buy-in and officially implement the Plan Update, the Plan was adopted by the LAUSD Board of Education using the sample resolution contained in Appendix D.

#### *Planning Step 10: Implement, Evaluate, and Revise the Plan*

The true worth of any mitigation plan is in the effectiveness of its implementation. Up to this point in the planning process, all of the HMPC's efforts have been directed at researching data, coordinating input from participating entities, and developing appropriate mitigation actions. Each recommended action includes key descriptors, such as a lead manager and possible funding sources, to help initiate implementation. An overall implementation strategy is described in Chapter 7 Plan Implementation and Maintenance.

Finally, there are numerous organizations within the LAUSD Planning Area whose goals and interests interface with hazard mitigation. Coordination with these other planning efforts, as addressed in Planning Step 3, is paramount to the implementation and ongoing success of this plan and mitigation in the District and is addressed further in Chapter 7.

#### Implementation and Maintenance Process: 2012

The 2012 LAUSD All Hazard Mitigation Plan included a process for plan maintenance and implementation of the mitigation strategy as well as formal updates to the plan document. The 2012 process called for annual reviews, led by LAUSD Risk Management, with updates to goals, objectives, and mitigation actions by a variety of LAUSD groups, including the Hazard Mitigation Task Force, the Facilities Department, the OEHS Department, and other designated LAUSD representatives. Any updates or changes necessary were to be forwarded to Risk Management for inclusion in further updates to the Plan. In addition, the 2012 process called for a formal plan update as required by DMA regulations every 5 years. Based on input from the HMPC and current LAUSD staff, annual reviews of the 2012 Plan were not conducted. This 2018 LHMP Update, once complete, will meet the DMA formal 5-year update requirement.

In addition, the 2012 LHMP was relied on and integrated into other planning mechanisms in the District. Table 3-4 lists the planning mechanism the 2012 LHMP Update was integrated into by LAUSD.

*Table 3-4 Incorporation of 2012 LAUSD LHMP Update into Other Planning Mechanisms*

| Planning Mechanism 2012 LHMP Was Incorporated or Implemented Through | Details |
|---|---|
| 2017 EOP | The 2017 EOP used the risk assessment from the 2012 LHMP to inform the hazard descriptions in the EOP update. |
| OTHERS? | |

The plan implementation and maintenance process as set forth in the 2012 plan has been updated for this LHMP Update. The revised update implementation and maintenance process for this LAUSD 2018 LHMP Update is set forth in Section 7 of this plan document. A strategy for continued public involvement for this update process is also included in Chapter 7.

# Chapter 4 Risk Assessment

**Requirement §201.6(c)(2): [The plan shall include] A risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.**

As defined by the Federal Emergency Management Agency (FEMA), risk is a combination of hazard, vulnerability, and exposure. "It is the impact that a hazard would have on people, services, facilities, and structures in a community and refers to the likelihood of a hazard event resulting in an adverse condition that causes injury or damage."

The risk assessment process identifies and profiles relevant hazards and assesses the exposure of lives, property, and infrastructure to these hazards. The process allows for a better understanding of a community's potential risk to natural hazards and provides a framework for developing and prioritizing mitigation actions to reduce risk from future hazard events.

This risk assessment followed the methodology described in the FEMA publication Understanding Your Risks—Identifying Hazards and Estimating Losses (FEMA 386-2, 2002), which breaks the assessment down to a four-step process:

1. Identify Hazards;
2. Profile Hazard Events;
3. Inventory Assets; and
4. Estimate Losses.

Data collected through this process has been incorporated into the following sections of this chapter:

- **Section 4.1: Hazard Identification** identifies the hazards that threaten the Planning Area and describes why some hazards have been omitted from further consideration.
- **Section 4.2: Hazard Profiles** discusses the threat and impacts to the Planning Area and describes location, extent, and previous occurrences of hazard events, and the likelihood of future occurrences.
- **Section 4.3: Vulnerability Assessment** assesses the Planning Area's exposure to natural hazards; considering assets and values at risk, critical facilities, future development trends, and, where possible, estimates potential hazard losses.
- **Section 4.4: Capability Assessment** inventories existing mitigation activities and policies, regulations, plans, and projects that pertain to mitigation and can affect net vulnerability.

This risk assessment covers the entire geographical extent of the Los Angeles Unified School District (LAUSD). This is referred to in this plan as the LAUSD Planning Area or District Planning Area. As required by FEMA, this risk assessment for the LAUSD Planning Area also includes an evaluation of how the hazards and risks vary across the Planning Area.

This LHMP Update involved a comprehensive review and update of each section of the 2012 risk assessment. Information from the 2012 LHMP was used in this Plan Update where valid and applicable. As part of the risk assessment update, new data was used, where available, and new analyses were conducted. Where data from existing studies and reports was used, the source is referenced throughout this risk assessment. Refinements, changes, and new methodologies used in the development of this risk assessment update are summarized in Chapter 2 What's New and also detailed in this risk assessment portion of the plan.

## 4.1 Hazard Identification

**Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the type…of all natural hazards that can affect the jurisdiction.**

The LAUSD Hazard Mitigation Planning Committee (HMPC) conducted a hazard identification study to determine the hazards that threaten the Planning Area. This section details the methodology and results of this effort.

### *Data Sources*

The following data sources were used for this Hazard Identification portion of the plan:

- FEMA Disaster Declaration Database
- National Climatic Data Center Storm Events Database
- 2012 LAUSD Hazard Mitigation Plan
- 2013 State of California Hazard Mitigation Plan
- 2014 County of Los Angeles All Hazard Mitigation Plan
- 2017 City of Los Angeles Hazard Mitigation Plan
- 2018 Draft State of California Hazard Mitigation Plan
- HMPC input

### 4.1.1. Results and Methodology

Using existing hazards data and input gained through planning meetings, the HMPC agreed upon a list of hazards that could affect LAUSD. Hazards data from the California Office of Emergency Services (Cal OES), FEMA, California Department of Water Resources (Cal DWR), the National Oceanic and Atmospheric Administration (NOAA), and many other sources were examined to assess the significance of these hazards to the Planning Area. Significance was measured in general terms and focused on key criteria such as frequency and resulting damage, which includes deaths and injuries, as well as property and economic damage. The natural hazards evaluated as part of this plan include those that have occurred historically or have the potential to cause significant human and/or monetary losses in the future. Only the more significant (or priority) hazards have a more detailed hazard profile and are analyzed further in Section 4.3 Vulnerability Assessment.

The following hazards in Table 4-1, listed alphabetically, were identified and investigated for this LHMP Update. As a starting point, both the 2013 California State Hazard Mitigation Plan and Draft 2018

California State Hazard Mitigation Plan were consulted to evaluate the applicability of new State hazards of concern and new data to the Planning Area. Building upon this effort, hazards from the past plan were also reviewed, and comments explain how hazards were updated from the previous plan. Most hazards from the 2012 plan were profiled in this Plan Update, with the exception of terrorism, public health emergencies, civil unrest, and major industrial accidents. Some hazards were reclassified and added to: water shortage was added to the drought hazard, levee failure was broken out from the flood hazard, and liquefaction was added in greater detail to earthquake. New hazards include climate change, localized flooding, landslides (with mud and debris flows), radon, extreme heat, and heavy rain and storms.

### *Table 4-1 LAUSD Hazard Identification and Comparison*

| 2018 Hazards | 2012 Hazards | Comment |
|---|---|---|
| Climate Change and Sea Level Rise | – | New hazard. |
| Dam Failure | Dam Failures | A comprehensive dam inventory developed. Dam inundation analysis was performed. |
| Drought and Water Shortage | Drought | The water shortage discussion was added. Additional vulnerability discussion was added. |
| Earthquake (including liquefaction) | Earthquake | An updated Hazus analysis was performed to add to the vulnerability discussion. Information from a 2014 LAUSD earthquake asset analysis was added. |
| Flood: 1%/0.2% annual chance | Floods | DFIRM flood analysis was performed. Assets at risk, populations at risk, and at risk to flooding were analyzed. |
| Flood: Localized/Stormwater | – | New hazard |
| Landslide, Mud, and Debris Flows (including post-fire) | – | New hazard |
| Levee Failure | Levee Failure (as part of flood) | The hazard was broken out from the flood hazard and a larger discussion of levee failure and its impacts to LAUSD was added. |
| Radon | – | New hazard. |
| Severe Weather: Extreme Heat | – | New hazard. |
| Severe Weather: Heavy Rains and Storms | – | New hazard |
| Severe Weather: High Winds and Tornadoes | Windstorms | Tornado was added. Additional information on past high wind and tornado occurrences were added. |
| Tsunami | Tsunami | Analysis of assets at risk and populations at risk was added. |
| Wildfire | Wildfire | Greater analysis of assets at risk and populations at risk was added. |
| – | Terrorism | This was dropped, see table below. |
| – | Public Health Emergencies | This was dropped, see table below. |
| – | Civil Unrest | This was dropped, see table below. |
| – | Major Industrial Accidents | This was dropped, see table below. |

Certain hazards were excluded from consideration for this Plan Update. They are shown in Table 4-2.

### *Table 4-2 LAUSD – Excluded Hazards*

| Hazard Excluded | Why Excluded |
|---|---|
| Avalanches | The District does not have sufficient snowfall to have avalanche as a hazard. |
| Air Pollution | While air pollution exists, there are other avenues outside of this Plan Update to address air pollution. |
| Energy Shortage and Energy Resilience | While energy emergencies occur from time to time, there are other avenues outside of this Plan Update to address this hazard. |
| Freeze | There are low numbers of freeze events in the District. |
| Insects Pests and Diseases | While pests and diseases from insects can occur, there has been few instances where it has affected the District. |
| Volcano | Due to distance from volcanoes, and the limited chance of an eruption, volcano was excluded from consideration. |
| Agricultural Pests and Diseases | There is very little agricultural land in the District. |
| Epidemic/Pandemic/Vector Borne Disease Hazards | While these diseases can occur, there has been few instances where it has affected the District. |
| Hazardous Materials Release | While hazardous materials releases can occur, there are other avenues outside of this Plan Update to address this hazard. |
| Marine Invasive Species | There is very little risk to the District from marine invasive species. |
| Natural Gas Pipeline Hazards | While pipelines exist in and near the District, there are other avenues outside of this Plan Update to address this hazard. |
| Oil Spills | While air pollution exists, there are other avenues outside of this Plan Update to address this hazard. |
| Radiological Accidents | While air pollution exists, there are other avenues outside of this Plan Update to address this hazard. |
| Terrorism | While air pollution exists, there are other avenues outside of this Plan Update to address this hazard. |
| Cyber Threats | While air pollution exists, there are other avenues outside of this Plan Update to address this hazard. |
| Airline Crashes | There have been few past occurrences in the County of airplane crashes. Further there are other avenues outside of this Plan Update to address this hazard. |
| Civil Disturbance | While civil disturbances occur from time to time, there are other avenues outside of this Plan Update to address this hazard. |
| Well Stimulation and Hydraulic Fracking | This is not occurring in the District Planning Area. |

Table 4-3 was completed by the District and HMPC to identify, profile, and rate the significance of identified hazards. Only the more significant (or priority) hazards have a more detailed hazard profile and are analyzed further in Section 4.3 Vulnerability Assessment. Those hazards that occur infrequently or have little or no impact on the Planning Area were determined to be of low significance and not considered a priority hazard. Significance was determined based on the hazard profile, focusing on key criteria such as frequency, extent, and resulting damage, including deaths/injuries and property, crop, and economic damage. The ability of a community to reduce losses through implementation of existing and new mitigation measures was also considered as to the significance of a hazard. This assessment was used by the HMPC to prioritize those hazards of greatest significance to the Planning Area, enabling the District to focus resources where they are most needed. Table 4-37 in Section 4.2.17 Natural Hazards Summary provides an overview of these hazards.

### *Table 4-3 LAUSD Hazard Assessment*

| Hazard | Geographic Extent | Probability of Future Occurrences | Magnitude/ Severity | Significance | Climate Change Influence |
|---|---|---|---|---|---|
| Climate Change and Sea Level Rise | Extensive | Highly Likely | Limited | Medium | – |
| Dam Failure | Significant | Occasional | Limited | High | Low |
| Drought and Water Shortage | Extensive | Likely/ Occasional | Negligible | Medium | Medium |
| Earthquake | Extensive | Occasional | Catastrophic | High | Low |
| Earthquake: Liquefaction | Extensive | Unlikely | Catastrophic | Medium | Low |
| Flood: 1%/0.2% Annual Chance | Significant | Occasional/ Unlikely | Limited | Medium | Medium |
| Flood: Localized/Stormwater | Significant | Highly Likely | Limited | Medium | Medium |
| Landslide, Mud, and Debris Flows | Significant | Likely | Limited | Medium | Low |
| Levee Failure | Limited | Occasional | Limited | Medium | Medium |
| Radon | Significant | Likely | Limited | Medium | Low |
| Severe Weather: Extreme Heat | Extensive | Highly Likely | Limited | Medium | Medium |
| Severe Weather: Heavy Rains and Storms | Extensive | Highly Likely | Limited | Medium | Medium |
| Severe Weather: High Winds and Tornados | Extensive | Highly Likely | Limited | Medium | Low |
| Tsunami | Limited | Occasional | Negligible | Medium | Low |
| Wildfire | Significant | Likely | Limited | Medium | High |

**Geographic Extent**
Limited: Less than 10% of planning area
Significant: 10-50% of planning area
Extensive: 50-100% of planning area

**Probability of Future Occurrences**
Highly Likely: Near 100% chance of occurrence in next year, or happens every year.
Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less.
Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

**Magnitude/Severity**
Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths
Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability
Limited—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability
Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid

**Significance**
Low: minimal potential impact
Medium: moderate potential impact
High: widespread potential impact

**Climate Change Impact:**
Low: Climate change is not likely to increase the probability of this hazard.
Medium: Climate change is likely to increase the probability of this hazard.
High: Climate change is very likely to increase the probability of this hazard.

## 4.1.2. Disaster Declaration History

One method the HMPC used to identify hazards was the researching of past events that triggered federal and/or state emergency or disaster declarations in the Planning Area. Federal and/or state disaster declarations may be granted when the severity and magnitude of an event surpasses the ability of the local government to respond and recover. Disaster assistance is supplemental and sequential. When the local government's capacity has been surpassed, a state disaster declaration may be issued, allowing for the provision of state assistance. Should the disaster be so severe that both the local and state governments' capacities are exceeded, a federal emergency or disaster declaration may be issued allowing for the provision of federal assistance.

The federal government may issue a disaster declaration through FEMA, the U.S. Department of Agriculture (USDA), and/or the Small Business Administration (SBA). FEMA also issues emergency declarations, which are more limited in scope and without the long-term federal recovery programs of major disaster declarations. The quantity and types of damage are the determining factors.

Disaster declarations are issued for affected counties. Any event that affected Los Angeles County likely impacted a portion or all of the District. Los Angeles County has experience 72 federal and 63 state declarations since 1950. 45 of the federal declarations were associated with fire events, 12 with flood events, 6 with severe storm, 3 with earthquake, 1 with dam failure, 2 with freezing, and 1 with hurricane (for evacuations stemming from Hurricane Katrina in 2005), 1 for landslide, and 1 with other (for a seismic sea wave in 1964). 19 of the state declarations were associated with fire events, 14 were associated with flood events, 8 were associated with agricultural disease, 7 were associated with severe storms, 5 were related to earthquake, 2 were related to drought, 2 were economic, 1 was related to freeze, 1 was related to high winds, 1 was related to a dam failure, 1 was related to landslide, 1 was related to a collision on I-5, and 1 was related to civil unrest. Details of federal and state disaster declarations is shown in Table 4-4. A summary of federal and state disaster declarations is shown in Table 4-5.

*Table 4-4 Los Angeles County Disaster Declaration History 1950 to 2018*

| Year | Disaster Type | Disaster Cause | County | Disaster Number | State Declaration Date | Federal Declaration Date |
|---|---|---|---|---|---|---|
| 1950 | Flood | 1950 Floods | Statewide | OCD 50-01 | 11/21/1950 | – |
| 1954 | Flood | Flood & Erosion | Statewide | DR – 15 | – | 2/5/1954 |
| 1955 | Flood | Flood | Statewide | DR – 47 | 12/22/1955 | 12/23/1955 |
| 1956 | Fire | Forest Fire | Statewide | DR – 65 | – | 12/29/1956 |
| 1958 | Fire | Newton Fires (Monrovia Fires) | Los Angeles | CDO 58-01 | 1/3/1958 | – |
| 1958 | Flood | Heavy Rainstorms & Flood | Statewide | DR – 82 | 4/2/1958 | 4/4/1958 |
| 1959 | Flood | Potential Flood Damage and Landsides as a Result of Fires | Los Angeles | CDO 59-01 | 1/8/1959 | – |
| 1961 | Fire | Fire (Los Angeles County) | Statewide | DR – 119 | – | 11/16/1961 |
| 1962 | Flood | Floods | Statewide | DR – 122 | 2/16/62<br>2/23/62 | 3/6/1962 |

| Year | Disaster Type | Disaster Cause | County | Disaster Number | State Declaration Date | Federal Declaration Date |
|---|---|---|---|---|---|---|
| 1962 | Flood | Severe Storms & Flooding | Statewide | DR – 138 | – | 10/24/1962 |
| 1963 | Flood | Severe Storms, Heavy Rains & Flooding | Statewide | DR – 145 | – | 2/25/1963 |
| 1963 | Dam/Levee Break | Flood Due to Broken Dam | Statewide | DR – 161 | 3/16/1964 | 12/21/1963 |
| 1964 | Other | Seismic Sea Wave (Tsunami) | Statewide | DR – 169 | – | 4/1/1964 |
| 1964 | Fire | Weldon Fire | Los Angeles | N/A | 3/16/1964 | – |
| 964 | Storms | Floods | Los Angeles | N/A | 4/3/1964 | – |
| 1965 | Landslide | 1965 Landslide | Los Angeles | N/A | 6/21/1965 | – |
| 1965 | Civil Unrest | 1965 Riots | Los Angeles | N/A | 8/14/1965 | – |
| 1976 | Fire | Woodson Fire | Los Angeles | N/A | 1/7/1967 | – |
| 1969 | Flood | Severe Storms & Flooding | Los Angeles | DR – 253 | 1/23/69, 1/25,69, 1/28/69, 1/29/69, 2/8/69, 2/10/69, 2/16/69, 3/12/69 | 1/26/1969 |
| 1970 | Fire | Forest & Brush Fires | Los Angeles | DR – 295 | 9/24/70, 9/28/70, 10/1/70, 10/2/70, 10/20/70, 11/14/70 | 9/29/1970 |
| 1971 | Earthquake | San Fernando Earthquake | Los Angeles | DR – 299 | 2/9/1971 | 2/9/1971 |
| 1972 | Agricultural Disease | Exotic Newcastle Disease Epidemic | Los Angeles | N/A | 4/10/72, 5/22/72 | – |
| 1973 | Fire | 1973 Fires | Los Angeles | N/A | 7/16/1973 | – |
| 1974 | Economic | Gasoline Shortage - OPEC | Los Angeles | N/A | 2/28/74, 3/4/74, 3/10/74 | – |
| 1975 | Fire | 1975 Fires | Los Angeles | N/A | 11/24/1975 | – |
| 1976 | Drought | 1976 Drought | Los Angeles | N/A | 2/9/76, 2/13,76, 2/24/76, 3/26/76, 7/6/76 | – |
| 1978 | Flood | Coastal Storms, Mudslides & Flooding | Los Angeles | DR – 547 | 3/9/78, 2/27,78, 2/13/78 | 2/15/1978 |
| 1978 | Fire | Brush Fires | Los Angeles | EM – 3067 | 10/24/1978 | 10/29/1978 |

| Year | Disaster Type | Disaster Cause | County | Disaster Number | State Declaration Date | Federal Declaration Date |
|---|---|---|---|---|---|---|
| 1979 | Fire | 1979 Fires | Los Angeles | N/A | 9/28/79, 9/21/79, 9/20/79 | – |
| 1979 | Economic | Gasoline Shortage - OPEC | Los Angeles | N/A | 5/8/79 - 11/13/79 | – |
| 1980 | Flood | Severe Storms, Mudslides & Flooding | Los Angeles | DR – 615 | 2/21/80, 2/7/80, 2/19/80 | 2/21/1980 |
| 1980 | Fire | Brush & Timber Fires | Los Angeles | DR – 635 | 11/18/1980, 11/25/80 | 11/27/1980 |
| 1981 | Agricultural Insect pest | 1981 Mediterranean Fruit Fly Infestation | Los Angeles | N/A | 8/8/81 - 9/25/81 | – |
| 1982 | Fire | Dayton Hills Fire | Los Angeles | GP 1982 | 10/10/1982 | – |
| 1983 | Coastal Storm | Coastal Storms, Floods, Slides & Tornadoes | Los Angeles | DR – 677 | 12/8/82-3/21/83 | 2/9/1983 |
| 1983 | Flood | 1983 Floods | Los Angeles | 82-19 | 3/83 | – |
| 1983 | High Winds | Wind Storms | Los Angeles | 83-01 | 3/83 | – |
| 1983 | Agricultural Insect pests | Mexican Fruit Fly | Los Angeles | N/A | 11/4/1983 | – |
| 1985 | Fire | 1985 Statewide Fires | Los Angeles | DR-739 | 7/1/85 - 7/11/85 | 7/18/1985 |
| 1987 | Agricultural Insect pest | Mediterranean Fruit Fly | Los Angeles | GP 1987 | 8/25/1987 | – |
| 1987 | Earthquake | Earthquake & Aftershocks | Los Angeles | DR – 799 | 10/2/87 - 10/5/87 | 10/7/1987 |
| 1988 | Flood | Severe Storms, High Tides & Flooding | Los Angeles | DR – 812 | 1/21/1988 | 2/5/1988 |
| 1988 | Fire | 1988 Fires | Los Angeles | GP 87-07 | 5/88 | – |
| 1988 | Agricultural Insect pest | Mediterranean Fruit Fly | Los Angeles | GP 1988 | 7/21/1988 | – |
| 1988 | Fire | Fires (Los Angeles) | Los Angeles | GP 88-03 | 12/9/1988 | – |
| 1989 | Agricultural Insect pest | Mediterranean Fruit Fly (Los Angeles) | Los Angeles | GP 1989 | 8/9/1989 | – |
| 1990 | Earthquake | Earthquake | Los Angeles | GP 89-07 | 3/9/90, 3/13/90 | – |
| 1990 | Agricultural Insect pest | Mexican Fruit Fly | Los Angeles | GP 1990 | 5/14/1990 | – |
| 1990 | Fire | Fires | Los Angeles | DR – 872 | 6/28/90, 6/29/90 | 6/30/1990 |
| 1991 | Freezing | Severe Freeze | Los Angeles | DR – 894 | 12/19/90-1/18/91 | 2/11/1991 |

| Year | Disaster Type | Disaster Cause | County | Disaster Number | State Declaration Date | Federal Declaration Date |
|---|---|---|---|---|---|---|
| 1991 | Earthquake | Sierra Madre Earthquake | Los Angeles | GP 91-04 | 7/5/1991 | – |
| 1992 | Flood | Rain/Snow/Wind Storms, Flooding, Mudslides | Los Angeles | DR – 935 | 2/12/92, 2/19/92 | 2/25/1992 |
| 1992 | Fire | Fire During a Period of Civil Unrest | Los Angeles | DR – 942 | 4/29/1992 | 5/2/1992 |
| 1993 | Flood | Severe Winter Storm, Mud & Land Slides, & Flooding | Los Angeles | DR – 979 | 1/7/93 - 2/19/93 | 2/3/1993 |
| 1993 | Fire | Fires, Mud/Landslides, Flooding, Soil Erosion | Los Angeles | DR – 1005 | – | 10/28/1993 |
| 1994 | Earthquake | Northridge Earthquake | Los Angeles | DR – 1008 | 1/17/94, 1/24/94 | 1/17/1994 |
| 1995 | Severe Storm | Severe Winter Storms, Flooding, Landslides, Mud Flows | Los Angeles | DR – 1044 | 1/6/95 - 3/14/95 | 1/10/1995 |
| 1995 | Severe Storm | Severe Winter Storms, Flooding Landslides, Mud Flow | Los Angeles | DR – 1046 | 1/6/95 - 3/14/95 | 3/12/1995 |
| 1996 | Severe Fires | Fire | Los Angeles | 96-04 1996 | 10/22/1996 | – |
| 1996 | Fire | Severe Firestorms | Los Angeles | EM – 3120 | 10/1/1996 | 10/23/1996 |
| 1998 | Severe Storm | Severe Winter Storms and Flooding | Los Angeles | DR – 1203 | Proclaimed | 2/9/1998 |
| 2001 | Flood | Storms | Los Angeles | DC 2001-01 2001 | 3/1/2001 | – |
| 2001 | Economic | Greed | Statewide | GP 2001 | 1/1/2001 | – |
| 2002 | Fire | Ca - Copper Fire | Los Angeles | FS – 2417 | – | 6/6/2002 |
| 2002 | Fire | Leona Fire | Los Angeles | FS – 2462 | – | 9/4/2002 |
| 2002 | Fire | Williams Fire | Los Angeles | FS – 2464 | – | 9/24/2002 |
| 2003 | Agricultural Disease | Exotic Newcastle Disease Epidemic | Los Angeles | GP 2003 2003 | 1/3/2003 | |
| 2003 | Fire | Ca - Wildfire (Pacific Fire) | Los Angeles | FM – 2466 | – | 1/7/2003 |
| 2003 | Fire | Ca-Verdale Fire | Los Angeles | FM – 2502 | – | 10/25/2003 |
| 2003 | Fire | Wildfires, Flooding, Mudflow and Debris Flow | Los Angeles | DR – 1498 | 10/26/2003 | 10/27/2003 |
| 2003 | Flood | Storms | Los Angeles | GP 2003-04 2 | 11/14/2003 | – |
| 2004 | Fire | Ca - Pine Fire | Los Angeles | FM – 2528 | | 7/14/2004 |
| 2004 | Fire | Ca-Foothill Wildfire | Los Angeles | FM – 2534 | – | 7/18/2004 |
| 2004 | Fire | Ca-Crown Wildfire | Los Angeles | FM – 2535 | – | 7/21/2004 |
| 2005 | Severe Storm | Severe Storms, Flooding, Debris Flows, And Mudslides | Los Angeles | DR – 1577 GP2005-01 | 1/12/2005 | 2/4/2005 |

| Year | Disaster Type | Disaster Cause | County | Disaster Number | State Declaration Date | Federal Declaration Date |
|---|---|---|---|---|---|---|
| 2005 | Severe Storm | Severe Storms, Flooding, Landslides, And Mud and Debris Flows | Los Angeles | DR – 1585 | 3/16/2005 | 4/14/2005 |
| 2005 | Hurricane | Hurricane Katrina Evacuation | Los Angeles | EM – 3248 | – | 9/13/2005 |
| 2005 | Fire | Topanga Fire | Los Angeles | FM – 2583 | – | 9/28/2005 |
| 2007 | Freezing | Severe Freeze | Los Angeles | DR – 1689 | – | 3/13/2007 |
| 2007 | Fire | Griffith Park Fire | Los Angeles | FM – 2691 | – | 5/9/2007 |
| 2007 | Fire | Island Fire | Los Angeles | FM – 2694 | – | 5/10/2007 |
| 2007 | Fire | Canyon Fire | Los Angeles | FM – 2708 | – | 7/8/2007 |
| 2007 | Fire | Buckweed Fire | Los Angeles | FM – 2733 | – | 10/21/2007 |
| 2007 | Fire | Canyon Fire | Los Angeles | FM – 2732 | – | 10/21/2007 |
| 2007 | Fire | Ranch Fire | Los Angeles | FM – 2736 | – | 10/22/2007 |
| 2007 | Fire | Wildfires | Los Angeles | EM – 3279 | – | 10/23/2007 |
| 2007 | I-5 Major Collision | Road Damage Accident | Los Angeles | GP 2007-13 | 10/14/2007 | – |
| 2007 | Fire | Wildfires, Flooding, Mud Flows, And Debris Flows | Los Angeles | DR – 1731 | – | 10/24/2007 |
| 2008 | Fire | Santa Anita Fire | Los Angeles | FM – 2763 | – | 4/27/2008 |
| 2008 | Fire | Firestorms and Flooding | Los Angeles | GP 2008-09 2008 | 4/27/2008 | – |
| 2008 | Fire | Marek Fire | Los Angeles | FM – 2788 | – | 10/12/2008 |
| 2008 | Fire | Sesnon Fire | Los Angeles | FM – 2789 | – | 10/13/2008 |
| 2008 | Fire | Freeway Fire Complex | Los Angeles | FM – 2792 | – | 11/15/2008 |
| 2008 | Fire | Sayre Fire | Los Angeles | FM – 2791 | – | 11/15/2008 |
| 2008 | Fire | Wildfires | Los Angeles | DR – 1810 | – | 11/18/2008 |
| 2009 | Fire | Pv Fire | Los Angeles | FM – 2828 | – | 8/28/2009 |
| 2009 | Fire | Station Fire | Los Angeles | FM – 2830 | – | 8/28/2009 |
| 2009 | Fire | Los Angeles County Wildfires | Los Angeles | GP-2009-05 | N/A | – |
| 2010 | Severe Storm | Severe Winter Storms, Flooding, And Debris and Mud Flows | Los Angeles | DR – 1884 | 1/21/2010, 1/22/2010, 1/27/2010 | 3/8/2010 |
| 2010 | Fire | Crown Fire | Los Angeles | FM – 2851 | – | 7/30/2010 |
| 2013 | Fire | Powerhouse Fire | Los Angeles | FM – 5025 | – | 6/2/2013 |
| 2014 | Fire | Colby Fire | Los Angeles | FM – 5051 | – | 1/16/2014 |
| 2014 | California Drought | Drought | Drought | GP 2014-13 | 1/17/2014 | – |
| 2016 | Fire | Old Fire | Los Angeles | FM – 5124 | – | 6/5/2016 |
| 2016 | Fire | Fish Fire | Los Angeles | FM – 5129 | – | 6/21/2016 |

| Year | Disaster Type | Disaster Cause | County | Disaster Number | State Declaration Date | Federal Declaration Date |
|---|---|---|---|---|---|---|
| 2016 | Fire | Sage Fire | Los Angeles | FM – 5132 | – | 7/9/2016 |
| 2016 | Fire | Sand Fire | Los Angeles | FM – 5135 | – | 7/23/2016 |
| 2017 | Fire | California Wildfires | Los Angeles | EM-3396 | – | 12/8/2017 |
| 2017 | Severe Storm | California Severe Winter Storms, Flooding, and Mudslides | Los Angeles | DR-4305 | – | 3/16/2017 |
| 2018 | Severe Storms | California Wildfires, Flooding, Mudflows, And Debris Flows | Los Angeles | DR-4353 | – | 1/2/2018 |

Source: Cal OES, FEMA

*Table 4-5 Los Angeles County – State and Federal Disaster Declarations Summary 1950-2018*

| Disaster Type | Federal Declarations | | State Declarations | |
|---|---|---|---|---|
| | Count | Years | Count | Years |
| Agricultural Disease | 0 | – | 8 | 1972, 1981, 1983, 1987, 1988, 1989, 1990, 2003 |
| Civil Unrest | 0 | – | 1 | 1965 |
| Dam/Levee Break | 1 | 1963 | 1 | 1963 |
| Drought | 0 | – | 2 | 1976, 2014 |
| Earthquake | 3 | 1971, 1987, 1994 | 5 | 1971, 1987, 1990, 1991, 1994 |
| Economic | 0 | – | 2 | 1979, 2001 |
| Fire | 44 | 1956, 1961, 1970, 1978, 1980, 1985, 1990, 1992, 1993, 1996, 2002 (three times), 2003 (three times), 2004 (three times), 2005, 2007 (eight times), 2008 (six times), 2009 (twice), 2010, 2013, 2014, 2016 (four times), 2017 | 19 | 1958, 1964, 1970, 1973, 1975, 1976, 1978, 1979, 1980, 1982, 1985, 1988 (twice), 1990, 1992, 1996 (twice), 2003, 2008 |
| Flood | 12 | 1954, 1955, 1958, 1962 (two times), 1963, 1969, 1978, 1980, 1988, 1992, 1993 | 14 | 1950, 1955, 1958, 1959, 1962, 1969, 1978, 1980, 1983, 1988, 1992, 1993, 2001, 2003 |
| Freeze | 2 | 1991, 2007 | 1 | 1991 |
| High Winds | 0 | – | 1 | 1983 |
| Hurricane | 1 | 2005 | 0 | – |
| I-5 Collision | 0 | – | 1 | 2007 |
| Landslide | 1 | 2018 | 1 | 1965 |
| Seismic Sea Wave (Tsunami) | 1 | 1964 | 0 | – |
| Severe Storms | 7 | 1995 (twice), 1998, 2005 (twice), 2010, 2017 | 7 | 1964, 1995 (twice), 1998, 2005 (twice), 2010 |
| **Totals** | **72** | – | **63** | **–** |

Source: Cal OES, FEMA

### *Disasters since 2012*

As detailed above, there have been ten FEMA disaster declarations since the 2012 plan, seven from wildfires, one from drought, one for landslide, and one from severe storms and flooding.

## 4.1.3. EOC Activations

The District was able to provide records on Emergency Operations Center activations since 2005. Some of these are hazard related, while others are human caused. These are shown in Table 4-6.

*Table 4-6 LAUSD – EOC Activations from 2005 to 2018*

| Date | Incident | Natural Hazard Related? |
|---|---|---|
| 1/26/2005 | Train Crash | N |
| 1/23/2007 | Labor Demonstration | N |
| 5/1/2008 | May Day | N |
| 10/13/2008 | Sesnon Fire | Y |
| 12/1/2011 | Wind Storm | Y |
| 12/2/2011 | Wind Storm | Y |
| 12/16/2011 | High Winds | Y |
| 5/1/2011 | May Day | N |
| 5/13/2011 | Unknown | N |
| 3/13/2012 | Labor Demonstration | N |
| 5/1/2012 | May Day | N |
| 10/4/2013 | Red Flag Warning | Y |
| 5/1/2013 | May Day | N |
| 2/28/2014 | Storm | Y |
| 4/10/2014 | Orland Bus Crash | N |
| 4/11/2014 | Orland Bus Crash | N |
| 5/1/2014 | May Day | N |
| 9/23/2014 | Unknown | N |
| 10/2/2014 | High Winds | Y |
| 10/3/2014 | High Winds | Y |
| 12/1/2014 | Ferguson Demonstrations | N |
| 12/2/2014 | Ferguson Demonstrations | N |
| 5/1/2015 | May Day | N |
| 12/15/2015 | Threat Shut Down | N |
| 3/7/2016 | El Nino | Y |
| 6/1/2016 | UCLA Shooting | N |
| 11/10/2016 | Political Demonstrations | N |

| Date | Incident | Natural Hazard Related? |
|---|---|---|
| 11/14/2016 | Political Demonstrations | N |
| 11/15/2016 | Political Demonstrations | N |
| 11/16/2016 | Political Demonstrations | N |
| 11/18/2016 | Political Demonstrations | N |
| 1/19/2017 | Labor Demonstration | N |
| 1/20/2017 | Inauguration Demonstrations | N |
| 5/1/2017 | May Day | N |
| 12/5/2017 | Creek/Skirball Fires | Y |
| 12/6/2017 | Creek/Skirball Fires | Y |
| 12/7/2017 | Creek/Skirball Fires | Y |
| 12/8/2017 | Creek/Skirball Fires | Y |
| 2/1/2018 | Castro MS Shooting | N |
| 3/14/2018 | Student Walkouts | N |
| 3/22/2018 | Storm | Y |
| 5/1/2018 | May Day | N |

## 4.2 Hazard Profiles

**Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the…location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.**

The hazards identified in Section 4.1 Hazard Identification, are profiled individually in this section. These profiles set the stage for Section 4.3 Vulnerability Assessment, where the vulnerability is quantified for each of the priority hazards.

Each hazard is profiled in the following format:

- **Hazard/Problem Description**—This section gives a description of the hazard and associated issues followed by details on the hazard specific to the LAUSD Planning Area. Where known, this includes information on the hazard location, extent, seasonal patterns, speed of onset/duration, and magnitude and/or any secondary effects.
- **Past Occurrences**—This section contains information on historical incidents, including impacts where known. The extent or location of the hazard within or near the LAUSD Planning Area is also included here. Historical incident worksheets and other input from the HMPC were used to capture information on past occurrences along with other data sources.
- **Frequency/Likelihood of Future Occurrence**—The frequency of past events is used in this section to gauge the likelihood of future occurrences. Where possible, frequency was calculated based on existing data. It was determined by dividing the number of events observed by the number of years on record and multiplying by 100. This gives the percent chance of the event happening in any given year (e.g., three droughts over a 30-year period equates to a 10 percent chance of experiencing a drought in any given year). The likelihood of future occurrences is categorized into one of the following classifications:
  - ✓ **Highly Likely**—Near 100 percent chance of occurrence in next year or happens every year
  - ✓ **Likely**—Between 10 and 100 percent chance of occurrence in next year or has a recurrence interval of 10 years or less
  - ✓ **Occasional**—Between 1 and 10 percent chance of occurrence in the next year or has a recurrence interval of 11 to 100 years
  - ✓ **Unlikely**—Less than 1 percent chance of occurrence in next 100 years or has a recurrence interval of greater than every 100 years.
- **Climate Change**—This section contains the effects of climate change (as applicable). The possible ramifications of climate change on the hazard are discussed.

**Section 4.2.17 Natural Hazards Summary** provides an initial assessment of the profiles and assigns a level of significance or priority to each hazard. Those hazards determined to be of high or medium significance were characterized as priority hazards that required further evaluation in Section 4.3 Vulnerability Assessment. Those hazards that occur infrequently or have little or no impact on the Planning Area were determined to be of low significance and not considered a priority hazard. Significance was determined based on the hazard profile, focusing on key criteria such as frequency, extent, and resulting damage, including deaths/injuries and property, crop, and economic damage. The ability of a community to reduce losses through implementation of existing and new mitigation measures was also considered as to the significance of a hazard. This assessment was used by the HMPC to prioritize those hazards of greatest significance to the Planning Area, enabling the District to focus resources where they are most needed.

The following sections provide profiles of the natural hazards that the HMPC identified in Section 4.1 Hazard Identification. The severe weather hazards are discussed first because it is often the secondary hazards generated by severe weather (e.g., flood and wildfire) that can result in the most significant losses. The other hazards follow alphabetically.

### *Data Sources*

In general, information provided by planning team members is integrated into this section with information from other data sources. The data sources listed below formed the basis for this Hazard Profiles portion of the plan. Where data and information from these studies, plans, reports, and other data sources were used, the source is referenced as appropriate throughout this risk assessment.

- INSERT

## 4.2.1. Severe Weather: General

Severe weather is generally any destructive weather event, but usually occurs throughout the LAUSD Planning Area as localized storms that bring heavy rain, lightning, and strong winds.

The National Oceanic and Atmospheric Administration's National Climatic Data Center (NCDC) has been tracking severe weather since 1950. Their Storm Events Database contains data on the following: all weather events from 1993 to current (except from 6/1993-7/1993); and additional data from the Storm Prediction Center, which includes tornadoes (1950-1992), thunderstorm winds (1955-1992), and hail (1955-1992). The database is aggregated to a county level. This database contains 715 severe weather events that occurred in Los Angeles County between January 1, 1950, and December 31, 2017. Table 4-7 summarizes these events. These events may or may not have directly affected the District.

*Table 4-7 NCDC Severe Weather Events for Los Angeles County 1950 - 12/31/2017**

| Event Type | Number of Events | Deaths | Deaths (indirect | Injuries | Injuries (indirect) | Property Damage | Crop Damage |
|---|---|---|---|---|---|---|---|
| Avalanche | 1 | 0 | 0 | 0 | 0 | $0 | $0 |
| Coastal Flood | 1 | 0 | 0 | 0 | 0 | $0 | $0 |
| Debris Flows | 3 | 0 | 0 | 0 | 0 | $0 | $0 |
| Dense Fog | 1 | 0 | 0 | 41 | 0 | $0 | $0 |
| Dust Devil | 4 | 0 | 0 | 0 | 0 | $0 | $0 |
| Excessive Heat | 9 | 18 | 0 | 0 | 0 | $0 | $0 |
| Flash Flood | 136 | 7 | 0 | 4 | 0 | $1,310,000 | $3,200,000 |
| Flood | 15 | 0 | 0 | 0 | 0 | $0 | $0 |
| Frost/Freeze | 2 | 0 | 0 | 0 | 0 | $0 | $6,200,000 |

| Event Type | Number of Events | Deaths | Deaths (indirect | Injuries | Injuries (indirect) | Property Damage | Crop Damage |
|---|---|---|---|---|---|---|---|
| Funnel Cloud | 9 | 0 | 0 | 0 | 0 | $0 | $0 |
| Hail | 25 | 0 | 0 | 0 | 0 | $3,500,000 | $0 |
| Heat | 8 | 0 | 0 | 0 | 0 | $0 | $0 |
| Heavy Rain | 12 | 0 | 0 | 4 | 0 | $5,000,000 | $0 |
| Heavy Snow | 23 | 0 | 0 | 0 | 0 | $0 | $0 |
| High Surf | 30 | 5 | 0 | 3 | 1 | $40,000,000 | $0 |
| High Wind | 198 | 2 | 0 | 3 | 0 | $0 | $0 |
| Lightning | 9 | 2 | 0 | 13 | 0 | $0 | $0 |
| Rip Current | 4 | 4 | 0 | 1 | 0 | $0 | $0 |
| Sneakerwave | 1 | 1 | 0 | 4 | 0 | $0 | $0 |
| Storm Surge/Tide | 1 | 0 | 0 | 27 | 0 | $0 | $0 |
| Strong Wind | 3 | 0 | 0 | 7 | 0 | $50,000 | $0 |
| Thunderstorm Wind | 59 | 0 | 0 | 10 | 0 | $55,000 | $0 |
| Tornado | 44 | 0 | 0 | 45 | 0 | $38,695,250 | $0 |
| Tropical Storm | 3 | 0 | 0 | 0 | 0 | $0 | $0 |
| Waterspout | 5 | 0 | 0 | 0 | 0 | $0 | $0 |
| Wildfire | 39 | 0 | 2 | 46 | 0 | $36,500,000 | $0 |
| Winter Storm | 57 | 0 | 0 | 0 | 0 | $0 | $0 |
| Winter Weather | 13 | 0 | 0 | 0 | 0 | $0 | $0 |
| **Total** | **715** | **39** | **2** | **208** | **1** | **$125,110,250** | **$9,400,000** |

Source: NCDC

*Note: Losses reflect totals for all impacted areas

The NCDC table above summarize severe weather events that occurred in the LAUSD Planning Area and Los Angeles County. Only a few of the events actually resulted in state and federal disaster declarations. It is further interesting to note that different data sources capture different events during the same time period, and often display different information specific to the same events. While the HMPC recognizes these inconsistencies, they see the value this data provides in depicting the County's "big picture" hazard environment.

As previously mentioned, most all of Los Angeles County's state and federal disaster declarations have been a result of severe weather. For this plan, severe weather is discussed in the following subsections:

- Extreme Heat
- Heavy Rains and Storms
- High Winds and Tornado

While the HMPC decided not to include cold and freeze as a hazard, cold weather does happen periodically, with little effect to the County and the District. Record colds are shown in Table 4-8.

*Table 4-8 Los Angeles County – Record Cold Temperatures by Month from 1936 to 2016*

| Month | Temperature | Date | Month | Temperature | Date |
|---|---|---|---|---|---|
| January | 27° | 1/4/1949 | July | 52° | 7/6/1947 |
| February | 34° | 2/12/1948 | August | 51° | 8/9/1948 |
| March | 35° | 3/5/1945 | September | 47° | 9/26/1948 |
| April | 42° | 4/4/1945 | October | 43° | 10/30/1946 |
| May | 45° | 5/4/1964 | November | 38° | 11/23/1947 |
| June | 48° | 6/8/1950 | December | 32° | 12/21/1968 |

Source: Western Regional Climate Center – Los Angeles International Airport Coop Station

## 4.2.2. Severe Weather: Extreme Heat

### *Hazard/Problem Description*

According to information provided by FEMA, extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks. Heat kills by taxing the human body beyond its abilities. In a normal year, about 175 Americans succumb to the demands of summer heat. In the 40-year period from 1936 through 1975, nearly 20,000 people were killed in the United States by the effects of heat and solar radiation. In the heat wave of 1980 more than 1,250 people died.

Heat disorders generally have to do with a reduction or collapse of the body's ability to shed heat by circulatory changes and sweating or a chemical (salt) imbalance caused by too much sweating. When heat gain exceeds a level at which the body can remove it, or when the body cannot compensate for fluids and salt lost through perspiration, the temperature of the body's inner core begins to rise, and heat-related illness may develop. Elderly persons, small children, chronic invalids, those on certain medications or drugs, and persons with weight and alcohol problems are particularly susceptible to heat reactions. In the District, those who are low-income, homeless, or living without air conditioning are at risk to extreme heat.

Heat emergencies are often slower to develop, taking several days of continuous, oppressive heat before a significant or quantifiable impact is seen. Heat waves do not strike victims immediately, but rather their cumulative effects slowly take the lives of vulnerable populations. Heat waves do not generally cause damage or elicit the immediate response of floods, fires, earthquakes, or other more "typical" disaster scenarios. While heat waves are obviously less dramatic, they are potentially deadlier. According to the 2018California State Hazard Mitigation Plan, the worst single heat wave event in California occurred in Southern California in 1955, when an eight-day heat wave resulted in 946 deaths.

The NWS has in place a system to initiate alert procedures (advisories or warnings) when extreme heat is expected to have a significant impact on public safety. The expected severity of the heat determines whether advisories or warnings are issued. The NWS HeatRisk forecast provides a quick view of heat risk potential over the upcoming seven days. The heat risk is portrayed in a numeric (0-4) and color (green/yellow/orange/red/magenta) scale which is similar in approach to the Air Quality Index (AQI) or the UV Index. This can be seen in Table 4-9.

*Table 4-9 National Weather Service Heat Risk Categories*

| Category | Level | Meaning |
|---|---|---|
| Green | 0 | No Elevated Risk |
| Yellow | 1 | Low Risk for those extremely sensitive to heat, especially those without effective cooling and/or adequate hydration |
| Orange | 2 | Moderate Risk for those who are sensitive to heat, especially those without effective cooling and/or adequate hydration |
| Red | 3 | High Risk for much of the population, especially those who are heat sensitive and those without effective cooling and/or adequate hydration |
| Magenta | 4 | Very High Risk for entire population due to long duration heat, with little to no relief overnight |

Source: National Weather Service

The NWS office in Los Angeles can issue the following heat-related advisory as conditions warrant.

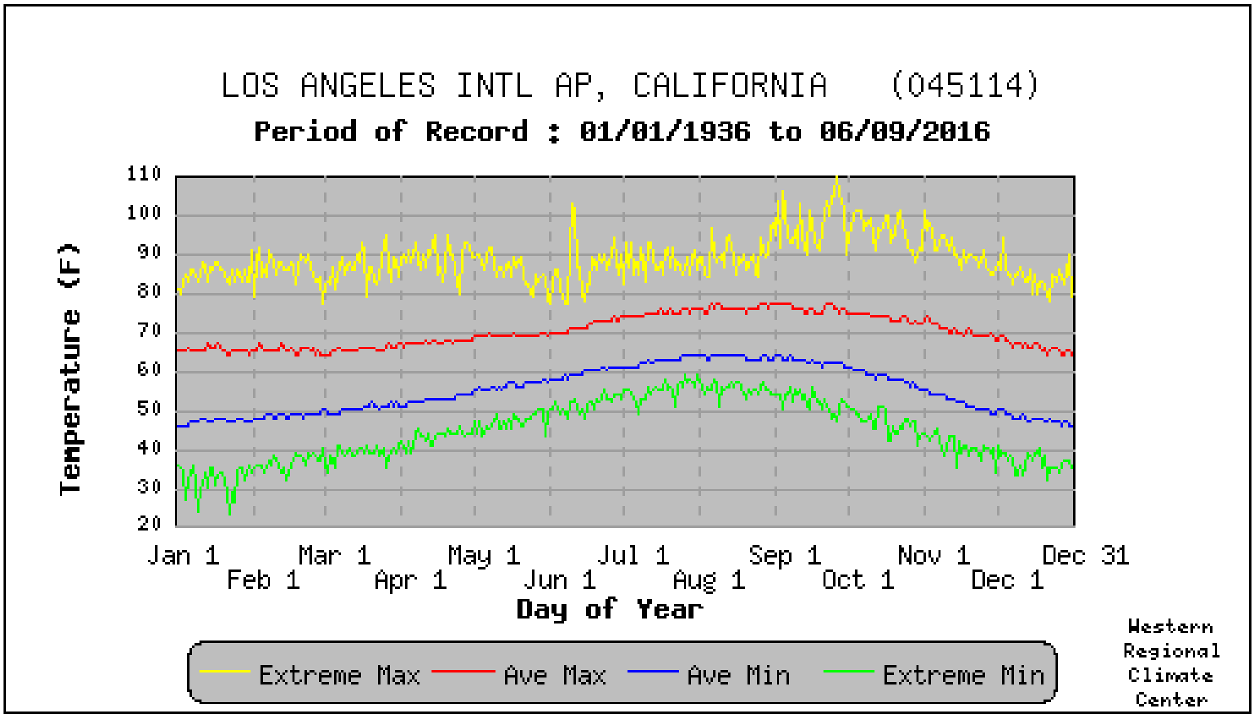
- **Heat Advisories** are issued during events where the HeatRisk is on the Orange/Red threshold (Orange will not always trigger an advisory)
- **Excessive Heat Watches/Warnings** are issued during events where the HeatRisk is in the Red/Magenta output

In Los Angeles, the summers are hot, but the combination of high temperature and high humidity, which are requirements for the NWS to declare a heat emergency, are relatively rare. Extreme heat occurs throughout the Planning Area primarily during the summer months. The Western Regional Climate Center (WRCC) maintains data on weather normal and extremes in the western United States. There are multiple weather stations in Los Angeles County. The Los Angeles International Airport station has a long period of record and was chosen for this Plan Update. WRCC data for the District and County is summarized below.

### Los Angeles County— Los Angeles International Airport Weather Station, Period of Record 1936 to 2016)

According to the WRCC, in the District and County, monthly average maximum temperatures in the warmest months (May through October) range from the mid-70s to the low 80s. The highest recorded daily extreme was 110°F on September 9, 1963. In a typical year, maximum temperatures exceed 90°F on 4.5 days.

*Figure 4-1 Los Angeles County— Daily Temperature Averages and Extremes*




Source: Western Regional Climate Center, www.wrcc.dri.edu/

*Table 4-10 Los Angeles County – Record High Temperatures*

| Month | Record High | Date | Month | Record High | Date |
|---|---|---|---|---|---|
| January | 91° | 1/31/2003 | July | 97° | 7/10/1959 |
| February | 92° | 2/3/1963 | August | 98° | 8/31/1955 |
| March | 95° | 3/26/1988 | September | 110° | 9/26/1963 |
| April | 102° | 4/6/1989 | October | 106° | 10/14/1961 |
| May | 97° | 5/16/1956 | November | 101° | 11/1/1966 |
| June | 104° | 6/16/1981 | December | 94° | 12/3/1958 |

Source: Western Regional Climate Center

The District noted that because of its expansive urban size, Los Angeles is identified as an urban heat island (UHI). UHIs develop in urban areas where natural surfaces are paved with asphalt or covered by buildings. Radiation from the sun is absorbed by these surfaces during the day and re-radiated at night, raising ambient temperatures. UHIs have high nighttime minimum temperatures compared to neighboring areas. Waste heat from air conditioners, vehicles, and other equipment contributes to the UHI effect.

## *Past Occurrences*

### Disaster Declaration History

There have been no FEMA or Cal OES disasters related to extreme heat, as shown in Table 4-5.

### NCDC Events

The NCDC data shows eight extreme heat incidents for Los Angeles County since 1993. Specific impacts for this event were not reported in the database. Information for this event shown in Table 4-11.

*Table 4-11 NCDC Extreme Heat Events in Los Angeles County 1993 to 12/31/2017**

| Event | Date | Deaths | Injuries | Property Damage | Crop Damage |
|---|---|---|---|---|---|
| Heat | 8/3/1997*** | 0 | 0 | $0 | $0 |
| Heat | 7/15/2006** | 0 | 0 | $0 | $0 |
| Heat | 7/22/2006** | 0 | 0 | $0 | $0 |
| Excessive Heat | 8/30/2007** | 0 | 0 | $0 | $0 |
| Excessive Heat | 9/1/2007** | 10 | 0 | $0 | $0 |
| Excessive Heat | 9/3/2007 | 8 | 0 | $0 | $0 |
| Excessive Heat | 6/20/2008** | 0 | 0 | $0 | $0 |
| Excessive Heat | 6/21/2008* | 0 | 0 | $0 | $0 |
| **Total** | | **18** | **0** | **$0** | **$0** |

Source: NCDC
*Deaths, injuries, and damages are for the entire event, and may not be exclusive to the County.
** 2 events were recorded on this date
*** 3 events were recorded on this date

### Hazard Mitigation Planning Committee Events

The HMPC noted that extreme heat is a yearly event, but could not recall specific incidents that caused damages, impacts, injuries, or deaths. PLEASE PROVIDE INFORMATION ON EXTREME HEAT ISSUES IN THE DISTRICT. WHAT ARE THE PRIMARY CONCERNS?

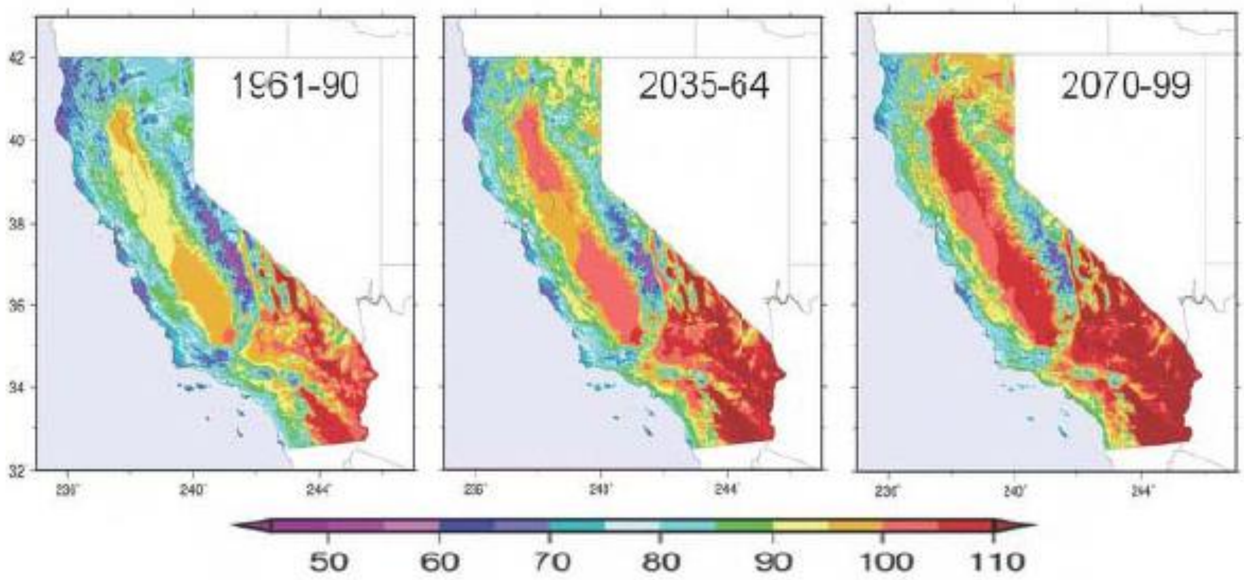
## *Likelihood of Future Occurrence*

**Highly Likely**—Temperature extremes are likely to continue to occur annually in the District Planning Area. Temperatures at or above 90°F can occur on summer days in the District. Fortunately, this comes at a time when most students are out of school.

### Climate Change and Extreme Heat

The California Climate Adaptation Strategy (CAS), citing a California Energy Commission study, states that "over the past 15 years, heat waves have claimed more lives in California than all other declared disaster events combined." This study shows that California is getting warmer, leading to an increased frequency, magnitude, and duration of heat waves. These factors may lead to increased mortality from excessive heat, as shown in Figure 4-2.

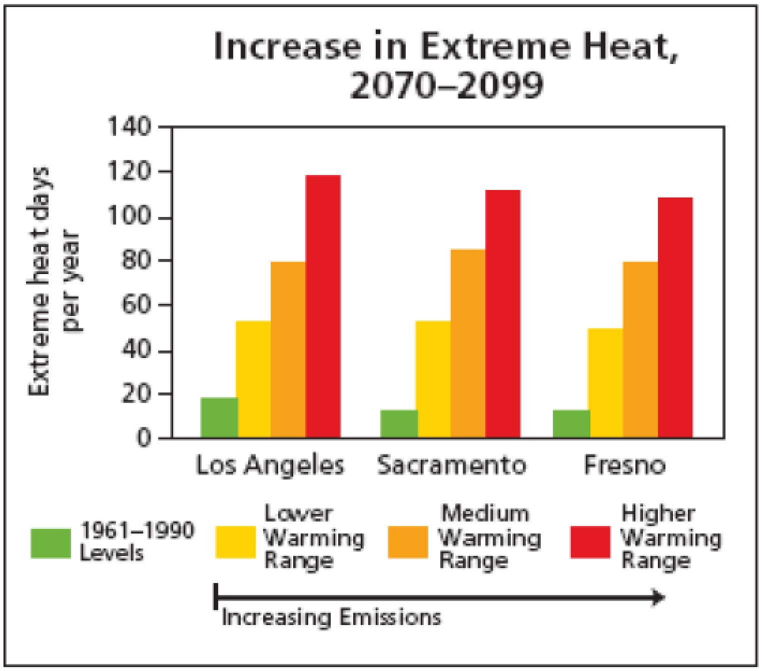
*Figure 4-2 California Historical and Projected Temperature Increases – 1961 to 2099*




Source: Dan Cayan; California Climate Adaptation Strategy

Per the CAS report and the 2018 State of California Hazard Mitigation Plan, by 2100, hotter temperatures are expected throughout the state, with projected increases of 3-5.5°F (under a lower emissions scenario) to 8-10.5°F (under a higher emissions scenario). As temperatures increase, California, Los Angeles County, and the District will face increased risk of death from dehydration, heat stroke, heat exhaustion, heart attack, stroke and respiratory distress caused by extreme heat. If temperatures rise to the higher warming range, there could be 100 more days per year with temperatures above 95°F in the City (see Figure 4-3). These changes could lead to an increase in deaths related to extreme heat in the County and can further impact the LAUSD Planning Area.

*Figure 4-3 Increase in Heat in Major California Cities from 2070 to 2099*



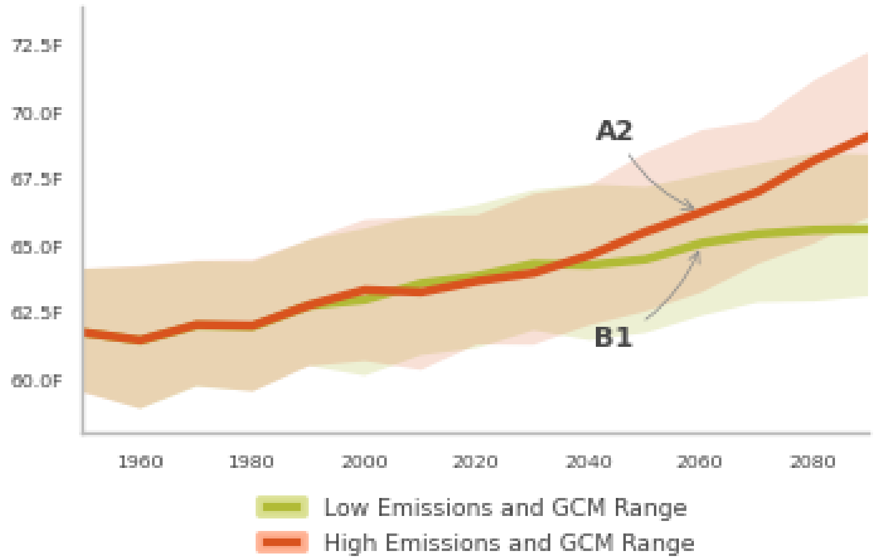

Source: 2018 California State Hazard Mitigation Plan

Cal Adapt noted that overall temperatures are expected to rise substantially throughout this century. For the south coast region, which includes LAUSD, the following is predicted (emphasis added):

- January increase in average temperatures: 1°F to 2.5°F by 2050 and 5°F to 6°F by 2100
- July increase in average temperatures: 3°F to 4°F by 2050 and 5°F to 10°F by 2100 with larger increases ***projected inland, which is where portions of the LAUSD are located***. (Modeled high temperatures; high carbon emissions scenario)

The projected temperature increases begin to diverge at mid-century so that, by the end of the century, the temperature increases projected in the higher emissions scenario (A2) are much higher than those projected in the lower emissions scenario (B1). These projections also differ depending on the time of year and the type of measurement (highs vs. lows), all of which have different potential effects to the state's ecosystem health, agricultural production, water use and availability, and energy demand. Future temperature estimates from Cal-Adapt are shown in Figure 4-4.

*Figure 4-4 Los Angeles County – Future Temperature Estimates in High and Low Emission Scenarios*




Source: Cal-Adapt – Temperature: Decadal Averages Map

## 4.2.3. Severe Weather: Heavy Rains and Storms

### *Hazard/Problem Description*

Storms in the District occur throughout the Planning Area and are generally characterized by heavy rain often accompanied by strong winds and sometimes lightning and hail. Approximately 10 percent of the thunderstorms that occur each year in the United States are classified as severe. A thunderstorm is classified as severe when it contains one or more of the following phenomena: hail that is three-quarters of an inch or greater, winds in excess of 50 knots (57.5 mph), or a tornado (discussed in Section 4.2.4). Heavy precipitation in the Los Angeles County and the District Planning Area falls mainly in the fall, winter, and spring months.

#### Heavy Rain and Storms

The NWS reports that storms and thunderstorms result from the rapid upward movement of warm, moist air. They can occur inside warm, moist air masses and at fronts. As the warm, moist air moves upward, it cools, condenses, and forms cumulonimbus clouds that can reach heights of greater than 35,000 ft. As the rising air reaches its dew point, water droplets and ice form and begin falling the long distance through the clouds towards earth's surface. As the droplets fall, they collide with other droplets and become larger. The falling droplets create a downdraft of air that spreads out at Earth's surface and causes strong winds associated with thunderstorms.

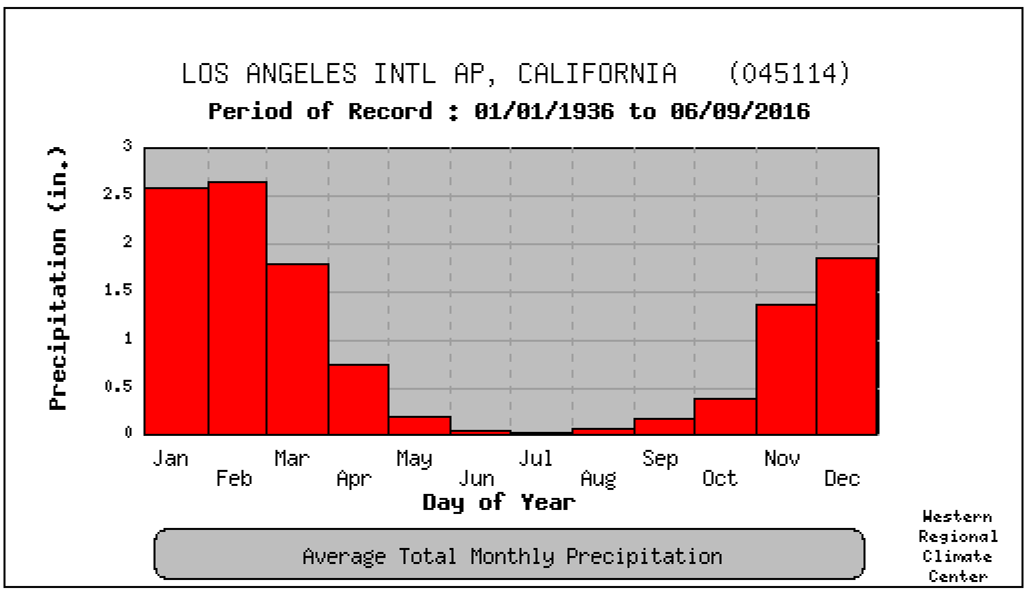
According to the HMPC, short-term, heavy storms can cause both widespread flooding as well as extensive localized drainage issues. This is true in District-owned areas, as much of the District properties are covered in impervious surfaces. With the increased growth of the surrounding area, the lack of adequate drainage systems has become an increasingly important issue. In addition to the flooding that often occurs during these storms, strong winds, when combined with saturated ground conditions, can down very mature trees.

Information from the Los Angeles International Airport weather station introduced in Section 4.2.1 Severe Weather: General, is summarized below.

#### Los Angeles County—Los Angeles International Airport Weather Station, Period of Record 1936 to 2016

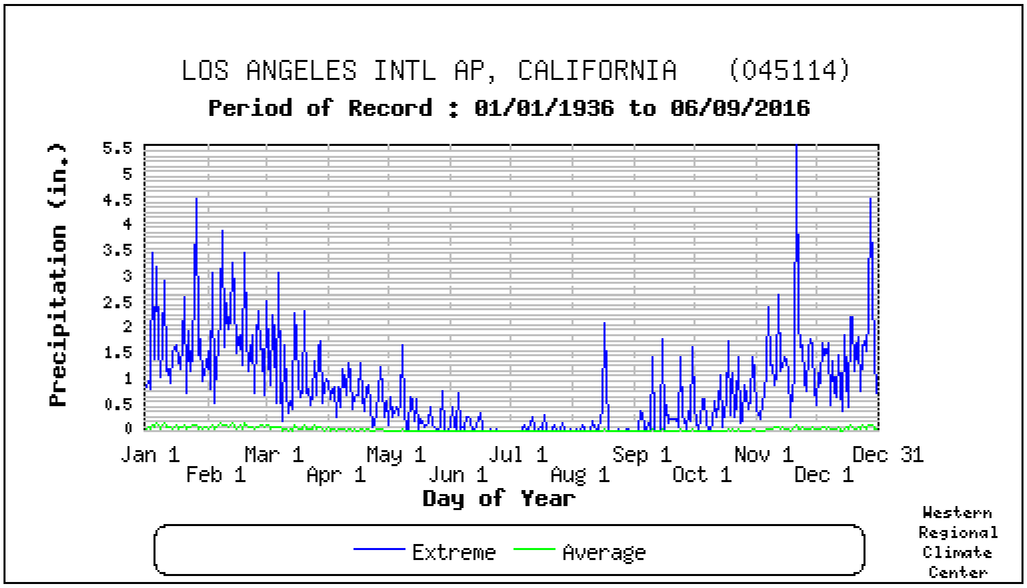
According to the WRCC, average annual precipitation in the District Planning Area and Los Angeles County is 12.02 inches per year. The highest recorded annual precipitation is 29.46 inches in 1983; the highest recorded precipitation for a 24-hour period is 5.60 inches on November 10, 1967. The lowest recorded annual precipitation was 0.00 inches in 1963. Average monthly precipitation for the Planning Area and Los Angeles County is shown in Figure 4-5. Daily average and extreme precipitations are shown in Figure 4-6.

*Figure 4-5 Los Angeles County—Monthly Average Total Precipitation*




Source: Western Regional Climate Center, www.wrcc.dri.edu/

*Figure 4-6 Los Angeles County—Daily Average and Extreme Precipitation*




Source: Western Regional Climate Center, www.wrcc.dri.edu/

## Hail

Hail can occur throughout the Planning Area during storm events. Hail is formed when water droplets freeze and thaw as they are thrown high into the upper atmosphere by the violent internal forces of thunderstorms. Hail is sometimes associated with severe storms within the District Planning Area. Hailstones are usually less than two inches in diameter and can fall at speeds of 120 miles per hour (mph). Severe hailstorms can be quite destructive, causing damage to roofs, buildings, automobiles, vegetation, and crops.

The National Weather Service classifies hail by diameter size, and corresponding everyday objects to help relay scope and severity to the population. Table 4-12 indicates the hailstone measurements utilized by the National Weather Service.

*Table 4-12 Hailstone Measurements*

| Average Diameter | Corresponding Household Object |
|---|---|
| .25 inch | Pea |
| .5 inch | Marble/Mothball |
| .75 inch | Dime/Penny |
| .875 inch | Nickel |
| 1.0 inch | Quarter |
| 1.5 inch | Ping-pong ball |
| 1.75 inch | Golf-Ball |
| 2.0 inch | Hen Egg |
| 2.5 inch | Tennis Ball |

| Average Diameter | Corresponding Household Object |
|---|---|
| 2.75 inch | Baseball |
| 3.00 inch | Teacup |
| 4.00 inch | Grapefruit |
| 4.5 inch | Softball |

Source: National Weather Service

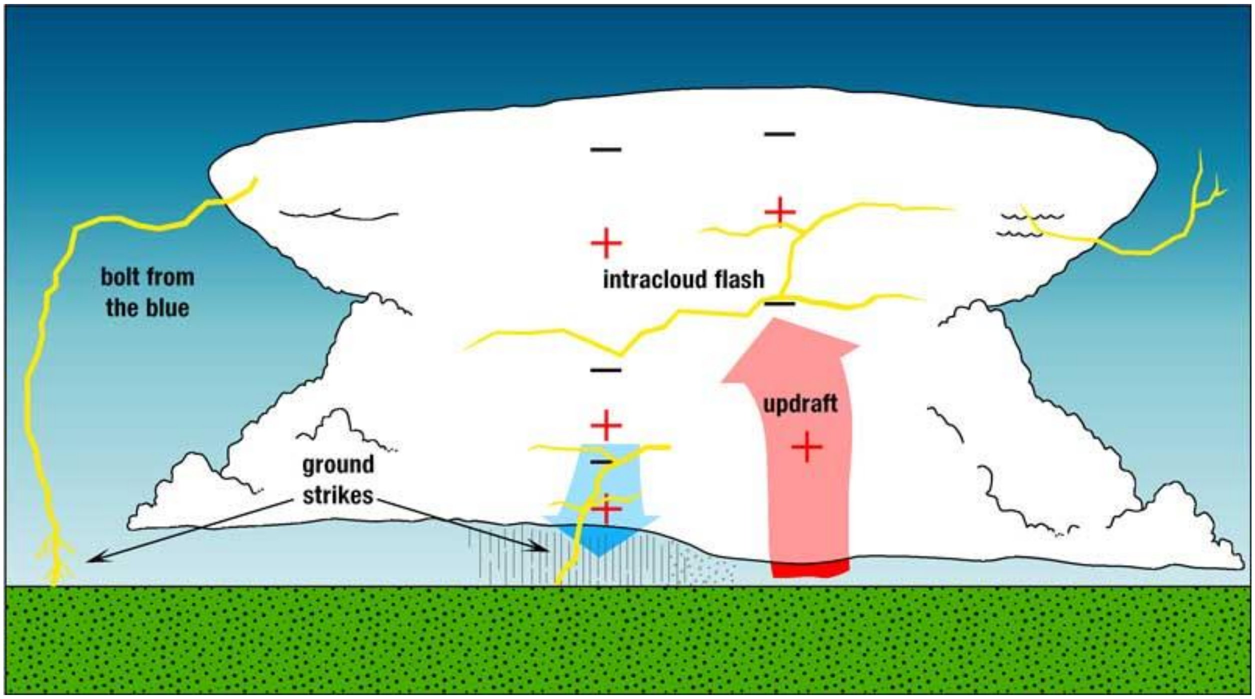
### Lightning

Lightning can occur throughout the County and District during storm events. Lightning is defined by the NWS as any and all of the various forms of visible electrical discharge caused by thunderstorms. Thunderstorms and lightning are usually (but not always) accompanied by rain. Cloud-to-ground lightning can kill or injure people by direct or indirect means. Objects can be struck directly, which may result in an explosion, burn, or total destruction. Or, damage may be indirect, when the current passes through or near an object, which generally results in less damage.

Intra-cloud lightning is the most common type of discharge. This occurs between oppositely charged centers within the same cloud. Usually it takes place inside the cloud and looks from the outside of the cloud like a diffuse brightening that flickers. However, the flash may exit the boundary of the cloud, and a bright channel, similar to a cloud-to-ground flash, can be visible for many miles.

Cloud-to-ground lightning is the most damaging and dangerous type of lightning, though it is also less common. Most flashes originate near the lower-negative charge center and deliver negative charge to earth. However, a large minority of flashes carry positive charge to earth. These positive flashes often occur during the dissipating stage of a thunderstorm's life. Positive flashes are also more common as a percentage of total ground strikes during the winter months. This type of lightning is particularly dangerous for several reasons. It frequently strikes away from the rain core, either ahead or behind the thunderstorm. It can strike as far as 5 or 10 miles from the storm in areas that most people do not consider to be a threat (see Figure 4-7). Positive lightning also has a longer duration, so fires are more easily ignited. And, when positive lightning strikes, it usually carries a high peak electrical current, potentially resulting in greater damage.

*Figure 4-7 Cloud to Ground Lightning*




Source: National Weather Service

## *Past Occurrences*

### Disaster Declaration History

A search of FEMA and Cal OES disaster declarations turned up multiple events. Heavy rains and storms have caused flooding in the County. Events where flooding resulted in a state or federal disaster declaration are shown in Table 4-13.

*Table 4-13 Los Angeles County – Disaster Declarations from Heavy Rain and Storms 1950-2018*

| Disaster Type | Federal Declarations | | State Declarations | |
|---|---|---|---|---|
| | Count | Years | Count | Years |
| Severe Storms | 7 | 1995 (twice), 1998, 2005 (twice), 2010, 2017 | 7 | 1964, 1995 (twice), 1998, 2005 (twice), 2010 |

Source: FEMA, Cal OES

### NCDC Events

The NCDC data recorded 46 hail, heavy rain, lightning, winter weather incidents for Los Angeles County since 1950. A summary of these events is shown in Table 4-14.

*Table 4-14 NCDC Severe Weather Events in Los Angeles County 1950-12/31/2017**

| Event Type | Number of Events | Deaths | Deaths (indirect | Injuries | Injuries (indirect) | Property Damage | Crop Damage |
|---|---|---|---|---|---|---|---|
| Hail | 25 | 0 | 0 | 0 | 0 | $3,500,000 | $0 |
| Heavy Rain | 12 | 0 | 0 | 4 | 0 | $5,000,000 | $0 |
| Lightning | 9 | 2 | 0 | 13 | 0 | $0 | $0 |
| Winter Storm | 57 | 0 | 0 | 0 | 0 | $0 | $0 |
| Winter Weather | 13 | 0 | 0 | 0 | 0 | $0 | $0 |
| **Total** | **116** | **2** | **0** | **17** | **0** | **$8,500,000** | **$0** |

Source: NCDC
*Note: Losses reflect totals for all impacted areas

### Hazard Mitigation Planning Committee Events

The HMPC noted the following events:

- **January 9, 2017** – Due to heavy rains and storms, Vinedale Elementary was in an evacuation zone. School was held at Glenwood Elementary for the day.
- **January 18 to January 23, 2017** – Severe storms and flooding hit the LAUSD Planning Area. Damages occurred to some of the LAUSD facilities. For example, repaired roof leaking at B3, S2, C32, D1, westside of Gym at Bethune Middle School, repaired roof leaking at Room 3, 19, 20, 22, 34, 38, 39, 40, and kitchen at Liberty Elementary School. The continuous downpour of rainfall for numerous days lead to investigation of the immediate repair to be done in the school. Among the work done were: washing of windows and wall for the main office as result of the flood and debris formation; emergency repair of the leak from the ceiling of the cafeteria serving area; providing temporary power at the main office as the result of the leaking roof and flooding; service done due to water intrusion/remediation-flooding to most of the parts of the main building and the unclogging of the rain gutter due to the debris that accumulated during the overwhelming oversupply of water at Nobel Middle School.
- OTHER SPECIFIC INSTANCES WHERE LAUSD WAS AFFECTED

## *Likelihood of Future Occurrence*

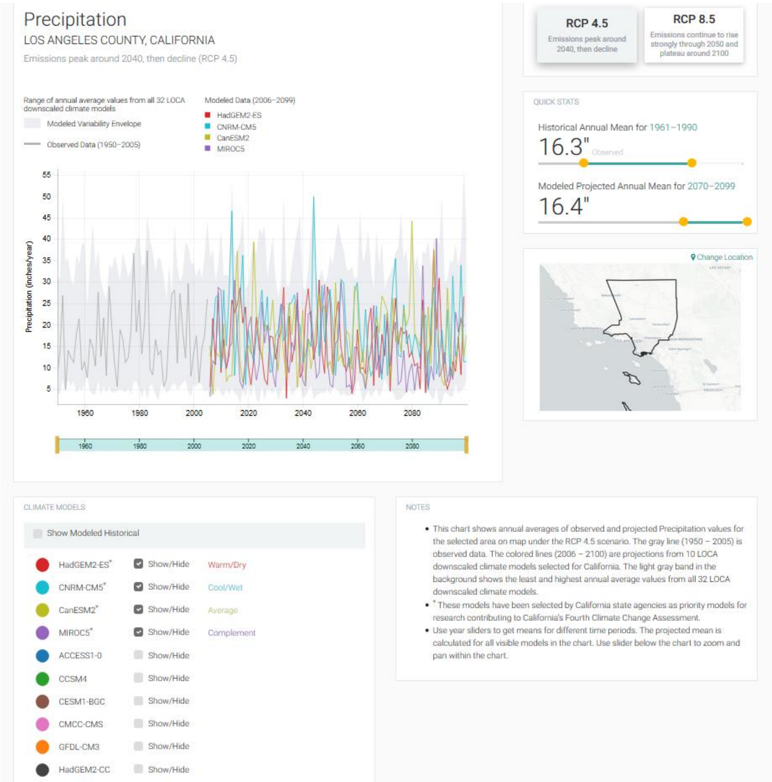
**Highly Likely** – Based on NCDC data and HMPC input, 116 heavy rain, hail, and lightning incidents over a 67-year period (1950-2017) equates to a severe storm event every year. As noted, this database likely doesn't capture all heavy rain, hail, and lightning events. Severe weather is a well-documented seasonal occurrence that will continue to occur often in the District Planning Area.

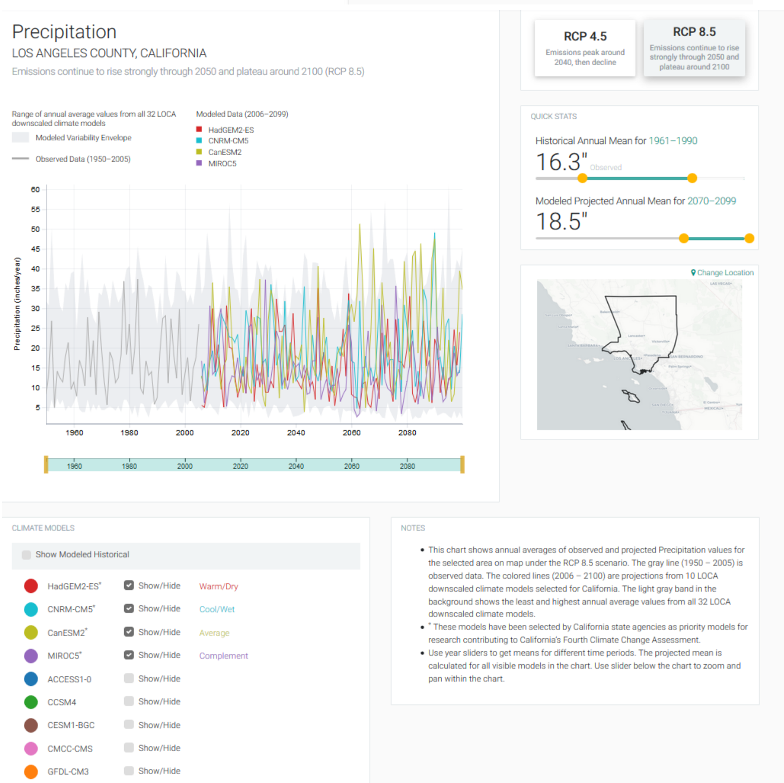
### Climate Change and Heavy Rains and Storms

According to the CAS, while average annual rainfall may increase or decrease slightly, the intensity of individual rainfall events is likely to increase during the 21st century. This may bring stronger thunderstorm winds. It is unlikely that hail will become more common in the District Planning Area. The amount of lightning and tornadoes is not projected to change.

Cal-Adapt noted that, on average, the projections show little change in total annual precipitation in California. These projections differ depending on the time of year and the type of measurement (highs vs. lows), all of which have different potential effects to the state's ecosystem health, agricultural production, water use and availability, and energy demand. On average, the projections show little change in total annual precipitation in California. Furthermore, among several models, precipitation projections do not show a consistent trend during the next century. The Mediterranean seasonal precipitation pattern is expected to continue, with most precipitation falling during winter from North Pacific storms. However, even modest changes would have a significant impact because California ecosystems are conditioned to historical precipitation levels and water resources are nearly fully utilized. Future precipitation estimates for the greater County are shown in Figure 4-8. The upper figure shows the low emissions scenario, and the lower figure shows the high emissions scenario. The lower emissions scenario shows only a 0.1 inch increase in annual precipitation, while the higher emissions scenario sees annual increases of 2.2 inches.

### *Figure 4-8 Los Angeles County– Future Precipitation Estimates: Low and High Emission Scenarios*




Source: Cal-Adapt – Precipitation: Decadal Averages Map

## 4.2.4. Severe Weather: High Winds and Tornadoes

### *Hazard/Problem Description*

#### High Winds

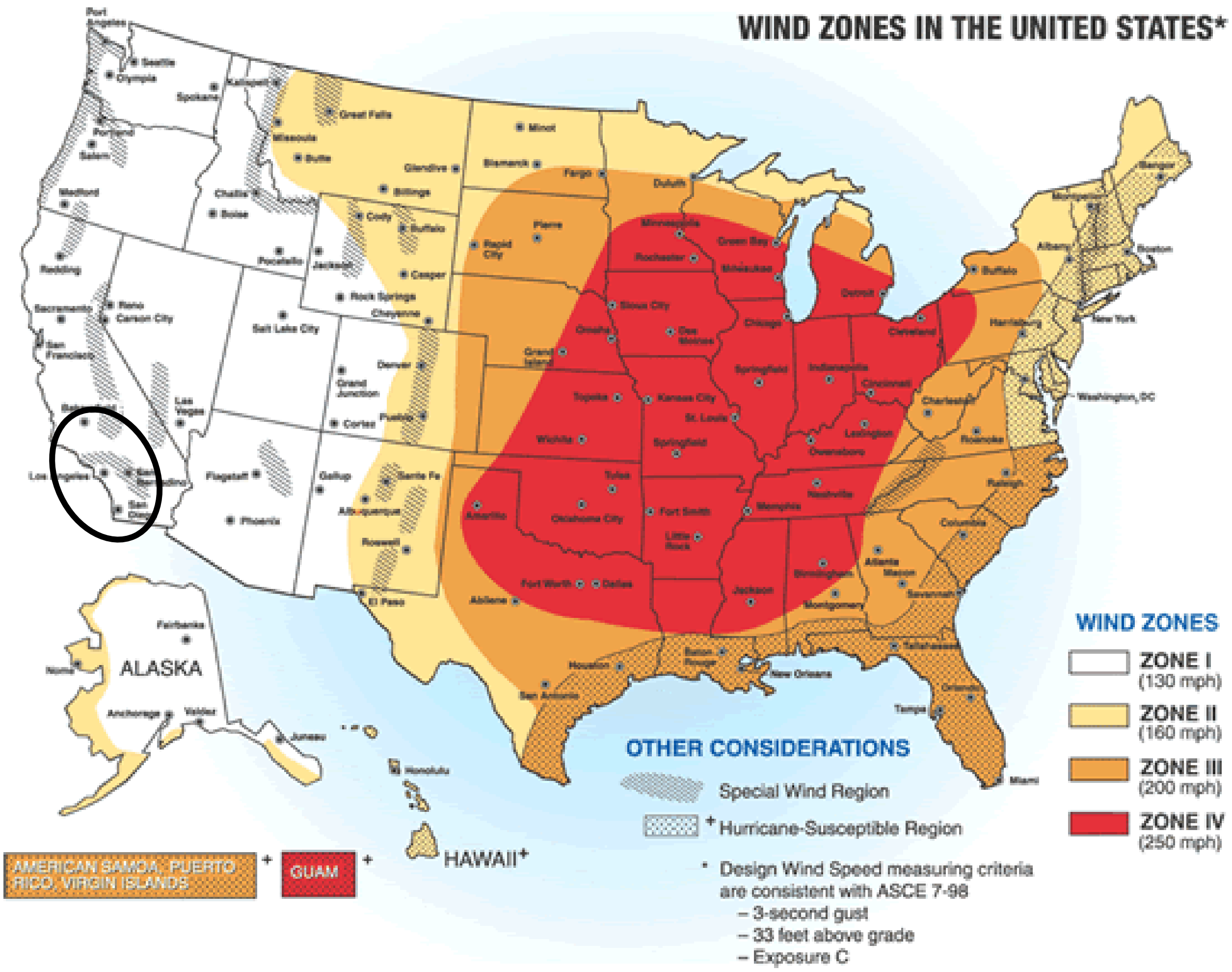
High winds, often accompanying severe storms and thunderstorms, can cause significant property damage including to public school facilities, threaten public safety, and have adverse economic impacts from business closures and power loss. Winds can also fan the flames of wildfire.

The entire Planning Area is subject to significant, non-tornadic (straight-line), winds. High winds, as defined by the NWS glossary, are sustained wind speeds of 40 mph or greater lasting for 1 hour or longer, or winds of 58 mph or greater for any duration. These winds may occur as part of a seasonal climate pattern or in relation to other severe weather events such as thunderstorms. Straight-line winds may also exacerbate existing weather conditions by increasing the effect on temperature and decreasing visibility due to the movement of particulate matters through the air, as in dust and snow storms. The winds may also exacerbate fire conditions by drying out the ground cover, propelling fuel around the region, and increasing the ferocity of exiting fires. These winds may damage crops, push automobiles off roads, damage roofs and structures, and cause secondary damage due to flying debris.

Of special concern in the District is Santa Ana winds. The NWS defines Santa Ana winds as strong downslope winds that blow through the mountain passes in southern California. Santa Ana winds often bring the lowest relative humidities of the year to coastal Southern California. These low humidities, combined with the warm, compressionally-heated airmass, plus the high wind speeds, create critical fire weather conditions. The combination of wind, heat, and dryness accompanying the Santa Ana winds turns the chaparral into explosive fuel feeding the infamous wildfires for which the region is known. Although the winds often have a destructive nature, they have some benefits as well. They cause cold water to rise from below the surface layer of the ocean, bringing with it many nutrients that ultimately benefit local fisheries.

Figure 4-9 depicts wind zones for the United States. The map denotes that Los Angeles County and the District fall into Zone I, which is characterized by high winds of up to 130 mph. Portions of the County and District, mostly bordering the San Gabriel Mountains, fall into a special wind region. These are areas where Santa Ana winds may occur.

*Figure 4-9 Wind Zones in the United States*

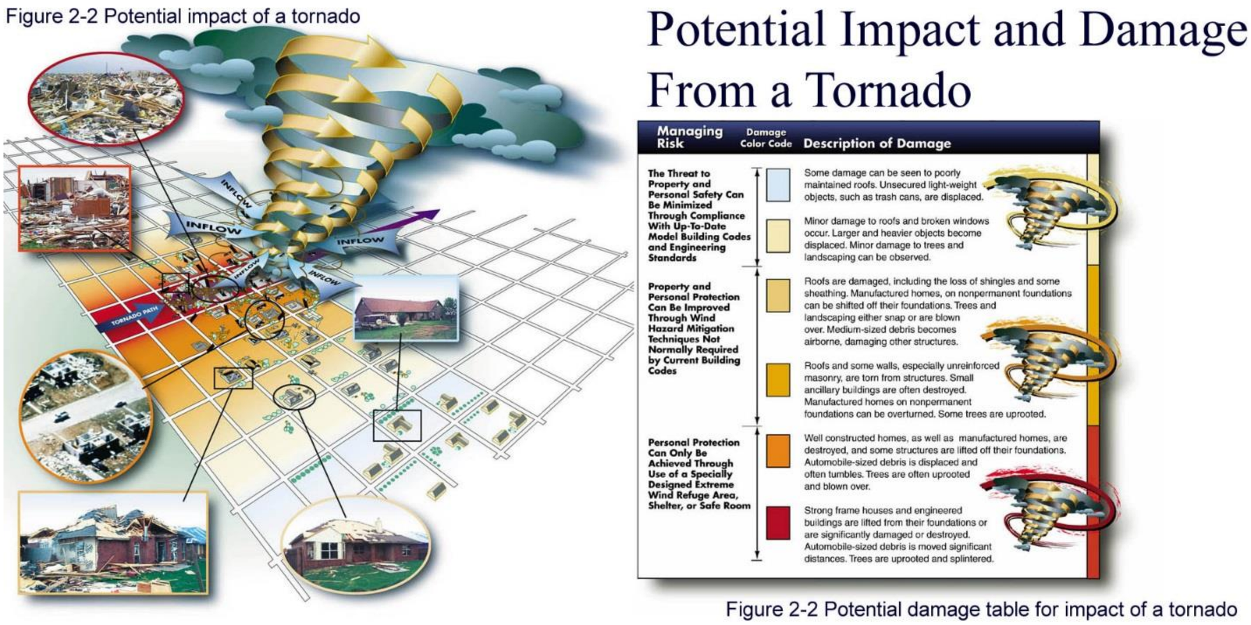



Source: Federal Emergency Management Agency

## Tornadoes

Tornadoes and funnel clouds can also occur during these types of severe storms. Tornadoes are another severe weather hazard that can affect anywhere within the District Planning Area, primarily during the rainy season in the late fall and early spring. Tornadoes form when cool, dry air sits on top of warm, moist air. Tornadoes are rotating columns of air marked by a funnel-shaped downward extension of a cumulonimbus cloud whirling at destructive speeds of up to 300 mph, usually accompanying a thunderstorm. Tornadoes are the most powerful storms that exist. They can have the same pressure differential across a path only 300 yards wide or less as 300-mile-wide hurricanes. Figure 4-10 illustrates the potential impact and damage from a tornado.

### *Figure 4-10 Potential Impact and Damage from a Tornado*




Source: FEMA: Building Performance Assessment: Oklahoma and Kansas Tornadoes

Prior to February 1, 2007, tornado intensity was measured by the Fujita (F) scale. This scale was revised and is now the Enhanced Fujita scale. Both scales are sets of wind estimates (not measurements) based on damage. The new scale provides more damage indicators (28) and associated degrees of damage, allowing for more detailed analysis and better correlation between damage and wind speed. It is also more precise because it considers the materials affected and the construction of structures damaged by a tornado. Table 4-15 shows the wind speeds associated with the original Fujita scale ratings and the damage that could result at different levels of intensity. Table 4-16 shows the wind speeds associated with the Enhanced Fujita Scale ratings.

### *Table 4-15 Original Fujita Scale*

| Fujita (F) Scale | Fujita Scale Wind Estimate (mph) | Typical Damage |
|---|---|---|
| F0 | < 73 | Light damage. Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged. |
| F1 | 73-112 | Moderate damage. Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads. |
| F2 | 113-157 | Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground. |
| F3 | 158-206 | Severe damage. Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown. |
| F4 | 207-260 | Devastating damage. Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown, and large missiles generated. |

| Fujita (F) Scale | Fujita Scale Wind Estimate (mph) | Typical Damage |
|---|---|---|
| F5 | 261-318 | Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yards); trees debarked; incredible phenomena will occur. |

Source: National Oceanic and Atmospheric Administration Storm Prediction Center, www.spc.noaa.gov/faq/tornado/f-scale.html

### *Table 4-16 Enhanced Fujita Scale*

| Enhanced Fujita (EF) Scale | Enhanced Fujita Scale Wind Estimate (mph) |
|---|---|
| EF0 | 65-85 |
| EF1 | 86-110 |
| EF2 | 111-135 |
| EF3 | 136-165 |
| EF4 | 166-200 |
| EF5 | Over 200 |

Source: National Oceanic and Atmospheric Administration Storm Prediction Center, www.spc.noaa.gov/faq/tornado/ef-scale.html

Tornadoes can cause damage to property and loss of life. While most tornado damage is caused by violent winds, the majority of injuries and deaths generally result from flying debris. Property damage can include damage to buildings, fallen trees and power lines, broken gas lines, broken sewer and water mains, and the outbreak of fires. Access roads and streets may be blocked by debris, delaying necessary emergency response.

## *Past Occurrences*

### Disaster Declaration History

There have been no past federal and one state disaster declarations due to high winds, as shown in Table 4-17.

### *Table 4-17 Los Angeles County – Disaster Declarations from High Winds and Tornadoes 1950-2018*

| Disaster Type | Federal Declarations | | State Declarations | |
|---|---|---|---|---|
| | Count | Years | Count | Years |
| High Winds | 0 | – | 1 | 1983 |

Source: CAL OES, FEMA

### NCDC Events

The NCDC data recorded 322 high wind and tornado incidents for Los Angeles County since 1950. A summary of these events is shown in Table 4-18.

*Table 4-18 NCDC Severe Weather Events in Los Angeles County 1950 – 12/31/2017**

| Event Type | Number of Events | Deaths | Deaths (indirect | Injuries | Injuries (indirect) | Property Damage | Crop Damage |
|---|---|---|---|---|---|---|---|
| Dust Devil | 4 | 0 | 0 | 0 | 0 | $0 | $0 |
| Funnel Cloud | 9 | 0 | 0 | 0 | 0 | $0 | $0 |
| High Wind | 198 | 2 | 0 | 3 | 0 | $0 | $0 |
| Strong Wind | 3 | 0 | 0 | 7 | 0 | $50,000 | $0 |
| Thunderstorm Wind | 59 | 0 | 0 | 10 | 0 | $55,000 | $0 |
| Tornado | 44 | 0 | 0 | 45 | 0 | $38,695,250 | $0 |
| Waterspout | 5 | 0 | 0 | 0 | 0 | $0 | $0 |
| **Total** | **322** | **2** | **0** | **65** | **0** | **$38,800,250** | **$0** |

Source: NCDC

*Note: Losses reflect totals for all impacted areas

### Hazard Mitigation Planning Committee Events

- **April 12, 2018** – Strong wind blew off roofing materials to rooms S & R (bungalow) during the night at Valley Alternative Magnet. The District checked the asbestos book and the roofing materials were negative for asbestos. Maintenance workers cleaned up roofing debris. Roofing Dept. was at the school site to secure the roof and assess the roof to order materials to start the repairs the following. OEHS Safety Officer was on site and stated that the classroom does not need to be relocated at this time. However; the classroom was relocated Monday through Wednesday of next week while repairs were in progress. There was swing space at the school site.
- INSERT EVENTS THAT AFFECTED THE DISTRICT

## *Likelihood of Future Occurrence*

**Highly Likely** – Based on NCDC data and HMPC input, 322 wind incidents over a 63-year period (1955-2017) equates to a severe wind event at least every year. However, as noted, this database likely doesn't capture all wind events. High winds are a well-documented seasonal occurrence that will continue to occur annually in the District Planning Area. Tornadoes are not as likely in the Planning Area, but do occur from time to time.

### Climate Change and High Winds

According to the CAS, while average annual rainfall may increase or decrease slightly, the intensity of individual thunderstorm events is likely to increase during the 21$^{st}$ century. This may bring stronger thunderstorm winds. The CAS does not discuss non-thunderstorm winds.

## 4.2.5. Climate Change and Sea Level Rise

### *Hazard/Problem Description*

#### Climate Change

Climate change is the distinct change in measures of weather patterns over a long period of time, ranging from decades to millions of years. More specifically, it may be a change in average weather conditions such as temperature, rainfall, snow, ocean and atmospheric circulation, or in the distribution of weather around the average. While the Earth's climate has cycled over its 4.5-billion-year age, these natural cycles have taken place gradually over millennia, and the Holocene, the most recent epoch in which human civilization developed, has been characterized by a highly stable climate – until recently.

This LHMP Update is concerned with human-induced climate change that has been rapidly warming the Earth at rates unprecedented in the last 1,000 years. Since industrialization began in the 19th century, the burning of fossil fuels (coal, oil, and natural gas) at escalating quantities has released vast amounts of carbon dioxide and other greenhouse gases responsible for trapping heat in the atmosphere, increasing the average temperature of the Earth. Secondary impacts include changes in precipitation patterns, the global water cycle, melting glaciers and ice caps, and rising sea levels. According to the Intergovernmental Panel on Climate Change (IPCC), climate change will "increase the likelihood of severe, pervasive and irreversible impacts for people and ecosystems" if unchecked.

Through changes to oceanic and atmospheric circulation cycles and increasing heat, climate change affects weather systems around the world. Climate change increases the likelihood and exacerbates the severity of extreme weather – more frequent or intense storms, floods, droughts, and heat waves. Consequences for human society include loss of life and injury, damaged infrastructure, long-term health effects, loss of agricultural crops, disrupted transport and freight, and more. Climate change is not a discrete event but a long-term hazard, the effects of which communities are already experiencing.

Climate change adaptation is a key priority of the State of California. The 2018 State of California Multi-Hazard Mitigation Plan stated that climate change is already affecting California. Sea levels have risen by as much as seven inches along the California coast over the last century, increasing erosion and pressure on the state's infrastructure, water supplies, and natural resources. The State has also seen increased average temperatures, more extreme hot days, fewer cold nights, a lengthening of the growing season, shifts in the water cycle with less winter precipitation falling as snow, and earlier runoff of both snowmelt and rainwater in the year. In addition to changes in average temperatures, sea level, and precipitation patterns, the intensity of extreme weather events is also changing.

In Los Angeles County and within the LAUSD Planning Area, the HMPC noted that each year it seems to get a bit warmer. California's Adaptation Planning Guide: Understanding Regional Characteristics has divided California into 11 different regions based on political boundaries, projected climate impacts, existing environmental setting, socioeconomic factors and regional designations. Los Angeles County and the District Planning Area fall within the South Coast Region. The South Coast (16+ million people) is the most heavily urbanized region in the state. The region consists of sprawling suburban development interspersed with dense urban centers, most notably Los Angeles (3.8+ million people) and San Diego (1.3+

million people). The character of the region is defined by the predominant feature of the Southern California coastline, accompanied by the San Gabriel Mountains and coastal mountains to the south. Corners of the region, such as the high desert community of Lancaster, differ substantially in context. However, the most prominent regional feature is the sprawling coastal metropolis along a coastal plain, interspersed with low-lying hills and a few inland areas such as the San Fernando and San Gabriel valleys. Table 4-19 provides a summary of Cal-Adapt Climate Projections for the South Coast Region.

*Table 4-19 Los Angeles County – Cal Adapt Climate Projections*

| Effect | Ranges |
|---|---|
| Temperature Change, 1990-2100 | January increase in average temperatures: 1°F to 2.5°F by 2050 and 5°F to 6°F by 2100<br>July increase in average temperatures: 3°F to 4°F by 2050 and 5°F to 10°F by 2100 with larger increases projected inland. (Modeled average temperatures; high emissions scenario) |
| Precipitation | Annual precipitation will vary by area but will decline overall throughout the century. Low-lying coastal areas will lose up to 2 inches by 2050 and 3 to 5 inches by 2090, while high elevations will see a drop of 4 to 5 inches by 2050 and 8 to 10 inches by 2090. (CCSM3 climate model; high carbon emissions scenario) |
| Sea Level Rise | By 2100, sea levels may rise up to 66 inches, posing considerable threats to coastal areas in the region including Venice Beach, the Port of Long Beach, the South Coast naval stations, and San Diego Harbor. As a result of sea level rise, 45 percent more land in Los Angeles County, 40 percent more land in San Diego County, 35 percent more land in Ventura County, and 28 percent more land in Orange County will be vulnerable to 100-year floods. |
| Heat wave | Along the coast, a heat wave is five days over temperature in the 80s. Inland, the temperature must hit the 90s and 100s for five days. All areas can expect 3 to 5 more heat waves by 2050 and 12 to 14 by 2100 in most areas of the region. |
| Snowpack | March snowpack in the San Gabriel Mountains will decrease from the 0.7-inch level in 2010 to zero by the end of the century. (CCSM3 climate model; high emissions scenario) |
| Wildfire | Little change is projected in the already high-fire risk in this region, save for slight increases expected in a few coastal mountainous areas such as near Ojai and in Castaic, Fallbrook, and Mission Viejo. |

Source: February 2017 Climate Change and Health Profile Report – Los Angeles County. CDPH and UC Davis.

## Sea Level Rise

In the past decade, there have been groundbreaking studies and an increased public awareness on the worldwide effects of climate change associated with global warming. Studies continue to document that global warming is continuing at progressive rates, which has been demonstrated by warmer and colder seasonal temperatures and patterns of more severe seasonal storm events. It is projected that sea levels will continue to rise as precipitation continues to increase and ice caps continue to melt. There are number of geographic areas of the LAUSD Planning Area that are at risk for flooding and will be dramatically impacted by sea level rise. These geographic areas include properties with low-lying elevations (most at sea level), and areas that are now filled and were once marshland.

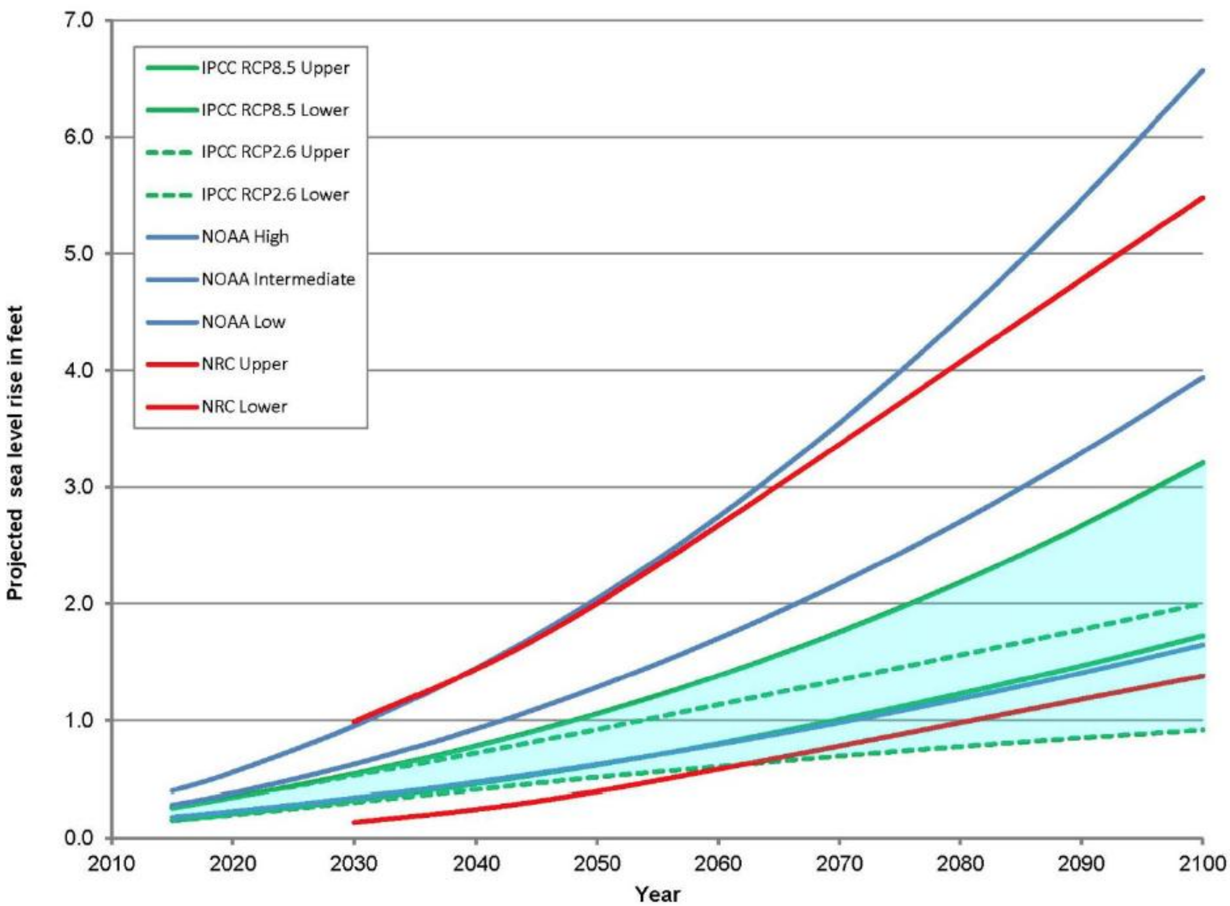
Climate change is expected to usher in an era of higher temperatures, increased precipitation and/or severe drought, and increased rates of sea level rise around the world. According to the National Research Council (NRC), global sea level has risen at an increasing rate since the late 19th/early 20th Century, when global temperatures first started to rise. Climate researchers believe sea level rise will drive storm surge and wave run-up higher than current conditions, thereby causing more extensive and frequent coastal, storm-driven flooding.

Tides, wave-driven run-up, and storms play the most critical roles in coastal flooding in Southern California, especially when big wave storms occur at or near peak high tides. Sea level rise slowly but inexorably exacerbates these effects by making the occurrence of extreme total high water levels more and more frequent over time.

As a result, climate researchers believe storms will impact the West Coast more powerfully in the future because sea level rise will raise wave run-up (or maximum vertical extent of wave up-rush on a beach) and storm surge, thereby causing more erosion and more extensive and frequent flooding and damages.

Figure 4-11 shows the variable range of future sea rise forecasts as predicted by NOAA, the State of California and NRC, and the IPCC. The blue lines represent the low, intermediate, and upper estimates by NOAA in 2012. The red lines show the probable range as predicted by the State's 2012 NRC sponsored study. The light blue band, represents the most recent forecast range published by the IPCC in 2013 using an improved understanding of the science involved and advanced numerical modeling techniques.

*Figure 4-11 Future Sea Level Rise Forecast for California*




Source: NOAA

The continued rise in sea level will increase inundation of low coastal areas. Near shore wave heights and wave energy will increase, intensifying the potential for storm damage, beach erosion, and bluff retreat. Ports and harbors will have reduced cargo transfer capability as ships ride higher along the dock. Wetlands can become inundated and degraded by salt water intrusion with resulting impacts related to land subsidence, loss of habitat for fish and wildlife, and loss of esthetic, recreational and commercial uses among others. Intact wetlands can serve as a buffer to flooding events by increasing flood capacity, restore ground water recharge and reduce the need for pumping, protect water quality and provide water supply reliability for the benefit of our communities.

## *Past Occurrences*

### Disaster Declaration History

Climate change and sea level rise has never been directly linked to any declared disasters.

### NCDC Events

The NCDC does not track climate change and sea level rise events.

### Hazard Mitigation Planning Committee Events

Past flooding, wildfire, levee failure, and drought disasters may have been exacerbated by climate change, but it is impossible to make direct connections to individual events. Unlike earthquake and floods that occur over a finite time period, climate change is a slow onset, long-term hazard, the effects of which some communities may already be already experiencing, but for which little empirical data exists. Further, given the science, it is likely that measurable effects may not be seriously experienced for years, decades, or may be avoided altogether by mitigation actions taken today.

The District noted that it seems that the summers have been getting hotter; cooling centers are being opened more frequently. The following on climate change events was also noted:

- When it rains, the data shows that storms are more intense
- Droughts seem more intense and extended
- Because of trend with increased temperatures – longer droughts and increased heat contributes to wildfire conditions
- It is a slow-moving disaster

VERIFY

## *Likelihood of Future Occurrence*

**Highly Likely** – Climate change is virtually certain to continue without immediate and effective global action. According to NASA, 2016 was one of the hottest year on record, and 15 of the 17 hottest years ever have occurred since 2000. Without significant global action to reduce greenhouse gas emissions, the IPCC concludes in its Fifth Assessment Synthesis Report (2014) that average global temperatures are likely to exceed 1.5°C by the end of the 21st century, with consequences for people, assets, economies and ecosystems, including risks from heat stress, storms and extreme precipitation, inland and coastal flooding, landslides, air pollution, drought, water scarcity, sea level rise and storm surges.

## Climate Scenarios

The United Nations IPCC developed several greenhouse gas (GHG) emissions scenarios based on differing sets of assumptions about future economic growth, population growth, fossil fuel use, and other factors. The emissions scenarios range from "business-as-usual" (i.e., minimal change in the current emissions trends) to more progressive (i.e., international leaders implement aggressive emissions reductions policies). Each of these scenarios leads to a corresponding GHG concentration, which is then used in climate models to examine how the climate may react to varying levels of GHGs. Climate researchers use many global climate models to assess the potential changes in climate due to increased GHGs.

### Key Uncertainties Associated with Climate Projections

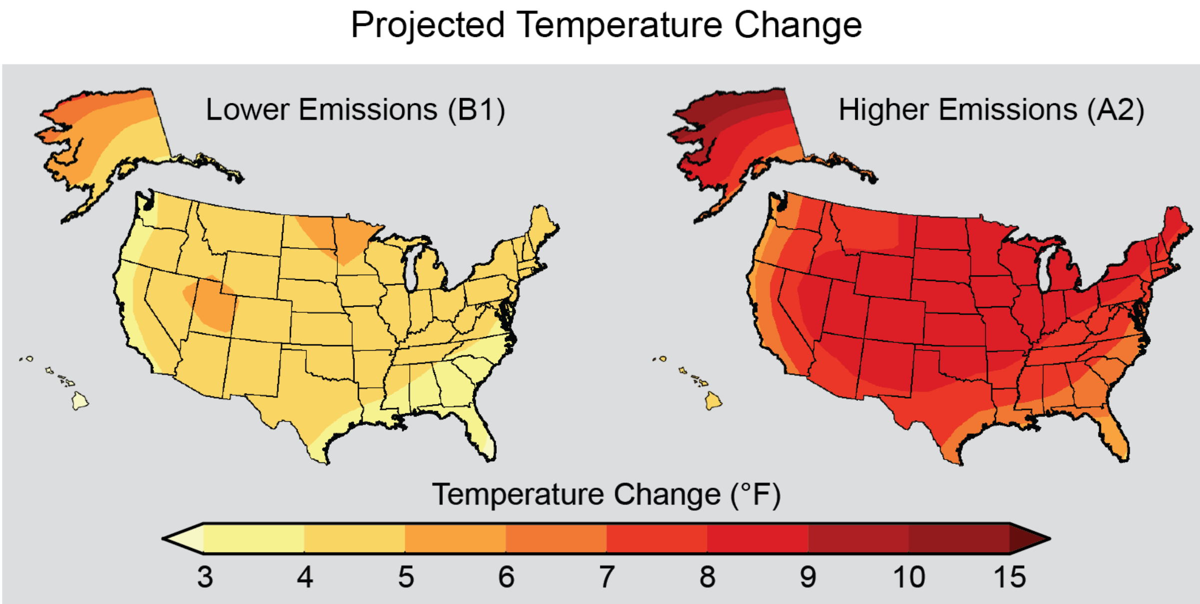
- Climate projections and impacts, like other types of research about future conditions, are characterized by uncertainty. Climate projection uncertainties include but are not limited to:
  - ✓ Levels of future greenhouse gas concentrations and other radiatively important gases and aerosols,
  - ✓ Sensitivity of the climate system to greenhouse gas concentrations and other radiatively important gases and aerosols,
  - ✓ Inherent climate variability, and
  - ✓ Changes in local physical processes (such as afternoon sea breezes) that are not captured by global climate models.

Even though precise quantitative climate projections at the local scale are characterized by uncertainties, the information provided can help identify the potential risks associated with climate variability/climate change and support long term mitigation and adaptation planning.

Following are excerpts from the Global Climate Change Impacts report that show the magnitude of the observed and projected changes in annual average temperature. It is important to discuss these projected temperature changes, as heat is a major driver of climate and climate related phenomena. The map for the period around 2000 shows that most areas of the United States have warmed 1 to 2°F compared to the 1960s and 1970s. Although not reflected in these maps of annual average temperature, this warming has generally resulted in longer warm seasons and shorter, less intense cold seasons. The average warming for the country as a whole is shown on the thermometers adjacent to each map. By the end of the century, the average U.S. temperature is projected to increase by approximately 7 to 11°F under the higher emissions scenario and by approximately 4 to 6.5°F under the lower emissions scenario.

Maps show projected change in average surface air temperature in the later part of this century (2071-2099) relative to the later part of the last century (1970-1999) under a scenario that assumes substantial reductions in heat trapping gases and a higher emissions scenario that assumes continued increases in global emissions. These are shown in Figure 4-12.

*Figure 4-12 Projected Temperature Change – Lower and Higher Emissions Scenario*




Source: National Climate Assessment

According to the California Natural Resource Agency (CNRA), climate change is already affecting California and is projected to continue to do so well into the foreseeable future. Current and projected changes include increased temperatures, sea level rise, a reduced winter snowpack altered precipitation patterns, and more frequent storm events. Over the long term, reducing greenhouse gases can help make these changes less severe, but the changes cannot be avoided entirely. Unavoidable climate impacts can result in a variety of secondary consequences including detrimental impacts on human health and safety, economic continuity, ecosystem integrity and provision of basic services.

The CAS delineated how climate change may impact and exacerbate natural hazards in the future, including wildfires, extreme heat, floods, and drought:

- Climate change is expected to lead to increases in the frequency, intensity, and duration of extreme heat events and heat waves in Los Angeles County, the LAUSD Planning Area, and the rest of California, which are likely to increase the risk of mortality and morbidity due to heat-related illness and exacerbation of existing chronic health conditions. Those most at risk and vulnerable to climate-related illness are the elderly, individuals with chronic conditions such as heart and lung disease, diabetes, and mental illnesses, infants, the socially or economically disadvantaged, and those who work outdoors.
- Higher temperatures will melt the Sierra snowpack earlier and drive the snowline higher, resulting in less snowpack to supply water to California users.
- Droughts are likely to become more frequent and persistent in the 21st century.
- Intense rainfall events, periodically ones with larger than historical runoff, will continue to affect California with more frequent and/or more extensive flooding.
- Storms and snowmelt may coincide and produce higher winter runoff from the landward side, while accelerating sea-level rise will produce higher storm surges during coastal storms. Together, these

changes may increase the probability of floods and levee and dam failures, along with creating issues related to salt water intrusion.

- Warmer weather, reduced snowpack, and earlier snowmelt can be expected to increase wildfire through fuel hazards and ignition risks. These changes can also increase plant moisture stress and insect populations, both of which affect forest health and reduce forest resilience to wildfires. An increase in wildfire intensity and extent will increase public safety risks, property damage, fire suppression and emergency response costs to government, watershed and water quality impacts, vegetation conversions and habitat fragmentation.

### 4.2.6. Dam Failure

#### *Hazard/Problem Description*

Dams are manmade structures built for a variety of uses including flood protection, power generation, agriculture, water supply, and recreation. When dams are constructed for flood protection, they are usually engineered to withstand a flood with a computed risk of occurrence. For example, a dam may be designed to contain a flood at a location on a stream that has a certain probability of occurring in any one year. If prolonged periods of rainfall and flooding occur that exceed the design requirements, that structure may be overtopped or fail. Overtopping is the primary cause of earthen dam failure in the United States.

Dam failures can also result from any one or a combination of the following causes:

- Earthquake;
- Inadequate spillway capacity resulting in excess overtopping flows;
- Internal erosion caused by embankment or foundation leakage, or piping or rodent activity;
- Improper design;
- Improper maintenance;
- Negligent operation; and/or
- Failure of upstream dams on the same waterway.

Water released by a failed dam generates tremendous energy and can cause a flood that is catastrophic to life and property. A catastrophic dam failure could challenge local response capabilities and require evacuations to save lives. Impacts to life safety will depend on the warning time and the resources available to notify and evacuate the public. Major loss of life could result as well as potentially catastrophic effects to roads, bridges, homes, and other infrastructure such as schools. Electric generating facilities and transmission lines could also be damaged and affect life support systems in communities outside the immediate hazard area. Associated water supply, water quality and health concerns could also be an issue. Factors that influence the potential severity of a full or partial dam failure are the amount of water impounded; the density, type, and value of development and infrastructure located downstream; and the speed of failure.

In general, there are three types of dams: concrete arch or hydraulic fill, earth and rockfill, and concrete gravity. Each type of dam has different failure characteristics. A concrete arch or hydraulic fill dam can fail almost instantaneously; the flood wave builds up rapidly to a peak then gradually declines. An earth-rockfill dam fails gradually due to erosion of the breach; a flood wave will build gradually to a peak and then decline until the reservoir is empty. And, a concrete gravity dam can fail instantaneously or gradually with a corresponding buildup and decline of the flood wave.

The Cal DWR Division of Safety of Dams has jurisdiction over impoundments that meet certain capacity and height criteria. Embankments that are less than six feet high and impoundments that can store less than 15 acre-feet are non-jurisdictional. Additionally, dams that are less than 25 feet high can impound up to 50 acre-feet without being jurisdictional. Cal DWR, Division of Safety of Dams (DSOD) assigns hazard ratings to large dams within the State. The following two factors are considered when assigning hazard ratings: existing land use and land use controls (zoning) downstream of the dam. Dams are classified in three categories that identify the potential hazard to life and property:

- **High hazard** indicates that a failure would most probably result in the loss of life
- **Significant hazard** indicates that a failure could result in appreciable property damage
- **Low hazard** indicates that failure would result in only minimal property damage and loss of life is unlikely

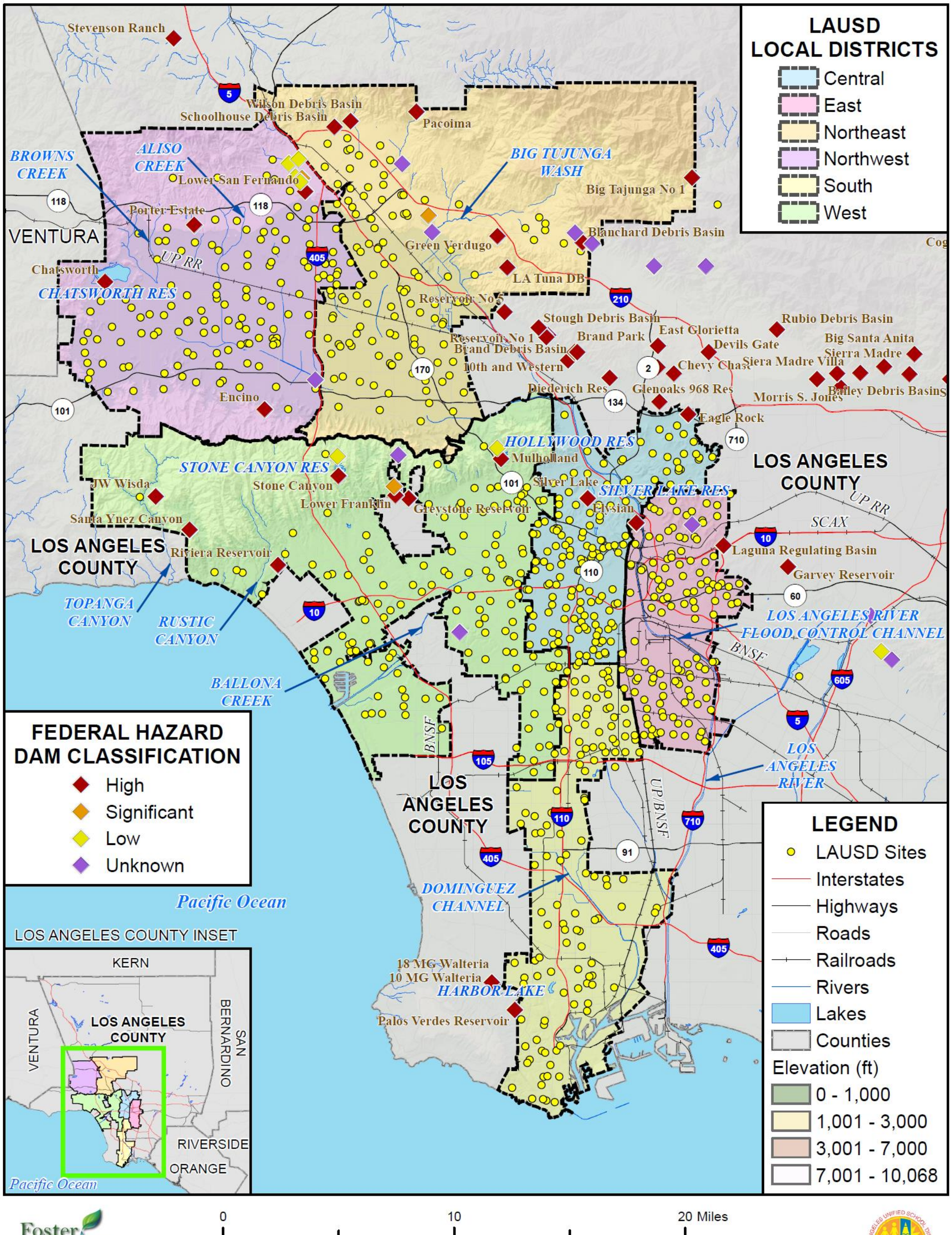
According to data provided by Los Angeles County, Cal DWR, and Cal OES, there are 110 dams in Los Angeles County that were constructed for flood control, storage, treatment impoundments, electrical generation, and recreational purposes. Of the 110 dams, 82 are rated as High Hazard, 5 as Significant Hazard, 8 as Low Hazard, and 17 were not rated. Figure 4-13 identifies the 110 dams located in the Los Angeles County Planning Area. Table 4-20 gives information about each dam, including whether that dam has a mapped inundation area, and whether the inundation area affects LAUSD buildings.

It should be noted that 60 of the 110 dams in Los Angeles County have inundation mapping. Of the mapped areas:

- 34 inundation areas intersect the LAUSD Planning Area
- 13 inundation areas intersect LAUSD Sites

More information on these can be found in the dam failure vulnerability discussion in Section 4.3.4.

## *Figure 4-13 Los Angeles County Dam Inventory*




Data Source: Cal OES Dam Status 3/2018, LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

### *Table 4-20 Los Angeles County Dam Inventory*

| Name | Purpose | Hazard Classification | Dam Type | River/Stream | Structural Height (ft) | Maximum Storage (acre-ft) | Mapped/ Affecting LAUSD |
|---|---|---|---|---|---|---|---|
| 10 MG Walteria | Water Supply | High | Earth | Offstream | 41 | 31 | Y/N |
| 10th and Western | Water Supply | High | Rockfill | Offstream | 28 | 46 | Y/N |
| 18 MG Walteria | Water Supply | High | Earth | Offstream | 31 | 58 | Y/N |
| Amargosa Creek | Flood Control | High | Rockfill | Amargosa Creek | 66 | 1,187 | N/– |
| Ascot | – | Not rated | – | – | – | – | N/– |
| Bailey Debris Basin | Flood Control | High | Rockfill | Bailey Canal Wash | 44 | 49 | N/– |
| Baldwin Hills Reservoir | – | Not rated | – | – | – | – | N/– |
| Big Dalton | Flood Control | High | – | Big Dalton Wash | 155 | 1,291 | N/– |
| Big Dalton Debris Basin | Flood Control | High | Rockfill | Big Dalton Wash | 60 | 193 | N/– |
| Big Santa Anita | Irrigation | High | Arch | Tributary of Rio Hondo | 228 | 858 | N/– |
| Big Tajunga No 1 | Flood Control | High | Arch | Big Tujunga Creek | 211 | 5,752 | Y/N |
| Blanchard Debris Basin | Flood Control | High | Rockfill | Blanchard Canal | 36 | 26 | N/– |
| Blanchard M1 | – | Not rated | – | – | – | – | N/– |
| Bouquet Canyon | Water Supply | High | Rockfill | Bouquet Creek | 193 | 36,519 | N/– |
| Brand Debris Basin | Flood Control | High | Rockfill | Brand Debris Basin | 46 | 42 | N/– |
| Brand Park | Water Supply | High | Rockfill | Offstream | 101 | 32 | N/– |
| Brown Mountain Barrier | – | Not rated | – | – | – | – | N/– |
| Castaic | Irrigation | High | Rockfill | Castaic Creek | 345 | 323,827 | N/– |
| Century | Water Supply | High | – | Malibu Creek | 45 | 70 | N/– |
| Channel Diversion Dike | Flood Control | Low | Rockfill | Storm Drain Channel | 43 | 437 | N/– |
| Chatsworth | Water Supply | High | – | Tributary of Los Angeles River | 46 | 9,890 | N/– |
| Chevy Chase | – | High | – | – | – | – | Y/N |

| Name | Purpose | Hazard Classification | Dam Type | River/Stream | Structural Height (ft) | Maximum Storage (acre-ft) | Mapped/ Affecting LAUSD |
|---|---|---|---|---|---|---|---|
| Chevy Chase 1290 | Water Supply | High | Rockfill | Tributary of Sycamore Canal | 91 | 17 | Y/N |
| Cogswell | Irrigation | High | Rockfill | West Fork of San Gabriel River | 270 | 8,973 | N/– |
| Devils Gate | Flood Control | High | Gravity | Arroyo Seco | 110 | 2,601 | Y/Y |
| Diederich Res | Water Supply | High | Rockfill | Offstream | 61 | 174 | Y/N |
| Drinkwater | Hydroelectric | High | Rockfill | Offstream | 107 | 92 | N/– |
| Dry Canyon | Irrigation | High | – | Dry Canyon Creek | 67 | 1,140 | N/N |
| Eagle Rock | Water Supply | High | Rockfill | Offstream | 115 | 254 | Y/Y |
| East Glorietta | Water Supply | High | Earth | Tributary of Verdugo Canal | 22 | 71 | Y/N |
| Eaton Wash Debris Basin | Flood Control | High | Rockfill | Eaton Wash | 64 | 721 | N/– |
| Eldenberry Forebay | Water Supply | Low | Rockfill | Castaic Creek | 182 | 27,711 | N/– |
| Elysian | Water Supply | High | Rockfill | Tributary of Los Angeles River | 72 | 167 | Y/N |
| Encino | Water Supply | High | Rockfill | Encino Creek | 170 | 9,793 | Y/Y |
| Fairmont | Flood Control | Significant | – | Antelope Valley | 123 | 7,510 | N/– |
| Fairmont #2 | Water Supply | High | Rockfill | Tributary of Antelope Valley | 24 | 493 | N/– |
| Garvey Reservoir | Water Supply | High | Rockfill | Tributary of Rio Hondo | 163 | 1,611 | Y/N |
| Glenoaks 968 Res | Water Supply | High | Rockfill | Offstream | 63 | 28 | Y/N |
| Green Verdugo | Water Supply | High | Rockfill | Tributary of Tujunga Wash | 120 | 99 | Y/N |
| Greenleaf Reservoir | – | Not rated | – | – | – | – | N/– |
| Greystone Reservoir | Water Supply | High | Earth | Offstream | 76 | 60 | Y/N |
| Haines Canyon Debris | Flood Control | Not rated | Earth | Haines Creek | 71 | 1 | N/– |
| Hansen | Flood Control | Not rated | Earth | Tujunga Wash | 99 | 1 | Y/Y |
| Hansen Recreational Lake | Water Supply | Significant | Rockfill | Offstream | 51 | 85 | N/– |
| Harold Reservoir | Irrigation | High | Rockfill | Tributary of Antelope Valley | 30 | 3,872 | N/– |

| Name | Purpose | Hazard Classification | Dam Type | River/Stream | Structural Height (ft) | Maximum Storage (acre-ft) | Mapped/ Affecting LAUSD |
|---|---|---|---|---|---|---|---|
| Headworks Reservoir | – | Not rated | – | – | – | – | N/– |
| JW Wisda | Water Supply | High | Rockfill | Tributary of Topanga Canyon | 51 | 45 | N/– |
| LA Tuna Debris Basin | Flood Control | High | Rockfill | La Tuna Canyon | 48 | 207 | N/– |
| Laguna Regulating Basin | Flood Control | High | Rockfill | Laguna Wash | 44 | 310 | Y/N |
| Lindero | Water Supply | High | Rockfill | Lindero Creek | 19 | 90 | N/– |
| Little Dalton Debris Basin | Flood Control | High | Rockfill | Little Dalton Debris Basin | 72 | 234 | N/– |
| Littlerock | Irrigation | High | Gravity | Littlerock Creek | 126 | 4,602 | N/– |
| Live Oak | Flood Control | High | Gravity | Live Oak Creek | 77 | 239 | N/– |
| Live Oak Reservoir | Water Supply | High | Rockfill | Tributary of Marshall Creek | 107 | 2,501 | N/– |
| Lopez | Flood Control | Not rated | Earth | Pacoima Wash | 51 | 1 | N/– |
| Los Angeles Reservoir | Water Supply | Significant | Rockfill | Big Tujunga Creek | 132 | 10,004 | Y/Y |
| Lower Franklin | Hydroelectric | High | – | Franklin Canyon | 105 | 920 | Y/Y |
| Lower Franklin #2 | Water Supply | Significant | Rockfill | Franklin Canyon | 50 | 206 | N/– |
| Lower San Fernando | Water Supply | High | – | San Fernando Creek | 127 | 10,004 | Y/Y |
| Lower Sunset Debris Basin | Flood Control | High | Rockfill | Sunset Canyon | 87 | 37 | N/– |
| Lower Van Norman Bypass | Water Supply | Low | Rockfill | Offstream | 79 | 240 | N/– |
| Malibu Lake Club | Water Supply | High | – | Malibu Creek | 45 | 500 | N/– |
| Morgan Debris Basin | Debris Control | High | Rockfill | Morgan Canyon Creek | 38 | 21 | N/– |
| Morris | Water Supply | High | Gravity | San Gabriel River | 249 | 27,511 | N/– |
| Morris S. Jones | Water Supply | High | Rockfill | Tributary of Pit River | 50 | 154 | N/– |
| Mulholland | Water Supply | High | Gravity | Weid Canyon | 198 | 4,038 | Y/Y |
| Pacoima | Flood Control | High | Arch | Pacoima Creek | 371 | 3,778 | Y/Y |

| Name | Purpose | Hazard Classification | Dam Type | River/Stream | Structural Height (ft) | Maximum Storage (acre-ft) | Mapped/ Affecting LAUSD |
|---|---|---|---|---|---|---|---|
| Palos Verdes Reservoir | Water Supply | High | Rockfill | Tributary of LA Harbor | 83 | 1,100 | N/Y** |
| Pearblossom SP Basin | – | Not rated | – | – | – | – | N/– |
| Pickens M1 | – | Not rated | – | – | – | – | N/– |
| Porter Estate | Irrigation | High | Rockfill | Tributary of Los Angeles River | 47 | 135 | N/– |
| Potrero | Water Supply | High | Gravity | Triunfo Canyon Creek | 41 | 791 | N/– |
| Puddingstone | Flood Control | High | Rockfill | Walnut Creek | 149 | 16,348 | N/– |
| Puddingstone Diversion | Flood Control | High | Rockfill | San Dimas Wash | 35 | 150 | N/– |
| Pyramid | Water Supply | High | Earth; Rockfill | Piru Creek | 406 | 170,066 | N/– |
| Reservoir No 1 | Water Supply | High | Earth | Tributary of Los Angeles River | 51 | 7,443 | Y/N |
| Reservoir No 4 | Water Supply | High | Rockfill | Offstream | 36 | 21 | Y/N |
| Reservoir No 5 | Water Supply | High | Earth | Offstream | 39 | 34 | Y/N |
| Reynolds Dam | – | Not rated | – | – | – | – | N/– |
| Riviera Reservoir | Water Supply | High | Earth | Offstream | 37 | 77 | Y/N |
| Rowena | – | Not rated | – | – | – | – | N/– |
| Rubio Debris Basin | Flood Control | High | Rockfill | Rubio Creek | 65 | 44 | N/– |
| San Dimas | Irrigation | High | Gravity | San Dimas Creek | 133 | 1,535 | N/– |
| San Gabriel No 1 | Hydroelectric | High | Rockfill | San Gabriel River | 325 | 0 | N/– |
| Santa Anita Debris Basin | Flood Control | High | Rockfill | Santa Anita Wash | 57 | 116 | N/– |
| Santa Fe | Flood Control | Not rated | Earth | San Gabriel River | 93 | 1 | N/– |
| Santa Ynez Canyon | Water Supply | High | Rockfill | Tributary of Santa Ynez Canal | 160 | 356 | Y/N |
| Sawpit | Flood Control | High | – | Sawpit Creel | 152 | 406 | N/– |
| Sawpit Debris Basin | Flood Control | High | Rockfill | Sawpit Wash | 83 | 152 | N/– |
| Schoolhouse Debris Basin | Flood Control | High | Rockfill | Mansfield Channel | 39 | 19 | N/– |

| Name | Purpose | Hazard Classification | Dam Type | River/Stream | Structural Height (ft) | Maximum Storage (acre-ft) | Mapped/ Affecting LAUSD |
|---|---|---|---|---|---|---|---|
| Sepulveda | Flood Control | Not rated | Earth | Los Angeles River | 58 | 1 | Y/Y |
| Sierra Madre | Flood Control | High | – | Lower Santa Anita Creek | 70 | 51 | N/– |
| Sierra Madre Villa | Flood Control | High | Rockfill | Sierra Madre Canal | 51 | 109 | N/– |
| Silver Lake | Water Supply | High | Rockfill | Tributary of Ballona Creek | 44 | 2,021 | Y/Y |
| Stevenson Ranch | Debris Control | High | – | Pico Canyon Creek | 41 | 105 | N/– |
| Stone Canyon | Water Supply | High | Rockfill | Stone Canyon Creek | 191 | 10,376 | Y/Y |
| Stough Debris Basin | Flood Control | High | Rockfill | Stough Canyon | 47 | 67 | N/– |
| Thompson | Water Supply | Significant | Rockfill | Middle Canyon | 116 | 1,010 | N/– |
| Thompson Creek | Flood Control | High | Rockfill | Thompson Creek | 67 | 543 | N/– |
| Upper Franklin | Water Supply | Not rated | Earth | – | 41 | 0 | Y/N |
| Upper Hollywood | Water Supply | Low | Rockfill | Weid Canyon | 88 | 196 | N/– |
| Upper San Fernando | Water Supply | Low | – | San Fernando Creek | 83 | 1,849 | N/– |
| Upper Stone Canyon | Water Supply | Low | Rockfill | Stone Canyon Creek | 113 | 425 | N/– |
| Westlake Reservoir | Irrigation | High | Rockfill | Tree Springs Creek | 161 | 9,204 | N/– |
| Weymouth Memorial Reservoir | Water Supply | High | Earth | Offstream | 18 | 151 | N/– |
| Whittier Narrows | Flood Control | Not rated | Earth | San Gabriel River | 57 | 1 | Y/Y |
| Whittier Res No 4 | Irrigation | Low | Rockfill | Tributary of San Gabriel River | 56 | 32 | N/– |
| Wilson Debris Basin | Flood Control | High | Rockfill | Wilson Canyon | 51 | 84 | N/– |
| Wrigley Reservoir | Water Supply | High | Rockfill | Haypress Creek | 43 | 62 | N/– |
| Yarnell Debris Basin | Flood Control | Low | Rockfill | Tributary of Bull Canyon | 43 | 105 | N/– |

Source: Cal OES and the National Performance of Dams Program

*One Acre Foot=326,000 gallons

** Palos Verdes is not mapped, but the HMPC noted that it would affect the District.

The 2015 LAUSD School Upgrade Program EIR noted that some of these dams are of greater concern than others. Dams of concern noted in this EIR for the District include:

- Hansen Dam
- Los Angeles Reservoir
- Encino Reservoir
- Sepulveda Dam
- Pacoima Reservoir
- Tujunga Reservoir (Big Tujunga)
- Devil's Gate Dam
- Wittier Narrow Dam
- Palos Verdes Reservoir

All of these dams noted in the EIR are mapped and included in the vulnerability assessment in Section 4.3.4, with the exception of Palos Verdes. The Cal OES inundation dataset did not have a mapped dam inundation zone for the Palos Verdes Reservoir.

### *Past Occurrences*

#### Disaster Declaration History

There have been one federal and one state disaster declarations related to dam failure in Los Angeles County from the Baldwin Hills dam failure.

*Table 4-21 Los Angeles County – State and Federal Disaster Declarations Summary 1950-2018*

| Disaster Type | Federal Declarations | | State Declarations | |
|---|---|---|---|---|
| | Count | Years | Count | Years |
| Dam/Levee Break | 1 | 1963 | 1 | 1963 |

Source: Cal OES, FEMA

#### NCDC Events

There have been no NCDC dam failure events in Los Angeles County.

#### Hazard Mitigation Planning Committee Events/National Performance of Dams Program Events

The HMPC and the NPDP were queried regarding dam failure in the County. The following was reported:

##### St. Francis Dam, 1928

The most catastrophic dam failure in California's history was that of the St. Francis Dam in Los Angeles County in March 1928. This failure resulted in the deaths of more than 450 people and destruction of nearly 1,000 homes and buildings. Numerous roads and bridges were destroyed or damaged beyond repair. The DSOD came into existence as a direct result of this catastrophe.

### Baldwin Hills Reservoir Collapse, 1963

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

### 1971 Earthquake

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

- Perched above the densely populated San Fernando Valley, the 142-foot-high, 2,100-foot-long Lower San Fernando Dam held a reservoir 1.6 miles long and as much as 130 feet deep and supplied 80 percent of the City's water supply. The quake shook loose a massive slide in the upstream slope of the Lower San Fernando Dam that lowered the crest about 30 feet and carried away much of upstream concrete facing of the dam. Resulting severe damage of the dam forced 80,000 residents to evacuate homes in an 11-square mile area down the valley while the water behind the earthen dam was lowered over a three-day period. The damage was so heavy that the dam could not be repaired to safely hold its water supply in the event of another large earthquake. The $33 million Los Angeles Dam and Reservoir was built in 1975-76 about 3,000 feet up the valley from the old Lower San Fernando Dam, and the old dam was reconstructed to provide a holding basin for stormwater and to back up the new dam.
- Several thousand people were evacuated from homes south of Van Norman Dam in Mission Hills when Van Norman Lake reportedly sank 1 foot. A 60-foot section of the concrete dam at the lake's southern edge collapsed, and portions were reported as still crumbling during the evacuation. The dam holds back more than 6 billion gallons of water and is the largest in the City's water system.
- Cracks were reported in the Hansen Dam on Sepulveda Boulevard in Lakeview Terrace.

### 1994 Northridge Earthquake

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

INSERT OTHER EVENTS THAT HAVE AFFECTED THE DISTRICT

## *Likelihood of Future Occurrence*

**Occasional**—The County and District remains at risk to dam breaches/failures from numerous dams under a variety of ownership and control and of varying ages and conditions. Given the number and types of dams in the County, their ages, and the risk for earthquakes in the County, the potential exists for future dam issues, including failures, in the District Planning Area. Thus, the HMPC determined the likelihood of future occurrence to be occasional. There is concern that many of the State's older dams, including those in Los Angeles County, could start experiencing similar problems.

### Climate Change and Dam Failure

Increases in precipitation could increase the potential for dam failure and uncontrolled releases in Los Angeles County and the District Planning Area.

## 4.2.7. Drought and Water Shortage

### *Hazard/Problem Description*

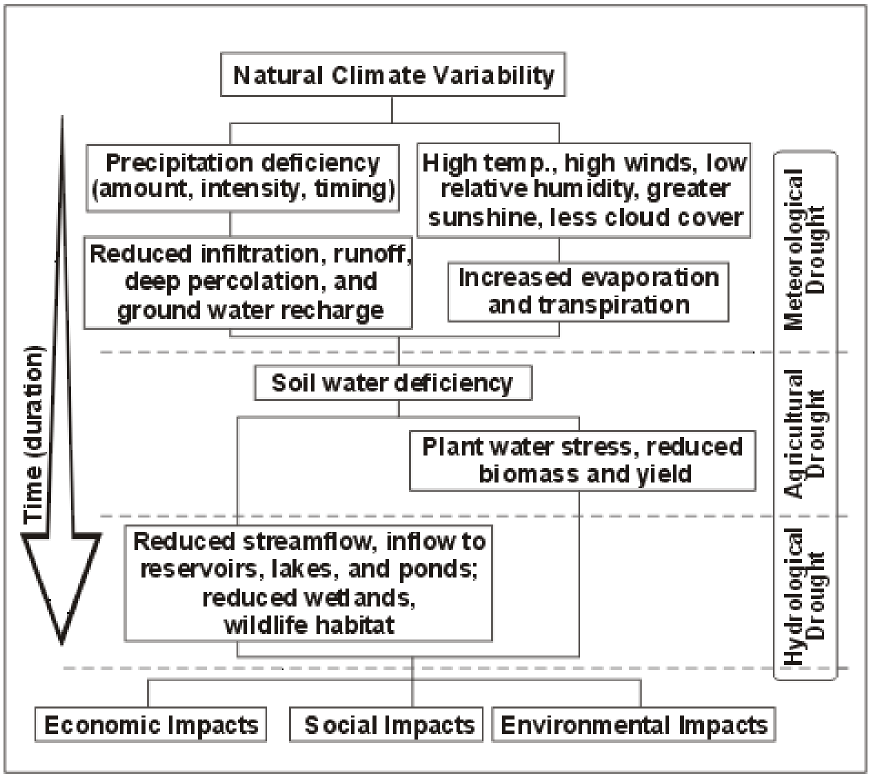
#### Drought

Drought is a gradual phenomenon. Although droughts are sometimes characterized as emergencies, they differ from typical emergency events. Most natural disasters, such as floods or forest fires, occur relatively rapidly and afford little time for preparing for disaster response. Droughts occur slowly, over a multi-year period, and it is often not obvious or easy to quantify when a drought begins and ends. Water districts normally require at least a 10-year planning horizon to implement a multiagency improvement project to mitigate the effects of a drought and water supply shortage.

Drought is a complex issue involving (see Figure 4-14) many factors—it occurs when a normal amount of precipitation and snow is not available to satisfy an area's usual water-consuming activities. Drought can often be defined regionally based on its effects:

- Meteorological drought is usually defined by a period of below average water supply.
- Agricultural drought occurs when there is an inadequate water supply to meet the needs of the state's crops and other agricultural operations such as livestock.
- Hydrological drought is defined as deficiencies in surface and subsurface water supplies. It is generally measured as streamflow, snowpack, and as lake, reservoir, and groundwater levels.
- Socioeconomic drought occurs when a drought impacts health, well-being, and quality of life, or when a drought starts to have an adverse economic impact on a region.

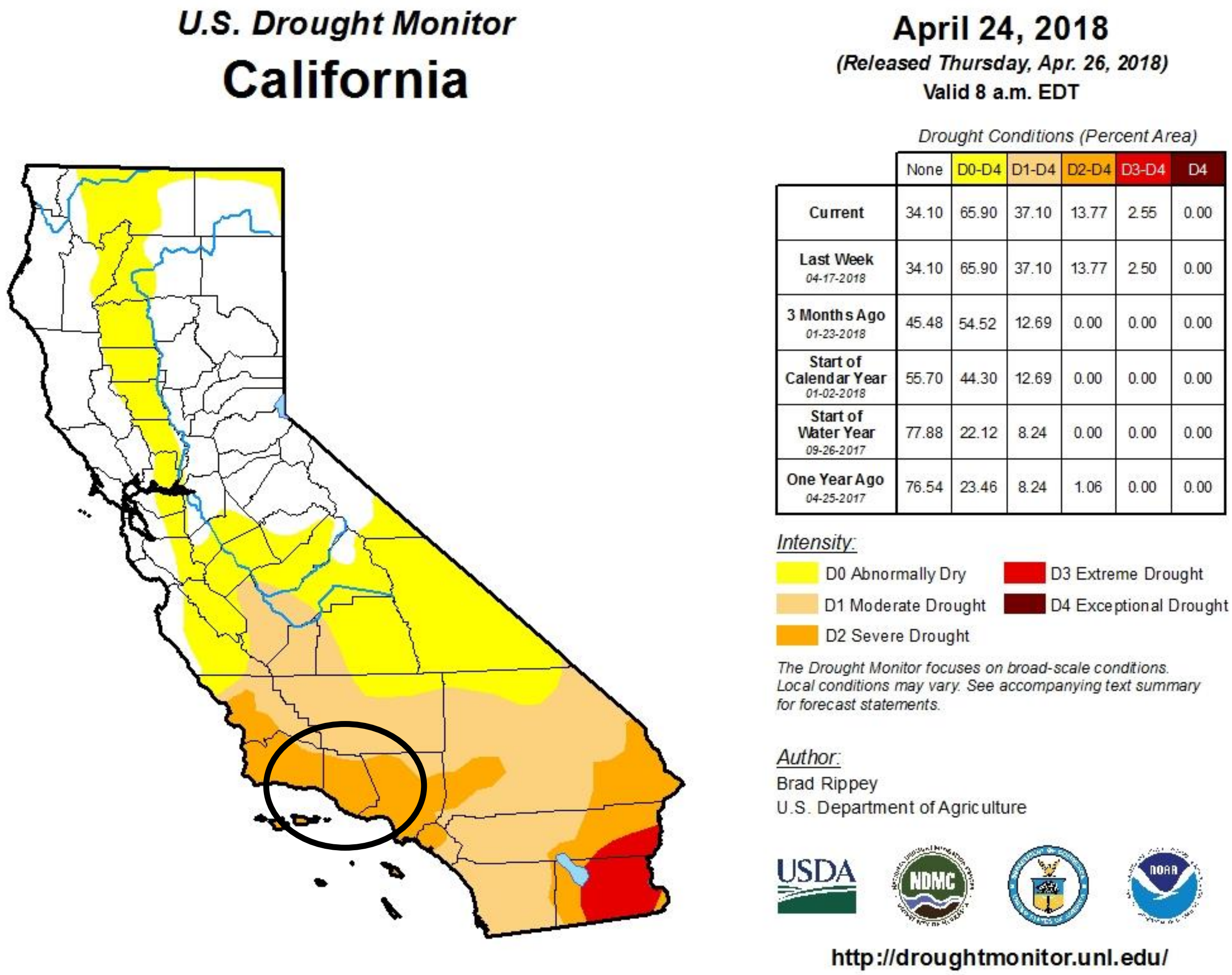
*Figure 4-14 Causes and Impact of Drought*




Source: National Drought Mitigation Center

Drought in the United States is monitored by the National Integrated Drought Information System (NIDIS). A major component of this portal is the U.S. Drought Monitor. The Drought Monitor concept was developed jointly by the NOAA's Climate Prediction Center, the NDMC, and the USDA's Joint Agricultural Weather Facility in the late 1990s as a process that synthesizes multiple indices, outlooks and local impacts, into an assessment that best represents current drought conditions. The final outcome of each Drought Monitor is a consensus of federal, state, and academic scientists who are intimately familiar with the conditions in their respective regions. A snapshot of the drought conditions in California and the LAUSD Planning Area can be found in Figure 4-15. A snapshot from 2015 and 2016 is shown in Figure 4-16.

*Figure 4-15 Drought Status in Los Angeles County*

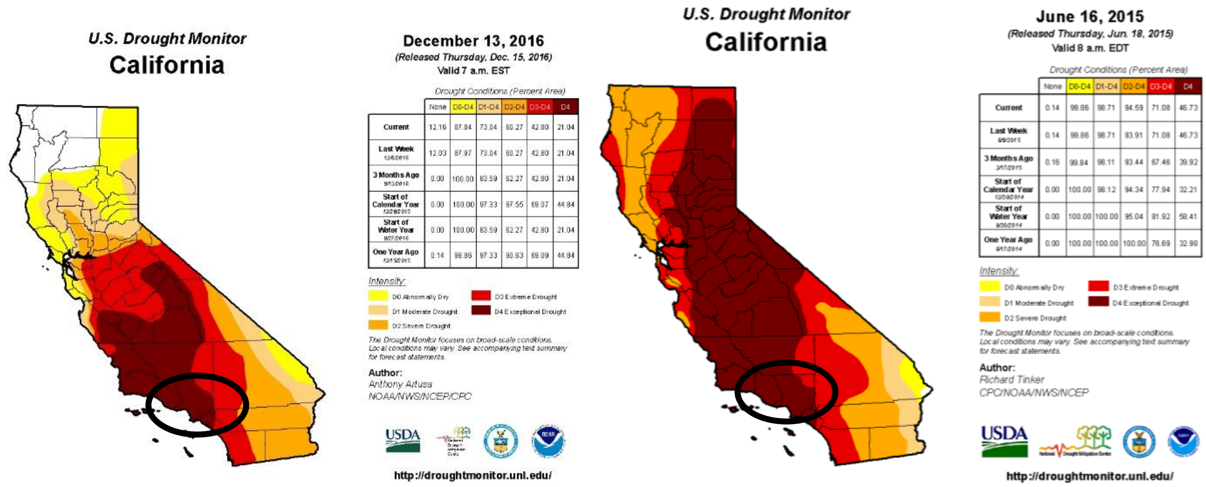



| | None | D0-D4 | D1-D4 | D2-D4 | D3-D4 | D4 |
|---|---|---|---|---|---|---|
| Current | 34.10 | 65.90 | 37.10 | 13.77 | 2.55 | 0.00 |
| Last Week 04-17-2018 | 34.10 | 65.90 | 37.10 | 13.77 | 2.50 | 0.00 |
| 3 Months Ago 01-23-2018 | 45.48 | 54.52 | 12.69 | 0.00 | 0.00 | 0.00 |
| Start of Calendar Year 01-02-2018 | 55.70 | 44.30 | 12.69 | 0.00 | 0.00 | 0.00 |
| Start of Water Year 09-26-2017 | 77.88 | 22.12 | 8.24 | 0.00 | 0.00 | 0.00 |
| One Year Ago 04-25-2017 | 76.54 | 23.46 | 8.24 | 1.06 | 0.00 | 0.00 |



Source: US Drought Monitor

*Figure 4-16 Previous Drought Status in Los Angeles County*




Source: US Drought Monitor

The Cal DWR says the following about drought:

> *One dry year does not normally constitute a drought in California. California's extensive system of water supply infrastructure—its reservoirs, groundwater basins, and inter-regional conveyance facilities—mitigates the effect of short-term dry periods for most water users. Defining when a drought begins is a function of drought impacts to water users. Hydrologic conditions constituting a drought for water users in one location may not constitute a drought for water users elsewhere, or for water users having a different water supply. Individual water suppliers may use criteria such as rainfall/runoff, amount of water in storage, or expected supply from a water wholesaler to define their water supply conditions.*

The drought issue in California is further compounded by water rights. Water is a commodity possessed under a variety of legal doctrines. The prioritization of water rights between farming and federally protected fish habitats in California contributes to this issue.

Drought is not initially recognized as a problem because it normally originates in what is considered good weather, which typically includes a dry late spring and summer in Mediterranean climates, such as in California. It is difficult to quantitatively assess drought impacts to the District and Los Angeles County because not many county-specific studies have been conducted. Some factors to consider include the impacts of fallowed agricultural land, habitat loss and associated effects on wildlife, and the drawdown of the groundwater table. The drawdown of the groundwater table is one factor that has been recognized to occur during repeated dry years. Lowering of groundwater levels results in the need to deepen wells, which subsequently lead to increased pumping costs. These costs are a major consideration for residents relying on domestic wells and agricultural producers that irrigate with groundwater and/or use it for frost protection. Some communities in higher elevations with shallow bedrock do not have a significant source of groundwater.

Drought impacts are wide-reaching and may be economic, environmental, and/or societal. The most significant impacts associated with drought in the District Planning Area are those related to water intensive activities such as wildfire protection, municipal usage, commerce, tourism, recreation, agriculture, and wildlife preservation. Also, during a drought, allocations go down and water costs increase, which results in reduced water availability. Voluntary conservation measures are a normal and ongoing part of system operations and actively implemented during extended droughts. A reduction of electric power generation and water quality deterioration are also potential problems. Drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding and erosion.

### Water Shortage

Southern California counties, including Los Angeles County, generally do not have sufficient groundwater and surface water supplies to mitigate the severest droughts of the past century. In order to get through periods of water shortage, areas of the State like Los Angeles County place demands on water resources from other areas of the State during severe drought. According to the 2012 LHMP, the three major types of water sources in the District Planning Area are major surface water, groundwater, and recycled water.

- Most major **surface waters** serve as storage facilities. Lakes and reservoirs receive rainwater and snowmelt from rivers, streams, and imported supplies from aqueducts, holding them until the water is needed. Most of the County's major surface waters are controlled by man-made facilities. For example, a series of dams and spreading grounds are used to capture close to 80 percent of the water that flows from the San Gabriel Mountains and through the San Gabriel River. Some of these surface waters support fish and wildlife and provide recreation areas for County residents that are compatible with flood management and water conservation operations. Due to the County's climate patterns, streams and rivers receive intermittent heavy winter rainstorms and little summer or fall precipitation, which affects the consistency of water flow. Small tributaries are also highly sensitive to pollution, and the cumulative impacts of polluted runoff and unnatural levels of silt degrades the water quality of these waterways to a much greater extent than a high-volume river with continuous flow. The County works within its jurisdiction to improve the health of rivers, streams, and minor tributaries to enhance overall water resources, groundwater recharge, and wildlife habitat.
- **Groundwater** is a crucial component of local fresh water supplies. Groundwater is the water beneath the Earth's surface that can be collected with wells, tunnels, or drainage galleries, or that flows naturally to the Earth's surface via seeps or springs. Eight major groundwater basins provide about one third of the County's overall water demand, except during times of drought. A reduction or decline in groundwater quantity or quality is detrimental to water users countywide, especially to the hundreds of households in rural areas who depend solely on private wells. Water accumulates beneath the ground in saturated zones, or aquifers, which are referred to as groundwater basins. These aquifers can hold millions of acre-feet of water and extend for miles. Basins fill with water as a result of snowmelt, rain, and surface flow percolating through the soil.
- **Recycled water** is used primarily for recharging groundwater aquifers through spreading operations and injection at seawater barriers. Other uses of recycled water include irrigation of landscaping, most commonly in parks, golf courses, and for roadway medians; supplying industrial processes, such as cooling and transportation, washing, and rinsing; filling artificial and decorative ponds and lakes; and flushing toilets in large, non-residential buildings. The County Sanitation Districts operate reclamation plants throughout the County and are the largest producers of recycled water. Other producers of recycled water include the cities of Burbank, Glendale, Los Angeles, Santa Monica, and the Central, Las Virgenes, and West Water Districts. Three of these plants in the southern portion of the County are capable of delivering over 50,000 acre-feet of treated water each year to spreading grounds and injection wells to combat saltwater intrusion into groundwater basins from the Pacific Ocean. In the

Antelope Valley, recycled water is used for agriculture and supports large bird populations at Piute Ponds.

## *Past Occurrences*

### Disaster Declaration History

There has been two state disaster related to drought and water shortage in Los Angeles County issued in 1976 and 2014. This can be seen in Table 4-22.

*Table 4-22 Los Angeles County – Disaster Declarations from Drought 1950-2017*

| Disaster Type | Federal Declarations | | State Declarations | |
|---|---|---|---|---|
| | Count | Years | Count | Years |
| Drought | 0 | – | 2 | 1976, 2014 |

Source: FEMA, Cal OES

#### 2014 Governor's Drought Declaration

California's ongoing response to its five-year drought has been guided by a series of executive orders issued by Governor Edmund G. Brown Jr. that are listed below beginning with the most recent and continuing in reverse chronological order:

- Executive Order B-37-16, May 9, 2016: The Governor's latest drought-related executive order established a new water use efficiency framework for California. The order bolstered the state's drought resilience and preparedness by establishing longer-term water conservation measures that include permanent monthly water use reporting, new urban water use targets, reducing system leaks and eliminating clearly wasteful practices, strengthening urban drought contingency plans and improving agricultural water management and drought plans.
- Executive Order B-36-15, November 13, 2015: This executive order called for additional actions to build on the State's ongoing response to record dry conditions and assist recovery efforts from 2015's devastating wildfires.
- Executive Order B-29-15, April 1, 2015: Key provisions included ordering the State Water Resources Control Board (Board) to impose restrictions to achieve a 25-percent reduction in potable urban water usage through February 28, 2016; directing Cal DWR to lead a statewide initiative, in partnership with local agencies, to collectively replace 50 million square feet of lawns and ornamental turf with drought tolerant landscapes, and directing the California Energy Commission to implement a statewide appliance rebate program to provide monetary incentives for the replacement of inefficient household devices.
- Executive Order B-28-14, December 22, 2014: The order cited paragraph 9 of the January 17, 2014 Proclamation and paragraph 19 of the April 25, 2014 Proclamation and extended the operation of the provisions in these paragraphs through May 31, 2016.
- Executive Order B-27-14, October 6, 2014: The order directed State agencies to assist local governments in their response to wildfires during California's drought conditions.
- Executive Order B-26-14, September 18, 2014: The order facilitated efforts to provide water to families in dire need as extreme drought continued throughout California.

- Proclamation of a Continued State of Emergency, April 25, 2014: The order strengthened the State's ability to manage water and habitat effectively in drought conditions and called on all Californians to redouble their efforts to conserve water.
- Drought State of Emergency, January 17, 2014: The Governor proclaimed a State of Emergency and directed State officials to take all necessary actions to make water immediately available. Key measures in the proclamation included:
  - ✓ Asking all Californians to reduce water consumption by 20 percent and referring residents and water agencies to the Save Our Water campaign – www.saveourwater.com – for practical advice on how to do so;
  - ✓ Directing local water suppliers to immediately implement local water shortage contingency plans;
  - ✓ Ordering the Board to consider petitions for consolidation of places of use for the State Water Project and Central Valley Project, which could streamline water transfers and exchanges between water users;
  - ✓ Directing DWR and the Board to accelerate funding for projects that could break ground in 2014 and enhance water supplies;
  - ✓ Ordering the Board to put water rights holders across the state on notice that they may be directed to cease or reduce water diversions based on water shortages;
  - ✓ Asking the Board to consider modifying requirements for releases of water from reservoirs or diversion limitations so that water may be conserved in reservoirs to protect cold water supplies for salmon, maintain water supplies and improve water quality.

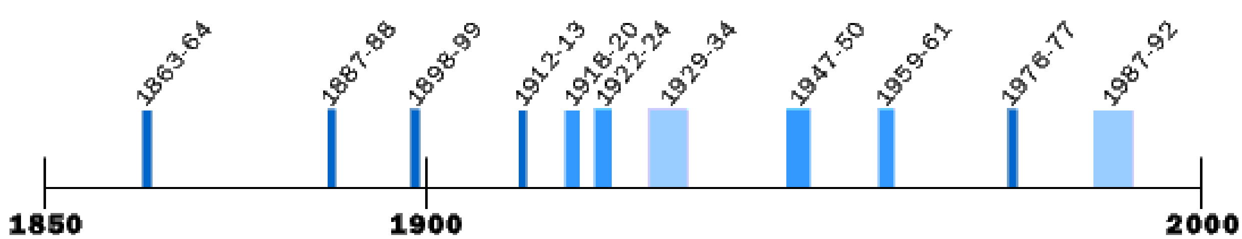
### NCDC Events

There have been no NCDC drought events in Los Angeles County.

### Hazard Mitigation Planning Committee Events

Historically, California has experienced multiple severe droughts. According to the DWR, the 1929-34 drought established the criteria commonly used in designing storage capacity and yield of large northern California reservoirs. The driest single year of California's measured hydrologic record between 1850 and 2000 was 1977. Figure 4-17 depicts California's Multi-Year Historical Dry Periods, 1850-2000.

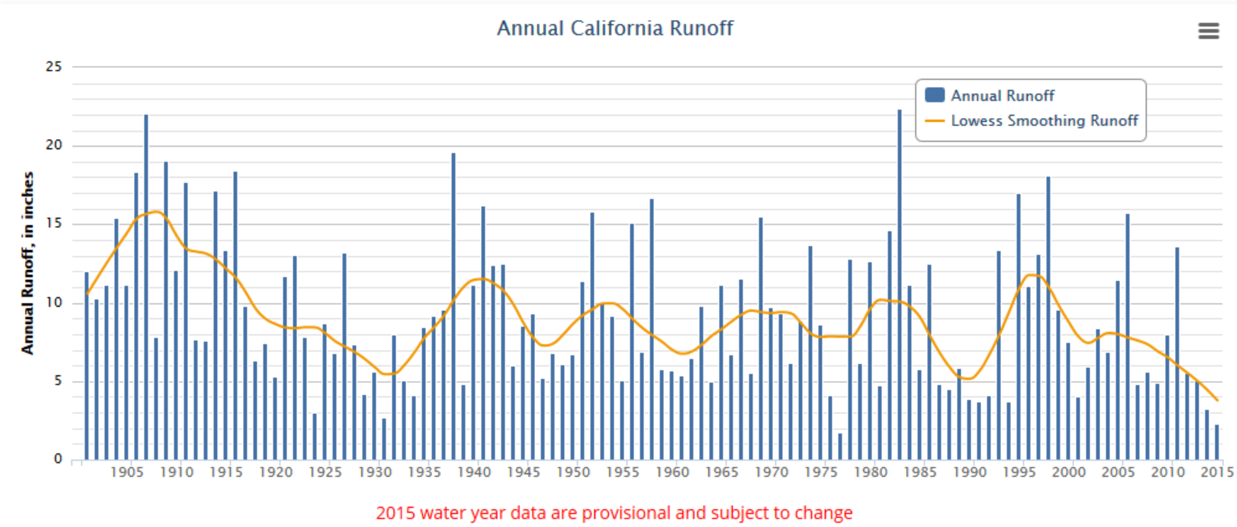
***Figure 4-17 California's Multi-Year Historical Dry Periods, 1850-2000***




Source: California Department of Water Resources, www.water.ca.gov/
Notes: Dry periods prior to 1900 estimated from limited data; covers dry periods of statewide or major regional extent

Figure 4-18 depicts runoff for the State from 1900 to 2015. This gives a historical context for the 2014-2015 drought to past droughts

*Figure 4-18 Annual California Runoff –1900 to 2015*

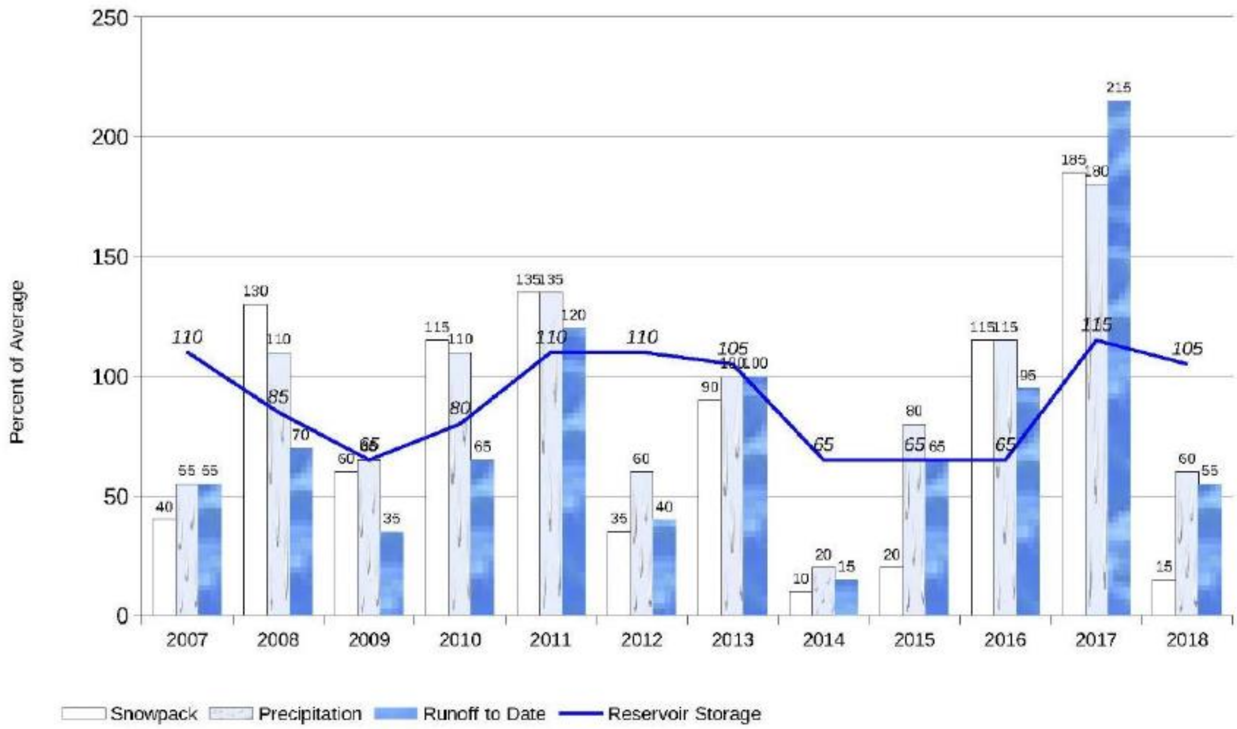



Source: California DWR

### Water Shortage

Figure 4-19 illustrates several indicators commonly used to evaluate water conditions in California. The percent-of -average values are determined by measurements made in each of the ten major hydrologic regions. The chart describes water conditions in California between 2005 and 2018. The chart illustrates the cyclical nature of weather patterns in California. Snow pack and precipitation increased in 2006, decreased sharply in 2007 through 2009, recovered somewhat in 2010-2011, again dramatically declined in 2012, reached average levels in 2013, and again decreased for 2014-2015, with average levels again reached in 2016. In 2017 precipitation, snowpack, and runoff, were significantly above average (resulting in other hazard events such as flooding), but 2018 follows with rainfall and snowpack well below average.

### *Figure 4-19 Water Supply Conditions, 2005 to 2018*




Source: 2018 State of California Hazard Mitigation Plan

Beginning in 2012, snowpack levels in California dropped dramatically. 2015 estimates place snowpack as 5 percent of normal levels. Snowpack measurements have been kept in California since 1950 and nothing in the historic record comes close to 2015's severely depleted level. The previous record for the lowest snowpack level in California, 25 percent of normal, was set both in 1976-77 and 2013-2014. In "normal" years, the snowpack supplies about 30 percent of California's water needs, according to the California Department of Water Resources. Snowpack levels began to increase in 2016, and in 2017 snowpack increased to the largest in 22 years, according to the State Department of Water Resources. In late 2017 and early 2018, drought conditions have begun to return to southern California.

## *Likelihood of Future Occurrence*

### Drought

**Likely**—Historical drought data for the Los Angeles County and the LAUSD Planning Area indicate there have been 5 significant droughts in the last 85 years. This equates to a drought every 17 years on average or a 5.9 percent chance of a drought in any given year. However, based on this data and given the multi-year length of droughts, the HMPC determined that future drought occurrence in the Planning Area is likely.

### Water Shortage

**Occasional** — Recent historical data for water shortage indicates that Los Angeles County and the LAUSD Planning Area may at times be at risk to both short and prolonged periods of water shortage. Based on this it is possible that water shortages will affect the District in the future during extreme drought conditions. It should be noted that water shortage has minimal effects on the building in the LAUSD Planning Area.

### *Climate Change and Drought and Water Shortage*

Climate scientists studying California find that drought conditions are likely to become more frequent and persistent over the 21st century due to climate change. The experiences of California during recent years underscore the need to examine more closely the state's water storage, distribution, management, conservation, and use policies. The CAS stresses the need for public policy development addressing long term climate change impacts on water supplies. The CAS notes that climate change is likely to significantly diminish California's future water supply, stating that:

> *California must change its water management and uses because climate change will likely create greater competition for limited water supplies needed by the environment, agriculture, and cities.*

The regional implications of declining water supplies as a long-term public policy issue are recognized in a Southern California Association of Governments July 2009 publication of essays examining climate change topics. In one essay, Dan Cayan observes:

> *In one form or another, many of Southern California's climate concerns radiate from efforts to secure an adequate fresh water supply…Of all the areas of North America, Southern California's annual receipt of precipitation is the most volatile – we only occasionally see a "normal" year, and in the last few we have swung from very wet in 2005 to very dry in 2007 and 2008….Southern California has special challenges because it is the most urban of the California water user regions and, regionwide, we import more than two-thirds of the water that we consume.*

Members of the HMPC noted a report published in Science magazine in 2015 that stated:

> *Given current greenhouse gas emissions, the chances of a 35+ year "megadrought" striking the Southwest by 2100 are above 80 percent.*

The HMPC was also aware of and noted a report from the Public Policy Institute of California that thousands of Californians – mostly in rural, small, disadvantaged communities – already face acute water scarcity, contaminated groundwater, or complete water loss. Climate change would make these effects worse.

## 4.2.8. Earthquake

### *Hazard/Problem Description*

An earthquake is caused by a sudden slip on a fault. Stresses in the earth's outer layer push the sides of the fault together. Stress builds up, and the rocks slip suddenly, releasing energy in waves that travel through the earth's crust and cause the shaking that is felt during an earthquake. The amount of energy released during an earthquake is usually expressed as a magnitude and is measured directly from the earthquake as recorded on seismographs. An earthquake's magnitude is expressed in whole numbers and decimals (e.g., 6.8). Seismologists have developed several magnitude scales. One of the first was the Richter Scale, developed in 1932 by the late Dr. Charles F. Richter of the California Institute of Technology. The Richter Magnitude Scale is used to quantify the magnitude or strength of the seismic energy released by an earthquake. Another measure of earthquake severity is intensity. Intensity is an expression of the amount of shaking at any given location on the ground surface (see Table 4-23). Seismic shaking is typically the greatest cause of losses to structures during earthquakes.

### *Table 4-23 Modified Mercalli Intensity (MMI) Scale*

| MMI | Felt Intensity |
|---|---|
| I | Not felt except by a very few people under special conditions. Detected mostly by instruments. |
| II | Felt by a few people, especially those on upper floors of buildings. Suspended objects may swing. |
| III | Felt noticeably indoors. Standing automobiles may rock slightly. |
| IV | Felt by many people indoors; by a few outdoors. At night, some people are awakened. Dishes, windows, and doors rattle. |
| V | Felt by nearly everyone. Many people are awakened. Some dishes and windows are broken. Unstable objects are overturned. |
| VI | Felt by everyone. Many people become frightened and run outdoors. Some heavy furniture is moved. Some plaster falls. |
| VII | Most people are alarmed and run outside. Damage is negligible in buildings of good construction, considerable in buildings of poor construction. |
| VIII | Damage is slight in specially designed structures, considerable in ordinary buildings, and great in poorly built structures. Heavy furniture is overturned. |
| IX | Damage is considerable in specially designed buildings. Buildings shift from their foundations and partly collapse. Underground pipes are broken. |
| X | Some well-built wooden structures are destroyed. Most masonry structures are destroyed. The ground is badly cracked. Considerable landslides occur on steep slopes. |
| XI | Few, if any, masonry structures remain standing. Rails are bent. Broad fissures appear in the ground. |
| XII | Virtually total destruction. Waves are seen on the ground surface. Objects are thrown in the air. |

Source: Multi-Hazard Identification and Risk Assessment, FEMA 1997

California is seismically active because it sits on the boundary between two of the earth's tectonic plates. Most of the state - everything east of the San Andreas Fault - is on the North American Plate. The cities of Monterey, Santa Barbara, Los Angeles, and San Diego are on the Pacific Plate, which is constantly moving northwest past the North American Plate. The relative rate of movement is about two inches per year. The San Andreas Fault is considered the boundary between the two plates, although some of the motion is taken up on faults as far away as central Utah.

The LAUSD geological setting was discussed in the LAUSD School Upgrade Program EIR. It reported that:

- The Northwest and Northeast Local Districts are within the Transverse Ranges Geomorphic Province and consists of the San Fernando and Verdugo valleys and mountain ranges and hills surrounding the two valleys—counterclockwise from the northeast: the San Gabriel Mountains and Verdugo Mountains, Santa Susana Mountains, Simi Hills; and northern portions of the Santa Monica Mountains and Hollywood Hills.

- The West Local District area includes most of the portions of the Santa Monica Mountains and Hollywood Hills – in the Transverse Ranges Geomorphic Province – that are within the District. The balance of the West Local District is part of the western Los Angeles Basin in the Peninsular Ranges Geomorphic Province.
- The Central Local District includes part of the central Los Angeles Basin and the San Rafael Hills, both in the Peninsular Ranges Geomorphic Province.
- The East Local District includes part of the central Los Angeles Basin and the Repetto Hills, both in the Peninsular Ranges Geomorphic Province.
- The South Local District spans part of the southern Los Angeles Basin and part of the Palos Verdes Hills, both in the Peninsular Ranges Geomorphic Province.
- Sedimentary rocks underlie most of the District, ranging in age from Mesozoic in the Santa Susana Mountains, the northern parts of the Santa Monica Mountains and Hollywood Hills, the San Rafael Hills and Repetto Hills, and the Palos Verdes Hills, to Quaternary across most of the Los Angeles Basin and San Fernando Valley.
- The San Gabriel Mountains consist mostly of granitic igneous rocks, ranging from Mesozoic to Precambrian in age; Mesozoic-age granitic rocks also underlie parts of the Hollywood Hills. Some volcanic rocks of Tertiary age are present in the Santa Monica Mountains.

### Faults

A fault is defined as "a fracture or fracture zone in the earth's crust along which there has been displacement of the sides relative to one another." For the purpose of planning there are two types of faults, active and inactive. Active faults have experienced displacement in historic time, suggesting that future displacement may be expected. Inactive faults show no evidence of movement in recent geologic time, suggesting that these faults are dormant. This does not mean, however, that faults having no evidence of surface displacement within the last 11,000 years are necessarily inactive. For example, the 1975 Oroville earthquake, the 1983 Coalinga earthquake, and the 1987 Whittier Narrows earthquake occurred on faults not previously recognized as active. Potentially active faults are those that have shown displacement within the last 1.6 million years (Quaternary). An inactive fault shows no evidence of movement in historic (last 200 years) or geologic time, suggesting that these faults are dormant.

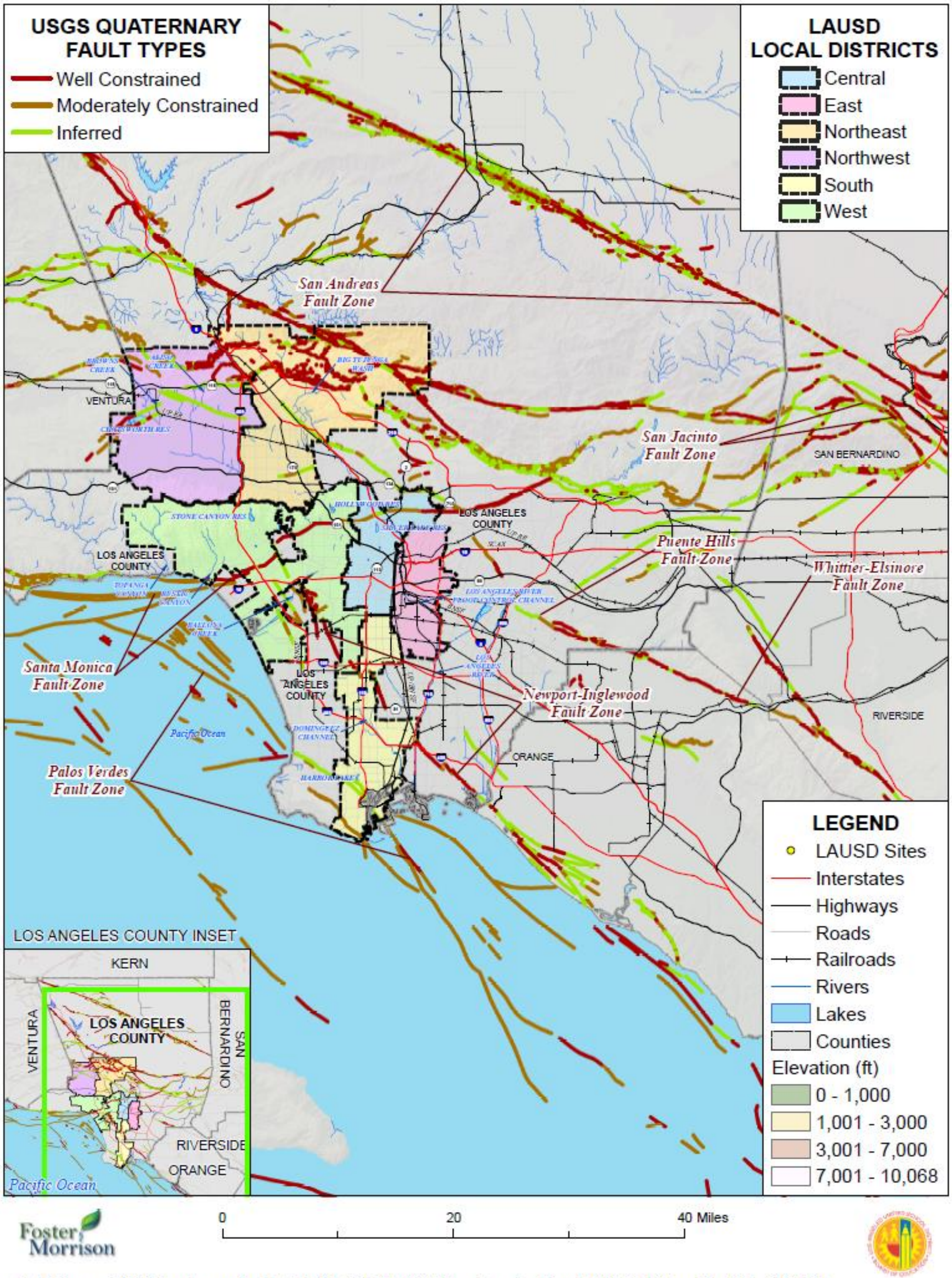
The District is located in a region of high seismicity with numerous local faults. The 2012 LHMP noted that the primary seismic hazard for the District is potential ground shaking from these major known faults, especially the Newport-Inglewood, Palos Verde, Puente Hills, San Andreas, and Santa Monica faults:

- The Newport-Inglewood fault is a right-lateral strike-slip fault that extends for 47 miles from Culver City southeast through Inglewood and other coastal communities to Newport Beach, at which point the fault extends east-southeast into the Pacific Ocean where it is known as the Rose Canyon Fault. The fault can be inferred on the Earth's surface as passing along and through a line of hills extending from Signal Hill to Culver City. This is the second most active fault in California and is capable of producing an earthquake with a magnitude of 6.3 to 7.5.
- The Palos Verde fault extends from the Pacific Ocean and comes ashore near the southwest point of the Redondo Beach-Torrance border. The fault then curves around the base of the Palos Verdes Peninsula roughly midway between the Pacific Coast Highway and the peninsula. It continues this southerly course until it runs into the Los Angeles Harbor. This fault is capable of producing an earthquake with a magnitude between 6.4 and 7.1.

- The Puente Hills fault, also known as the Puente Hills thrust system, is an active geological fault that runs about 25 miles in three discrete sections from the Puente Hills region in the southeast to just south of Griffith Park in the northwest. The fault is known as a blind thrust fault due to the lack of surface features normally associated with thrust faults. This fault is capable of producing an earthquake with a magnitude between 7.0 and 7.5.
- The San Andreas fault is a continental transform fault that extends roughly 800 miles through California. It forms the tectonic boundary between the Pacific Plate and the North American Plate, and its motion is right-lateral strike-slip (horizontal). The fault divides into three segments, each with different characteristics and a different degree of earthquake risk, the most significant being the southern segment, which passes within about 35 miles of Los Angeles. This fault is capable of producing a magnitude between 7.8 to 8.5.
- The Santa Monica fault is one of several northeast-southwest-trending, north-dipping, reverse faults that extend through the Los Angeles metropolitan area for approximately 50 miles. This fault is capable of producing an earthquake with a magnitude of 6.0 to 7.0.

Figure 4-20 shows fault locations in and near the District.

## *Figure 4-20 Active Faults in and near LAUSD*




Data Source: USGS Quaternary Faults (July 17, 2014), LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

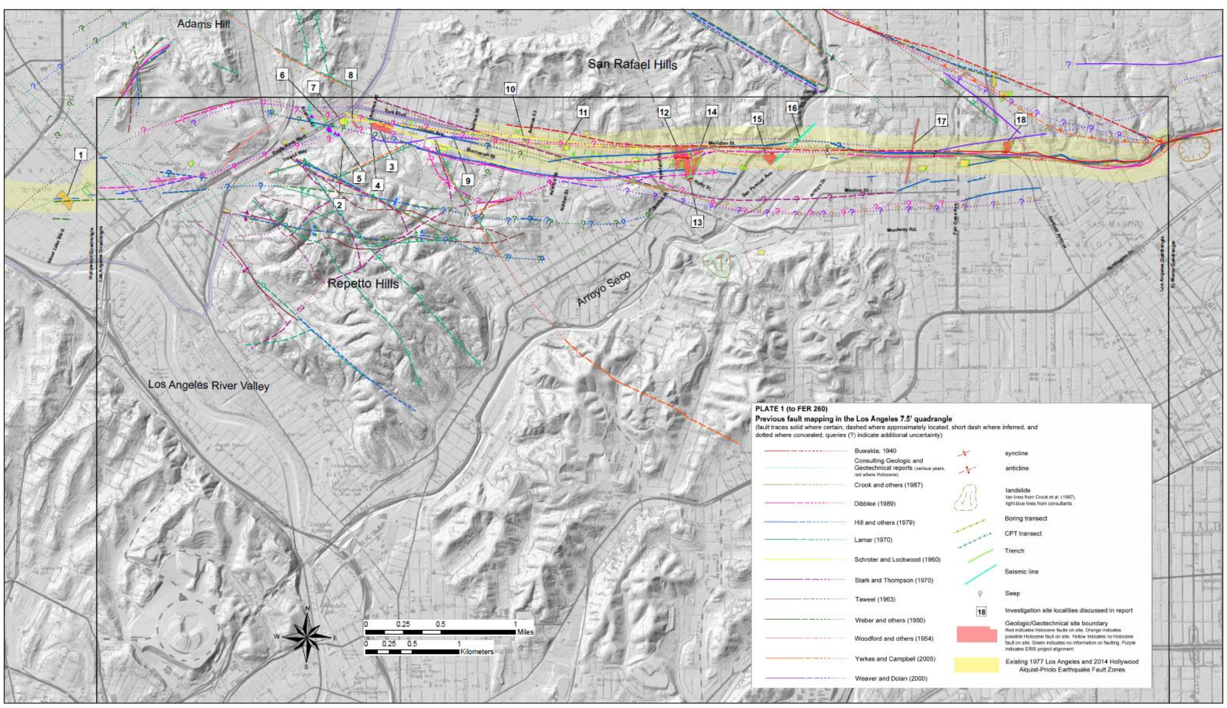
Two types of fault movement represent possible hazards to structures in the immediate vicinity of the fault: fault creep and sudden fault displacement. Fault creep, a slow movement of one side of a fault relative to the other, can cause cracking and buckling of sidewalks and foundations even without perceptible ground shaking. Sudden fault displacement occurs during an earthquake event and may result in the collapse of buildings or other structures that are found along the fault zone when fault displacement exceeds an inch or two. The only protection against damage caused directly by fault displacement is to prohibit construction in the fault zone.

### Alquist Priolo Zones

Three revised Official Maps of Alquist-Priolo Earthquake Fault Zones were released on June 15, 2017 by the California Geological Survey (CGS). Areas covered are within Los Angeles County and affect the cities of Arcadia, Los Angeles, Monrovia, Pasadena, San Marino, and South Pasadena. These maps are released under the authority of the Alquist-Priolo Earthquake Fault Zoning (AP) Act that was passed following the 1971 San Fernando earthquake. The AP Act is a state law designed to reduce the hazard from surface fault rupture during an earthquake. Earthquake Fault Zones are regulatory zones that encompass surface traces of active faults that have a potential for future surface fault rupture.

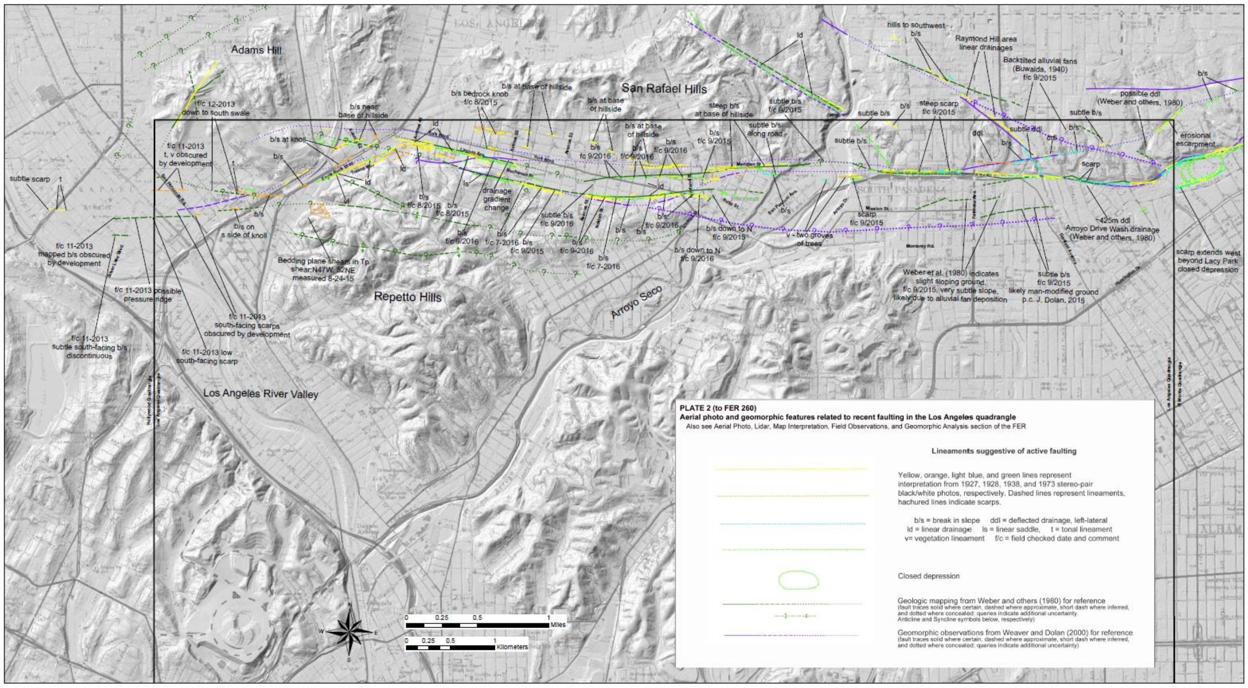
These revised maps show the location of AP Earthquake Fault Zones (EFZ) and Seismic Hazard Zones (SHZ), if evaluated, and are collectively referred to as Earthquake Zones of Required Investigation. These are shown in Figure 4-21 through Figure 4-23.

***Figure 4-21 LAUSD – Alquist Priolo Zone Plate 1***



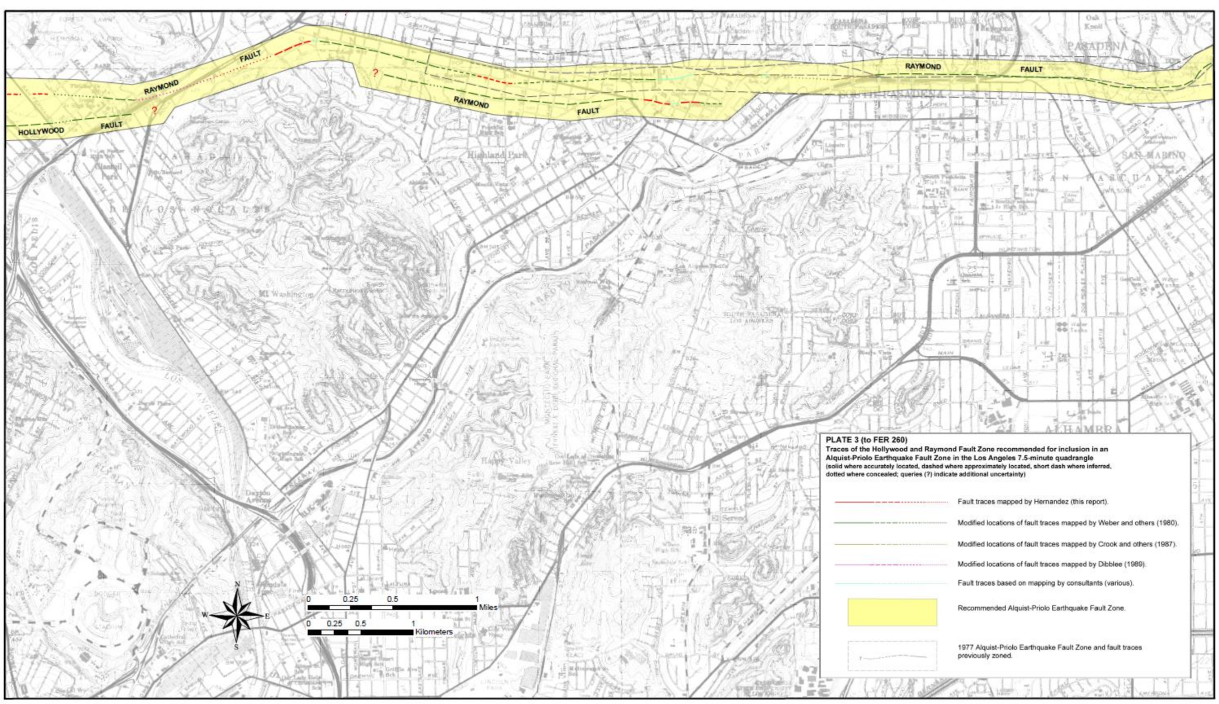

Source: California Department of Conservation

## *Figure 4-22 LAUSD – Alquist Priolo Zone Plate 2*




Source: California Department of Conservation

## *Figure 4-23 LAUSD – Alquist Priolo Zone Plate 3*




Source: California Department of Conservation

## Earthquake Hazards

Earthquakes can cause structural damage, injury, and loss of life, as well as damage to infrastructure networks, such as water, power, gas, communication, and transportation. Earthquakes may also cause collateral emergencies including dam and levee failures, hazmat incidents, fires, avalanches, and landslides. The degree of damage depends on many interrelated factors. Among these are: the magnitude, focal depth, distance from the causative fault, source mechanism, duration of shaking, high rock accelerations, type of surface deposits or bedrock, degree of consolidation of surface deposits, presence of high groundwater, topography, and the design, type, and quality of building construction. This section briefly discusses issues related to types of seismic hazards.

### Ground Shaking

Ground shaking is motion that occurs as a result of energy released during faulting. The damage or collapse of buildings and other structures caused by ground shaking is among the most serious seismic hazards. Damage to structures from this vibration, or ground shaking, is caused by the transmission of earthquake vibrations from the ground to the structure. The intensity of shaking and its potential impact on buildings is determined by the physical characteristics of the underlying soil and rock, building materials and workmanship, earthquake magnitude and location of epicenter, and the character and duration of ground motion.

Actual ground breakage generally affects only those buildings directly over or nearby the fault. Ground shaking generally has a much greater impact over a greater geographical area than ground breakage. The amount of breakage and shaking is a function of earthquake magnitude, type of bedrock, depth and type of soil, general topography, and groundwater. As with most communities in Southern California near active faults, much of the District territory would be susceptible to violent ground shaking.

### Seismic Structural Safety

Older buildings constructed before building codes were established, and even newer buildings constructed before earthquake-resistance provisions were included in the codes, are the most likely to be damaged during an earthquake. Buildings one or two stories high of wood-frame construction are considered to be the most structurally resistant to earthquake damage. Older masonry buildings without seismic reinforcement (unreinforced masonry) are the most susceptible to the type of structural failure that causes injury or death. ARE THERE ANY OF THESE IN THE DISTRICT?

The susceptibility of a structure to damage from ground shaking is also related to the underlying foundation material. A foundation of rock or very firm material can intensify short-period motions which affect low-rise buildings more than tall, flexible ones. A deep layer of water-logged soft alluvium can cushion low-rise buildings, but it can also accentuate the motion in tall buildings. The amplified motion resulting from softer alluvial soils can also severely damage older masonry buildings.

Other potentially dangerous conditions include, but are not limited to: building architectural features that are not firmly anchored, such as parapets and cornices; roadways, including column and pile bents and abutments for bridges and overcrossings; and above-ground storage tanks and their mounting devices. Such features could be damaged or destroyed during strong or sustained ground shaking.

### Liquefaction Potential

Liquefaction is a process whereby soil is temporarily transformed to a fluid formed during intense and prolonged ground shaking. Liquefaction for the District is discussed in Section 4.2.9 below.

### Settlement

Settlement can occur in poorly consolidated soils during ground shaking. During settlement, the soil materials are physically rearranged by the shaking to result in a less stable alignment of the individual minerals. Settlement of sufficient magnitude to cause significant structural damage is normally associated with rapidly deposited alluvial soils or improperly founded or poorly compacted fill. These areas are known to undergo extensive settling with the addition of irrigation water, but evidence due to ground shaking is not available.

### Other Hazards

Earthquakes can also cause landslides and dam failures. Earthquakes may cause landslides (discussed in Section 4.2.11), particularly during the wet season, in areas of high water or saturated soils. Finally, earthquakes can cause dams to fail (see Section 4.2.5 Dam Failure).

## *Past Occurrences*

### Disaster Declaration History

There have been three federal and five state disaster declarations for earthquakes in the County. These can be seen in Table 4-25.

*Table 4-24 Los Angeles County – State and Federal Disaster Declarations Summary 1950-2018*

| Disaster Type | Federal Declarations | | State Declarations | |
|---|---|---|---|---|
| | Count | Years | Count | Years |
| Earthquake | 3 | 1971[1], 1987[2], 1994[5] | 5 | 1971[1], 1987[2], 1990[3], 1991[4], 1994[5] |
| **Totals** | **3** | – | **5** | **–** |

Source: Cal OES, FEMA

[1]San Fernando Earthquake; [2]Whittier Narrows Earthquake; [3]Upland Earthquake; [4]Sierra Madre Earthquake; [5]Northridge Earthquake

### NCDC Events

Earthquake events are not tracked by the NCDC database.

### USGS Events

The USGS National Earthquake Information Center database contains data on earthquakes in Los Angeles County and the LAUSD Planning Area. Table 4-25 shows the approximate distances earthquakes can be felt away from the epicenter. According to the table, a magnitude 5.0 earthquake could be felt up to 90 miles away. The USGS database was searched for magnitude 5.0 or greater on the Richter Scale within 90 miles of the center of the City of Los Angeles. These results are detailed in Table 4-26.

### *Table 4-25 Approximate Relationships between Earthquake Magnitude and Intensity*

| Richter Scale Magnitude | Maximum Expected Intensity (MM)* | Distance Felt (miles) |
|---|---|---|
| 2.0 - 2.9 | I – II | 0 |
| 3.0 - 3.9 | II – III | 10 |
| 4.0 - 4.9 | IV – V | 50 |
| 5.0 - 5.9 | VI – VII | 90 |
| 6.0 - 6.9 | VII – VIII | 135 |
| 7.0 - 7.9 | IX – X | 240 |
| 8.0 - 8.9 | XI – XII | 365 |

*Modified Mercalli Intensity Scale.

Source: United State Geologic Survey, Earthquake Intensity Zonation and Quaternary Deposits, Miscellaneous Field Studies Map 9093, 1977.

### *Table 4-26 Magnitude 5.0 Earthquakes or Greater within 90 Miles of Los Angeles**

| Date | Richter Magnitude | Location |
|---|---|---|
| 12/26/1951 | 5.75 | 11km NNE of San Clemente Is. (SE tip), CA |
| 7/21/1952 | 5.19 | 11km SSE of Arvin, CA |
| 7/21/1952 | 5.18 | 5km SW of Tehachapi, CA |
| 7/21/1952 | 5.2 | 12km NE of Grapevine, CA |
| 7/21/1952 | 5.18 | 9km NW of Grapevine, CA |
| 7/21/1952 | 5.4 | 9km NW of Grapevine, CA |
| 7/21/1952 | 5.8 | 13km WNW of Grapevine, CA |
| 7/21/1952 | 7.5 | 6km WNW of Grapevine, CA |
| 7/23/1952 | 5.13 | 6km N of Grapevine, CA |
| 7/23/1952 | 5.51 | 6km SSE of Arvin, CA |
| 7/23/1952 | 5.55 | 13km ENE of Grapevine, CA |
| 7/23/1952 | 5.43 | 25km SSW of Bodfish, CA |
| 7/25/1952 | 5.62 | 19km N of Tehachapi, CA |
| 7/25/1952 | 5.55 | 22km N of Tehachapi, CA |
| 7/31/1952 | 5.64 | 14km NNW of Tehachapi, CA |
| 8/7/1952 | 5.03 | 19km NW of Grapevine, CA |
| 1/12/1954 | 5.4 | 13km WNW of Grapevine, CA |
| 5/23/1954 | 5.03 | 7km WNW of Grapevine, CA |
| 9/23/1963 | 5.29 | 6km SSE of Hemet, CA |
| 7/5/1968 | 5.05 | 20km ENE of Santa Cruz Is. (NW end), CA |
| 9/12/1970 | 5.22 | 3km W of Lytle Creek, CA |
| 2/9/1971 | 6.6 | 10km SSW of Agua Dulce, CA |

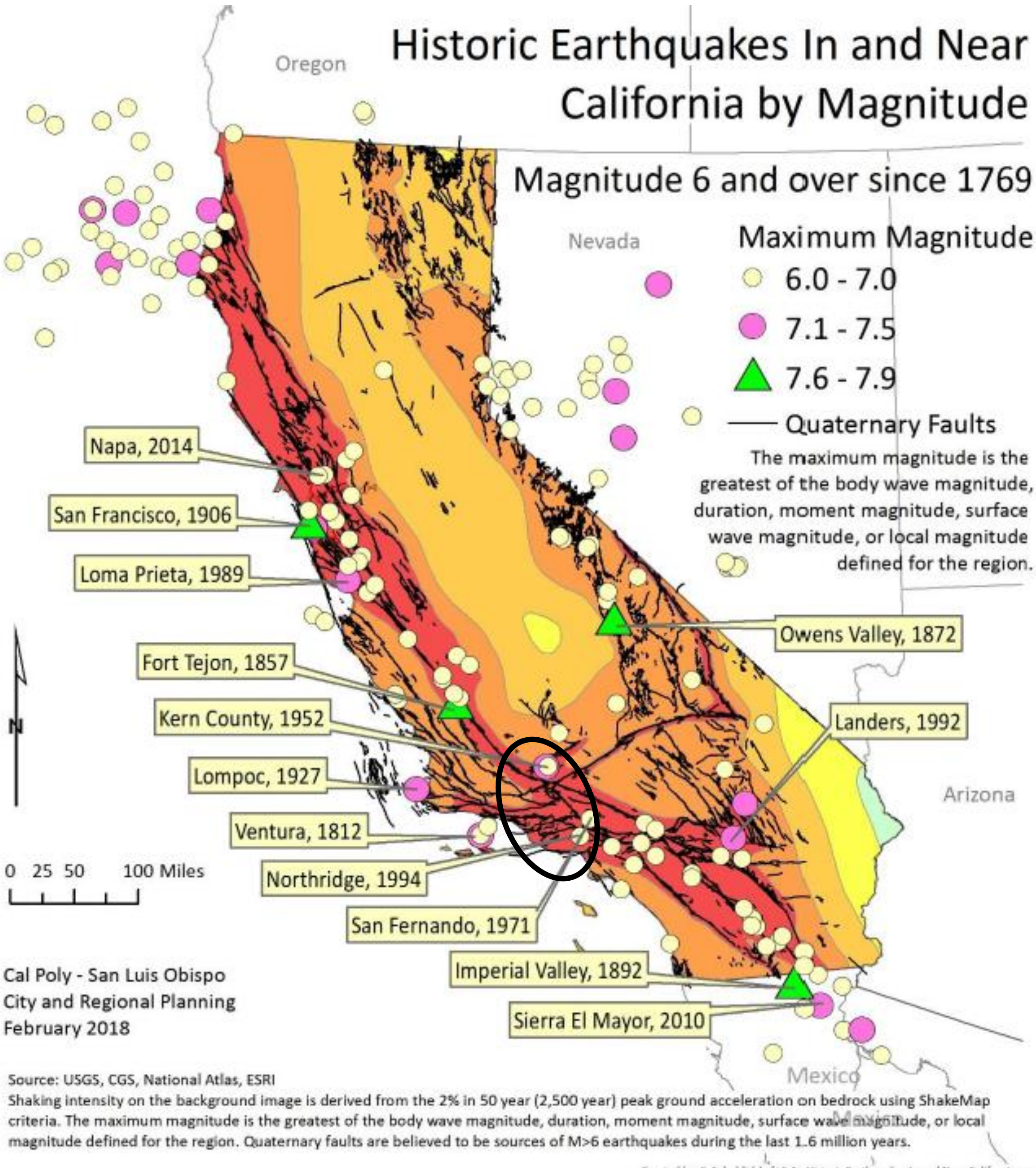
| Date | Richter Magnitude | Location |
|---|---|---|
| 2/21/1973 | 5.3 | 22km W of Malibu, CA |
| 8/6/1973 | 5.14 | 9km SSE of Santa Cruz Is. (E end), CA |
| 8/13/1978 | 5.08 | 12km S of Santa Barbara, CA |
| 1/1/1979 | 5.21 | 13km S of Malibu Beach, CA |
| 9/4/1981 | 5.45 | 11km NNW of Santa Barbara Is., CA |
| 7/13/1986 | 5.45 | 47km ENE of San Clemente Is. (SE tip), CA |
| 10/1/1987 | 5.9 | 2km SSW of Rosemead, CA |
| 10/4/1987 | 5.25 | 2km WSW of Rosemead, CA |
| 6/10/1988 | 5.37 | 16km NE of Lebec, CA |
| 12/3/1988 | 5.02 | 1km SSE of Pasadena, CA |
| 12/16/1988 | 5.03 | 12km SW of Morongo Valley, CA |
| 2/28/1990 | 5.51 | 6km NNE of Claremont, CA |
| 6/28/1991 | 5.8 | 13km NNE of Sierra Madre, CA |
| 6/28/1992 | 5.26 | 1km N of Big Bear Lake, California |
| 6/28/1992 | 6.3 | 7km SSE of Big Bear City, CA |
| 7/9/1992 | 5.3 | Southern California |
| 7/11/1992 | 5.67 | 12km NW of California City, California |
| 8/17/1992 | 5.23 | 7km SE of Big Bear Lake, California |
| 11/27/1992 | 5.29 | 10km NNW of Big Bear City, California |
| 12/4/1992 | 5.26 | 10km SE of Lucerne Valley, California |
| 5/28/1993 | 5.19 | 21km SW of Lamont, California |
| 1/17/1994 | 5.58 | 7km NNE of Simi Valley, California |
| 1/17/1994 | 5.2 | 9km N of Chatsworth, California |
| 1/17/1994 | 5.89 | 1km ENE of Granada Hills, California |
| 1/17/1994 | 6.7 | 1km NNW of Reseda, CA |
| 1/18/1994 | 5.24 | 10km ESE of Piru, California |
| 1/19/1994 | 5.07 | 10km SSW of Valencia, California |
| 1/29/1994 | 5.06 | 6km NNE of Chatsworth, California |
| 3/20/1994 | 5.24 | 3km WNW of Panorama City, California |
| 6/26/1995 | 5.02 | 11km SW of Valencia, California |
| 4/26/1997 | 5.07 | 12km ESE of Piru, California |
| 10/16/1999 | 5.6 | 7km ENE of Running Springs, CA |
| 7/29/2008 | 5.44 | 5km S of Chino Hills, CA |
| 3/29/2014 | 5.1 | 2km NW of Brea, CA |
| 4/5/2018 | 5.31 | 29km SW of Santa Cruz Is. (E end), CA |

Source: USGS

*Search dates 1950 – April 1, 2018

Figure 4-24 shows major historical earthquakes in California from 1769 to 2017. Figure 4-25 shows the numbers of historical occurrences of events described as MMI Scale VII or greater from 1800 to 2017. Such events notably have been concentrated along the San Andreas Fault system, particularly in the San Francisco Bay, Monterey Bay, and Humboldt County areas. It shows the areas damaged in California by earthquake from 1800-2017.

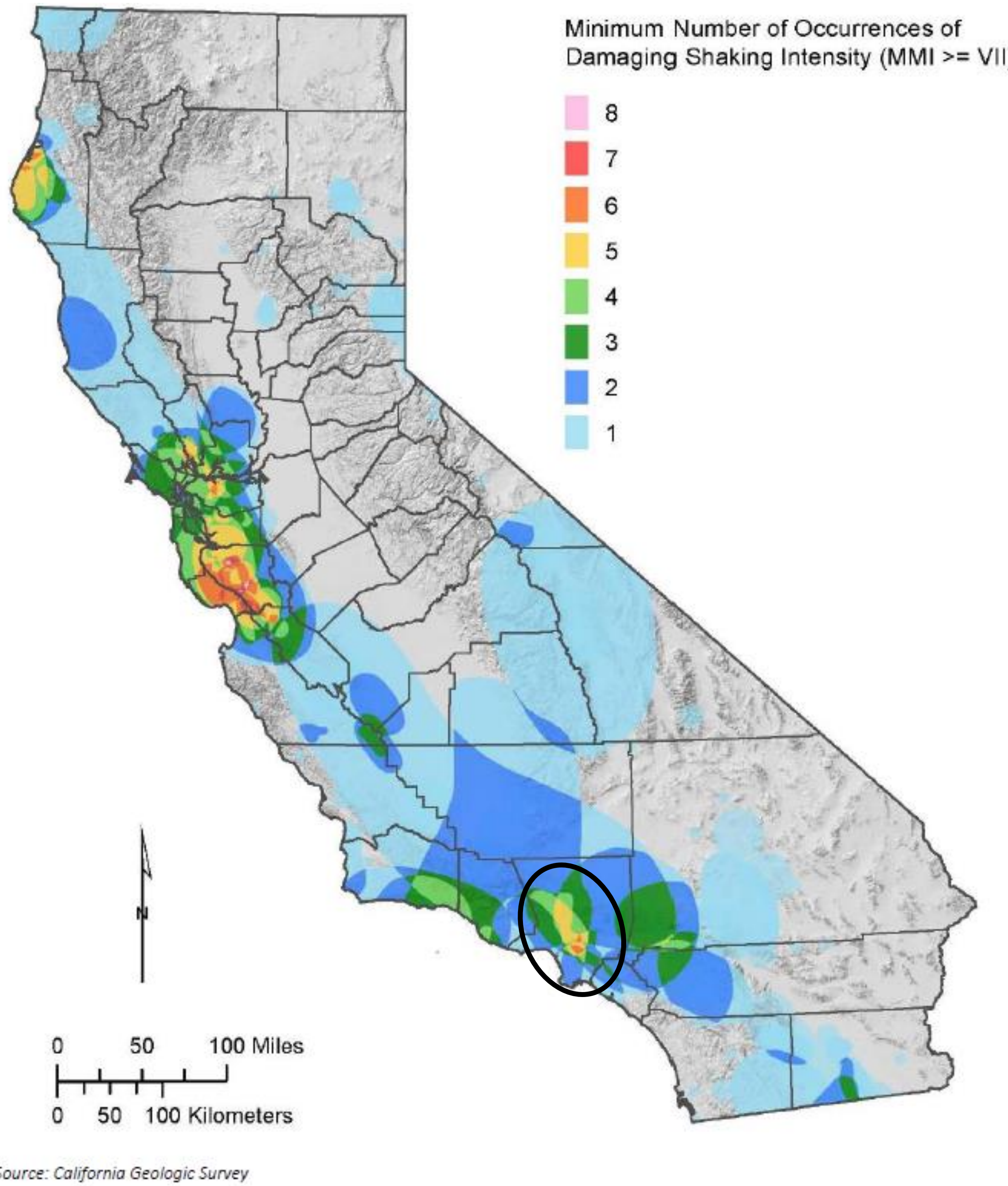
*Figure 4-24 Historic Earthquakes in California (1769-2017)*




| | MMI | Damage | Effects |
|---|---|---|---|
| | X | Very Heavy | Some well-built, wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent. |
| | IX | Heavy | Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations. |
| | VIII | Moderate to Heavy | Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned. |
| | VII | Moderate | Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly-built or badly designed structures; some chimneys broken. |
| | VI | Light | Felt by all, many frightened. Some heavy furniture moved; a few instance of fallen plaster. Damage slight. |
| | V | Very Light | Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop. |

Source: 2018 State of California Multi-Hazard Mitigation Plan

*Figure 4-25 California Areas Damaged by Earthquake*




Source: 2018 State of California Multi-Hazard Mitigation Plan

## Hazard Mitigation Planning Committee Events

WHAT EVENTS HAVE SPECIFICALLY AFFECTED THE DISTRICT? WHAT DAMAGES OCCURRED?

## *Likelihood of Future Occurrence*

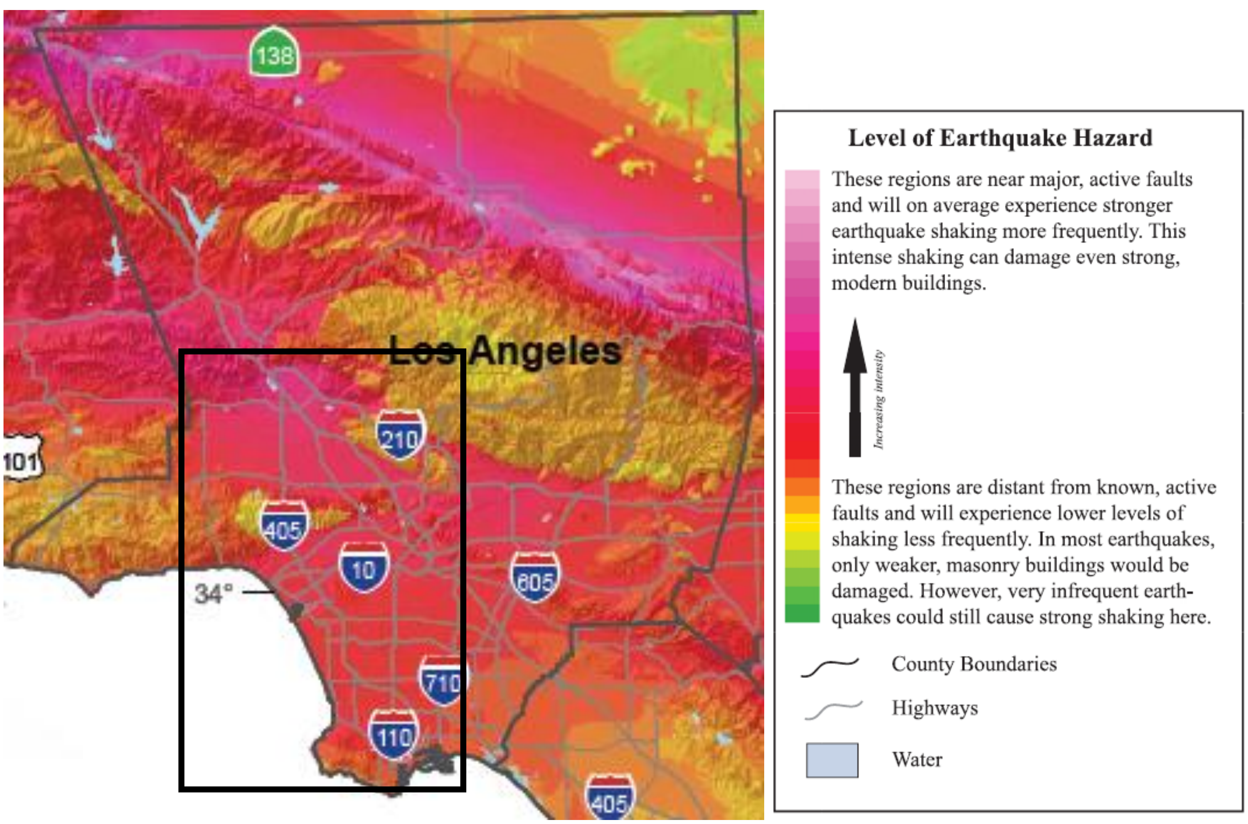
**Occasional (major earthquake); Likely (minor earthquake)**—Los Angeles County seismic activity within the past two hundred years has shown multiple major or damaging earthquakes occurring on identified fault lines within or near the County. The combination of plate tectonics and associated California coastal mountain range building geology, essentially guarantees earthquake as a result of the periodic release of tectonic stresses. Los Angeles County and the District lie in the center of the North American and Pacific tectonic plate activity. There have been earthquakes as a result of this activity in the historic past, and there will continue to be earthquakes in the future.

### Mapping of Future Occurrences

#### Earthquake Intensity

Maps indicating the maximum expectable intensity of ground shaking for the County are available through several sources. Figure 4-26, prepared by the California Division of Mines and Geology, shows the expected relative intensity of ground shaking and damage in California from anticipated future earthquakes. The shaking potential is calculated as the level of ground motion that has a 2% chance of being exceeded in 50 years, which is the same as the level of ground-shaking with about a 2,500-year average repeat time. The black square encompasses the District Planning Area. Although the greatest hazard is in areas of highest intensity as shown on the map, no region is immune from potential earthquake damage.

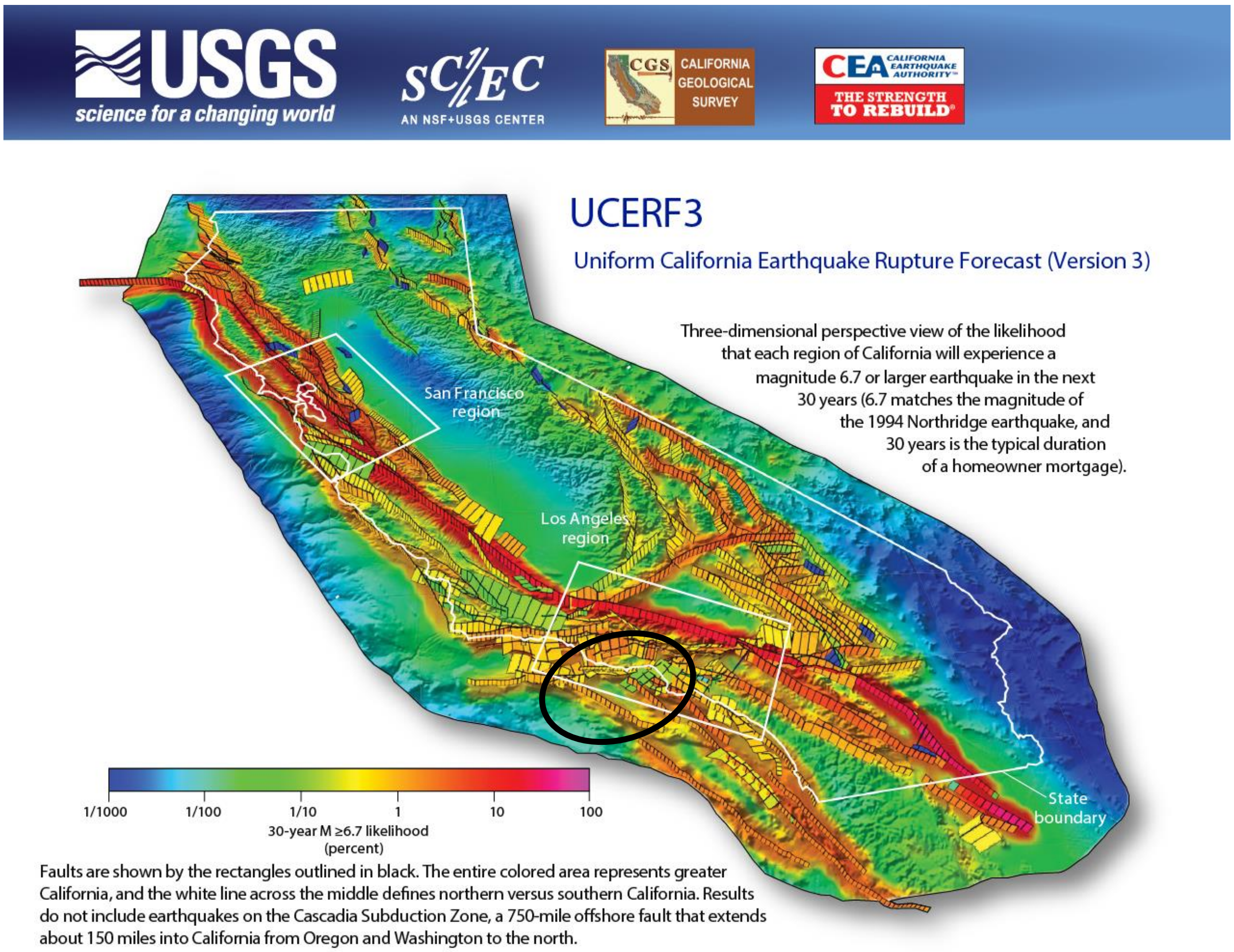
*Figure 4-26 Maximum Expectable Earthquake Intensity – 2,500 Year Event*




Source: California Division of Mines and Geology – Earthquake Shaking Potential for California 2016

In 2014, the USGS and the California Geological Survey (CGS) released the time-dependent version of the Uniform California Earthquake Rupture Forecast (UCERF III) model. The UCERF III results have helped to reduce the uncertainty in estimated 30-year probabilities of strong ground motions in California. The UCERF map is shown in Figure 4-27 and indicates that Los Angeles County and the District have a moderate to high risk of earthquake occurrence, which coincides with the likelihood of future occurrence rating of occasional.

*Figure 4-27 Probability of Earthquake Magnitudes Occurring in 30 Year Time Frame*




Source: United States Geological Survey Open File Report 2015-3009

### Climate Change and Earthquake

Climate changes is unlikely to increase earthquake frequency or strength.

## 4.2.9. Earthquake: Liquefaction

### *Hazard/Problem Description*

Liquefaction is a process whereby soil is temporarily transformed to a fluid formed during intense and prolonged ground shaking. Areas most prone to liquefaction are those that are water saturated (e.g., where the water table is less than 30 feet below the surface) and consist of relatively uniform sands that are loose to medium density. In addition to necessary soil conditions, the ground acceleration and duration of the earthquake must be of sufficient energy to induce liquefaction.

Liquefaction during major earthquakes has caused severe damage to structures on level ground as a result of settling, titling, or floating. Such damage occurred in San Francisco on bay-filled areas during the 1989 Loma Prieta earthquake, even though the epicenter was several miles away. If liquefaction occurs in or under a sloping soil mass, the entire mass may flow toward a lower elevation. Also of particular concern in terms of developed and newly developing areas are fill areas that have been poorly compacted.

The District has large areas of possible impacts in all 6 Local Districts. Areas less affected in the District are those areas that are in the more topographically diverse, like the San Gabriel mountains.

### *Past Occurrences*

#### Disaster Declaration History

There have been no federal or state disaster declarations for liquefaction. Liquefaction may have occurred during the earthquakes that qualified the County for state and disaster declarations, but it was a secondary hazard to the earthquake event.

#### NCDC Events

Liquefaction events are not tracked by the NCDC database.

#### Hazard Mitigation Planning Committee Events

ANY PAST LIQUEFACTION EVENTS FOR THE DISTRICT?

### *Likelihood of Future Occurrence*

**Unlikely**—Los Angeles County seismic activity within the past two hundred years has shown multiple major or damaging earthquakes occurring on identified fault lines within or near the County. There are areas in the District Planning Area at risk to liquefaction from earth shaking. There have been earthquakes as a result of this activity in the historic past, and there will continue to be earthquakes in the future.

#### Climate Change and Earthquake

Climate changes is unlikely to increase liquefaction events.

## 4.2.10. Flood: 1%/0.2% Annual Chance

### *Hazard/Problem Description*

Flooding is the rising and overflowing of a body of water onto normally dry land. History clearly highlights floods as one of the natural hazards impacting the District. Floods are among the costliest natural disasters in terms of human hardship and economic loss nationwide. Floods can cause substantial damage to structures, landscapes, and utilities as well as life safety issues. Floods can be extremely dangerous, and even six inches of moving water can knock over a person given a strong current. A car will float in less than two feet of moving water and can be swept downstream into deeper waters. This is one reason floods kill more people trapped in vehicles than anywhere else. During a flood, people can also suffer heart attacks or electrocution due to electrical equipment short outs. Floodwaters can transport large objects downstream which can damage or remove stationary structures, such as dam spillways. Ground saturation can result in instability, collapse, or other damage. Objects can also be buried or destroyed through sediment deposition. Floodwaters can also break utility lines and interrupt services. Standing water can cause damage to crops, roads, foundations, and electrical circuits. Direct impacts, such as drowning, can be limited with adequate warning and public education about what to do during floods. Where flooding occurs in populated areas, warning and evacuation will be of critical importance to reduce life and safety impacts from any type of flooding.

The nearest major waterways are the Los Angeles River, Santa Clara River, Rio Hondo River, San Gabriel River, and Coyote Creek. The San Gabriel River is one mile to the west and it does create a potential for flooding for the Los Angeles Unified School District.

#### Health Hazards from Flooding

Certain health hazards are also common to flood events. While such problems are often not reported, three general types of health hazards accompany floods. The first comes from the water itself. Floodwaters carry anything that was on the ground that the upstream runoff picked up, including dirt, oil, animal waste, and lawn, farm and industrial chemicals. Pastures and areas where cattle and hogs are kept or their wastes are stored can contribute polluted waters to the receiving streams.

Floodwaters also saturate the ground, which leads to infiltration into sanitary sewer lines. When wastewater treatment plants are flooded, there is nowhere for the sewage to flow. Infiltration and lack of treatment can lead to overloaded sewer lines that can back up into low-lying areas and homes. Even when it is diluted by flood waters, raw sewage can be a breeding ground for bacteria such as e. coli and other disease-causing agents.

The second type of health problems arise after most of the water has gone. Stagnant pools can become breeding grounds for mosquitoes, and wet areas of a building that have not been properly cleaned breed mold and mildew. A building that is not thoroughly cleaned becomes a health hazard, especially for small children and the elderly.

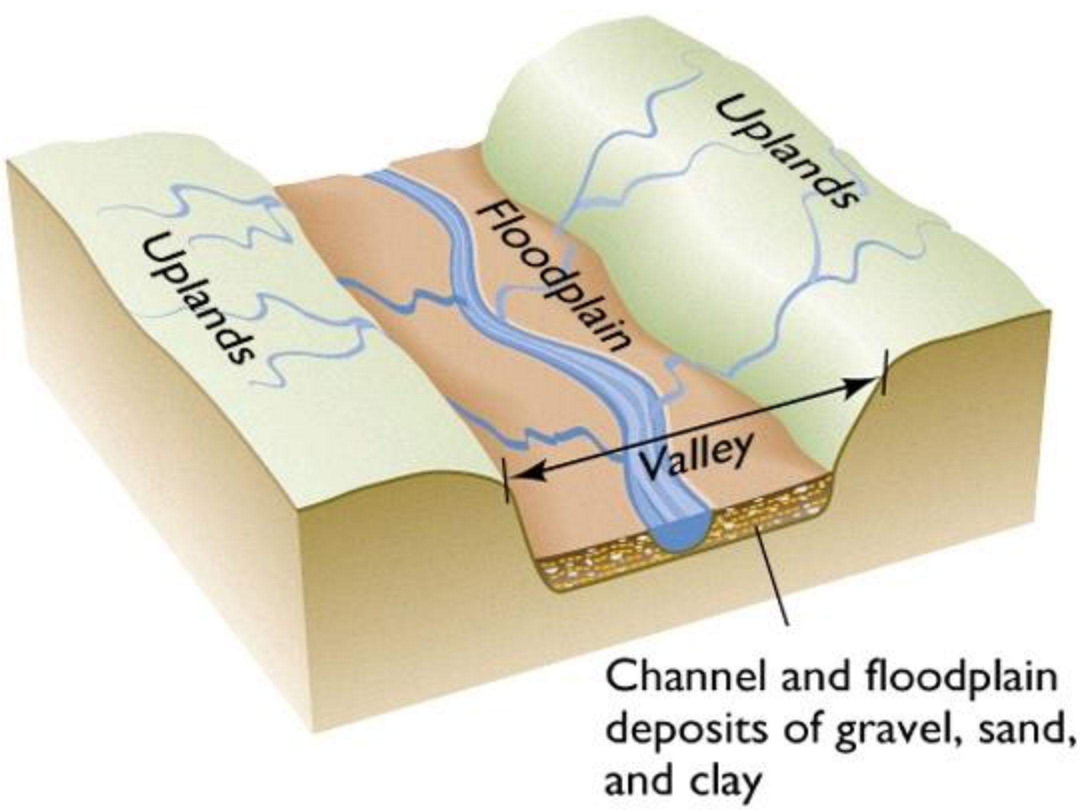
Another health hazard occurs when heating ducts in a forced air system are not properly cleaned after inundation. When the furnace or air conditioner is turned on, the sediments left in the ducts are circulated throughout the building and breathed in by the occupants. If a city or county water system loses pressure, a boil order may be issued to protect people and animals from contaminated water.

The third problem is the long-term psychological impact of having been through a flood and seeing one's home damaged and irreplaceable keepsakes destroyed. The cost and labor needed to repair a flood-damaged home puts a severe strain on people, especially the unprepared and uninsured. There is also a long-term problem for those who know that their homes can be flooded again. The resulting stress on floodplain residents takes its toll in the form of aggravated physical and mental health problems.

### Floodplains

The area adjacent to a channel is the floodplain (see Figure 4-28). Floodplains are illustrated on inundation maps, which show areas of potential flooding and water depths. In its common usage, the floodplain most often refers to that area that is inundated by the 1% annual chance (or 100-year) flood, the flood that has a one percent chance in any given year of being equaled or exceeded. The 1% annual chance flood is the national minimum standard to which communities regulate their floodplains through the National Flood Insurance Program (NFIP). The 500-year flood is the flood that has a 0.2% chance of being equaled or exceeded in any given year. The potential for flooding can change and increase through various land use changes and changes to land surface, which result in a change to the floodplain. A change in environment can create localized flooding problems inside and outside of natural floodplains by altering or confining natural drainage channels. These changes are most often created by human activity.

***Figure 4-28 Floodplain Schematic***




Source: FEMA

Areas within the District susceptible to various types of flood events as described below.

- **Riverine flooding** – Riverine flooding, defined as when a watercourse exceeds its "bank-full" capacity, generally occurs as a result of prolonged rainfall, or rainfall that is combined with already saturated soils from previous rain events. This type of flood occurs in river systems whose tributaries may drain large geographic areas and include one or more independent river basins. The onset and duration of riverine floods may vary from a few hours to many days. Factors that directly affect the amount of flood runoff include precipitation amount, intensity and distribution, the amount of soil moisture, seasonal variation in vegetation, snow depth, and water-resistance of the surface due to urbanization. In the District Planning Area, riverine flooding is largely caused by heavy and continued rains, sometimes (though rarely) combined with snowmelt, and heavy flow from tributary streams. These intense storms can overwhelm the local waterways as well as the integrity of flood control structures. The warning time associated with slow rise floods assists in life and property protection.
- **Flash flooding** – Flash flooding describes localized floods of great volume and short duration. This type of flood usually results from a heavy rainfall on a relatively small drainage area. Precipitation of this sort usually occurs in the winter and spring. Flash floods often require immediate evacuation within the hour and thus early threat identification and warning is critical for saving lives
- **Localized/Stormwater flooding** – Localized flooding problems are often caused by flash flooding, severe weather, or an unusual amount of rainfall. Flooding from these intense weather events usually occurs in areas experiencing an increase in runoff from impervious surfaces associated with development and urbanization as well as inadequate storm drainage systems. More on localized flooding can be found in Section 4.2.11.
- **Dam failure flooding** – Flooding from failure of one or more upstream dams is also a concern to the District. A catastrophic dam failure could easily overwhelm local response capabilities and require mass evacuations to save lives. Impacts to life safety will depend on the warning time and the resources available to notify and evacuate the public. Major loss of life could result, and there could be associated health concerns as well as problems with the identification and burial of the deceased. Dam failure is further addressed in Section 4.2.5 Dam Failure.

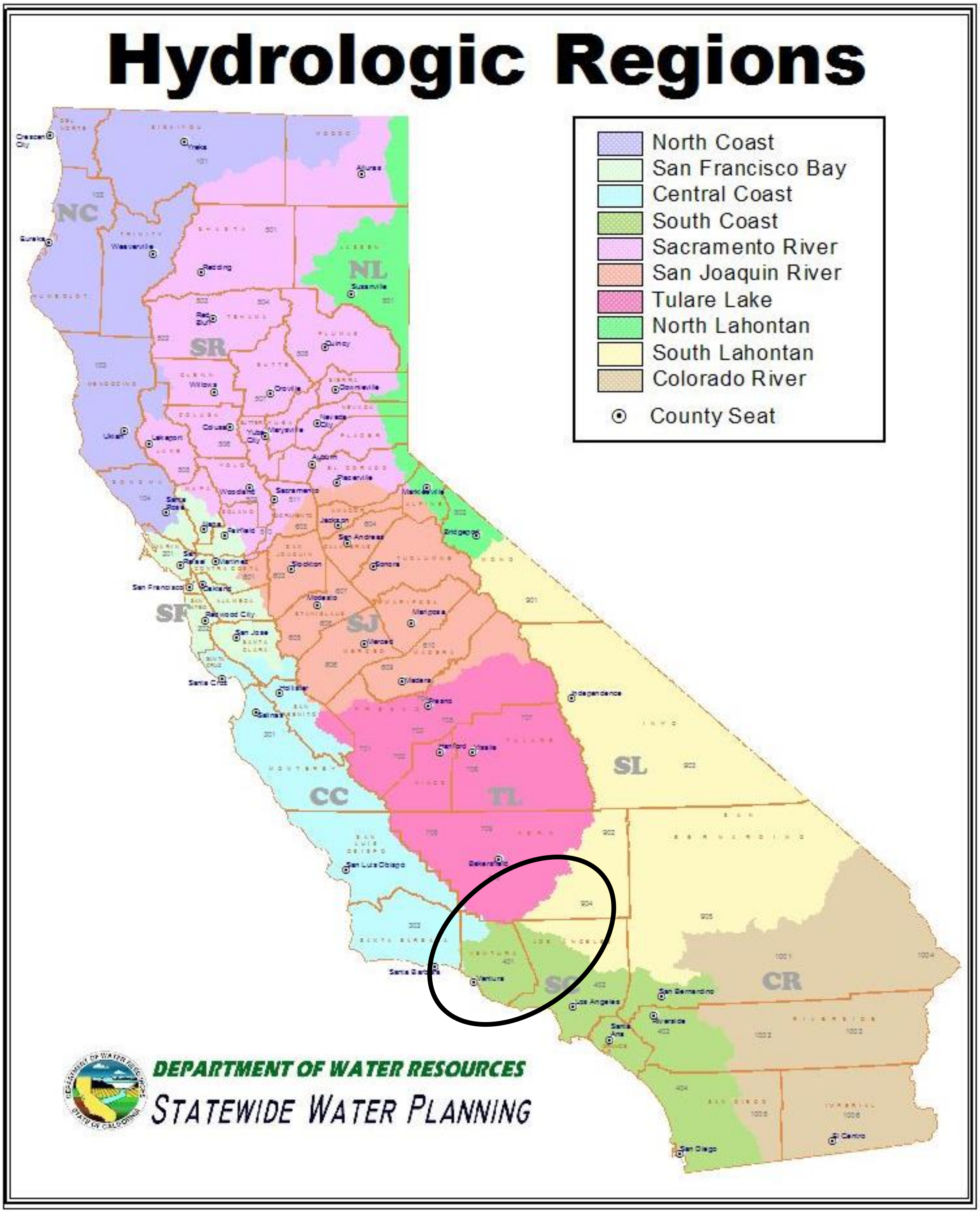
### Major Sources of Flooding

California has 10 hydrologic regions. The District sits in the South Coast hydrologic regions.

- The South Coast Hydrologic Region covers approximately 6.78 million acres (10,600 square miles) of the southern California watershed that drains to the Pacific Ocean. The region includes all of Orange County, most of San Diego and Los Angeles Counties, parts of Riverside, San Bernardino, and Ventura counties, and a small amount of Kern and Santa Barbara counties. According to 2000 census data, about 17 million people live within the boundaries of the South Coast region, approximately 50 percent of the population of California. Because this region amounts to only about 7 percent of the surface area of the State, this has the highest population density of any hydrologic region in California. Major population centers include the metropolitan areas surrounding Ventura, Los Angeles, San Diego, San Bernardino, and Riverside. The region is bounded on the west by the Pacific Ocean and the watershed divide near the Ventura-Santa Barbara County line. The northern boundary corresponds to the crest of the Transverse Ranges through the San Gabriel and San Bernardino mountains. The eastern boundary lies along the crest of the San Jacinto Mountains and low-lying hills of the Peninsular Range that form a drainage boundary with the Colorado River hydrologic region. The southern boundary is the international boundary with the Republic of Mexico. Significant geographic features include the coastal plain, the central Transverse Ranges, the Peninsular Ranges, and the San Fernando, San Gabriel, Santa Ana River, and Santa Clara River valleys.

A map of the California's hydrological regions is provided in Figure 4-29.

*Figure 4-29 California Hydrologic Regions*




Source: California Department of Water Resources

### The Los Angeles County Waterway System

The 2016 FIS noted that the area served by the District is characterized by diversified topography. The terrain within the Los Angeles corporate limits can be classified in broad terms as being 75 percent alluvial plain and 25 percent rugged canyons and hills. Elevations range from 5,074 feet at Sister Elsie Peak in the San Gabriel Mountains to nearly mean sea level in the southwestern part of the District. The Los Angeles River, which is the primary flood threat to the City of Los Angeles and the District, originates at the west end of the San Fernando Valley in the northwestern-most corner of the County. The river channel extends through the heart of Los Angeles County by flowing east to Glendale where it turns and flows south to the Pacific Ocean. The Los Angeles River is part of a network of dams, reservoirs, debris collection basins, and spreading grounds built by the Los Angeles County Flood Control District (LACFCD) and US Army Corps of Engineers (USACE) to minimize flooding in the county. The portion of the river that affects the City of Los Angeles begins at the Arroyo Seco and ends at the mouth of the river at the Pacific Ocean. The floodplain starts in the northeast part of the City of Los Angeles at the Arroyo Seco confluence, passes through the Cities of Los Angeles, Bell, Bell Gardens, South Gate, Lynwood, Lakewood, Paramount, Compton, Bellflower, Carson, Gardena and Long Beach, to its terminus at the Pacific Ocean.

The remaining major drainage networks near the District are those of the Ballona Creek and Dominguez Channel systems. The West Los Angeles area is tributary to Ballona Creek and other channels that discharge into the Pacific Ocean on the west side of the County. The Central District is tributary to Compton Creek and the Los Angeles River, which flows southerly beyond the city limits and discharges into the ocean. The Harbor District is tributary to Dominguez Channel and Harbor Lake, which drain adjacent to the Los Angeles River mouth.

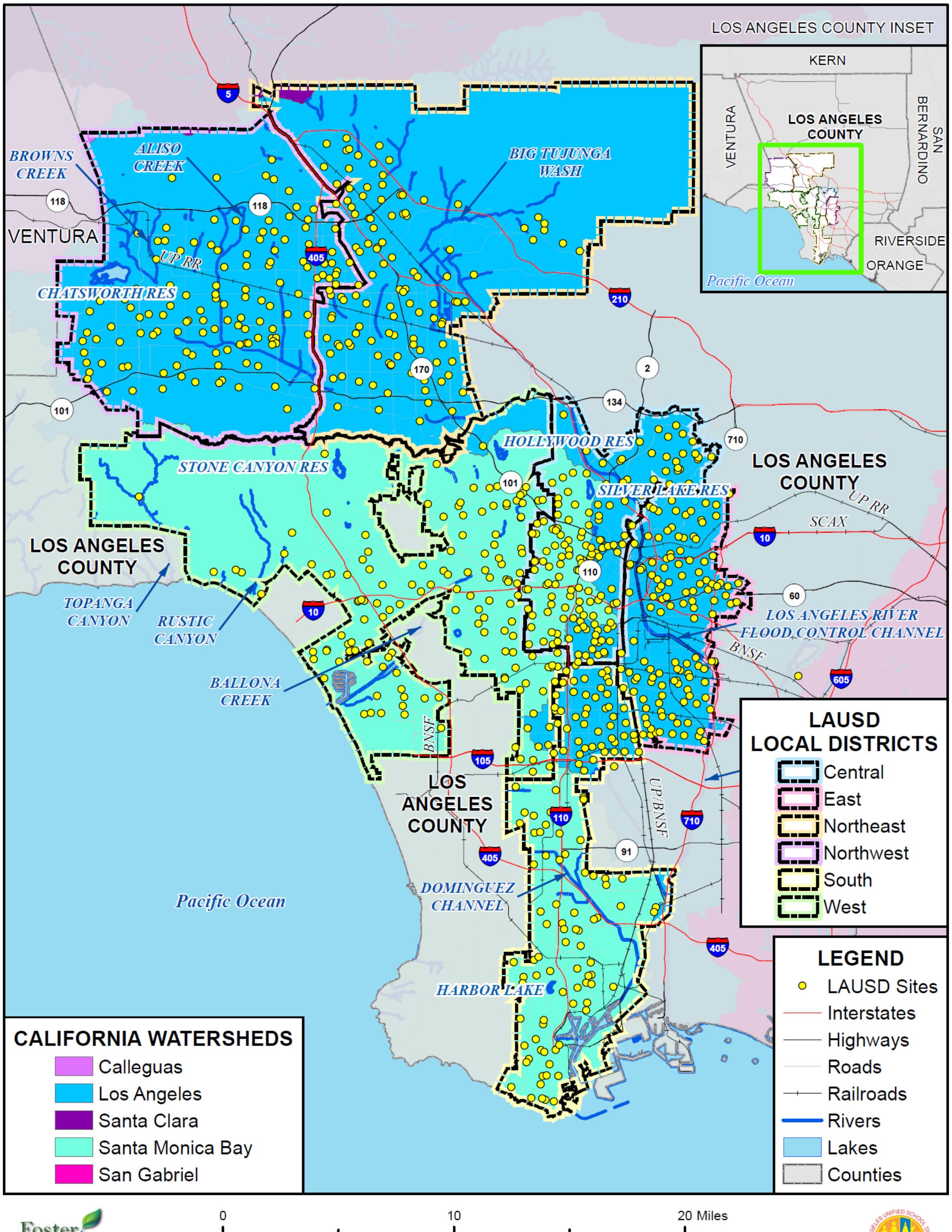
The topography of the coastal plain on which much of the City of Los Angeles resides is gradually sloped from the foothills of the San Gabriel Mountains upstream of the city, to the Pacific Ocean with a few exceptions of rising hills and depressed areas. Ground elevations range from 10,000 feet in the San Gabriel Mountains, to 330 feet near the Arroyo Seco confluence, to mean sea level at the mouth of the Los Angeles River. The city contains numerous steep, developed hillside residential areas.

Underlying soils are considered alluvial, and varies from coarse sand and gravel to silty clay and gravel or clay. The land is generally well-drained, with relatively few perched water or artesian area. Mapping done by Cal DWR notes that the District's territory crosses 5 watersheds. These include the following watersheds:

- Calleguas Watershed
- Los Angeles Watershed
- Santa Clara Watershed
- Santa Monica Bay Watershed
- San Gabriel Watershed

Figure 4-30 illustrates the primary watersheds of Los Angeles County, as well as the primary waterways in the County.

*Figure 4-30 Primary Watersheds and Waterways of Los Angeles County*




Data Source: California Interagency Watershed Map of 1999 (Calwater 2.2, updated May 2004, "calw221"), LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

### Flooding in Los Angeles County

The 2016 FIS noted that Los Angeles County has a long history of destructive flooding. These are listed in the FIS Events section of the Past Occurrences below. Many flood control facilities were constructed after the heavy loss of life and property damage incurred in the January 1934 flood event. These facilities have eliminated much of the damage which could have resulted in their absence. However, the floods of January and February 1969 and February and March 1978 demonstrated that Los Angeles County will always be susceptible to flood disaster. Of particular concern are mudflows which frequently occur in the foothill areas during intense rainfall, usually following wildfires in the upstream watershed. This hazard has not been addressed in this study but has been identified and addressed in numerous ways by the County, such as the construction of over one hundred debris basins at the mouths of mountainous canyons, to retain the high volume of sediment and debris that flood flows may carry during large floods. Debris basins have been demonstrated to be the only effective means of keeping downstream channel free of debris blockage, and the subsequent overtopping that would result during large flood events. In the Los Angeles basin area, an extensive flood control system has eliminated much of the flood hazard experienced in years past. The major components of the Los Angeles County flood control system are the Los Angeles River, the San Gabriel River, Rio Hondo, Ballona Creek, and Dominguez Channel. In addition, numerous other storm drains, channels and debris basins have been constructed by the USACE, local agencies, and private developers. Responsibility for maintaining the majority of this system, which serves the incorporated cities as well as unincorporated county territory, lies with the LACFCD. Generally, the larger drainage systems mentioned above are designed to contain a 1- percent annual chance flood event.

### Special Flooding Circumstances

There are two special types of flooding that can affect the District and the surrounding County:

- El Niño is a disruption of the ocean-atmosphere system in the tropical Pacific having important consequences. Among these consequences is increased rainfall across the southern tier of the US and in Peru, which has caused destructive flooding, and drought in the West Pacific, sometimes associated with devastating brush fires in Australia. Observations of conditions in the tropical Pacific are considered essential for the prediction of short term (a few months to 1 year) climate variations. El Niño (Spanish name for the male child), initially referred to a weak, warm current appearing annually around Christmas time along the coast of Ecuador and Peru, and lasting only a few weeks, to a month or more. Every three to seven years, an El Niño event can last for many months, having significant economic and atmospheric consequences worldwide. During the past forty-five years, ten of these major El Niño events have been recorded, the worst of which occurred in 1997-1998. Previous to this, the El Niño event in 1982-1983 was the strongest. Some of the El Niño events have persisted more than one year.
- Atmospheric rivers are relatively long, narrow regions in the atmosphere – like rivers in the sky – that transport most of the water vapor outside of the tropics. These columns of vapor move with the weather, carrying an amount of water vapor roughly equivalent to the average flow of water at the mouth of the Mississippi River. When the atmospheric rivers make landfall, they often release this water vapor in the form of rain or snow. While atmospheric rivers are responsible for great quantities of rain that can produce flooding, they also contribute to beneficial increases in snowpack. A series of atmospheric rivers fueled the strong winter storms that battered the U.S. West Coast from western Washington to southern California from Dec. 10–22, 2010, producing 11 to 25 inches of rain in certain areas. These

rivers also contributed to the snowpack in the Sierras, which received 75 percent of its annual snow by Dec. 22, the first full day of winter.

### Los Angeles County Flood Mapping

As part of the County's ongoing efforts to identify and manage their flood prone areas, Los Angeles County relies on a variety of different mapping efforts. These efforts trickle down to the What follows is a brief description of FEMA and DWR mapping efforts covering Los Angeles County and the LAUSD Planning Area.

#### FEMA Floodplain Mapping

FEMA established standards for floodplain mapping studies as part of the NFIP. The NFIP makes flood insurance available to property owners in participating communities adopting FEMA-approved local floodplain studies, maps, and regulations. Floodplain studies that may be approved by FEMA include federally funded studies; studies developed by state, city, and regional public agencies; and technical studies generated by private interests as part of property annexation and land development efforts. Such studies may include entire stream reaches or limited stream sections depending on the nature and scope of a study. A general overview of floodplain mapping is provided in the following paragraphs. Details on the NFIP and mapping specific to the District are in Section 4.3 Vulnerability Assessment.

##### *Flood Insurance Study (FIS)*

The FIS develops flood-risk data for various areas of the community that will be used to establish flood insurance rates and to assist the community in its efforts to promote sound floodplain management. The current Los Angeles County FIS is dated January 6, 2016.

##### *Flood Insurance Rate Map (FIRM)*

The FIRM is designed for flood insurance and floodplain management applications. For flood insurance, the FIRM designates flood insurance rate zones to assign premium rates for flood insurance policies. For floodplain management, the FIRM delineates 1% and 0.2% annual chancer floodplains, floodways, and the locations of selected cross sections used in the hydraulic analysis and local floodplain regulation. The County FIRMs have been replaced by digital flood insurance rate maps (DFIRMs) as part of FEMA's Map Modernization program, which is discussed further below.

##### *Letter of Map Revision (LOMR) and Map Amendment (LOMA)*

LOMRs and LOMAs represent separate floodplain studies dealing with individual properties or limited stream segments that update the FIS and FIRM data between periodic FEMA publications of the FIS and FIRM.

##### *Digital Flood Insurance Rate Maps (DFIRM)*

As part of its Map Modernization program, FEMA is converting paper FIRMS to digital FIRMs, DFIRMS. These digital maps:

- Incorporate the latest updates (LOMRs and LOMAs);
- Utilize community supplied data;
- Verify the currency of the floodplains and refit them to community supplied base maps;
- Upgrade the FIRMs to a GIS database format to set the stage for future updates and to enable support for GIS analyses and other digital applications; and
- Solicit community participation.

DFIRMs for Los Angeles County have been developed, are dated September 28, 2008 (updated with all available LOMRs through January 6, 2016), and are being used for the flood analysis for this LHMP Update. A new DFIRM update is in process. Information from the January 6, 2016 FIS was used.

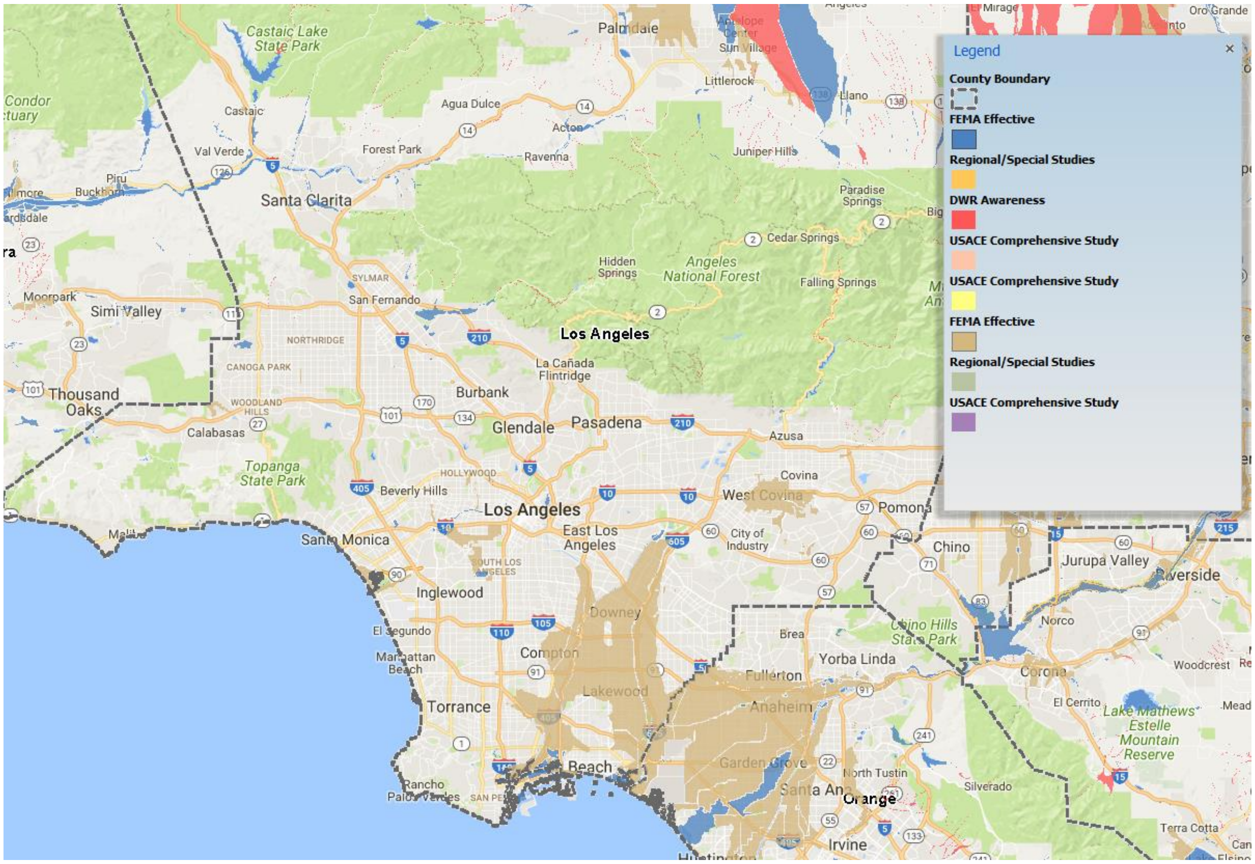
### California Department of Water Resources Best Available Maps (BAM)

Also to be considered when evaluating the flood risks in Los Angeles County and the District are various floodplain maps developed by the California DWR for various areas throughout California, and in the Sacramento-San Joaquin Valley cities and counties. The FEMA regulatory maps provide just one perspective on flood risks in Los Angeles County. Senate Bill 5 (SB 5), enacted in 2007, authorized the California DWR to develop the Best Available Maps (BAM) displaying 1% and 0.5% (200-year) annual chance floodplains for areas located within the Sacramento-San Joaquin (SAC-SJ) Valley watershed. This effort was completed by DWR in 2008. DWR has expanded the BAM to cover all counties in the State and to include 0.2% annual chance floodplains.

Different than the FEMA DFIRMs which have been prepared to support the NFIP and generally reflect only the 1% and 0.2% annual chance flood risks, the BAMs are provided for informational purposes and are intended to reflect current 1%, 0.5% (200-year) as applicable, and 0.2% annual chance flood risks using the best available data. The 100-year floodplain limits on the BAM are a composite of multiple 1% annual chance floodplain mapping sources. It is intended to show all currently identified areas at risk for a 100-year flood event, including FEMA's 1% annual chance floodplains. The BAM are comprised of different engineering studies performed by FEMA, Corps, and DWR for assessment of potential 1%, 0.5%, and 0.2% annual chance floodplain areas. These studies are used for different planning and/or regulatory applications, and for each flood frequency may use varied analytical and quality control criteria depending on the study type requirements.

The value in the BAMs is that they provide a bigger picture view of potential flood risk to the County and District than that provided in the FEMA DFIRMs. This provides the community and residents with an additional tool for understanding potential flood hazards not currently mapped as a regulated floodplain. Improved awareness of flood risk can reduce exposure to flooding for new structures and promote increased protection for existing development. Informed land use planning will also assist in identifying levee maintenance needs and levels of protection. By including the FEMA 1% annual chance floodplain, it also supports identification of the need and requirement for flood insurance. Figure 4-31 shows the BAM for the Los Angeles County and the District Planning Area.

## *Figure 4-31 Los Angeles County– Flood Awareness (Best Available) Map*




Source: California DWR

Legend explanation: Blue - FEMA 1%, Orange – Local 1% (developed from local agencies), Red – DWR 1%r (Awareness floodplains identify the 1% annual chance flood hazard areas using approximate assessment procedures.), Pink – USACE 1% (2002 Sac and San Joaquin River Basins Comp Study), Yellow – USACE 0.5% (2002 Sac and San Joaquin River Basins Comp Study), Tan – FEMA 0.2%, Grey – Local 0.2% (developed from local agencies), Purple – USACE 0.2%(2002 Sac and San Joaquin River Basins Comp Study).

## *Past Occurrences*

### Disaster Declaration History

A list of state and federal disaster declarations for Los Angeles County from flooding is shown on Table 4-27.

#### *Table 4-27 Los Angeles County – State and Federal Disaster Declaration from Flood 1950-2018*

| Disaster Type | Federal Declarations | | State Declarations | |
|---|---|---|---|---|
| | Count | Years | Count | Years |
| Flood | 12 | 1954, 1955, 1958, 1962 (two times), 1963, 1969, 1978, 1980, 1988, 1992, 1993 | 14 | 1950, 1955, 1958, 1959, 1962, 1969, 1978, 1980, 1983, 1988, 1992, 1993, 2001, 2003 |

| Disaster Type | Federal Declarations | | State Declarations | |
|---|---|---|---|---|
| | Count | Years | Count | Years |
| **Totals** | **12** | – | **14** | **–** |

Source: Cal OES, FEMA

## NCDC Events

The NCDC tracks flooding events for the County. Events have been tracked for flooding since 1993. Table 4-28 shows events in Los Angeles County since 1993.

*Table 4-28 NCDC Flood Events in Los Angeles County 1993 to 3/31/2017*

| Event Type | Number of Events | Deaths | Deaths (indirect | Injuries | Injuries (indirect) | Property Damage | Crop Damage |
|---|---|---|---|---|---|---|---|
| Coastal Flood | 1 | 0 | 0 | 0 | 0 | $0 | $0 |
| Flash Flood | 136 | 7 | 0 | 4 | 0 | $1,310,000 | $3,200,000 |
| Flood | 15 | 0 | 0 | 0 | 0 | $0 | $0 |
| Rip Current | 4 | 4 | 0 | 1 | 0 | $0 | $0 |
| Storm Surge/Tide | 1 | 0 | 0 | 27 | 0 | $0 | $0 |
| **Total** | **157** | **11** | **0** | **32** | **0** | **$1,310,000** | **$3,200,000** |

Source: NCDC

## FIS Events

The FIS noted that Los Angeles County has a long history of destructive flooding. The County suffered the effects of flooding episodes in 1811, 1815, 1825, 1832, 1861-62, 1867, 1876, 1884, 1888-91 (each year), 1914, 1921, and 1927. Similar and better-documented floods have occurred in January 1934, March 1938, February 1941, January 1943, January 1952, January 1956, January and February 1969, March 1978, January 1979, March 1980, March 1983, January 1992, and January 1994.

The FIS also noted that the cities of Bellflower, Carson, Compton, Downey, Gardena, Lakewood, Long Beach, Los Angeles, Lynwood, Montebello, Paramount, Pico Rivera, Santa Fe Springs, South Gate, and Whittier have a history of flooding roughly parallel to that of the larger Los Angeles River watershed. The cities are all in or abut the District Planning Area. Prior to the construction of the extensive storm drain and flood control channel system protecting numerous communities within the County, these cities suffered the continual damage wrought by overflow of the Los Angeles River and/or its tributaries. Following completion of this system, and due to the lack of a very large flood event during the intervening period, the major cause of flood damage within these cities has been flooding by overflow of local drainage systems and smaller tributaries to the Los Angeles River system.

Localized flooding occurred to a large extent during the floods of January and February 1969, February and March 1978, and February 1980, March 1983, January 1992, and January 1994. This flooding was due to the occurrence of localized high-intensity rainfall events, which overwhelmed the ability of local storm drains and flood control channels to drain off the excess runoff.

Flood control facilities constructed after the large events of the 1930's eliminated much of the damage which could have resulted in their absence; however, the level of protection offered by these facilities may have diminished during this period of rapid development of the Los Angeles basin, demonstrated by the almost break-out of the Los Angeles River in 1980, during an event that was recorded as considerably smaller than that of the expected design level of protection. Construction of the Los Angeles County Drainage Area Project (LACDA) has brought to level of protection offered by the system up to a level of greater than a 1-percent annual chance event.

These District Planning Area remains susceptible to flood damage from other sources. Of particular concern are mudflows which frequently occur in the foothill areas during intense rainfall, usually following wildfires in the upstream watershed.

Prior to completion of the Corps of Engineers' Los Angeles County Drainage Area study and Los Angeles River and Rio Hondo flood control channel modifications, the upper and lower reach of the Los Angeles River Channel were not capable of adequately conveying a 1-percent annual chance flood event. Overbank areas were susceptible to flooding caused by overtopping and potential failure of levee structures. Completion of this project, and its subsequent pursuit of Map Revision and USACE certification of the level of protection offered by the project, has resulted in areas of the District's removal from the regulatory 1-percent annual chance floodplain. Breakout is still possible during events larger than the current design of the system is capable of conveying.

In addition to land-based storms, the coastline of the cities of Long Beach and Los Angeles are also susceptible to storm-associated flooding. The southern California coastline is exposed to waves generated by winter and summer storms originating in the Pacific Ocean. It is not uncommon for these storms to cause 15-foot breakers. The occurrence of such a storm event in combination with high astronomical tides and strong winds can cause a significant wave runup and allow storm waves to attack higher than normal elevations along the coastline. When this occurs, shoreline erosion and coastal flooding frequently results in damage to inadequately protected structures and facilities located along low-lying portions of the shoreline.

Brief descriptions of several significant storms follow, which provide information to which coastal flood hazards and the projected flood depths can be compared.

- **September 16, 1910** – Heavy seas and high ground swells undermined homes in the Long Beach area. Efforts were made to check the destruction of the waves by building temporary bulkheads along the waterfront at its most exposed points, but until the tide began to recede late in the evening, little effective good was done. The ocean eroded Park at high tide on the afternoon of the 16th. Within a short period of time, over a mile of the bulkhead and sidewalk were destroyed.
- **September 1934** – A recurrence of destructive waves, similar to those of August 21, 1934, broke along the coast centering northward in the Long Beach area. Damage was reported at Malibu, where portions of the Roosevelt Highway were flooded due to waters backed up at a storm drain project under construction. In addition, the Pine Avenue Pier in Long Beach was destroyed. No damage was reported at either San Pedro or Santa Monica. Structures along the pike were endangered and temporary devices of protection were installed.
- **September 24-25, 1939** – A tropical cyclone lashed the entire southern California coastline on Sunday, September 24$^{th}$ and Monday, September 25$^{th}$. The storm brought approximately a 20°F drop in

temperature throughout southern California and winds reached 65 miles per hour. The gales and rain claimed lives, wreaked havoc with power and phone lines, temporarily destroyed the main railroad systems, closed highways, and flooded homes. Eight large homes along the waterfront at Sunset Beach were swept away. In Long Beach, plate glass windows were smashed by fierce winds. Some Pacific Electric track was washed out at Hermosa Beach. Disruption of phone service was heaviest in the Bellflower, Hynes-Clearwater, and Artesia areas. Homes along the shore from Malibu to Huntington Beach were heavily damaged by pounding seas and high winds. Many small boats were washed ashore, and several were wrecked when the high waves dashed them upon breakwaters or rocky shores. At least 10 yachts and barges were sunk or wrecked upon breakwaters or sands. At Santa Monica, the 227-foot fishing barge Minne A was washed ashore. Five deaths in the surf were reported; two at Los Angeles, two at Long Beach, and one at Newport Beach. At Burbank, one woman was drowned and others injured when a boat overturned.

- **December 25, 26, and 27, 1940** – Twenty- and thirty-foot waves undermined residences and portions of the Strand at Redondo Beach. Two houses collapsed, and five blocks of oceanfront walk were destroyed. In addition, 25-foot breakers undermined a house and store 50 feet landward of the normal high tide mark. At Belmont Peninsula, Long Beach, 70 homes were threatened with being cut off from the mainland by intense wave action.
- **May 22, 1960** – Resurgent seismic-triggered ocean waves stemming from Chilean earthquakes smashed dock facilities and hundreds of small craft. Damage was estimated at upwards of $1 million. Hardest hit was the Los Angeles-Long Beach Harbor complex, where a series of tidal currents surged back and forth through narrow Cerritos Channel wreaking havoc among the yacht anchorages. Some 300 yachts and small boats were torn from their slips and estimates indicated that from 15 to 30 boats were sunk. The closing of the Terminal Island bridges and suspension of ferry service caused monumental traffic jams in the Los Angeles/Long Beach area. The peak surge was estimated at between 8 and 9 feet.
- **Winter 1977-1978** – A combination of high astronomical tides, strong onshore winds, and high storm waves resulted in significant coastal flooding along the coastline of Los Angeles County. High tides and waves were responsible for an estimated $1 to 1.8 million in private property losses to homes located along beaches in Malibu; $80,000 worth of damage to the Santa Monica Pier; $150,000 worth of damage to the Long Beach Harbor; and $140,000 worth of damage to a bicycle path in 81 Segundo. Other losses resulting from wave damages occurred at Leo Carillo State Beach, Redondo Beach, Avalon, and other areas along the county shoreline.

### Hazard Mitigation Planning Committee Events

The HMPC provided additional information on the following historical flood events that affected the .LAUSD Planning Area

- INSERT SPECIFIC TIMES THE DISTRICT WAS AFFECTED. GIVE AS MUCH DETAIL AS POSSIBLE ON DAMAGES.

## *Likelihood of Future Occurrence*

### 1% Annual Chance Flood

**Occasional**— The 1% annual chance flood (100-year) is the flood that has a 1 percent chance of being equaled or exceeded in any given year. This, by definition, makes the likelihood of future occurrence occasional. However, the 1% annual chance flood could occur more than once in a relatively short period of time.

### 0.2% Annual Chance Flood

**Unlikely**—The 0.2% annual chance flood (500-year) is the flood that has a 0.2 percent chance of being equaled or exceeded in any given year. This, by definition, makes the likelihood of future occurrence unlikely.

### *Climate Change and Flood*

According to the CAS, climate change may affect flooding in Los Angeles County and District Planning Area. While average annual rainfall may increase or decrease slightly, the intensity of individual rainfall events is likely to increase during the 21st century. It is possible that average soil moisture and runoff could decline, however, due to increasing temperature, evapotranspiration rates, and spacing between rainfall events. Reduced snowpack and increased number of intense rainfall events are likely to put additional pressure on water infrastructure which could increase the chance of flooding associated with breaches or failures of flood control structures such as levees and dams. Future precipitation projections were shown in Figure 4-8 in Section 4.2.3. Also according to the National Center for Atmospheric Research in Boulder, Colorado, Atmospheric Rivers are likely to grow more intense in coming decades, as climate changes warms the atmosphere enabling it to hold more water.

## 4.2.11. Flood: Localized Flooding

### *Hazard/Problem Description*

Flooding occurs in areas other than the FEMA mapped floodplains. Flooding may be from drainages not studied by FEMA, lack of or inadequate drainage infrastructure, or inadequate maintenance. Most streams, drainage channels, and drainage facilities are not maintained by a public agency and are the responsibility of individual property owners, and occasionally non-governmental organizations.

Localized, stormwater flooding occurs throughout the District Planning Area during the rainy season from November through April. Prolonged heavy rainfall contributes to a large volume of runoff resulting in high peak flows of moderate duration. Flooding is more severe when previous rainfall has created saturated ground conditions. Urban storm drainpipes and pump stations have a finite capacity. When rainfall exceeds this capacity, or the system is clogged, water accumulates in the street until it reaches a level of overland release. This type of flooding may occur when intense storms occur over areas of development.

In addition to flooding, damage to these areas during heavy storms can include pavement deterioration, washouts, landslides/mudslides, debris areas, and downed trees. The amount and type of damage or flooding that occurs varies from year to year, depending on the quantity of runoff. These areas and the types of damage that affect or may affect the District are presented in Table 4-29.

*Table 4-29 LAUSD Localized Flooding Areas* ***PLEASE PROVIDE INPUT TO THE TABLE***

| Location (LAUSD Facility/Road Name) | Flooding | Pavement Deterioration | Washouts | High Water/ Creek Crossing | Landslides/ Mudslides | Debris | Downed Trees |
|---|---|---|---|---|---|---|---|
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |
| | | | | | | | |

Source: LAUSD

## *Past Occurrences*

### Disaster Declarations

There are no identified state or federal disaster declarations for localized flooding. However, localized flooding was likely an issue during previous declarations for severe storms, heavy rains and floods.

### NCDC Events

The past occurrences of localized flooding are included in the 1% and 0.2% annual chance flood hazard profile in Section 4.2.9.

### Hazard Mitigation Planning Committee Events

ANY EVENTS TO ADD THAT AFFECTED THE DISTRICT?

## *Likelihood of Future Occurrence*

**Highly Likely**—With respect to the localized, stormwater flood issues, the potential for flooding may increase as storm water is channelized due to land development. Such changes can create localized flooding problems in and outside of natural floodplains by altering or confining natural drainage channels. Urban storm drainage systems have a finite capacity. When rainfall exceeds this capacity or systems clog, water accumulates in the street until it reaches a level of overland release. With older infrastructure, this type of flooding will continue to occur on an annual basis during heavy rains.

### *Climate Change and Localized Flood*

Even if average annual rainfall may decrease slightly, the intensity of individual rainfall events is likely to increase during the 21st century, increasing the likelihood of overwhelming stormwater systems built to historical rainfall averages. This makes localized flooding more likely.

## 4.2.12. Landslides, Mud, and Debris Flows

### *Hazard/Problem Description*

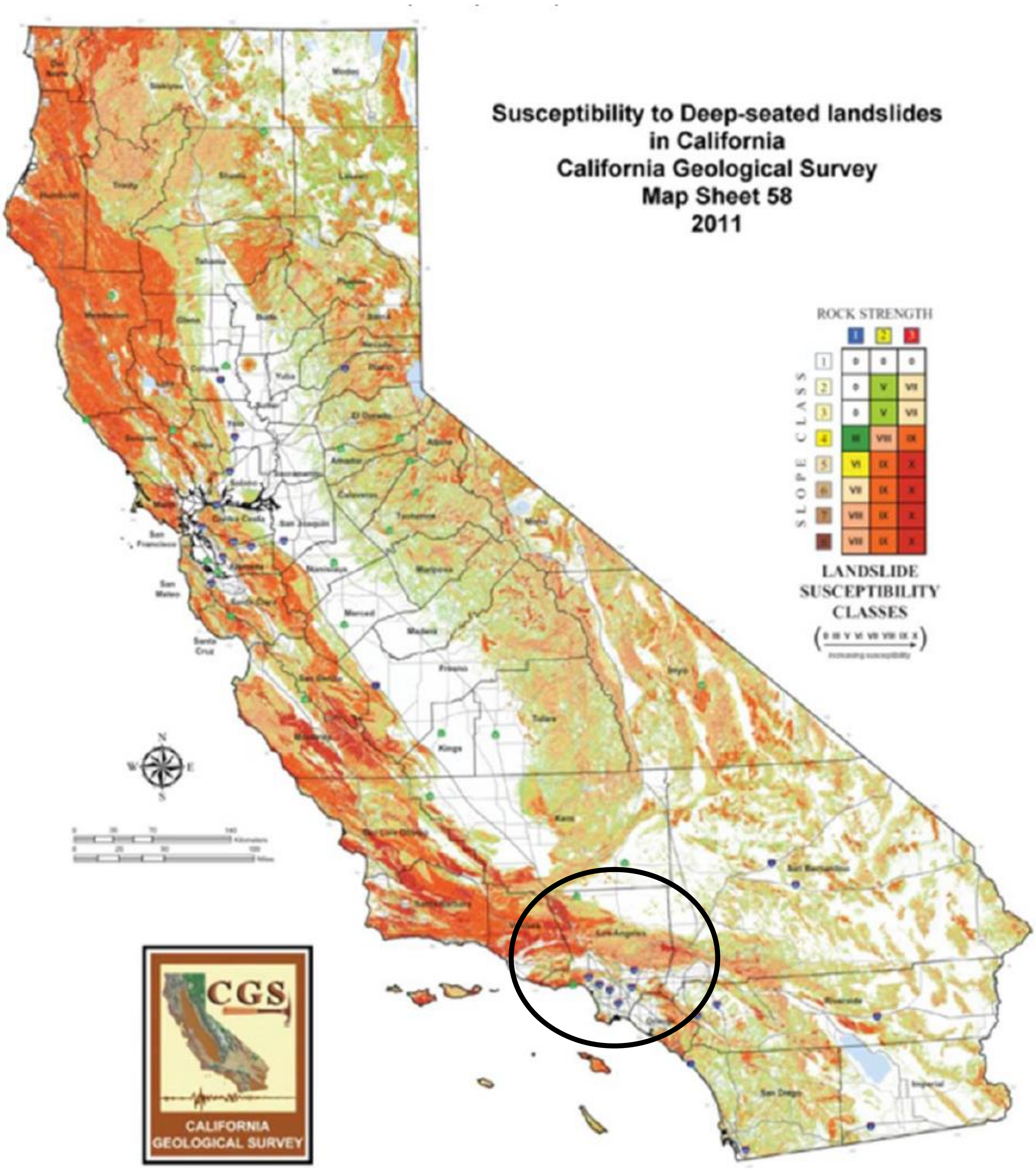
According to the California Geological Survey, landslides refer to a wide variety of processes that result in the perceptible downward and outward movement of soil, rock, and vegetation under gravitational influence. Common names for landslide types include slump, rockslide, debris slide, lateral spreading, debris avalanche, earth flow, and soil creep. Landslides, mud and debris flows may be triggered by both natural and human-induced changes in the environment that result in slope instability.

The susceptibility of an area to landslides depends on many variables including steepness of slope, type of slope material, structure and physical properties of materials, water content, amount of vegetation, and proximity to areas undergoing rapid erosion or changes caused by human activities. These activities include mining, construction, and changes to surface drainage areas. Landslide events can be determined by the composition of materials and the speed of movement. A rockfall is dry and fast while a debris flow is wet and fast. Regardless of the speed of the slide, the materials within the slide, or the amount of water present in the movement, landslides are a serious natural hazard.

Landslides often accompany or follow other natural hazard events, such as floods, wildfires, or earthquakes. A discussion on the effects of wildfire on landslides, mud, and debris flows is included in the wildfire profile in Section 4.2.14; however, past occurrences of landslide from post-wildfire areas are included in the past occurrences section of this hazard. Landslides can occur slowly or very suddenly and can damage and destroy structures, roads, utilities, and forested areas, and can cause injuries and death. If landslides, mud, or debris flows occur during times where the District buildings area occupied, it puts both the building and the enrolled population at risk.

Figure 4-32 was developed for the 2018 State of California Multi-Hazard Mitigation Plan. It indicates that there are areas throughout Los Angeles County at moderate to high risk for landslides.

*Figure 4-32 Landslide Susceptibility Areas*




Source: 2018 State of California Multi-Hazard Mitigation Plan

Landslide hazard areas are scattered throughout the LAUSD Planning Area. As development has spread into the hillsides, unstable soil and erosion often contributes to landslides, mud and debris flows. Factors that characterize landslide hazard areas include significant slope, weak rocks, and heavy rains.

In the District, the Santa Susana Mountains and the mountains north of the Santa Clara River valley are extremely susceptible to landslides during seismic shaking. In the Santa Susana Mountains, more than 75 percent of the slope area has been denuded by landslides triggered by strong shaking. Characteristic landslides in this area were anywhere from several inches to several feet deep. These slides consisted of dry, highly disaggregated material that cascaded to flatter areas near the bases of nearby slopes. In the San Gabriel Mountains to the northeast, rock falls have been fewer and more widely scattered. This has been attributed to the mountain range's Mesozoic granite and Precambrian metamorphic rock that, although deeply weathered, is more competent than the weak sediment of the Santa Susana Mountains.

The 2015 LAUSD School Upgrade Program EIR noted that areas that could be subject to landslides and mudflows are at the bases of foothills and mountains; canyons and areas immediately below the mouths of canyons; and washes. Such areas are found in and along the margins of the San Gabriel Mountains, Santa Susana Mountains, Simi Hills, and Santa Monica Mountains. Most of the urbanized parts of the District are on broad alluvial plains that are not subject to mudflows.

## *Past Occurrences*

### Disaster Declaration History

There have been one federal and one state disaster declarations associated with landslides in Los Angeles County, as shown in Table 4-30.

*Table 4-30 Los Angeles County – State and Federal Disaster Declarations Summary 1950-2018*

| Disaster Type | Federal Declarations | | State Declarations | |
|---|---|---|---|---|
| | Count | Years | Count | Years |
| Landslide | 1 | 2018 | 1 | 1965 |
| **Totals** | **1** | – | **1** | **–** |

Source: Cal OES, FEMA

### NCDC Events

The NCDC contains no records for landslides in Los Angeles County.

### Hazard Mitigation Planning Committee Events

The HMPC noted that there have been landslides, mud and debris flows in the past:

- **1934** Crescenta Valley Flood and Mudslides: From December 30, 1933-January 1, 1934, on January 1, 1934, a few minutes after New Year's, a major flood and mudslide terrorized the residents of La Crescenta Valley. Prior to the flood and mudslide, a fire in the Angeles National Forest occurred that burned the forest to the ground. Then a winter rain storm hit and dumped more than 14 inches in two days. Observers told local newspaper reporters that day stated that a 20-foot wall of mud and rocks thundered out of the canyons blowing through flimsy check dams of chicken wire and rocks. The flood and mudslide was responsible for 45 deaths and destroyed more than 400 homes and Model "A" cars in La Crescenta and Montrose. Eyewitness accounts stated boulders up to 70 tons lay strewn about like ping pong balls. To memorialize the lives that were lost that day, a brass plaque stands at Rosemont and Fairway Avenues, where an American Legion Hall, containing 12 refugees, was swept away.

- **March 12-14, 1941**: A heavy storm impacted the San Gabriel Mountains. In Wrightwood three houses were destroyed from a mudslide.
- **January 18-19, 1954**: Debris flows reached as high as 10' deep in Arcadia that caused fatalities. Large boulders smashed into houses. These debris and mudflows followed by wildfires in the San Gabriel Mountains.
- **December 2-7, 1966**: Debris and mud flows and flooding damaged homes and roads in Wrightwood.
- **November 18-21, 1967**: A sub-tropical storm system produced 14" in mountains above Los Angeles. The storm was referred to as the worst storm since 1934. On November 19, 1.87" fell in a one hour period in Los Angeles, at the time the greatest one hour rainfall on record. The storm caused flashed flooding and mudslides. 400 people were stranded in the mountains due to closed highways.
- **1978** La Crescenta and Lake View Terrace Flood and Mudslide: In February 8-10 1978, 44 years after the 1934 flood and mudslide, disaster would strike once again as another major mudslide would hit La Crescenta. After several brush fires that had scorched the mountain terrains, the La Crescenta area received nine inches of heavy rain that month. According to eye witness accounts, the mudslide literally picked up 13 cars and traveled down the streets. The water and mud eventually ended up on Foothill Boulevard and Esko Avenue. There were even damaged cars that were located on Dominica Avenue in Lake View Terrace. Overall, 20 people died, 13 of them in the San Gabriel Mountains. There were widespread flooding, flash flooding and mudslides. Numerous homes were washed away.
- **March 3-4, 1978**: Heavy rains caused 20 deaths due to flooding and mudslides in the Los Angeles area.
- **November 17-18, 1986**: An early storm brought heavy rain fall that contributed to a mudslide that blocked Malibu Canyon Road.
- **October 31, 1987**: Heavy rain contributed to several mudslides and sewage spills that closed an 80-mile stretch of coastline in Los Angeles.
- **April 19-23, 1988**: Heavy rain fell on the Los Angeles area. The rain fall caused flooding of roadways and intersections, mudslides and contributed to traffic accidents. During this rain fall period, three of the Los Angeles Dodgers baseball games were rained out as the team had 12 rainouts in the previous 26 years of the franchise's history. Trees fell down on power lines and caused power outages.
- **November 12, 2009**: At 10:30 p.m., a fast-forming storm cells unloaded intense rainfall on mountain slopes denuded by the Station Fire, the largest recorded wildfire in L.A. County history, triggered flows of mud, rock and boulders into a hillside community located in La Canada Flintridge. There were no injuries reported, and there was some minor damage to properties.
- **January 18, 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.
- **February 6, 2010**: At 4:45 a.m. a rainstorm system triggered severe debris and mud flow on Manistee Drive and Ocean View Boulevard located in the community of Paradise Valley in La Canada Flintridge. At the time, approximately 800 homes in the Station Fire burned areas, the largest recorded wildfire in Los Angeles County history, including Acton, La Canada Flintridge, La Crescenta, and Sierra Madre were asked to evacuate. California Governor Arnold Schwarzenegger, U.S. Congressman David Drier, California Assemblyman Anthony Portantino, L.A. County Supervisor Michael D. Antonovich, and Mayor of La Canada Flintridge Laura Olhasso toured the Paradise Valley community of La Canada Flintridge that served as ground zero of the debris and mudflow on Saturday, February 7. No injuries were reported.

- **September 10, 2011**: A heavy thunderstorm hovered over the unincorporated area of Lake Los Angeles as the "Buttes" were unable to hold on as it triggered a severe debris and mud flows that rolled down the hillsides where 16 homes sustained mud damage.
- **January 9, 2018** – The HMPC noted that there was a debris flow for the Creek/La Tuna area and at fs 59 for the Skirball areas. Notify LA messages were sent to warn residents in the Creek area about possible debris flow and evacuations. There were no mandatory evacuation orders in the City. North 5 Freeway remains closed except for 1 lane due to earlier accident at the 118 interchange. Northbound US 101 closed between State Route 126 in Ventura and Milpas Street in Santa Barbara for a flooding at Seacliff Drive in Ventura, flooding in La Conchita in Ventura County and a mudslide in Montecito. This is a major route into Los Angeles. State Route 27 (Topanga Canyon Rd) was closed from sr1 (Pacific Coast Highway) and Grandview in Topanga (Los Angeles County) due to a slide. This is used by local residents and commuters from the San Fernando Valley to reach State Route1 (Caltrans). LAWA reported that Terminal 2 (Delta Airlines) was closed due to flooding and passengers are being re-routed to Tom Bradley terminal.

ANY OTHER EVENTS TO ADD THAT AFFECTED THE DISTRICT? DID ANY OF THE ABOVE HAVE AFFECTS ON THE DISTRICT? 2018?

### *Likelihood of Future Occurrence*

**Likely**—Based on data provided by the HMPC, landslides are naturally occurring events that will inevitably happen as long as gravity itself is a controlling factor upon the landscape. Given the nature of localized problems identified within the District, landslides will likely continue to impact the area when heavy precipitation occurs, as they have in the past.

#### Climate Change and Landslide and Debris Flows

According to the CAS, climate change may result in precipitation extremes (i.e., wetter wet periods and drier dry periods). More information on precipitation increases can be found in Section 4.2.3. While total average annual rainfall may decrease only slightly, rainfall is predicted to occur in fewer, more intense precipitation events. The combination of a generally drier climate in the future, which will increase the chance of drought and wildfires, and the occasional extreme downpour is likely to cause more mudslides, landslides, and debris flows. An increase in wildfire risk may cause increased post-wildfire landslide and mudflow areas.

## 4.2.13. Levee Failure

### *Hazard/Problem Description*

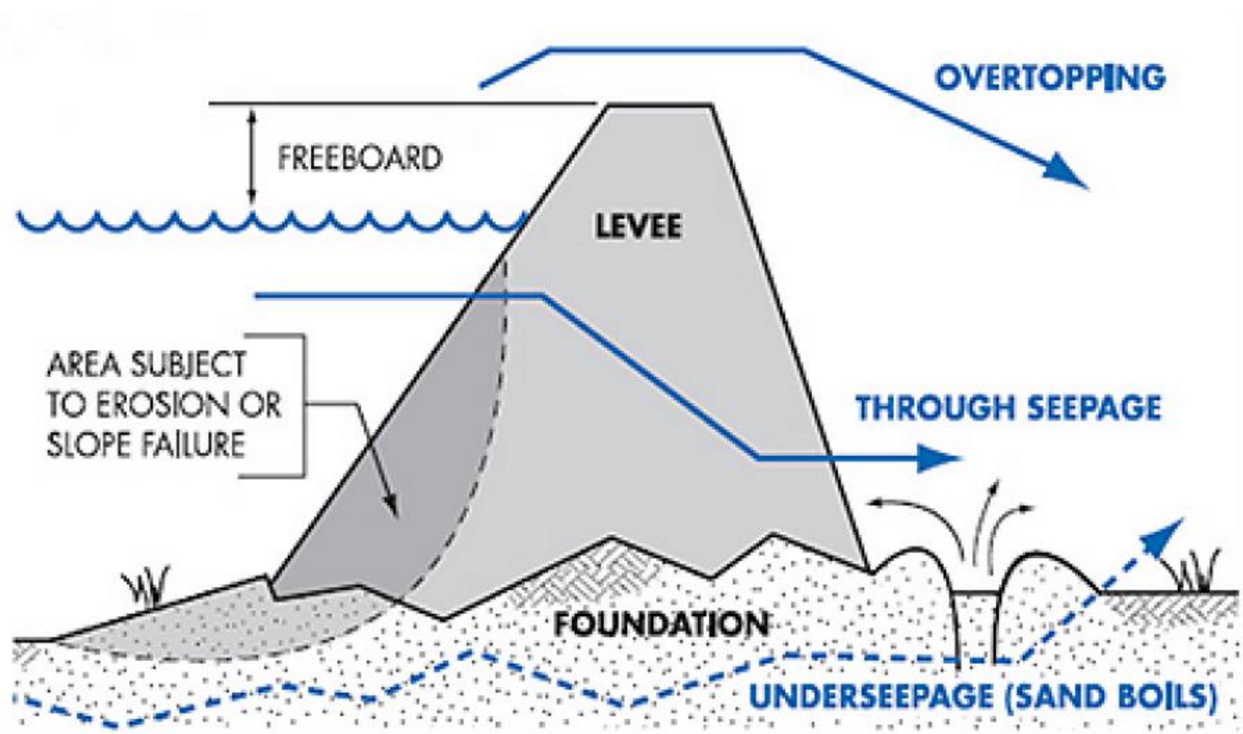
A levee is a raised area that runs along the banks of a stream or canal. Levees reinforce the banks and help prevent flooding by containing higher flow events to the main stream channel. By confining the flow to a narrower steam channel, levees can also increase the speed of the water. Levees can be natural or man-made. A natural levee is formed when sediment settles on the stream bank, raising the level of the land around the stream. To construct a man-made levee, workers place dirt or concrete along the stream banks, creating an embankment. This embankment is flat at the top, and slopes at an angle down to the water. For added strength, sandbags are sometimes placed over dirt embankments.

Levees provide strong flood protection, but they are not failsafe. Levees are designed to protect against a specific flood level and could be overtopped during severe weather events or dam failure. Levees reduce, not eliminate, the risk to individuals and structures located behind them. A levee system failure or overtopping can create severe flooding and high-water velocities. It's important to remember that no levee provides protection from events for which it was not designed, and proper operation and maintenance are necessary to reduce the probability of failure.

Under-seepage refers to water flowing under the levee through the levee foundation materials, often emanating from the bottom of the landside slope and ground surface and extending landward from the landside toe of the levee. Through-seepage refers to water flowing through the levee prism directly, often emanating from the landside slope of the levee. Both conditions can lead to failure by several mechanisms, including excessive water pressures causing foundation heave and slope instabilities, slow progressing internal erosion, and piping leading to levee slumping.

Rodents burrowing into and compromising the levee system is a significant issue in the Planning Area. Erosion can also lead to levee failure. Figure 4-33 depicts the causes of levee failure.

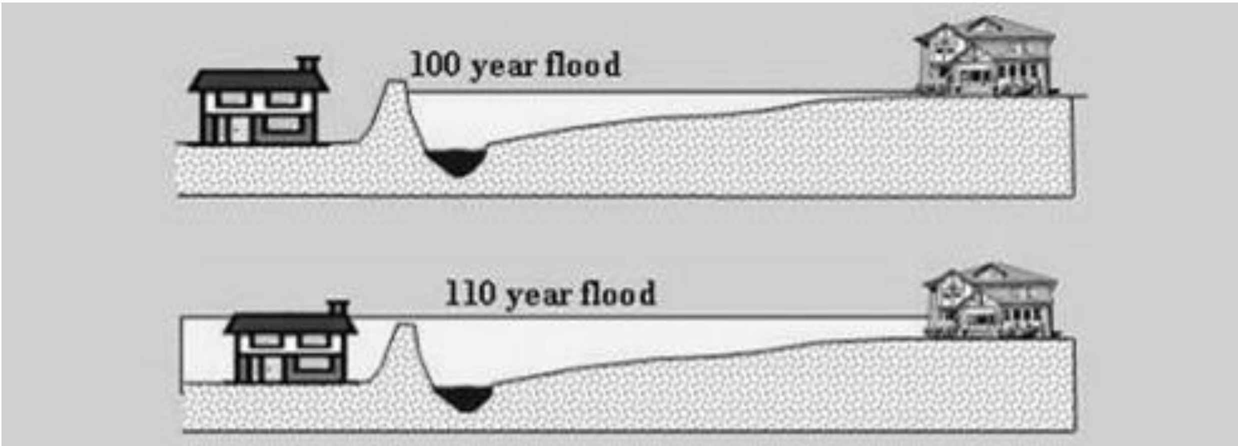
***Figure 4-33 Potential Causes of Levee Failure***




Source: USACE

Overtopping failure occurs when the flood water level rises above the crest of a levee. As shown in Figure 4-34, overtopping of levees can cause greater damage than a traditional flood due to the often lower topography behind the levee.

*Figure 4-34 Flooding from Levee Overtopping*




Source: Levees in History: The Levee Challenge. Dr. Gerald E. Galloway, Jr., P.E., Ph.D., Water Policy Collaborative, University of Maryland, Visiting Scholar, USACE, IWR.

## Los Angeles County Levees

During development of the County's current DFIRMs dated 9/8/2008, FEMA coordinated with the USACE, the local communities, and other organizations to compile a list of levees that exist within Los Angeles County. A discussion of these levees is provided in both the 2016 FIS and the County's 2016 Comprehensive Flood Management Plan (CFMP).

### Flood Insurance Study Levee Discussion

The 2016 FIS noted that there are levees within Los Angeles County that are either partially or fully accredited. For FEMA to accredit levees with providing protection from the base flood (i.e., those that provide protection from the flood that has a 0.1% chance of being equaled or exceeded in any given year), the levees must meet the criteria of the Code of Federal Regulations, Title 44, Section 65.10 (44 CFR 65.10), titled "Mapping of Areas Protected by Levee Systems. To minimize the impact of the levee recognition and certification process, FEMA issued Procedure Memorandum No. 43 - Guidelines for Identifying Provisionally Accredited Levees on March 16, 2007. These guidelines will allow issuance of preliminary and effective versions of FIRMs while the levee owners or communities are compiling the full documentation required to show compliance with 44 CFR Section 65.10. The guidelines also explain that preliminary FIRMs can be issued while providing the communities and levee owners with a specified timeframe to correct any maintenance deficiencies associated with a levee and to show compliance with 44 CFR Section 65.10.

For a community to avail itself of the additional time, it had to sign an agreement with FEMA. Levees for which such agreements were signed are shown on the final effective FIRM as providing protection from the flood that has a 1-percent-chance of being equaled or exceeded in any given year and labeled as a Provisionally Accredited Levee (PAL). Communities had two years from the date of FEMA's initial coordination to submit to FEMA final accreditation data for all PALs. Table 4-31 lists all levees shown on the FIRM, to include PALs. These PAL levees are not yet certified and accredited.

Several levees within Los Angeles County and its incorporated communities meet the criteria of 44 CFR 65.10., Table 4-32, "List of Certified and Accredited Levees" lists all levees shown on the FIRM that meet the requirements of 44 CFR 65.10 and have been determined to provide protection from the flood that has a 1-percent-chance of being equaled or exceeded in any given year.

*Table 4-31 Los Angeles County – List of Levees Requiring Flood Hazard Revisions (unaccredited)*

| Community | Flood Source | Levee Inventory ID | FIRM Panel | USACE Level |
|---|---|---|---|---|
| City of Santa Clarita | South Fork Santa Clara River Bouquet Canyon Creek Santa Clara River | 2, 4,7,10, 13, 15, 26 | 06037C0820F | No |
| City of Compton City of Long Beach | Compton Creek | 20b | 06037C1955F | No |
| City of Cerritos<br>City of Lakewood<br>City of Hawaiian Gardens<br>City of Long Beach | Coyote Creek | 21 | 06037C1990F | No |
| City of Carson<br>City of Los Angeles | Dominguez Channel | 22a | 06037C1935 | No |
| City of Carson<br>City of Los Angeles | Dominguez Channel | 22b | 06037C1965 | No |
| City of Bell<br>City of Cudahy<br>City of Southgate<br>City of Vernon | Los Angeles River | 25a | 06037C0100F | Yes |
| Los Angeles County | Undetermined | 28a | 06037C0100F | No |
| Los Angeles County | Undetermined | 28c | 06037C07 15F | No |
| Los Angeles County | Undetermined | 28d | 06037C0975F | No |
| City of Los Angeles | Undetermined | 29 | 06037C1780F | No |
| City of Bellflower<br>City of Cerritos<br>City of Downey<br>City of Lakewood<br>City of Long Beach<br>City of Norwalk<br>City of Pico Rivera | San Gabriel River | 33 | 06037C1664F<br>06037C1668F<br>06037C1829F<br>06037C1830F<br>06037C1840F<br>06037C1841F<br>06037C1980F<br>06037C1988F<br>06037C1990F<br>06037C2076F | No |

Source: January 6, 2016 Los Angeles County FIS

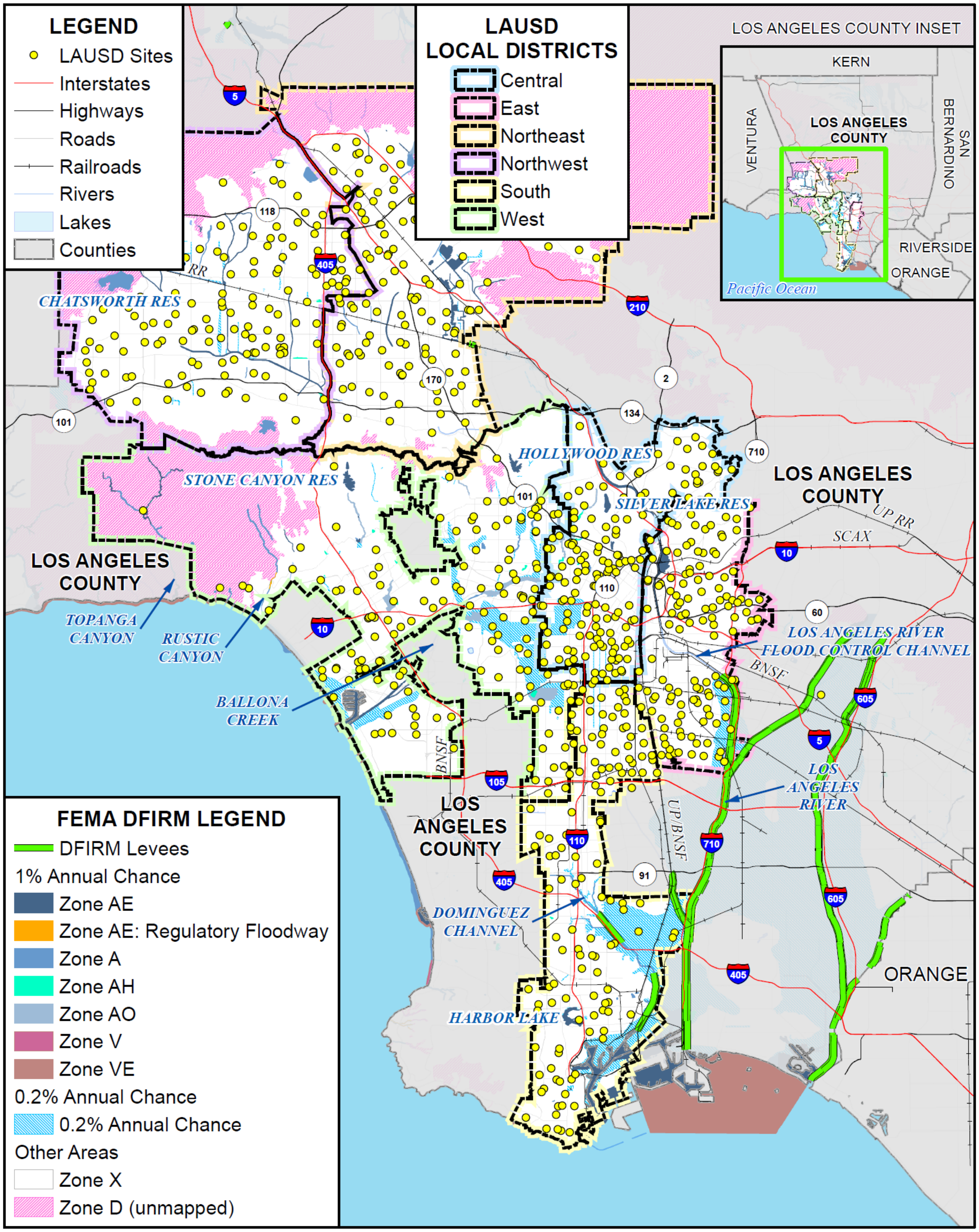
*Table 4-32 Los Angeles County – List of Certified and Accredited Levees*

| Community | Flood Source | Levee Inventory ID | FIRM Panel | USACE Level |
|---|---|---|---|---|
| City of Santa Clarita | Santa Clara River<br>Bouquet Canyon Creek<br>South Fork Santa Clara River | 5, 6, 14, 23 | 06037C0840F | No |
| City of Long Beach City of Southgate City of Paramount | Los Angeles River | 25b | 06037C1668F<br>06037C1664F<br>06037C1830F<br>06037C1820F<br>06037C1840F<br>06037C1980F<br>06037C1990F<br>06037C1988F<br>06037C2076F | No |
| City of Bell Gardens<br>City of Commerce<br>City of Downey<br>City of Montebello<br>City of Pico Rivera<br>City of Southgate | Rio Hondo River | 31 | 06037C1663F<br>06037C1664F<br>06037C1810F<br>06037C1820F<br>06037C1830F | No |

Source: January 6, 2016 Los Angeles County FIS

Levees in the DFIRM database for the District are shown in Figure 4-35.

*Figure 4-35 LAUSD – Levee Areas*




0 10 20 Miles

Foster Morrison

Data Source: FEMA Effective DFIRM 9/28/2008 (NFHL 1/6/2016 database), LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

### Comprehensive Flood Management Plan Levee Discussion

The Los Angeles County CFMP also provides a discussion on levees. They noted that an area impacted by an accredited levee is shown as a moderate-risk area and labeled Zone X on a FIRM. This accreditation affects insurance and building requirements. The NFIP does not require flood insurance for areas protected by accredited levees, although FEMA recommends the purchase of flood insurance in these areas due to the risk of flooding from levee failure or overtopping. As detailed in the FIS, if a levee is not accredited, the area it protects will still be mapped as a high-risk area (an SFHA), and the federal mandatory purchase of flood insurance applies (FEMA, 2012).

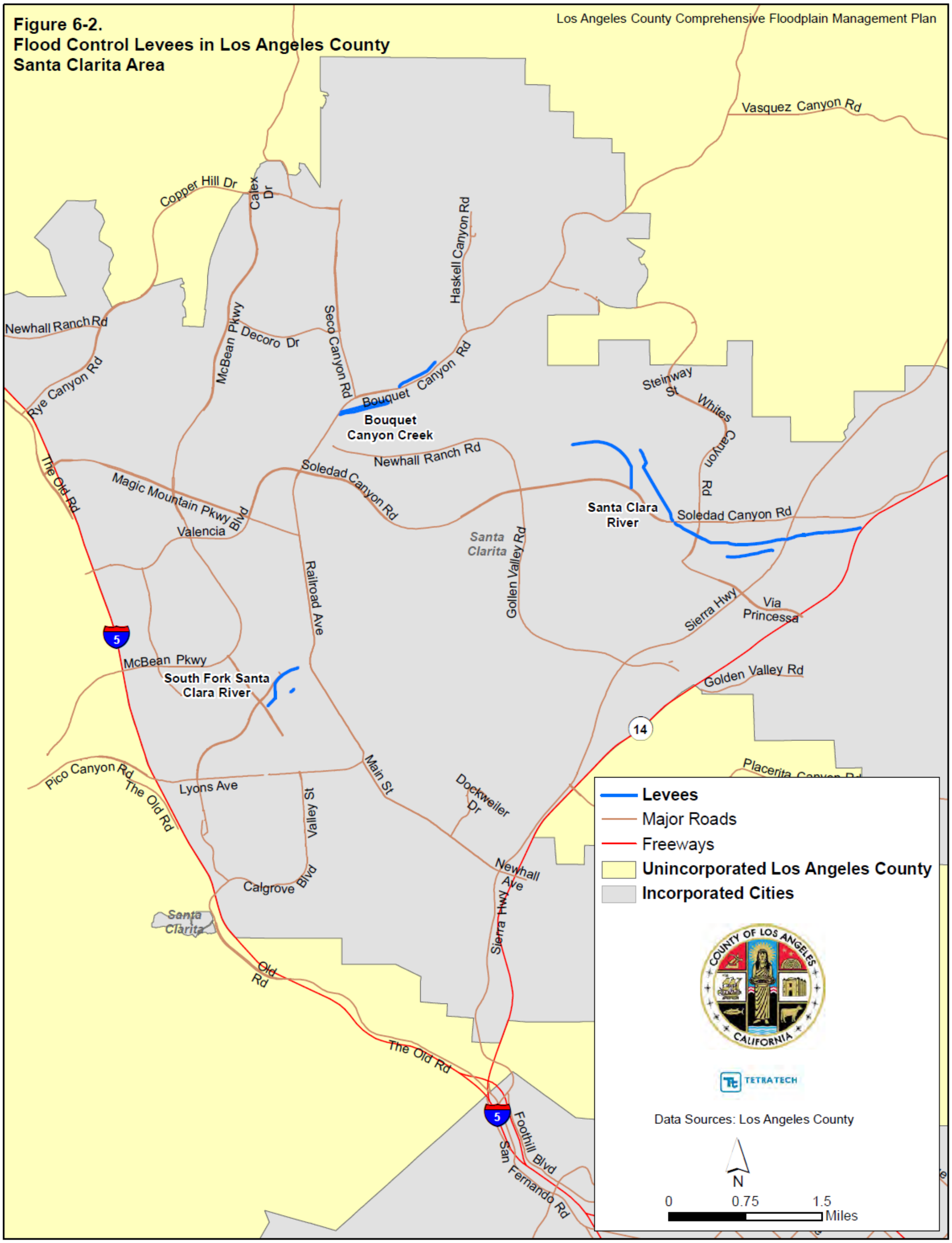
Even with levee certification and FEMA accreditation, there is a flood risk associated with levees. While levees are designed to reduce risk, even properly maintained levees can fail or be overtopped by large flood events. Levees reduce risk, they do not eliminate it.

In Los Angeles County, there are over 200 miles of levees that provide protection against floods of 25-year or greater magnitude. Most of these levees are in cities; fewer than 10 percent are in the unincorporated County. Figure 4-36 and Figure 4-37 show the levees with greater than 25-year protection that would flood developed areas of the County should they be overtopped (mapping of levees with 25-year or great protection is required under Step 4 of Activity 510 of the 2013 CRS Coordinator's Manual). These maps indicate levees that have been accredited by FEMA, and therefore do not represent a flood hazard. The County has received accreditation on 89 percent of the levees for which FEMA certification was required.

The CFMP further noted that the following County levees are not accredited by FEMA:

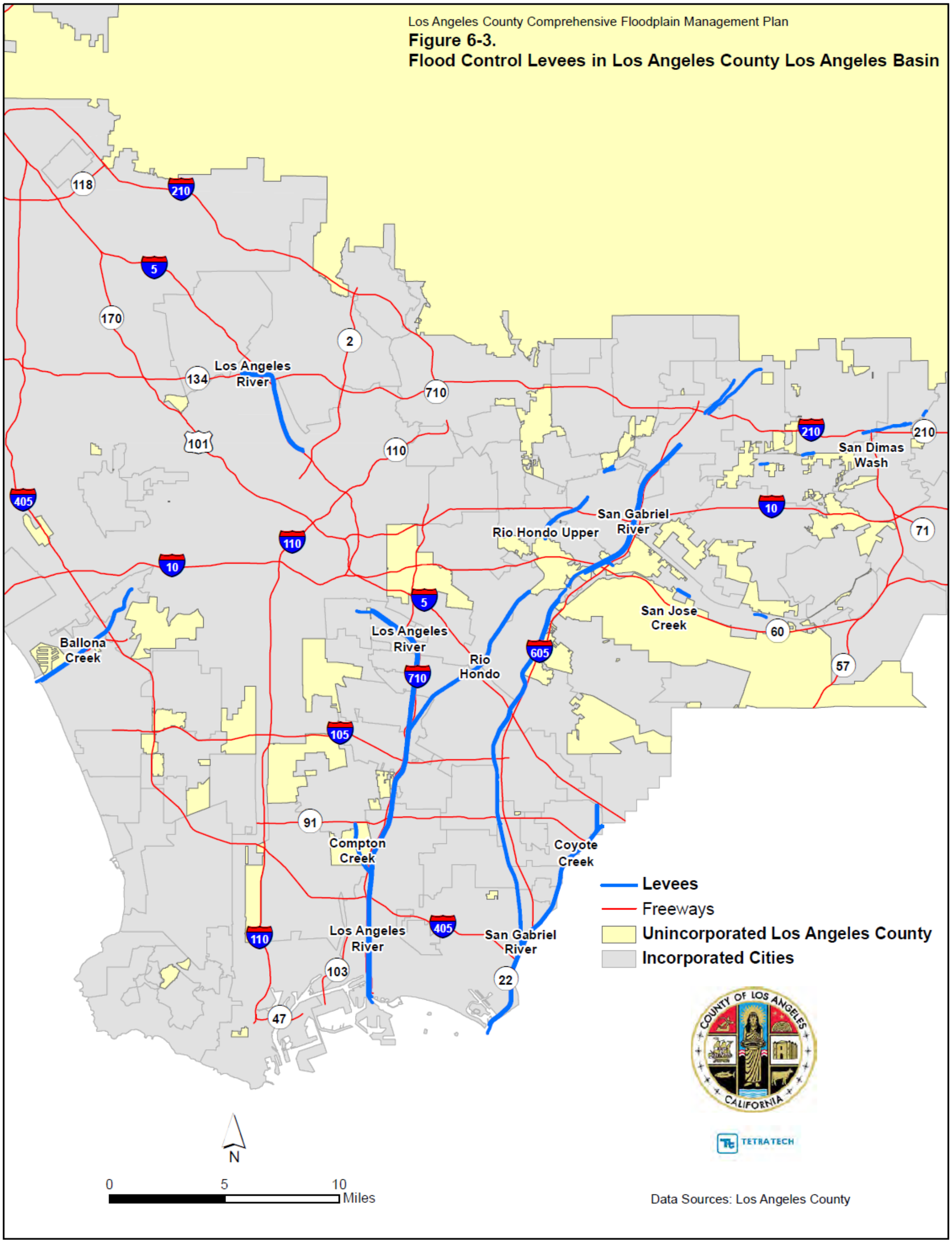
- Dominguez Channel Levee
- Compton Creek Levee
- Bouquet Canyon Creek Levees (ID Nos. 13 and 15)
- Santa Clara River Levees Nos. 4, 7, 10, and
- South Fork Santa Clara River Levee No. 26.

*Figure 4-36 Los Angeles County Levees – Santa Clarita Area*




Source: 2016 Los Angeles County CFMP

*Figure 4-37 Los Angeles County Levees – Los Angeles Basin Area*




Source: 2016 Los Angeles County CFMP

## *Past Occurrences*

### Disaster Declaration History

There have been no disasters declarations related to levee failure in Los Angeles County, as shown on Table 4-5.

### NCDC Events

There have been no NCDC levee failure events in Los Angeles County.

### Hazard Mitigation Planning Committee Events

ANYTHING TO ADD HERE? 1997?

## *Likelihood of Future Occurrence*

**Occasional** – Though there are multiple levees in Los Angeles County, the likelihood of future levee failures is currently considered unlikely. However, with many of the levees not be certified and otherwise constructed to 25 year and other design criteria, there remains the potential for overtopping and storms exceeding design criteria.

### Climate Change and Levee Failure

In general, increased flood frequency in California is a predicted consequence of climate change. Mechanisms whereby climate change leads to an elevated flood risk include more extreme precipitation events and shifts in the seasonal timing of river flows. This threat may be particularly significant because recent estimates indicate the additional force exerted upon the levees is equivalent to the square of the water level rise. These extremes are most likely to occur during storm events, leading to more severe damage from floods, including those associated with levee failures.

# 4.2.14. Radon

## *Hazard/Problem Description*

Radon gas is a naturally occurring, radioactive gas that is odorless and colorless. It forms from the radioactive decay of small amounts of uranium and thorium naturally present in rocks and soils. Typical concentrations of uranium and thorium for many rocks and soils are on the order of a few parts-per-million (ppm). The average uranium content for the earth's continental crust is about 2.5- 2.8 ppm. Certain rock types, such as black (organic-rich) shales, some granitic rocks, and rhyolites can have uranium and thorium present at levels of tens to hundreds of ppm. While all buildings have some potential for elevated indoor-radon levels, buildings on rocks and associated soils containing concentrations of uranium will have a greater likelihood of elevated indoor-radon levels.

Radon gas moves readily through rock and soil along micro-fractures and through pore-spaces between mineral grains. Movement away from its site of origin is typically a few meters to tens of meters, but may be up to several hundred meters. Many conditions affect how far radon can move in the subsurface but the ultimate limitation is the relatively short half-lives of radon's different isotopes. Because radon-222 (a daughter element of uranium-238) has the longest half-life, it is usually the predominant radon isotope in indoor air. Radon gas moves from the soil into buildings in various ways. It can move through cracks in slabs or basement walls, pores and cracks in concrete blocks, through-going floor-wall joints, and openings around pipes. Radon moves into buildings from the soil when air pressure inside the buildings is lower than the air pressure outside. When exhaust fans are used, or the inside air is heated, or wind is blowing across the building, the building's internal air pressure is lowered. Because radon enters buildings from the adjacent soil, radon levels are typically highest in basements and ground floor rooms. It can also enter those buildings that use private wells. The ground water drawn from wells contains dissolved radon gas, which can be released, for example, through the use of the bathroom shower. However, radon gas from this source typically accounts for only about 5 percent of the total radon in indoor air (WRRTC, 1997).

Radon levels are commonly expressed in picocuries per liter of air (pCi/L), where a picocurie is a measure of radioactivity. The national average of indoor radon levels in homes is about 1.3 pCi/L. Radon levels outdoors, where radon is diluted, average about 0.4 pCi/L. The U.S. Environmental Protection Agency (EPA) recommends taking action to reduce indoor radon levels when levels are 4 pCi/L or higher.

- High: indoor radon screening level greater than 4 pCi/L
- Medium: indoor radon screening level between 2 and 4 pCi/L
- Low: indoor radon screening level less than 2 pCi/L

Although radon levels are used as a guide for acceptable levels of exposure and for action levels, it is primarily the inhalation of two radon daughter elements, polonium-218 and polonium- 214, that leads to lung cancer. These elements have very short half-lives and when they enter the lungs they attach to lung tissue or trapped dust particles and quickly undergo radioactive decay. This is in contrast to the longer-lived radon-222 that is mostly exhaled before it undergoes radioactive decay. The alpha particles emitted as polonium-218 and polonium-214 decay are thought to cause cancer by damaging the DNA (deoxyribonucleic acid) in lung tissue cells, resulting in abnormal or tumorous cell growth (Brookins, 1990).

According to the California Department of Public Health, the US EPA recommends that all schools nationwide be tested for radon. To date, approximately 20% of the schools nationwide have done some testing. Some states have tested all their public schools. HOW MANY HAVE BEEN TESTED IN LAUSD?

## *Past Occurrences*

### Disaster Declaration History

There have been no disasters declarations related to radon in Los Angeles County, as shown on Table 4-5.

### NCDC Events

There have been no NCDC radon events in Los Angeles County, as the NCDC does not track radon.

## Hazard Mitigation Planning Committee Events

According to the Hazard Mitigation Planning Team the following details on prior Radon testing in the school district occurred.

### LAUSD 1989 Radon Report (Phase I) Summary

The EPA and the Los Angeles Times with the California Department of Health Services (DHS) and the Foundation for Advancements in Science and Education (FASE) have conducted numerous studies to determine the extent of the radon problem. The results of these studies were released in September and October 1988 and revealed elevated radon levels in homes. At that time, the EPA and the Assistant Surgeon General announced a national advisory urging the testing of most homes for radon. These findings prompted the District's Employee Safety Section, in consultation with the DHS and the FASE, to develop and conduct a preliminary radon study. This study was conducted to determine if a radon problem exists in any schools in the LAUSD.

In 1989, based on increased concerns regarding radon levels in schools, LAUSD conducted a preliminary radon study of 78 selected schools. Selection of schools was based on topography, geology, and administrative regions. The results of the study were reassuring and indicated that the District did not appear to have a significant radon problem. No schools in the study had radon levels detected above the level at which the EPA requires closure and/or immediate corrective action (> 100 pCi/L). Only two schools of the 78 surveyed had radon levels above the EPA recommended action level of 4 pCi/L requiring corrective action. Corrective action consisting of sealing openings and cracks and positive air pressurization was initiated at these two schools and radon levels were reduced below the action level established by the EPA. The report recommended that LAUSD develop long-range plans to test all remaining schools for radon.

To establish a reasonable margin of safety in 1989, the District set a value of 2.0 pCi/L as the level at which immediate confirmatory testing would be conducted (Compared to the 4.0 pCi/L level for nine to twelve month testing as established by the EPA). Such confirmatory tests would be conducted in all classrooms at such sites. If confirmatory measurements exceeded 4.0 pCi/L, then immediate corrective action would be initiated. Retesting would be conducted to confirm that the corrective action has reduced the levels well below 4.0 pCi/L. Initially, short-term retesting was conducted at all schools which had screening levels at or above 2.0 pCi/L. However, after review of retest results, it was found that 79 out of 85 rooms (93%) with initial screening measurements greater than or equal to 2.0 pCi/L but less than 4.0 pCi/L had radon levels below 2.0 pCi/L. Therefore, the protocol for retesting was revised, where short-term retesting was conducted only in rooms with radon levels at or above 4.0 pCi/L.

### LAUSD 1990 Radon Report (Phase II) Summary

In 1990 an additional eighty-six schools were selected and tested for Phase II of the radon program based on underlying geology, geographic location or information obtained from the preliminary radon study (action level).

Of the 86 schools surveyed in Phase II, 67 out of 3248 rooms (2.0 percent) tested, exceeded the EPA minimum action level of 4.0 pCi/L. Survey results confirmed results from the preliminary study regarding varied radon levels in different areas of the District. The survey results also indicate that there appears to be a correlation between the radon levels and the type of building substructures (i.e. basements, slab on grade, crawlspace, etc.).

During the study it was determined that by increasing natural ventilation by opening closed windows/doors or adjusting the mechanical ventilation systems lower radon levels could be effectively achieved, and in most cases, to outdoor ambient levels (0.2 - 0.7 pCi/L). After increasing natural ventilation or adjusting the mechanical ventilation, 96 percent of rooms with levels greater than 4.0 pCi/L were reduced to below the District action level.

#### 2015 Testing

In December 2015, the Facilities Services Division (FSD) contacted OEHS regarding the sampling for radon at the San Pedro High School science building. This request was based on the Division of the State Architect (DSA) review of design plans for an elevator addition to the science building on campus and whether radon sampling had been conducted.

#### 2016 Testing

In February 2016, OEHS conducted radon sampling activities on both the 1st and 2nd floors of the science building. The sampling was conducted by a California Department of Public Health certified radon measurement provider. The results of the radon sampling indicated elevated radon levels above 4 pCi/L in 2 non-classroom locations on the 1st floor and one detection on the 2nd floor averaged to 2.9 pCi/L. The 2nd floor detection average of 2.9 pCi/L was surprising as radon is not typically detected above the first floor in structures.

OEHS recommends the resumption of radon sampling to include testing in all occupied buildings on District property within the high radon zone. Upon completion of the first round of sampling, follow up radon testing will be conducted at locations where action levels were exceeded (equal or greater than 4 pCi/L) A determination for further action may be required based on the results of the follow-up sampling. OEHS will also sample for radon at locations in the high and moderate radon zones that are undergoing renovations.

OEHS recommends the preparation of guidelines describing the procedure for radon resistant construction for all new buildings in high radon zones as a mitigation measure. Based on survey data, radon resistant construction in all new buildings in moderate radon zones may be required since radon levels vary over time, and may change as site conditions change. These guidelines may consist of installing a vapor barrier placed between the ground surface and the floor of the building, a vented crawl space between the vapor barrier and the floor of the buildings, and possibly a fan/ventilation system that removes the air from the crawl space below the floor of the building and vents that air to the atmosphere above the buildings via piping.

### *Likelihood of Future Occurrence*

**Likely** – Radon is a naturally occurring gas. While all buildings have some potential for elevated indoor-radon levels, buildings on rocks and associated soils containing concentrations of uranium will have a greater likelihood of elevated indoor-radon levels. Any school or District facility with radon issues in the past is likely to see radon issues in the future. Radon mitigation can lower radon levels, but it cannot stop them from naturally occurring.

### Climate Change and Radon

Climate change is unlikely to affect radon in the District.

## 4.2.15. Tsunami

### *Hazard/Problem Description*

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

The most active plate boundaries rim the Pacific Ocean and the Caribbean Sea. Consequently, this is where most tsunami activity is expected. Most tsunamis originate in the Pacific "Ring of Fire," which is the most active seismic region on earth. An estimated 489 cities in Alaska, California, Hawaii, Oregon, and Washington are susceptible to tsunamis. As many as 900,000 residents of these cities could be inundated by a 50-foot tsunami. In addition, millions of tourists that visit these regions each year could be impacted by tsunami events along the Pacific coast.

A tsunami consists of a series of high-energy waves that radiate outward like pond ripples from an area where a generating event occurs. The waves arrive at shorelines over an extended period. Tsunamis are typically classified as local or distant. Locally generated tsunamis have minimal warning times, leaving few options except to run to high ground. They may be accompanied by damage resulting from the triggering earthquake due to ground shaking, surface faulting, liquefaction or landslides.

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

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

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

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

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

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

## *Past Occurrences*

### Disaster Declaration History

There has been one disaster declarations related to tsunami in Los Angeles County, as shown on Table 4-33.

*Table 4-33 Los Angeles County – Tsunami State and Federal Disaster Declarations 1950-2018*

| Disaster Type | Federal Declarations | | State Declarations | |
|---|---|---|---|---|
| | Count | Years | Count | Years |
| Seismic Sea Wave (Tsunami) | 1 | 1964 | 0 | – |

Source: Cal OES, FEMA

### NCDC Events

There have been no NCDC tsunami events in Los Angeles County in the NCDC database.

## Hazard Mitigation Planning Committee Events

Eighty-two possible or confirmed tsunamis have been observed or recorded in California in the past 150 years. Statewide, most recorded tsunami events were small and detected only by tide gages. Eleven events were large enough to cause damage, and four caused deaths. The following is a summary of major tsunami events that have affected Los Angeles County (Los Angeles County, 2015 and National Geophysical Data Center, 2017)

- September 16, 2015—A magnitude 8.3 earthquake in Chile caused the National Tsunami Warning Center to issue a tsunami advisory for Southern California including Los Angeles County. No damage was reported in Los Angeles County.
- March 11, 2011—A magnitude 9.0 earthquake in Japan generated tsunami waves that caused extensive damage in Japan. The tsunami reached Los Angeles County, where waves capsized vessels berthed near the Santa Catalina Island and caused minor damage in Marina del Rey, Redondo Beach and Santa Monica. This was the most damaging tsunami to hit California since 1964. The California coastal counties of Del Norte, Monterey, and Santa Cruz were included in FEMA-1968-DR-CA declaration.
- February 27, 2010—A tsunami originating off Chile created rapid water level fluctuations and strong currents in harbors and along beaches in California.
- September 29, 2009—Following a magnitude 8.0 to 8.3 earthquake 120 miles from America Samoa, a tsunami brought strong currents and dangerous waves to the San Pedro area and the Santa Monica Bay area.
- November 29, 1975—A magnitude 7.2 earthquake in Hawaii caused a tsunami that reached Santa Catalina Island.
- March 27, 1964—A magnitude 9.2 earthquake in Prince William Sound, Alaska triggered a tsunami that caused damage in Alaska, British Columbia, Washington, California and Hawaii. The hardest hit was Crescent City, California, where waves destroyed half of the waterfront business district. There was also extensive damage in San Francisco Bay, marinas in Marin County and the Los Angeles and Long Beach harbors.
- May 22-24, 1960—A magnitude 8.5 earthquake in Chile caused a tsunami that contributed to a scuba diver death and $1 million in damage.
- April 1, 1946—A magnitude 7.8 earthquake in Alaska's Aleutian Island chain caused a tsunami whose effects were felt along the United States coastline, especially in Los Angeles and Long Beach harbor areas.
- 1927—A tsunami hit Southern California, raising the ocean by 6 feet.

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

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

WHAT, IF ANY, AFFECT DID ANY OF THESE HAVE ON THE DISTRICT?

### *Likelihood of Future Occurrence*

**Occasional** – Strong earthquakes occurring near the LAUSD or elsewhere on the Pacific "Ring of Fire," especially Alaska, give the District little warning of the overwhelming waves that move up to 600 mph. A massive earthquake in the central Aleutian Islands of Alaska could send 30-foot waves to the Marin coast within about five hours. Since earthquakes of this magnitude are rare, the likelihood of future occurrence is occasional.

#### Climate Change and Tsunami

The impacts of global climate change on tsunami probability are unknown. Some scientists say that melting glaciers could induce tectonic activity, inducing earthquakes. Other scientists have indicated that underwater avalanches (also caused by melting glaciers), may also result in tsunamis. Even if climate change does not increase the frequency with which tsunamis occur, it may result in more destructive waves. As sea levels continue to rise, tsunami inundation areas would likely reach further into communities than current mapping indicates.

## 4.2.16. Wildfire

### *Hazard/Problem Description*

California is recognized as one of the most fire-prone and consequently fire-adapted landscapes in the world. The combination of complex terrain, Mediterranean climate, and productive natural plant communities, along with ample natural and aboriginal ignition sources, has created conditions for extensive wildfires. Wildland fire is an ongoing concern for the District Planning Area. Generally, the fire season extends from early spring through late fall of each year during the hotter, dryer months. However, in recent years, wildfire season is more of a year around event. Fire conditions arise from a combination of high temperatures, low moisture content in the air and fuel, an accumulation of vegetation, and high winds.

Potential losses from wildfire include human life, structures and other improvements, natural and cultural resources, quality and quantity of water supplies, timber, and recreational opportunities. Economic losses could also result. Smoke and air pollution from wildfires can be a severe health hazard. In addition, catastrophic wildfire can create favorable conditions for other hazards such as flooding; landslides, mud and debris flows; and erosion during the rainy season.

#### Wildland Urban Interface

Throughout California, communities are increasingly concerned about wildfire safety as increased development in the foothills and mountain areas and subsequent fire control practices have affected the natural cycle of the ecosystem. While wildfire risk is predominantly associated with wildland urban interface (WUI) areas, significant wildfires can also occur in heavily populated areas. The wildland urban interface is a general term that applies to development adjacent to landscapes that support wildland fire. The WUI defines the community development into the foothills and mountainous areas of California. The WUI describes those communities that are mixed in with grass, brush and timbered covered lands (wildland). These are areas where wildland fire once burned only vegetation but now burns homes as well.

There are two types of WUI environments. The first is the true urban interface where development abruptly meets wildland. The second WUI environment is referred to as the wildland urban intermix. Wildland urban intermix communities are rural, low density communities where homes are intermixed in wildland areas. Wildland urban intermix communities are difficult to defend because they are sprawling communities over a large geographical area with wild fuels throughout. This profile makes access, structure protection, and fire control difficult as fire can freely run through the community.

WUI fires are often the most damaging. WUI fires occur where the natural and urban development intersect. Even relatively small acreage fires may result in disastrous damages. WUI fires occur where the natural forested landscape and urban-built environment meet or intermix. The damages are primarily reported as damage to infrastructure, built environment, loss of socio-economic values and injuries to people.

The pattern of increased damages is directly related to increased urban spread into historical forested areas that have wildfire as part of the natural ecosystem. Many WUI fire areas have long histories of wildland fires that burned only vegetation in the past. However, with new development, a wildland fire following a historical pattern now burns developed areas. WUI fires can occur where there is a distinct boundary between the built and natural areas or where development or infrastructure has encroached or is intermixed in the natural area. WUI fires may include fires that occur in remote areas that have critical infrastructure easements through them, including electrical transmission towers, railroads, water reservoirs, communications relay sites or other infrastructure assets. Human impact on wildland areas has made it much more difficult to protect life and property during a wildland fire. This home construction has created a new fuel load within the wildland and shifted firefighting tactics to life safety and structure protection.

### LA County and LAUSD Wildfires

Wildland fires affect grass, forest, and brushlands, as well as any structures located within them. Where there is human access to wildland areas the risk of fire increases due to a greater chance for human carelessness and historical fire management practices. Generally, there are four major factors that sustain wildfires and allow for predictions of a given area's potential to burn. These factors include fuel, topography, weather, and human actions.

- **Fuel** – Fuel is the material that feeds a fire and is a key factor in wildfire behavior. Fuel is generally classified by type and by volume. Fuel sources are diverse and include everything from dead tree leaves, twigs, and branches to dead standing trees, live trees, brush, and cured grasses. Also to be considered as a fuel source are manmade structures, such as homes and other associated combustibles. The type of prevalent fuel directly influences the behavior of wildfire. Fuel is the only factor that is under human control. The 2017 Los Angeles County Strategic Fire Plan describes the fuels in the County. There are a wide range of fuels and vegetation types in the District. Of these different vegetation types, coastal sage scrub, chaparral, and grasslands reach some degree of flammability during the dry summer months and, under certain conditions, during the winter months. For example, as chaparral gets older, twigs and branches within the plants die and are held in place. A stand of brush 10- to 20-years of age usually has enough dead material to produce rates of spread about the same as in grass fires when the fuels have dried out. In severe drought years, additional plant material may die, contributing to the fuel load. There will normally be enough dead fuel accumulated in 20- to 30-year old brush to give rates of spread about twice as fast as in a grass fire. Under moderate weather conditions that produce a spread rate of one-half foot per second in grass, a 20- to 30-year old stand of chaparral may have a rate of fire spread of about one foot per second. Fire spread in old brush (40 years or older) has been measured at eight times as fast as in grass, about four feet per second. Under extreme weather conditions, the fastest fire spread in grass is 12 feet per second or about eight miles per hour.

- **Topography** – An area's terrain and land slopes affect its susceptibility to wildfire spread. Both fire intensity and rate of spread increase as slope increases due to the tendency of heat from a fire to rise via convection. The arrangement of vegetation throughout a hillside can also contribute to increased fire activity on slopes. The Fire Plan noted that terrain within the District's territory can be classified in broad terms as being 75 percent alluvial plain and 25 percent rugged canyons and hills. Elevations range from 5,074 feet at Sister Elsie Peak in the San Gabriel Mountains to nearly mean sea level in the southwestern part of the District. The canyons and hills of the area are at higher risk to wildfire. The 2012 District LHMP noted that rough topography greatly limits road construction, road standards, and accessibility by ground equipment. Steep topography also channels airflow, creating extremely erratic winds on lee slopes and in canyons. Water supply for fire protection to structures at higher elevations is frequently dependent on pumping units. The source of power for such units is usually from overhead distribution lines, which are subject to destruction by wildland fires.
- **Weather –** Weather components such as temperature, relative humidity, wind, and lightning also affect the potential for wildfire. High temperatures and low relative humidity dry out fuels that feed wildfires, creating a situation where fuel will ignite more readily and burn more intensely. Thus, during periods of drought, the threat of wildfire increases. Wind is the most treacherous weather factor. The greater a wind, the faster a fire will spread and the more intense it will be. In addition to wind speed, wind shifts can occur suddenly due to temperature changes or the interaction of wind with topographical features such as slopes or steep hillsides. Lightning also ignites wildfires, often in difficult to reach terrain for firefighters. The 2017 Los Angeles County Strategic Fire Plan noted that during the autumn and winter months, high-pressure weather systems will originate over the Great Basin and upper Mojave Deserts, which heats up the air. These systems often produce strong offshore winds, known as the Santa Ana winds by the National Weather Service and is described as having strong down slope winds blowing through the mountain passes of Southern California. The relative humidity of the air is further decreased as it travels from the high desert to the coast. These hot dry winds blow through the valley and canyons pre-heating and dropping the fuel moisture and relative humidities in all areas of Los Angeles County, including the District Planning Area. This can cause a high frequency of wildland fires where the temperatures are high, while fuel moistures are extremely low, and winds are blowing at 30-70 miles per hour.
- **Human Actions** – Most wildfires are ignited by human action, the result of direct acts of arson, carelessness, or accidents. Many fires originate in populated areas along roads and around homes, and are often the result of arson or careless acts such as the disposal of cigarettes, use of equipment or debris burning. Recreation areas that are located in high fire hazard areas also result in increased human activity that can increase the potential for wildfires to occur.

## Wildfire Smoke and Air Quality

In addition to the direct effects of fire burning vegetation and buildings, a secondary effect of smoke can affect those far outside of the area directly affected by the fire.

The 2012 District LHMP noted that smoke is composed primarily of carbon dioxide, water vapor, carbon monoxide, particulate matter, hydrocarbons and other organic chemicals, nitrogen oxides, trace minerals and several thousand other compounds. The actual composition of smoke depends on the fuel type, the temperature of the fire, and the wind conditions. Different types of wood and vegetation are composed of varying amounts of cellulose, lignin, tannins and other polyphenolics, oils, fats, resins, waxes and starches, which produce different compounds when burned.

Particulate matter is the principal pollutant of concern from wildfire smoke for the relatively short-term exposures (hours to weeks) typically experienced by the public. Particulate matter is a generic term for particles suspended in the air, typically as a mixture of both solid particles and liquid droplets. Particles from smoke tend to be very small - less than one micrometer in diameter. For purposes of comparison, a human hair is about 60 micrometers in diameter. Particulate matter in wood smoke has a size range near the wavelength of visible light (0.4 – 0.7 micrometers). Thus, smoke particles efficiently scatter light and reduce visibility. Moreover, such small particles can be inhaled into the deepest recesses of the lung and are thought to represent a greater health concern than larger particles.

Another pollutant of concern during smoke events is carbon monoxide. Carbon monoxide is a colorless, odorless gas, produced by incomplete combustion of wood or other organic materials. Carbon monoxide levels are highest during the smoldering stages of a fire. Other air pollutants, such as acrolein, benzene, and formaldehyde, are present in smoke, but in much lower concentrations than particulate matter and carbon monoxide.

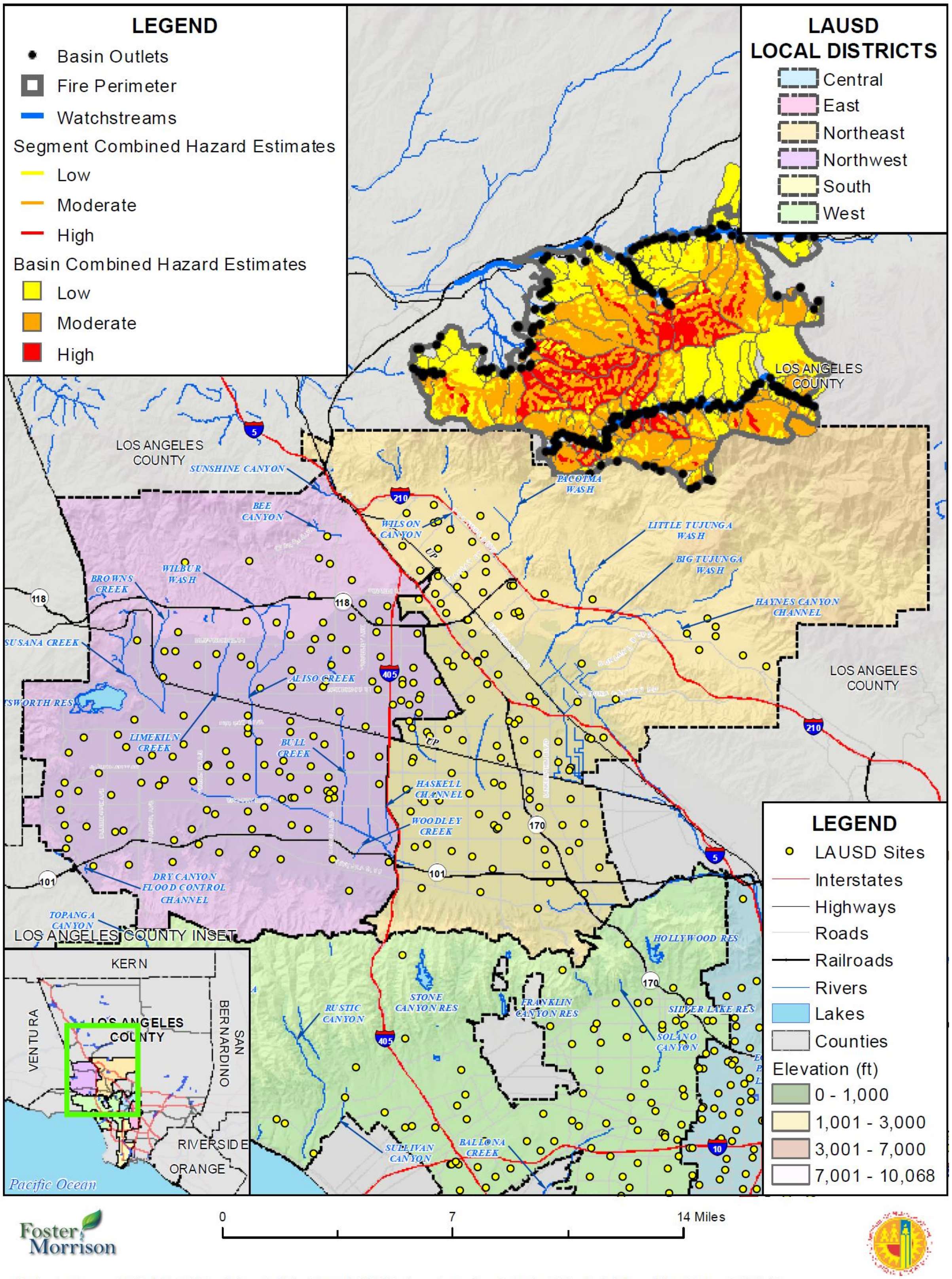
The behavior of smoke depends on many factors, including the fire's size and location, the topography of the area and the weather. Inversions are common in mountainous terrain. Smoke often fills the valleys, where people usually live. Smoke levels are unpredictable: a wind that usually clears out a valley may simply blow more smoke in, or may fan the fires, causing a worse episode the next day. Smoke concentrations change constantly. By the time public health officials can issue a warning or smoke advisory, the smoke may already have cleared. National Weather Service satellite photos, weather and wind forecasts, and knowledge of the area can all help in predicting how much smoke will come into an area, but predictions are rarely accurate for more than a few hours.

Communities with established air quality programs may issue public alerts based on predicted 24-hour average concentrations of particulate matter. Smoke emergencies need to be handled differently, however, as smoke concentrations generally tend to be very high for only a few hours at a time. These short-term peaks may cause some of the most deleterious health effects.

## Post-Wildfire Landslides, Mud and Debris Flows

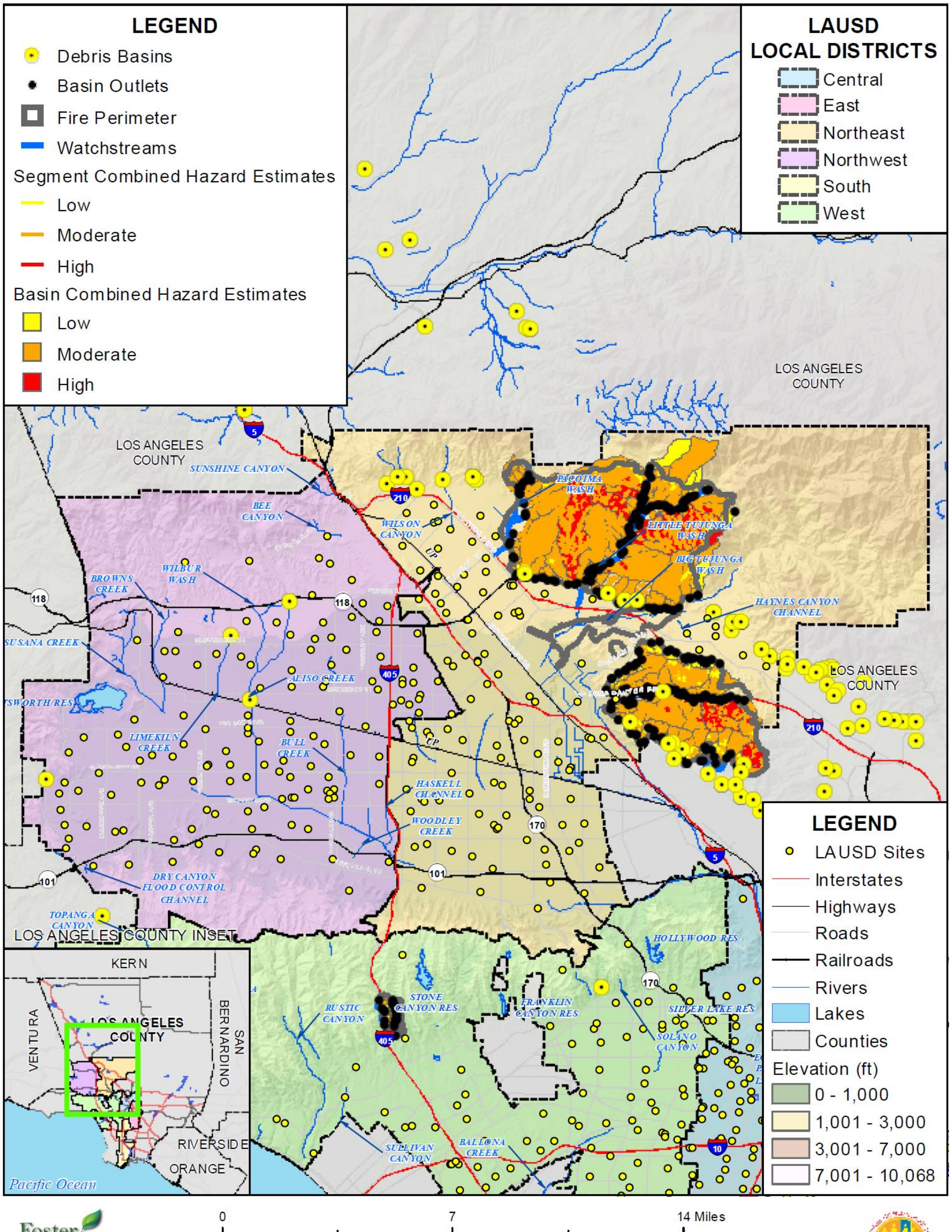
Post-wildfire landslides, mud and debris flows are of particular concern in Los Angeles County and the LAUSD Planning Area. Fires that burn in hilly areas vegetation that holds hillsides together during rainstorms. Once that vegetation is removed, the hillside may be compromised, resulting in landslides and debris flows. Mapping of these areas has begun to occur. Figure 4-38 and Figure 4-39 show the areas in 2016 and 2017 that were burned and are susceptible to post-wildfire mud and debris flows. These areas are in topographically diverse areas. Heavy rains in these areas could cause landslides and debris flows to form. As shown in these maps, the post-wildfire burn area in 2016 is in LAUSD Planning Area, but is not located close to existing LAUSD infrastructure. The 2017 burn area is both in the LAUSD Planning Area, and is somewhat close to LAUSD infrastructure.

*Figure 4-38 LAUSD – Post-Wildfire Burn Areas 2016*




Data Source: 2016 USGS Post-fire Debris Flow, LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

*Figure 4-39 LAUSD – Post-Wildfire Burn Areas 2017*




Data Source: 2017 USGS Post-fire Debris Flow, LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

### *Past Occurrences*

Past occurrences of fire in the County are quite numerous. There are also numerous sources that capture portions of these past occurrences. This section uses disaster declarations, NCDC events, and CAL FIRE events to paint the picture of past occurrences of wildfire. Events not captured by these plans and databases, and those impacting the LAUSD Planning Area, are then supplemented by the HMPC.

#### Disaster Declaration History

A search of FEMA and Cal OES disaster declarations turned up multiple events. These are shown in Table 4-34.

*Table 4-34 Los Angeles County – State and Federal Disaster Declaration from Wildfire 1950-2018*

| Disaster Type | Federal Declarations | | State Declarations | |
|---|---|---|---|---|
| | Count | Years | Count | Years |
| Fire | 44 | 1956, 1961, 1970, 1978, 1980, 1985, 1990, 1992, 1993, 1996, 2002 (three times), 2003 (three times), 2004 (three times), 2005, 2007 (eight times), 2008 (six times), 2009 (twice), 2010, 2013, 2014, 2016 (four times), 2017 | 19 | 1958, 1964, 1970, 1973, 1975, 1976, 1978, 1979, 1980, 1982, 1985, 1988 (twice), 1990, 1992, 1996 (twice), 2003, 2008 |

Source: Cal OES, FEMA

#### NCDC Events

The NCDC has tracked wildfire events in the County dating back to 1993. The 39 events in Los Angeles County are shown in Table 4-35.

*Table 4-35 NCDC Wildfire Events in Los Angeles County 1993 to 12/31/2017*

| Date | Event | Injuries (direct) | Deaths (direct) | Property Damage | Crop Damage | Injuries (indirect) | Deaths (in direct) |
|---|---|---|---|---|---|---|---|
| 21-OCT-96 | Wildfire | 16 | 0 | $1,500,000 | $0 | 0 | 0 |
| 09-DEC-98 | Wildfire | 0 | 0 | $0 | $0 | 0 | 0 |
| 03-JAN-99 | Wildfire | 0 | 0 | $0 | $0 | 0 | 0 |
| 29-AUG-99 | Wildfire | 0 | 0 | $0 | $0 | 0 | 0 |
| 29-AUG-99 | Wildfire | 0 | 0 | $0 | $0 | 0 | 0 |
| 01-SEP-99 | Wildfire | 0 | 0 | $0 | $0 | 0 | 0 |
| 21-DEC-99 | Wildfire | 0 | 0 | $0 | $0 | 0 | 0 |
| 27-DEC-99 | Wildfire | 1 | 0 | $0 | $0 | 0 | 0 |
| 11-MAY-02 | Wildfire | 0 | 0 | $0 | $0 | 0 | 0 |
| 05-JUN-02 | Wildfire | 0 | 0 | $0 | $0 | 0 | 0 |
| 01-SEP-02 | Wildfire | 14 | 0 | $12,700,000 | $0 | 0 | 0 |

| Date | Event | Injuries (direct) | Deaths (direct) | Property Damage | Crop Damage | Injuries (indirect) | Deaths (in direct) |
|---|---|---|---|---|---|---|---|
| 02-SEP-02 | Wildfire | 0 | 0 | $0 | $0 | 0 | 0 |
| 22-SEP-02 | Wildfire | 14 | 0 | $15,300,000 | $0 | 0 | 0 |
| 06-JAN-03 | Wildfire | 0 | 0 | $0 | $0 | 0 | 0 |
| 21-OCT-03 | Wildfire | 0 | 0 | $0 | $0 | 0 | 0 |
| 24-OCT-03 | Wildfire | 0 | 0 | $0 | $0 | 0 | 0 |
| 01-NOV-03 | Wildfire | 0 | 0 | $0 | $0 | 0 | 0 |
| 12-JUL-04 | Wildfire | 0 | 0 | $0 | $0 | 0 | 0 |
| 17-JUL-04 | Wildfire | 0 | 0 | $0 | $0 | 0 | 0 |
| 20-JUL-04 | Wildfire | 0 | 0 | $0 | $0 | 0 | 0 |
| 12-APR-07 | Wildfire | 0 | 0 | $0 | $0 | 0 | 0 |
| 08-MAY-07 | Wildfire | 1 | 0 | $0 | $0 | 0 | 0 |
| 02-SEP-07 | Wildfire | 0 | 0 | $0 | $0 | 0 | 0 |
| 21-OCT-07 | Wildfire | 0 | 0 | $0 | $0 | 0 | 0 |
| 12-OCT-08 | Wildfire | 0 | 0 | $0 | $0 | 0 | 0 |
| 14-NOV-08 | Wildfire | 0 | 0 | $3,500,000 | $0 | 0 | 0 |
| 14-NOV-08 | Wildfire | 0 | 0 | $3,500,000 | $0 | 0 | 0 |
| 26-AUG-09 | Wildfire | 0 | 0 | $0 | $0 | 0 | 2 |
| 01-SEP-09 | Wildfire | 0 | 0 | $0 | $0 | 0 | 0 |
| 30-MAY-13 | Wildfire | 0 | 0 | $0 | $0 | 0 | 0 |
| 01-JUN-13 | Wildfire | 0 | 0 | $0 | $0 | 0 | 0 |
| 16-JAN-14 | Wildfire | 0 | 0 | $0 | $0 | 0 | 0 |
| 16-JAN-14 | Wildfire | 0 | 0 | $0 | $0 | 0 | 0 |
| 20-JUN-16 | Wildfire | 0 | 0 | $0 | $0 | 0 | 0 |
| 01-JUL-16 | Wildfire | 0 | 0 | $0 | $0 | 0 | 0 |
| 09-JUL-16 | Wildfire | 0 | 0 | $0 | $0 | 0 | 0 |
| 22-JUL-16 | Wildfire | 0 | 0 | $0 | $0 | 0 | 0 |
| 01-AUG-16 | Wildfire | 0 | 0 | $0 | $0 | 0 | 0 |
| 01-SEP-17 | Wildfire | 0 | 0 | $0 | $0 | 0 | 0 |
| **Totals** | | **46** | **0** | **$36,500,00** | **$0** | **0** | **2** |

Source: NCDC

*Deaths, injuries, and damages are for the entire event, and may not be exclusive to the County.

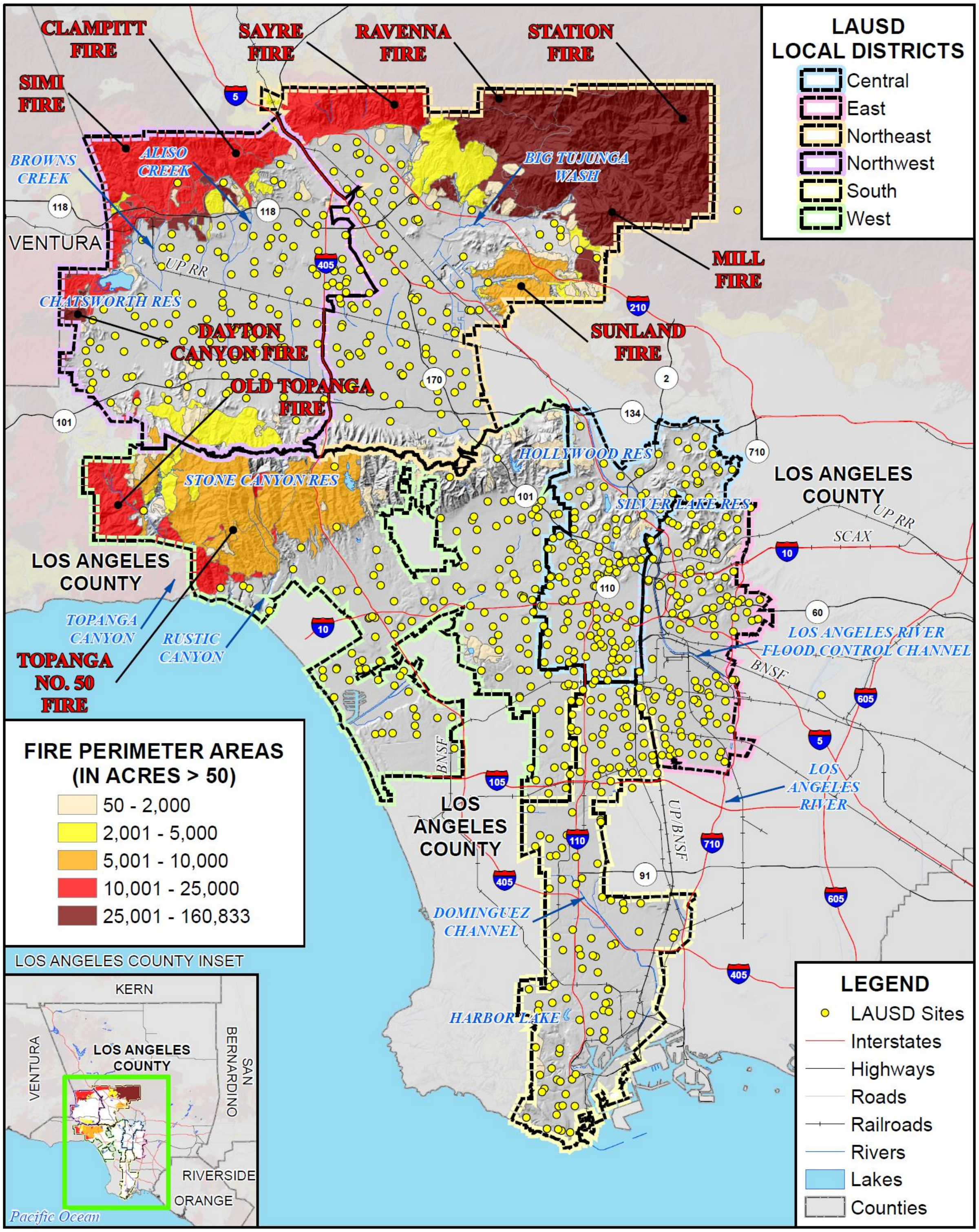
### CAL FIRE Events

CAL FIRE, USDA Forest Service Region 5, Bureau of Land Management (BLM), the National Park Service (NPS), Contract Counties and other agencies jointly maintain a comprehensive fire perimeter GIS layer for public and private lands throughout the state. The data covers fires back to 1878 (though the first recorded incident for the District was in 1916). For the National Park Service, Bureau of Land Management, and US Forest Service, fires of 10 acres and greater are reported. For CAL FIRE, timber fires greater than 10 acres, brush fires greater than 50 acres, grass fires greater than 300 acres, and fires that destroy three or more residential dwellings or commercial structures are reported. CAL FIRE recognizes the various federal, state, and local agencies that have contributed to this dataset, including USDA Forest Service Region 5, BLM, National Park Service, and numerous local agencies.

Fires may be missing altogether or have missing or incorrect attribute data. Some fires may be missing because historical records were lost or damaged, fires were too small for the minimum cutoffs, documentation was inadequate, or fire perimeters have not yet been incorporated into the database. Also, agencies are at different stages of participation. For these reasons, the data should not be used for statistical or analytical purposes.

The data provides a reasonable view of the spatial distribution of past large fires in California. Using GIS, fire perimeters that intersect Los Angeles County and the District were extracted and are listed in summary in Table 4-36. There are 23 fires recorded in this database that crossed District boundaries and were greater than 100 acres. Each of them was tracked by CAL FIRE. Many more small fires have occurred, but were not included in the analysis. Figure 4-40 shows fire history for the District Planning Area, colored by the size of the acreage burned. This map contains fires from 1878 to 2018.

*Figure 4-40 Los Angeles County Wildfire History – CAL FIRE 1878 to 2018*




Data Source: CAL FIRE Fire History 2017 (Fire16_1), LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

*Table 4-36 LAUSD – Wildfire History Summary 1878-2018*

| Fire Name | Year | Alarm Date | Containment Date | Cause | Acres Burned |
|---|---|---|---|---|---|
| Sand Canyon | 1916 | – | – | Unknown | 365 |
| 1916 – Supervisor#35 | 1916 | 6/24/1916 | – | Unknown | 100 |
| Tunnel | 1916 | 9/14/1916 | – | Unknown | 670 |
| Tunnel | 1916 | 9/14/1916 | – | Unknown | 3,200 |
| Pacoima Canyon | 1918 | 7/20/1918 | – | Unknown | 384 |
| Zachau Ranch | 1919 | – | – | Unknown | 100 |
| San Fernando Oil Co. | 1919 | 8/16/1919 | – | Unknown | 200 |
| Ravenna | 1919 | 9/18/1919 | – | Unknown | 65,000 |
| Fitzgerald | 1923 | 8/22/1923 | – | Unknown | 160 |
| Magazine Canyon | 1923 | 12/9/1923 | – | Unknown | 340 |
| Mcellveney | 1924 | 1/19/1924 | – | Unknown | 200 |
| La Tuna | 1999 | 8/5/1999 | 8/5/1999 | Miscellaneous | 225 |
| Wildwood Fire | 2002 | 6/20/2002 | 6/28/2002 | Equipment Use | 113 |
| Middle Fire | 2003 | 8/7/2003 | 8/8/2003 | Equipment Use | 300 |
| Simi Fire | 2003 | 10/25/2003 | – | Unknown | 107,560 |
| Foothill | 2004 | 7/17/2004 | 7/25/2004 | Arson | 5,969 |
| Topanga | 2005 | 9/28/2005 | 10/10/2005 | Unknown | 23,396 |
| Marek | 2008 | 10/12/2008 | 10/20/2008 | Unknown | 4,574 |
| Sayre | 2008 | 11/14/2008 | 12/5/2008 | Unknown | 11,263 |
| Tujunga | 2009 | 7/5/2009 | 7/9/2009 | Lightning | 180 |
| Station | 2009 | 8/26/2009 | 9/22/2009 | Arson | 160,371 |
| Wheatland | 2016 | 5/23/2016 | 5/25/2016 | Equipment Use | 130 |
| Sand | 2016 | 7/22/2016 | 8/7/2016 | Equipment Use | 41,432 |

Source: CAL FIRE

## Hazard Mitigation Planning Committee

The following text is reproduced from a Public Assistance grant application for the Creek, Rye, and Skirball fires from December 5, 2017 to December 15, 2017.

> *Multiple wildfires broke out across Los Angeles County in the first week of December 2017. It comprised the Creek, Rye, and Skirball fires which burned over 22,000 acres of dense brush. It destroyed 1,429 structures and emitted enormous amounts of smoke which blanketed the Northeast, Northwest, and West Local Districts affecting 296 campuses. Gusty winds drove the thick smoke onto these schools, inundating the interior and exterior with particulate matters such as soot, ash, dust, and metals. The LAUSD Data Center sustained heavy smoke damage. The LAUSD IT Department deployed its staff to get the affected schools back on line*

*and hired Data Span to clean its data center. Due to the mandatory evacuations, some LAUSD staff were unable to take their cars home which caused extra transportation costs. LAUSD Maintenance Operations and Procurement Department carried out interior cleanup. All drinking fountains needed to be flushed, as well as HCAC systems. Roofs were power washed. Quality inspections were performed to provide safe campuses.*

The District noted issues that occurred during the Creek and Skirball fires in December of 2017. On 12/5 -The schools below were relocated to the following sites .

- Harding, Hubbard, and Vaughn EEC were redirected to San Fernando HS
- Mt. Gleason MS was redirected to East Valley High
- Sunland EL, Brainard EL, Plain View EL, and Verdugo Hills HS (updated location) were redirected to North Hollywood HS
- Apperson EL, Mountain View EL, Pinewood EL (updated location), Pinewood EEC (updated location), and Stone Hurst ES were redirected to Grant High

On 12/6 -Local District Northeast School Closures

- Mt. Gleason MS
- Brainard ES
- Sunland ES
- Plainview ES
- Verdugo Hills HS
- Mt. Lukens Continuation HS
- Apperson ES
- Pinewood ES
- Pinewood EEC
- Mountain View ES
- Stonehurst ES
- Hubbard ES
- Harding ES
- Vaughn EEC
- Vinedale ES
- Sylmar Leadership Academy (K-8)
- Sylmar ES
- Sylmar HS
- Sylmar Biotech HS
- Evergreen Continuation HS
- Olive Vista MS
- Haddon ES
- Gridley ES
- Dyer ES
- El Dorado ES
- Vista del Valle ES
- CCLA
- Morningside ES
- San Fernando MS

- San Fernando HS
- Mission Continuation HS
- SFIAM MS
- Broadous ES
- Osceola ES
- Herrick ES
- Maclay MS
- Coughlin ES
- Pacoima MS
- Telfair ES
- O'Melveny ES
- San Fernando ES
- Sharp ES
- Vena ES
- Sun Valley HS
- Sun Valley MS
- Haddon EEC
- Telfair EEC
- Pacoima EEC
- San Fernando EEC
- Fernangeles ES
- Broadous EEC

In addition, due to the Getty fire, the following Local District West schools were closed on 12/6 with the exception of Brentwood which was relocated to Dorsey HS

- Kentor Canyon ES, Community Magnet Charter ES, Roscomere ES, and Brentwood Magnet ES- on 12/6 relocated to Dorsey High School

On 12/7 and 12/8 all schools in Local Districts Northeast and Northwest were closed.

Also in Local District West the schools that were closed on 12/6 were closed on 12/7 and 12/8.In addition to the three original school closures, the following schools were closed on 12/7 and 12/8.

- Topanga EL
- Marquez
- Palisades Charter EL
- Palisades HS (Charter)
- Canyon EL
- Revere MS
- Kenter Canyon EL
- Brentwood Magnet
- University HS
- Brockton EL
- Sterry EL
- Westwood EL
- Emerson MS

- Fairburn EL
- Warner EL
- Community Magnet Charter
- Roscomare Road

On 12/6- The Adult Division closed the following locations:

- North Valley Occupational Center
- North Hollywood Learning Center
- East Valley Skill Center
- Rinaldi Learning Center

The Adult Division closures for 12/7 and 12/8

- Local District Northeast:
  - ✓ North Valley Occupational Center
  - ✓ East Valley Occupational Center
  - ✓ North Hollywood Learning Center
  - ✓ Rinaldi Adult Learning Center
  - ✓ North Valley Aviation Center
- Local District Northwest
  - ✓ West Valley Occupational Center
  - ✓ Reseda Community Adult School (co-located at HS)
  - ✓ Van Nuys Community Adult School (co-located at HS)
- Local District West
  - ✓ University Adult School (co-located at HS)

On 12/5 the following Charter Sites were closed

- Bert Corona MS (private site)
- Bert Corona HS (co-located Maclay MS)
- Vaughn Next Century Learning Center (EEC to 12th grade; one campus is Vaughn Street ES District site; others are private)
- Community Charter Middle School (PUC school – private site)
- CALS Charter Early College HS (PUC school – private site)
- Lakeview Charter Academy (PUC school – private site)
- Pacoima Charter ES (District site)
- Fenton Primary (private site)
- Fenton Avenue (District site)

On 12/6 and remained closed 12/7 and 12/8 The Charter Division list of closures:

- Alliance Marine-Innovation & Technology 6-12 Complex
- Bert Corona Charter School
- Bert Corona Charter High School - (co-located at Maclay MS)
- CHAMPS Charter High School
- Discovery Charter Preparatory School #2

- Fenton Avenue Charter School - (Conversion charter; District campus)
- Fenton Primary Center
- Fenton STEM
- Fenton Leadership Academy
- Girls Athletic Leadership School Los Angeles
- Lashon Academy
- Montague Charter Academy - (Conversion charter; District campus)
- N.E.W. Academy Canoga Park
- North Valley Military Institute College Preparatory Academy
- Pacoima Charter School - (Conversion charter; District campus)
- Palisades Charter High School (Conversion charter; District campus)
- PUC Lakeview Charter Academy
- PUC Community Charter Elementary School
- PUC Community Charter Middle School
- PUC Community Charter Early College High School
- PUC Inspire Charter Academy
- PUC Nueva Esperanza Charter Academy
- PUC Lakeview Charter High School
- PUC Triumph Charter Academy
- PUC Triumph Charter High School
- Vaughn Next Century Learning Center
- Valley Charter Elementary (Conversion charter; District campus)
- Valley Charter Middle School
- Valor Academy Elementary School
- Valor Academy Middle School
- Valor Academy High School - (Panorama HS)
- Birmingham Community Charter

WHAT OTHER FIRES HAVE AFFECTED THE DISTRICT? OLD PLAN MENTIONED 2009 STATION FIRE BUT GAVE NO DETAILS.

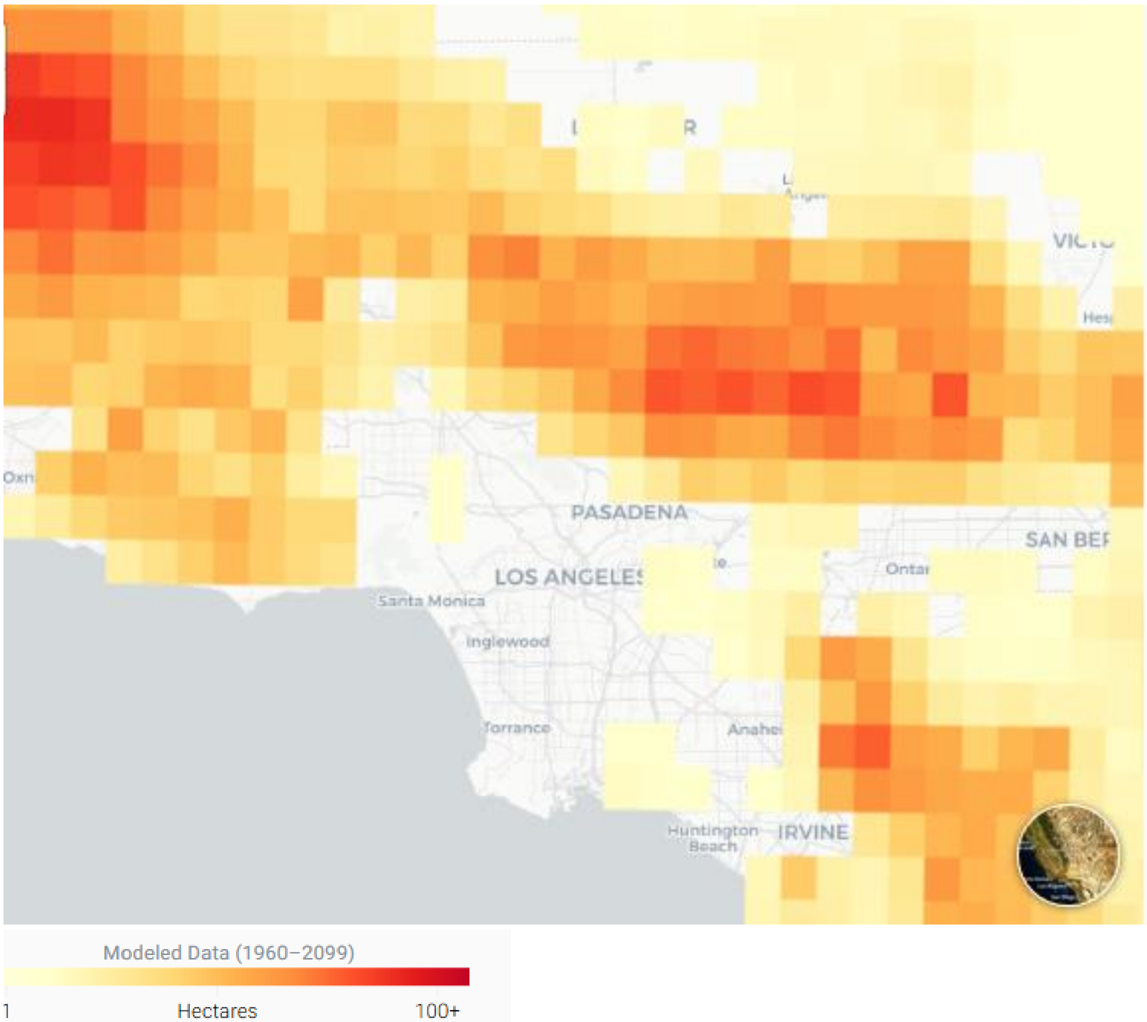
### *Likelihood of Future Occurrence*

**Likely** — From May to October of each year, Los Angeles County and the LAUSD Planning Area faces a serious wildland fire threat, especially in topographically diverse areas and the more mountainous regions. Fires will continue to occur on an annual basis in the LAUSD Planning Area. The threat of wildfire and potential losses are constantly increasing as human development and population increase and the wildland urban interface areas expand.

### Climate Change and Wildfire

Warmer temperatures can exacerbate drought conditions. Drought often kills plants and trees, which serve as fuel for wildfires. Warmer temperatures could increase the number of wildfires and pest outbreaks, such as the western pine beetle. Cal-Adapt's wildfire tool predicts the potential increase in the amount of burned areas for the year 2085, as compared to recent (2010) conditions. This is shown in Figure 4-41. Based on this model, Cal-Adapt predicts that wildfire risk in Los Angeles County will increase slightly in the near term and subside during mid-to late-century. However, wildfire models can vary depending on the parameters used. Cal-Adapt does not take landscape and fuel sources into account in their model. In all likelihood, in Los Angeles County, precipitation patterns, high levels of heat, topography, and fuel load will determine the frequency and intensity of future wildfire.

*Figure 4-41 Los Angeles County – Projected Increase in Wildfire Burn Areas in 2085*




Source: Cal-Adapt – Using the CNRM-CM5 Model, the RCP 4.5 Scenario, and the Central Population Growth Scenario

## 4.2.17. Natural Hazards Summary

Table 4-37 summarizes the results of the hazard identification and hazard profile for the LAUSD Planning Area based on the hazard identification data and input from the HMPC. For each hazard profiled in Section 4.3, this table includes the likelihood of future occurrence and whether the hazard is considered a priority hazard for the District Planning Area based on the methodology previously presented in Section 4.1.

*Table 4-37 Hazard Identification/Profile Summary and Determination of Priority Hazards*

| Hazard | Likelihood of Future Occurrence | Priority Hazard |
|---|---|---|
| Climate Change and Sea Level Rise | Highly Likely | Y |
| Dam Failure | Occasional | Y |
| Drought and Water Shortage | Likely/ Occasional | Y |
| Earthquake | Occasional | Y |
| Earthquake: Liquefaction | Unlikely | Y |
| Flood: 100/500–year | Occasional/ Unlikely | Y |
| Flood: Localized/Stormwater | Highly Likely | Y |
| Landslide, Mud, and Debris Flows (including post-fire) | Likely | Y |
| Levee Failure | Occasional | Y |
| Radon | Likely | Y |
| Severe Weather: Extreme Heat | Highly Likely | Y |
| Severe Weather: Heavy Rains and Storms | Highly Likely | Y |
| Severe Weather: High Winds and Tornados | Highly Likely | Y |
| Tsunami | Occasional | Y |
| Wildfire | Likely | Y |

## 4.3 Vulnerability Assessment

**Requirement §201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.**

**Requirement §201.6(c)(2)(ii)(A): The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas.**

**Requirement §201.6(c)(2)(ii)(B): [The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate.**

**Requirement §201.6(c)(2)(ii)(C): [The plan should describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.**

With LAUSD's hazards identified and profiled, the HMPC conducted a vulnerability assessment to describe the impact that each hazard would have on the LAUSD Planning Area. The vulnerability assessment quantifies, to the extent feasible using best available data, assets at risk to natural hazards and estimates potential losses. This section focuses on the vulnerabilities of the LAUSD Planning Area as a whole.

This vulnerability assessment followed the methodology described in the FEMA publication Understanding Your Risks—Identifying Hazards and Estimating Losses. The vulnerability assessment first describes the total vulnerability and assets at risk for the District and then discusses vulnerability by hazard.

### *Data Sources*

Data used to support this assessment included the sources listed below. Where data and information from these studies, plans, reports, and other data sources were used, the source is referenced as appropriate throughout this vulnerability assessment.

- INSERT

### 4.3.1. LAUSD Total Vulnerability and Assets at Risk

As a starting point for analyzing the LAUSD Planning Area's vulnerability to identified hazards, the HMPC used a variety of data to define a baseline against which all disaster impacts could be compared. If a catastrophic disaster was to occur in the LAUSD Planning Area, this section describes significant assets at risk in the Planning Area. Data used in this baseline assessment included:

- Total values at risk;
- Critical facility inventory;
- Cultural, historical, and natural resources; and

➢ Growth and development trends.

## *Total Values at Risk*

### Building Inventory and Values

This analysis captures the values associated with LAUSD owned assets located within Los Angeles County. The data provided by LAUSD and Los Angeles County, as described further below, represents best available data and provides information as to what is potentially at risk and vulnerable to the damaging effects of natural hazards within the LAUSD Planning Area.

Understanding the total values of LAUSD assets is a starting point to understanding the overall value of identified assets at risk in the District. When the total assets and values of LAUSD facilities are combined with other District assets such as school enrollments, critical infrastructure, historic and cultural resources, and natural resources, the big picture emerges as to what is potentially at risk and vulnerable to the damaging effects of natural hazards within the LAUSD Planning Area.

#### Methodology

LAUSD's facilities dataset, including information on site type, site name, building replacement values, and enrollment values, was used as the basis for the inventory of all facilities within the LAUSD Planning Area. The Los Angeles County's 2016 Assessor's data and parcel layer was obtained to perform the spatial analysis and was joined to the facilities database to obtain information on assessed land values and to create a parcel inventory of LAUSD properties. The replacement values for LAUSD sites and buildings, provided by LAUSD, were added to land values to determine the total values of LAUSD assets. Other GIS data, such as jurisdictional boundaries, roads, streams, and area features, was also obtained from Los Angeles County to support countywide mapping and analysis of assets at risk.

LAUSD's facilities dataset provided a GIS dataset containing the 798 district-specific sites. The facilities dataset was utilized to identify the 3,814 LAUSD owned parcels specific to LAUSD. The LAUSD facilities dataset was further linked to the assessor land value data and parcel data, resulting in 3,728 successful record matches. The LAUSD building replacement costs for those buildings located on the 798 district-specific sites was also linked to the 3,728 parcels for the analysis. The data did not contain duplicate records. In total, 3,728 records were utilized for the parcel polygon analysis.

It should be noted that the GIS data spatially identified 3,814 parcels, and these parcels and their associated assessor parcel numbers (APNs) were reviewed by LAUSD. LAUSD's review identified 86 parcels as Not LAUSD Property or APN Not Found. As a result, the 86 parcels were omitted, and only 3,728 parcels were utilized for the analysis.

Results are provided in this Plan for LAUSD facilities with analysis broken out by the six Local Districts (Central, East, Northeast, Northwest, South, and West), both in summary form and by site type. Appendix ?? includes additional details on the specific LAUSD facilities organized by site name and site type for each of the six Local Districts. In addition, the District owns facilities outside the District boundaries. Tabular analysis for these locations is provided in the vulnerability profiles below.

### *Data Limitations & Notations*

Although based on best available data, the resulting information should only be used as an initial guide to overall values in the LAUSD Planning Area. In the event of a disaster, structures and other infrastructure improvements are at the greatest risk of damage. Depending on the type of hazard and resulting damages, the land itself may not suffer a significant loss. For that reason, the values of structures and other infrastructure improvements are of greatest concern. Also, it is critical to note a specific limitation to the assessed values data within the County, created by Proposition 13. Instead of adjusting property values annually, no adjustments are made until a property transfer occurs. As a result, overall property value information is most likely low and may not reflect current market or true potential loss values for properties within the County.

The HMPC also noted that there are a few places where existing data limits the values of certain LAUSD facilities. These items noted include:

- Value of the computer equipment at the Main Data Center ($63,355,275 in the Beaudry Building)
- Value of the computer equipment at the Secondary Data Center ($63,355,275 in the ECOPOD in Van Nuys)
- Value of the RADIO CORE equipment at the Soto Street Facility ($10,000,000)

### *Site Type Categories*

LAUSD site type categories provided descriptive information of each property. The site type categories were linked back to the asset dataset created for LAUSD. The final site type categories for LAUSD include:

- Admin Facility
- Adult Education Facility
- Charter School
- Continuation High School
- Currently A Closed School
- Early Education Center
- Elementary School
- Middle School
- Senior High School
- Span High School (i.e. Grades K-12)
- Span Middle School (i.e. Grades K-8)
- Special Education Center

### *Estimated Content Replacement Values*

LAUSD's facility data were used to develop estimated content replacement values (CRVs) that are potentially at loss from hazards. FEMA's standard CRV factors were utilized to develop more accurate loss estimates for all mapped hazard analyses. FEMA's CRV factors estimate value as a percent of improved structure value by property type. Table 4-38 shows the breakdown of how estimated CRV factors are used for the District.

*Table 4-38 LAUSD– Content Replacement Factors by Property Use*

| LAUSD Property Type | Hazus Property Use Categories | Hazus Content Replacement Values |
|---|---|---|
| Educational Structures | Institutional | 100% |

Source: Hazus

### LAUSD Values at Risk Results

Using the methodology described above, values at risk were determined by using GIS. Table 4-39 shows the total values of the LAUSD Planning Area. This table is important as potential losses to the District include land, structure and contents values. In addition, loss estimates contained in the hazard vulnerability sections of this Chapter will use calculations based on the total values, including content replacement values. Appendix ?? provides additional detail tables broken out by Local District, Site Type, and Site Name.

*Table 4-39 LAUSD – Total Values at Risk by Local Districts Values*

| LAUSD Local Districts | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Inside Local District Areas | | | | | | |
| Central | 1,258 | $358,526,663 | 1,909 | $7,749,605,930 | $7,749,605,930 | $15,857,738,524 |
| East | 1,014 | $85,815,716 | 2,383 | $5,091,603,772 | $5,091,603,772 | $10,269,023,260 |
| Northeast | 260 | $86,971,028 | 3,185 | $3,955,972,180 | $3,955,972,180 | $7,998,915,388 |
| Northwest | 166 | $72,313,627 | 3,481 | $4,204,790,211 | $4,204,790,211 | $8,481,894,048 |
| South | 555 | $87,272,189 | 2,855 | $4,642,918,491 | $4,642,918,491 | $9,373,109,170 |
| West | 468 | $194,562,132 | 2,709 | $4,693,229,325 | $4,693,229,325 | $9,581,020,782 |
| **Inside Areas Total** | **3,721** | **$885,461,355** | **16,522** | **$30,338,119,909** | **$30,338,119,909** | **$61,561,701,173** |
| Outside of Local District Areas | | | | | | |
| Outside Areas | 7 | $6,025,565 | 25 | $251,772,284 | $251,772,284 | $509,570,132 |
| **Outside Areas Total** | **7** | **$6,025,565** | **25** | **$251,772,284** | **$251,772,284** | **$509,570,132** |
| | | | | | | |
| **Grand Total** | **3,728** | **$891,486,920** | **16,547** | **$30,589,892,192** | **$30,589,892,192** | **$62,071,271,305** |

Source: LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

Table 4-40 through Table 4-45 shows the total values of the LAUSD Planning Area broken out by Local District with estimated content replacement values (CRVs) included (using CRV multipliers from Table 4-38). This table is important as potential losses to the District include land, structure and contents values. Table 4-46 shows the areas outside the Local District areas, by site type.

### *Table 4-40 LAUSD – Local District Central Total Values at Risk by Site Type*

| Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Admin Facility | 15 | $8,872,068 | 36 | $1,972,164,776 | $1,972,164,776 | $3,953,201,621 |
| Adult Education Facility | 5 | $1,896,367 | 32 | $251,887,155 | $251,887,155 | $505,670,676 |
| Charter School | 23 | $2,691,373 | 7 | $43,573,968 | $43,573,968 | $89,839,310 |
| Continuation High School | 1 | $0 | 9 | $20,410,184 | $20,410,184 | $40,820,369 |
| Currently a Closed School | 6 | $236,076 | 7 | $8,655,330 | $8,655,330 | $17,546,735 |
| Early Education Center | 15 | $468,417 | 20 | $9,468,447 | $9,468,447 | $19,405,311 |
| Elementary School | 660 | $93,114,962 | 1,039 | $2,396,323,320 | $2,396,323,320 | $4,885,761,602 |
| Middle School | 203 | $43,945,746 | 234 | $873,988,910 | $873,988,910 | $1,791,923,565 |
| Senior High School | 296 | $204,029,643 | 393 | $1,961,839,090 | $1,961,839,090 | $4,127,707,822 |
| Span High School (i.e. Grades K-12) | 8 | $1,397,102 | 65 | $108,594,905 | $108,594,905 | $218,586,912 |
| Span Middle School (i.e. Grades K-8) | 21 | $961,002 | 45 | $49,336,708 | $49,336,708 | $99,634,419 |
| Special Education Center | 5 | $913,907 | 22 | $53,363,138 | $53,363,138 | $107,640,182 |
| **Central Total** | **1,258** | **$358,526,663** | **1,909** | **$7,749,605,930** | **$7,749,605,930** | **$15,857,738,524** |

Source: LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

### *Table 4-41 LAUSD – Local District East Total Values at Risk by Site Type*

| Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Admin Facility | 12 | $1,696,897 | 47 | $140,365,742 | $140,365,742 | $282,428,380 |
| Adult Education Facility | 3 | $752,102 | 60 | $84,433,230 | $84,433,230 | $169,618,562 |
| Continuation High School | 1 | $0 | 7 | $6,199,487 | $6,199,487 | $12,398,974 |
| Elementary School | 623 | $45,606,207 | 1,314 | $2,329,574,436 | $2,329,574,436 | $4,704,755,080 |

| Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Middle School | 84 | $6,225,841 | 367 | $774,490,754 | $774,490,754 | $1,555,207,348 |
| Senior High School | 275 | $29,491,428 | 513 | $1,644,135,496 | $1,644,135,496 | $3,317,762,419 |
| Span High School (i.e. Grades K-12) | 14 | $1,480,933 | 62 | $66,133,229 | $66,133,229 | $133,747,391 |
| Special Education Center | 2 | $562,308 | 13 | $46,271,398 | $46,271,398 | $93,105,105 |
| **East Total** | **1,014** | **$85,815,716** | **2,383** | **$5,091,603,772** | **$5,091,603,772** | **$10,269,023,260** |

Source: LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

### *Table 4-42 LAUSD – Local District Northeast Total Values at Risk by Site Type*

| Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Admin Facility | 6 | $1,307,581 | 36 | $21,067,878 | $21,067,878 | $43,443,337 |
| Adult Education Facility | 2 | $156,899 | 47 | $35,642,716 | $35,642,716 | $71,442,331 |
| Charter School | 4 | $519,256 | 115 | $53,190,070 | $53,190,070 | $106,899,396 |
| Community Day School | 1 | $21,532 | 2 | $466,236 | $466,236 | $954,005 |
| Continuation High School | 2 | $46,847 | 4 | $1,843,111 | $1,843,111 | $3,733,070 |
| Early Education Center | 2 | $49,926 | 8 | $6,577,296 | $6,577,296 | $13,204,518 |
| Elementary School | 157 | $22,739,906 | 1,825 | $1,613,643,914 | $1,613,643,914 | $3,250,027,734 |
| Middle School | 36 | $24,020,430 | 470 | $874,416,537 | $874,416,537 | $1,772,853,505 |
| Senior High School | 49 | $37,929,328 | 656 | $1,324,224,860 | $1,324,224,860 | $2,686,379,047 |
| Special Education Center | 1 | $179,323 | 22 | $24,899,561 | $24,899,561 | $49,978,445 |
| **Northeast Total** | **260** | **$86,971,028** | **3,185** | **$3,955,972,180** | **$3,955,972,180** | **$7,998,915,388** |

Source: LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

### *Table 4-43 LAUSD – Local District Northwest Total Values at Risk by Site Type*

| Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Admin Facility | 6 | $1,238,978 | 58 | $93,175,364 | $93,175,364 | $187,589,706 |
| Adult Education Facility | 3 | $1,594,627 | 112 | $96,247,597 | $96,247,597 | $194,089,821 |
| Charter School | 5 | $7,738,031 | 165 | $249,309,542 | $249,309,542 | $506,357,115 |
| Continuation High School | 2 | $368,630 | 21 | $6,170,822 | $6,170,822 | $12,710,274 |
| Currently a Closed School | 5 | $2,242,855 | 91 | $73,354,713 | $73,354,713 | $148,952,282 |
| Elementary School | 107 | $26,623,726 | 1,853 | $1,602,361,966 | $1,602,361,966 | $3,231,347,659 |
| Middle School | 15 | $13,222,980 | 501 | $955,855,203 | $955,855,203 | $1,924,933,385 |
| Senior High School | 18 | $16,129,606 | 552 | $983,400,901 | $983,400,901 | $1,982,931,408 |
| Span High School (i.e. Grades K-12) | 2 | $2,073,119 | 73 | $80,414,559 | $80,414,559 | $162,902,238 |
| Special Education Center | 3 | $1,081,075 | 55 | $64,499,543 | $64,499,543 | $130,080,161 |
| **Northwest Total** | **166** | **$72,313,627** | **3,481** | **$4,204,790,211** | **$4,204,790,211** | **$8,481,894,048** |

Source: LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

### *Table 4-44 LAUSD – Local District South Total Values at Risk by Site Type*

| Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Admin Facility | 6 | $779,044 | 12 | $21,083,165 | $21,083,165 | $42,945,374 |
| Adult Education Facility | 31 | $1,739,597 | 54 | $85,949,987 | $85,949,987 | $173,639,570 |
| Charter School | 11 | $794,745 | 28 | $69,236,652 | $69,236,652 | $139,268,050 |
| Community Day School | 1 | $488,024 | 21 | $3,893,022 | $3,893,022 | $8,274,069 |
| CTR | 1 | $22,538 | 3 | $1,126,899 | $1,126,899 | $2,276,336 |
| Elementary School | 309 | $40,063,973 | 1,618 | $2,166,821,801 | $2,166,821,801 | $4,373,707,575 |
| Middle School | 58 | $18,960,190 | 528 | $932,637,693 | $932,637,693 | $1,884,235,575 |

| Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Senior High School | 120 | $22,634,376 | 506 | $1,243,790,184 | $1,243,790,184 | $2,510,214,745 |
| Span Middle School (i.e. Grades K-8) | 5 | $281,124 | 32 | $25,612,594 | $25,612,594 | $51,506,311 |
| Special Education Center | 13 | $1,508,578 | 53 | $92,766,493 | $92,766,493 | $187,041,565 |
| **South Total** | **555** | **$87,272,189** | **2,855** | **$4,642,918,491** | **$4,642,918,491** | **$9,373,109,170** |

Source: LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

### *Table 4-45 LAUSD – Local District West Total Values at Risk by Site Type*

| Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Admin Facility | 5 | $1,124,397 | 23 | $102,163,062 | $102,163,062 | $205,450,521 |
| Adult Education Facility | 2 | $464,318 | 14 | $20,560,827 | $20,560,827 | $41,585,973 |
| Charter School | 13 | $2,622,891 | 60 | $38,295,116 | $38,295,116 | $79,213,124 |
| Community Day School | 1 | $340,696 | 5 | $2,190,247 | $2,190,247 | $4,721,189 |
| Continuation High School | 1 | $25,486 | 2 | $977,394 | $977,394 | $1,980,273 |
| Currently a Closed School | 1 | $0 | 11 | $6,452,672 | $6,452,672 | $12,905,345 |
| Early Education Center | 2 | $515,658 | 13 | $7,836,983 | $7,836,983 | $16,189,623 |
| Elementary School | 265 | $73,042,086 | 1,630 | $2,059,908,439 | $2,059,908,439 | $4,192,858,964 |
| Middle School | 29 | $33,021,637 | 477 | $1,032,534,523 | $1,032,534,523 | $2,098,090,683 |
| Senior High School | 144 | $80,825,582 | 429 | $1,342,968,906 | $1,342,968,906 | $2,766,763,394 |
| Span Middle School (i.e. Grades K-8) | 3 | $1,991,202 | 24 | $19,568,043 | $19,568,043 | $41,127,288 |
| Special Education Center | 2 | $588,179 | 21 | $59,773,113 | $59,773,113 | $120,134,405 |
| **West Total** | **468** | **$194,562,132** | **2,709** | **$4,693,229,325** | **$4,693,229,325** | **$9,581,020,782** |

Source: LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

*Table 4-46 LAUSD – Outside of Local District Area Total Values at Risk by Site Type*

| Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Admin Facility | 1 | $6,025,565 | 1 | $149,306,997 | $149,306,997 | $304,639,558 |
| Senior High School | 6 | $0 | 24 | $102,465,287 | $102,465,287 | $204,930,574 |
| **Outside Areas Total** | **7** | **$6,025,565** | **25** | **$251,772,284** | **$251,772,284** | **$509,570,132** |

LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

## Critical Facility Inventory

For purposes of this plan, a critical facility is defined as:

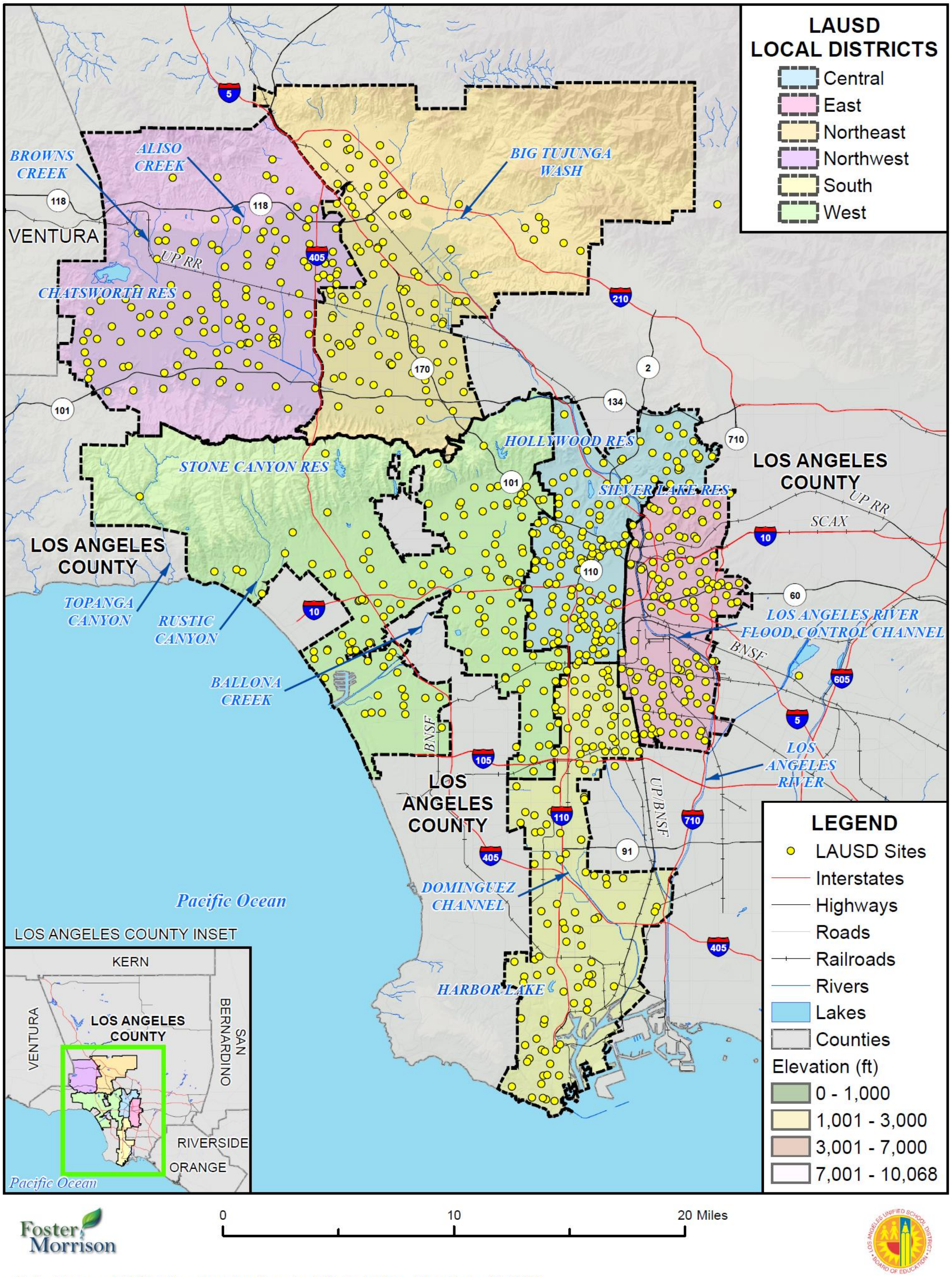
> ***Any facility, including without limitation, a structure, infrastructure, property, equipment or service, that if adversely affected during a hazard event may result in severe consequences to public health and safety or interrupt essential services and operations for the community at any time before, during and after the hazard event.***

FEMA generally defines a critical facility using the following categories: (1) Essential Services Facilities (2) At-risk Populations Facilities, and (3) Hazardous Materials Facilities.

- Essential Services Facilities include, without limitation, public safety, emergency response, emergency medical, designated emergency shelters, communications, public utility plant facilities and equipment, and government operations. Sub-Categories:
  - ✓ Public Safety - Police stations, fire and rescue stations, emergency operations centers
  - ✓ Emergency Response - Emergency vehicle and equipment storage and essential governmental work centers for continuity of government operations.
  - ✓ Emergency Medical - Hospitals, emergency care, urgent care, ambulance services.
  - ✓ Designated Emergency Shelters
  - ✓ Communications - Main hubs for telephone, main broadcasting equipment for television systems, radio and other emergency warning systems.
  - ✓ Public Utility Plant Facilities - including equipment for treatment, generation, storage, pumping and distribution (hubs for water, wastewater, power and gas.
  - ✓ Essential Government Operations - Public records, courts, jails, building permitting and inspection services, government administration and management, maintenance and equipment centers.
- At Risk Population Facilities include, without limitation, pre-schools, public and private primary and secondary schools, before and after school care centers, daycare centers, group homes, and assisted living residential or congregate care facilities.
- Hazardous Materials Facilities include, without limitation, any facility that could, if adversely impacted, release of hazardous material(s) in sufficient amounts during a hazard event that would create harm to people, the environment and property.

By this definition, all of the facilities owned by LAUSD would be considered critical facilities. A map of these facilities can be found on Figure 4-42.

*Figure 4-42 LAUSD – Critical Facility Locations*




Data Source: LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

Staff talks about many of their operational facilities, utilities, EOC, etc. being more critical in function. Can you discuss which of these are more critical?

## *Cultural, Historical, and Natural Resources*

Assessing LAUSD's vulnerability to disaster also involves inventorying the cultural, historical, and natural resource assets of the area. This information is important for the following reasons:

- The District may decide that these types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.
- In the event of a disaster, an accurate inventory of cultural, historical and natural resources allows for more prudent care in the disaster's immediate aftermath when the potential for additional impacts is higher.
- The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.
- Natural resources can have beneficial functions that reduce the impacts of natural hazards, for example, wetlands and riparian and sensitive habitat which help absorb and attenuate floodwaters and thus support overall mitigation objectives.

### Cultural and Historical Resources

LAUSD owns many schools and other properties that are considered historical resources. There are shown in Table 4-47.

*Table 4-47 LAUSD – Historic Property Summary*

| School Type | Number |
|---|---|
| **Eligible (Historic) Schools** | |
| Adult School | 2 |
| Children's Center/ EEC | 2 |
| Elementary School | 121 |
| Learning Center | 1 |
| Magnet | 1 |
| Middle School | 41 |
| High School | 31 |
| Old Canyon, Farmdale, Vernon | 3 |
| Special Education Center | 3 |
| **Total Historic Schools** | **205** |
| **Schools Requiring Evaluation** | |
| Adult School | 2 |
| Children's Center | 3 |
| Elementary School | 91 |
| Learning Center | 0 |

| School Type | Number |
|---|---|
| **Eligible (Historic) Schools** | |
| Magnet/ Charter | 2 |
| Middle School | 8 |
| High School | 7 |
| Old Canyon, Farmdale, Vernon | 0 |
| Special Education Center | 3 |
| **Total Requiring Evaluation** | **116** |

Source: LAUSD

## Natural Resources

Natural resources are important to include in cost/benefit analyses for future projects and may be used to leverage additional funding for mitigation projects that also contribute to community goals for protecting sensitive natural resources. Awareness of natural assets can lead to opportunities for meeting multiple objectives. For instance, protecting wetlands areas protects sensitive habitat as well as reducing the force of and storing floodwaters. Also understanding the location of threatened and endangered species is important for determining appropriate mitigation measures and future development.

LAUSD schools are developed with buildings; paved areas including parking lots, hardcourts, and walkways; and landscaped areas, including turf playfields and ornamental landscaping of trees, shrubs, and/or grass. Playfields and ornamental turf on school campuses are not generally suitable habitat for sensitive species due to frequent disturbances for athletic and recreational uses and for maintenance activities such as mowing. Some LAUSD campuses contain native gardens; however, these are instructional and ornamental gardens and are frequently disturbed by instructional and maintenance activities.

Vegetation types in the part of the District in the San Gabriel Mountains include mixed chaparral, montane hardwood, chamise-redshank chaparral, and coastal scrub as described below. However, there are no LAUSD schools in the part of the District in the San Gabriel Mountains.

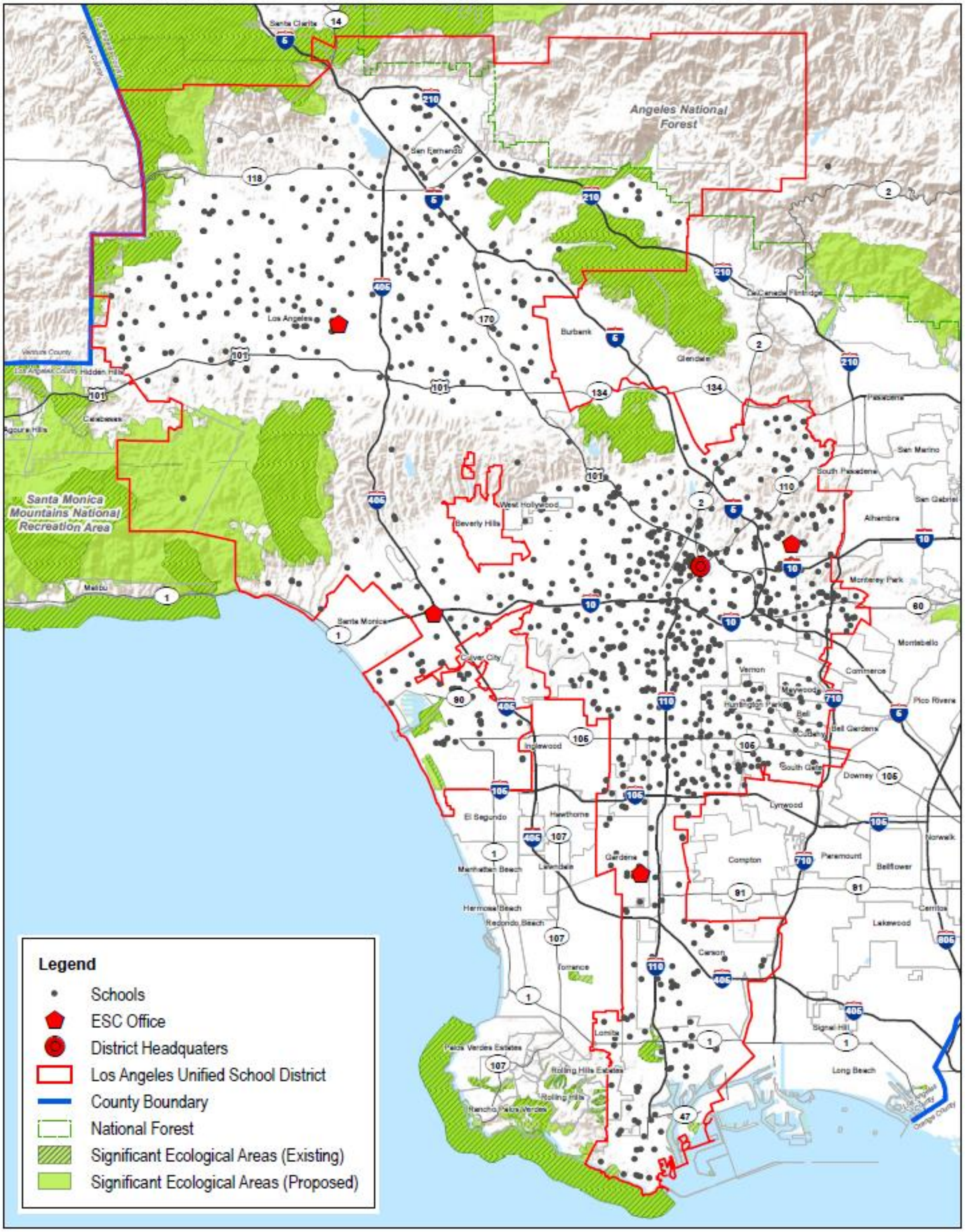
- Mixed chaparral. Associated shrubs including chamise, silk-tassel, toyon, yerba-santa, California fremontia, scrub oak, chaparral oak, and species of ceanothus and manzanita.
- Montane hardwood. At lower elevations, montane hardwood overstory species typically include oaks, white alder, bigleaf maple, bigcone Douglas-fir, and California-laurel. Understory vegetation usually is dominated by chaparral species such as coffeeberry, manzanita, and ceanothus. A wide variety of wildlife relies on this habitat, including jays, woodpeckers, squirrel, black bear, mule deer, and various reptiles and amphibians.
- Chamise-redshank chaparral. Nearly pure stands of chamise or redshank. Wildlife species associated with this chaparral are similar to those associated with sagebrush and coastal sage scrub.
- Coastal sage scrub. Found at elevations below 2,500 feet in climates with mild temperatures and maritime influence. Shrubs are knee high with soft flexible leaves that are often drought deciduous (they lose their leaves during the summer dry season). Common species include California sagebrush, brittle-bush, California buckwheat, and various types of sage. Topanga Elementary Charter School at

22075 Topanga School Road is adjacent to Topanga State Park. Vegetation types in the state park immediately north of the school include coastal oak woodland and annual grassland.

- Coastal oak woodland. Occurs on flat to steep slopes that are often facing northwest at low elevations between 105 to 2,851 feet. It is dominated by coast live oak in the tree layer with various species of shrubs and annual grassland in the understory layer.
- Annual grassland. Introduced annual grasses, including wild oats, soft chess, red brome, wild barley, true clovers, and many others. Remnants of native plants and grasses are also found in this habitat, including California poppy, purple needlegrass, and Idaho fescue. Characteristic wildlife associated with annual grassland include the western fence lizard, common garter snake, and western rattlesnake, California ground squirrel, California vole, badger, coyote, burrowing owl, short-eared owl, and western meadowlark.

Significant ecological areas in the District can be found on Figure 4-43.

## *Figure 4-43 LAUSD – Significant Ecological Areas*




Source: LAUSD School Upgrade Program EIR 2015

## Special Status Species

To further understand natural resources that may be particularly vulnerable to a hazard event, as well as those that need consideration when implementing mitigation activities, it is important to identify at-risk species (i.e., endangered species) in the Planning Area. An endangered species is any species of fish, plant life, or wildlife that is in danger of extinction throughout all or most of its range. A threatened species is a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Both endangered and threatened species are protected by law and any future hazard mitigation projects are subject to these laws. Candidate species are plants and animals that have been proposed as endangered or threatened but are not currently listed.

The California Natural Diversity Database, a program that inventories the status and locations of rare plants and animals in California, was queried to create an inventory of special status species in Los Angeles County and potentially in the LAUSD Planning Area. Table 4-48 lists the name, federal status, state status, California Department of Fish and Wildlife status, and the California Rare Plant rank of species in Los Angeles County. SUMMARY TABLE IN NEXT ITERATION

### *Table 4-48 Special Status Species in Los Angeles County*

| Scientific Name | Common Name | Federal Status | State Status | CDFW Status | CA Rare Plant Rank |
|---|---|---|---|---|---|
| **Animals – Amphibians** | | | | | |
| *Anaxyrus californicus* | arroyo toad | Endangered | None | SSC | - |
| *Batrachoseps gabrieli* | San Gabriel slender salamander | None | None | - | - |
| *Ensatina eschscholtzii croceator* | yellow-blotched salamander | None | None | WL | - |
| *Ensatina klauberi* | large-blotched salamander | None | None | WL | - |
| *Rana boylii* | foothill yellow-legged frog | None | Candidate Threatened | SSC | - |
| *Rana draytonii* | California red-legged frog | Threatened | None | SSC | - |
| *Rana muscosa* | southern mountain yellow-legged frog | Endangered | Endangered | WL | - |
| *Taricha torosa* | Coast Range newt | None | None | SSC | - |
| *Spea hammondii* | western spadefoot | None | None | SSC | - |
| **Animals – Arachnids** | | | | | |
| *Socalchemmis gertschi* | Gertsch's socalchemmis spider | None | None | - | - |
| **Animals - Birds** | | | | | |
| *Accipiter cooperii* | Cooper's hawk | None | None | WL | - |
| *Accipiter gentilis* | northern goshawk | None | None | SSC | - |
| *Accipiter striatus* | sharp-shinned hawk | None | None | WL | - |
| *Aquila chrysaetos* | golden eagle | None | None | FP; WL | - |
| *Buteo regalis* | ferruginous hawk | None | None | WL | - |

| Scientific Name | Common Name | Federal Status | State Status | CDFW Status | CA Rare Plant Rank |
|---|---|---|---|---|---|
| *Buteo swainsoni* | Swainson's hawk | None | Threatened | - | - |
| *Circus cyaneus* | northern harrier | None | None | SSC | - |
| *Elanus leucurus* | white-tailed kite | None | None | FP | - |
| *Haliaeetus leucocephalus* | bald eagle | Delisted | Endangered | FP | - |
| *Pandion haliaetus* | osprey | None | None | WL | - |
| *Eremophila alpestris actia* | California horned lark | None | None | WL | - |
| *Cerorhinca monocerata* | rhinoceros auklet | None | None | WL | - |
| *Fratercula cirrhata* | tufted puffin | None | None | SSC | - |
| *Ptychoramphus aleuticus* | Cassin's auklet | None | None | SSC | - |
| *Synthliboramphus scrippsi* | Scripps's murrelet | Candidate | Threatened | - | - |
| *Aythya americana* | redhead | None | None | SSC | - |
| *Aythya valisineria* | canvasback | None | None | - | - |
| *Branta bernicla* | brant | None | None | SSC | - |
| *Dendrocygna bicolor* | fulvous whistling-duck | None | None | SSC | - |
| *Chaetura vauxi* | Vaux's swift | None | None | SSC | - |
| *Cypseloides niger* | black swift | None | None | SSC | - |
| *Ardea alba* | great egret | None | None | - | - |
| *Ardea herodias* | great blue heron | None | None | - | - |
| *Botaurus lentiginosus* | American bittern | None | None | - | - |
| *Egretta thula* | snowy egret | None | None | - | - |
| *Ixobrychus exilis* | least bittern | None | None | SSC | - |
| *Nycticorax nycticorax* | black-crowned night heron | None | None | - | - |
| *Cardinalis cardinalis* | northern cardinal | None | None | WL | - |
| *Piranga rubra* | summer tanager | None | None | SSC | - |
| *Gymnogyps californianus* | California condor | Endangered | Endangered | FP | - |
| *Charadrius alexandrinus nivosus* | western snowy plover | Threatened | None | SSC | - |
| *Charadrius montanus* | mountain plover | None | None | SSC | - |
| *Mycteria americana* | wood stork | None | None | SSC | - |
| *Pica nuttalli* | yellow-billed magpie | None | None | - | - |
| *Coccyzus americanus occidentalis* | western yellow-billed cuckoo | Threatened | Endangered | - | - |
| *Phoebastria albatrus* | short-tailed albatross | Endangered | None | SSC | - |
| *Aimophila ruficeps canescens* | southern California rufous-crowned sparrow | None | None | WL | - |
| *Aimophila ruficeps obscura* | Santa Cruz Island rufous-crowned sparrow | None | None | SSC | - |
| *Ammodramus savannarum* | grasshopper sparrow | None | None | SSC | - |
| *Artemisiospiza belli belli* | Bell's sage sparrow | None | None | WL | - |

| Scientific Name | Common Name | Federal Status | State Status | CDFW Status | CA Rare Plant Rank |
|---|---|---|---|---|---|
| *Artemisiospiza belli clementeae* | San Clemente sage sparrow | Threatened | None | SSC | - |
| *Junco hyemalis caniceps* | gray-headed junco | None | None | WL | - |
| *Melospiza melodia graminea* | Channel Island song sparrow | None | None | SSC | - |
| *Passerculus sandwichensis alaudinus* | Bryant's savannah sparrow | None | None | SSC | - |
| *Passerculus sandwichensis beldingi* | Belding's savannah sparrow | None | Endangered | - | - |
| *Passerculus sandwichensis rostratus* | large-billed savannah sparrow | None | None | SSC | - |
| *Pipilo maculatus clementae* | San Clemente spotted towhee | None | None | SSC | - |
| *Pooecetes gramineus affinis* | Oregon vesper sparrow | None | None | SSC | - |
| *Spizella breweri* | Brewer's sparrow | None | None | - | - |
| *Falco columbarius* | merlin | None | None | WL | - |
| *Falco mexicanus* | prairie falcon | None | None | WL | - |
| *Falco peregrinus anatum* | American peregrine falcon | Delisted | Delisted | FP | - |
| *Spinus lawrencei* | Lawrence's goldfinch | None | None | - | - |
| *Gavia immer* | common loon | None | None | SSC | - |
| *Grus canadensis canadensis* | lesser sandhill crane | None | None | SSC | - |
| *Grus canadensis tabida* | greater sandhill crane | None | Threatened | FP | - |
| *Progne subis* | purple martin | None | None | SSC | - |
| *Riparia riparia* | bank swallow | None | Threatened | - | - |
| *Oceanodroma furcata* | fork-tailed storm-petrel | None | None | SSC | - |
| *Oceanodroma homochroa* | ashy storm-petrel | None | None | SSC | - |
| *Oceanodroma melania* | black storm-petrel | None | None | SSC | - |
| *Agelaius tricolor* | tricolored blackbird | None | Candidate Endangered | SSC | - |
| *Xanthocephalus xanthocephalus* | yellow-headed blackbird | None | None | SSC | - |
| *Lanius ludovicianus* | loggerhead shrike | None | None | SSC | - |
| *Lanius ludovicianus anthonyi* | Island loggerhead shrike | None | None | SSC | - |
| *Lanius ludovicianus mearnsi* | San Clemente loggerhead shrike | Endangered | None | SSC | - |
| *Chlidonias niger* | black tern | None | None | SSC | - |
| *Hydroprogne caspia* | Caspian tern | None | None | - | - |
| *Larus californicus* | California gull | None | None | WL | - |
| *Sternula antillarum browni* | California least tern | Endangered | Endangered | FP | - |
| *Thalasseus elegans* | elegant tern | None | None | WL | - |
| *Toxostoma bendirei* | Bendire's thrasher | None | None | SSC | - |
| *Toxostoma lecontei* | Le Conte's thrasher | None | None | SSC | - |

| Scientific Name | Common Name | Federal Status | State Status | CDFW Status | CA Rare Plant Rank |
|---|---|---|---|---|---|
| *Callipepla californica catalinensis* | Catalina California quail | None | None | SSC | - |
| *Baeolophus inornatus* | oak titmouse | None | None | - | - |
| *Icteria virens* | yellow-breasted chat | None | None | SSC | - |
| *Setophaga petechia* | yellow warbler | None | None | SSC | - |
| *Pelecanus erythrorhynchos* | American white pelican | None | None | SSC | - |
| *Pelecanus occidentalis californicus* | California brown pelican | Delisted | Delisted | FP | - |
| *Phalacrocorax auritus* | double-crested cormorant | None | None | WL | - |
| *Melanerpes lewis* | Lewis' woodpecker | None | None | - | - |
| *Sphyrapicus ruber* | red-breasted sapsucker | None | None | - | - |
| *Coturnicops noveboracensis* | yellow rail | None | None | SSC | - |
| *Laterallus jamaicensis coturniculus* | California black rail | None | Threatened | FP | - |
| *Rallus obsoletus levipes* | light-footed Ridgway's rail | Endangered | Endangered | FP | - |
| *Rallus obsoletus obsoletus* | California Ridgway's rail | Endangered | Endangered | FP | - |
| *Numenius americanus* | long-billed curlew | None | None | WL | - |
| *Asio flammeus* | short-eared owl | None | None | SSC | - |
| *Asio otus* | long-eared owl | None | None | SSC | - |
| *Athene cunicularia* | burrowing owl | None | None | SSC | - |
| *Psiloscops flammeolus* | flammulated owl | None | None | - | - |
| *Strix occidentalis occidentalis* | California spotted owl | None | None | SSC | - |
| *Polioptila californica californica* | coastal California gnatcatcher | Threatened | None | SSC | - |
| *Polioptila melanura* | black-tailed gnatcatcher | None | None | WL | - |
| *Plegadis chihi* | white-faced ibis | None | None | WL | - |
| *Calypte costae* | Costa's hummingbird | None | None | - | - |
| *Selasphorus rufus* | rufous hummingbird | None | None | - | - |
| *Campylorhynchus brunneicapillus sandiegensis* | coastal cactus wren | None | None | SSC | - |
| *Cistothorus palustris clarkae* | Clark's marsh wren | None | None | SSC | - |
| *Thryomanes bewickii leucophrys* | San Clemente Bewick's wren | None | None | SSC | - |
| *Contopus cooperi* | olive-sided flycatcher | None | None | SSC | - |
| *Empidonax traillii* | willow flycatcher | None | Endangered | - | - |
| *Empidonax traillii extimus* | southwestern willow flycatcher | Endangered | Endangered | - | - |
| *Pyrocephalus rubinus* | vermilion flycatcher | None | None | SSC | - |
| *Vireo bellii pusillus* | least Bell's vireo | Endangered | Endangered | - | - |
| *Vireo huttoni unitti* | Catalina Hutton's vireo | None | None | SSC | - |
| *Vireo vicinior* | gray vireo | None | None | SSC | - |

| Scientific Name | Common Name | Federal Status | State Status | CDFW Status | CA Rare Plant Rank |
|---|---|---|---|---|---|
| **Animals – Crustaceans** | | | | | |
| *Branchinecta lynchi* | vernal pool fairy shrimp | Threatened | None | - | - |
| *Streptocephalus woottoni* | Riverside fairy shrimp | Endangered | None | - | - |
| **Animals – Fish** | | | | | |
| *Catostomus santaanae* | Santa Ana sucker | Threatened | None | - | - |
| *Gila orcuttii* | arroyo chub | None | None | SSC | - |
| *Rhinichthys osculus ssp. 3* | Santa Ana speckled dace | None | None | SSC | - |
| *Siphateles bicolor mohavensis* | Mohave tui chub | Endangered | Endangered | FP | - |
| *Gasterosteus aculeatus microcephalus* | resident threespine stickleback | None | None | - | - |
| *Gasterosteus aculeatus williamsoni* | unarmored threespine stickleback | Endangered | Endangered | FP | - |
| *Eucyclogobius newberryi* | tidewater goby | Endangered | None | SSC | - |
| *Stereolepis gigas* | giant sea bass | None | None | - | - |
| *Oncorhynchus mykiss irideus pop. 10* | steelhead - southern California DPS | Endangered | None | - | - |
| **Animals – Insects** | | | | | |
| *Trimerotropis occidentiloides* | Santa Monica grasshopper | None | None | - | - |
| *Bombus crotchii* | Crotch bumble bee | None | None | - | - |
| *Bombus morrisoni* | Morrison bumble bee | None | None | - | - |
| *Cicindela gabbii* | western tidal-flat tiger beetle | None | None | - | - |
| *Cicindela hirticollis gravida* | sandy beach tiger beetle | None | None | - | - |
| *Cicindela latesignata latesignata* | western beach tiger beetle | None | None | - | - |
| *Cicindela senilis frosti* | senile tiger beetle | None | None | - | - |
| *Ceratochrysis longimala* | Desert cuckoo wasp | None | None | - | - |
| *Carolella busckana* | Busck's gallmoth | None | None | - | - |
| *Onychobaris langei* | Lange's El Segundo Dune weevil | None | None | - | - |
| *Trigonoscuta dorothea dorothea* | Dorothy's El Segundo Dune weevil | None | None | - | - |
| *Atractelmis wawona* | Wawona riffle beetle | None | None | - | - |
| *Panoquina errans* | wandering (=saltmarsh) skipper | None | None | - | - |
| *Diplectrona californica* | California diplectronan caddisfly | None | None | - | - |
| *Callophrys mossii hidakupa* | San Gabriel Mountains elfin butterfly | None | None | - | - |
| *Euphilotes battoides allyni* | El Segundo blue butterfly | Endangered | None | - | - |

| Scientific Name | Common Name | Federal Status | State Status | CDFW Status | CA Rare Plant Rank |
|---|---|---|---|---|---|
| *Glaucopsyche lygdamus palosverdesensis* | Palos Verdes blue butterfly | Endangered | None | - | - |
| *Plebejus saepiolus aureolus* | San Gabriel Mountains blue butterfly | None | None | - | - |
| *Plebulina emigdionis* | San Emigdio blue butterfly | None | None | - | - |
| *Rhaphiomidas terminatus terminatus* | El Segundo flower-loving fly | None | None | - | - |
| *Danaus plexippus pop. 1* | monarch - California overwintering population | None | None | - | - |
| *Euphydryas editha quino* | quino checkerspot butterfly | Endangered | None | - | - |
| *Coenonycha clementina* | San Clemente Island coenonycha beetle | None | None | - | - |
| *Brennania belkini* | Belkin's dune tabanid fly | None | None | - | - |
| *Coelus globosus* | globose dune beetle | None | None | - | - |
| *Aglaothorax longipennis* | Santa Monica shieldback katydid | None | None | - | - |
| *Eucosma hennei* | Henne's eucosman moth | None | None | - | - |
| **Animals – Mammals** | | | | | |
| *Ovis canadensis nelsoni* | desert bighorn sheep | None | None | FP | - |
| *Urocyon littoralis catalinae* | Santa Catalina Island fox | Threatened | Threatened | - | - |
| *Urocyon littoralis clementae* | San Clemente Island fox | None | Threatened | - | - |
| *Chaetodipus californicus femoralis* | Dulzura pocket mouse | None | None | SSC | - |
| *Chaetodipus fallax fallax* | northwestern San Diego pocket mouse | None | None | SSC | - |
| *Chaetodipus fallax pallidus* | pallid San Diego pocket mouse | None | None | SSC | - |
| *Dipodomys merriami parvus* | San Bernardino kangaroo rat | Endangered | None | SSC | - |
| *Perognathus alticolus inexpectatus* | Tehachapi pocket mouse | None | None | SSC | - |
| *Perognathus inornatus* | San Joaquin Pocket Mouse | None | None | - | - |
| *Perognathus longimembris brevinasus* | Los Angeles pocket mouse | None | None | SSC | - |
| *Perognathus longimembris pacificus* | Pacific pocket mouse | Endangered | None | SSC | - |
| *Lepus californicus bennettii* | San Diego black-tailed jackrabbit | None | None | SSC | - |
| *Eumops perotis californicus* | western mastiff bat | None | None | SSC | - |
| *Nyctinomops femorosaccus* | pocketed free-tailed bat | None | None | SSC | - |
| *Nyctinomops macrotis* | big free-tailed bat | None | None | SSC | - |
| *Microtus californicus stephensi* | south coast marsh vole | None | None | SSC | - |

| Scientific Name | Common Name | Federal Status | State Status | CDFW Status | CA Rare Plant Rank |
|---|---|---|---|---|---|
| *Neotoma lepida intermedia* | San Diego desert woodrat | None | None | SSC | - |
| *Onychomys torridus ramona* | southern grasshopper mouse | None | None | SSC | - |
| *Peromyscus maniculatus clementis* | San Clemente deer mouse | None | None | SSC | - |
| *Enhydra lutris nereis* | southern sea otter | Threatened | None | FP | - |
| *Taxidea taxus* | American badger | None | None | SSC | - |
| *Arctocephalus townsendi* | Guadalupe fur-seal | Threatened | Threatened | FP | - |
| *Macrotus californicus* | California leaf-nosed bat | None | None | SSC | - |
| *Ammospermophilus nelsoni* | Nelson's antelope squirrel | None | Threatened | - | - |
| *Neotamias speciosus speciosus* | lodgepole chipmunk | None | None | - | - |
| *Xerospermophilus mohavensis* | Mohave ground squirrel | None | Threatened | - | - |
| *Sorex ornatus salicornicus* | southern California saltmarsh shrew | None | None | SSC | - |
| *Sorex ornatus willetti* | Santa Catalina shrew | None | None | SSC | - |
| *Antrozous pallidus* | pallid bat | None | None | SSC | - |
| *Corynorhinus townsendii* | Townsend's big-eared bat | None | None | SSC | - |
| *Euderma maculatum* | spotted bat | None | None | SSC | - |
| *Lasionycteris noctivagans* | silver-haired bat | None | None | - | - |
| *Lasiurus blossevillii* | western red bat | None | None | SSC | - |
| *Lasiurus cinereus* | hoary bat | None | None | - | - |
| *Lasiurus xanthinus* | western yellow bat | None | None | SSC | - |
| *Myotis ciliolabrum* | western small-footed myotis | None | None | - | - |
| *Myotis evotis* | long-eared myotis | None | None | - | - |
| *Myotis thysanodes* | fringed myotis | None | None | - | - |
| *Myotis velifer* | cave myotis | None | None | SSC | - |
| *Myotis volans* | long-legged myotis | None | None | - | - |
| *Myotis yumanensis* | Yuma myotis | None | None | - | - |
| **Animals – Mollusks** | | | | | |
| *Haliotis corrugata* | pink abalone | None | None | - | - |
| *Haliotis cracherodii* | black abalone | Endangered | None | - | - |
| *Haliotis fulgens* | green abalone | None | None | - | - |
| *Haplotrema catalinense* | Santa Catalina lancetooth | None | None | - | - |
| *Micrarionta gabbi* | San Clemente islandsnail | None | None | - | - |
| *Xerarionta intercisa* | horseshoe snail | None | None | - | - |
| *Xerarionta redimita* | wreathed cactussnail | None | None | - | - |
| *Tryonia imitator* | mimic tryonia (=California brackishwater snail) | None | None | - | - |
| *Radiocentrum avalonense* | Catalina mountainsnail | None | None | - | - |

| Scientific Name | Common Name | Federal Status | State Status | CDFW Status | CA Rare Plant Rank |
|---|---|---|---|---|---|
| *Sterkia clementina* | San Clemente Island blunt-top snail | None | None | - | - |
| *Gonidea angulata* | western ridged mussel | None | None | - | - |
| *Pristiloma shepardae* | Shepard's snail | None | None | - | - |
| **Animals – Reptiles** | | | | | |
| *Anniella pulchra* | northern California legless lizard | None | None | SSC | - |
| *Anniella sp.* | California legless lizard | None | None | SSC | - |
| *Anniella stebbinsi* | southern California legless lizard | None | None | SSC | - |
| *Chelonia mydas* | green sea turtle | Threatened | None | - | - |
| *Arizona elegans occidentalis* | California glossy snake | None | None | SSC | - |
| *Diadophis punctatus modestus* | San Bernardino ringneck snake | None | None | - | - |
| *Lampropeltis zonata (parvirubra)* | California mountain kingsnake (San Bernardino population) | None | None | WL | - |
| *Lampropeltis zonata (pulchra)* | California mountain kingsnake (San Diego population) | None | None | WL | - |
| *Salvadora hexalepis virgultea* | coast patch-nosed snake | None | None | SSC | - |
| *Emys marmorata* | western pond turtle | None | None | SSC | - |
| *Thamnophis hammondii* | two-striped gartersnake | None | None | SSC | - |
| *Thamnophis hammondii ssp.* | Santa Catalina gartersnake | None | None | - | - |
| *Thamnophis sirtalis ssp.* | south coast gartersnake | None | None | SSC | - |
| *Phrynosoma blainvillii* | coast horned lizard | None | None | SSC | - |
| *Uma scoparia* | Mojave fringe-toed lizard | None | None | SSC | - |
| *Plestiodon skiltonianus interparietalis* | Coronado skink | None | None | WL | - |
| *Aspidoscelis hyperythra* | orange-throated whiptail | None | None | WL | - |
| *Aspidoscelis tigris stejnegeri* | coastal whiptail | None | None | SSC | - |
| *Gopherus agassizii* | desert tortoise | Threatened | Threatened | - | - |
| *Crotalus ruber* | red-diamond rattlesnake | None | None | SSC | - |
| *Xantusia riversiana* | island night lizard | Delisted | None | - | - |
| **Community – Aquatic** | | | | | |
| – | Southern California Arroyo Chub/Santa Ana Sucker Stream | Southern California Arroyo Chub/Santa Ana Sucker Stream | None | None | - |

| Scientific Name | Common Name | Federal Status | State Status | CDFW Status | CA Rare Plant Rank |
|---|---|---|---|---|---|
| – | Southern California Coastal Lagoon | Southern California Coastal Lagoon | None | None | - |
| – | Southern California Steelhead Stream | Southern California Steelhead Stream | None | None | - |
| – | Southern California Threespine Stickleback Stream | Southern California Threespine Stickleback Stream | None | None | - |
| **Community – Terrestrial** | | | | | |
| – | California Walnut Woodland | California Walnut Woodland | None | None | - |
| – | Canyon Live Oak Ravine Forest | Canyon Live Oak Ravine Forest | None | None | - |
| – | Island Cherry Forest | Island Cherry Forest | None | None | - |
| – | Island Ironwood Forest | Island Ironwood Forest | None | None | - |
| – | Mainland Cherry Forest | Mainland Cherry Forest | None | None | - |
| – | Maritime Succulent Scrub | Maritime Succulent Scrub | None | None | - |
| – | Mojave Riparian Forest | Mojave Riparian Forest | None | None | - |
| – | Open Engelmann Oak Woodland | Open Engelmann Oak Woodland | None | None | - |
| – | Riversidian Alluvial Fan Sage Scrub | Riversidian Alluvial Fan Sage Scrub | None | None | - |
| – | Southern Coast Live Oak Riparian Forest | Southern Coast Live Oak Riparian Forest | None | None | - |
| – | Southern Coastal Bluff Scrub | Southern Coastal Bluff Scrub | None | None | - |
| – | Southern Coastal Salt Marsh | Southern Coastal Salt Marsh | None | None | - |

| Scientific Name | Common Name | Federal Status | State Status | CDFW Status | CA Rare Plant Rank |
|---|---|---|---|---|---|
| – | Southern Cottonwood Willow Riparian Forest | Southern Cottonwood Willow Riparian Forest | None | None | - |
| – | Southern Dune Scrub | Southern Dune Scrub | None | None | - |
| – | Southern Foredunes | Southern Foredunes | None | None | - |
| – | Southern Mixed Riparian Forest | Southern Mixed Riparian Forest | None | None | - |
| – | Southern Riparian Forest | Southern Riparian Forest | None | None | - |
| – | Southern Riparian Scrub | Southern Riparian Scrub | None | None | - |
| – | Southern Sycamore Alder Riparian Woodland | Southern Sycamore Alder Riparian Woodland | None | None | - |
| – | Southern Willow Scrub | Southern Willow Scrub | None | None | - |
| – | Valley Needlegrass Grassland | Valley Needlegrass Grassland | None | None | - |
| – | Valley Oak Woodland | Valley Oak Woodland | None | None | - |
| – | Walnut Forest | Walnut Forest | None | None | - |
| – | Wildflower Field | Wildflower Field | None | None | - |
| **Plants – Bryophytes** | | | | | |
| *Anomobryum julaceum* | slender silver moss | None | None | - | 4.2 |
| *Tortula californica* | California screw moss | None | None | - | 1B.2 |
| **Plants – Lichens** | | | | | |
| *Texosporium sancti-jacobi* | woven-spored lichen | None | None | - | 3 |
| *Graphis saxorum* | Baja rock lichen | None | None | - | 3 |
| **Plants – Vascular** | | | | | |
| *Allium howellii var. clokeyi* | Mt. Pinos onion | None | None | - | 1B.3 |
| *Amaranthus watsonii* | Watson's amaranth | None | None | - | 4.3 |
| *Cymopterus deserticola* | desert cymopterus | None | None | - | 1B.2 |
| *Eryngium aristulatum var. parishii* | San Diego button-celery | Endangered | Endangered | - | 1B.1 |
| *Lomatium insulare* | San Nicolas Island lomatium | None | None | - | 1B.2 |

| Scientific Name | Common Name | Federal Status | State Status | CDFW Status | CA Rare Plant Rank |
|---|---|---|---|---|---|
| *Oreonana vestita* | woolly mountain-parsley | None | None | - | 1B.3 |
| *Perideridia pringlei* | adobe yampah | None | None | - | 4.3 |
| *Spermolepis lateriflora* | western bristly scaleseed | None | None | - | 2A |
| *Asplenium vespertinum* | western spleenwort | None | None | - | 4.2 |
| *Artemisia nesiotica* | island sagebrush | None | None | - | 4.3 |
| *Baccharis malibuensis* | Malibu baccharis | None | None | - | 1B.1 |
| *Baccharis plummerae ssp. plummerae* | Plummer's baccharis | None | None | - | 4.3 |
| *Centromadia parryi ssp. australis* | southern tarplant | None | None | - | 1B.1 |
| *Centromadia pungens ssp. laevis* | smooth tarplant | None | None | - | 1B.1 |
| *Chaenactis glabriuscula var. orcuttiana* | Orcutt's pincushion | None | None | - | 1B.1 |
| *Cirsium occidentale var. compactum* | compact cobwebby thistle | None | None | - | 1B.2 |
| *Constancea nevinii* | Nevin's woolly sunflower | None | None | - | 1B.3 |
| *Deinandra clementina* | island tarplant | None | None | - | 4.3 |
| *Deinandra minthornii* | Santa Susana tarplant | None | Rare | - | 1B.2 |
| *Deinandra paniculata* | paniculate tarplant | None | None | - | 4.2 |
| *Erigeron breweri var. jacinteus* | San Jacinto Mountains daisy | None | None | - | 4.3 |
| *Eriophyllum mohavense* | Barstow woolly sunflower | None | None | - | 1B.2 |
| *Hazardia cana* | San Clemente Island hazardia | None | None | - | 1B.2 |
| *Helianthus inexpectatus* | Newhall sunflower | None | None | - | 1B.1 |
| *Helianthus nuttallii ssp. parishii* | Los Angeles sunflower | None | None | - | 1A |
| *Hulsea vestita ssp. gabrielensis* | San Gabriel Mountains hulsea | None | None | - | 4.3 |
| *Hulsea vestita ssp. parryi* | Parry's hulsea | None | None | - | 4.3 |
| *Isocoma menziesii var. decumbens* | decumbent goldenbush | None | None | - | 1B.2 |
| *Lasthenia glabrata ssp. coulteri* | Coulter's goldfields | None | None | - | 1B.1 |
| *Malacothrix foliosa ssp. foliosa* | leafy malacothrix | None | None | - | 4.2 |
| *Microseris douglasii ssp. platycarpha* | small-flowered microseris | None | None | - | 4.2 |
| *Microseris sylvatica* | sylvan microseris | None | None | - | 4.2 |
| *Munzothamnus blairii* | Blair's munzothamnus | None | None | - | 1B.2 |
| *Packera ionophylla* | Tehachapi ragwort | None | None | - | 4.3 |
| *Pentachaeta lyonii* | Lyon's pentachaeta | Endangered | Endangered | - | 1B.1 |
| *Pseudognaphalium leucocephalum* | white rabbit-tobacco | None | None | - | 2B.2 |
| *Senecio aphanactis* | chaparral ragwort | None | None | - | 2B.2 |
| *Senecio astephanus* | San Gabriel ragwort | None | None | - | 4.3 |
| *Stylocline masonii* | Mason's neststraw | None | None | - | 1B.1 |

| Scientific Name | Common Name | Federal Status | State Status | CDFW Status | CA Rare Plant Rank |
|---|---|---|---|---|---|
| *Symphyotrichum defoliatum* | San Bernardino aster | None | None | - | 1B.2 |
| *Symphyotrichum greatae* | Greata's aster | None | None | - | 1B.3 |
| *Syntrichopappus lemmonii* | Lemmon's syntrichopappus | None | None | - | 4.3 |
| *Berberis nevinii* | Nevin's barberry | Endangered | Endangered | - | 1B.1 |
| *Cryptantha clokeyi* | Clokey's cryptantha | None | None | - | 1B.2 |
| *Cryptantha traskiae* | Trask's cryptantha | None | None | - | 1B.1 |
| *Cryptantha wigginsii* | Wiggins' cryptantha | None | None | - | 1B.2 |
| *Harpagonella palmeri* | Palmer's grapplinghook | None | None | - | 4.2 |
| *Plagiobothrys parishii* | Parish's popcornflower | None | None | - | 1B.1 |
| *Dithyrea maritima* | beach spectaclepod | None | Threatened | - | 1B.1 |
| *Erysimum insulare* | island wallflower | None | None | - | 1B.3 |
| *Erysimum suffrutescens* | suffrutescent wallflower | None | None | - | 4.2 |
| *Lepidium virginicum var. robinsonii* | Robinson's pepper-grass | None | None | - | 4.3 |
| *Nasturtium gambelii* | Gambel's water cress | Endangered | Threatened | - | 1B.1 |
| *Sibara filifolia* | Santa Cruz Island winged-rockcress | Endangered | None | - | 1B.1 |
| *Thysanocarpus rigidus* | rigid fringepod | None | None | - | 1B.2 |
| *Bergerocactus emoryi* | golden-spined cereus | None | None | - | 2B.2 |
| *Opuntia basilaris var. brachyclada* | short-joint beavertail | None | None | - | 1B.2 |
| *Nemacladus secundiflorus var. robbinsii* | Robbins' nemacladus | None | None | - | 1B.2 |
| *Lonicera subspicata var. subspicata* | Santa Barbara honeysuckle | None | None | - | 1B.2 |
| *Arenaria paludicola* | marsh sandwort | Endangered | Endangered | - | 1B.1 |
| *Loeflingia squarrosa var. artemisiarum* | sagebrush loeflingia | None | None | - | 2B.2 |
| *Aphanisma blitoides* | aphanisma | None | None | - | 1B.2 |
| *Atriplex coulteri* | Coulter's saltbush | None | None | - | 1B.2 |
| *Atriplex pacifica* | south coast saltscale | None | None | - | 1B.2 |
| *Atriplex parishii* | Parish's brittlescale | None | None | - | 1B.1 |
| *Atriplex serenana var. davidsonii* | Davidson's saltscale | None | None | - | 1B.2 |
| *Chenopodium littoreum* | coastal goosefoot | None | None | - | 1B.2 |
| *Suaeda esteroa* | estuary seablite | None | None | - | 1B.2 |
| *Suaeda taxifolia* | woolly seablite | None | None | - | 4.2 |
| *Crocanthemum greenei* | island rush-rose | Threatened | None | - | 1B.2 |
| *Calystegia felix* | lucky morning-glory | None | None | - | 1B.1 |

| Scientific Name | Common Name | Federal Status | State Status | CDFW Status | CA Rare Plant Rank |
|---|---|---|---|---|---|
| *Calystegia macrostegia ssp. amplissima* | island morning-glory | None | None | - | 4.3 |
| *Calystegia peirsonii* | Peirson's morning-glory | None | None | - | 4.2 |
| *Convolvulus simulans* | small-flowered morning-glory | None | None | - | 4.2 |
| *Dichondra occidentalis* | western dichondra | None | None | - | 4.2 |
| *Dudleya blochmaniae ssp. blochmaniae* | Blochman's dudleya | None | None | - | 1B.1 |
| *Dudleya cymosa ssp. agourensis* | Agoura Hills dudleya | Threatened | None | - | 1B.2 |
| *Dudleya cymosa ssp. crebrifolia* | San Gabriel River dudleya | None | None | - | 1B.2 |
| *Dudleya cymosa ssp. marcescens* | marcescent dudleya | Threatened | Rare | - | 1B.2 |
| *Dudleya cymosa ssp. ovatifolia* | Santa Monica dudleya | Threatened | None | - | 1B.1 |
| *Dudleya densiflora* | San Gabriel Mountains dudleya | None | None | - | 1B.1 |
| *Dudleya multicaulis* | many-stemmed dudleya | None | None | - | 1B.2 |
| *Dudleya virens ssp. hassei* | Catalina Island dudleya | None | None | - | 1B.2 |
| *Dudleya virens ssp. insularis* | island green dudleya | None | None | - | 1B.2 |
| *Dudleya virens ssp. virens* | bright green dudleya | None | None | - | 1B.2 |
| *Crossosoma californicum* | Catalina crossosoma | None | None | - | 1B.2 |
| *Cuscuta obtusiflora var. glandulosa* | Peruvian dodder | None | None | - | 2B.2 |
| *Carex occidentalis* | western sedge | None | None | - | 2B.3 |
| *Cladium californicum* | California saw-grass | None | None | - | 2B.2 |
| *Fimbristylis thermalis* | hot springs fimbristylis | None | None | - | 2B.2 |
| *Arctostaphylos catalinae* | Santa Catalina Island manzanita | None | None | - | 1B.2 |
| *Arctostaphylos crustacea ssp. subcordata* | Santa Cruz Island manzanita | None | None | - | 4.2 |
| *Arctostaphylos gabilanensis* | Gabilan Mountains manzanita | None | None | - | 1B.2 |
| *Arctostaphylos glandulosa ssp. gabrielensis* | San Gabriel manzanita | None | None | - | 1B.2 |
| *Arctostaphylos parryana ssp. tumescens* | interior manzanita | None | None | - | 4.3 |
| *Euphorbia misera* | cliff spurge | None | None | - | 2B.2 |
| *Acmispon argophyllus var. adsurgens* | San Clemente Island bird's-foot trefoil | None | Endangered | - | 1B.1 |
| *Acmispon dendroideus var. dendroideus* | island broom | None | None | - | 4.2 |
| *Acmispon dendroideus var. traskiae* | San Clemente Island lotus | Threatened | Endangered | - | 1B.3 |
| *Astragalus bicristatus* | crested milk-vetch | None | None | - | 4.3 |

| Scientific Name | Common Name | Federal Status | State Status | CDFW Status | CA Rare Plant Rank |
|---|---|---|---|---|---|
| *Astragalus brauntonii* | Braunton's milk-vetch | Endangered | None | - | 1B.1 |
| *Astragalus lentiginosus var. antonius* | San Antonio milk-vetch | None | None | - | 1B.3 |
| *Astragalus leucolobus* | Big Bear Valley woollypod | None | None | - | 1B.2 |
| *Astragalus miguelensis* | San Miguel Island milk-vetch | None | None | - | 4.3 |
| *Astragalus nevinii* | San Clemente Island milk-vetch | None | None | - | 1B.2 |
| *Astragalus preussii var. laxiflorus* | Lancaster milk-vetch | None | None | - | 1B.1 |
| *Astragalus pycnostachyus var. lanosissimus* | Ventura Marsh milk-vetch | Endangered | Endangered | - | 1B.1 |
| *Astragalus tener var. titi* | coastal dunes milk-vetch | Endangered | Endangered | - | 1B.1 |
| *Lathyrus splendens* | pride-of-California | None | None | - | 4.3 |
| *Lupinus albifrons var. johnstonii* | interior bush lupine | None | None | - | 4.3 |
| *Lupinus elatus* | silky lupine | None | None | - | 4.3 |
| *Lupinus guadalupensis* | Guadalupe Island lupine | None | None | - | 4.2 |
| *Lupinus paynei* | Payne's bush lupine | None | None | - | 1B.1 |
| *Lupinus peirsonii* | Peirson's lupine | None | None | - | 1B.3 |
| *Oxytropis oreophila var. oreophila* | rock-loving oxytrope | None | None | - | 2B.3 |
| *Rupertia rigida* | Parish's rupertia | None | None | - | 4.3 |
| *Trifolium palmeri* | southern island clover | None | None | - | 4.2 |
| *Quercus dumosa* | Nuttall's scrub oak | None | None | - | 1B.1 |
| *Quercus durata var. gabrielensis* | San Gabriel oak | None | None | - | 4.2 |
| *Quercus engelmannii* | Engelmann oak | None | None | - | 4.2 |
| *Quercus pacifica* | island scrub oak | None | None | - | 4.2 |
| *Quercus tomentella* | island oak | None | None | - | 4.2 |
| *Frasera neglecta* | pine green-gentian | None | None | - | 4.3 |
| *Ribes divaricatum var. parishii* | Parish's gooseberry | None | None | - | 1A |
| *Ribes viburnifolium* | Santa Catalina Island currant | None | None | - | 1B.2 |
| *Phacelia floribunda* | many-flowered phacelia | None | None | - | 1B.2 |
| *Phacelia hubbyi* | Hubby's phacelia | None | None | - | 4.2 |
| *Phacelia mohavensis* | Mojave phacelia | None | None | - | 4.3 |
| *Phacelia ramosissima var. austrolitoralis* | south coast branching phacelia | None | None | - | 3.2 |
| *Phacelia stellaris* | Brand's star phacelia | None | None | - | 1B.1 |
| *Juglans californica* | southern California black walnut | None | None | - | 4.2 |
| *Juncus acutus ssp. leopoldii* | southwestern spiny rush | None | None | - | 4.2 |

| Scientific Name | Common Name | Federal Status | State Status | CDFW Status | CA Rare Plant Rank |
|---|---|---|---|---|---|
| *Juncus duranii* | Duran's rush | None | None | - | 4.3 |
| *Acanthomintha obovata ssp. cordata* | heart-leaved thorn-mint | None | None | - | 4.2 |
| *Clinopodium mimuloides* | monkey-flower savory | None | None | - | 4.2 |
| *Lepechinia fragrans* | fragrant pitcher sage | None | None | - | 4.2 |
| *Lepechinia rossii* | Ross' pitcher sage | None | None | - | 1B.2 |
| *Monardella australis ssp. cinerea* | gray monardella | None | None | - | 4.3 |
| *Monardella hypoleuca ssp. hypoleuca* | white-veined monardella | None | None | - | 1B.3 |
| *Monardella linoides ssp. oblonga* | Tehachapi monardella | None | None | - | 1B.3 |
| *Monardella macrantha ssp. hallii* | Hall's monardella | None | None | - | 1B.3 |
| *Monardella saxicola* | rock monardella | None | None | - | 4.2 |
| *Monardella viridis* | green monardella | None | None | - | 4.3 |
| *Scutellaria bolanderi ssp. austromontana* | southern mountains skullcap | None | None | - | 1B.2 |
| *Calochortus catalinae* | Catalina mariposa-lily | None | None | - | 4.2 |
| *Calochortus clavatus var. avius* | Pleasant Valley mariposa-lily | None | None | - | 1B.2 |
| *Calochortus clavatus var. clavatus* | club-haired mariposa-lily | None | None | - | 4.3 |
| *Calochortus clavatus var. gracilis* | slender mariposa-lily | None | None | - | 1B.2 |
| *Calochortus fimbriatus* | late-flowered mariposa-lily | None | None | - | 1B.3 |
| *Calochortus palmeri var. palmeri* | Palmer's mariposa-lily | None | None | - | 1B.2 |
| *Calochortus plummerae* | Plummer's mariposa-lily | None | None | - | 4.2 |
| *Calochortus striatus* | alkali mariposa-lily | None | None | - | 1B.2 |
| *Calochortus weedii var. intermedius* | intermediate mariposa-lily | None | None | - | 1B.2 |
| *Fritillaria pinetorum* | pine fritillary | None | None | - | 4.3 |
| *Lilium humboldtii ssp. humboldtii* | Humboldt lily | None | None | - | 4.2 |
| *Lilium humboldtii ssp. ocellatum* | ocellated humboldt lily | None | None | - | 4.2 |
| *Lilium parryi* | lemon lily | None | None | - | 1B.2 |
| *Lavatera assurgentiflora ssp. glabra* | southern island mallow | None | None | - | 1B.1 |
| *Malacothamnus clementinus* | San Clemente Island bush-mallow | Endangered | Endangered | - | 1B.1 |
| *Malacothamnus davidsonii* | Davidson's bush-mallow | None | None | - | 1B.2 |
| *Malacothamnus fasciculatus var. catalinensis* | Santa Catalina Island bush-mallow | None | None | - | 4.2 |
| *Sidalcea neomexicana* | salt spring checkerbloom | None | None | - | 2B.2 |
| *Calandrinia breweri* | Brewer's calandrinia | None | None | - | 4.2 |

| Scientific Name | Common Name | Federal Status | State Status | CDFW Status | CA Rare Plant Rank |
|---|---|---|---|---|---|
| *Cistanthe maritima* | seaside cistanthe | None | None | - | 4.2 |
| *Claytonia lanceolata var. peirsonii* | Peirson's spring beauty | None | None | - | 3.1 |
| *Lewisia brachycalyx* | short-sepaled lewisia | None | None | - | 2B.2 |
| *Nama stenocarpa* | mud nama | None | None | - | 2B.2 |
| *Abronia maritima* | red sand-verbena | None | None | - | 4.2 |
| *Camissoniopsis guadalupensis ssp. clementina* | San Clemente Island evening-primrose | None | None | - | 1B.2 |
| *Camissoniopsis lewisii* | Lewis' evening-primrose | None | None | - | 3 |
| *Clarkia xantiana ssp. parviflora* | Kern Canyon clarkia | None | None | - | 4.2 |
| *Botrychium crenulatum* | scalloped moonwort | None | None | - | 2B.2 |
| *Piperia cooperi* | chaparral rein orchid | None | None | - | 4.2 |
| *Castilleja gleasoni* | Mt. Gleason paintbrush | None | Rare | - | 1B.2 |
| *Castilleja grisea* | San Clemente Island paintbrush | Threatened | Endangered | - | 1B.3 |
| *Castilleja plagiotoma* | Mojave paintbrush | None | None | - | 4.3 |
| *Chloropyron maritimum ssp. maritimum* | salt marsh bird's-beak | Endangered | Endangered | - | 1B.2 |
| *Orobanche parishii ssp. brachyloba* | short-lobed broomrape | None | None | - | 4.2 |
| *Orobanche valida ssp. valida* | Rock Creek broomrape | None | None | - | 1B.2 |
| *Canbya candida* | white pygmy-poppy | None | None | - | 4.2 |
| *Dendromecon harfordii var. rhamnoides* | south island bush-poppy | None | None | - | 3.1 |
| *Eschscholzia ramosa* | island poppy | None | None | - | 4.3 |
| *Romneya coulteri* | Coulter's matilija poppy | None | None | - | 4.2 |
| *Parnassia cirrata var. cirrata* | San Bernardino grass-of-Parnassus | None | None | - | 1B.3 |
| *Diplacus johnstonii* | Johnston's monkeyflower | None | None | - | 4.3 |
| *Diplacus parviflorus* | island bush monkeyflower | None | None | - | 4.3 |
| *Diplacus traskiae* | Santa Catalina Island monkeyflower | None | None | - | 1A |
| *Erythranthe diffusa* | Palomar monkeyflower | None | None | - | 4.3 |
| *Gambelia speciosa* | showy island snapdragon | None | None | - | 1B.2 |
| *Dissanthelium californicum* | California dissanthelium | None | None | - | 1B.2 |
| *Hordeum intercedens* | vernal barley | None | None | - | 3.2 |
| *Imperata brevifolia* | California satintail | None | None | - | 2B.1 |
| *Muhlenbergia appressa* | appressed muhly | None | None | - | 2B.2 |
| *Muhlenbergia californica* | California muhly | None | None | - | 4.3 |

| Scientific Name | Common Name | Federal Status | State Status | CDFW Status | CA Rare Plant Rank |
|---|---|---|---|---|---|
| *Orcuttia californica* | California Orcutt grass | Endangered | Endangered | - | 1B.1 |
| *Puccinellia simplex* | California alkali grass | None | None | - | 1B.2 |
| *Eriastrum rosamondense* | Rosamond eriastrum | None | None | - | 1B.1 |
| *Gilia interior* | inland gilia | None | None | - | 4.3 |
| *Gilia latiflora ssp. cuyamensis* | Cuyama gilia | None | None | - | 4.3 |
| *Gilia nevinii* | Nevin's gilia | None | None | - | 4.3 |
| *Leptosiphon pygmaeus ssp. pygmaeus* | pygmy leptosiphon | None | None | - | 1B.2 |
| *Linanthus concinnus* | San Gabriel linanthus | None | None | - | 1B.2 |
| *Navarretia fossalis* | spreading navarretia | Threatened | None | - | 1B.1 |
| *Navarretia ojaiensis* | Ojai navarretia | None | None | - | 1B.1 |
| *Navarretia peninsularis* | Baja navarretia | None | None | - | 1B.2 |
| *Navarretia prostrata* | prostrate vernal pool navarretia | None | None | - | 1B.1 |
| *Navarretia setiloba* | Piute Mountains navarretia | None | None | - | 1B.1 |
| *Polygala cornuta var. fishiae* | Fish's milkwort | None | None | - | 4.3 |
| *Acanthoscyphus parishii var. abramsii* | Abrams' oxytheca | None | None | - | 1B.2 |
| *Acanthoscyphus parishii var. parishii* | Parish's oxytheca | None | None | - | 4.2 |
| *Chorizanthe leptotheca* | Peninsular spineflower | None | None | - | 4.2 |
| *Chorizanthe parryi var. fernandina* | San Fernando Valley spineflower | Proposed Threatened | Endangered | - | 1B.1 |
| *Chorizanthe parryi var. parryi* | Parry's spineflower | None | None | - | 1B.1 |
| *Chorizanthe spinosa* | Mojave spineflower | None | None | - | 4.2 |
| *Dodecahema leptoceras* | slender-horned spineflower | Endangered | Endangered | - | 1B.1 |
| *Eriogonum crocatum* | conejo buckwheat | None | Rare | - | 1B.2 |
| *Eriogonum giganteum var. formosum* | San Clemente Island buckwheat | None | None | - | 1B.2 |
| *Eriogonum giganteum var. giganteum* | Santa Catalina Island buckwheat | None | None | - | 4.3 |
| *Eriogonum grande var. grande* | island buckwheat | None | None | - | 4.2 |
| *Eriogonum kennedyi var. alpigenum* | southern alpine buckwheat | None | None | - | 1B.3 |
| *Eriogonum microthecum var. johnstonii* | Johnston's buckwheat | None | None | - | 1B.3 |
| *Eriogonum umbellatum var. minus* | alpine sulphur-flowered buckwheat | None | None | - | 4.3 |
| *Goodmania luteola* | golden goodmania | None | None | - | 4.2 |
| *Mucronea californica* | California spineflower | None | None | - | 4.2 |

| Scientific Name | Common Name | Federal Status | State Status | CDFW Status | CA Rare Plant Rank |
|---|---|---|---|---|---|
| *Nemacaulis denudata var. denudata* | coast woolly-heads | None | None | - | 1B.2 |
| *Sidotheca caryophylloides* | chickweed oxytheca | None | None | - | 4.3 |
| *Androsace elongata ssp. acuta* | California androsace | None | None | - | 4.2 |
| *Delphinium parishii ssp. subglobosum* | Colorado Desert larkspur | None | None | - | 4.3 |
| *Delphinium parryi ssp. purpureum* | Mt. Pinos larkspur | None | None | - | 4.3 |
| *Delphinium variegatum ssp. kinkiense* | San Clemente Island larkspur | Endangered | Endangered | - | 1B.1 |
| *Delphinium variegatum ssp. thornei* | Thorne's royal larkspur | None | None | - | 1B.1 |
| *Ceanothus megacarpus var. insularis* | island ceanothus | None | None | - | 4.3 |
| *Rhamnus pirifolia* | island redberry | None | None | - | 4.2 |
| *Cercocarpus betuloides var. blancheae* | island mountain-mahogany | None | None | - | 4.3 |
| *Cercocarpus traskiae* | Catalina Island mountain-mahogany | Endangered | Endangered | - | 1B.1 |
| *Drymocallis cuneifolia var. ewanii* | Ewan's cinquefoil | None | None | - | 1B.3 |
| *Horkelia cuneata var. puberula* | mesa horkelia | None | None | - | 1B.1 |
| *Lyonothamnus floribundus ssp. aspleniifolius* | Santa Cruz Island ironwood | None | None | - | 1B.2 |
| *Lyonothamnus floribundus ssp. floribundus* | Santa Catalina Island ironwood | None | None | - | 1B.2 |
| *Potentilla multijuga* | Ballona cinquefoil | None | None | - | 1A |
| *Galium angustifolium ssp. gabrielense* | San Antonio Canyon bedstraw | None | None | - | 4.3 |
| *Galium angustifolium ssp. gracillimum* | slender bedstraw | None | None | - | 4.2 |
| *Galium catalinense ssp. acrispum* | San Clemente Island bedstraw | None | Endangered | - | 1B.3 |
| *Galium catalinense ssp. catalinense* | Santa Catalina Island bedstraw | None | None | - | 1B.3 |
| *Galium cliftonsmithii* | Santa Barbara bedstraw | None | None | - | 4.3 |
| *Galium grande* | San Gabriel bedstraw | None | None | - | 1B.2 |
| *Galium jepsonii* | Jepson's bedstraw | None | None | - | 4.3 |
| *Galium johnstonii* | Johnston's bedstraw | None | None | - | 4.3 |
| *Galium nuttallii ssp. insulare* | Nuttall's island bedstraw | None | None | - | 4.3 |
| *Nolina cismontana* | chaparral nolina | None | None | - | 1B.2 |
| *Heuchera abramsii* | Abrams' alumroot | None | None | - | 4.3 |

| Scientific Name | Common Name | Federal Status | State Status | CDFW Status | CA Rare Plant Rank |
|---|---|---|---|---|---|
| *Heuchera caespitosa* | urn-flowered alumroot | None | None | - | 4.3 |
| *Jepsonia malvifolia* | island jepsonia | None | None | - | 4.2 |
| *Lithophragma maximum* | San Clemente Island woodland star | Endangered | Endangered | - | 1B.1 |
| *Scrophularia villosa* | Santa Catalina figwort | None | None | - | 1B.2 |
| *Selaginella asprella* | bluish spike-moss | None | None | - | 4.3 |
| *Lycium brevipes var. hassei* | Santa Catalina Island desert-thorn | None | None | - | 3.1 |
| *Lycium californicum* | California box-thorn | None | None | - | 4.2 |
| *Lycium torreyi* | Torrey's box-thorn | None | None | - | 4.2 |
| *Solanum wallacei* | Wallace's nightshade | None | None | - | 1B.1 |
| *Thelypteris puberula var. sonorensis* | Sonoran maiden fern | None | None | - | 2B.2 |
| *Brodiaea filifolia* | thread-leaved brodiaea | Threatened | Endangered | - | 1B.1 |
| *Brodiaea kinkiensis* | San Clemente Island brodiaea | None | None | - | 1B.2 |
| *Muilla coronata* | crowned muilla | None | None | - | 4.2 |
| *Triteleia clementina* | San Clemente Island triteleia | None | None | - | 1B.2 |
| *Viola pinetorum ssp. grisea* | grey-leaved violet | None | None | - | 1B.3 |

Sources: California Natural Diversity Database BIOS Viewer Tool

**Federal Status**

Endangered: The classification provided to an animal or plant in danger of extinction within the foreseeable future throughout all or a significant portion of its range.

Threatened: The classification provided to an animal or plant which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Proposed Endangered: The classification provided to an animal or plant that is proposed for federal listing as Endangered in the Federal Register under Section 4 of the Endangered Species Act.

Proposed Threatened: The classification provided to an animal or plant that is proposed for federal listing as Threatened in the Federal Register under Section 4 of the Endangered Species Act.

Candidate: The classification provided to an animal or plant that has been studied by the United States Fish and Wildlife Service, and the Service has concluded that it should be proposed for addition to the Federal Endangered and Threatened species list.

None: The plant or animal has no federal status.

Delisted: The plant or animal was previously listed as Endangered or Threatened, but is no longer listed on the Federal Endangered and Threatened species list.

**CDFW Status**

FP: Fully Protected: This classification was the State of California's initial effort to identify and provide additional protection to those animals that were rare or faced possible extinction.

SSC: Species of Special Concern: To this end, the Department has designated certain vertebrate species as "Species of Special Concern" because declining population levels, limited ranges, and/or continuing threats have made them vulnerable to extinction. The goal of designating species as "Species of Special Concern" is to halt or reverse their decline by calling attention to their plight and addressing the issues of concern early enough to secure their long-term viability.

WL: Watch List: Species that were previously designated as "Species of Special Concern" but no longer merit that status, or which do not yet meet SSC criteria, but for which there is concern and a need for additional information to clarify status.

**CA Rare Plant Rank**

1A: Plants presumed extinct in California and rare/extinct elsewhere

1B.1: Plants rare, threatened, or endangered in California and elsewhere; seriously threatened in California

1B.2: Plants rare, threatened, or endangered in California and elsewhere; fairly threatened in California

1B.3: Plants rare, threatened, or endangered in California and elsewhere; not very threatened in California
2A: Plants presumed extirpated in California, but more common elsewhere
2B.1: Plants rare, threatened, or endangered in California, but more common elsewhere; seriously threatened in California
2B.2: Plants rare, threatened, or endangered in California, but more common elsewhere; fairly threatened in California
2B.3: Plants rare, threatened, or endangered in California, but more common elsewhere; not very threatened in California
3.1: Plants about which we need more information; seriously threatened in California
3.2: Plants about which we need more information; fairly threatened in California
3.3: Plants about which we need more information; not very threatened in California
4.1: Plants of limited distribution; seriously threatened in California
4.2: Plants of limited distribution; fairly threatened in California
4.3: Plants of limited distribution; not very threatened in California

## Wetlands

Wetlands are habitats in which soils are intermittently or permanently saturated or inundated. Wetland habitats vary from rivers to seasonal ponding of alkaline flats and include swamps, bogs, marshes, vernal pools, and riparian woodlands. Wetlands are considered to be waters of the United States and are subject to the jurisdiction of the U.S. Army Corps of Engineers as well as the California Department of Fish and Wildlife (CDFW). Where the waters provide habitat for federally endangered species, the U.S. Fish and Wildlife Service may also have authority.

Wetlands are a valuable natural resource for communities providing beneficial impact to water quality, wildlife protection, recreation, and education, and play an important role in hazard mitigation. Wetlands provide drought relief in water-scarce areas where the relationship between water storage and streamflow regulation is vital, and reduce flood peaks and slowly release floodwaters to downstream areas. When surface runoff is dampened, the erosive powers of the water are greatly diminished. Furthermore, the reduction in the velocity of inflowing water as it passes through a wetland helps remove sediment being transported by the water.

In the District, the 2015 LAUSD School Upgrade Program EIR noted that riparian habitats occur along the banks of rivers and streams.  Riparian habitats are mapped on the National Wetlands Mapper along numerous drainages in the District in the San Gabriel Mountains, Santa Susana Mountains, Simi Hills, Santa Monica Mountains, Hollywood Hills, and Palos Verdes Hills.  Major wetland areas in the District are generally in 100-year flood zones, for instance, in Hansen Dam Park, Tujunga Wash, and Pacoima Wash in the San Fernando Valley; and in Ken Malloy Harbor Regional Park in Harbor City in the City of Los Angeles.48 Many smaller wetland areas that would be identified by site-specific jurisdictional delineations are not mapped on the National Wetlands Mapper.  Existing District schools are generally fully developed with buildings, parking lots, hardscape including walkways and hardcourts, and landscaped areas including turf playfields; thus, existing campuses usually don’t include jurisdictional waters and/or wetlands.

### Natural and Beneficial Functions

Wetlands are often found in floodplains and depressional areas of a watershed.  Many wetlands receive and store floodwaters, thus slowing and reducing downstream flow. Wetlands perform a variety of ecosystem functions including food web support, habitat for insects and other invertebrates, fish and wildlife habitat, filtering of waterborne and dry-deposited anthropogenic pollutants, carbon storage, water flow regulation (e.g., flood abatement), groundwater recharge, and other human and economic benefits.

Wetlands, and other riparian and sensitive areas, provide habitat for insects and other invertebrates that are critical food sources to a variety of wildlife species, particularly birds. There are species that depend on these areas during all parts of their lifecycle for food, overwintering, and reproductive habitat. Other species use wetlands and riparian areas for one or two specific functions or parts of the lifecycle, most commonly for food resources. In addition, these areas produce substantial plant growth that serves as a food source to herbivores (wild and domesticated) and a secondary food source to carnivores.

Wetlands slow the flow of water through the vegetation and soil, and pollutants are often held in the soil. In addition, because the water is slowed, sediments tend to fall out, thus improving water quality and reducing turbidity downstream.

These natural floodplain functions associated with the natural or relatively undisturbed floodplain that moderates flooding, such as wetland areas, are critical for maintaining water quality, recharging groundwater, reducing erosion, redistributing sand and sediment, and providing fish and wildlife habitat. Preserving and protecting these areas and associated functions are a vital component of sound floodplain management practices for the District Planning Area.

## *Growth and Development Trends*

As part of the risk assessment process, the HMPC looked at changes in growth and development, both past and future, and examined these changes in the context of hazard-prone areas, and how the changes in growth and development affect potential vulnerability. Information from the District forms the basis of this discussion.

### Current Enrollment

LAUSD enrolls 464,296 students in its facilities, as of the 2017-2018 school year. The District provided enrollment statistics by local district area. These can be seen in Table 4-49.

*Table 4-49 LAUSD – Enrollments by Local District Area*

| LAUSD Local Districts | Total Enrollment |
|---|---|
| **Inside Local District Areas** | |
| Local District Central | 78,865 |
| Local District East | 78,095 |
| Local District Northeast | 71,424 |
| Local District Northwest | 80,930 |
| Local District South | 79,494 |
| Local District West | 73,902 |
| **Inside Local District Areas Total** | **462,710** |
| **Outside of Local District Areas** | |
| Outside of Local District Areas | 1,586 |
| **Outside of Local District Areas Total** | **1,586** |

| LAUSD Local Districts | Total Enrollment |
|---|---|
| | |
| **Grand Total** | **464,296** |

Source: LAUSD

## Special Populations

According to the Centers for Disease Control and Prevention (CDC), a number of factors, including poverty, lack of access to transportation, and crowded housing may weaken a community's ability to prevent human suffering and financial loss in the event of disaster. These factors are known as social vulnerability. Social vulnerability varies across communities and also across households within communities. Variations in social vulnerability can increase or decrease the effect of hazard exposure. Certain populations of people are more at risk to hazard events, including the homeless, those who speak a language other than English in their homes, people of lower socioeconomic status, the infirm, and those with mental health issues.

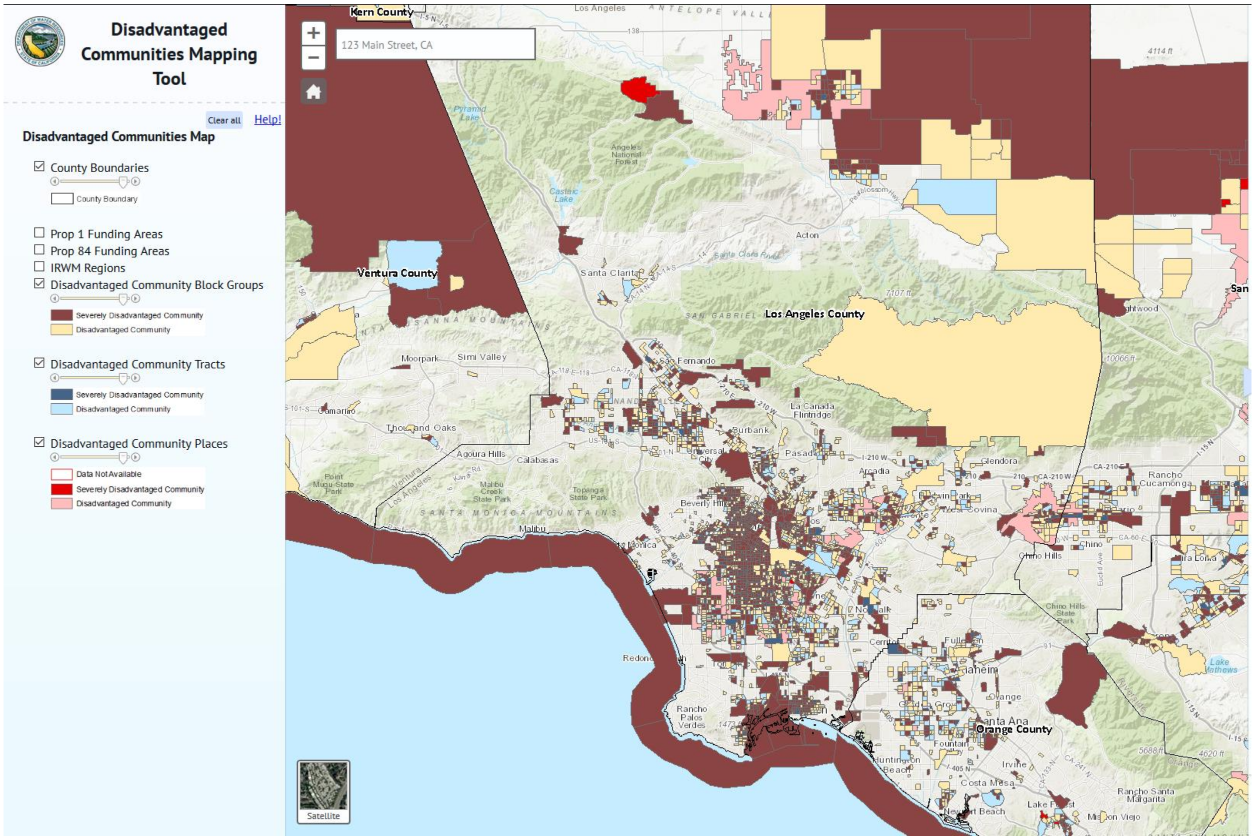
### Cal DWR Special Population Mapping

The Department of Water Resources (DWR) has developed a web-based application to assist local agencies and other interested parties in evaluating disadvantaged community (DAC) status throughout the State, using the definition provided by Proposition 84 Integrated Regional Water Management (IRWM) Guidelines (2015). The DAC Mapping Tool is an interactive map application that allows users to overlay the following three US Census geographies as separate data layers:

- Census Place
- Census Tract
- Census Block Group

Only those census geographies that meet the DAC definition are shown on the map (i.e., only those with an annual median household income (MHI) that is less than 80 percent of the Statewide annual MHI (PRC Section 75005(g)). In addition, those census geographies having an annual MHI that is less than 60 percent of the Statewide annual MHI are shown as "Severely Disadvantaged Communities" (SDAC). The DAC map for Los Angeles County is shown in Figure 4-44.

*Figure 4-44 Los Angeles County – Disadvantaged Communities*




Source: Cal DWR

## LAUSD Special Populations

WE HAVE DATA, BUT WE HAVE QUESTIONS ABOUT IT. WE WILL ASK THE APPROPRIATE PERSON TO GET ANSWERS. ONCE ANSWERED, WE WILL FILL OUT.

## Development since 2012 Plan

Since the creation of the 2012 LHMP, LAUSD has both built new buildings (two new schools) and improved existing structures. Table 4-50 shows the existing buildings and use types that were improved or added to since 2012. Table 4-51 shows the two new schools that were built: Maywood Center for Enriched Studies (High School built in 2017) and Dr. Sammy Lee Medical and Health Science Magnet (Elementary School built in 2012).

includes greening projects to mitigate heat related to climate change, ADA for emergency evacuations and other non-structural improvements.

*Table 4-50 LAUSD – Existing Buildings Improved or Added to Since 2012*

| Facility Type/Use | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|
| Classrooms | 26 | 26 | 5 | 10 | 5 | 7 |
| Physical Education | 3 | 2 | 2 | 0 | 1 | 1 |
| Administration | 1 | 0 | 0 | 1 | 0 | 0 |
| Auditorium/ Multi-Purpose | 1 | 1 | 0 | 1 | 1 | 0 |
| Food Services (includes Lunch Shelters) | 20 | 22 | 16 | 10 | 12 | 7 |
| Library - Media | 1 | 1 | 2 | 1 | 0 | 0 |
| **Total** | **52** | **52** | **25** | **23** | **19** | **115** |

Source: LAUSD (totals do not include Relocatable Housing Units)

*Table 4-51 LAUSD – New Facilities/Structures Constructed Since 2012*

| Facility Type/Use | 2012 | 2013 | 2014 | 2015 | 2016 | 2017 |
|---|---|---|---|---|---|---|
| Classrooms | 1 | 0 | 0 | 0 | 0 | 3 |
| Physical Education | 1 | 0 | 0 | 0 | 0 | 1 |
| Administration | 0 | 0 | 0 | 0 | 0 | 0 |
| Auditorium/ Multi-Purpose | 0 | 0 | 0 | 0 | 0 | 0 |
| Food Services (includes Lunch Shelters) | 0 | 0 | 0 | 0 | 0 | 0 |
| Library - Media | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total** | 2 | 0 | 0 | 0 | 0 | 4 |

Source: LAUSD (totals do not include Relocatable Housing Units)

## Future Development

WILL WORK TO INSERT LEAD IN TO THE TABLE.

*Table 4-52 LAUSD – Future Development Areas*

| School Name | Project Type | Project Description | New Buildings? | Seismic | Fire Hazard | Flooding | Tsunami | Dam Inundation | Sea Level Rise | Radon | Liquefactio | Landslide | Climate Change |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Aggeler Opportunity HS | Addition | Project scope includes a new adaptive metal building that includes a library, multipurpose room and restrooms, a new modular restroom building, site upgrades necessary to enable safe and efficient operation of the campus, and upgrades to meet accessibility requirements of the California Building Code and the Americans with Disabilities Act (ADA). Hazards mitigated: Seismic and ease of emergency evacuation via ADA. | Yes | Yes - Primary | No | No | No | No | No | No | No | No | No |
| Arminta EEC | Campus Improvement | Design and construct new nature explore classroom including required fire alarm, restroom, parking lot, drinking fountain and pedestrian gate accessibility upgrades. Hazards mitigated: Seismic and ease of emergency evacuation via ADA. | Yes | Yes - Primary | No | No | No | No | No | No | No | No | No |
| Canoga Park EEC | Campus Improvement | Design and construct new nature explore classroom including required fire alarm upgrades. Hazards mitigated: Seismic. | Yes | Yes - Primary | No | No | No | No | No | No | No | No | No |
| Escalante EEC | Campus Improvement | Design and construct new nature explore classroom. Hazards mitigated: Seismic. | Yes | Yes - Primary | No | No | No | No | No | No | No | No | No |
| Gardena EEC | Campus Improvement | Design and construct new nature explore classroom including required fire alarm, restroom, parking lot, drinking fountain and pedestrian gate accessibility upgrades. Hazards mitigated: Seismic and ease of emergency evacuation via ADA. | No | Yes - Primary | No | No | No | No | No | No | No | No | No |
| Marina EEC | Campus Improvement | Design and construct new nature explore classroom including required fire alarm upgrades, accessibility upgrades to restrooms, and installation of new entry access gates. Hazards mitigated: Seismic and ease of emergency evacuation via ADA. | No | Yes - Primary | No | No | No | No | No | No | No | No | No |
| Mikes EEC | Campus Improvement | Design and construct new nature explore classroom including required fire alarm upgrades and restroom accessibility upgrades. Hazards mitigated: Seismic and ease of emergency evacuation via ADA. | Yes | Yes - Primary | No | No | No | No | No | No | No | No | No |
| 66th St. EEC | Campus Improvement | Design and construct new nature explore classroom including required fire alarm and restroom accessibility upgrades. Hazards mitigated: Seismic and ease of emergency evacuation via ADA. | Yes | Yes - Primary | No | No | No | No | No | No | No | No | No |

| School Name | Project Type | Project Description | New Buildings? | Seismic | Fire Hazard | Flooding | Tsunami | Dam Inundation | Sea Level Rise | Radon | Liquefactio | Landslide | Climate Change |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Marshall HS | Campus Improvement | The project scope of work includes repairs and improvements to the historic façade of the administration building including the tower, seismic strengthening of the tower portion of the administration building, and accessibility upgrades required by the Americans with Disabilities Act (ADA) including modifications to provide an accessible entry to the school. Hazards mitigated: Seismic and ease of emergency evacuation via ADA. | No | Yes - Primary | No | No | No | No | No | No | No | No | No |
| Carson HS | Campus Improvement | Three chemistry labs with safety equipment including emergency shower/eyewash, fume hood, utility shutoff valves and heating, ventilation, and air conditioning (HVAC) units. Chemical storage cabinets, eyewash and new exterior door to walkway for workroom, fire sprinklers in chemistry labs and workroom, upgrade kitchen hood with fire suppression, functional repairs to plumbing and cabinetry, and upgrades to meet accessibility requirements of the California Building Code and the Americans with Disabilities Act (ADA) including path of travel improvements, restroom and fountain. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |
| Chatsworth Charter HS | Campus Improvement | Two chemistry labs with safety equipment including emergency shower/eyewash, fume hood, utility shutoff valves and HVAC units. Chemical storage cabinets and eyewash in workroom, fire sprinklers in chemistry labs and workroom, upgrade kitchen hood with fire suppression, functional repairs to plumbing and cabinetry, and upgrades to meet accessibility requirements of the California Building Code and the Americans with Disabilities Act (ADA) including path of travel improvements, restroom and fountain. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |
| Elizabeth Learning Center | Campus Improvement | Two chemistry labs with safety equipment including emergency shower/eyewash, fume hood, utility shutoff valves and heating, ventilation, and air conditioning (HVAC) units. Chemical storage cabinets and eyewash in workroom, fire sprinklers in chemistry labs and workroom, functional repairs to plumbing and cabinetry, and upgrades to meet accessibility requirements of the California Building Code and the Americans with Disabilities Act (ADA) including path of travel improvements, restroom and fountain. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |

| School Name | Project Type | Project Description | New Buildings? | Seismic | Fire Hazard | Flooding | Tsunami | Dam Inundation | Sea Level Rise | Radon | Liquefactio | Landslide | Climate Change |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Monroe HS | Campus Improvement | Two chemistry labs with safety equipment including emergency shower/eyewash, fume hood, utility shutoff valves and HVAC units. Chemical storage cabinets and eyewash in workroom, fire sprinklers in chemistry labs and workroom, functional repairs to plumbing and cabinetry, and upgrades to meet accessibility requirements of the California Building Code and the Americans with Disabilities Act (ADA) including path of travel improvements, restroom and fountain. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |
| Reseda HS | Campus Improvement | Three science labs (two chemistry/one physics), with safety equipment including emergency shower/eyewash, improved electrical capacity. Fire sprinklers in two chemistry labs and a workroom. Install new fire suppression system in cafeteria kitchen hood according to DSA requirements. Functional repairs to plumbing, including new casework, HVAC and fume hoods in the chemistry labs. Upgrades to meet accessibility requirements of the California Building Code and the Americans with Disabilities Act (ADA) including path of travel improvements, restroom and fountain. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |
| Sylmar Charter HS | Campus Improvement | Four chemistry labs with safety equipment including emergency shower/eyewash, fume hood, utility shutoff valves and HVAC units. Chemical storage cabinets and eyewash in workroom, fire sprinklers in chemistry labs and workroom, functional repairs to plumbing and cabinetry, replacement of trough stations, and upgrades to meet accessibility requirements of the California Building Code and the Americans with Disabilities Act (ADA) including path of travel improvements, restroom and fountain. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |
| University HS | Campus Improvement | The project will provide 3 chemistry laboratories and 1 Integrated Coordinated Science (ICS) laboratory with safety equipment including emergency shower/eyewash, fume hood, utility shutoff valves and heating, ventilation, and air conditioning (HVAC) units. Chemical storage cabinets and eyewash in workroom, fire sprinklers in chemistry laboratory and workroom, functional repairs to plumbing and cabinetry, and upgrades to meet accessibility requirements of the California Building Code and the Americans with Disabilities Act (ADA) including path of travel improvements, restroom and drinking fountain. | No | No | No | No | No | No | No | No | No | No | No |

| School Name | Project Type | Project Description | New Buildings? | Seismic | Fire Hazard | Flooding | Tsunami | Dam Inundation | Sea Level Rise | Radon | Liquefactio | Landslide | Climate Change |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Marquez Charter ES | Campus Improvement | Marquez Charter School has had soil instability issues at the hillside supporting the playground and a classroom building. The condition of the slope worsened, prompting the District to relocate students in the classroom building to bungalows sited elsewhere on the campus. Initially, a project was developed to repair the slope by reinforcing the hillside so the building could remain on the campus. Upon further analysis during the design phase of the project, it was determined that this was a costly solution that could not be guaranteed to be successful in the long term. The redefined project entails the demolition of a portion of the existing 14,000 square foot classroom building (Classroom Building 004DAM), and the rehabilitation of the building's outer restrooms, as well as work, storage and electrical rooms. In the footprint of the demolished portion of the building and yard, an outdoor learning center and courtyard will be constructed consisting of a student assembly area for performing arts activities, instructional areas with benches, and a learning garden, all in accordance with Americans with Disabilities Act (ADA) requirements including a ramp to the lower playground. | Yes | Yes | No | No | No | No | No | No | No | Yes - Primary | No |
| Monroe HS | Campus Improvement | Repair fire damage at the shop building. | | | | | | | | | | | |
| Sun Valley HS | Campus Improvement | On March 3, 2013, a fire damaged a classroom building with 5,496 square feet. This project will demolish the fire-damaged classroom building, repair a portion of the attached arcade, and provide an outdoor educational learning center and courtyard with trees, shrubbery, and ground cover in its place. The scope will include required Americans with Disabilities Act (ADA) path of travel improvements from the parking lot to the main building, installation of a new concrete masonry security fence, and galvanized access gate. | No | No | No | No | No | No | No | No | No | No | No |
| CHIME Institute's Schwarzenegger Community School | Charter Augmentation Grant | The project is comprised of 2 two-story buildings consisting of 16 new classrooms, a library/media center, and administrative offices. The project also includes an expansion of the existing parking lot and field area. The project provides the additional classrooms necessary to support the full K-8 program for CHIME Institute's Schwarzenegger Community School in permanent facilities and allows for the removal of temporary housing. | Yes | Yes - Primary | No | No | No | No | No | No | No | No | No |
| Verdugo Hills HS | Fire Alarm System | Fire Alarm System | No | No | No | No | No | No | No | No | No | No | No |

| School Name | Project Type | Project Description | New Buildings? | Seismic | Fire Hazard | Flooding | Tsunami | Dam Inundation | Sea Level Rise | Radon | Liquefactio | Landslide | Climate Change |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Pearl Journalism/ Communications Magnet HS | HVAC | Non Air-Conditioned Classroom & Equipment | No | No | No | No | No | No | No | No | No | No | Yes - Primary |
| 28th St. ES | HVAC | The project will replace the over 25-year-old McQuay water source heat pumps and cooling tower on the main building (005CDG). The existing equipment serves 28 classrooms, is beyond its life cycle. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |
| 93rd St. ES | HVAC | The project will replace all heating, cooling and ventilation systems throughout the site. The system provides heating and cooling to 24 classrooms and administrative offices. The existing boilers and air handler units are more than 50 years old and are in poor condition resulting in unreliable service. Maintenance & Operations has received more than 45 service calls within the past 12 months. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |
| Burton ES | HVAC | The project will replace deteriorated and aged wall-hung heat pumps and rooftop air conditioning units in 14 buildings that serve classrooms, administrative and support areas, with rooftop units. The equipment is more than 25 years old, inefficient and requires frequent service. Maintenance & Operations received approximately 50 related service calls within the past 12 months prior to approval of this project. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |
| Camellia ES | HVAC | The project will remove Marvair wall-mounted HVAC systems and replace them with new package rooftop gas/electric units on buildings 1 through 12. Eighteen classrooms are affected and the existing equipment is more than 25 years old and in poor condition. Maintenance & Operations received more than 40 related service calls within the past 12 months prior to approval of this project. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |
| Carver MS | HVAC | The project will replace the over 40-year-old existing air conditioning and heating unit that serves the Carver, Martin Luther King, and Malcolm X buildings. The project will affect more than 30 classrooms. The existing unit is beyond its service life and economic repair, resulting in multiple related service calls. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |

| School Name | Project Type | Project Description | New Buildings? | Seismic | Fire Hazard | Flooding | Tsunami | Dam Inundation | Sea Level Rise | Radon | Liquefactio | Landslide | Climate Change |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Coldwater Canyon ES | HVAC | The project will replace the 25-year-old deteriorated and beyond economical repair aged wall-hung heat pumps in 27 buildings that serve classrooms, administrative and support areas, with rooftop units. Maintenance & Operations received more than a dozen related service calls within the past 12 months prior to approval of this project. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |
| Drew MS | HVAC | The project will remove and replace the existing air handlers, pumps and controls, that provide heating and cooling for the multipurpose room, 20 classrooms, dining room, and offices in buildings 1 and 2. The equipment is more than 50 years old and is in poor condition resulting in unreliable service. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |
| Graham ES | HVAC | The project will remove and replace the 26-year-old existing Trane chiller, boiler, water-source heat-pumps and air-handlers, which provide heating and air conditioning for 20 or more classrooms and offices. The equipment is in poor condition resulting in repeated service calls. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |
| Griffin ES | HVAC | The project will remove and replace the 45-ton chiller, evaporator cooler, and fan coils in the main building and cafeteria building that provides heating and cooling for 15 classrooms, offices, and the kitchen. This project also includes removing electronic controls and electrical panels for the chilled water system. The existing equipment is 25 years old and in very poor condition resulting in frequent breakdowns. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |
| Griffith MS | HVAC | The project will remove and replace the over 20-year-old 50-ton Trane air cooled chiller, fan coils, and air handlers. This system provides heating and cooling for the physical education building and a 25 classroom building. The scope of work also includes replacing four roof-mounted, multi-zone air handling units, and one existing air-cooled chiller serving classroom building #1. The existing units are in very bad condition resulting in numerous service calls. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |
| Hamasaki ES | HVAC | The project will remove the over 50-year-old existing heating, ventilation, and air conditioning (HVAC) systems in the main building and replace them with more energy efficient fan coil units. Servicing 20 classroom, the existing equipment is in very poor condition and provides unreliable service. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |

| School Name | Project Type | Project Description | New Buildings? | Seismic | Fire Hazard | Flooding | Tsunami | Dam Inundation | Sea Level Rise | Radon | Liquefactio | Landslide | Climate Change |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Hamilton HS | HVAC | The project will replace heating/ventilation units for the boys' and girls' gyms and locker rooms in the physical education buildings. The units are well over 50 years old, unreliable, inefficient and beyond their life cycle. Also adding air condition to the boys and girls gym. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |
| Hoover ES | HVAC | The project will remove and replace the existing Airfan multi-zone air handler, which provides heating and cooling for the auditorium and the three-story building with 25 classrooms. The existing unit is more than 40 years old and is in very poor condition resulting in numerous service calls. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |
| Kittridge ES | HVAC | The project will replace the over 25-year-old deteriorated and aged wall-hung heat pumps in 25 buildings that serve classrooms, administrative and support areas, with rooftop units. The equipment is inefficient and requires frequent service. Maintenance & Operations received more than 38 related service calls within the past 12 months prior to approval of this project. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |
| Loreto ES | HVAC | The project will replace the existing steam boilers and associated equipment, fan coil units, and rooftop package units servicing 3 classroom buildings. The existing equipment is more than 25 years old, inefficient, and requires frequent service. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |
| Loyola Village ES | HVAC | The project will remove and replace 26 Bard wall-hung units. The units provide heating and air conditioning for 25 classrooms. The existing equipment is more than 25 years old and in very poor condition resulting in unreliable service. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |
| Marina Del Rey MS | HVAC | The project will remove and replace the 25-year-old existing boilers and heating and ventilation (HVAC) systems which provide heating for the gymnasium and locker rooms. The existing equipment is in very poor condition resulting in numerous related service calls. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |
| Menlo ES | HVAC | The project will remove and replace the 28-year-old existing chiller, boilers, and fan coil units, which provide heating and air conditioning to 25 classrooms, locker rooms, and offices. The equipment is in poor condition requiring repeated servicing. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |
| Montague Charter Academy | HVAC | The project will remove roof-mounted heating and cooling units in Buildings A, B, C, D, F, H, and K and replace them with new roof-mounted gas/electric units. The existing units are more than 25 years old and beyond their useful life and economic repair. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |

| School Name | Project Type | Project Description | New Buildings? | Seismic | Fire Hazard | Flooding | Tsunami | Dam Inundation | Sea Level Rise | Radon | Liquefactio | Landslide | Climate Change |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Paseo del Rey Natural Science Magnet | HVAC | The project will remove and replace the over 36-year-old existing boilers, heating and ventilation units which provide heating and cooling for the main building and classrooms. The existing equipment is severely deteriorated resulting in unreliable service. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |
| Perez Special Education Center | HVAC | The project will remove and replace the over 30-year-old existing 90-ton chiller, multi-zones, and fan coil units which provide heating and air conditioning for 35 classrooms and a number of offices. The existing equipment is in poor condition, and unreliable. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |
| Rowan ES | HVAC | The project will remove and replace the over 25-year-old existing 50-ton chiller, boiler, and fan coil units which provide heating and air conditioning to the main building with 20 classrooms. The existing equipment breaks down frequently and is beyond ecumenical repair. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |
| State ES | HVAC | The project will remove and replace the existing 80-ton Trane chiller, Ajax boiler, air handlers, and direct digital controls which provide heating and cooling to 23 classrooms. This equipment is more than 30 years old, in poor condition, and in constant need of servicing. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |
| Sun Valley MS | HVAC | The project will replace the existing 25-year-old heat pump units for a 20-classroom building. The existing units are inefficient, noisy, and require frequent service. Units are now deteriorated beyond economical repair. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |
| Taft Charter HS | HVAC | The project will replace the over 30-year-old deteriorated and aged steam boiler, air handlers, fan coils, chillers and pumps with eight packaged rooftop air conditioning units that serve the administration building consisting of classrooms as well as administrative and support areas. The equipment is highly inefficient and requires frequent service. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |
| Van Nuys ES | HVAC | The project will replace the over 30-year-old deteriorated and aged air handlers, fan coils, chillers, pumps, and exhaust fans that serve classrooms, administrative and support areas, with rooftop units. The equipment is inefficient and requires frequent service. Maintenance & Operations received more than 57 related service calls within the past 12 months prior to approval of this project. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |

| School Name | Project Type | Project Description | New Buildings? | Seismic | Fire Hazard | Flooding | Tsunami | Dam Inundation | Sea Level Rise | Radon | Liquefactio | Landslide | Climate Change |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| West Vernon ES | HVAC | The project will replace the over 30-year-old deteriorated and aged air handlers, fan coils and wall mounted heat pumps that serve classrooms, administrative and support areas. The equipment is highly inefficient and requires frequent service. Units are now deteriorated beyond economical repair. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |
| Byrd MS | HVAC | This project will replace the non-traditional heating, ventilation, air conditioning (HVAC) system currently installed at East Valley Area New HS #1A, the new location of Byrd MS since 2008, with a traditional model. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |
| Birmingham Community Charter HS | IT Network Upgrade | Project scope includes the replacement of obsolete and failing equipment and deteriorating cabling, installation of wireless network infrastructure and fiber to increase bandwidth, and associated IT upgrades. The budget for this project includes the scope of work for any other school located at this same site. | No | No | No | No | No | No | No | No | No | No | No |
| El Sereno MS | IT Network Upgrade | Project scope includes the replacement of obsolete and failing equipment and deteriorating cabling, installation of wireless network infrastructure and fiber to increase bandwidth, and associated IT upgrades. The budget for this project includes the scope of work for any other school located at this same site. | No | No | No | No | No | No | No | No | No | No | No |
| Maywood Center for Enriched Studies | New Construction | The District acquired land to build a new high school. The campus will consist of three small schools that include classrooms, science labs, student dining, and administrative offices. Shared facilities among the three small schools will include performing arts classrooms, a multipurpose room, a gymnasium, support services, food services, playfields, and a parking structure. New Schools mitigated ALL relevant hazard categories. Primary hazard mitigated for this project is Seismic. | Yes | Yes - Primary | No | No | NO | No | No | No | No | No | Yes |
| Lee Medical & Health Science Magnet | New Construction | The District built a new elementary school on District-owned land at Virgil MS. The District acquired land at the northwest corner of Council St. and Madison Ave. to be developed into new playfields on 3.23 acres. As a part of this project, the site of the former White House PC was converted to surface parking for both the existing middle school and the new elementary school. School facilities include classrooms, a library, multipurpose room, food service and lunch shelter, administration, and playfields. New Schools mitigated ALL relevant hazard categories. Primary hazard mitigated for this project is Seismic. | Yes | Yes - Primary | No | No | NO | No | No | No | Yes | No | Yes |

| School Name | Project Type | Project Description | New Buildings? | Seismic | Fire Hazard | Flooding | Tsunami | Dam Inundation | Sea Level Rise | Radon | Liquefactio | Landslide | Climate Change |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Maintenance & Operations: Central Office | Plumbing/Irrigation/Drainage | The water conservation fixture replacement program replaced outdated fixtures and valves that allowed high volumes of water to be wasted per flush. The program removed older water closet assemblies that used 3.5 gallons per flush (gpf) and replaced them with new toilet fixtures using 1.28 gpf. Standard flush urinals that used 1.5 gpf were replaced with new urinals using 0.125 gpf. These efforts conserve a precious natural resource while generating continual cost savings through lower water bills over the long term. Fixtures were replaced at 29 schools with the greatest need throughout the District. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |
| Lincoln HS | Plumbing/Irrigation/Drainage | The project will remove and replace the deteriorating domestic water lines and building drain lines within the plumbing system. The plumbing system connects to the Cafeteria, Home Economics building and restrooms serving 12 classrooms. The plumbing system is more than 75 years old and is seriously deteriorated which has resulted in several compromises to the piping system with high potentials for service interruptions. Abatement of asbestos containing materials from the plumbing system is required. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |
| Chatsworth Charter HS | Roofing | The project will remove and replace all 264,100 square feet of existing roofing on 21 buildings consisting of 116 classrooms and arcades. The roofing has separated and deteriorated in several areas and repairs have been unsuccessful. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |
| El Camino Real Charter HS | Roofing | The project will remove and replace roofing on the administration building and classroom building. The existing roof is peeling and bubbling which has resulted in many repairs. The existing roof has poor surface area drainage and water ponding issues. | No | No | No | No | No | No | No | No | No | No | Yes - Primary |
| Audubon MS | Seismic Modernization | The project will seismically retrofit the lunch pavilion, a non-ductile concrete frame structure, built in 1972. In conjunction with Division of the State Architect (DSA), staff has categorized the lunch pavilion as a "Category 2", "Priority 1B" structure. These building types are not expected to perform as well in future earthquakes and therefore require seismic corrections and upgrades. | No | Yes - Primary | No | No | No | No | No | No | No | No | No |

| School Name | Project Type | Project Description | New Buildings? | Seismic | Fire Hazard | Flooding | Tsunami | Dam Inundation | Sea Level Rise | Radon | Liquefactio | Landslide | Climate Change |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Crenshaw HS | Seismic Modernization | Demolish the existing lunch pavilion, covered walkways, student store, multipurpose/food service and music buildings. Construct a new lunch pavilion, covered walkways, student store, and performing arts/food service facility to replace the multipurpose/food service and music buildings. Includes replacement of the aging and deteriorating energy management system, 16-year-old central plant chillers, and heating, ventilation, and air conditioning (HVAC) equipment. The project will also relocate utility lines as necessary and provide associated path of travel upgrades to ensure compliance with the California Building Code and the Americans with Disabilities Act (ADA). | Yes | Yes - Primary | No | No | No | No | No | No | No | No | Yes |
| 1st St. ES | Seismic Modernization | The project will provide seismic retrofit of the 2-story classroom building (006CDT) as required, modernize 10 classrooms, food service area, indoor dining and existing lunch pavilion, and relocate the trash enclosure to an area closer to the public street. The scope also includes a new additional lunch pavilion near the existing food services and lunch pavilion, and upgrades to meet accessibility requirements of the California Building Code and the Americans with Disabilities Act (ADA) including path of travel improvements as required. | Yes | Yes - Primary | No | No | No | No | No | No | No | No | Yes |
| Foshay Learning Center | Seismic Modernization | Remove the existing 2-story north classroom building and 19 portable classrooms; replace with a 3-story classroom building providing 35 classrooms. Remove existing lunch pavilion/student store building and instrument music building; replace with new student store and lunch pavilion. Provide new playfields including turf field to meet State & District standards. Provide an efficient parking area with increased parking count and new fencing and gates. Provide upgrades to meet accessibility requirements of the California Building Code and the Americans with Disabilities Act (ADA) including path of travel improvements as required. | Yes | Yes - Primary | No | No | No | No | No | No | No | No | Yes |
| Olive Vista MS | Seismic Modernization | Remove the existing multipurpose building and provide a new multipurpose building with multipurpose room, food service and lunch pavilion/student store. Remove the existing physical education building and provide a new physical education building with gym, locker rooms, fitness room, and faculty office. Provide upgrades to meet accessibility requirements of the California Building Code and the Americans with Disabilities Act (ADA) including path of travel improvements as required for both new buildings. | Yes | Yes - Primary | No | No | No | No | No | No | No | No | Yes |

| School Name | Project Type | Project Description | New Buildings? | Seismic | Fire Hazard | Flooding | Tsunami | Dam Inundation | Sea Level Rise | Radon | Liquefactio | Landslide | Climate Change |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Venice HS | Seismic Modernization | Remove existing lunch pavilion/student store structure, 4 portable classroom buildings, a portable sanitary building, and a storage building west of the existing pavilion. Provide a new lunch pavilion/student store and improvements to the quad area newly vacated by the existing structure per the campus master plan. Provide upgrades to meet accessibility requirements of the California Building Code and the Americans with Disabilities Act (ADA) including path of travel improvements as required. | Yes | Yes - Primary | No | No | No | No | No | No | No | No | No |
| Widney Special Education HS | Seismic Modernization | The project will seismically retrofit the lunch pavilion building to meet current Division of the State Architect (DSA) structural codes and requirements. The project will also provide "light" modernizations and repairs (i.e. patch paint and minor repairs as necessary) to the lunch pavilion, and any associated upgrades to meet the accessibility requirements of the California Building Code and the Americans with Disabilities Act (ADA) including path of travel improvements. | No | Yes - Primary | No | No | No | No | No | No | No | No | No |

Source: LAUSD

Includes /Temperature/Heat/Water Conservation/Energy Conservation

## 4.3.2. LAUSD's Vulnerability to Specific Hazards

The Disaster Mitigation Act regulations require that the HMPC evaluate the risks associated with the hazards identified in the planning process. This section summarizes the possible impacts and quantifies, where data permits, the LAUSD Planning Area's vulnerability to each of the hazards identified as a priority hazard in Section 4.2.17 Natural Hazards Summary.

### *Defining Significance (Priority) of a Hazard*

Defining the significance or priority of a hazard to a community is based on a subjective analysis of several factors. This analysis is used to focus and prioritize hazards and associated mitigation measures for the plan. These factors include the following:

- **Past Occurrences**: Frequency, extent, and magnitude of historic hazard events.
- **Likelihood of Future Occurrences**: Based on past hazard events.
- **Ability to Reduce Losses through Implementation of Mitigation Measures**: This looks at both the ability to mitigate the risk of future occurrences as well as the ability to mitigate the vulnerability of the District to a given hazard event.

Based on information developed for the hazard profiles, all identified hazards were determined to be priority hazards evaluated further as part of this vulnerability assessment:

- Climate Change and Sea Level Rise
- Dam Failure
- Drought and Water Shortage
- Earthquake
- Earthquake: Liquefaction
- Flood: 100/500–year
- Flood: Localized/Stormwater
- Landslide, Mud, and Debris Flows (including post-fire)
- Levee Failure
- Radon
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rains and Storms
- Severe Weather: High Winds and Tornados
- Tsunami
- Wildfire

An estimate of the vulnerability of the LAUSD Planning Area to each identified priority hazard, in addition to the estimate of risk of future occurrence, is provided in each of the hazard-specific sections that follow. Vulnerability is measured in general, qualitative terms and is a summary of the potential impact based on past occurrences, spatial extent, and damage and casualty potential. It is categorized into the following classifications:

- **Extremely Low**—The occurrence and potential cost of damage to life and property is very minimal to nonexistent.

- **Low**—Minimal potential impact. The occurrence and potential cost of damage to life and property is minimal.
- **Medium**—Moderate potential impact. This ranking carries a moderate threat level to the general population and/or built environment. Here the potential damage is more isolated and less costly than a more widespread disaster.
- **High**—Widespread potential impact. This ranking carries a high threat to the general population and/or built environment. The potential for damage is widespread. Hazards in this category may have occurred in the past.
- **Extremely High**—Very widespread with catastrophic impact.

Vulnerability can be quantified in those instances where there is a known, identified hazard area, such as a mapped floodplain. In these instances, the numbers and values of LAUSD parcels, sites and facilities subject to the identified hazard can be counted and their values tabulated. Together, this information conveys the impact, or vulnerability, of that area, and the District, to that hazard.

The HMPC identified multiple hazards in the LAUSD Planning Area for which specific geographical hazard areas have been defined and for which sufficient data exists to support a quantifiable vulnerability analysis. These hazards are climate change (sea level rise), dam failure, earthquake, earthquake: liquefaction), flood, landslide, tsunami, and wildfire. With the exception of earthquakes, all hazards were analyzed using GIS and the LAUSD facilities dataset combined with the County parcel and assessor data. The FEMA's loss estimation software, HAZUS-MH, was used to analyze the District's vulnerability to earthquakes, as presented in a 2014 earthquake report for the District.

For climate change (sea level rise), dam failure, earthquake induced liquefaction, flood (1%/0.2% annual chance), landslide, tsunami, and wildfire, the HMPC inventoried the following for each community, to the extent possible, to quantify vulnerability in identified hazard areas:

- General hazard-related impacts, including impacts to life, safety, and health
- Values at risk (i.e., types, numbers, and value of land and improvements)
- Identification of population at risk (i.e., based on enrollment data provided by LAUSD)
- Overall impact to the District
- Future development/development trends within the identified hazard area

The vulnerability and potential impacts from priority hazards that do not have specific mapped areas nor the data to support quantifiable vulnerability analyses are discussed in more general terms. These include:

- Drought and Water Shortage
- Flood: Localized/Stormwater
- Levee Failure
- Radon
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rain and Storms
- Severe Weather: High Winds and Tornadoes

The vulnerability sections below are presented alphabetically.

## 4.3.3. Climate Change and Sea Level Rise Vulnerability Assessment

This hazard can vary across the LAUSD Planning Area. Table 4-53 breaks out how climate change and sea level rise vulnerability varies by Local District. Below the table are the discussions of how climate change and sea level rise affect the District Planning Area, respectively.

*Table 4-53 LAUSD –Climate Change and Sea Level Rise Vulnerability Summary by Local District*

| LAUSD Planning Area/ Local Districts | Geographic Extent | Magnitude/ Severity | Probability of Future Occurrences | Significance | Vulnerability |
|---|---|---|---|---|---|
| Central | Limited | Limited | Likely | Medium | Medium |
| East | Limited | Limited | Likely | Medium | Medium |
| Northeast | Limited | Limited | Likely | Medium | Medium |
| Northwest | Limited | Limited | Likely | Medium | Medium |
| South | Extensive | Critical | Likely | High | High |
| West | Extensive | Critical | Likely | High | High |

Source: LAUSD

### *Climate Change Vulnerability*

The California Adaptation Planning Guide (APG) prepared by California OES and CNRA was developed to provide guidance and support for local governments and regional collaboratives to address the unavoidable consequences of climate change.

The APG: Defining Local and Regional Impacts focuses on understanding the ways in which climate change can affect a community. According to this APG, climate change impacts (temperature, precipitation, sea level rise, ocean acidification, and wind) affect a wide range of community structures, functions and populations. These impacts further defined by regional and local characteristics are discussed by secondary impacts and seven sectors found in local communities: Public Health, Socioeconomic, and equity impacts; Ocean and Coastal Resources; Water Management; Forest and Rangeland; Biodiversity and Habitat; Agriculture; and Infrastructure.

#### Los Angeles County Climate Change Impacts

The APG: Understanding Regional Characteristics identified the following impacts specific to the South Coast region. The District Planning Area is at risk to the following:

- Temperature increases
- Decreased precipitation
- Sea level rise
- Reduced tourism
- Increase wildfire
- Public Health – heat and air quality

- Coastal erosion

The South Coast is a highly urbanized region. High population density also creates greater vulnerability to climate-related hazards simply because more people are in harm's way. The concentration of population on the coast has the potential to affect public safety, infrastructure, and the integrity of coastal ecosystems. In addition, the urban setting can also amplify public health risks because increased temperatures are even higher due to the urban heat island. California's Adaptation Guide: Understanding Regional Characteristics provides input on adaptation considerations for the South Coast Region. As detailed in this guide, climate change has the potential to disrupt many features that characterize the region, including ecosystems health, snowpack, and the tourist economy. The impacts from climate chance will have only small differences between each Local District. Specific regional impacts, which also apply to the Local Districts, include the following:

**Wildfire.** The South Coast already experiences wildfire. The extent to which climate change is projected to alter existing wildfire risk is variable. Wildfire frequency and severity will depend on shifts in vegetation and Santa Ana wind behavior. Management of fire risk such as prescribed burns may be subject to regulations beyond normal California forest practice. For example, the "High Use" subdistricts of Cal Fire's Southern District may have additional stipulations with regard to management practice. Increased temperature and decreased moisture, such as longer drought periods, will increase fire vulnerability in a number of areas. Along with impacts associated with temporary and/or permanent displacement, long-term impacts on the elderly and children under the age of five are of concern. Eye and respiratory illnesses due to air pollution resulting from wildfires, and exacerbation of asthma, allergies, chronic obstructive pulmonary disease (COPD), and other cardiovascular diseases are likely to increase. Increased fire risk could affect the District Planning Area by directly affecting buildings, or by smoke affecting enrolled populations.

**Public Health, Socioeconomic, and Equity Impact.** In the highly populated areas within this region, "urban heat islands" will exacerbate the public health impacts that poor air quality and heat waves have upon the more vulnerable populations of this area. The highest percentages of impervious surfaces are in the urban areas of Los Angeles and San Diego counties, increasing the potential impacts of heat islands. Southern California's urban centers are warming more rapidly than other parts of the State. Los Angeles, San Diego, and Orange counties rank first, second, and third in the state in absolute numbers of the elderly and children less than five years of age. These two populations are most likely to suffer from heat-related illnesses and heat events. Because of the significant and varied population in this region, there is also likely to be a significant population that fits into a number of the socially vulnerable categories lacking adaptive capacity. This increases the vulnerability of these populations. The higher cost of living in some areas of this region means low-income families pay a high percentage of their income on housing and transportation. Increases in food and energy costs may impact low-income residents.

**Water Supply**. Two primary sources of water used by the South Coast region are the State Water Project and the Colorado River. In both cases, these water supplies originate in mountain snowpack. Climate change will result in reduced snowpack, which will translate into reduced water supply. Further threatening the regional water supply is the vulnerability of the levees protecting the California Delta, which feeds the State Water Project. Jurisdictions in the South Coast must carefully consider the vulnerability of their water supply. Climate change will reduce water supply and subsequently increase costs. Industries reliant on water may be affected, resulting in reduced revenue and employment base. While these effects may be muted somewhat in the District Planning Area, the risk of water shortage does exist.

In addition to the APG, the HMPC provided a report from the Proceedings of the National Academy of Sciences (PNAS) stating that some of the recent fire impacts may have been attributed to climate change. The PNAS report posits that climate influences wildfire potential primarily by modulating fuel abundance in fuel-limited environments, and by modulating fuel aridity in flammability-limited environments. Increased forest fire activity across the western United States in recent decades has contributed to widespread forest mortality, carbon emissions, periods of degraded air quality, and substantial fire suppression expenditures.

### *Sea Level Rise Vulnerability*

Sea level rise has the potential to result in far-reaching impacts on the South Coast region, as discussed in California's Adaptation Guide: Understanding Regional Characteristics. Sea level rise may affect the region's tourism–the largest value tourist industry in the state (NOEP, 2005)–as well as other considerable assets, including international airports and seaports. A study by the California Department of Boating and Waterways and San Francisco State University using three example beaches in the region shows considerable loss of recreational and ecological benefits due to sea level rise. A 1.4-meter rise in sea level will increase the population vulnerable to a 100-year coastal storm from 86,000 to 149,300. Most of the population at risk is in Orange County. Areas near Huntington Beach, Seal Beach, the Port of Long Beach, Marina Del Rey, and Port Hueneme also will be of particular concern in the region due to the significant inland penetration of flood waters exacerbated by sea level rise. Sea level rise is expected to affect vulnerable populations along the coast through the immediate effects of flooding and temporary displacement and longer-term effects of permanent displacement and disruption of local tourism. Of particular concern are populations that do not have the resources to prepare for, respond to, and recover from disasters. Impacts could include temporary and/or permanent displacement; drowning and property damage; and coastal erosion harming recreational activities, tourism, and the tourism industry.

Sea level rise in Los Angeles is expected to match global projections over the next century with an increase of 0.1 - 0.6 meters (m), or 0.3 - 2.0 feet (ft), from 2000 - 2050 and 0.4 - 1.7 m (or 1.3 - 5.6 ft) from 2000 - 2100 (NRC 2012). Tides, wave-driven run-up, and storm surge play critical roles in coastal flooding in Southern California, especially when big wave storms occur at or near peak high tides. Sea level rise will potentially exacerbate the damage from these events. Sea level rise has the potential to affect multiple school facilities in the District Planning Area. A discussion of these facilities at risk follows.

#### Methodology

The Coastal Storm Modeling System (CoSMoS) 3.0, developed by the USGS, is a modeling approach that projects coastal flooding and shoreline change due to both sea-level rise and coastal storms driven by climate change. CoSMoS developed 40 sea level rise scenarios to assess sea level rise during the 2010 to 2100 year period:

- 10 sea level rise scenarios to choose from: 0 – 2 meters (m) at 0.25 m increments, and an extreme 5 m scenario

- 4 storm scenarios: normal conditions; 0-year return; 20-year return; and 100-year return intervals

Additional information on CoSMoS can be found at:

- https://walrus.wr.usgs.gov/coastal_processes/cosmos/socal3.0/

For the purposes of this plan, the following four scenarios were selected based on selection criteria from the CoSMos website to reflect best and worst case sea level rise scenarios for the LAUSD Planning Area:

- 0.25 m, including low-lying areas, with 0-year (no storm surge) return interval
- 1.50 m, including low-lying areas, with 0-year (no storm surge) return interval
- 0.25 m, including low-lying areas, with 100-year (100-year storm surge) return interval
- 1.50 m, including low-lying areas, with 100-year (100-year storm surge) return interval

The first two scenarios represent potential risk from sea level rise over time based on climate change conditions and reflect that area of land that may eventually be underwater and no longer usable. The second two scenarios represent the same base sea level rise conditions combined with storm surge from a 1% annual chance or 100-year storm.

The 2016 Coastal Storm Modeling System (CoSMoS) 3.0 data was obtained for the Los Angeles County area for the LAUSD Planning Area for these four scenarios. LAUSD's facilities database, including information on building replacement values, was used as the basis for the inventory of all facilities within LAUSD. The County's Assessor's data and parcel layer was joined to the facilities database to obtain information on assessed land values and to create a parcel inventory of LAUSD properties. As previously described, CRVs were calculated and added to building replacement values and the assessed land values, to determine the overall potential values at risk. GIS was used to overlay the sea level rise scenarios onto the parcel layer polygons, and where the sea level rise scenario intersected a parcel polygon, it was assigned with that hazard scenario for the entire parcel. This analysis was repeated for each of the four scenario combinations. Note that the value of the improved land is also included in the total of values at risk as the land itself is at risk to landslide.

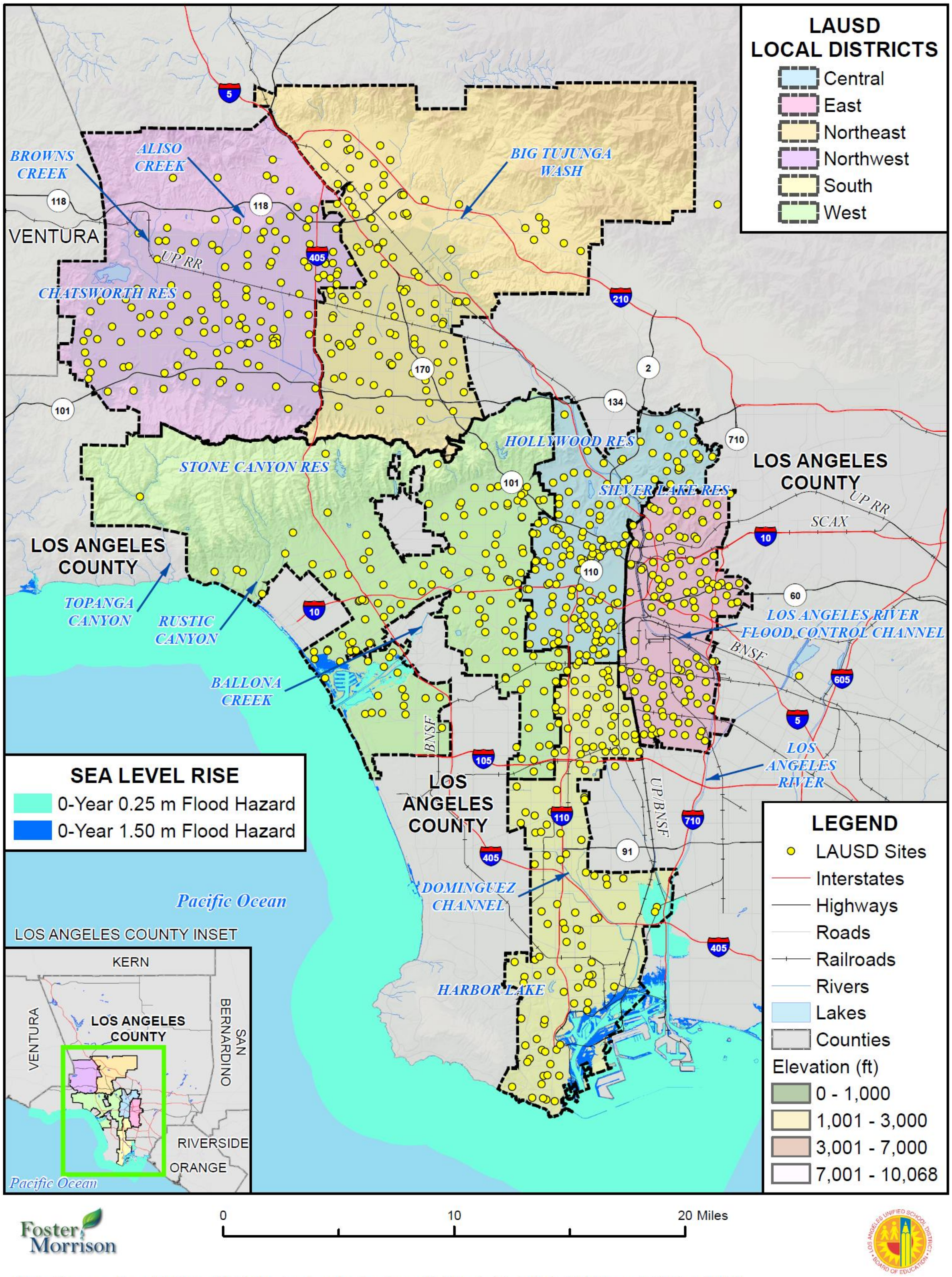
#### Limitations

It should be noted that the resulting sea level rise inundation loss estimates may actually be more or less than that presented in the below tables as LAUSD may include structures located on parcels within the inundation area that are actually outside the inundation boundaries or otherwise elevated and located outside of the area of impact. Further, depending on the magnitude, storm surge, or other factors of a sea level rise event, the inundation loss estimates may also be more or less than that presented in the below tables due to the varying impacts to land, structures, and their contents and therefore their respective values. Also, it is important to keep in mind that the assessed land value may be below the actual market value of improved parcels due to Proposition 13.

### Values at Risk

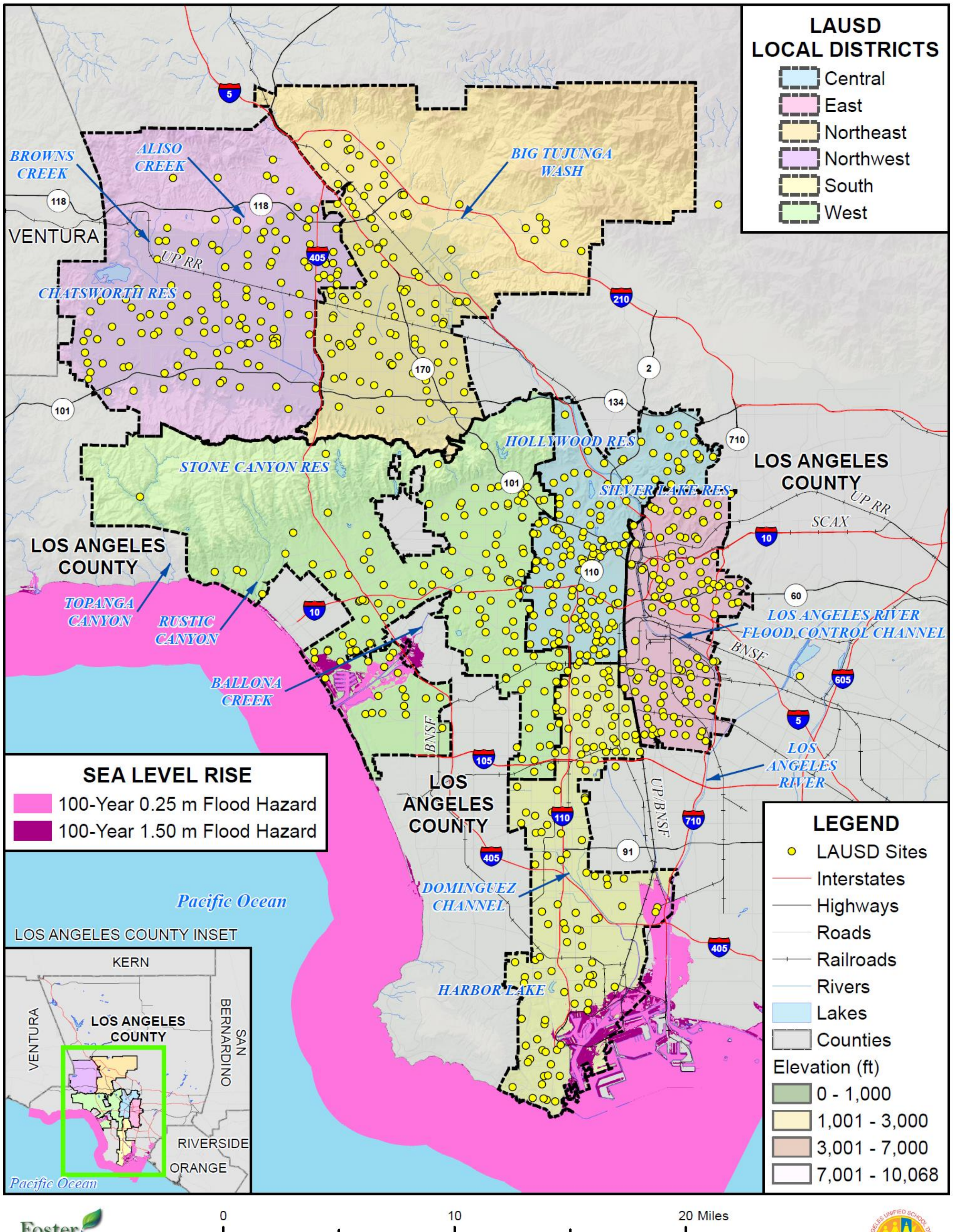
Areas of sea level rise risk exist in the West and South Local Districts of the LAUSD. The CoSMoS sea level rise scenario layers, with and without expected 100-year storm surge, was overlaid with the LAUSD facility layer in GIS to obtain results. This section includes summary tables by Local District for the LAUSD Planning Area and tables broken out by Local District and Site Type, while Appendix ?? includes detailed tables by Local District and Site Type with details on specific facilities affected. Areas of sea level rise, with and without storm surge, in the District Planning Area is shown in Figure 4-45 and Figure 4-46. Table 4-54 and Table 4-55 illustrates the potential estimated damages to District from sea level rise (with and without storm surge, respectively).

*Figure 4-45 LAUSD – Sea Level Rise Scenarios without Storm Surge (0-year storm)*




Data Source: Coastal Storm Modeling System for Southern California (CoSMoS 3.0) Phase2 2017, LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

## *Figure 4-46 LAUSD – Sea Level Rise Scenarios with Storm Surge (100-year storm)*




Data Source: Coastal Storm Modeling System for Southern California (CoSMoS 3.0) Phase2 2017, LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

*Table 4-54 LAUSD – Local District Summary – Sea Level Rise Scenarios without Storm Surge (0-year storm) Values at Risk*

| LAUSD Local Districts | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| **0-Year Return Period, 0.25m Sea Level Rise Scenario** | | | | | | |
| Local District South | 4 | $687,406 | 35 | $113,240,531 | $113,240,531 | $227,168,468 |
| Local District West | 3 | $3,901,384 | 56 | $77,628,969 | $77,628,969 | $159,159,323 |
| **Total** | **7** | **$4,588,790** | **91** | **$190,869,500** | **$190,869,500** | **$386,327,791** |
| **0-Year Return Period, 1.5m Sea Level Rise Scenario** | | | | | | |
| Local District South | 4 | $687,406 | 35 | $113,240,531 | $113,240,531 | $227,168,468 |
| Local District West | 9 | $7,899,193 | 121 | $166,876,039 | $166,876,039 | $341,651,272 |
| **Total** | **13** | **$8,586,599** | **156** | **$280,116,570** | **$280,116,570** | **$568,819,740** |

Source: CoSMoS 3.0, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

*Table 4-55 LAUSD – Local District Summary Sea Level Rise Scenarios with Storm Surge (100-year storm) Values at Risk*

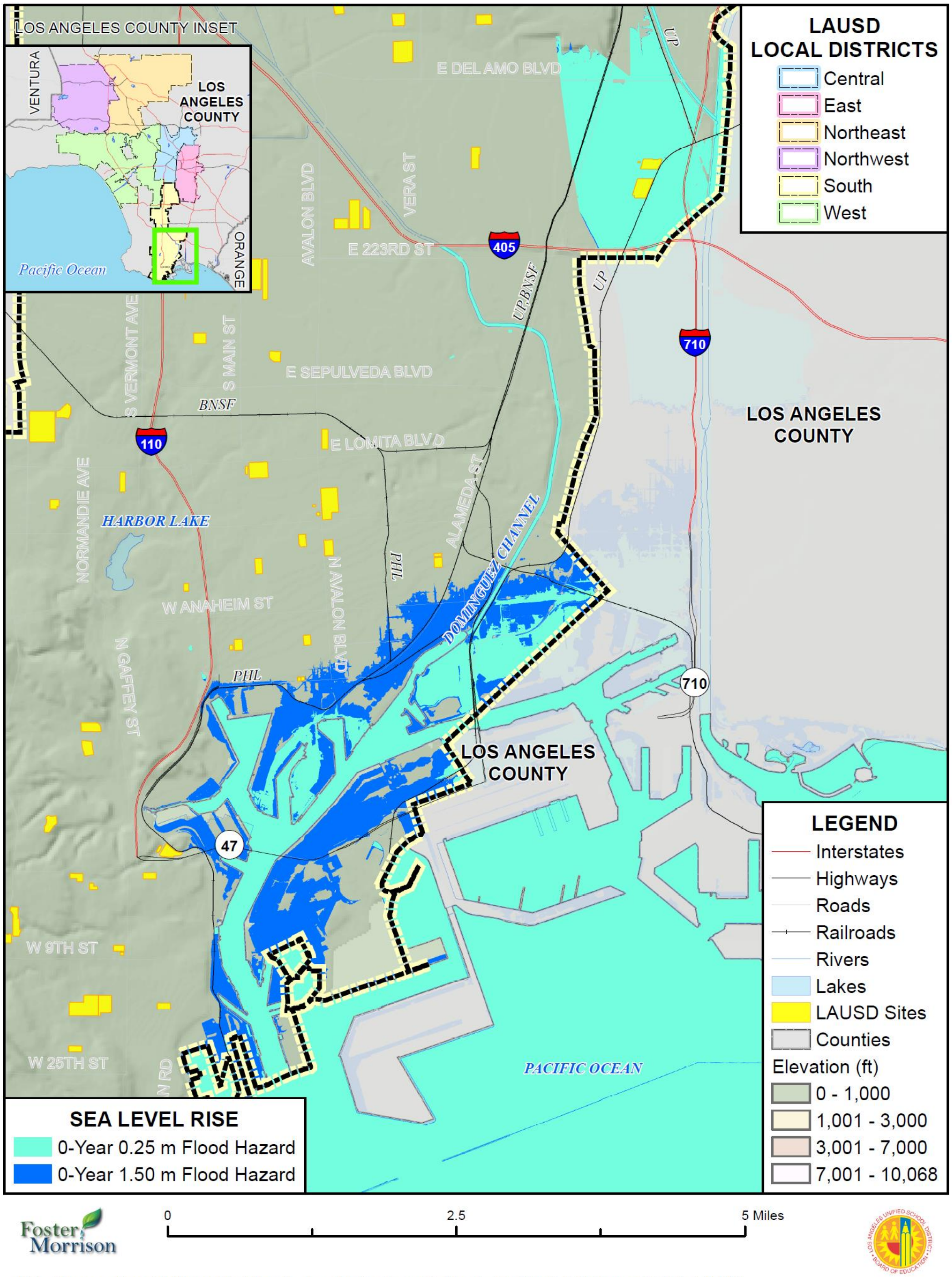
| LAUSD Local Districts | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| **100-Year Return Period, 0.25m Sea Level Rise Scenario** | | | | | | |
| Local District South | 4 | $687,406 | 35 | $113,240,531 | $113,240,531 | $227,168,468 |
| Local District West | 5 | $4,484,193 | 72 | $116,829,692 | $116,829,692 | $238,143,577 |
| **Total** | 9 | $5,171,599 | 107 | $230,070,223 | $230,070,223 | $465,312,045 |
| **100-Year Return Period, 1.5m Sea Level Rise Scenario** | | | | | | |
| Local District South | 4 | $687,406 | 35 | $113,240,531 | $113,240,531 | $227,168,468 |
| Local District West | 10 | $8,012,549 | 121 | $166,876,039 | $166,876,039 | $341,764,628 |
| **Total** | **14** | **$8,699,955** | **156** | **$280,116,570** | **$280,116,570** | **$568,933,096** |

Source: CoSMoS 3.0, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

Sea level rise maps and analysis, with and without 100-year storm surge, were further broken out for the LAUSD by Local District and by Site Type. These maps show locations of sea level rise flooding areas (with and without a 100-year storm surge) and facilities by Local District; while the tables show the parcel counts, building counts, land values, replacement values, contents values, and total values for the South and West Local Districts. Figure 4-47 and Figure 4-48 show the south and west district, respectively, for the sea level rise scenarios without storm surge. Table 4-56 shows the results for these two Local Districts for the 0.25m sea level rise scenario, while Table 4-57 shows the results for these two districts for the 1.5m sea level rise scenario Figure 4-49 and Figure 4-50 show the South and West Local Districts, respectively, for the sea level rise scenarios with storm surge. Table 4-58 shows the results for these two districts for the

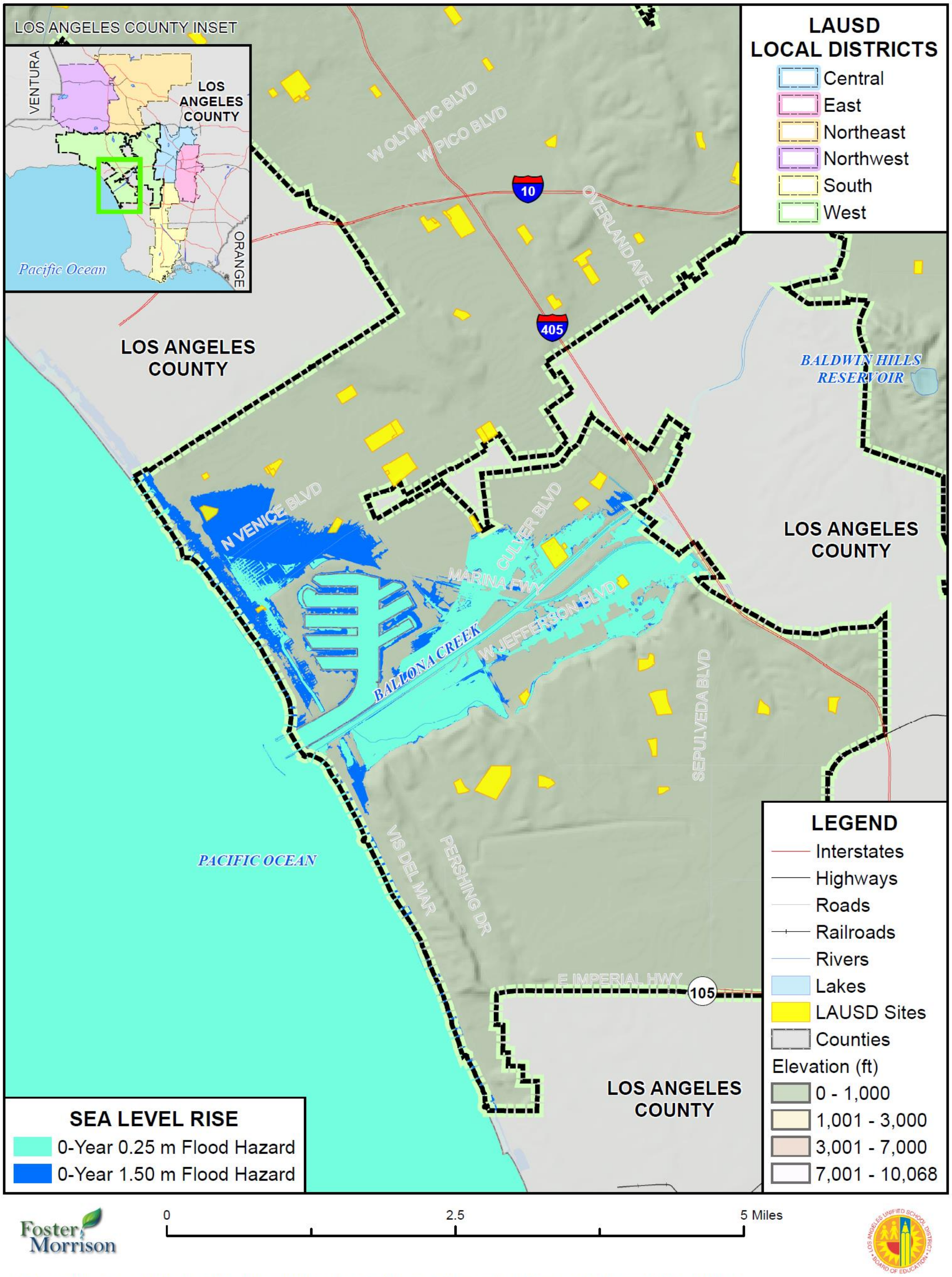
0.25m sea level rise scenario with storm surge, while Table 4-59 shows the results for these two districts for the 1.5m sea level rise scenario with storm surge.

*Figure 4-47 LAUSD – Local District South Sea Level Rise Scenarios without Storm Surge (0-year storm)*




Data Source: Coastal Storm Modeling System for Southern California (CoSMoS 3.0) Phase2 2017, LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

*Figure 4-48 LAUSD – Local District West Sea Level Rise Scenarios without Storm Surge (0-year storm)*




Data Source: Coastal Storm Modeling System for Southern California (CoSMoS 3.0) Phase2 2017, LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

*Table 4-56 LAUSD – Local District Sea Level Rise (0.25m Scenario) without Storm Surge (0-year storm) Values at Risk by Site Type*

| Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Local District South | | | | | | |
| Elementary School | 3 | $687,406 | 20 | $21,261,462 | $0 | $21,948,868 |
| Senior High School | 1 | $0 | 15 | $91,979,069 | $91,979,069 | $183,958,138 |
| **South Total** | **4** | **$687,406** | **35** | **$113,240,531** | **$113,240,531** | **$227,168,468** |
| Local District West | | | | | | |
| Elementary School | 1 | $541,820 | 14 | $9,930,273 | $9,930,273 | $20,402,366 |
| Middle School | 2 | $3,359,564 | 42 | $67,698,697 | $67,698,697 | $138,756,957 |
| **West Total** | **3** | **$3,901,384** | **56** | **$77,628,969** | **$77,628,969** | **$159,159,323** |
| | | | | | | |
| **Grand Total** | **7** | **$4,588,790** | **91** | **$190,869,500** | **$190,869,500** | **$386,327,791** |

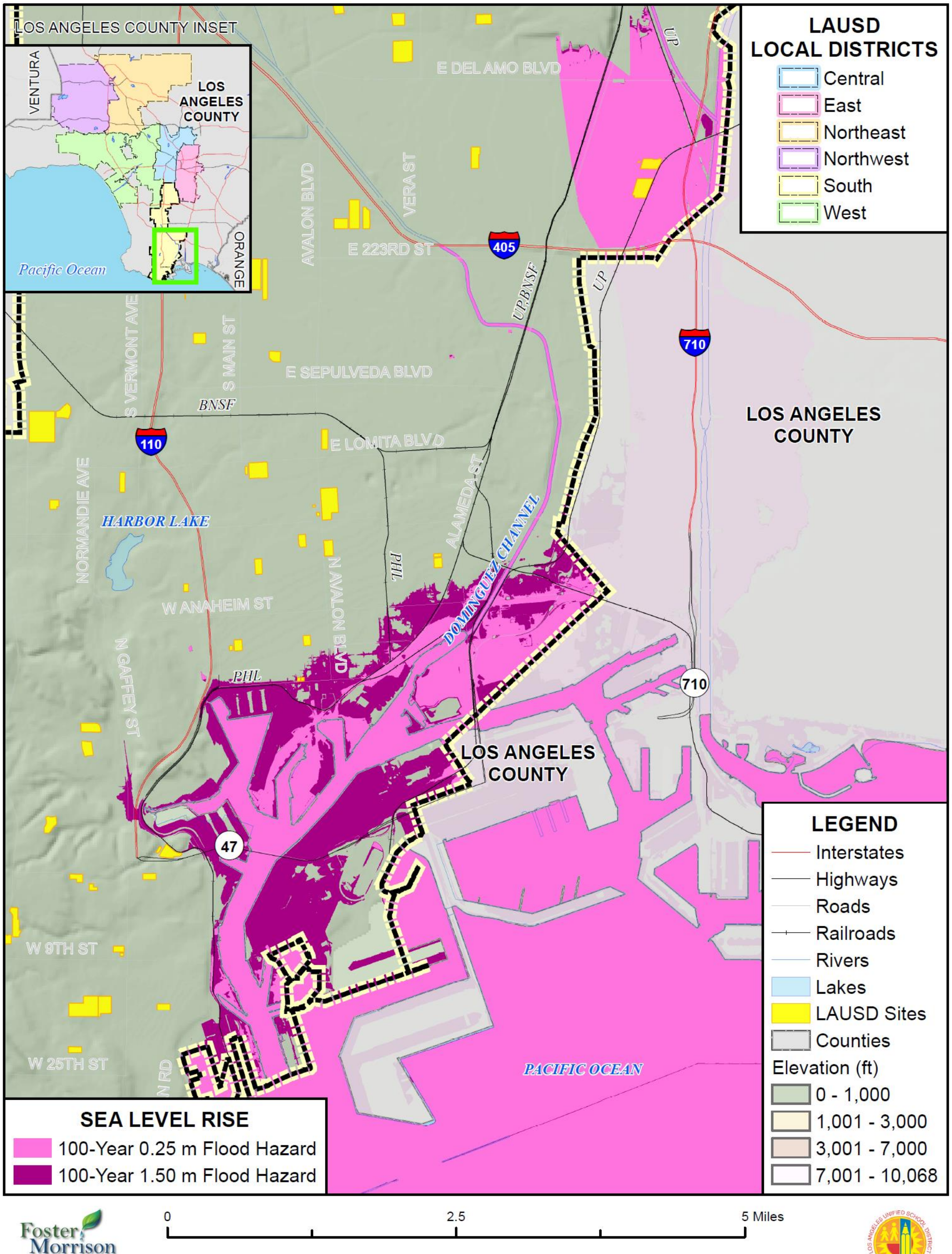
Source: CoSMoS 3.0, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

*Table 4-57 LAUSD – Local District Sea Level Rise (1.5m Scenario) without Storm Surge (0-year storm) Values at Risk by Site Type*

| Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Local District South | | | | | | |
| Elementary School | 3 | $687,406 | 20 | $21,261,462 | $0 | $21,948,868 |
| Senior High School | 1 | $0 | 15 | $91,979,069 | $91,979,069 | $183,958,138 |
| **South Total** | **4** | **$687,406** | **35** | **$113,240,531** | **$113,240,531** | **$227,168,468** |
| Local District West | | | | | | |
| Elementary School | 5 | $2,890,425 | 63 | $87,879,687 | $87,879,687 | $178,649,798 |
| Middle School | 2 | $3,359,564 | 42 | $67,698,697 | $67,698,697 | $138,756,957 |
| Span Middle School (i.e Grades K-8) | 2 | $1,649,204 | 16 | $11,297,656 | $11,297,656 | $24,244,517 |
| **West Total** | **9** | **$7,899,193** | **121** | **$166,876,039** | **$166,876,039** | **$341,651,272** |
| | | | | | | |
| **Grand Total** | **13** | **$8,586,599** | **156** | **$280,116,570** | **$280,116,570** | **$568,819,740** |

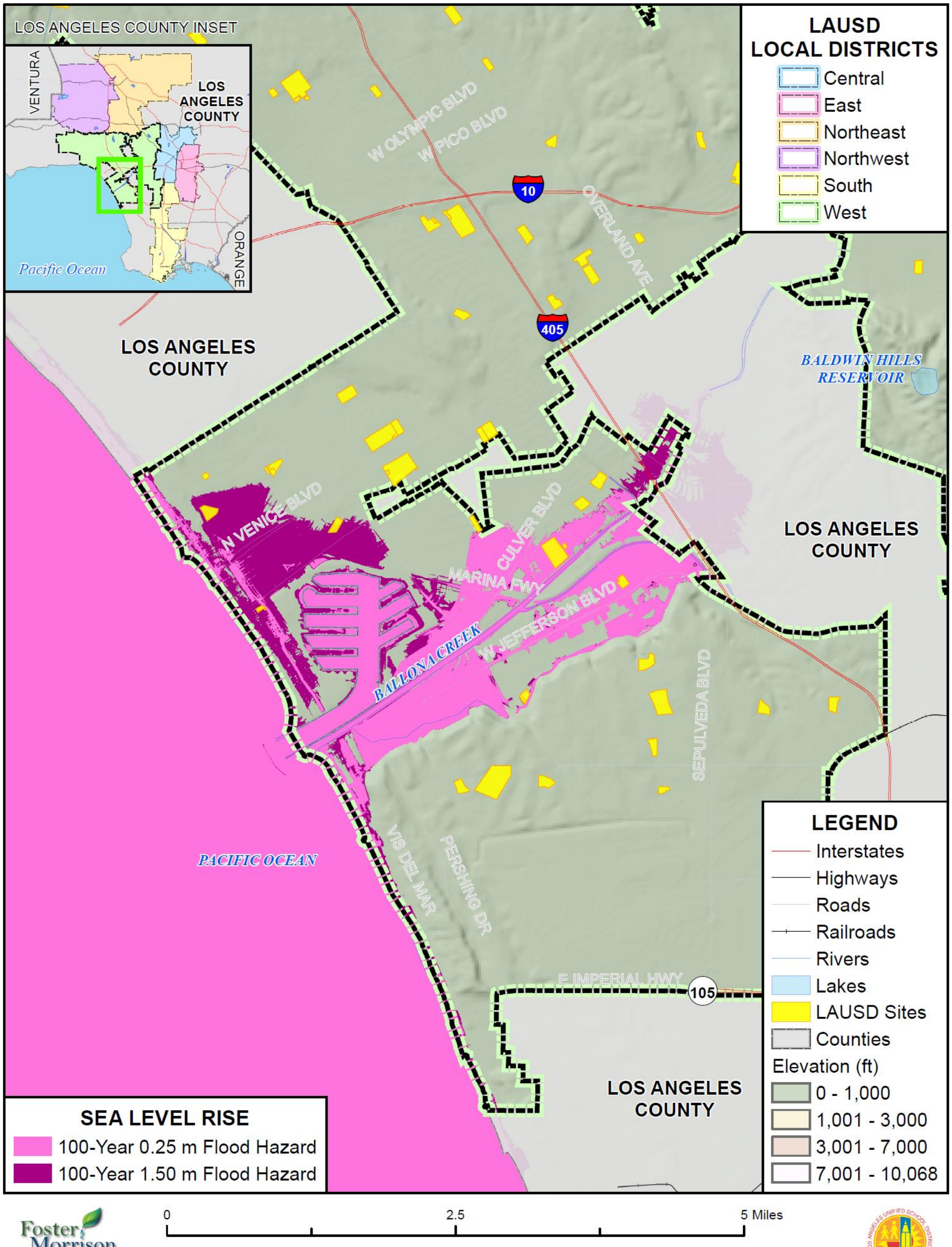
Source: CoSMoS 3.0, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

*Figure 4-49 LAUSD – Local District South Sea Level Rise Scenarios with Storm Surge (100-year storm)*




Data Source: Coastal Storm Modeling System for Southern California (CoSMoS 3.0) Phase2 2017, LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

*Figure 4-50 LAUSD – Local District West Sea Rise Scenarios with Storm Surge (100-year storm)*




Data Source: Coastal Storm Modeling System for Southern California (CoSMoS 3.0) Phase2 2017, LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

*Table 4-58 LAUSD – Local District Sea Level Rise (0.25m Scenario) with Storm Surge (100-year storm) Values at Risk By Site Type*

| Local District/Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Local District South | | | | | | |
| Elementary School | 3 | $687,406 | 20 | $21,261,462 | $0 | $21,948,868 |
| Senior High School | 1 | $0 | 15 | $91,979,069 | $91,979,069 | $183,958,138 |
| **South Total** | **4** | **$687,406** | **35** | **$113,240,531** | **$113,240,531** | **$227,168,468** |
| Local District West | | | | | | |
| Elementary School | 3 | $1,124,629 | 30 | $49,130,996 | $49,130,996 | $99,386,620 |
| Middle School | 2 | $3,359,564 | 42 | $67,698,697 | $67,698,697 | $138,756,957 |
| **West Total** | **5** | **$4,484,193** | **72** | **$116,829,692** | **$116,829,692** | **$238,143,577** |
| | | | | | | |
| **Grand Total** | **9** | **$5,171,599** | **107** | **$230,070,223** | **$230,070,223** | **$465,312,045** |

Source: CoSMoS 3.0, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

*Table 4-59 LAUSD – Local District Sea Level Rise (1.5m Scenario) with Storm Surge (100-year storm) Values at Risk by Site Type*

| Local District/Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Local District South | | | | | | |
| Elementary School | 3 | $687,406 | 20 | $21,261,462 | $0 | $21,948,868 |
| Senior High School | 1 | $0 | 15 | $91,979,069 | $91,979,069 | $183,958,138 |
| **South Total** | **4** | **$687,406** | **35** | **$113,240,531** | **$113,240,531** | **$227,168,468** |
| Local District West | | | | | | |
| Elementary School | 6 | $3,003,781 | 63 | $87,879,687 | $87,879,687 | $178,763,154 |
| Middle School | 2 | $3,359,564 | 42 | $67,698,697 | $67,698,697 | $138,756,957 |
| Span Middle School (i.e. Grades K-8) | 2 | $1,649,204 | 16 | $11,297,656 | $11,297,656 | $24,244,517 |
| **West Total** | **10** | **$8,012,549** | **121** | **$166,876,039** | **$166,876,039** | **$341,764,628** |
| | | | | | | |
| **Grand Total** | **14** | **$8,699,955** | **156** | **$280,116,570** | **$280,116,570** | **$568,933,096** |

Source: CoSMoS 3.0, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

## Population at Risk

A separate analysis was performed to determine the LAUSD population (enrollments) in sea level rise areas. Enrollments by facility were provided by LAUSD. Using GIS, the sea level rise scenarios, with and without storm surge, were overlayed on the LAUSD facility layer. Results were tabulated and are shown in Table 4-60 by sea level rise scenario, with and without storm surge.

*Table 4-60 LAUSD – Total Enrollment at Risk to Sea Level Rise Scenarios with and without Storm Surge*

| Local District | Total Enrollment |
|---|---|
| 0.25m Scenario without Storm Surge (0-year storm) | |
| South | 1,344 |
| West | 884 |
| **Total** | **2,228** |
| 1.5m Scenario without Storm Surge (0-year storm) | |
| South | 1,344 |
| West | 3,156 |
| **Total** | **4,500** |
| 0.25m Scenario with Storm Surge (100-year storm) | |
| South | 1,344 |
| West | 1,760 |
| **Total** | **3,104** |
| 1.5m Scenario with Storm Surge (100-year storm) | |
| South | 1,344 |
| West | 3,156 |
| **Total** | **4,500** |

Source: CoSMoS; LAUSD

To give further detail on populations of enrolled students in the sea level rise scenario areas, enrolled populations in these areas were broken out by Local District site types. This can be seen for the South (Table 4-61) and West (Table 4-62), which are the only two districts expected to be affected.

*Table 4-61 LAUSD – Local District South Enrollment in Sea Level Rise Scenario Areas with and without Storm Surge*

| Site Type | Total Enrollment |
|---|---|
| 0.25m Scenario without Storm Surge (0-year storm) | |
| Elementary School | 497 |
| Senior High School | 847 |
| **Total** | **1,344** |

| Site Type | Total Enrollment |
|---|---|
| 1.5m Scenario without Storm Surge (0-year storm) | |
| Elementary School | 497 |
| Senior High School | 847 |
| **Total** | **1,344** |
| 0.25m Scenario with Storm Surge (100-year storm) | |
| Elementary School | 497 |
| Senior High School | 847 |
| **Total** | **1,344** |
| 1.5m Scenario with Storm Surge (100-year storm) | |
| Elementary School | 497 |
| Senior High School | 847 |
| **Total** | **1,344** |

Source: Cal OES; LAUSD

### *Table 4-62 LAUSD – Local District West Enrollment in Sea Level Rise Scenario Areas with and without Storm Surge*

| Site Type | Total Enrollment |
|---|---|
| 0.25m Scenario without Storm Surge (0-year storm) | |
| Elementary School | 278 |
| Middle School | 606 |
| **Total** | **884** |
| 1.5m Scenario without Storm Surge (0-year storm) | |
| Elementary School | 2,166 |
| Middle School | 606 |
| Span Middle School (i.e. Grades K-8) | 384 |
| **Total** | **3,156** |
| 0.25m Scenario with Storm Surge (100-year storm) | |
| Elementary School | 1,154 |
| Middle School | 606 |
| **Total** | **1,760** |
| 1.5m Scenario with Storm Surge (100-year storm) | |
| Elementary School | 2,166 |
| Middle School | 606 |
| Span Middle School (i.e. Grades K-8) | 384 |
| **Total** | **3,156** |

Source: Cal OES; LAUSD

### Overall District Impact

Sea level rise floods (both with and without storm surge) and their impacts vary by location and severity of event and will likely only affect certain areas of the District during specific times. Based on the risk assessment, it is evident that sea level rise has the potential to put lives and property at risk and would likely include devastating economic impacts to certain areas of the LAUSD Planning Area. Impacts that are not always quantified, but can be anticipated, include:

- Injury and loss of life;
- Disruption of and damage to school facilities, infrastructure and services;
- Health hazards associated with mold and mildew, contamination of drinking water, etc.;
- Damage to roads/bridges resulting in loss of mobility and access to school facilities;
- Significant economic impact (jobs, sales, tax revenue) to the District associated with interruption to the school year;
- Impact to families of students that may have find alternative child care during disruptions;
- Significant disruption to students and teachers as temporary facilities and relocations would likely be needed, including addressing transportation needs for families having to attend out of area schools
- Added stress and impact on the overall mental health of the community.

## *Future Development (Climate Change and Sea Level Rise)*

Los Angeles County and the LAUSD Planning Area in general could see population fluctuations as a result of climate impacts relative to those experienced in other regions, and these fluctuations are expected to impact demand for housing and other development. This could affect the tax base that is used to fund the Los Angeles Unified School District. Schools in the sea level rise areas may need to be relocated. Other interior western states may experience an exodus of population due to challenges in adapting to heat even more extreme than that which is projected to occur here. While there are currently no formal studies of specific migration patterns expected to impact the Los Angeles County region and District Planning Area, climate-induced migration was recognized within the UNFCCC Conference of Parties Paris Agreement of 2015 and is expected to be the focus of future studies.

**Climate change and sea level rise, coupled with shifting demographics and market conditions, could impact both the location of desired developments and the nature of development**. Demand may increase for smaller dwellings that are less resource intensive, more energy efficient, easier to maintain and can be more readily adapted or even moved in response to changing conditions. Compact, mixed-use and infill developments that can help residents avoid long commutes and vulnerabilities associated with the transportation system will likely continue to grow in popularity. The value of open space and pressure to preserve it will likely increase, due in part to its restorative, recreational, environmental and habitat benefits but also for its ability to sequester carbon, help mitigate the accumulation of greenhouse gas in the atmosphere and slow down the global warming trend. Higher flood risks, especially if coupled with increased federal flood insurance rates, may decrease market demand for housing and other types of development in floodplains, while increased risk of wildfires may do the same for new developments in the urban-wildland interface. Flood risks may also inspire new development and building codes that elevate structures while maintaining streetscapes and neighborhood characteristics. Shifting demographics could affect the enrollment of LAUSD as a whole, or could have smaller local effects.

**Climate change and sea level rise will stress water resources**. Water is an issue in every region, but the nature of the potential impacts varies. Drought, related to reduced precipitation, increased evaporation, and increased water loss from plants, is an important issue in many U.S. regions, especially in the West. Floods, water quality problems, and impacts on aquatic ecosystems and species are likely to be amplified by climate change.

**Similarly, protecting and enhancing water supply will also need to be addressed**. California's Sustainable Groundwater Management Act (SGMA) will contribute to addressing groundwater and aquifer recharge needs. Good groundwater management will provide a buffer against drought and climate change, and contribute to reliable water supplies regardless of weather patterns. California depends on groundwater for a major portion of its annual water supply, and sustainable groundwater management is essential to a reliable and resilient water system. Protection of critical recharge areas should be addressed across the County in the respective Groundwater Management Plans. Further, these plans should include provisions that guide development or curtail development in areas that would harm or compromise recharge areas.

**Climate change and sea level rise will affect transportation**. The transportation network is vital to the county and the region's economy, safety, and quality of life. While it is widely recognized that emissions from transportation have impacts on climate change, climate will also likely have significant impacts on transportation infrastructure and operations. Examples of specific types of impacts include softening of asphalt roads and warping of railroad rails; damage to roads; flooding of roadways, rail routes, and airports from extreme events; and interruptions to flight plans due to severe weather. Climate change impacts considered in the plan include: extreme temperatures; increased precipitation, runoff and flooding; increased wildfires; and landslides. Although landslides are not a direct result of climate change, these events are expected to increase in frequency due to increased rainfall, runoff, and wildfire. These events have the potential to cause injuries or fatalities, environmental damage, property damage, infrastructure damage, and interruption of operations of the District.

**Climate change and sea level rise will affect land uses and planning**. Climate change coupled with shifting demographics and market conditions, could impact both the location of desired developments and the nature of development. Demand may increase for smaller dwellings that are less resource intensive, more energy efficient, easier to maintain and can be more readily adapted or even moved in response to changing conditions. Compact, mixed-use and infill developments that can help residents avoid long commutes and vulnerabilities associated with the transportation system will likely continue to grow in popularity. The value of open space, urban greening, green infrastructure, tree canopy expansion and pressure to preserve it will likely increase, due in part to its restorative, recreational, environmental, and habitat, and physical and mental health benefits but also for its ability to sequester carbon and cool the surrounding environment. Shifting demographics could affect the enrollment of LAUSD as a whole, or could have smaller local effects.

**Climate change and sea level rise will affect utilities**. California is already experiencing impacts from climate change such as an increased number of wildfires, sea level rise, and severe drought. Utility efforts to deal with these impacts range from emergency and risk management protocols to new standards for infrastructure design and new resource management techniques. Utilities are just beginning to build additional resilience and redundancy into their infrastructure investments from a climate adaptation perspective, but have been doing so from an overall safety and reliability perspective for decades. Grid infrastructure problems could affect the District.

**Addressing Heat Events**. During heat waves in Los Angeles County, a heat alert is issued and news organizations are provided with tips on how vulnerable people can protect themselves. ARE SCHOOLS USED AS COOLING CENTERS? ARE ALL SCHOOLS AIR CONDITIONED?

In California, development decisions affecting coastal areas are regulated at the state, regional, and local levels. The State Department of Parks and Recreation has jurisdiction over more than 300 miles of California coastline and implements a Coastal Erosion Policy to avoid construction of new structures or coastal facilities in areas subject to ocean wave erosion, sea cliff retreat, and unstable cliffs. The California Coastal Commission mandates the local preparation of Local Coastal Programs (LCPs), which are required to implement state Coastal Act policies (subject to review and approval by the Coastal Commission). LAUSD will work with local agencies, Los Angeles County and several State Agencies and Departments for the future development of LAUSD properties along the coastline.

## 4.3.4. Dam Failure Vulnerability Assessment

This hazard varies across the LAUSD Planning Area. Table 4-63 breaks out how dam failure vulnerability varies by Local District.

*Table 4-63 LAUSD – Dam Failure Vulnerability by Local District*

| LAUSD Planning Area/ Local Districts | Geographic Extent | Magnitude/ Severity | Probability of Future Occurrences | Significance | Vulnerability |
|---|---|---|---|---|---|
| Central | Extensive | Critical | Occasional | High | High |
| East | Extensive | Limited | Occasional | Medium | Medium |
| Northeast | Extensive | Critical | Occasional | High | High |
| Northwest | Extensive | Limited | Occasional | Medium | Medium |
| South | Extensive | Critical | Occasional | Medium | Medium |
| West | Extensive | Critical | Occasional | High | High |

Source: LAUSD

Dam failure flooding can occur as the result of partial or complete collapse of an impoundment. Dam failures often result from prolonged rainfall and flooding. The primary danger associated with dam failure is the high velocity flooding of those properties downstream of the dam. A dam failure can range from a small, uncontrolled release to a catastrophic failure. Vulnerability to dam failures is confined to the areas subject to inundation downstream of the facility. Secondary losses would include loss of the multi-use functions of the facility and associated revenues that accompany those functions.

Dam failure flooding would vary by Local District depending on which dam fails and the nature and extent of the dam failure and associated flooding. Based on the risk assessment, it is apparent that a major dam failure could have a devastating impact on the District. Dam failure flooding presents a threat to life (enrolled populations) and property, including buildings, their contents, and their use. Large flood events can affect lifeline utilities (e.g., water, sewerage, and power), transportation, jobs, tourism, the environment, and the local and regional economies.

As detailed in Section 4.2.6, the District is vulnerable to multiple dams. 110 dams are located in the County, but only 60 have mapped inundation areas. It should be noted that, of the 60 dams, 21 dams have mapped inundation areas that intersect the District Planning Area boundaries, but do not directly affect District facilities. These dams are not analyzed in this LHMP Update. The 21 dams are:

- 10 MG Walteria
- 10th and Western
- 18 MG Walteria
- Big Tajunga No 1
- Brand Park
- Chevy Chase
- Chevy Chase 1290
- Diederich Res
- East Glorietta
- Elysian
- Garvey Reservoir
- Glenoaks 968 Res
- Green Verdugo
- Greystone Reservoir
- Laguna Regulating Basin
- Reservoir No 1
- Reservoir No 4
- Reservoir No 5
- Riviera Reservoir
- Santa Ynez Canyon
- Upper Franklin

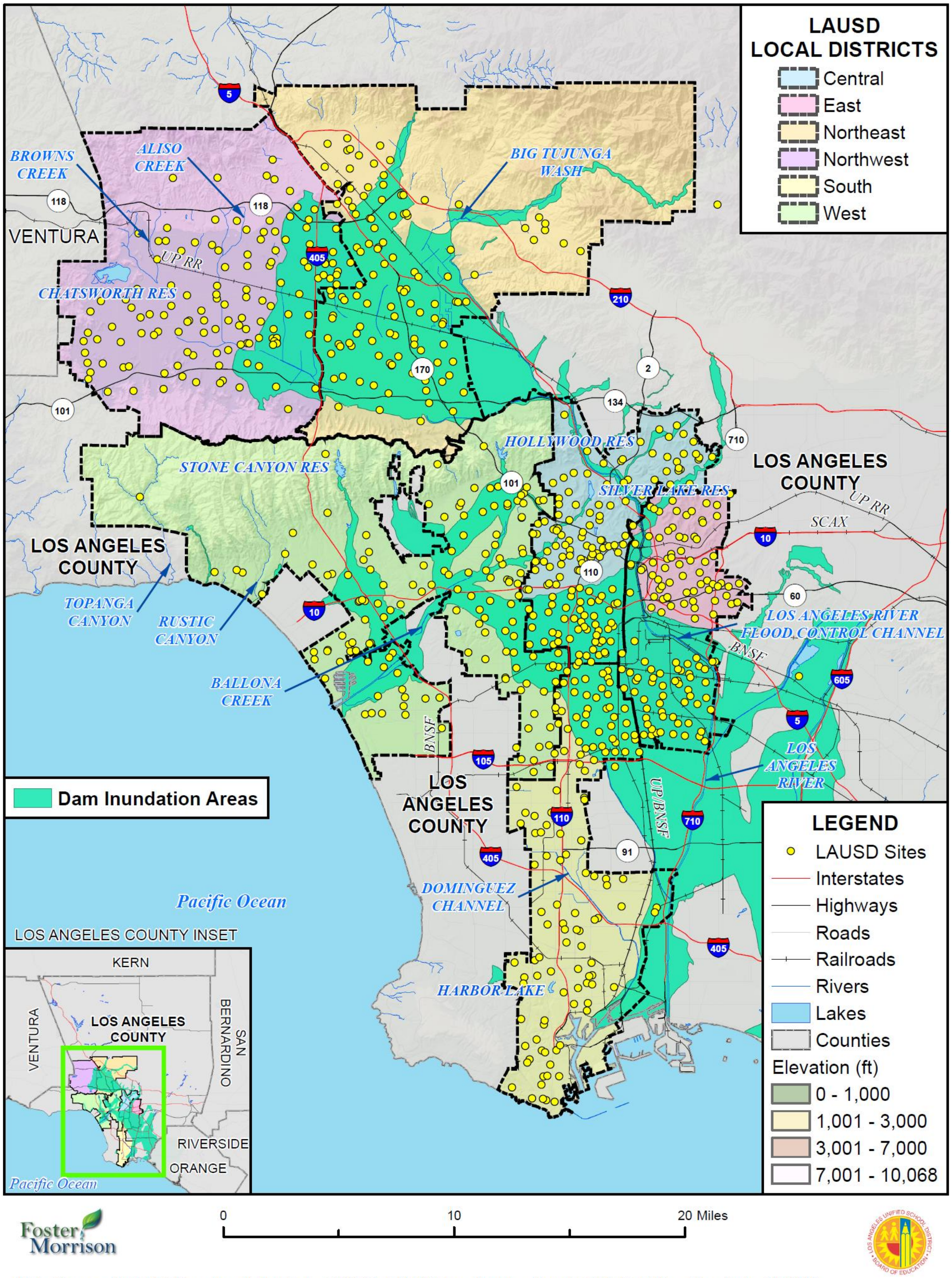
The 13 dams with inundation areas that affect District facilities are:

- Devils Gate
- Eagle Rock
- Encino
- Hansen
- Los Angeles Reservoir
- Lower Franklin
- Lower San Fernando
- Mulholland
- Pacoima
- Sepulveda
- Silver Lake
- Stone Canyon
- Whittier Narrows

## *Values at Risk*

The LAUSD Planning Area contains dam inundation areas. Dam inundation areas, as obtained from Cal OES, were used as the basis of this dam inundation analysis. This section includes summary tables by Local District for the LAUSD Planning Area and tables broken out by Local District and Site Type, while Appendix ?? includes detailed tables by Local District and Site Type with details on specific facilities affected. Figure 4-51 shows the dam inundation areas of these 13 dams of concern for the District. The depth of flooding due to the failure of a dam is unknown and will be based on the nature and magnitude of the dam failure event. It should be noted that this analysis is not dam specific and is based collectively on dam inundation areas from all 13 dams. Using this approach LAUSD facilities were determined to be in or outside of a dam inundation area.

*Figure 4-51 LAUSD – Dam Inundation Areas (13 Dams of Concern)*




Data Source: Cal OES Dam Inundation Data 10/2017, LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

### Methodology and Results

LAUSD's facilities database, including information on building replacement values, was used as the basis for the inventory of all facilities within LAUSD. The County's Assessor's data and parcel layer was joined to the facilities database to obtain information on assessed land values and to create a parcel inventory of LAUSD properties. As previously described, CRVs were calculated and added to building replacement values and the assessed land values, to determine the overall potential values at risk. GIS was used to overlay the dam inundation area onto the parcel layer polygons, and where the inundation area intersected a parcel polygon, it was determined whether each parcel was inside or outside a dam inundation area. In some cases there are parcels within and outside of the dam inundation areas. GIS was used to overlay the parcel polygon data onto the dam inundation areas to determine which parcels were within the inundation areas. For the purposes of this analysis, the parcel polygon that intersected an inundation area was assigned within or outside of the dam inundation area for the entire parcel. The parcels were segregated and analyzed in this fashion for the LAUSD planning area.

#### Limitations

Actual losses during any inundation event will be related to a number of potential factors including inundation depth, velocity, and building type and construction. The District had identified 13 dam inundation areas of concern that had inundation areas that intersected with LAUSD facilities. With the Cal OES data, an analysis of these dam inundation areas was performed. As previously described not every dam in the County has a Cal OES dam inundation layer available. The risk of dam failure may be higher than analyzed, due to these missing inundation layers. Table 4-64 shows the parcel count, building count, and values at risk by Local District for the LAUSD Planning Area.

*Table 4-64 LAUSD – Local Districts Summary of Dam Inundation Areas Values at Risk*

| LAUSD Local Districts | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| **Inside Local District Areas** | | | | | | |
| Central | 494 | $127,697,883 | 853 | $4,772,931,783 | $4,772,931,783 | $9,673,561,449 |
| East | 785 | $59,111,816 | 1,154 | $2,491,539,051 | $2,491,539,051 | $5,042,189,918 |
| Northeast | 210 | $76,255,939 | 2,363 | $2,997,574,137 | $2,997,574,137 | $6,071,404,213 |
| Northwest | 63 | $19,720,986 | 1,010 | $1,156,986,501 | $1,156,986,501 | $2,333,693,989 |
| South | 325 | $37,416,447 | 868 | $1,707,815,630 | $1,707,815,630 | $3,453,047,707 |
| West | 244 | $96,534,962 | 1,091 | $2,154,114,511 | $2,154,114,511 | $4,404,763,985 |
| **Inside Areas Total** | **2,121** | **$416,738,033** | **7,339** | **$15,280,961,614** | **$15,280,961,614** | **$30,978,661,261** |
| **Outside of Local District Areas** | | | | | | |
| Outside of Areas | 7 | $6,025,565 | 25 | $251,772,284 | $251,772,284 | $509,570,132 |
| **Outside of Areas Total** | **7** | **$6,025,565** | **25** | **$251,772,284** | **$251,772,284** | **$509,570,132** |

| LAUSD Local Districts | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| | | | | | | |
| **Grand Total** | **3,728** | **$891,486,920** | **16,547** | **$30,589,892,192** | **$30,589,892,192** | **$62,071,271,305** |

Source: Cal OES, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

Dam inundation maps and analysis was broken out for the LAUSD by Local District and site type. These maps and tables show the parcels, building, contents, and values for the following Local Districts:

- Central (Figure 4-52 and Table 4-65)
- East (Figure 4-53and Table 4-66)
- Northeast (Figure 4-54 and Table 4-67)
- Northwest (Figure 4-55 and Table 4-68)
- South (Figure 4-56 and Table 4-69)
- West (Figure 4-57 and Table 4-70)
- Outside Local District (Table 4-71)

These tables are not specific to any one dam failure event but reflects the total number of affected parcels falling either in or outside of the inundation areas associated with all 13 dams with available inundation data.

*Figure 4-52 LAUSD – Local District Central Dam Inundation Areas*

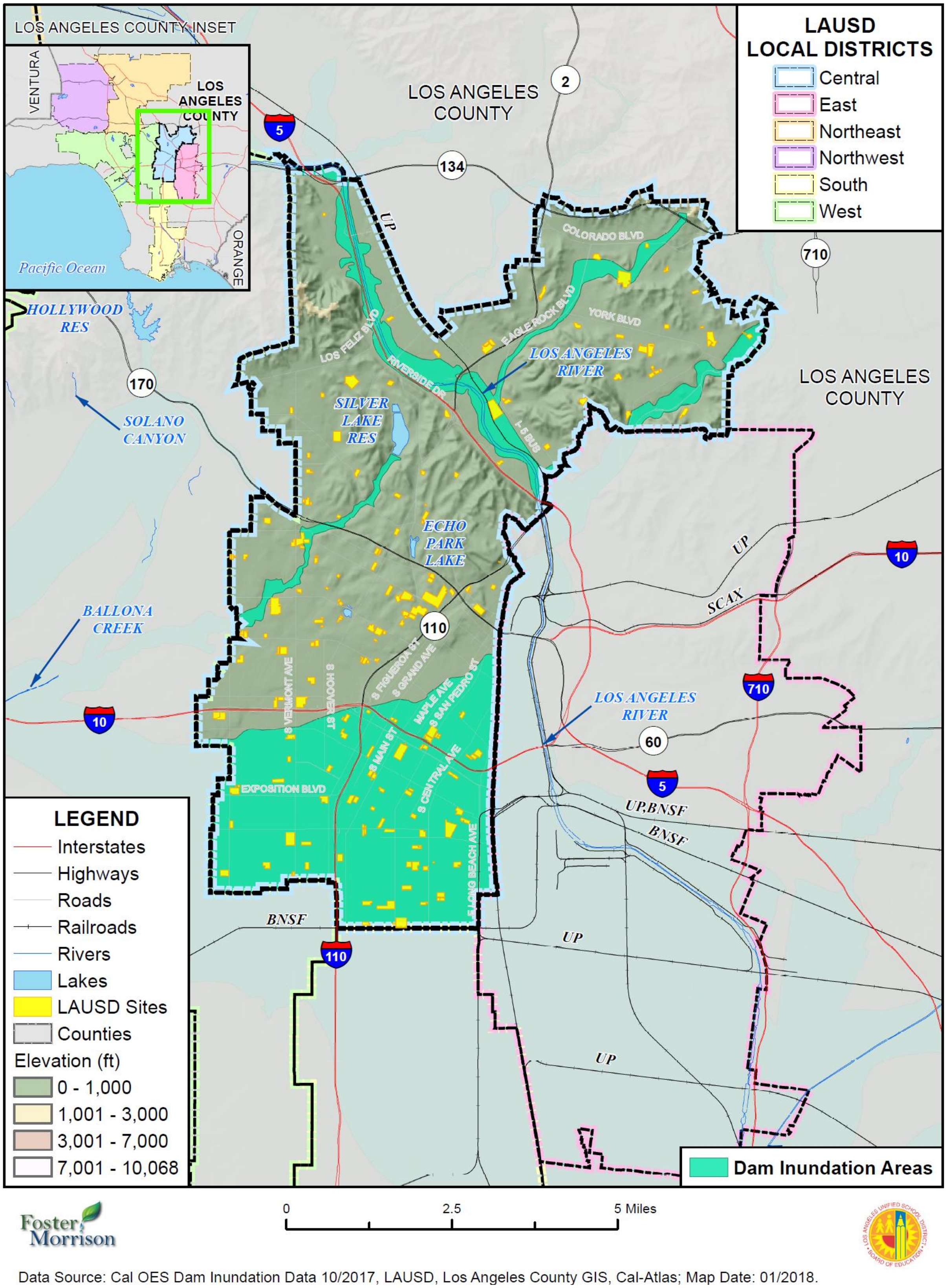
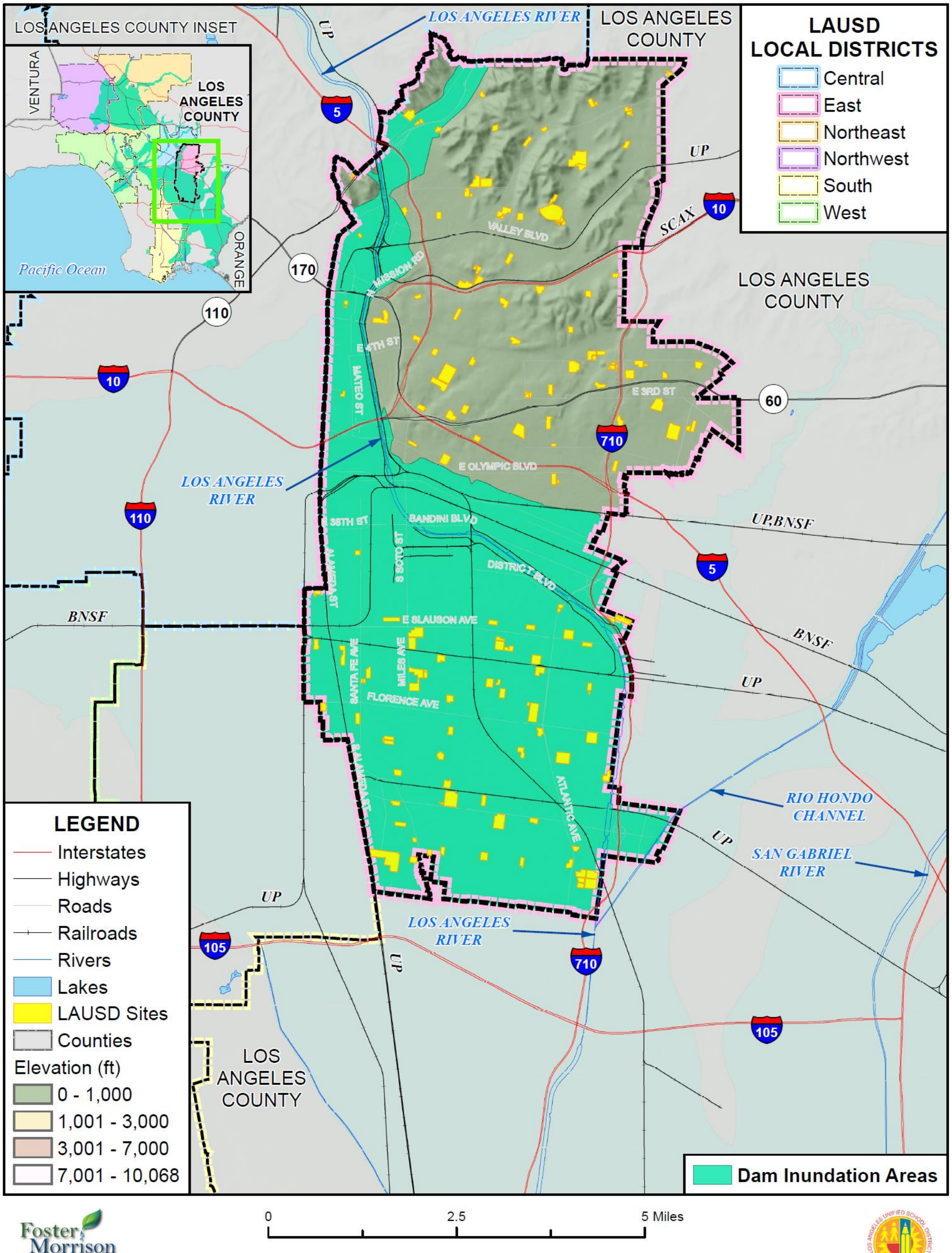


*Table 4-65 LAUSD – Local District Central Dam Inundation Areas Values at Risk by Site Type*

| Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Admin Facility | 11 | $6,340,088 | 33 | $1,939,290,700 | $1,939,290,700 | $3,884,921,488 |
| Adult Education Facility | 2 | $438,066 | 3 | $208,733,116 | $208,733,116 | $417,904,298 |
| Charter School | 23 | $2,691,373 | 7 | $43,573,968 | $43,573,968 | $89,839,310 |
| Continuation High School | 1 | $0 | 9 | $20,410,184 | $20,410,184 | $40,820,369 |
| Early Education Center | 3 | $225,118 | 3 | $2,038,690 | $2,038,690 | $4,302,497 |
| Elementary School | 287 | $23,916,159 | 388 | $1,052,194,431 | $1,052,194,431 | $2,128,305,021 |
| Middle School | 106 | $29,849,746 | 102 | $500,422,492 | $500,422,492 | $1,030,694,731 |
| Senior High School | 52 | $62,724,952 | 226 | $887,848,977 | $887,848,977 | $1,838,422,907 |
| Span High School (i.e. Grades K-12) | 8 | $1,397,102 | 65 | $108,594,905 | $108,594,905 | $218,586,912 |
| Span Middle School (i.e. Grades K-8) | 1 | $115,279 | 17 | $9,824,319 | $9,824,319 | $19,763,917 |
| **Central Total** | **494** | **$127,697,883** | **853** | **$4,772,931,783** | **$4,772,931,783** | **$9,673,561,449** |

Source: Cal OES, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

*Figure 4-53 LAUSD – Local District East Dam Inundation Areas*



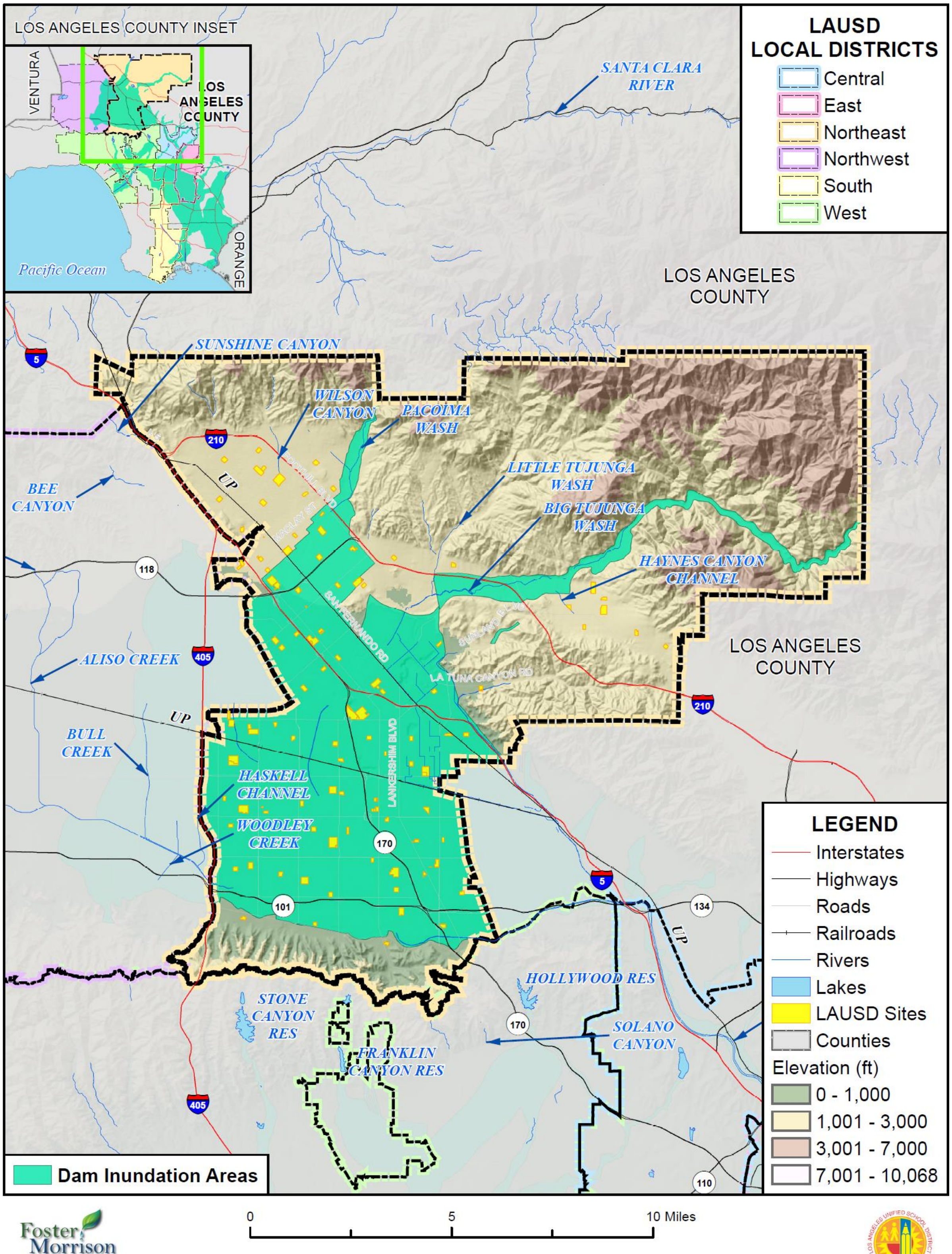

Data Source: Cal OES Dam Inundation Data 10/2017, LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

### *Table 4-66 LAUSD – Local District East Dam Inundation Areas Values at Risk by Site Type*

| Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Admin Facility | 3 | $840,302 | 20 | $10,879,972 | $10,879,972 | $22,600,245 |
| Adult Education Facility | 2 | $0 | 5 | $30,336,919 | $30,336,919 | $60,673,838 |
| Continuation High School | 1 | $0 | 7 | $6,199,487 | $6,199,487 | $12,398,974 |
| Elementary School | 488 | $30,774,227 | 578 | $1,196,911,961 | $1,196,911,961 | $2,424,598,148 |
| Middle School | 77 | $3,228,072 | 190 | $375,545,253 | $375,545,253 | $754,318,579 |
| Senior High School | 200 | $22,788,282 | 292 | $805,532,230 | $805,532,230 | $1,633,852,742 |
| Span High School (i.e. Grades K-12) | 14 | $1,480,933 | 62 | $66,133,229 | $66,133,229 | $133,747,391 |
| **East Total** | **785** | **$59,111,816** | **1,154** | **$2,491,539,051** | **$2,491,539,051** | **$5,042,189,918** |

Source: Cal OES, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

*Figure 4-54 LAUSD – Local District Northeast Dam Inundation Areas*



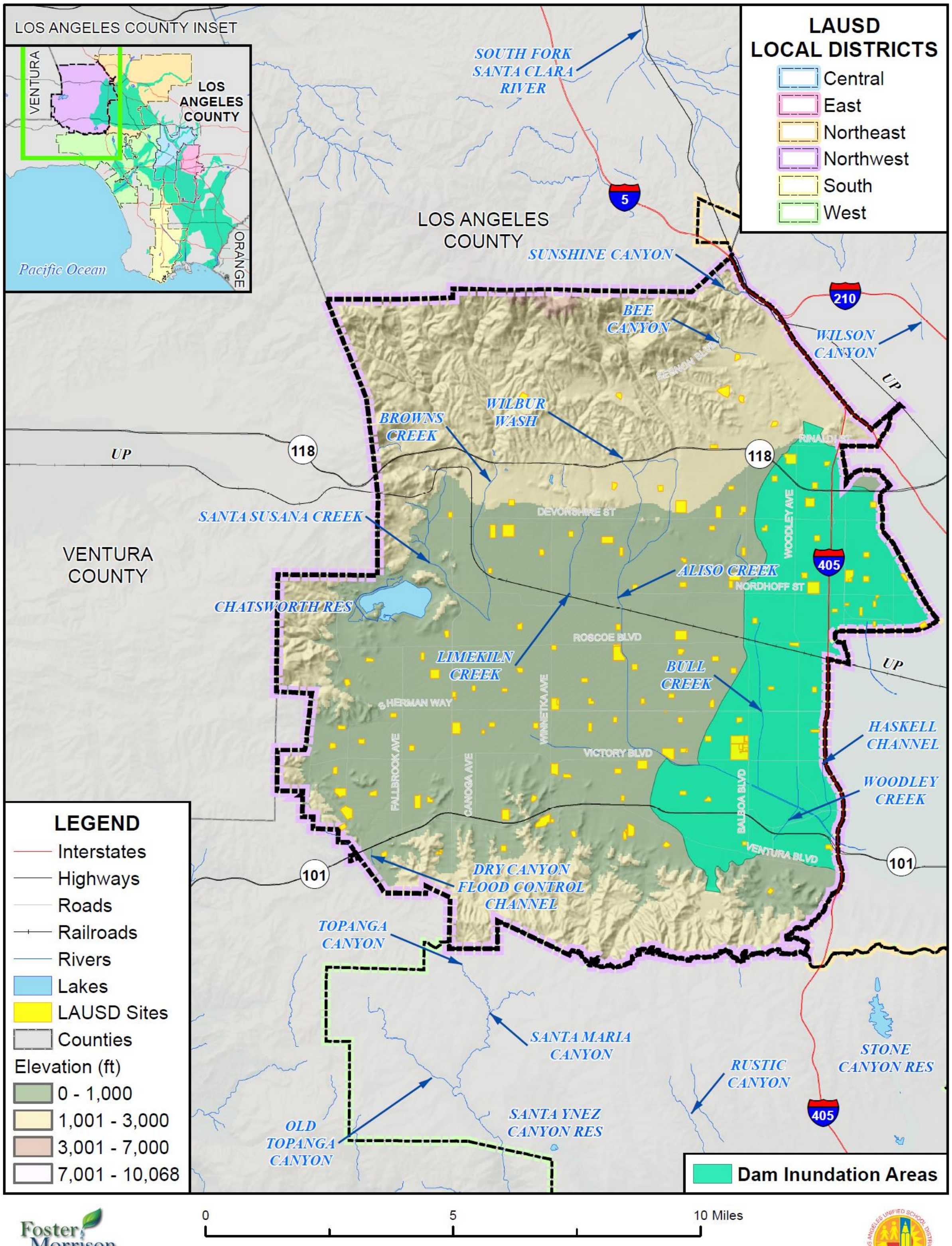

Data Source: Cal OES Dam Inundation Data 10/2017, LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

*Table 4-67 LAUSD – Local District Northeast Dam Inundation Areas Values at Risk by Site Type*

| Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Admin Facility | 6 | $1,307,581 | 36 | $21,067,878 | $21,067,878 | $43,443,337 |
| Charter School | 3 | $382,206 | 84 | $40,380,848 | $40,380,848 | $81,143,903 |
| Community Day School | 1 | $21,532 | 2 | $466,236 | $466,236 | $954,005 |
| Continuation High School | 2 | $46,847 | 4 | $1,843,111 | $1,843,111 | $3,733,070 |
| Early Education Center | 2 | $49,926 | 8 | $6,577,296 | $6,577,296 | $13,204,518 |
| Elementary School | 122 | $17,512,583 | 1,279 | $1,091,400,984 | $1,091,400,984 | $2,200,314,552 |
| Middle School | 29 | $21,639,510 | 376 | $683,921,852 | $683,921,852 | $1,389,483,215 |
| Senior High School | 44 | $35,116,431 | 552 | $1,127,016,369 | $1,127,016,369 | $2,289,149,168 |
| Special Education Center | 1 | $179,323 | 22 | $24,899,561 | $24,899,561 | $49,978,445 |
| **Northeast Total** | **210** | **$76,255,939** | **2,363** | **$2,997,574,137** | **$2,997,574,137** | **$6,071,404,213** |

Source: Cal OES, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

*Figure 4-55 LAUSD – Local District Northwest Dam Inundation Areas*



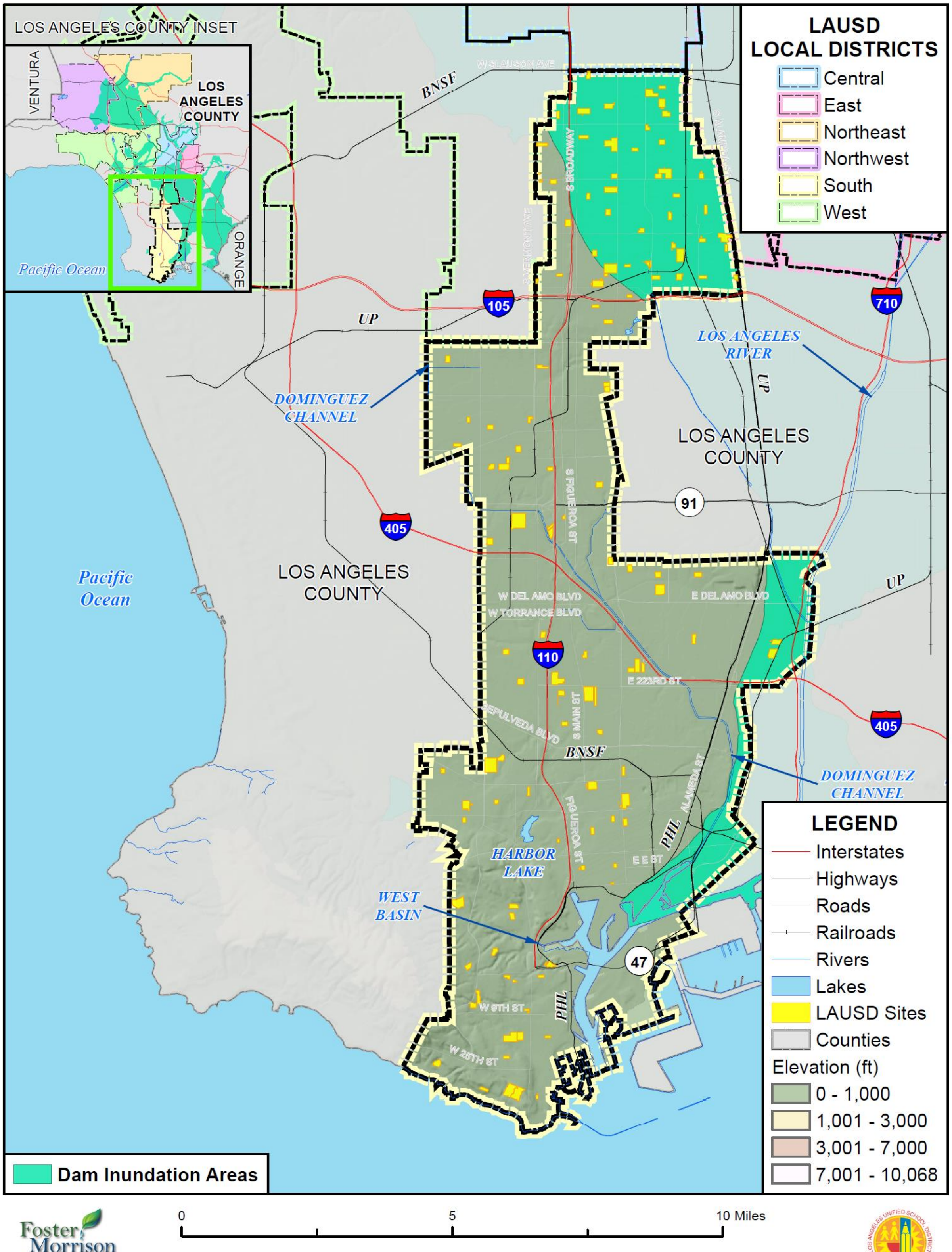

Data Source: Cal OES Dam Inundation Data 10/2017, LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

*Table 4-68 LAUSD – Local District Northwest Dam Inundation Areas Values at Risk by Site Type*

| Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Admin Facility | 4 | $1,001,556 | 46 | $49,417,446 | $49,417,446 | $99,836,448 |
| Charter School | 1 | $3,861,166 | 56 | $85,201,504 | $85,201,504 | $174,264,175 |
| Continuation High School | 1 | $63,795 | 3 | $1,625,891 | $1,625,891 | $3,315,576 |
| Elementary School | 46 | $8,180,429 | 576 | $516,396,034 | $516,396,034 | $1,040,972,497 |
| Middle School | 3 | $2,942,898 | 136 | $208,598,032 | $208,598,032 | $420,138,962 |
| Senior High School | 6 | $2,915,137 | 145 | $266,211,772 | $266,211,772 | $535,338,681 |
| Span High School (i.e. Grades K-12) | 1 | $383,263 | 28 | $13,849,762 | $13,849,762 | $28,082,788 |
| Special Education Center | 1 | $372,741 | 20 | $15,686,061 | $15,686,061 | $31,744,862 |
| **Northwest Total** | **63** | **$19,720,986** | **1,010** | **$1,156,986,501** | **$1,156,986,501** | **$2,333,693,989** |

Source: Cal OES, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

*Figure 4-56 LAUSD – Local District South Dam Inundation Areas*



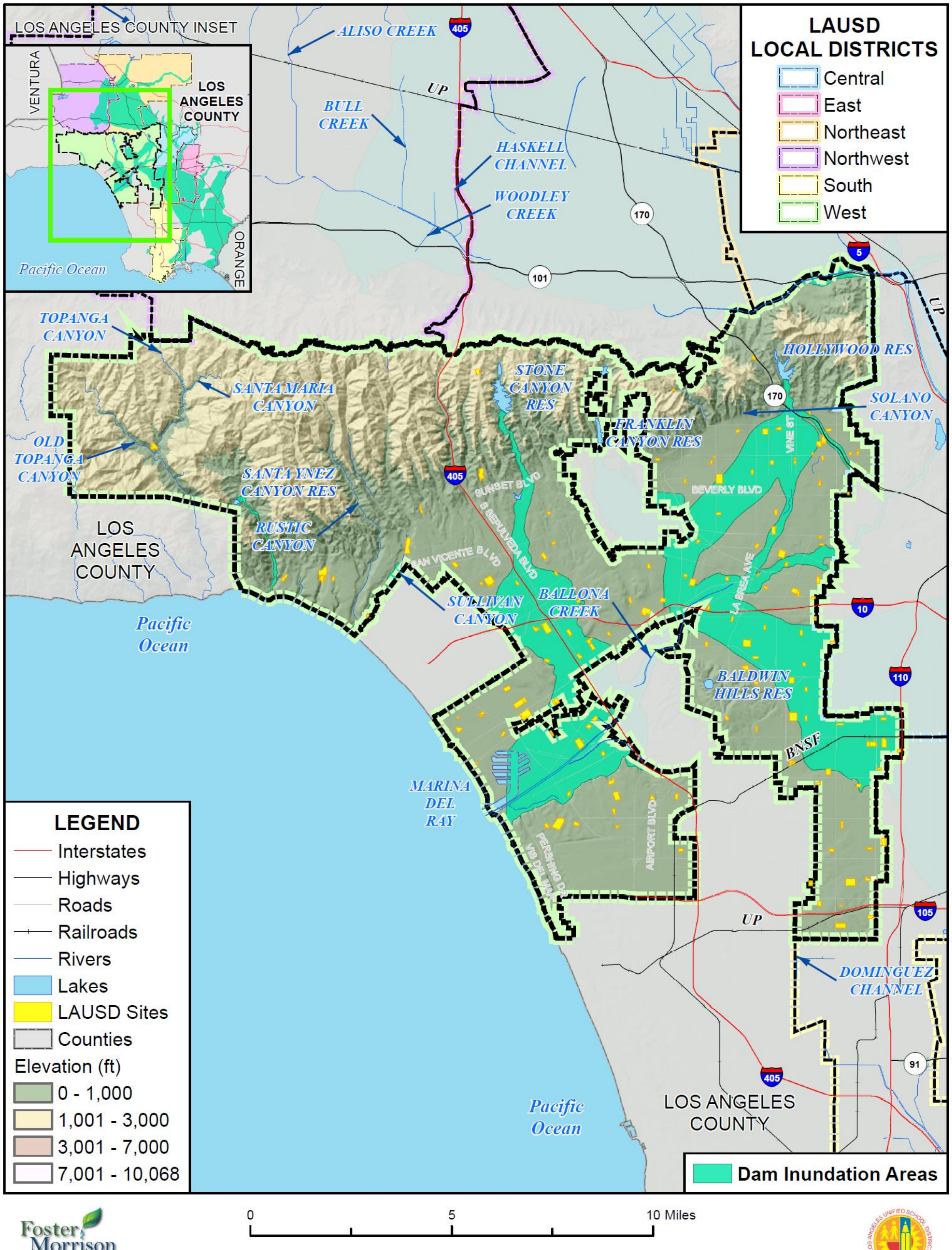

Data Source: Cal OES Dam Inundation Data 10/2017, LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

### *Table 4-69 LAUSD – Local District South Dam Inundation Areas Values at Risk by Site Type*

| Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Adult Education Facility | 28 | $1,225,864 | 21 | $24,046,772 | $24,046,772 | $49,319,407 |
| Charter School | 1 | $704,496 | 28 | $69,236,652 | $69,236,652 | $139,177,801 |
| Elementary School | 177 | $20,299,037 | 532 | $884,746,226 | $884,746,226 | $1,789,791,489 |
| Middle School | 10 | $2,826,670 | 140 | $235,201,000 | $235,201,000 | $473,228,670 |
| Senior High School | 109 | $12,360,380 | 147 | $494,584,980 | $494,584,980 | $1,001,530,340 |
| **South Total** | **325** | **$37,416,447** | **868** | **$1,707,815,630** | **$1,707,815,630** | **$3,453,047,707** |

Source: Cal OES, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

*Figure 4-57 LAUSD – Local District West Dam Inundation Areas*




Data Source: Cal OES Dam Inundation Data 10/2017, LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

*Table 4-70 LAUSD – Local District West Dam Inundation Areas Values at Risk by Site Type*

| Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Admin Facility | 3 | $662,862 | 12 | $9,965,460 | $9,965,460 | $20,593,783 |
| Early Education Center | 2 | $515,658 | 13 | $7,836,983 | $7,836,983 | $16,189,623 |
| Elementary School | 105 | $27,241,072 | 646 | $919,548,741 | $919,548,741 | $1,866,338,555 |
| Middle School | 17 | $17,703,181 | 251 | $579,984,424 | $579,984,424 | $1,177,672,029 |
| Senior High School | 116 | $49,824,010 | 155 | $614,295,821 | $614,295,821 | $1,278,415,652 |
| Special Education Center | 1 | $588,179 | 14 | $22,483,082 | $22,483,082 | $45,554,343 |
| **West Total** | **244** | **$96,534,962** | **1,091** | **$2,154,114,511** | **$2,154,114,511** | **$4,404,763,985** |

Source: Cal OES, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

*Table 4-71 LAUSD – Outside Local District Dam Inundation Areas Values at Risk by Site Type*

| Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Admin Facility | 1 | $6,025,565 | 1 | $149,306,997 | $149,306,997 | $304,639,558 |
| Senior High School | 2 | $0 | 2 | $92,380,788 | $92,380,788 | $184,761,576 |
| **Outside Areas Total** | **3** | **$6,025,565** | **3** | **$241,687,785** | **$241,687,785** | **$489,401,134** |

Source: Cal OES, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

## Population at Risk

A separate analysis was performed to determine the LAUSD populations (enrollment) in dam inundation areas. Using GIS, the dam inundation area dataset was overlayed on the LAUSD facility layer, which also included available enrollment data by facility. Results were tabulated and are shown in Table 4-72. According to this analysis, for the entire LAUSD Planning Area, there is a population of 224,557 enrolled students in dam inundation areas. However, it is unlikely that all dams that could affect the District would fail at the same time, so actual affected populations would likely be much lower during a dam failure event.

*Table 4-72 LAUSD – Local District Summary of Total Enrollment at Risk to Dam Inundation*

| Jurisdiction | Total Enrollment |
|---|---|
| **Inside Local District Areas** | |
| Central | 37,164 |

| Jurisdiction | Total Enrollment |
|---|---|
| East | 44,234 |
| Northeast | 56,449 |
| Northwest | 23,335 |
| South | 27,665 |
| West | 34,124 |
| **Inside Areas Total** | **222,971** |
| Outside of Local District Areas | |
| **Outside Areas Total** | **1,586** |
| | |
| **Grand Total** | **224,557** |

Source: Cal OES; LAUSD

To give further detail on populations of enrolled students in the dam inundation areas, enrolled populations in dam inundation areas were broken out by Local Districts and site type. This can be seen for the Central (Table 4-73), East (Table 4-74), Northeast (Table 4-75), Northwest (Table 4-76), South (Table 4-77), West (Table 4-78), and outside Local Districts (Table 4-79).

*Table 4-73 LAUSD – Local District Central Enrollment in Dam Inundation Areas by Site Type*

| Site Type | Total Enrollment |
|---|---|
| Admin Facility | 0 |
| Adult Education Facility | 0 |
| Charter School | 0 |
| Continuation High School | 52 |
| Early Education Center | 0 |
| Elementary School | 19,411 |
| Middle School | 5,696 |
| Senior High School | 8,497 |
| Span High School (i.e. Grades K-12) | 2,950 |
| Span Middle School (i.e. Grades K-8) | 558 |
| **Central Total** | **37,164** |

Source: Cal OES; LAUSD

*Table 4-74 LAUSD – Local District East Enrollment in Dam Inundation Areas by Site Type*

| Site Type | Total Enrollment |
|---|---|
| Admin Facility | 0 |
| Adult Education Facility | 0 |
| Continuation High School | 0 |
| Elementary School | 24,194 |

| Site Type | Total Enrollment |
|---|---|
| Middle School | 6,836 |
| Senior High School | 11,427 |
| Span High School (i.e. Grades K-12) | 1,777 |
| **East Total** | **44,234** |

Source: Cal OES; LAUSD

### *Table 4-75 LAUSD – Local District Northeast Enrollment in Dam Inundation Areas by Site Type*

| Site Type | Total Enrollment |
|---|---|
| Admin Facility | 0 |
| Charter School | 0 |
| Community Day School | 0 |
| Continuation High School | 0 |
| Early Education Center | 0 |
| Elementary School | 26,939 |
| Middle School | 11,721 |
| Senior High School | 17,662 |
| Special Education Center | 127 |
| **Northeast Total** | **56,449** |

Source: Cal OES; LAUSD

### *Table 4-76 LAUSD – Local District Northwest Enrollment in Dam Inundation Areas by Site Type*

| Site Type | Total Enrollment |
|---|---|
| Admin Facility | 0 |
| Charter School | 0 |
| Continuation High School | 0 |
| Elementary School | 13,387 |
| Middle School | 4,238 |
| Senior High School | 4,795 |
| Span High School (i.e. Grades K-12) | 591 |
| Special Education Center | 324 |
| **Northwest Total** | **23,335** |

Source: Cal OES; LAUSD

### *Table 4-77 LAUSD – Local District South Enrollment in Dam Inundation Areas by Site Type*

| Site Type | Total Enrollment |
|---|---|
| Adult Education Facility | 0 |

| Site Type | Total Enrollment |
|---|---|
| Charter School | 0 |
| Elementary School | 19,245 |
| Middle School | 3,845 |
| Senior High School | 4,575 |
| **South Total** | **27,665** |

Source: Cal OES; LAUSD

### *Table 4-78 LAUSD – Local District West Enrollment in Dam Inundation Areas by Site Type*

| Site Type | Total Enrollment |
|---|---|
| Early Education Center | 0 |
| Elementary School | 18,543 |
| Middle School | 7,592 |
| Senior High School | 7,948 |
| Special Education Center | 41 |
| **Local District West Total** | **34,124** |

Source: Cal OES; LAUSD

### *Table 4-79 LAUSD – Outside Local District Enrollment in Dam Inundation Areas by Site Type*

| Site Type | Total Enrollment |
|---|---|
| Admin Facility | 0 |
| Senior High School | 1,586 |
| **Outside Areas Total** | **1,586** |

Source: Cal OES; LAUSD

## *Overall District Impact*

Dam failure floods and their impacts vary by location and severity of any given dam failure event and will likely only affect certain areas of the District during specific times. Based on the risk assessment, it is evident that dam failure floods have the potential for devastating impacts to certain areas of the District. Impacts that are not always quantified, but can be anticipated in a large dam failure event, include:

- Injury and loss of life;
- District building structural and property damage;
- Disruption of and damage to public infrastructure and services;
- Health hazards associated with mold and mildew, contamination of drinking water, etc.;
- Damage to roads/bridges resulting in loss of mobility;
- Significant economic impact (jobs, sales, tax revenue) to the community;
- Significant disruption to students and teachers as temporary facilities and relocations would likely be needed.
- Impact on the overall mental health of the community.

***Note***: After reviewing the hazard profile of dam failure in Section 4.2.6 and in this vulnerability profile, the HMPC decided to lower the priority of this hazard to low. As such, no mitigation actions related to dam failure will be pursued.

### *Future Development*

All development will be within existing LAUSD sites, thus future development by the District should not change the number of sites in the dam inundation areas. However, increases in student enrollment and staffing could affect populations within these dam inundation areas.

## 4.3.5. Drought and Water Shortage Vulnerability Assessment

This hazard can vary across the LAUSD Planning Area. Table 4-80 breaks out how drought and water shortage vulnerability vary by Local District.

*Table 4-80 LAUSD –Drought and Water Shortage Vulnerability by Local District*

| LAUSD Planning Area/ Local Districts | Geographic Extent | Magnitude/ Severity | Probability of Future Occurrences | Significance | Vulnerability |
|---|---|---|---|---|---|
| Central | Extensive | Negligible | Likely | Medium | Medium |
| East | Extensive | Negligible | Likely | Medium | Medium |
| Northeast | Extensive | Negligible | Likely | Medium | Medium |
| Northwest | Extensive | Negligible | Likely | Medium | Medium |
| South | Extensive | Negligible | Likely | Medium | Medium |
| West | Extensive | Negligible | Likely | Medium | Medium |

Source: LAUSD

Drought is different than many of the other natural hazards in that it is not a distinct event and usually has a slow onset. Drought can severely impact a region both physically and economically. Drought affects different sectors in different ways and with varying intensities. Adequate water is the most critical issue for agricultural, manufacturing, tourism, recreation, and commercial and domestic use. As the population in the area continues to grow, so will the demand for water.

Based on historical information, the occurrence of drought in California, including Los Angeles County and the District Planning Area, is cyclical, driven by weather patterns. Drought has occurred in the past and will occur in the future. Periods of actual drought with adverse impacts can vary in duration, and the period between droughts is often extended. Although an area may be under an extended dry period, determining when it becomes a drought is based on impacts to individual water users. The vulnerability of Los Angeles County to drought is district wide, but impacts may vary and include reduction in water supply, and an increase in dry fuels.

Drought impacts are wide-reaching and may be economic, environmental, and/or societal. Tracking drought impacts can be difficult. The Drought Impact Reporter from the NDMC is a useful reference tool that compiles reported drought impacts nationwide. Table 4-81 show drought impacts for the Los Angeles

County from 1850 to March 2018. The data represented is skewed, with the majority of these impacts from records within the past ten years.

### *Table 4-81 Los Angeles County Drought Impacts*

| Category | Number of Impacts |
|---|---|
| Agriculture | 32 |
| Business and Industry | 11 |
| Energy | 3 |
| Fire | 29 |
| Plants & Wildlife | 37 |
| Relief, Response, and Restrictions | 85 |
| Society and Public Health | 62 |
| Tourism and Recreation | 8 |
| Water Supply and Quality | 130 |
| **Total** | **397** |

Source: National Drought Mitigation Center, 1/1/1850-3/15/2018

It is difficult to quantitatively assess drought impacts to Los Angeles County and the District because not many county-specific studies have been conducted. Some factors to consider include water restrictions and their effects on school grounds and athletic facilities. The State has conducted some empirical studies on the economic effects of fallowed lands with regard to water purchased by the State's Water Bank; but these studies do not quantitatively address the situation in Los Angeles County and the District.

WHAT ARE THE SPECIFIC VULNERABILITIES OF THE DISTRICT TO DROUHT AND WATER SUPPLY?

### *Future Development*

HOW WILL DROUGHT AFFECT FUTURE DEVELOPMENT IN THE DISTRICT? HOW WILL IT BE MITIGATED?

## 4.3.6. Earthquake Vulnerability Assessment

This hazard varies across the LAUSD Planning Area. Table 4-82 breaks out how earthquake vulnerability varies by Local District.

### *Table 4-82 LAUSD – Local District Earthquake Vulnerability*

| LAUSD Planning Area/ Local Districts | Geographic Extent | Magnitude/ Severity | Probability of Future Occurrences | Significance | Vulnerability |
|---|---|---|---|---|---|
| Central | Extensive | Catastrophic | Unlikely | High | High |
| East | Extensive | Catastrophic | Unlikely | High | High |

| LAUSD Planning Area/ Local Districts | Geographic Extent | Magnitude/ Severity | Probability of Future Occurrences | Significance | Vulnerability |
|---|---|---|---|---|---|
| Northeast | Extensive | Catastrophic | Unlikely | High | High |
| Northwest | Extensive | Catastrophic | Unlikely | High | High |
| South | Extensive | Catastrophic | Unlikely | High | High |
| West | Extensive | Catastrophic | Unlikely | High | High |

Source: LAUSD

Earthquake vulnerability is primarily based on population and the built environment. Urban areas in high seismic hazard zones are the most vulnerable, while uninhabited areas are less vulnerable.

Ground shaking is the primary earthquake hazard. Many factors affect the survivability of structures and systems from earthquake-caused ground motions. These factors include proximity to the fault, direction of rupture, epicentral location and depth, magnitude, local geologic and soils conditions, types and quality of construction, building configurations and heights, and comparable factors that relate to utility, transportation, and other network systems. Ground motions become structurally damaging when average peak accelerations reach 10 to 15 percent of gravity, average peak velocities reach 8 to 12 centimeters per second, and when the Modified Mercalli Intensity Scale is about VII (18-34 percent peak ground acceleration), which is considered to be very strong (general alarm; walls crack; plaster falls).

The combination of plate tectonics and associated California coastal mountain range building geology, essentially guarantees earthquake as a result of the periodic release of tectonic stresses. Los Angeles County's mountainous terrain lies in the center of the North American and Pacific tectonic plate activity. There have been earthquakes as a result of this activity in the historic past, and there will continue to be earthquakes in the future of the California north coastal mountain region. The San Andreas fault poses one of the more significant impact to Los Angeles County and the District Planning Area as it has the capabilities of producing a quake in the upwards of 7.1 or greater.

Fault ruptures itself contributes very little to damage unless the structure or system element crosses the active fault. In general, newer construction is more earthquake resistant than older construction due to enforcement of improved building codes. However, should ground shaking be very intense, District facilities could be destroyed. Of greater risk than the building is the students who occupy those buildings.

## Values at Risk

Earthquake losses will vary across the LAUSD Planning Area depending on the source and magnitude of the event. To further evaluate potential losses associated with earthquake activity in the Planning Area, data was collected from a 2014 LAUSD Asset Prioritization analysis for the District.

### 2014 Los Angeles Unified School District Asset Prioritization

In 2014, the District worked with a consultant to develop to a rational, repeatable prioritization methodology to estimate relative seismic risk and assign a risk score for buildings on the District's Assembly Bill 300 (a 1999 bill requiring a survey of California school buildings) list. This created a list of buildings in LAUSD that were most at risk to earthquake. The methodology for creating the lists is based on the FEMA HAZUS-MH procedure. The FEMA HAZUS-MH approach is a nationally recognized and accepted standard. The seismic risk scores described in this report considers factors such as the earthquake magnitude, year of construction, type of construction, number of stories and if available, code and construction quality at the time of construction of the building. The consultant provided analysis for all of the buildings for a 500-year seismic event, which roughly corresponds to an earthquake with a 10% probability of exceedance in 50 years. Under current design codes, new buildings are designed to this level. Discussions with the consultant working with LAUSD agreed upon that the 500-year event was a more appropriate earthquake to be used in this prioritization. The report, in its entirety, can be found in Appendix X.

### *Results Summary*

The Earthquake Asset Prioritization report looked at 637 buildings that the District owns. The buildings were reviewed individually by Hazus using the following parameters:

- Soil VS30: average shear wave velocity down to 30 meters of soil
- %DS4-500: Probability of being in damage state 4 during a 500-year event
- Complete Damage State [DS4]: damage state that is defined in Section 4 (complete destruction) for each type of building at different code levels

The vulnerability ranking of the buildings according to the HAZUS-MH methodology based on probability of exceeding damage state DS4 (complete damage) in a 500-year event are presented in Table 9 of the document in Appendix X. The first portion is presented here as Figure 4-58. This portion was picked as it shows those facilities with over a 33.3% chance of being complete demolished. It has to be noted that the ranking of the buildings presented here is intended to assist LAUSD in establishing a priority list for more detailed evaluation and possible retrofit or replacing of a subset of buildings from the list provided. The ranking presented here is based solely on generic HAZUS-MH type information about the buildings and probabilistic seismic hazard analysis based on this analysis

### *Figure 4-58 LAUSD Buildings Ranked According to Vulnerability Indices*

| Rank 500 | Bldg # | Bldg ID | Site Name | Bldg Name | Bldg. Type | Code Cat* | Code† | Lat | Long | Soil VS30 | %DS4-500 |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1040 | 2836-001DDG | CARSON EL | KINDERGARTEN BLDG B | URML | Std | P | 33.8319 | -118.2751 | 252 | 43.22% |
| 2 | 3199 | 8226-006CAJ | LE CONTE MS | SHOP BLDG 1 | C3L | Std | P | 34.0948 | -118.3169 | 367 | 37.62% |
| 3 | 4287 | 8529-008CEJ | BANNING SH | GYMNASIUM BLDG | RM1L | Std | P | 33.7934 | -118.2626 | 228 | 37.42% |
| 4 | 511 | 3959-001CDG | 42ND ST EL | ADMINISTRATIVE BLDG | C2L | Std | P | 34.0063 | -118.3218 | 227 | 36.24% |
| 5 | 3284 | 7671-004CAJ | WESTERN EL | AUDITORIUM BLDG | C2L | Std | P | 33.9939 | -118.3083 | 229 | 35.38% |
| 6 | 3018 | 8928-010CCG | WASHINGTON PREP SH | SHOP BLDG | RM1L | Std | P | 33.9379 | -118.303 | 255 | 34.68% |
| 7 | 650 | 6356-002CAJ | ROSCOE EL | ADMINISTRATIVE & CLASSROOM -WEST | RM1L | Std | P | 34.216 | -118.3667 | 334 | 34.59% |
| 8 | 1109 | 4014-002CDG | FRIES EL | CLASSROOM BLDG 2 | RM1L | Std | P | 33.7891 | -118.2659 | 241 | 34.23% |
| 9 | 1168 | 7507-001CAG | VICTORIA EL | AUDITORIUM BLDG | RM1L | Std | P | 33.9468 | -118.2113 | 253 | 34.04% |
| 10 | 4 | 4014-001CDF | FRIES EL | CLASSROOM BLDG 1 | RM1L | Std | P | 33.7887 | -118.2659 | 243 | 33.95% |
| 11 | 3780 | 4315-002CBG | GULF EL | AUDITORIUM BLDG | RM1L | Std | P | 33.7861 | -118.2731 | 244 | 33.77% |
| 12 | 2799 | 5548-002CAK | 92ND ST EL | ASSEMBLY & CLASSROOM BLDG - WEST | RM1L | Std | P | 33.9529 | -118.2371 | 257 | 33.68% |
| 13 | 3392 | 4315-001CDG | GULF EL | ADMIN.BLDG(CLRM) | RM1L | Std | P | 33.7857 | -118.2731 | 245 | 33.59% |

Source: 2014 LAUSD Asset Prioritization

Table 4-83 summarizes the analysis of the 637 buildings in the District by percent change of complete destruction. It should be noted that the percent change is of complete damage, not of partial damages.

*Table 4-83 LAUSD Buildings by Percent Chance of Complete Damage*

| Percentage Change of Complete Damage | Number of Buildings |
|---|---|
| Over 40% | 1 |
| 30%-40% | 49 |
| 20%-30% | 141 |
| 10%-20% | 74 |
| 0%-10% | 408 |

Source: 2014 LAUSD Asset Prioritization

## 4.3.7. Earthquake: Liquefaction Vulnerability Assessment

This hazard varies across the LAUSD Planning Area. Table 4-82 breaks out how earthquake and liquefaction vulnerability varies by Local District.

*Table 4-84 LAUSD – Local District Earthquake and Liquefaction Vulnerability*

| LAUSD Planning Area/ Local Districts | Geographic Extent | Magnitude/ Severity | Probability of Future Occurrences | Significance | Vulnerability |
|---|---|---|---|---|---|
| Central | Extensive | Catastrophic | Unlikely | Medium | Medium |
| East | Extensive | Catastrophic | Unlikely | Medium | Medium |
| Northeast | Extensive | Catastrophic | Unlikely | Medium | Medium |
| Northwest | Extensive | Catastrophic | Unlikely | Medium | Medium |
| South | Extensive | Catastrophic | Unlikely | Medium | Medium |
| West | Extensive | Catastrophic | Unlikely | Medium | Medium |

Source: LAUSD

Liquefaction is a process whereby strong earthquake shaking causes sediment layers that are saturated with groundwater to lose strength and behave as a fluid. This subsurface process can lead to near surface or surface ground failure that can result in property damage and structural failure. If surface ground failure does occur, it is usually expressed as lateral spreading, flow failures, ground oscillation, and/or general loss of bearing strength. Sand boils (injections of fluidized sediment) can commonly accompany these different types of failure.

The 2014 School Upgrade Program EIR noted that research and historical data indicate that loose, granular materials at depths of less than 50 feet with silt and clay contents of less than 30 percent saturated by relatively shallow groundwater table are most susceptible to liquefaction. Should earthquake occur, District facilities and enrolled students could be impacted.

## Methodology

The 2016 California Department of Conservation - Division of Mines and Geology liquefaction potential zone data was obtained for the Los Angeles County area to analyze the liquefaction potential in the LAUSD Planning Area. LAUSD's facilities database, including information on building replacement values, was used as the basis for the inventory of all facilities within LAUSD. The County's Assessor's data and parcel layer was joined to the facilities database to obtain information on assessed land values and to create a parcel inventory of LAUSD properties. As previously described, CRVs were calculated and added to building replacement values and the assessed land values, to determine the overall potential values at risk. GIS was used to overlay the liquefaction potential layer onto the parcel layer polygons, and where the liquefaction potential zone intersected a parcel polygon, it was assigned as being within the hazard zone for the entire parcel. Note that the value of the improved land is also included in the total of values at risk as the land itself is at risk to liquefaction. Results are provided in this plan for LAUSD with analysis broken out by the six Local Districts, both in summary form and by site type. Appendix ?? includes additional details on the specific LAUSD facilities organized by site type for each of the six Local Districts.

### Limitations

It should be noted that the resulting liquefaction loss estimates may actually be more or less than that presented in the below tables. Further, depending on the magnitude of the earthquake event, the liquefaction loss estimates may also be more or less than that presented in the below tables due to the varying impacts to land, structures, and their contents and therefore their respective values. Also, it is important to keep in mind that the assessed land value may be below the actual market value of improved parcels due to Proposition 13.

## Values at Risk

Areas of liquefaction potential zones exist throughout the entire LAUSD area. The California Department of Mines and Geology liquefaction layer was overlaid with the LAUSD facility layer in GIS to obtain results. Based on the data, this analysis indicates whether a District site falls within or outside the Liquefaction Potential Zone. This section includes summary tables by Local District for the LAUSD Planning Area and tables broken out by Local District and Site Type, while Appendix ?? includes detailed tables by Local District and Site Type with details on specific facilities affected. Areas of liquefaction in the LAUSD Planning Area is shown in Figure 4-59. Table 4-85 illustrates the potential estimated damages to District from earthquake induced liquefaction.

*Figure 4-59 LAUSD – Local District Liquefaction Zones*

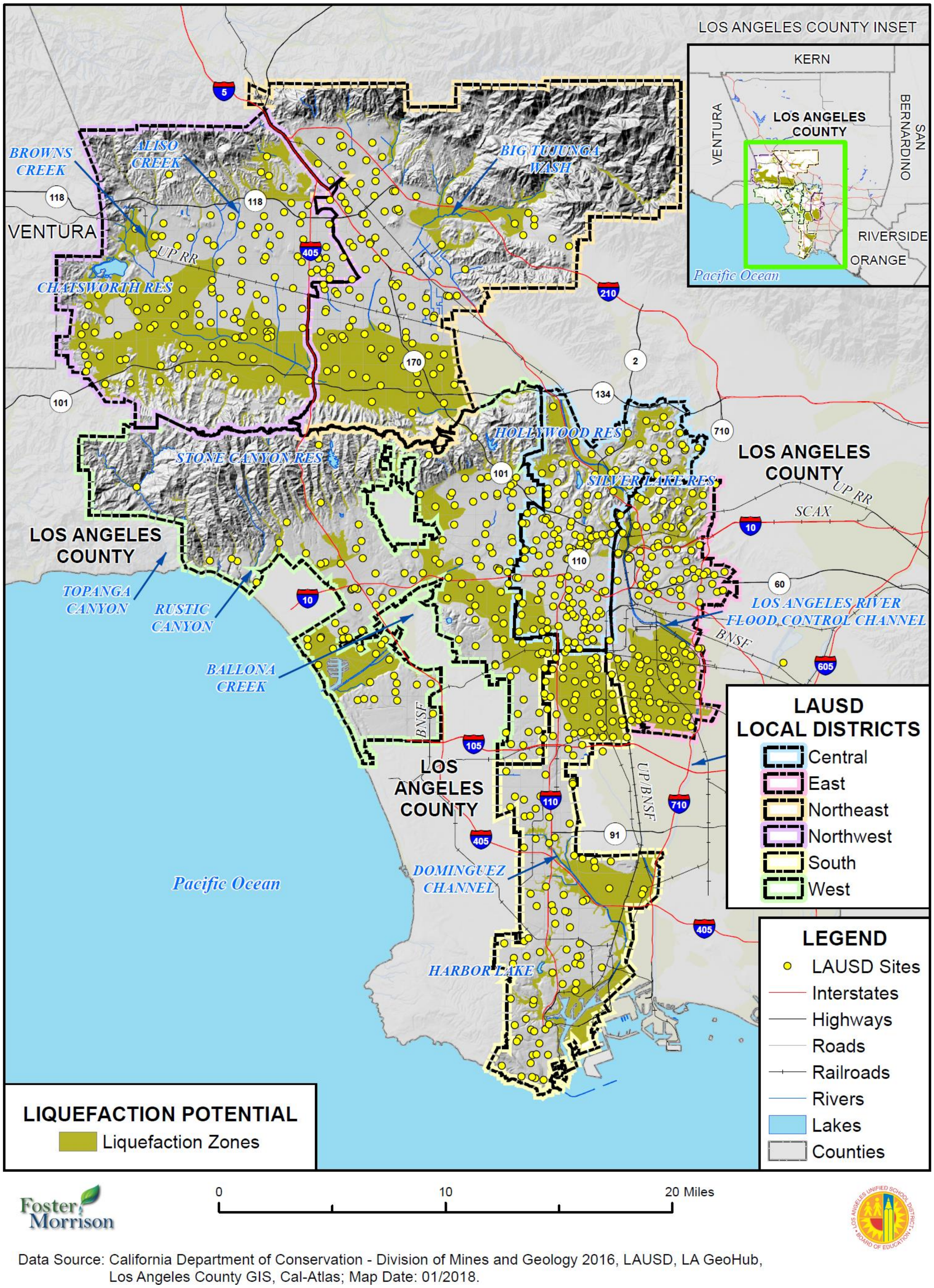


*Table 4-85 LAUSD –Local District Summary Values at Risk in Liquefaction Zones*

| LAUSD Local Districts | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Inside Local District Areas | | | | | | |
| Central | 198 | $92,343,846 | 717 | $1,802,620,469 | $1,802,620,469 | $3,697,584,784 |
| East | 804 | $62,620,892 | 1,484 | $3,216,368,900 | $3,216,368,900 | $6,495,358,693 |
| Northeast | 90 | $24,696,681 | 1,079 | $1,310,686,022 | $1,310,686,022 | $2,646,068,724 |
| Northwest | 75 | $41,334,161 | 1,864 | $2,216,678,141 | $2,216,678,141 | $4,474,690,443 |
| South | 374 | $42,766,286 | 1,157 | $2,231,719,594 | $2,231,719,594 | $4,506,205,473 |
| West | 213 | $68,490,159 | 932 | $1,585,892,362 | $1,585,892,362 | $3,240,274,883 |
| **Inside Areas Total** | **1,754** | **$332,252,025** | **7,233** | **$12,363,965,487** | **$12,363,965,487** | **$25,060,183,000** |
| Outside of Local District Areas | | | | | | |
| **Outside Areas Total** | **3** | **$6,025,565** | **3** | **$241,687,785** | **$241,687,785** | **$489,401,134** |
| | | | | | | |
| **Grand Total** | **1,757** | **$338,277,590** | **7,236** | **$12,605,653,272** | **$12,605,653,272** | **$25,549,584,134** |

Source: California Division of Mines and Geology, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

Earthquake induced liquefaction maps and analysis was broken out for the LAUSD by Local District and Site Type. These maps and tables show the parcels, building, contents, and values for the following Local Districts:

- Central (Figure 4-60 and Table 4-86)
- East (Figure 4-61 and Table 4-87)
- Northeast (Figure 4-62 and Table 4-88)
- Northwest (Figure 4-63 and Table 4-89)
- South (Figure 4-64 and Table 4-90)
- West (Figure 4-65 and Table 4-91)
- Outside Local District (Table 4-92)

*Figure 4-60 LAUSD – Local District Central Liquefaction Zones*

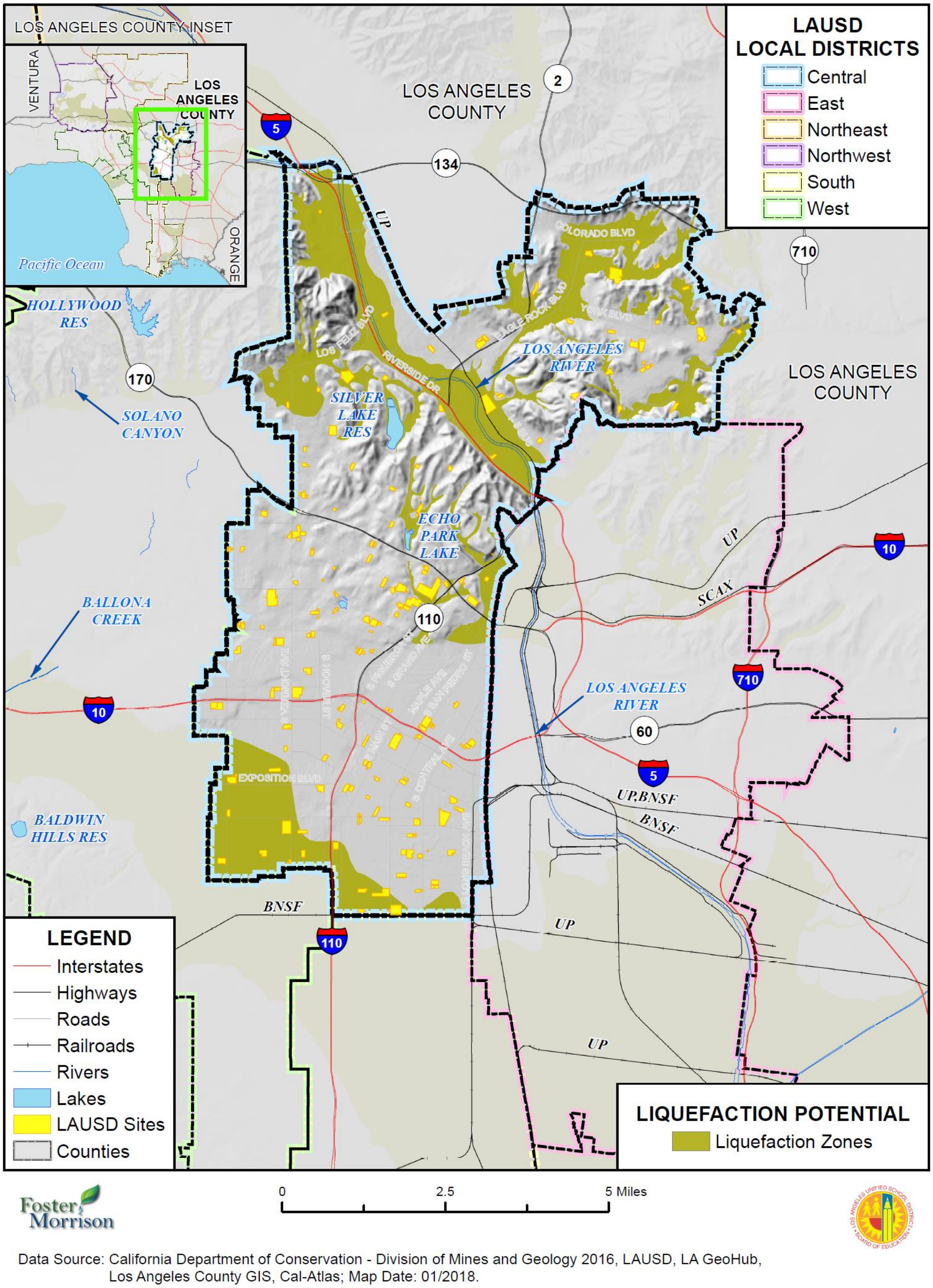
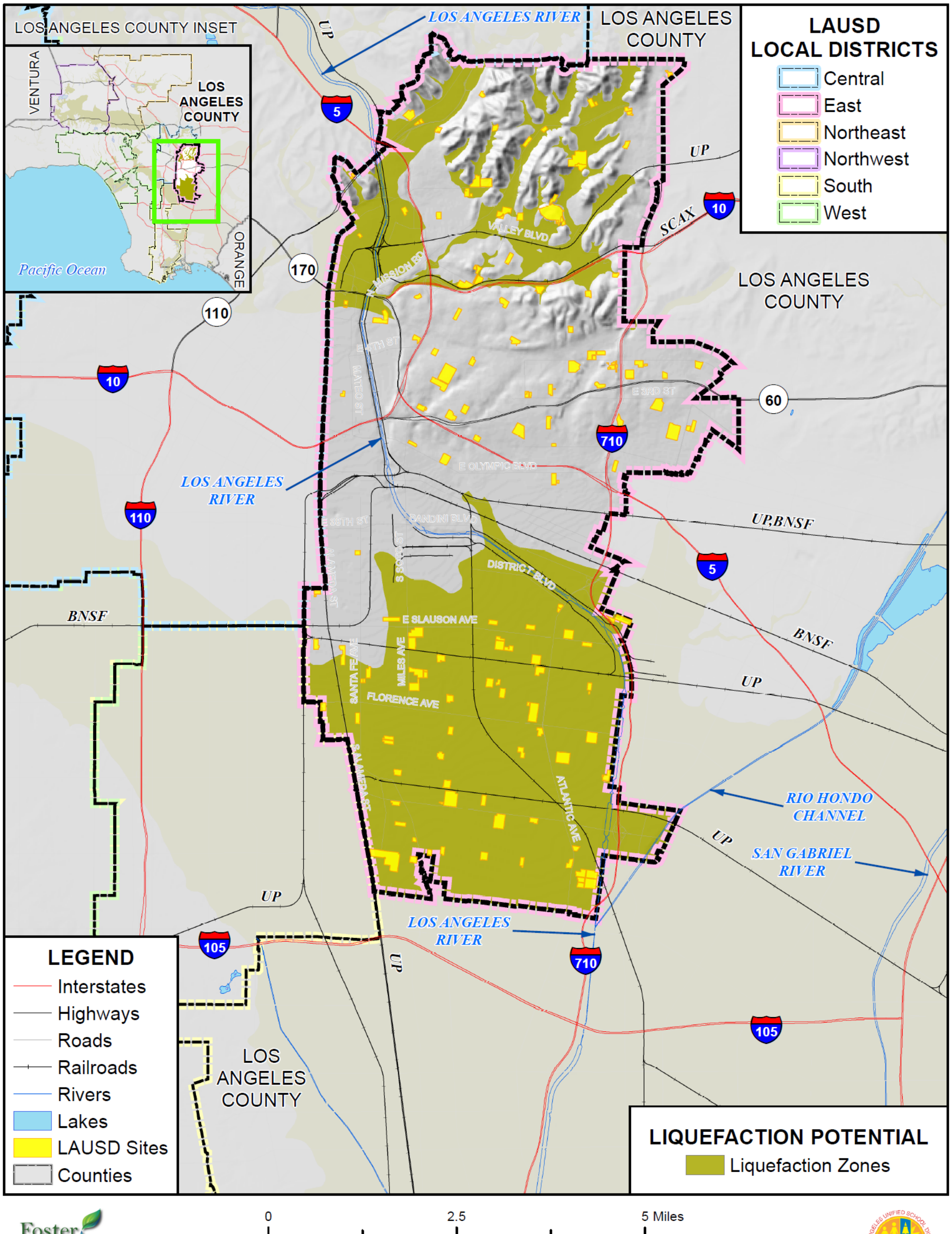


*Table 4-86 LAUSD – Local District Central Values at Risk in Liquefaction Zones by Site Type*

| Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Adult Education Facility | 2 | $1,255,922 | 19 | $37,811,970 | $37,811,970 | $76,879,862 |
| Early Education Center | 1 | $0 | 5 | $667,852 | $667,852 | $1,335,703 |
| Elementary School | 85 | $12,057,728 | 364 | $578,090,076 | $578,090,076 | $1,168,237,880 |
| Middle School | 43 | $6,906,290 | 16 | $154,657,704 | $154,657,704 | $316,221,698 |
| Senior High School | 44 | $70,363,174 | 224 | $896,900,117 | $896,900,117 | $1,864,163,407 |
| Span High School (i.e. Grades K-12) | 5 | $852,380 | 44 | $85,156,042 | $85,156,042 | $171,164,464 |
| Span Middle School (i.e. Grades K-8) | 18 | $908,352 | 45 | $49,336,708 | $49,336,708 | $99,581,769 |
| **Central Total** | **198** | **$92,343,846** | **717** | **$1,802,620,469** | **$1,802,620,469** | **$3,697,584,784** |

Source: California Division of Mines and Geology, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

## *Figure 4-61 LAUSD – Local District East Liquefaction Zones*



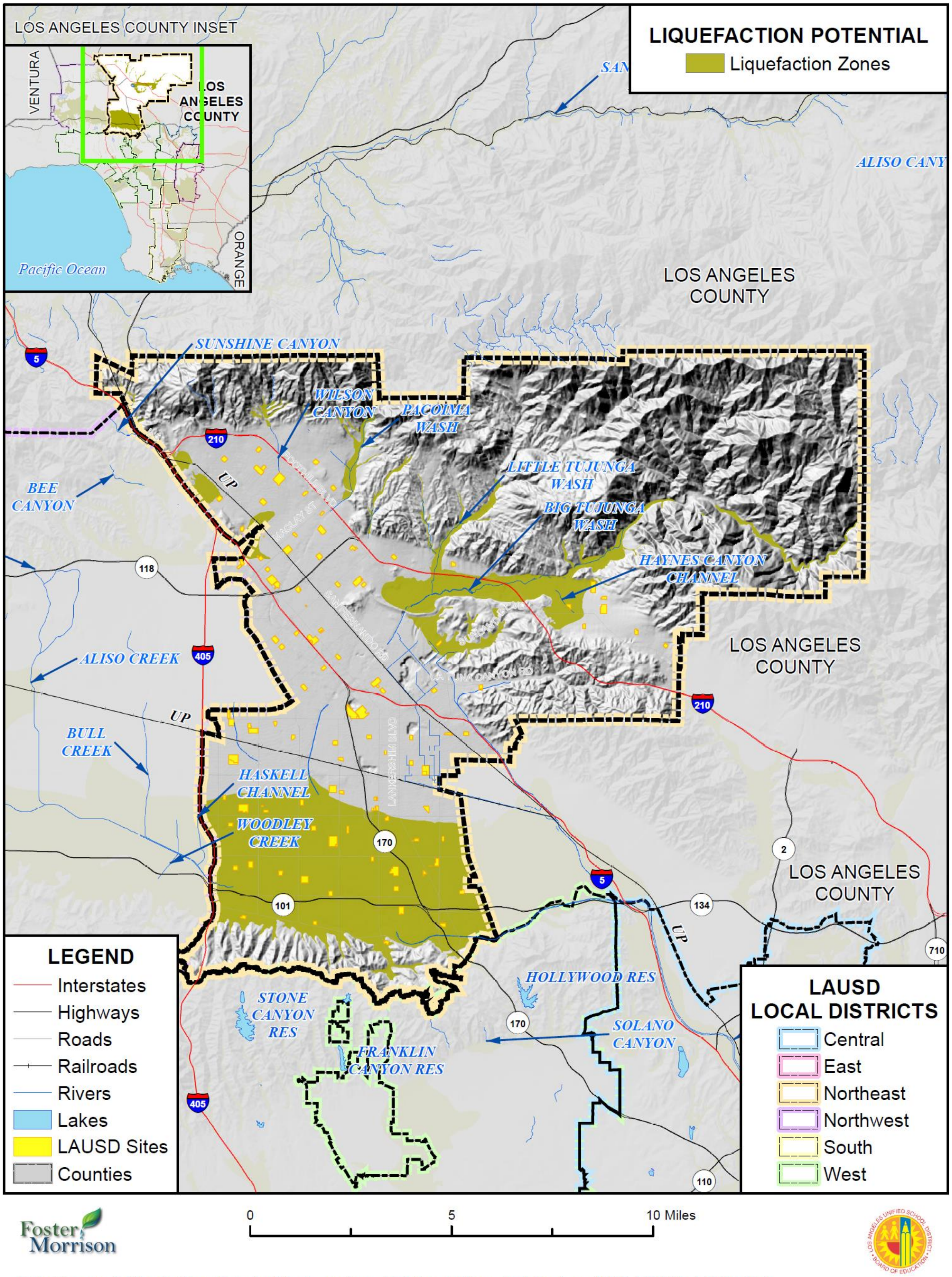

Data Source: California Department of Conservation - Division of Mines and Geology 2016, LAUSD, LA GeoHub, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

### *Table 4-87 LAUSD – Local District East Values at Risk in Liquefaction Zones by Site Type*

| Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Admin Facility | 9 | $1,694,530 | 41 | $136,895,932 | $136,895,932 | $275,486,394 |
| Adult Education Facility | 3 | $752,102 | 60 | $84,433,230 | $84,433,230 | $169,618,562 |
| Elementary School | 499 | $32,902,491 | 717 | $1,412,355,251 | $1,412,355,251 | $2,857,612,992 |
| Middle School | 77 | $3,486,000 | 222 | $395,949,312 | $395,949,312 | $795,384,623 |
| Senior High School | 202 | $22,304,836 | 382 | $1,120,601,947 | $1,120,601,947 | $2,263,508,730 |
| Span High School (i.e. Grades K-12) | 14 | $1,480,933 | 62 | $66,133,229 | $66,133,229 | $133,747,391 |
| **East Total** | **804** | **$62,620,892** | **1,484** | **$3,216,368,900** | **$3,216,368,900** | **$6,495,358,693** |

Source: California Division of Mines and Geology, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

*Figure 4-62 LAUSD – Local District Northeast Liquefaction Zones*



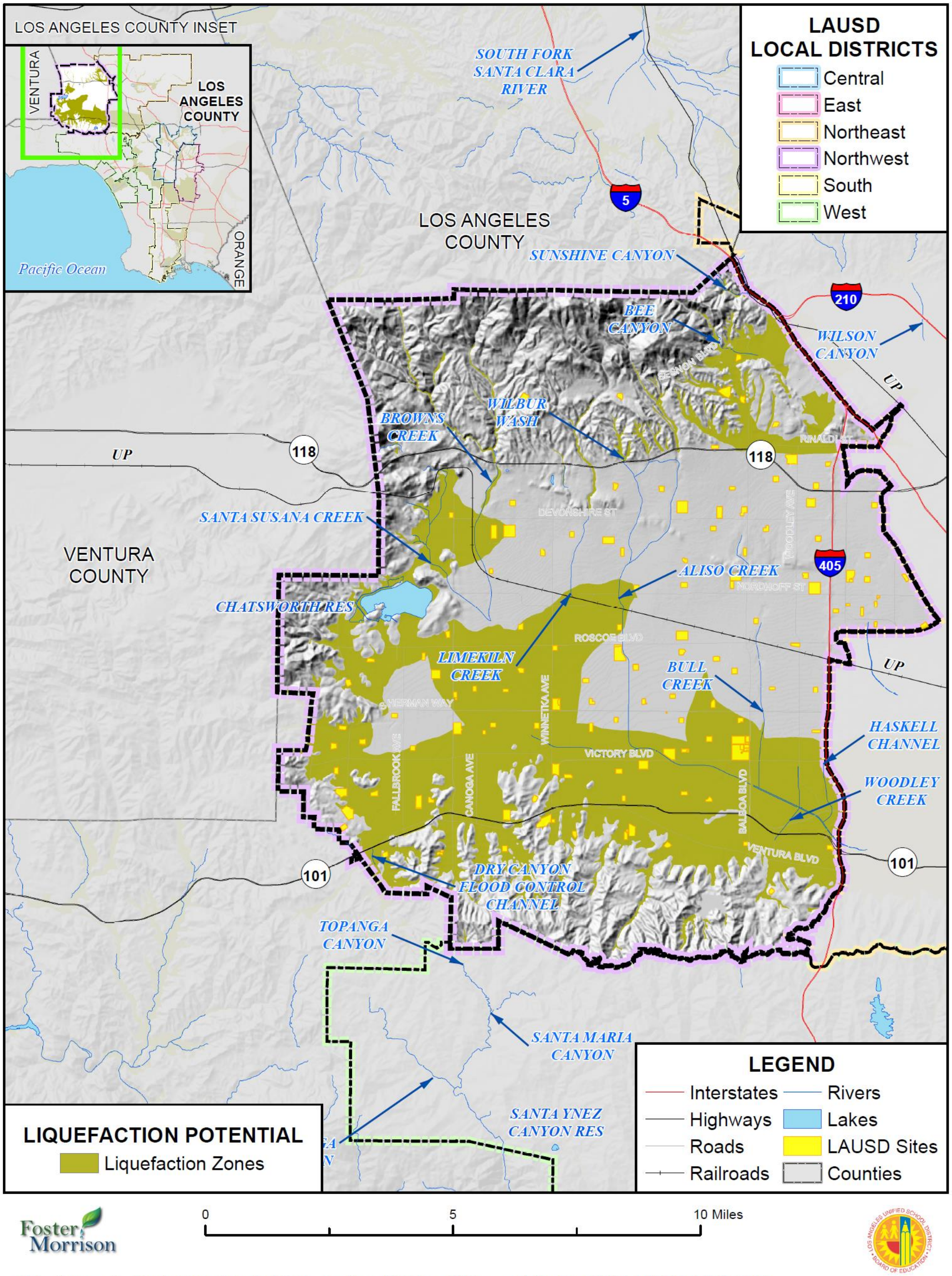

Data Source: California Department of Conservation - Division of Mines and Geology 2016, LAUSD, LA GeoHub, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

*Table 4-88 LAUSD – Local District Northeast Values at Risk in Liquefaction Zones by Site Type*

| Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Adult Education Facility | 1 | $102,211 | 47 | $35,642,716 | $35,642,716 | $71,387,643 |
| Community Day School | 1 | $21,532 | 2 | $466,236 | $466,236 | $954,005 |
| Continuation High School | 2 | $46,847 | 4 | $1,843,111 | $1,843,111 | $3,733,070 |
| Elementary School | 55 | $10,023,378 | 653 | $579,534,772 | $579,534,772 | $1,169,092,921 |
| Middle School | 8 | $3,819,105 | 161 | $290,870,316 | $290,870,316 | $585,559,736 |
| Senior High School | 23 | $10,683,608 | 212 | $402,328,870 | $402,328,870 | $815,341,348 |
| **Northeast Total** | **90** | **$24,696,681** | **1,079** | **$1,310,686,022** | **$1,310,686,022** | **$2,646,068,724** |

Source: California Division of Mines and Geology, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

*Figure 4-63 LAUSD – Local District Northwest Liquefaction Zones*



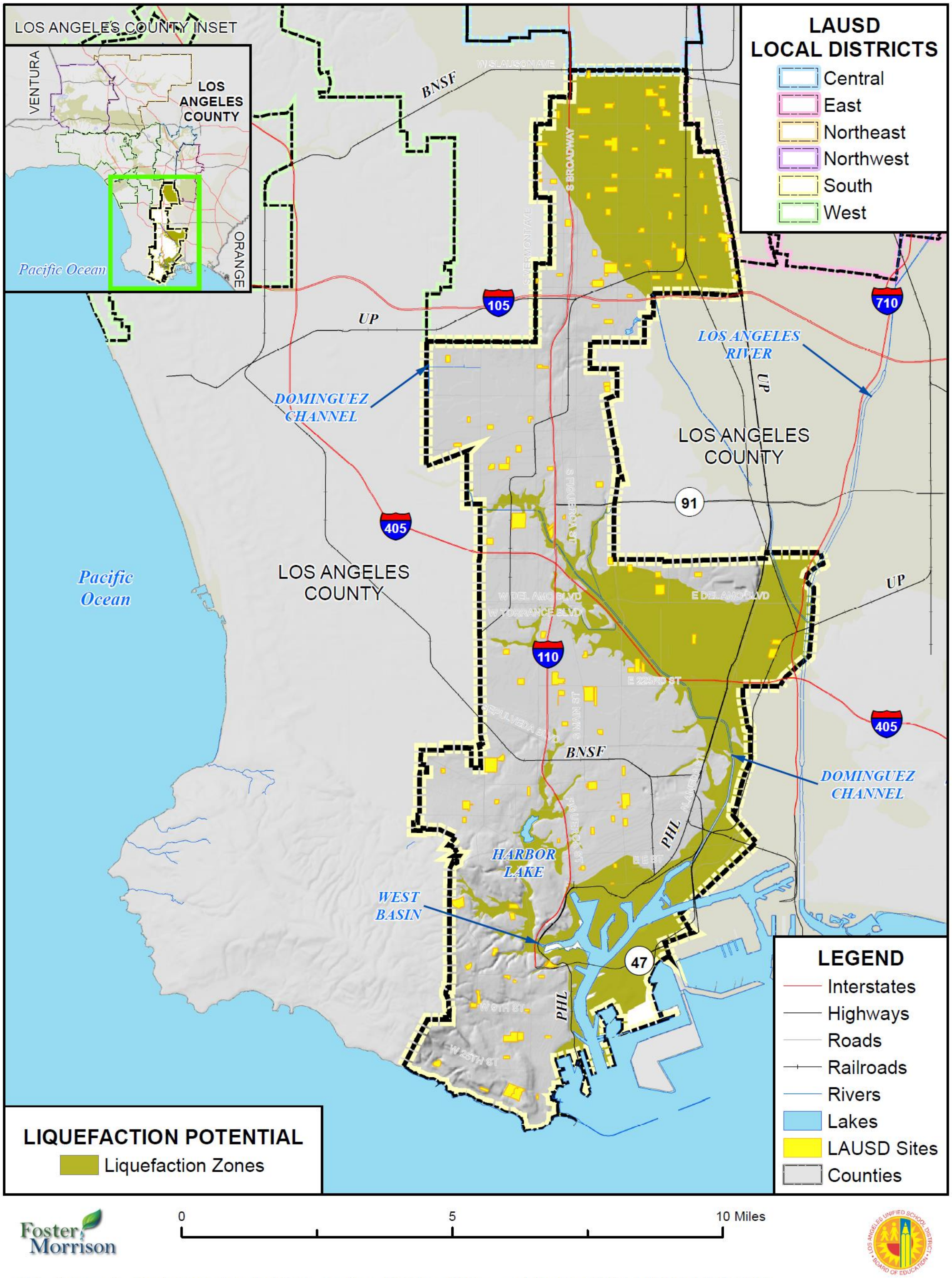

Data Source: California Department of Conservation - Division of Mines and Geology 2016, LAUSD, LA GeoHub, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

***Table 4-89 LAUSD – Local District Northwest Values at Risk in Liquefaction Zones by Site Type***

| Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Admin Facility | 5 | $899,562 | 47 | $90,748,749 | $90,748,749 | $182,397,060 |
| Adult Education Facility | 1 | $1,246,872 | 82 | $67,412,885 | $67,412,885 | $136,072,641 |
| Charter School | 3 | $5,848,336 | 99 | $173,013,038 | $173,013,038 | $351,874,413 |
| Continuation High School | 1 | $63,795 | 3 | $1,625,891 | $1,625,891 | $3,315,576 |
| Currently a Closed School | 3 | $1,449,980 | 64 | $57,900,437 | $57,900,437 | $117,250,854 |
| Elementary School | 43 | $13,185,471 | 871 | $710,809,993 | $710,809,993 | $1,434,805,458 |
| Middle School | 9 | $8,143,695 | 285 | $539,913,772 | $539,913,772 | $1,087,971,238 |
| Senior High School | 7 | $8,050,590 | 320 | $479,152,756 | $479,152,756 | $966,356,103 |
| Span High School (i.e. Grades K-12) | 2 | $2,073,119 | 73 | $80,414,559 | $80,414,559 | $162,902,238 |
| Special Education Center | 1 | $372,741 | 20 | $15,686,061 | $15,686,061 | $31,744,862 |
| **Northwest Total** | **75** | **$41,334,161** | **1,864** | **$2,216,678,141** | **$2,216,678,141** | **$4,474,690,443** |

Source: California Division of Mines and Geology, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

*Figure 4-64 LAUSD – Local District South Liquefaction Zones*



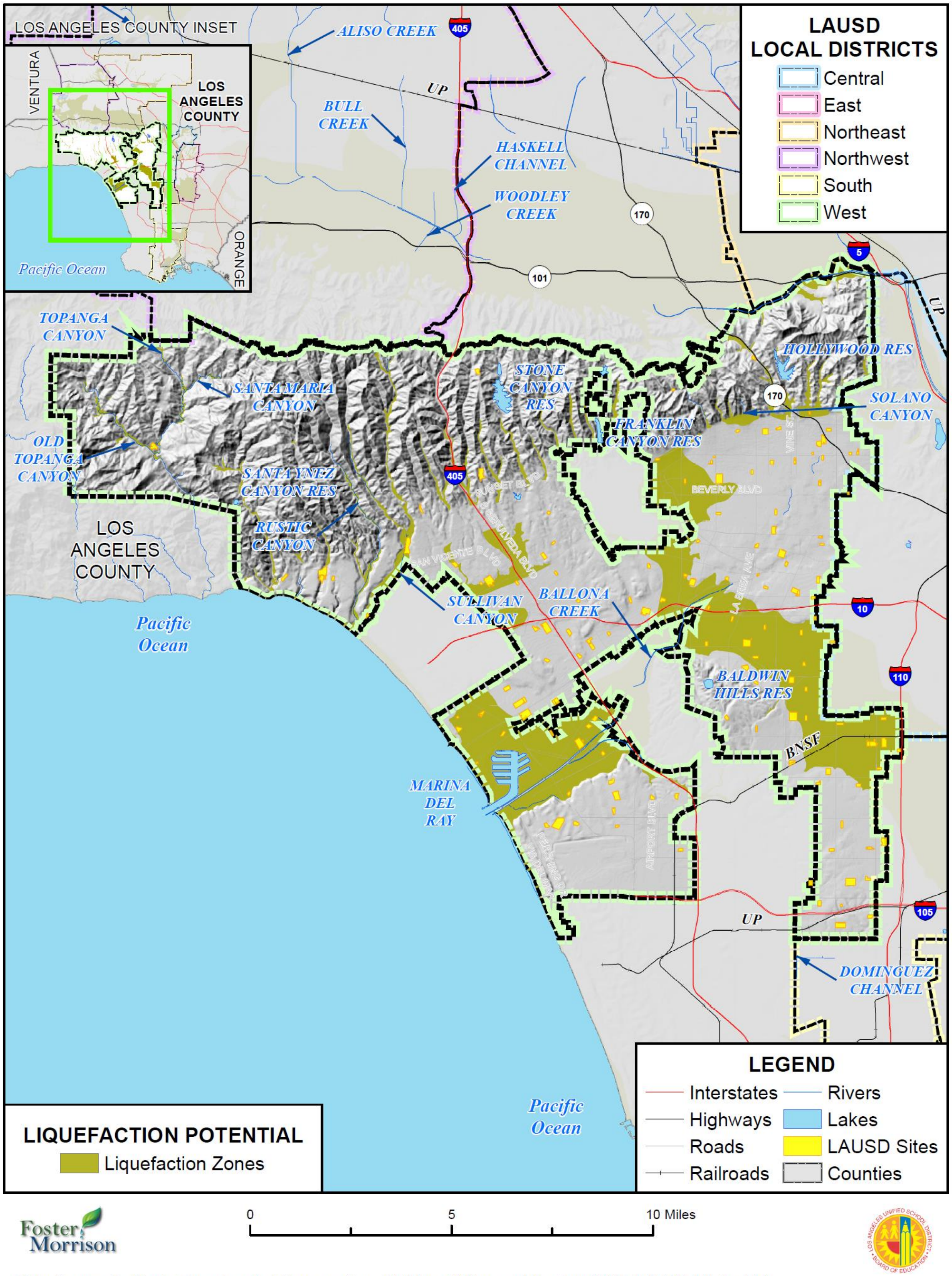

Data Source: California Department of Conservation - Division of Mines and Geology 2016, LAUSD, LA GeoHub, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

### *Table 4-90 LAUSD – Local District South Values at Risk in Liquefaction Zones by Site Type*

| Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Admin Facility | 5 | $568,992 | 9 | $11,407,436 | $11,407,436 | $23,383,864 |
| Adult Education Facility | 30 | $1,611,510 | 46 | $78,847,497 | $78,847,497 | $159,306,503 |
| Charter School | 1 | $704,496 | 28 | $69,236,652 | $69,236,652 | $139,177,801 |
| Community Day School | 1 | $488,024 | 21 | $3,893,022 | $3,893,022 | $8,274,069 |
| Elementary School | 210 | $22,605,102 | 625 | $1,025,715,522 | $1,025,715,522 | $2,074,036,147 |
| Middle School | 15 | $4,427,782 | 189 | $372,164,308 | $372,164,308 | $748,756,398 |
| Senior High School | 112 | $12,360,380 | 239 | $670,455,156 | $670,455,156 | $1,353,270,691 |
| **South Total** | **374** | **$42,766,286** | **1,157** | **$2,231,719,594** | **$2,231,719,594** | **$4,506,205,473** |

Source: California Division of Mines and Geology, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

*Figure 4-65 LAUSD – Local District West Liquefaction Zones*




Data Source: California Department of Conservation - Division of Mines and Geology 2016, LAUSD, LA GeoHub, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

### *Table 4-91 LAUSD – Local District West Values at Risk in Liquefaction Zones by Site Type*

| Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Adult Education Facility | 1 | $105,669 | 2 | $8,270,835 | $8,270,835 | $16,647,338 |
| Early Education Center | 1 | $107,077 | 9 | $3,535,723 | $3,535,723 | $7,178,524 |
| Elementary School | 83 | $23,319,157 | 581 | $767,655,407 | $767,655,407 | $1,558,629,971 |
| Middle School | 8 | $9,302,502 | 143 | $243,408,427 | $243,408,427 | $496,119,355 |
| Senior High School | 118 | $34,006,550 | 181 | $551,724,314 | $551,724,314 | $1,137,455,178 |
| Span Middle School (i.e. Grades K-8) | 2 | $1,649,204 | 16 | $11,297,656 | $11,297,656 | $24,244,517 |
| **West Total** | **213** | **$68,490,159** | **932** | **$1,585,892,362** | **$1,585,892,362** | **$3,240,274,883** |

Source: California Division of Mines and Geology, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

### *Table 4-92 LAUSD – Outside of Local District Areas Values at Risk in Liquefaction Zones by Site Type*

| Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Admin Facility | 1 | $6,025,565 | 1 | $149,306,997 | $149,306,997 | $304,639,558 |
| Senior High School | 2 | $0 | 2 | $92,380,788 | $92,380,788 | $184,761,576 |
| **Outside Areas Total** | **3** | **$6,025,565** | **3** | **$241,687,785** | **$241,687,785** | **$489,401,134** |

Source: California Division of Mines and Geology, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

## Population at Risk

A separate analysis was performed to determine population (enrollment) in earthquake induced liquefaction areas. Using GIS, the liquefaction area dataset was overlayed on the LAUSD facility layer. Results were tabulated and are shown in Table 4-93.

### *Table 4-93 LAUSD – Local District Summary Total Enrollment at Risk to Liquefaction Zones by Site Type*

| Jurisdiction | Total Enrollment |
|---|---|
| **Inside Local District Areas** | |
| Central | 26,009 |
| East | 51,479 |
| Northeast | 27,227 |
| Northwest | 39,209 |

| Jurisdiction | Total Enrollment |
|---|---|
| South | 32,845 |
| West | 29,924 |
| **Inside Areas Total** | **206,693** |
| Outside of Local District Areas | |
| **Outside Areas Total** | **1,586** |
| | |
| **Grand Total** | **208,279** |

Source: Cal OES; LAUSD

To give further detail on populations of enrolled students in the dam inundation area, enrolled populations in dam inundation areas were broken out by Local Districts by site type. This can be seen for the Central (Table 4-95), East (Table 4-74), Northeast (Table 4-96), Northwest (Table 4-97), South (Table 4-98), West (Table 4-99), and outside Local District (Table 4-100).

### *Table 4-94 LAUSD – Local District Central Enrollment in Liquefaction Zones by Site Type*

| Site Type | Total Enrollment |
|---|---|
| Adult Education Facility | 0 |
| Early Education Center | 0 |
| Elementary School | 11,924 |
| Middle School | 1,662 |
| Senior High School | 9,579 |
| Span High School (i.e. Grades K-12) | 1,899 |
| Span Middle School (i.e. Grades K-8) | 945 |
| **Central Total** | **26,009** |

Source: Cal OES; LAUSD

### *Table 4-95 LAUSD – Local District East Enrollment in Liquefaction Zones by Site Type*

| Site Type | Total Enrollment |
|---|---|
| Admin Facility | 0 |
| Adult Education Facility | 0 |
| Elementary School | 27,601 |
| Middle School | 7,187 |
| Senior High School | 14,914 |
| Span High School (i.e. Grades K-12) | 1,777 |
| **East Total** | **51,479** |

Source: Cal OES; LAUSD

### *Table 4-96 LAUSD – Local District Northeast Enrollment in Liquefaction Zones by Site Type*

| Site Type | Total Enrollment |
|---|---|
| Adult Education Facility | 0 |
| Community Day School | 0 |
| Continuation High School | 0 |
| Elementary School | 14,793 |
| Middle School | 4,712 |
| Senior High School | 7,722 |
| **Northeast Total** | **27,227** |

Source: Cal OES; LAUSD

### *Table 4-97 LAUSD – Local District Northwest Enrollment in Liquefaction Zones by Site Type*

| Site Type | Total Enrollment |
|---|---|
| Admin Facility | 0 |
| Adult Education Facility | 0 |
| Charter School | 0 |
| Continuation High School | 0 |
| Currently a Closed School | 0 |
| Elementary School | 17,999 |
| Middle School | 10,638 |
| Senior High School | 7,569 |
| Span High School (i.e. Grades K-12) | 2,679 |
| Special Education Center | 324 |
| **Northwest Total** | **39,209** |

Source: Cal OES; LAUSD

### *Table 4-98 LAUSD – Local District South Enrollment in Liquefaction Zones by Site Type*

| Site Type | Total Enrollment |
|---|---|
| Admin Facility | 0 |
| Adult Education Facility | 0 |
| Charter School | 0 |
| Community Day School | 0 |
| Elementary School | 21,602 |
| Middle School | 5,205 |
| Senior High School | 6,038 |
| **South Total** | **32,845** |

Source: Cal OES; LAUSD

*Table 4-99 LAUSD – Local District West Enrollment in Liquefaction Zones by Site Type*

| Site Type | Total Enrollment |
|---|---|
| Adult Education Facility | 0 |
| Early Education Center | 0 |
| Elementary School | 16,010 |
| Middle School | 4,053 |
| Senior High School | 9,477 |
| Span Middle School (i.e. Grades K-8) | 384 |
| **Local District West Total** | **29,924** |

Source: Cal OES; LAUSD

*Table 4-100 LAUSD – Outside Local District Enrollment in Liquefaction Zones by Site Type*

| Site Type | Total Enrollment |
|---|---|
| Admin Facility | 0 |
| Senior High School | 1,586 |
| **Outside Areas Total** | **1,586** |

Source: Cal OES; LAUSD

### Overall District Impact

Liquefaction impacts vary by location and severity of any given event and will likely only affect certain areas of the District during specific times. Based on the risk assessment, it is evident that earthquake-based liquefaction may have a potentially large economic impacts to certain areas of the District Planning Area. Impacts that are not quantified, but can be anticipated in large future events, include:

- Injury and loss of life;
- District building structural and property damage;
- Disruption of and damage to public infrastructure and services;
- Damage to roads/bridges resulting in loss of mobility;
- Significant economic impact (jobs, sales, tax revenue) to the community and District;
- Significant disruption to students and teachers as temporary facilities and relocations would likely be needed.
- Impact on the overall mental health of the community.

### *Future Development*

HOW WILL FUTURE SCHOOLS TAKE EARTHQUAKE AND LIQUEFACTION INTO ACCOUNT WHEN BEING BUILT?

## 4.3.8. Flood: 1%/0.2% Annual Chance Vulnerability Assessment

This hazard varies across the LAUSD Planning Area. Table 4-101 breaks out how 1% and 0.2% annual chance flood vulnerability varies by Local District.

*Table 4-101 LAUSD – Flood: 1% and 0.2% Annual Chance Vulnerability by Local District*

| LAUSD Planning Area/ Local Districts | Geographic Extent | Magnitude/ Severity | Probability of Future Occurrences (1%/0.2%) | Significance | Vulnerability |
|---|---|---|---|---|---|
| Central | Limited | Limited | Occasional/ Unlikely | Medium | Medium |
| East | Limited | Limited | Occasional/ Unlikely | Medium | Medium |
| Northeast | Limited | Limited | Occasional/ Unlikely | Low | Low |
| Northwest | Limited | Limited | Occasional/ Unlikely | Low | Low |
| South | Limited | Limited | Occasional/ Unlikely | Medium | Medium |
| West | Limited | Limited | Occasional/ Unlikely | Medium | Medium |

Source: LAUSD

Flooding can pose problem in Los Angeles County and the District. Historically, the LAUSD Planning Area has been at risk to flooding primarily during the winter and spring months when river systems in the County swell with heavy rainfall and snowmelt runoff. Normally, storm floodwaters are kept within defined limits by a variety of storm drainage and flood control measures. Occasionally, extended heavy rains result in floodwaters that exceed normal high-water boundaries and cause damage. Flooding has occurred both within the 1% and 0.2% annual chance floodplains and in other localized areas.

The 2012 District LHMP noted that the nearest major waterways in going through or in proximately to the LAUSD Planning Area are the Los Angeles River, Santa Clara River, Rio Hondo River, San Gabriel River, and Coyote Creek. The San Gabriel River is one mile to the west and it does create a potential for flooding for the LAUSD Planning Area.

The District has historical, cultural, and natural resources located throughout the District as previously described. Risk analysis of these resources was not possible due to data limitations. However, as previously described, natural areas, such as wetlands and riparian areas within the floodplain, often benefit from periodic flooding as a naturally recurring phenomenon. These natural areas often reduce flood impacts by allowing absorption and infiltration of floodwaters. Preserving and protecting these areas and associated functions are a vital component of sound floodplain management practices for the greater Los Angeles County. In addition, any historical, cultural, or natural resources located in the floodplain is potentially at risk to flooding.

The vulnerability of the District to severe flooding is moderate as it can result in life safety issues, property damage, and economic impacts to District facilities.

### Flood Hazard Assessment

This risk assessment for the LAUSD LHMP Update assessed the flood hazard specific to the District. Existing studies, maps, historical data, and federal, state, and local community expertise and knowledge contributed to this current flood assessment for the District. This flood risk assessment for this LHMP Update includes an assessment of future flooding conditions based on historic development in the floodplains and proposed future development as further described throughout this plan. The flood vulnerability assessment that follows focuses on the flood hazard based on FEMA DFIRMs.

## *Values at Risk*

LAUSD has mapped FEMA flood hazard areas. GIS was used to determine the possible impacts of flooding to LAUSD facilities and how the risk varies across the LAUSD Planning Area. This section includes summary tables by Local District for the LAUSD Planning Area and tables broken out by Local District and Site Type, while Appendix ?? includes detailed tables by Local District and Site Type with details on specific facilities affected. Maps and analysis tables detailing the FEMA flood hazards in the LAUSD Planning Area are provided below. The following methodology was followed in determining parcels and values at risk to the 1% annual chance (i.e., 100-year) flood and 0.2% annual chance (i.e., 500-year) flood.

### Methodology

LAUSD, located within Los Angeles County has a FEMA DFIRM dated September 28, 2008, and as updated by the National Flood Hazard Layer (NFHL) through January 6, 2016, which was utilized to perform the flood analysis. It should be noted that there is a Los Angeles County preliminary DFIRM dated 3/18/2018 that was not used due to its preliminary status. LAUSD's facilities database, including information on building replacement values, was used as the basis for the inventory of all facilities within LAUSD. The County's Assessor's data and parcel layer was joined to the facilities database to obtain information on assessed land values and to create a parcel inventory of LAUSD properties. As previously described, CRVs were calculated and added to building replacement values and the assessed land values, to determine the overall potential values at risk.

In some cases there are parcels in multiple flood zones, such as Zone A, Zone X, or Shaded X. GIS was used to overlay the parcel polygon data onto the DFIRM flood data. For the purposes of this analysis, the flood zone that intersected a parcel polygon was assigned the flood zone for the entire parcel. The parcels were segregated and analyzed in this fashion for the LAUSD Planning Area. Results are provided in this plan for LAUSD with analysis broken out by the six Local Districts, both in summary form and by site type. Appendix ?? includes additional details on the specific LAUSD facilities organized by site type for each of the six Local Districts. Each of the DFIRM flood zones that begins with the letter 'A' depict the Special Flood Hazard Area, or the 1% annual chance flood event (commonly referred to as the 100-year flood). Table 4-102 explains the difference between DFIRM mapped flood zones within the 1% annual chance flood zone as well as other flood zones located within the District Planning Area. The effective DFIRM maps for the District Planning Area are shown on Figure 4-66.

*Table 4-102 LAUSD – DFIRM Flood Hazard Zones*

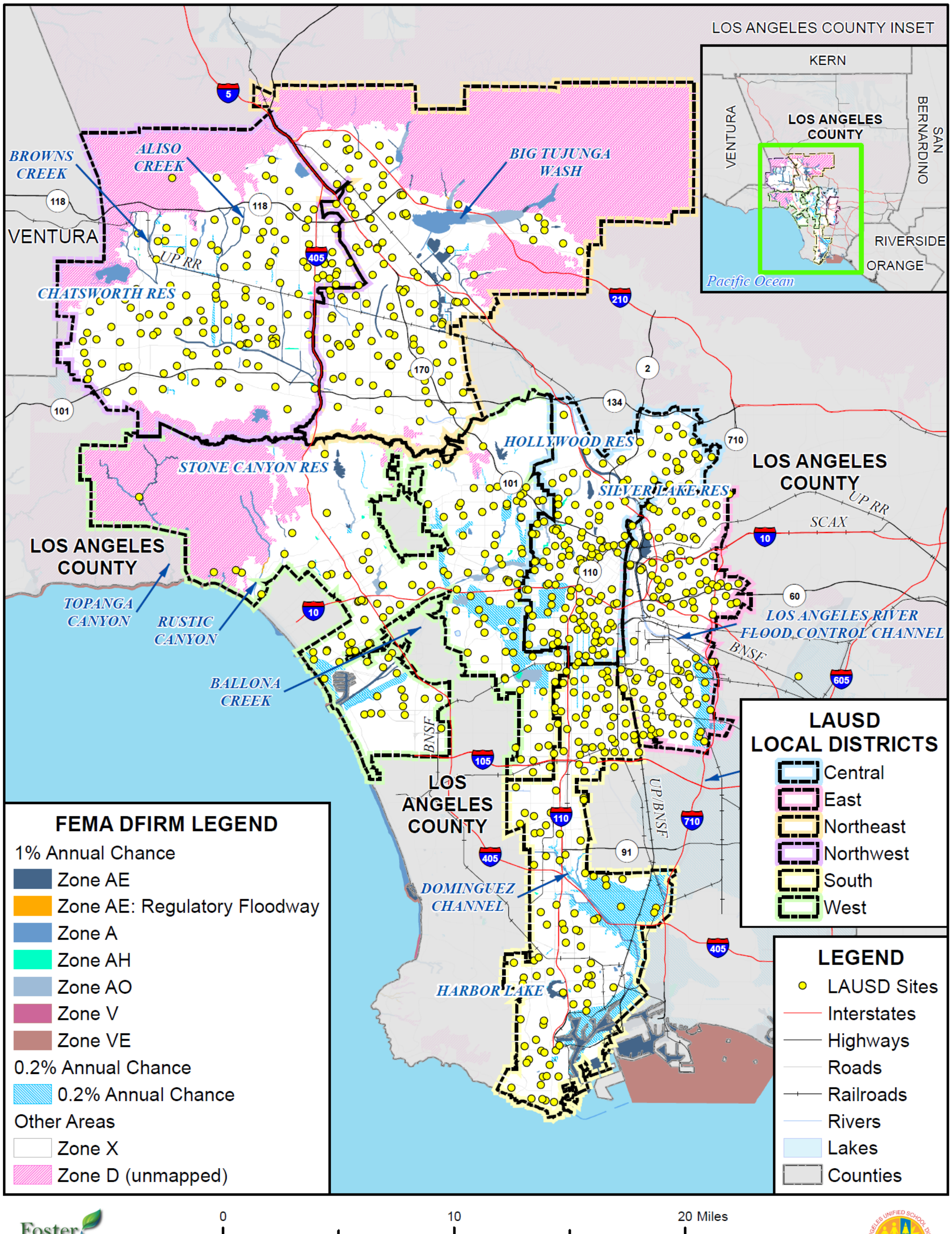
| Flood Zone | Description |
|---|---|
| A | 1% annual chance flood: No base flood elevations provided |
| AE | 1% annual chance flood: Base flood elevations provided |
| AE Floodway* | 1% annual chance flood: Regulatory floodway; Base flood elevations provided |
| AH | Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually areas of ponding) where average depths are between one and three feet. Base Flood Elevations (BFEs) derived from detailed hydraulic analyses are shown in this zone. |

| Flood Zone | Description |
|---|---|
| AO | Areas subject to inundation by 1-percent-annual-chance shallow flooding (usually sheet flow on sloping terrain) where average depths are between one and three feet. Average flood depths derived from detailed hydraulic analyses are shown in this zone. |
| V | Areas along coasts subject to inundation by the 1-percent-annual-chance flood event with additional hazards associated with storm-induced waves. Because detailed hydraulic analyses have not been performed, no Base Flood Elevations (BFEs) or flood depths are shown. |
| VE | Areas subject to inundation by the 1-percent-annual-chance flood event with additional hazards due to storm-induced velocity wave action. Base Flood Elevations (BFEs) derived from detailed hydraulic analyses are shown. |
| Shaded X | 0.2% annual chance flood: The areas between the limits of the 1% annual chance flood and the 0.2-percent-annual-chance (or 500-year) flood |
| X (unshaded) | No flood hazard |
| D | Unmapped Areas |

Source: FEMA

*In Los Angeles County, the floodway is defined as the channel of any water course and adjacent lands that must be reserved in order to discharge the base flood without increasing the water surface elevation more than one foot.

*Figure 4-66 LAUSD– DFIRM Flood Zones*




Data Source: FEMA Effective DFIRM 9/28/2008 (NFHL 1/6/2016 database), LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

### Limitations

It also should be noted that the resulting flood loss estimates may actually be more or less than that presented in the below tables as the District may include structures located within the 1% or 0.2% annual chance floodplain that are elevated at or above the level of the base flood elevation, according to local floodplain development requirements. Also, it is important to keep in mind that these assessed values may be well below the actual market value of improved parcels located within the floodplain due primarily to Proposition 13.

## LAUSD Flood Analysis Results

Table 4-103 contains summary flood analysis results for the LAUSD Planning Area. This table shows the number of parcels and values at risk to the 1% and 0.2% annual chance event by Local District area for LAUSD. Table 4-103 shows a summary of the value of parcels, buildings, land, contents, and total values by 1% and 0.2 annual chance flood zones.

*Table 4-103 LAUSD – Local District Summary Values at Risk in the DFIRM 1% and 0.2 Annual Chance Flood Zones*

| Flood Zone / Site Type | Total Parcel Count* | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Inside Local District Areas | | | | | | |
| **Local District Central** | | | | | | |
| 1% Annual Chance Flood | 5 | $485,403 | 8 | $29,424,358 | $29,424,358 | $59,334,120 |
| 0.2% Annual Chance Flood** | 200 | $41,271,778 | 263 | $767,119,398 | $767,119,398 | $1,575,510,574 |
| **Central Total** | **205** | **$41,757,181** | **271** | **$796,543,757** | **$796,543,757** | **$1,634,844,694** |
| **Local District East** | | | | | | |
| 0.2% Annual Chance Flood** | 131 | $17,144,427 | 146 | $310,227,538 | $310,227,538 | $637,599,502 |
| **East Total** | **131** | **$17,144,427** | **146** | **$310,227,538** | **$310,227,538** | **$637,599,502** |
| **Local District Northeast** | | | | | | |
| 1% Annual Chance Flood | 7 | $13,844,346 | 144 | $202,070,276 | $202,070,276 | $417,984,899 |
| **Northeast Total** | **7** | **$13,844,346** | **144** | **$202,070,276** | **$202,070,276** | **$417,984,899** |
| **Local District Northwest** | | | | | | |
| 1% Annual Chance Flood | 1 | $1,870,081 | 90 | $119,846,653 | $119,846,653 | $241,563,387 |
| 0.2% Annual Chance Flood** | 4 | $2,558,209 | 133 | $171,428,387 | $171,428,387 | $345,414,983 |
| **Northwest Total** | **5** | **$4,428,290** | **223** | **$291,275,040** | **$291,275,040** | **$586,978,371** |
| **Local District South** | | | | | | |
| 0.2% Annual Chance Flood | 83 | $15,190,211 | 247 | $665,652,042 | $665,652,042 | $1,346,494,296 |
| **South Total** | **83** | **$15,190,211** | **247** | **$665,652,042** | **$665,652,042** | **$1,346,494,296** |
| **Local District West** | | | | | | |
| 1% Annual Chance Flood | 18 | $2,187,333 | 40 | $74,500,974 | $74,500,974 | $151,189,281 |

| Flood Zone / Site Type | Total Parcel Count* | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| 0.2% Annual Chance Flood** | 47 | $15,947,117 | 293 | $598,791,948 | $598,791,948 | $1,213,531,014 |
| **West Total** | **65** | **$18,134,450** | **333** | **$673,292,922** | **$673,292,922** | **$1,364,720,295** |
| **Inside Areas Total** | **496** | **$110,498,905** | **1,364** | **$2,939,061,576** | **$2,939,061,576** | **$5,988,622,057** |
| **Outside of Local District Areas** | | | | | | |
| **Outside of Local District Areas** | | | | | | |
| 0.2% Annual Chance Flood | 1 | $6,025,565 | 1 | $149,306,997 | $149,306,997 | $304,639,558 |
| **Outside Areas Total** | **1** | **$6,025,565** | **1** | **$149,306,997** | **$149,306,997** | **$304,639,558** |
| | | | | | | |
| **Grand Total** | **497** | **$116,524,470** | **1,365** | **$3,088,368,572** | **$3,088,368,572** | **$6,293,261,615** |

Source: FEMA 9/8/2008 DFIRM; Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

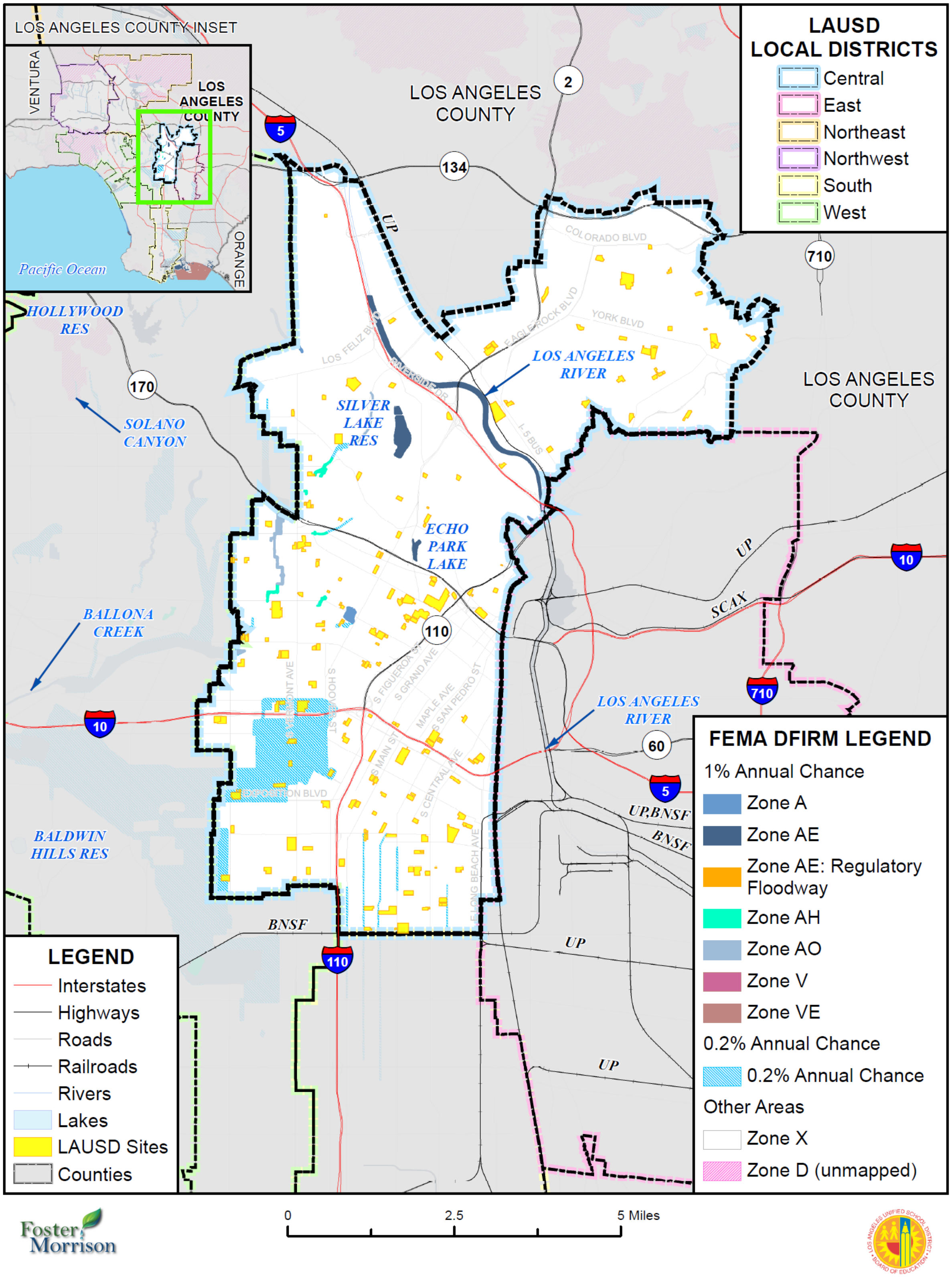
*With respect to improve parcels within the floodplain, the actual structures on the parcels may not be located within the actual floodplain, may be elevated and or otherwise outside of the identified flood zone

**This parcel count only includes those parcels in the 0.2% annual chance floodplain, exclusive of the 1% annual chance floodplain. The 0.2% annual chance flood, in actuality, also includes all parcels in the 1% annual chance floodplain.

DFIRM flood maps and analysis were broken out for the LAUSD by Local District. These maps show locations of flood zones and facilities by Local District by site type; while the tables show the parcel counts, building counts, land values, contents values, and total values for the following Local Districts:

- Central (Figure 4-67 and Table 4-104)
- East (Figure 4-68 and Table 4-105)
- Northeast (Figure 4-69 and Table 4-106)
- Northwest (Figure 4-70 and Table 4-107)
- South (Figure 4-71 and Table 4-108)
- West (Figure 4-72 and Table 4-109)
- Outside of Local District Areas (Table 4-110)

*Figure 4-67 LAUSD – Local District Central DFIRM Flood Zones*




Data Source: FEMA Effective DFIRM 9/28/2008 (NFHL 1/6/2016 database), LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

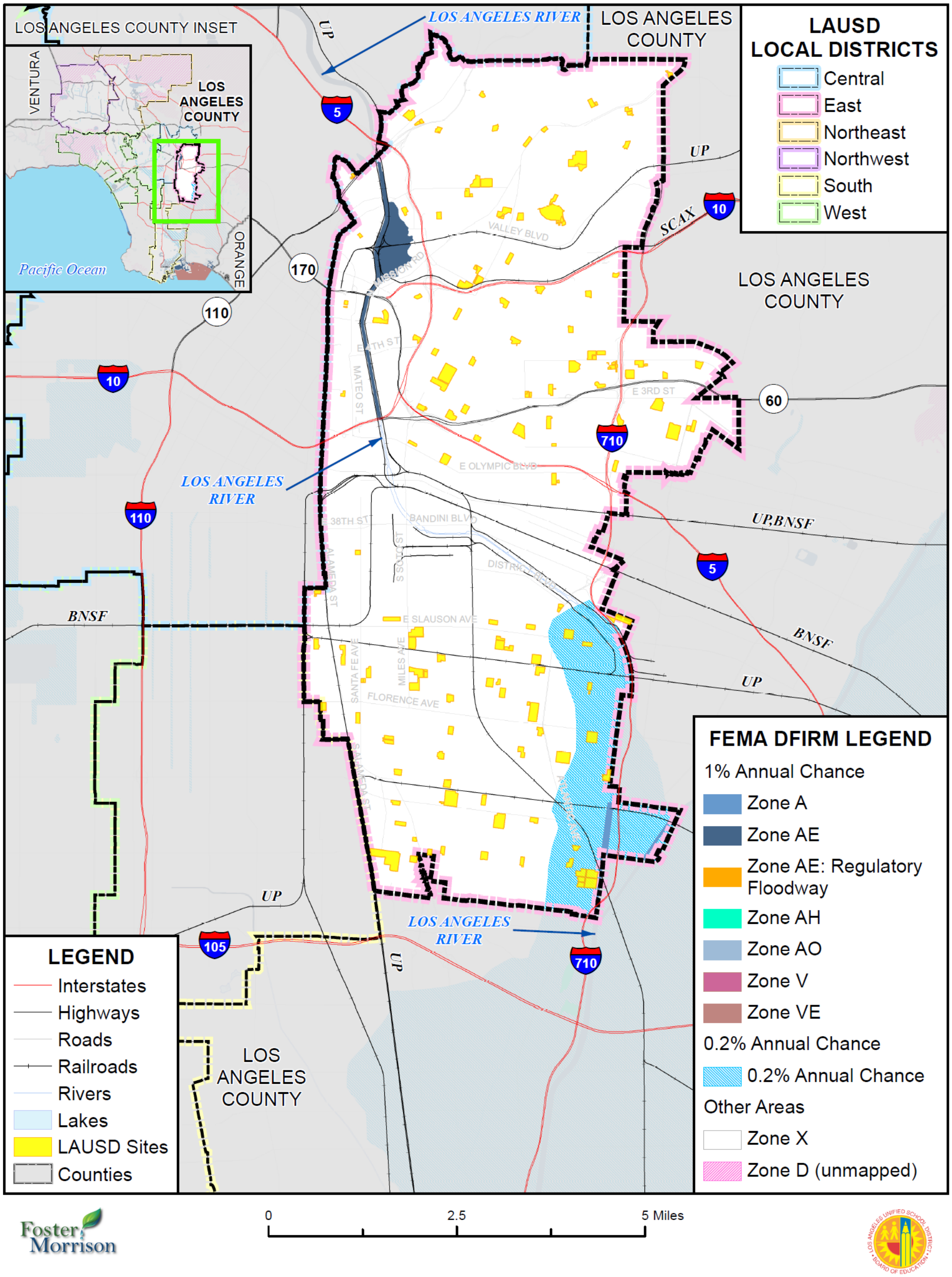
*Table 4-104 LAUSD – Local District Central Values at Risk in DFIRM 1% and 0.2 Annual Chance Flood Zones by Site Type*

| Flood Zone / Site Type | Total Parcel Count* | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| 1% Annual Chance Flood Hazard | | | | | | |
| **Zone AH** | | | | | | |
| Elementary School | 5 | $485,403 | 8 | $29,424,358 | $29,424,358 | $59,334,120 |
| Zone AH Total | 5 | $485,403 | 8 | $29,424,358 | $29,424,358 | $59,334,120 |
| **1% Annual Chance Flood Hazard Total** | **5** | **$485,403** | **8** | **$29,424,358** | **$29,424,358** | **$59,334,120** |
| 0.2% Annual Chance Flood Hazard (Zone X Shaded) | | | | | | |
| Elementary School | 89 | $15,593,129 | 93 | $276,522,110 | $276,522,110 | $568,637,348 |
| Middle School | 40 | $6,690,269 | 56 | $133,402,794 | $133,402,794 | $273,495,858 |
| Senior High School | 59 | $17,149,005 | 30 | $220,873,215 | $220,873,215 | $458,895,435 |
| Span High School (i.e. Grades K-12) | 8 | $1,397,102 | 65 | $108,594,905 | $108,594,905 | $218,586,912 |
| Special Education Center | 4 | $442,273 | 19 | $27,726,374 | $27,726,374 | $55,895,021 |
| **0.2% Annual Chance Flood Hazard Total** | **200** | **$41,271,778** | **263** | **$767,119,398** | **$767,119,398** | **$1,575,510,574** |
| **Central Total** | **205** | **$41,757,181** | **271** | **$796,543,757** | **$796,543,757** | **$1,634,844,694** |

Source: FEMA 9/8/2008 DFIRM, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

*With respect to improve parcels within the floodplain, the actual structures on the parcels may not be located within the actual floodplain, may be elevated and or otherwise outside of the identified flood zone

*Figure 4-68 LAUSD – Local District East DFIRM Flood Zones*




Data Source: FEMA Effective DFIRM 9/28/2008 (NFHL 1/6/2016 database), LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

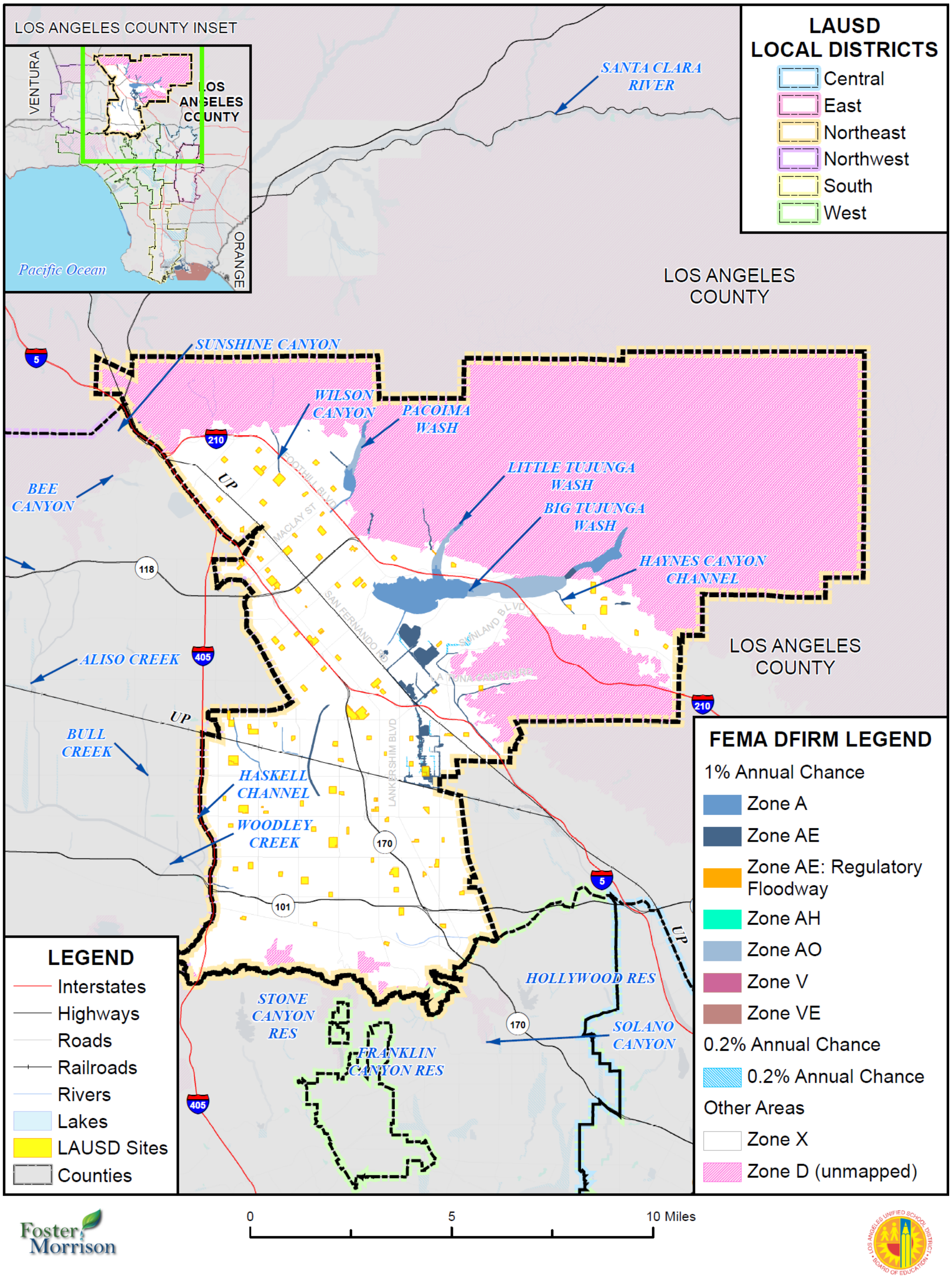
### *Table 4-105 LAUSD – Local District East Values at Risk in DFIRM 1% and 0.2 Annual Chance Flood Zones by Site Type*

| Flood Zone / Site Type | Total Parcel Count* | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| **0.2% Annual Chance Flood Hazard (Zone X Shaded)** | | | | | | |
| Admin Facility | 1 | $362,471 | 12 | $5,966,730 | $5,966,730 | $12,295,930 |
| Elementary School | 23 | $2,812,577 | 89 | $163,523,317 | $163,523,317 | $329,859,210 |
| Senior High School | 107 | $13,969,379 | 45 | $140,737,491 | $140,737,491 | $295,444,362 |
| 0.2% Annual Chance Flood Hazard Total | 131 | $17,144,427 | 146 | $310,227,538 | $310,227,538 | $637,599,502 |
| **East Total** | **131** | **$17,144,427** | **146** | **$310,227,538** | **$310,227,538** | **$637,599,502** |

Source: FEMA 9/8/2008 DFIRM, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

*With respect to improve parcels within the floodplain, the actual structures on the parcels may not be located within the actual floodplain, may be elevated and or otherwise outside of the identified flood zone

*Figure 4-69 LAUSD – Local District Northeast DFIRM Flood Zones*




Data Source: FEMA Effective DFIRM 9/28/2008 (NFHL 1/6/2016 database), LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

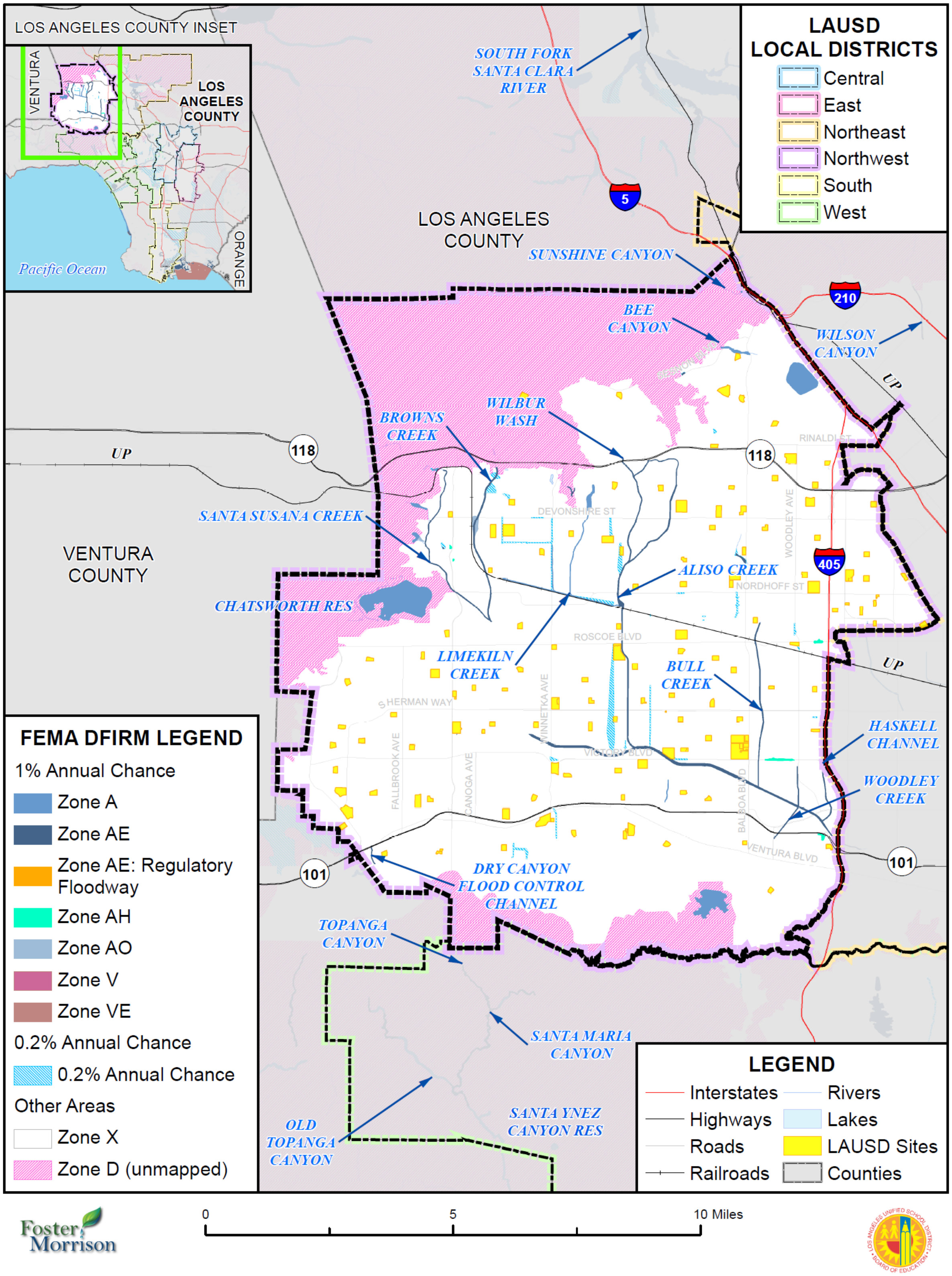
### *Table 4-106 LAUSD – Local District Northeast Values at Risk in DFIRM 1% and 0.2 Annual Chance Flood Zones by Site Type*

| Flood Zone / Site Type | Total Parcel Count* | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| 1% Annual Chance Flood Hazard | | | | | | |
| **Zone A** | | | | | | |
| Middle School | 1 | $10,543,101 | 14 | $71,805,397 | $71,805,397 | $154,153,894 |
| **Zone A Total** | **1** | **$10,543,101** | **14** | **$71,805,397** | **$71,805,397** | **$154,153,894** |
| **Zone AE** | | | | | | |
| Admin Facility | 2 | $1,158,062 | 23 | $13,950,219 | $13,950,219 | $29,058,499 |
| Elementary School | 3 | $255,271 | 57 | $35,316,652 | $35,316,652 | $70,888,576 |
| Middle School | 1 | $1,887,912 | 50 | $80,998,009 | $80,998,009 | $163,883,930 |
| Zone AE Total | 6 | $3,301,245 | 130 | $130,264,880 | $130,264,880 | $263,831,004 |
| 1% Annual Chance Flood Hazard Total | 7 | $13,844,346 | 144 | $202,070,276 | $202,070,276 | $417,984,899 |
| **Northeast Total** | **7** | **$13,844,346** | **144** | **$202,070,276** | **$202,070,276** | **$417,984,899** |

Source: FEMA 9/8/2008 DFIRM; Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

*With respect to improve parcels within the floodplain, the actual structures on the parcels may not be located within the actual floodplain, may be elevated and or otherwise outside of the identified flood zone

*Figure 4-70 LAUSD – Local District Northwest DFIRM Flood Zones*




Data Source: FEMA Effective DFIRM 9/28/2008 (NFHL 1/6/2016 database), LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

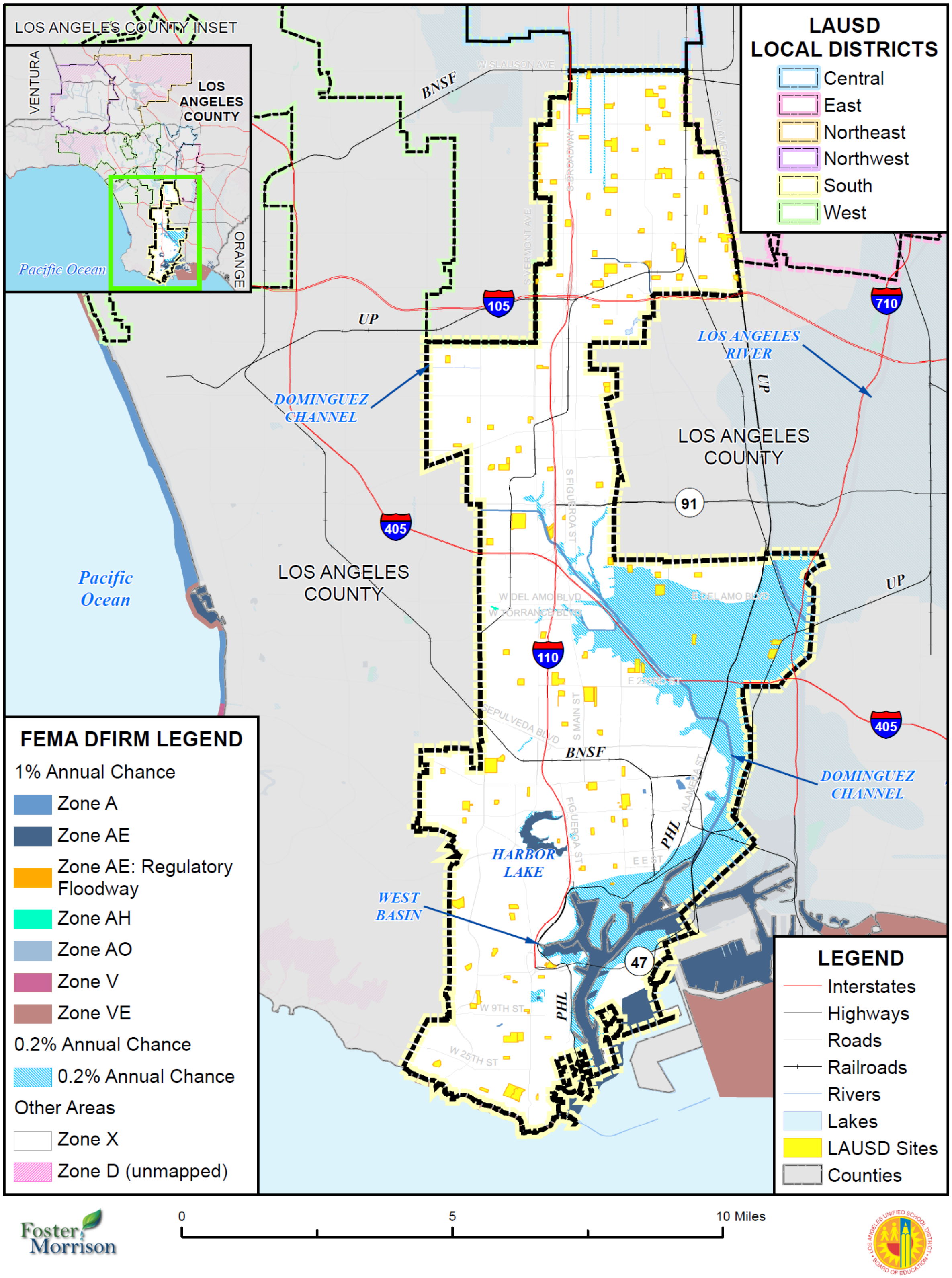
*Table 4-107 LAUSD – Local District Northwest Values at Risk in DFIRM 1% and 0.2 Annual Chance Flood Zones by Site Type*

| Flood Zone / Site Type | Total Parcel Count* | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| 1% Annual Chance Flood Hazard | | | | | | |
| **Zone AE** | | | | | | |
| Senior High School | 1 | $1,870,081 | 90 | $119,846,653 | $119,846,653 | $241,563,387 |
| **Zone AE Total** | **1** | **$1,870,081** | **90** | **$119,846,653** | **$119,846,653** | **$241,563,387** |
| **1% Annual Chance Flood Hazard Total** | **1** | **$1,870,081** | **90** | **$119,846,653** | **$119,846,653** | **$241,563,387** |
| 0.2% Annual Chance Flood Hazard (Zone X Shaded) | | | | | | |
| Adult Education Facility | 1 | $163,309 | 12 | $15,050,337 | $15,050,337 | $30,263,983 |
| Elementary School | 1 | $352,245 | 25 | $20,513,029 | $20,513,029 | $41,378,303 |
| Senior High School | 1 | $1,632,767 | 84 | $117,189,800 | $117,189,800 | $236,012,366 |
| Special Education Center | 1 | $409,888 | 12 | $18,675,222 | $18,675,222 | $37,760,331 |
| **0.2% Annual Chance Flood Hazard Total** | **4** | **$2,558,209** | **133** | **$171,428,387** | **$171,428,387** | **$345,414,983** |
| **Northwest Total** | **5** | **$4,428,290** | **223** | **$291,275,040** | **$291,275,040** | **$586,978,371** |

Source: FEMA 9/8/2008 DFIRM, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

*With respect to improve parcels within the floodplain, the actual structures on the parcels may not be located within the actual floodplain, may be elevated and or otherwise outside of the identified flood zone

*Figure 4-71 LAUSD – Local District South DFIRM Flood Zones*




Data Source: FEMA Effective DFIRM 9/28/2008 (NFHL 1/6/2016 database), LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

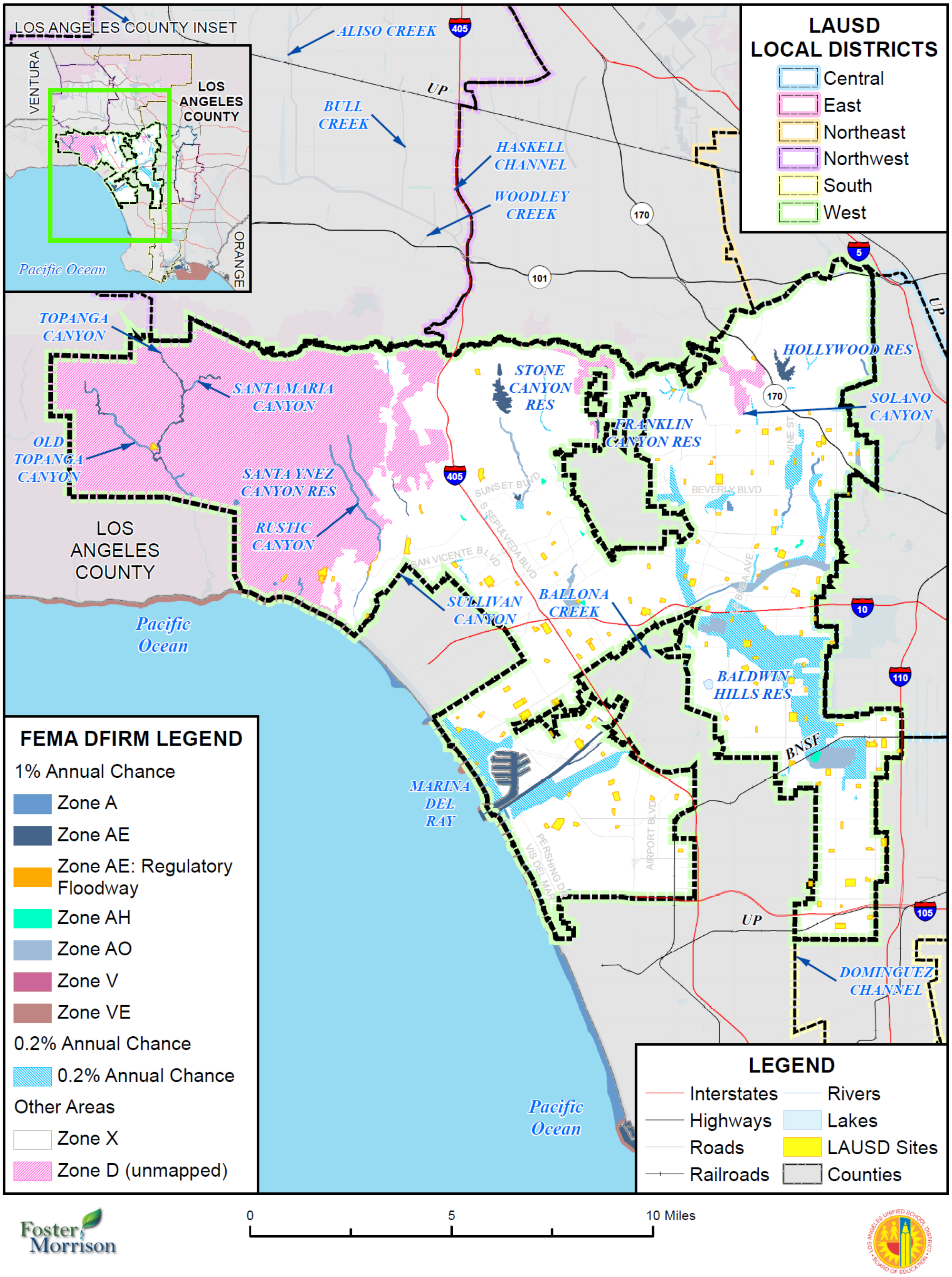
*Table 4-108 LAUSD – Local District South Values at Risk in DFIRM 1% and 0.2 Annual Chance Flood Zones by Site Type*

| Flood Zone / Site Type | Total Parcel Count* | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| 0.2% Annual Chance Flood Hazard (Zone X Shaded) | | | | | | |
| Elementary School | 42 | $6,904,576 | 104 | $157,186,446 | $157,186,446 | $321,277,468 |
| Middle School | 9 | $2,659,250 | 80 | $189,715,916 | $189,715,916 | $382,091,081 |
| Senior High School | 32 | $5,626,385 | 63 | $318,749,681 | $318,749,681 | $643,125,746 |
| **0.2% Annual Chance Flood Hazard Total** | **83** | **$15,190,211** | **247** | **$665,652,042** | **$665,652,042** | **$1,346,494,296** |
| **South Total** | **83** | **$15,190,211** | **247** | **$665,652,042** | **$665,652,042** | **$1,346,494,296** |

Source: FEMA 9/8/2008 DFIRM, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

*With respect to improve parcels within the floodplain, the actual structures on the parcels may not be located within the actual floodplain, may be elevated and or otherwise outside of the identified flood zone

*Figure 4-72 LAUSD – Local District West DFIRM Flood Zones*




Data Source: FEMA Effective DFIRM 9/28/2008 (NFHL 1/6/2016 database), LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

### *Table 4-109 LAUSD – Local District West Values at Risk in DFIRM 1% and 0.2 Annual Chance Flood Zones by Site Type*

| Flood Zone / Site Type | Total Parcel Count* | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| 1% Annual Chance Flood Hazard | | | | | | |
| **Zone AO** | | | | | | |
| Elementary School | 18 | $2,187,333 | 40 | $74,500,974 | $74,500,974 | $151,189,281 |
| **Zone AO Total** | **18** | **$2,187,333** | **40** | **$74,500,974** | **$74,500,974** | **$151,189,281** |
| **1% Annual Chance Flood Hazard Total** | **18** | **$2,187,333** | **40** | **$74,500,974** | **$74,500,974** | **$151,189,281** |
| 0.2% Annual Chance Flood Hazard (Zone X Shaded) | | | | | | |
| Admin Facility | 1 | $267,690 | 1 | $5,058,912 | $5,058,912 | $10,385,514 |
| Early Education Center | 1 | $408,581 | 4 | $4,301,259 | $4,301,259 | $9,011,100 |
| Elementary School | 36 | $10,576,244 | 175 | $327,441,957 | $327,441,957 | $665,460,158 |
| Middle School | 2 | $2,237,922 | 23 | $57,512,823 | $57,512,823 | $117,263,567 |
| Senior High School | 5 | $807,476 | 74 | $193,179,341 | $193,179,341 | $387,166,158 |
| Span Middle School (i.e. Grades K-8) | 2 | $1,649,204 | 16 | $11,297,656 | $11,297,656 | $24,244,517 |
| **0.2% Annual Chance Flood Hazard Total** | **47** | **$15,947,117** | **293** | **$598,791,948** | **$598,791,948** | **$1,213,531,014** |
| **Local District West Total** | **65** | **$18,134,450** | **333** | **$673,292,922** | **$673,292,922** | **$1,364,720,295** |

Source: FEMA 9/8/2008 DFIRM, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

*With respect to improve parcels within the floodplain, the actual structures on the parcels may not be located within the actual floodplain, may be elevated and or otherwise outside of the identified flood zone

### *Table 4-110 LAUSD – Outside of Local District Values at Risk in DFIRM 1% and 0.2 Annual Chance Flood Zones by Site Type*

| Flood Zone / Site Type | Total Parcel Count* | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| 0.2% Annual Chance Flood Hazard | | | | | | |
| Admin Facility | 1 | $6,025,565 | 1 | $149,306,997 | $149,306,997 | $304,639,558 |
| 0.2% Annual Chance Flood Hazard Total | 1 | $6,025,565 | 1 | $149,306,997 | $149,306,997 | $304,639,558 |
| **Outside of Local District Areas Total** | **1** | **$6,025,565** | **1** | **$149,306,997** | **$149,306,997** | **$304,639,558** |

Source: FEMA 9/8/2008 DFIRM, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

*With respect to improve parcels within the floodplain, the actual structures on the parcels may not be located within the actual floodplain, may be elevated and or otherwise outside of the identified flood zone

### Insurance Coverage, Claims Paid, and Repetitive Losses

NEED INFORMATION ON HOW DISTRICT PARTICIPATES IN NFIP AND HOW THEY GET FLOOD INSURANCE

## *Population at Risk*

A separate analysis was performed to determine the LAUSD populations (enrollments) in flood zones. Using GIS, the DFIRM flood dataset was overlayed on the LAUSD facility layer. Enrollment counts by facility were provided by LAUSD. Results were tabulated and are shown in Table 4-111. According to this analysis, there is a population of 6,629 in the 1% and 40,931 in the 0.2% annual chance flood event.

*Table 4-111 LAUSD – Total Enrollment at Risk to 1% and 0.2% Annual Chance Flooding* by Local District*

| Location | Total Enrollment |
|---|---|
| Inside Local District Areas | |
| Central – 1% Annual Chance | 433 |
| Central – 0.2% Annual Chance | 12,764 |
| **Central Total** | **13,197** |
| East – 1% Annual Chance | 0 |
| East– 0.2% Annual Chance | 5,302 |
| **East Total** | **5,302** |
| Northeast – 1% Annual Chance | 3,273 |
| Northeast – 0.2% Annual Chance | 0 |
| **Northeast Total** | **3,273** |
| Northwest – 1% Annual Chance | 1,529 |
| Northwest – 0.2% Annual Chance | 3,984 |
| **Northwest Total** | **5,513** |
| South – 1% Annual Chance | 0 |
| South – 0.2% Annual Chance | 8,482 |
| **South Total** | **8,482** |
| West – 1% Annual Chance | 1,394 |
| West – 0.2% Annual Chance | 10,399 |
| **West Total** | **11,793** |
| **Inside Areas Total** | **47,560** |
| Outside of Local District Areas | |
| **Outside Areas Total** | **0** |
| | |
| **Grand Total** | **47,560** |

Source: FEMA 9/8/2008 DFIRM; LAUSD

*With respect to improve parcels within the floodplain, the actual structures on the parcels may not be located within the actual floodplain, may be elevated and or otherwise outside of the identified flood zone

To give further detail on populations of enrolled students in the dam inundation area, enrolled populations in DFIRM flood zones were broken out by Local Districts and Site Type. This can be seen for the Central (Table 4-73), East (Table 4-74), Northeast (Table 4-75), Northwest (Table 4-76), South (Table 4-77), West (Table 4-78), and outside Local District (Table 4-79).

### *Table 4-112 LAUSD – Local District Central Enrollment at Risk to 1% and 0.2% Annual Chance Flooding* by Site Type*

| Site Type | Total Enrollment |
|---|---|
| 1% Annual Chance Flood Hazard | |
| **Zone AH** | |
| Elementary School | 433 |
| **Zone AH Total** | **433** |
| **1% Annual Chance Flood Hazard Total** | **433** |
| 0.2% Annual Chance Flood Hazard (Zone X (shaded)) | |
| Elementary School | 5,212 |
| Middle School | 2,425 |
| Senior High School | 2,073 |
| Span High School (i.e. Grades K-12) | 2,950 |
| Special Education Center | 104 |
| **0.2% Annual Chance Flood Hazard Total** | **12,764** |
| | |
| **Central Grand Total** | **13,197** |

Source: FEMA 9/8/2008 DFIRM; LAUSD

*With respect to improve parcels within the floodplain, the actual structures on the parcels may not be located within the actual floodplain, may be elevated and or otherwise outside of the identified flood zone

### *Table 4-113 LAUSD – Local District East Enrollment at Risk to 1% and 0.2% Annual Chance Flooding* by Site Type*

| Site Type | Total Enrollment |
|---|---|
| 0.2% Annual Chance Flood Hazard (Zone X (shaded)) | |
| Admin Facility | 0 |
| Elementary School | 3,768 |
| Senior High School | 1,534 |
| **0.2% Annual Chance Flood Hazard Total** | **5,302** |

Source: FEMA 9/8/2008 DFIRM; LAUSD

*With respect to improve parcels within the floodplain, the actual structures on the parcels may not be located within the actual floodplain, may be elevated and or otherwise outside of the identified flood zone

*Table 4-114 LAUSD – Local District Northeast Enrollment at Risk to 1% and 0.2% Annual Chance Flooding* by Site Type*

| Site Type | Total Enrollment |
|---|---|
| 1% Annual Chance Flood Hazard | |
| **Zone A** | |
| Middle School | 1,181 |
| **Zone A Total** | **1,181** |
| **Zone AE** | |
| Admin Facility | 0 |
| Elementary School | 539 |
| Middle School | 1,553 |
| **Zone AE Total** | **2,092** |
| **1% Annual Chance Flood Hazard Total** | **3,273** |

Source: FEMA 9/8/2008 DFIRM; LAUSD

*With respect to improve parcels within the floodplain, the actual structures on the parcels may not be located within the actual floodplain, may be elevated and or otherwise outside of the identified flood zone

*Table 4-115 LAUSD – Local District Northwest Enrollment at Risk to 1% and 0.2% Annual Chance Flooding* by Site Type*

| Site Type | Total Enrollment |
|---|---|
| 1% Annual Chance Flood Hazard | |
| **Zone AE** | |
| Senior High School | 1,529 |
| **Zone AE Total** | **1,529** |
| **1% Annual Chance Flood Hazard Total** | **1,529** |
| 0.2% Annual Chance Flood Hazard (Zone X (shaded)) | |
| Adult Education Facility | 0 |
| Elementary School | 609 |
| Senior High School | 3,188 |
| Special Education Center | 187 |
| **0.2% Annual Chance Flood Hazard Total** | **3,984** |
| | |
| **Northwest Grand Total** | **5,513** |

Source: FEMA 9/8/2008 DFIRM; LAUSD

*With respect to improve parcels within the floodplain, the actual structures on the parcels may not be located within the actual floodplain, may be elevated and or otherwise outside of the identified flood zone

### *Table 4-116 LAUSD – Local District South Enrollment at Risk to 1% and 0.2% Annual Chance Flooding* by Site Type*

| Site Type | Total Enrollment |
|---|---|
| 0.2% Annual Chance Flood Hazard (Zone X (shaded)) | |
| Elementary School | 2,545 |
| Middle School | 2,445 |
| Senior High School | 3,492 |
| **0.2% Annual Chance Flood Hazard Total** | **8,482** |

Source: FEMA 9/8/2008 DFIRM; LAUSD

*With respect to improve parcels within the floodplain, the actual structures on the parcels may not be located within the actual floodplain, may be elevated and or otherwise outside of the identified flood zone

### *Table 4-117 LAUSD – Local District West Enrollment at Risk to 1% and 0.2% Annual Chance Flooding* by Site Type*

| Site Type | Total Enrollment |
|---|---|
| 1% Annual Chance Flood Hazard | |
| **Zone AO** | |
| Elementary School | 1,394 |
| **Zone AO Total** | **1,394** |
| **1% Annual Chance Flood Hazard Total** | **1,394** |
| 0.2% Annual Chance Flood Hazard | |
| **Zone X (shaded)** | |
| Admin Facility | 0 |
| Early Education Center | 0 |
| Elementary School | 6,073 |
| Middle School | 491 |
| Senior High School | 3,451 |
| Span Middle School (i.e. Grades K-8) | 384 |
| 0.2% Annual Chance Flood Hazard Total | **10,399** |
| | |
| **West Grand Total** | **11,793** |

Source: FEMA 9/8/2008 DFIRM; LAUSD

*With respect to improve parcels within the floodplain, the actual structures on the parcels may not be located within the actual floodplain, may be elevated and or otherwise outside of the identified flood zone

### *Table 4-118 LAUSD – Outside Local District Enrollment at Risk to 1% and 0.2% Annual Chance Flooding* by Site Type*

| Site Type | Total Enrollment |
|---|---|
| – | – |
| **Total Outside Areas** | **0** |

Source: FEMA 9/8/2008 DFIRM; LAUSD
*With respect to improve parcels within the floodplain, the actual structures on the parcels may not be located within the actual floodplain, may be elevated and or otherwise outside of the identified flood zone

## *Overall District Impact*

Floods and their impacts vary by location and severity of any given flood event and will likely only affect certain areas of the District during specific times. Based on the risk assessment, it is evident that floods will continue to have potentially devastating economic and other impacts to certain areas of the District. However, many of the floods in the County and District Planning Area are minor, localized flood events that are more of a nuisance than a disaster. Impacts that are not quantified, but can be anticipated in large future events, include:

- Injury and loss of life;
- LAUSD structure and property damage;
- Disruption of and damage to public infrastructure and services;
- Health hazards associated with mold and mildew, contamination of drinking water, etc.;
- Damage to roads/bridges resulting in loss of mobility;
- Significant economic impact (jobs, sales, tax revenue) to the community and District;
- Negative impact on commercial and residential property values impacting LAUSD revenue; and
- Significant disruption to students and teachers as temporary facilities and relocations would likely be needed.
- Impact on the overall mental health of the community.

## *Future Development and Future Flood Conditions*

This section provides an analysis of the flood hazard and proposed future development within the District based on FEMA DFIRMs and also discusses considerations in evaluating future flooding conditions.

### Future Development: General Considerations

Communities that participate in the NFIP adopt regulations and codes that govern development in special flood hazard areas, and enforce those requirements through their local floodplain management ordinances through the issuance of permits. Los Angeles County and the numerous cities that have LAUSD facilities within their boundaries enforce floodplain management ordinances that provide standards for development, subdivision of land, construction of buildings, and improvements and repairs to buildings that meet the minimum requirements of the NFIP. PROVIDE DETAILS ON THE FLOODPLAIN MANAGEMENT REQUIREMENTS THAT THE DISTRICT FOLLOWS THROUGHT THE STATE.

The International Residential Code (IRC) and International Building Code (IBC), by reference to ASCE 24, include requirements that govern the design and construction of buildings and structures in flood hazard areas. FEMA has determined that the flood provisions of the I-Codes are consistent with the requirements of the NFIP (the I-Code requirements shown either meet or exceed NFIP requirements). ASCE 24, a design standard developed by the American Society of Civil Engineers, expands on the minimum NFIP requirements with more specificity, additional requirements, and some limitations.

With the adoption of the 2015 International Code, communities will be moving towards a more stringent approach to regulatory floodplain management, beyond the minimum requirements of the NFIP. The adoption and enforcement of disaster-resistant building codes is a core community action to promote effective mitigation. When communities ensure that new buildings and infrastructure are designed and constructed in accordance with national building codes and construction standards, they significantly increase local resilience now and in the future. With continued advancements in building codes, local ordinances should be reviewed and updated to meet and exceed standards as practicable to protect new development from future flood events and to further promote disaster resiliency.

One of the most effective ways to reduce vulnerability to potential flood damage is through careful land use planning that fully considers applicable flood management information and practices. Master planning will also be necessary to assure that open channel flood flow conveyances serving the smaller internal streams and drainage areas are adequately prepared to accommodate the flows. Preservation and maintenance of natural and riparian areas should also be an ongoing priority to realize the flood control benefits of the natural and beneficial functions of these areas. Also to be considered in reducing flooding in areas of existing and future development is to promote implementation of stormwater program elements and erosion and sediment controls, including the clearing of vegetation from natural and man-made drains that are critical to flood protection. Both native and invasive species can clog drains, and reduce flows of floodwaters, which slow that natural drainage process and can exacerbate flooding.

### Future Flood Conditions: The Effects of Climate Change

The effects of climate change on future flood conditions should also be considered. While the risk and associated short and long-term impacts of climate change are uncertain, experts in this field tend to agree that among the most significant impacts include those resulting from increased heat and precipitation events that cause increased frequency and magnitude of flooding. Increases in damaging flood events will cause greater property damage, public health and safety concerns displacement, and loss of life. In addition, an increase in the magnitude and severity of flood events can lead to potential contamination of potable water in the District . Displacement of residents can include both temporary and long-term displacement, increase in insurance rates or restriction of coverage in vulnerable areas.

Los Angeles County and the District will continue to study the risk and vulnerability associated with future flood conditions, both in terms of future growth areas and other considerations such as climate change, as they evaluate and implement their flood mitigation and adaptation strategy for the LAUSD Planning Area.

### Future Flood Conditions: ARkStorm Scenario

Also to be considered in evaluating potential “worst case” future flood conditions, is the ARkStorm Scenario. Although much attention in California’s focuses on the “Big One” as a high magnitude earthquake, there is the risk of another significant event in California – a massive, statewide winter storm. The last such storms occurred in the 19th century, outside the memory of current emergency managers, officials, and communities. However, massive storms are a recurring feature of the state, the source of rare but inevitable disasters. The USGS Multi Hazards Demonstration Project’s (MHDP) developed a product called ARkStorm, which addressed massive U.S. West Coast storms analogous to those that devastated California in 1861-1862. Over the last decade, scientists have determined that the largest storms in

California are the product of phenomena called Atmospheric Rivers, and so the MHDP storm scenario is called the ARkStorm, for Atmospheric River 1000 (a measure of the storm's size).

Scientific studies of offshore deposits in northern and southern California indicate that storms of this magnitude and larger have occurred about as often as large earthquakes on the southern San Andreas Fault. Such storms are projected to become more frequent and intense as a result of climate change. This scientific effort resulted in a plausible flood hazard scenario to be used as a planning and preparation tool by hazard mitigation and emergency response agencies.

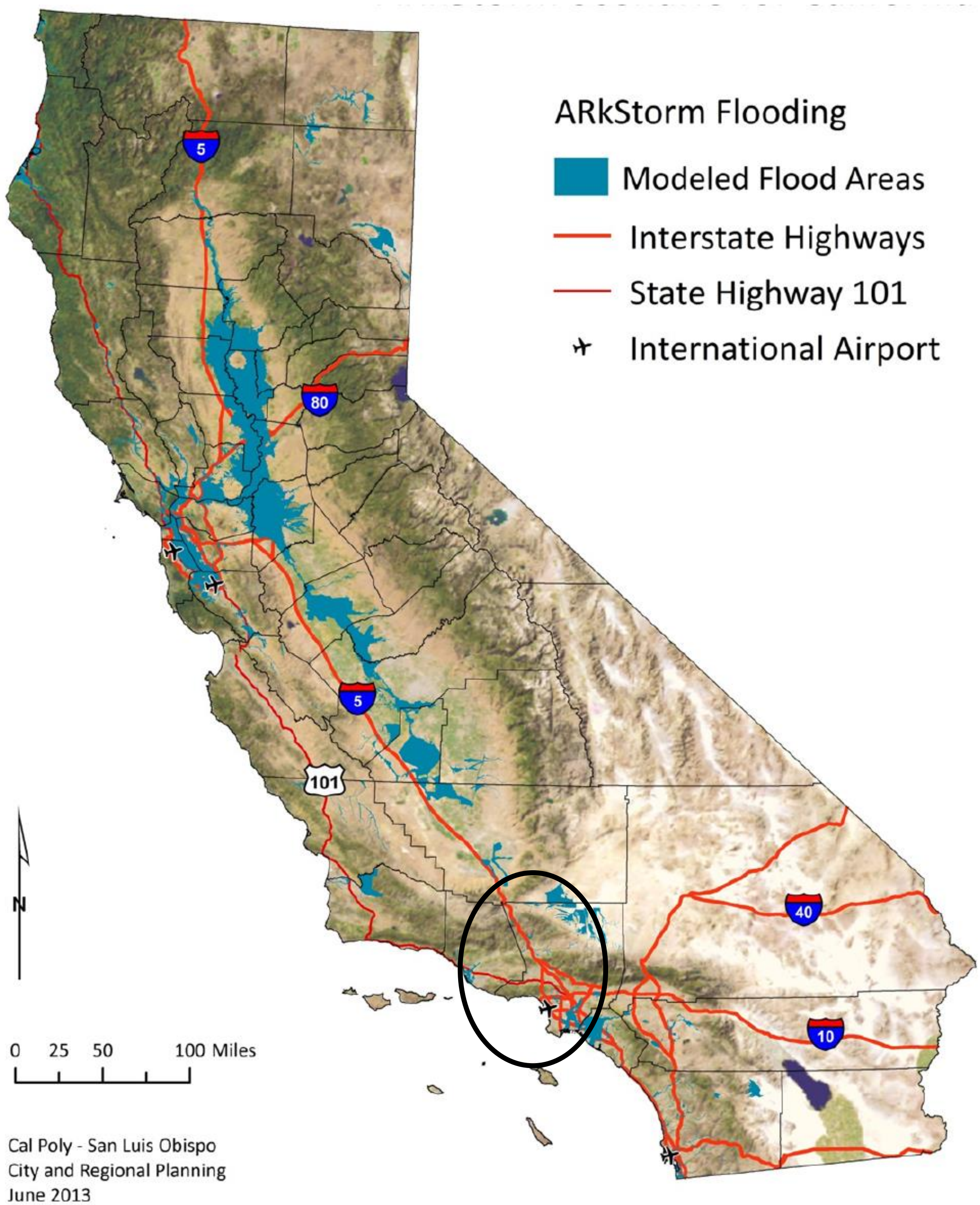
For the ARkStorm Scenario, experts designed a large, scientifically realistic meteorological event followed by an examination of the secondary hazards (e.g., landslides and flooding), physical damages to the intense winter storms of 1861-62 that left California's Central Valley impassible. Storms far larger than the ARkStorm, dubbed megastorms, have also hit California at least six times in the last two millennia.

The ARkStorm produces precipitation in many places exceeding levels experienced on average every 500 to 1,000 years. Extensive flooding in many cases overwhelms the state's flood protection system, which is at best designed to resist 100- to 200-year runoffs (many flood protection systems in the state were designed for smaller runoff events). The Central Valley experiences widespread flooding. Serious flooding also occurs in Orange County, Los Angeles County, San Diego, the San Francisco Bay Area, and other coastal communities. In some places, winds reach hurricane speeds, as high as 125 miles per hour. Hundreds of landslides occur, damaging roads, highways, and homes. Property damage exceeds $300 billion, most of it from flooding. Agricultural losses and other costs to repair lifelines, dewater flooded islands, and repair damage from landslides brings the total direct property loss to nearly $400 billion, of which only $20 to $30 billion would be recoverable through public and commercial insurance. Power, water, sewer, and other lifelines experience damage that takes weeks or months to restore. Flooding evacuation could involve over one million residents in the inland region and Delta counties.

A storm of ARkStorm's magnitude has important implications: 1) it raises serious questions about the ability of existing national, state, and local disaster policy to handle an event of this magnitude; 2) it emphasizes the choice between paying now to mitigate, or paying a lot more later to recover; 3) innovative financing solutions are likely to be needed to avoid fiscal crisis and adequately fund response and recovery costs; 4) responders and government managers at all levels could be encouraged to conduct self-assessments and devise table-top exercises to exercise their ability to address a similar event; 5) the scenario can be a reference point for application of FEMA and Cal OES guidance connecting federal, state, and local natural hazards mapping and mitigation planning under the NFIP and Disaster Mitigation Act of 2000; and 6) common messages to educate the public about the risk of such an extreme event could be developed and consistently communicated to facilitate policy formulation and transformation.

Figure 4-73 depicts an ARkStorm modeled scenario showing the potential for flooding primarily in the Central Valley as the result of a large storm. The modeled scenario suggests the District would likely escape inundation.

*Figure 4-73 Projected ARkStorm Flooding in California*




Source: USGS ARkStorm

## 4.3.9. Flood: Localized Stormwater Flooding Vulnerability Assessment

This hazard can vary across the LAUSD Planning Area. Table 4-119 breaks out how localized flood vulnerability varies by Local District.

*Table 4-119 LAUSD – Localized Flood Vulnerability by Local District*

| LAUSD Planning Area/ Local Districts | Geographic Extent | Magnitude/ Severity | Probability of Future Occurrences | Significance | Vulnerability |
|---|---|---|---|---|---|
| Central | Significant | Limited | Highly Likely | Medium | Medium |
| East | Significant | Limited | Highly Likely | Medium | Medium |
| Northeast | Significant | Limited | Highly Likely | Medium | Medium |
| Northwest | Significant | Limited | Highly Likely | Medium | Medium |
| South | Significant | Limited | Highly Likely | Medium | Medium |
| West | Significant | Limited | Highly Likely | Medium | Medium |

Source: LAUSD

Historically, the Planning Area has been at risk to flooding primarily during the winter and spring months when stream systems in the County swell with heavy rainfall. Localized flooding is worsened by impervious surfaces (i.e. parking lots) in urbanized areas. Localized flooding also occurs throughout the Planning Area at various times throughout the year with several areas of primary concern unique to each community. The District noted problematic localized flooding areas as shown in Table 4-29 in Section 4.2.9.

Local drainage problems are common throughout the County of Los Angeles and in the District. The 2014 LA County All-Hazard Plan noted that the County's maintenance and operations staff are aware of local drainage threats. The problems are often present where storm water runoff enters culverts or goes underground into storm sewers. Inadequate maintenance can also contribute to the flood hazard in these urban areas. Public infrastructure is often upgraded when it is replaced due to age or when roads are upgraded. It is more problematic to upgrade infrastructure on private property, as this is the property owner's responsibility and the County can generally not require its upgrade unless other new construction requires permits and appropriate mitigation.

WHAT ARE THE GREATEST CONCERNS FROM LOCALIZED FLOODING IN THE DISTRICT?

### *Future Development*

The risk of stormwater/localized flooding to future development can be minimized by accurate recordkeeping of repetitive localized storm activity. Mitigating the root causes of the localized stormwater or choosing not to develop in areas that often are subject to localized flooding will reduce future risks of losses due to stormwater/localized flooding.

The potential for flooding may increase as stormwater is channeled due to land development. Such changes can create localized flooding problems inside and outside of natural floodplains by altering or confining natural drainage channels. Floodplain modeling and master planning should be based on build out property use to ensure that all new development remains safe from future flooding. While local floodplain management, stormwater management, and water quality regulations and policies address these changes on a site-by-site basis, their cumulative effects can have a negative impact on the floodplain.

HOW DOES THE DISTRICT TAKE LOCALIZED FLOODING INTO ACCOUNT WHEN SITING AND BUILDING?

### 4.3.10. Landslide, Mud, and Debris Flows Vulnerability Assessment

This hazard varies across the LAUSD Planning Area. Table 4-120 breaks out how landslide, mud, and debris flow vulnerability varies by Local District.

*Table 4-120 LAUSD – Landslide, Mud, and Debris Flow Vulnerability by Local District*

| LAUSD Planning Area/ Local Districts | Geographic Extent | Magnitude/ Severity | Probability of Future Occurrences | Significance | Vulnerability |
|---|---|---|---|---|---|
| Central | Limited | Limited | Occasional | Low | Low |
| East | Limited | Limited | Occasional | Low | Low |
| Northeast | Significant | Critical | Occasional | Medium | Medium |
| Northwest | Significant | Critical | Occasional | Medium | Medium |
| South | Limited | Limited | Occasional | Low | Low |
| West | Limited | Limited | Occasional | Low | Low |

Source: LAUSD

Landslides in the District and Los Angeles County include a wide variety of processes resulting in downward and outward movement of soil, rock, and vegetation. Common names for landslide types include slumps, rockslides, debris slides, lateral spreading, debris avalanches, earth flows, and soil creep. Although landslides are primarily associated with slopes greater than 15 percent, they can also occur in relatively flat areas and as cut-and-fill failures, river bluff failures, lateral spreading landslides, collapse of wine-waste piles, failures associated with quarries, and open-pit mines. Landslides may be triggered by both natural- and human-caused activity.

In the District Planning Area, landslides could cause damages to schools, as well as cause transportation issues that may affect one or more sites in the District. This would affect both facilities and enrolled students.

Although this hazard also includes related issues such as mudslides and debris flows, available mapped hazard data was limited to landslides; thus, the remainder of this section is focused on the landslide vulnerability.

### Methodology

The 2001 Landslide Incidence and Susceptibility data was obtained for the Los Angeles County area for the LAUSD Planning Area. LAUSD's facilities database, including information on building replacement values, was used as the basis for the inventory of all facilities within LAUSD. The County's Assessor's data and parcel layer was joined to the facilities database to obtain information on assessed land values and to create a parcel inventory of LAUSD properties. As previously described, CRVs were calculated and added to building replacement values and the assessed land values, to determine the overall potential values at risk. GIS was used to overlay the landslide hazard layer onto the parcel layer polygons, and where the landslide zones intersected a parcel polygon, it was assigned with that hazard zone for the entire parcel. Note that the value of the improved land is also included in the total of values at risk as the land itself is at risk to landslide. Results are provided in this plan for LAUSD with analysis broken out by the six Local Districts, both in summary form and by site type. Appendix ?? includes additional details on the specific LAUSD facilities organized by site type for each of the six Local Districts.

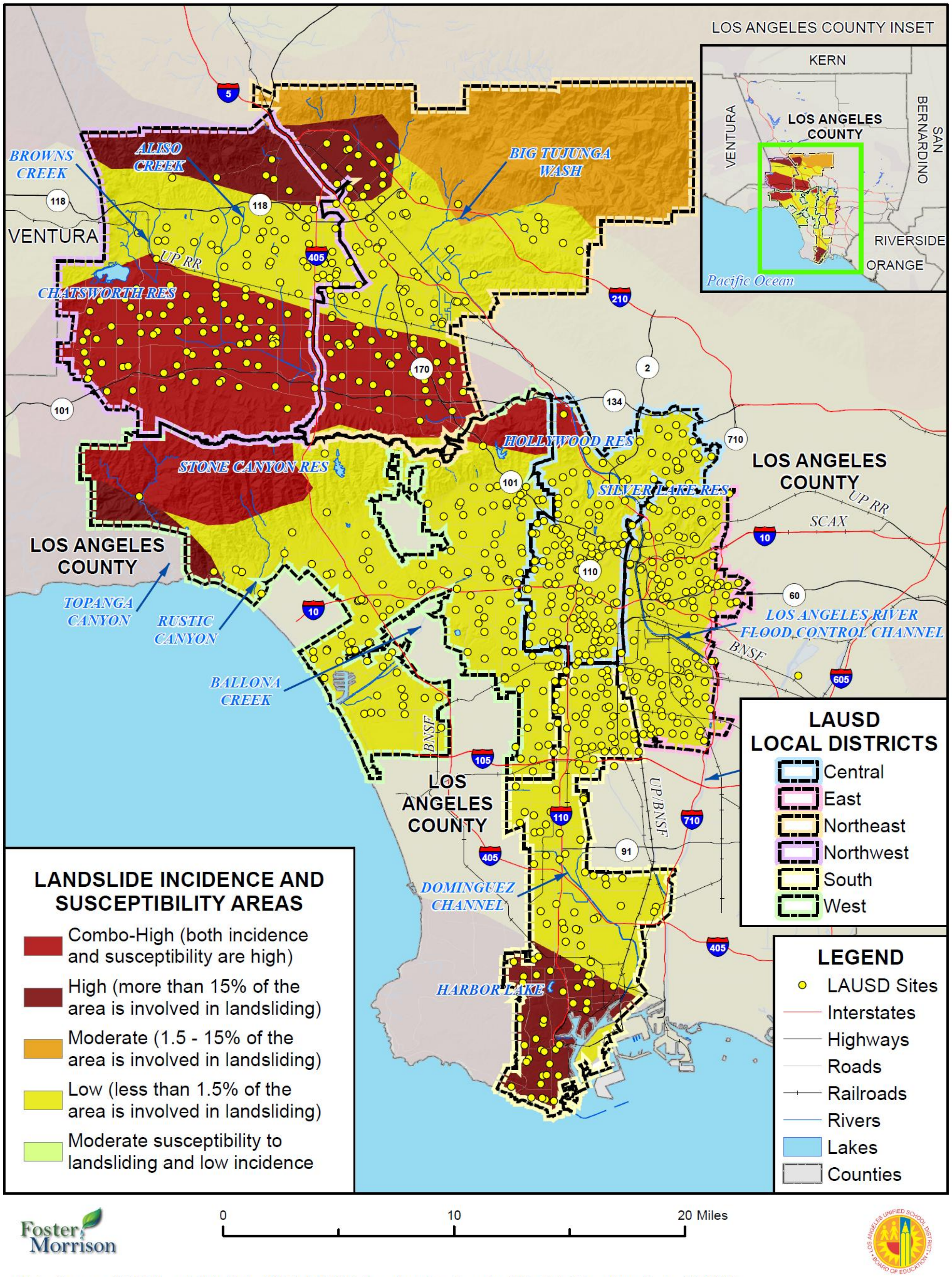
#### Limitations

It should be noted that the resulting landslide loss estimates may actually be more or less than that presented in the below tables. Further, depending on the magnitude and size of a landslide event, the loss estimates may also be more or less than that presented in the below tables due to the varying impacts to land, structures, and their contents and therefore their respective values. Also, it is important to keep in mind that the assessed land value may be below the actual market value of improved parcels due to Proposition 13.

## *Values at Risk*

The USGS landslide layer was overlaid with the LAUSD facility layer in GIS to obtain results. This section includes summary tables by Local District for the LAUSD Planning Area and tables broken out by Local District and Site Type, while Appendix ?? includes detailed tables by Local District and Site Type with details on specific facilities affected. Areas of landslide incidence and susceptibility in the LAUSD Planning Area is shown in Figure 4-74. Table 4-121 illustrates the potential estimated damages to District from landslides.

*Figure 4-74 LAUSD – Landslide Incidence and Susceptibility Areas*




Data Source: USGS Landslide Data 2001, LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

*Table 4-121 LAUSD – Local District Summary Values at Risk in Landslide Incidence and Susceptibility Areas*

| Landslide Susceptibility and Incidence Area | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Inside Local District Areas | | | | | | |
| **Local District Central** | | | | | | |
| Combo-High | 1 | $0 | 8 | $4,604,433 | $4,604,433 | $9,208,867 |
| Low | 1,257 | $358,526,663 | 1,901 | $7,745,001,497 | $7,745,001,497 | $15,848,529,657 |
| **Central Total** | **1,258** | **$358,526,663** | **1,909** | **$7,749,605,930** | **$7,749,605,930** | **$15,857,738,524** |
| **Local District East** | | | | | | |
| Low | 1,014 | $85,815,716 | 2,383 | $5,091,603,772 | $5,091,603,772 | $10,269,023,260 |
| **East Total** | **1,014** | **$85,815,716** | **2,383** | **$5,091,603,772** | **$5,091,603,772** | **$10,269,023,260** |
| **Local District Northeast** | | | | | | |
| Combo-High | 131 | $33,873,579 | 1,195 | $1,442,623,534 | $1,442,623,534 | $2,919,120,647 |
| High | 27 | $8,452,483 | 494 | $673,594,623 | $673,594,623 | $1,355,641,729 |
| Moderate | 1 | $106,182 | 7 | $16,133,033 | $16,133,033 | $32,372,249 |
| Low | 101 | $44,538,784 | 1,489 | $1,823,620,990 | $1,823,620,990 | $3,691,780,763 |
| **Northeast Total** | **260** | **$86,971,028** | **3,185** | **$3,955,972,180** | **$3,955,972,180** | **$7,998,915,388** |
| **Local District Northwest** | | | | | | |
| Combo-High | 89 | $46,164,360 | 2,166 | $2,404,695,630 | $2,404,695,630 | $4,855,555,620 |
| High | 8 | $2,122,168 | 160 | $268,526,729 | $268,526,729 | $539,175,627 |
| Low | 69 | $24,027,099 | 1,155 | $1,531,567,851 | $1,531,567,851 | $3,087,162,801 |
| **Local District Northwest Total** | **166** | **$72,313,627** | **3,481** | **$4,204,790,211** | **$4,204,790,211** | **$8,481,894,048** |
| **Local District South** | | | | | | |
| High | 128 | $32,440,023 | 855 | $1,414,588,160 | $1,414,588,160 | $2,861,616,343 |
| Low | 427 | $54,832,166 | 2,000 | $3,228,330,331 | $3,228,330,331 | $6,511,492,827 |
| **South Total** | **555** | **$87,272,189** | **2,855** | **$4,642,918,491** | **$4,642,918,491** | **$9,373,109,170** |
| **Local District West** | | | | | | |
| Combo-High | 3 | $164,706 | 14 | $11,636,952 | $11,636,952 | $23,438,611 |
| High | 1 | $871,015 | 35 | $18,115,413 | $18,115,413 | $37,101,841 |
| Low | 464 | $193,526,411 | 2,660 | $4,663,476,960 | $4,663,476,960 | $9,520,480,330 |
| **Local District West Total** | **468** | **$194,562,132** | **2,709** | **$4,693,229,325** | **$4,693,229,325** | **$9,581,020,782** |
| **Inside Areas Total** | **3,721** | **$885,461,355** | **16,522** | **$30,338,119,909** | **$30,338,119,909** | **$61,561,701,173** |
| Outside of Local District Areas | | | | | | |
| Moderate | 4 | $0 | 22 | $10,084,499 | $10,084,499 | $20,168,998 |
| Low | 3 | $6,025,565 | 3 | $241,687,785 | $241,687,785 | $489,401,134 |
| **Outside Areas Total** | **7** | **$6,025,565** | **25** | **$251,772,284** | **$251,772,284** | **$509,570,132** |

| Landslide Susceptibility and Incidence Area | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| | | | | | | |
| **Grand Total** | **3,728** | **$891,486,920** | **16,547** | **$30,589,892,192** | **$30,589,892,192** | **$62,071,271,305** |

Source: USGS Landslide Data 2001, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

Landslide incidence and susceptibility area maps and analysis were broken out for the LAUSD by Local District and by site type. These maps show locations of landslide incidence and susceptibility areas and facilities by Local District and site type; while the tables show the parcel counts, building counts, land values, contents values, and total values for the following Local Districts:

- Central (Figure 4-75 and Table 4-122)

East (Source: USGS Landslide Data 2001, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

- Figure 4-76 and Table 4-123)

Northeast (Source: USGS Landslide Data 2001, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

- Figure 4-77 and Table 4-124)

Northwest (Source: USGS Landslide Data 2001, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

- Figure 4-78 and Table 4-125)

South (Source: USGS Landslide Data 2001, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

- Figure 4-79 and Table 4-126)

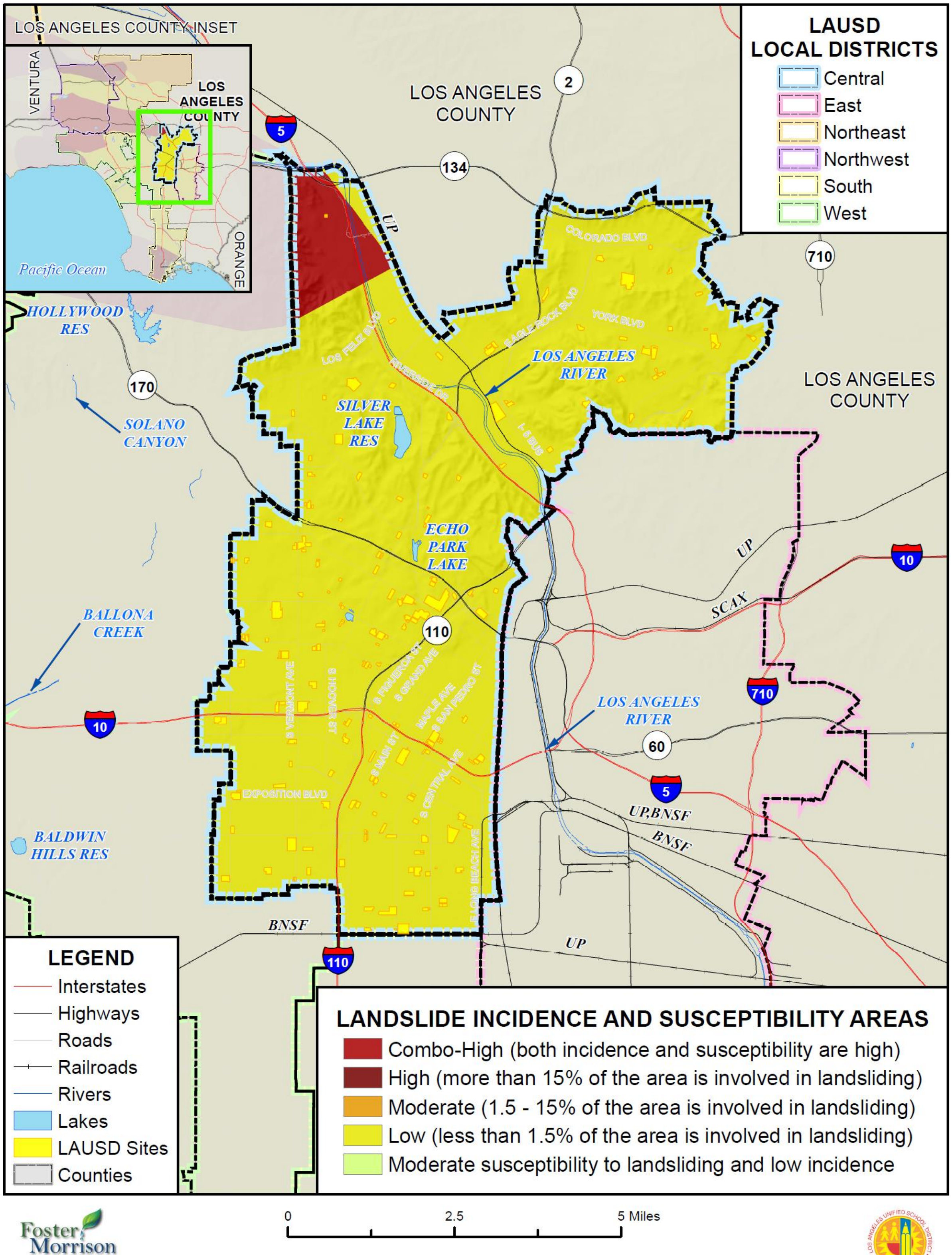
West (Source: USGS Landslide Data 2001, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

- Figure 4-80 and Table 4-127)

Outside of Local District Areas (Source: USGS Landslide Data 2001, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

- Table 4-128)

## *Figure 4-75 LAUSD – Local District Central Landslide Susceptibility and Incidence Areas*



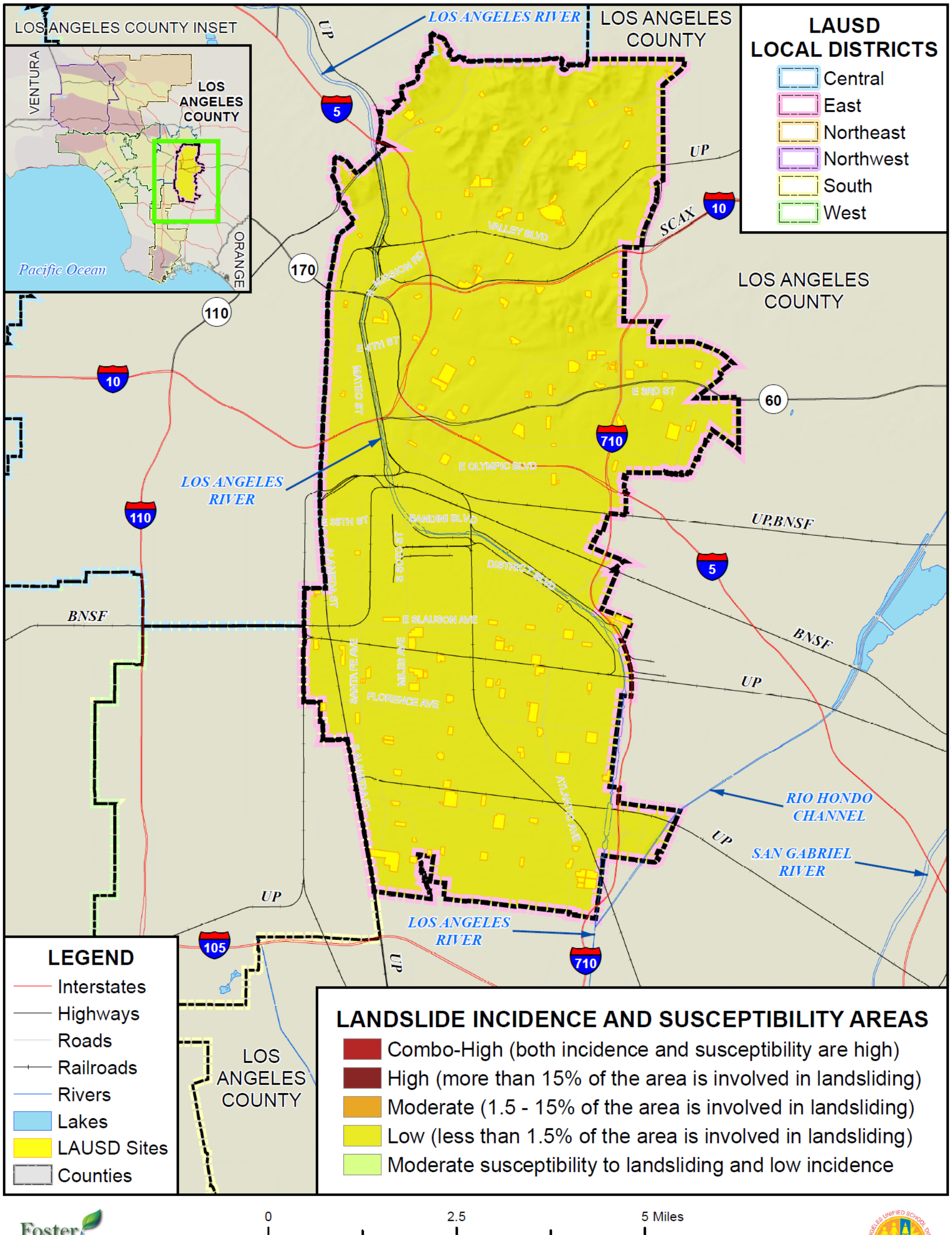

Data Source: USGS Landslide Data 2001, LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

*Table 4-122 LAUSD – Local District Central Values at Risk in Landslide Susceptibility and Incidence Areas by Site Type*

| Landslide Susceptibility and Incidence Area / Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Combo-High | | | | | | |
| Senior High School | 1 | $0 | 8 | $4,604,433 | $4,604,433 | $9,208,867 |
| **Combo-High Total** | **1** | **$0** | **8** | **$4,604,433** | **$4,604,433** | **$9,208,867** |
| Low | | | | | | |
| Admin Facility | 15 | $8,872,068 | 36 | $1,972,164,776 | $1,972,164,776 | $3,953,201,621 |
| Adult Education Facility | 5 | $1,896,367 | 32 | $251,887,155 | $251,887,155 | $505,670,676 |
| Charter School | 23 | $2,691,373 | 7 | $43,573,968 | $43,573,968 | $89,839,310 |
| Continuation High School | 1 | $0 | 9 | $20,410,184 | $20,410,184 | $40,820,369 |
| Currently a Closed School | 6 | $236,076 | 7 | $8,655,330 | $8,655,330 | $17,546,735 |
| Early Education Center | 15 | $468,417 | 20 | $9,468,447 | $9,468,447 | $19,405,311 |
| Elementary School | 660 | $93,114,962 | 1,039 | $2,396,323,320 | $2,396,323,320 | $4,885,761,602 |
| Middle School | 203 | $43,945,746 | 234 | $873,988,910 | $873,988,910 | $1,791,923,565 |
| Senior High School | 295 | $204,029,643 | 385 | $1,957,234,656 | $1,957,234,656 | $4,118,498,955 |
| Span High School (i.e. Grades K-12) | 8 | $1,397,102 | 65 | $108,594,905 | $108,594,905 | $218,586,912 |
| Span Middle School (i.e. Grades K-8) | 21 | $961,002 | 45 | $49,336,708 | $49,336,708 | $99,634,419 |
| Special Education Center | 5 | $913,907 | 22 | $53,363,138 | $53,363,138 | $107,640,182 |
| **Low Total** | **1,257** | **$358,526,663** | **1,901** | **$7,745,001,497** | **$7,745,001,497** | **$15,848,529,657** |
| **Central Total** | **1,258** | **$358,526,663** | **1,909** | **$7,749,605,930** | **$7,749,605,930** | **$15,857,738,524** |

Source: USGS Landslide Data 2001, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

*Figure 4-76 LAUSD – Local District East Landslide Susceptibility and Incidence Areas*




Foster Morrison

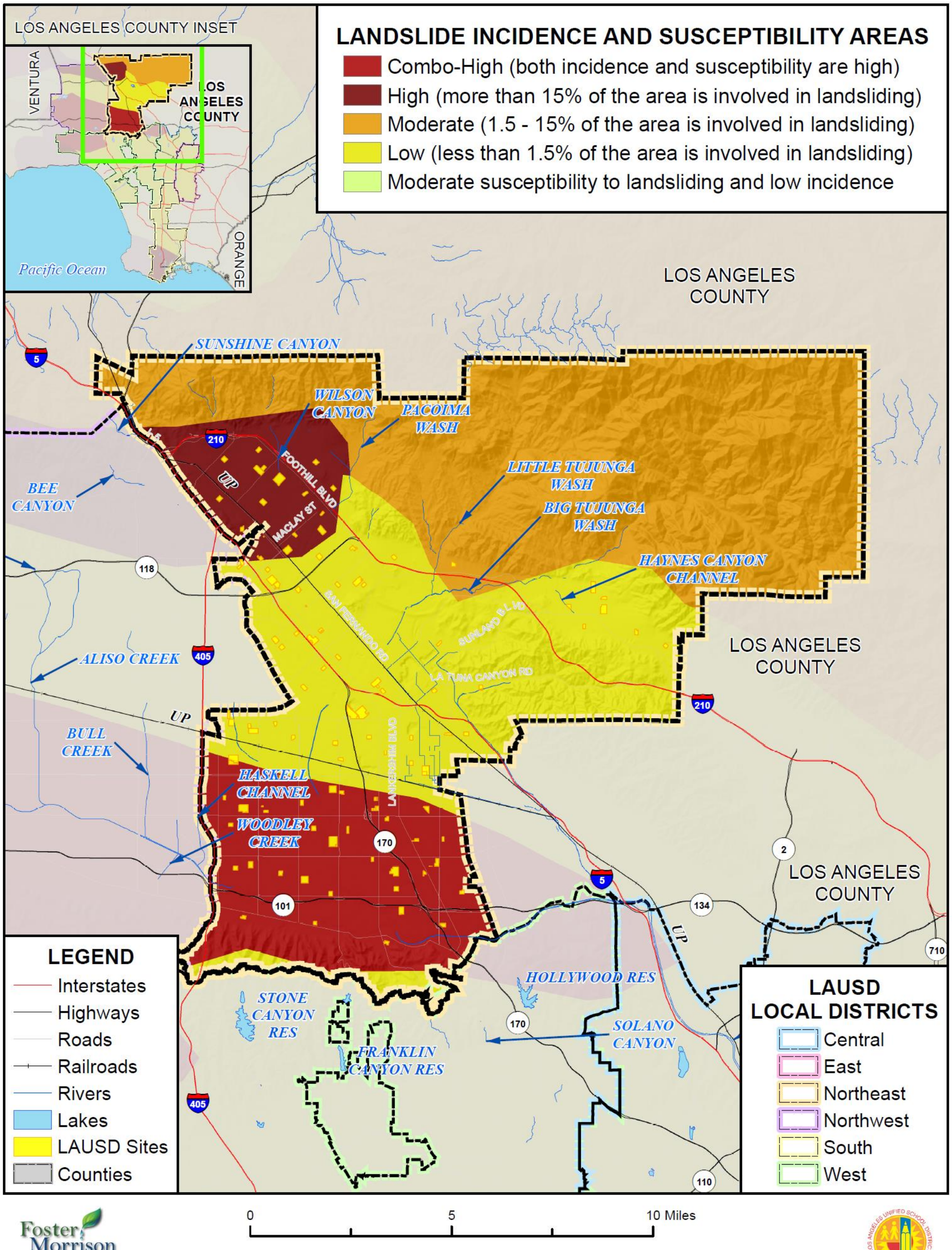
Data Source: USGS Landslide Data 2001, LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

*Table 4-123 LAUSD – Local District East Values at Risk in Landslide Susceptibility and Incidence Areas by Site Type*

| Landslide Susceptibility and Incidence Area / Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Low | | | | | | |
| Admin Facility | 12 | $1,696,897 | 47 | $140,365,742 | $140,365,742 | $282,428,380 |
| Adult Education Facility | 3 | $752,102 | 60 | $84,433,230 | $84,433,230 | $169,618,562 |
| Continuation High School | 1 | $0 | 7 | $6,199,487 | $6,199,487 | $12,398,974 |
| Elementary School | 623 | $45,606,207 | 1,314 | $2,329,574,436 | $2,329,574,436 | $4,704,755,080 |
| Middle School | 84 | $6,225,841 | 367 | $774,490,754 | $774,490,754 | $1,555,207,348 |
| Senior High School | 275 | $29,491,428 | 513 | $1,644,135,496 | $1,644,135,496 | $3,317,762,419 |
| Span High School (i.e. Grades K-12) | 14 | $1,480,933 | 62 | $66,133,229 | $66,133,229 | $133,747,391 |
| Special Education Center | 2 | $562,308 | 13 | $46,271,398 | $46,271,398 | $93,105,105 |
| **Low Total** | **1,014** | **$85,815,716** | **2,383** | **$5,091,603,772** | **$5,091,603,772** | **$10,269,023,260** |
| **East Total** | **1,014** | **$85,815,716** | **2,383** | **$5,091,603,772** | **$5,091,603,772** | **$10,269,023,260** |

Source: USGS Landslide Data 2001, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

*Figure 4-77 LAUSD – Local District Northeast Landslide Susceptibility and Incidence Areas*



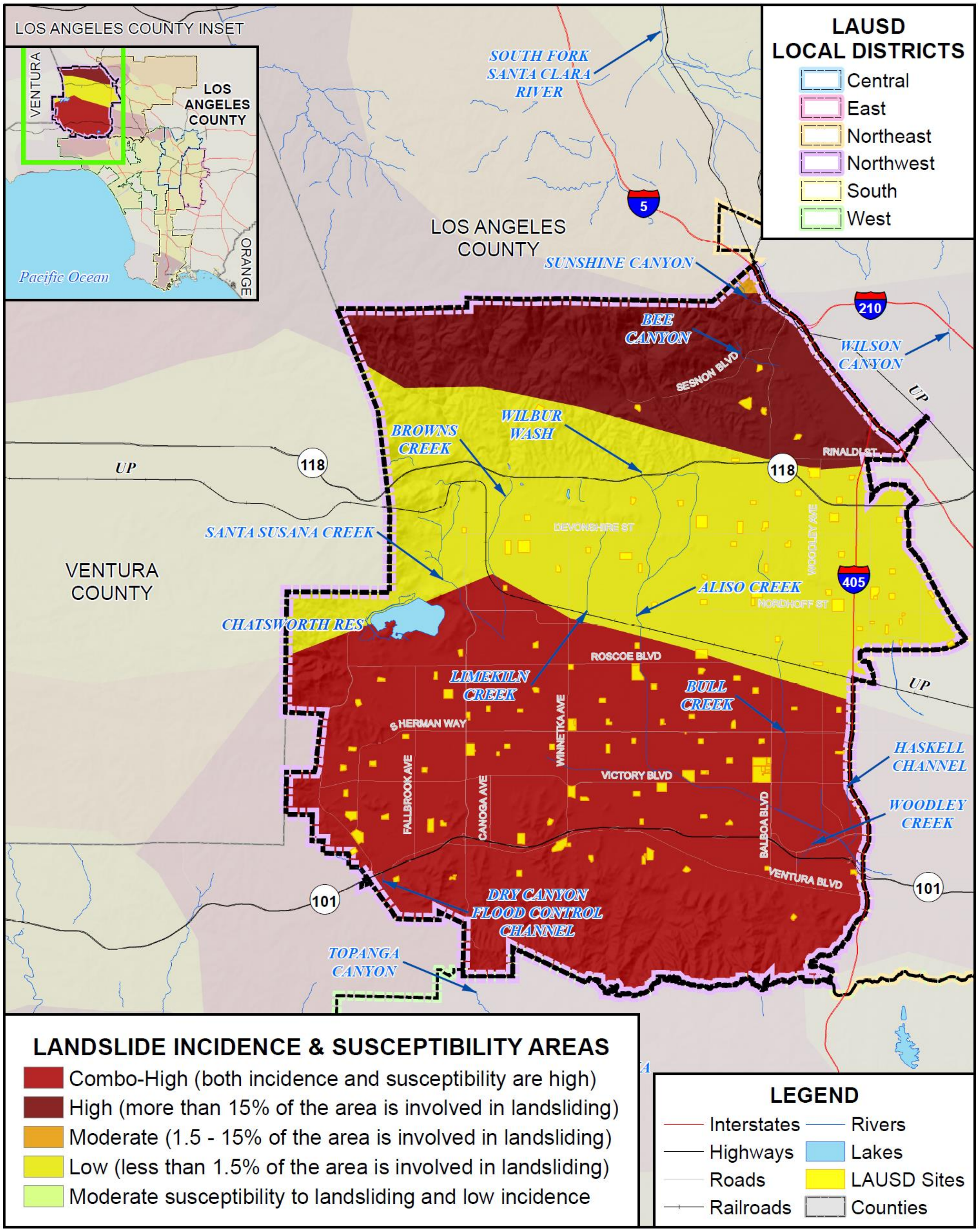

Data Source: USGS Landslide Data 2001, LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

*Table 4-124 LAUSD – Local District Northeast Values at Risk in Landslide Susceptibility and Incidence Areas by Site Type*

| Landslide Susceptibility and Incidence Area / Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Combo-High | | | | | | |
| Community Day School | 1 | $21,532 | 2 | $466,236 | $466,236 | $954,005 |
| Continuation High School | 2 | $46,847 | 4 | $1,843,111 | $1,843,111 | $3,733,070 |
| Elementary School | 82 | $13,751,519 | 750 | $638,982,116 | $638,982,116 | $1,291,715,751 |
| Middle School | 22 | $7,615,226 | 180 | $294,151,184 | $294,151,184 | $595,917,595 |
| Senior High School | 24 | $12,438,455 | 259 | $507,180,886 | $507,180,886 | $1,026,800,226 |
| **Combo-High Total** | **131** | **$33,873,579** | **1,195** | **$1,442,623,534** | **$1,442,623,534** | **$2,919,120,647** |
| High | | | | | | |
| Adult Education Facility | 2 | $156,899 | 47 | $35,642,716 | $35,642,716 | $71,442,331 |
| Elementary School | 18 | $2,911,234 | 308 | $310,119,796 | $310,119,796 | $623,150,826 |
| Middle School | 5 | $2,081,198 | 61 | $125,447,301 | $125,447,301 | $252,975,799 |
| Senior High School | 2 | $3,303,152 | 78 | $202,384,810 | $202,384,810 | $408,072,773 |
| **High Total** | **27** | **$8,452,483** | **494** | **$673,594,623** | **$673,594,623** | **$1,355,641,729** |
| Moderate | | | | | | |
| Elementary School | 1 | $106,182 | 7 | $16,133,033 | $16,133,033 | $32,372,249 |
| **Moderate Total** | **1** | **$106,182** | **7** | **$16,133,033** | **$16,133,033** | **$32,372,249** |
| Low | | | | | | |
| Admin Facility | 6 | $1,307,581 | 36 | $21,067,878 | $21,067,878 | $43,443,337 |
| Charter School | 4 | $519,256 | 115 | $53,190,070 | $53,190,070 | $106,899,396 |
| Early Education Center | 2 | $49,926 | 8 | $6,577,296 | $6,577,296 | $13,204,518 |
| Elementary School | 56 | $5,970,971 | 760 | $648,408,968 | $648,408,968 | $1,302,788,908 |
| Middle School | 9 | $14,324,006 | 229 | $454,818,052 | $454,818,052 | $923,960,111 |
| Senior High School | 23 | $22,187,721 | 319 | $614,659,164 | $614,659,164 | $1,251,506,048 |
| Special Education Center | 1 | $179,323 | 22 | $24,899,561 | $24,899,561 | $49,978,445 |
| **Low Total** | **101** | **$44,538,784** | **1,489** | **$1,823,620,990** | **$1,823,620,990** | **$3,691,780,763** |
| **Northeast Total** | **260** | **$86,971,028** | **3,185** | **$3,955,972,180** | **$3,955,972,180** | **$7,998,915,388** |

Source: USGS Landslide Data 2001, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

*Figure 4-78 LAUSD – Local District Northwest Landslide Susceptibility and Incidence Areas*




Foster Morrison

0 5 10 Miles

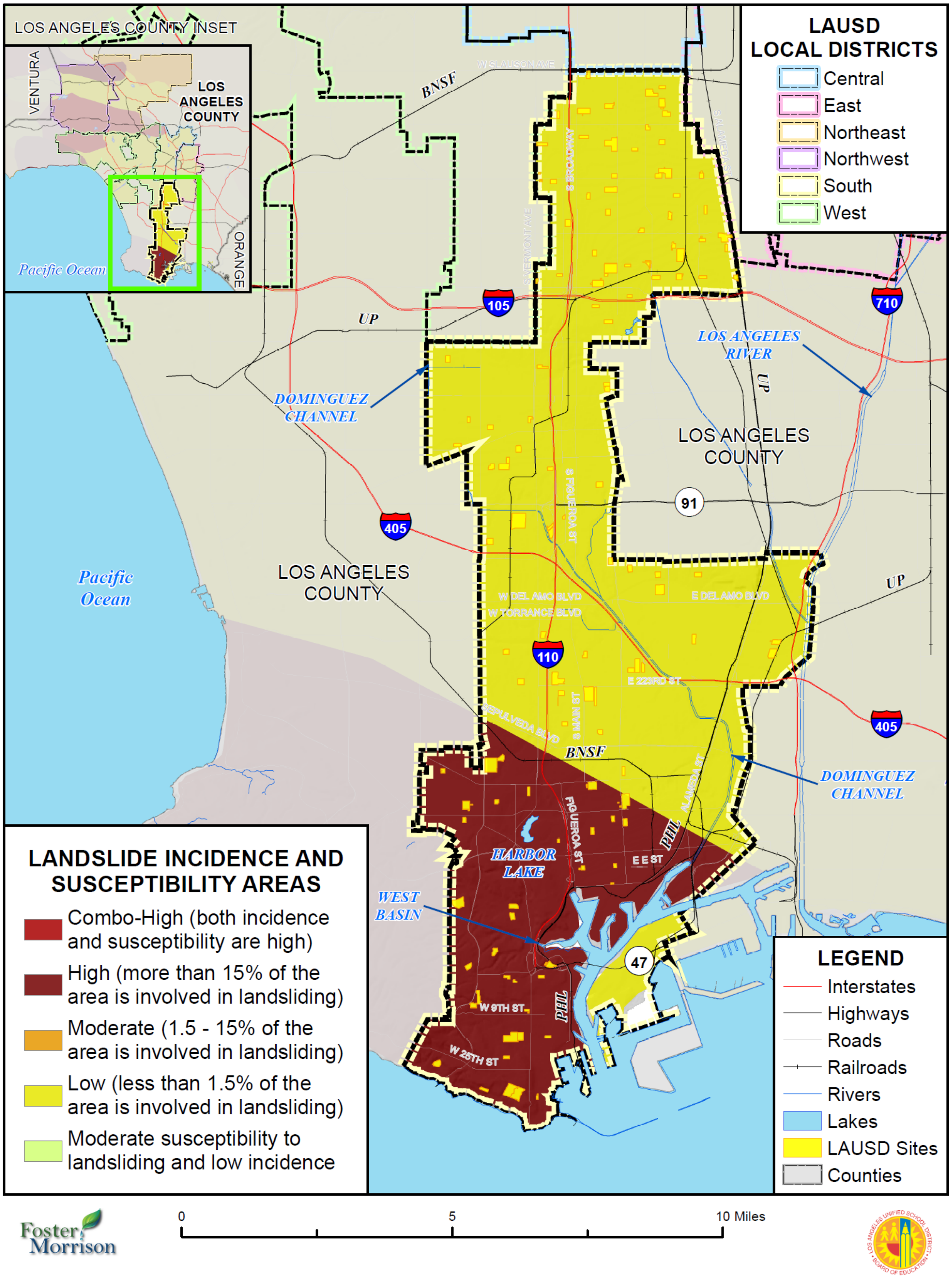
Data Source: USGS Landslide Data 2001, LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

*Table 4-125 LAUSD – Local District Northwest Values at Risk in Landslide Susceptibility and Incidence Areas by Site Type*

| Landslide Susceptibility and Incidence Area / Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Combo-High | | | | | | |
| Admin Facility | 5 | $899,562 | 47 | $90,748,749 | $90,748,749 | $182,397,060 |
| Adult Education Facility | 2 | $1,410,181 | 94 | $82,463,221 | $82,463,221 | $166,336,624 |
| Charter School | 3 | $5,848,336 | 99 | $173,013,038 | $173,013,038 | $351,874,413 |
| Continuation High School | 2 | $368,630 | 21 | $6,170,822 | $6,170,822 | $12,710,274 |
| Currently a Closed School | 5 | $2,242,855 | 91 | $73,354,713 | $73,354,713 | $148,952,282 |
| Elementary School | 51 | $16,399,233 | 1,095 | $868,381,346 | $868,381,346 | $1,753,161,925 |
| Middle School | 8 | $7,881,665 | 264 | $475,676,595 | $475,676,595 | $959,234,854 |
| Senior High School | 8 | $7,959,704 | 327 | $489,973,043 | $489,973,043 | $987,905,789 |
| Span High School (i.e. Grades K-12) | 2 | $2,073,119 | 73 | $80,414,559 | $80,414,559 | $162,902,238 |
| Special Education Center | 3 | $1,081,075 | 55 | $64,499,543 | $64,499,543 | $130,080,161 |
| **Combo-High Total** | **89** | **$46,164,360** | **2,166** | **$2,404,695,630** | **$2,404,695,630** | **$4,855,555,620** |
| High | | | | | | |
| Elementary School | 4 | $701,918 | 73 | $78,919,283 | $78,919,283 | $158,540,484 |
| Middle School | 1 | $671,192 | 29 | $62,713,940 | $62,713,940 | $126,099,071 |
| Senior High School | 3 | $749,058 | 58 | $126,893,507 | $126,893,507 | $254,536,071 |
| **High Total** | **8** | **$2,122,168** | **160** | **$268,526,729** | **$268,526,729** | **$539,175,627** |
| Low | | | | | | |
| Admin Facility | 1 | $339,416 | 11 | $2,426,615 | $2,426,615 | $5,192,645 |
| Adult Education Facility | 1 | $184,446 | 18 | $13,784,376 | $13,784,376 | $27,753,197 |
| Charter School | 2 | $1,889,695 | 66 | $76,296,504 | $76,296,504 | $154,482,702 |
| Elementary School | 52 | $9,522,575 | 685 | $655,061,337 | $655,061,337 | $1,319,645,249 |
| Middle School | 6 | $4,670,123 | 208 | $417,464,668 | $417,464,668 | $839,599,459 |
| Senior High School | 7 | $7,420,844 | 167 | $366,534,352 | $366,534,352 | $740,489,547 |
| **Low Total** | **69** | **$24,027,099** | **1,155** | **$1,531,567,851** | **$1,531,567,851** | **$3,087,162,801** |
| **Northwest Total** | **166** | **$72,313,627** | **3,481** | **$4,204,790,211** | **$4,204,790,211** | **$8,481,894,048** |

Source: USGS Landslide Data 2001, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

*Figure 4-79 LAUSD – Local District South Landslide Susceptibility and Incidence Areas*



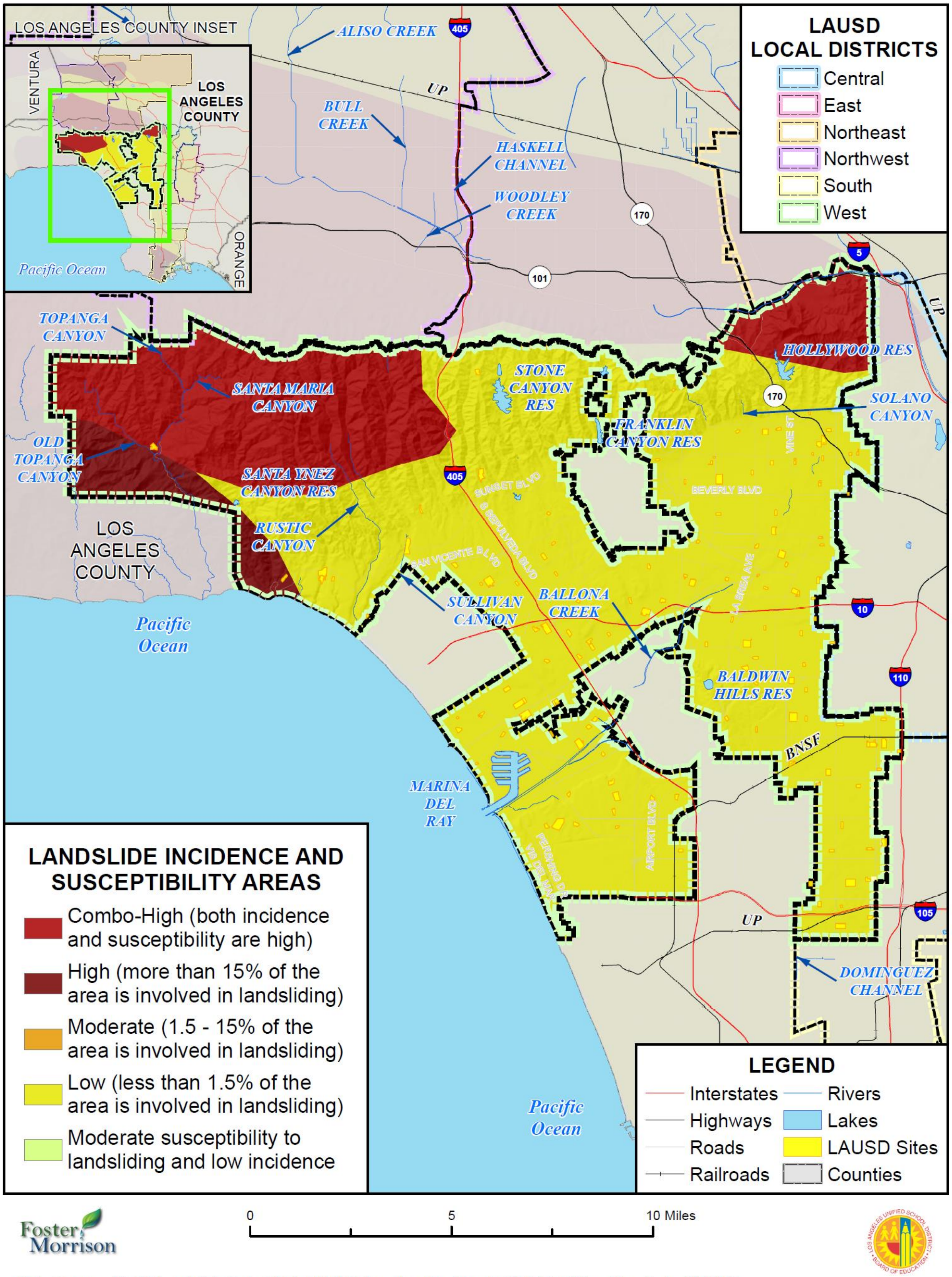

Data Source: USGS Landslide Data 2001, LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

*Table 4-126 LAUSD – Local District South Values at Risk in Landslide Susceptibility and Incidence Areas by Site Type*

| Landslide Susceptibility and Incidence Area / Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| High | | | | | | |
| Adult Education Facility | 3 | $513,733 | 33 | $61,903,215 | $61,903,215 | $124,320,163 |
| Community Day School | 1 | $488,024 | 21 | $3,893,022 | $3,893,022 | $8,274,069 |
| CTR | 1 | $22,538 | 3 | $1,126,899 | $1,126,899 | $2,276,336 |
| Elementary School | 79 | $10,263,859 | 387 | $529,265,929 | $529,265,929 | $1,068,795,716 |
| Middle School | 29 | $11,840,270 | 186 | $330,414,690 | $330,414,690 | $672,669,649 |
| Senior High School | 6 | $8,459,337 | 208 | $451,966,560 | $451,966,560 | $912,392,456 |
| Special Education Center | 9 | $852,262 | 17 | $36,017,846 | $36,017,846 | $72,887,953 |
| **High Total** | **128** | **$32,440,023** | **855** | **$1,414,588,160** | **$1,414,588,160** | **$2,861,616,343** |
| Low | | | | | | |
| Admin Facility | 6 | $779,044 | 12 | $21,083,165 | $21,083,165 | $42,945,374 |
| Adult Education Facility | 28 | $1,225,864 | 21 | $24,046,772 | $24,046,772 | $49,319,407 |
| Charter School | 11 | $794,745 | 28 | $69,236,652 | $69,236,652 | $139,268,050 |
| Elementary School | 230 | $29,800,114 | 1,231 | $1,637,555,873 | $1,637,555,873 | $3,304,911,859 |
| Middle School | 29 | $7,119,920 | 342 | $602,223,003 | $602,223,003 | $1,211,565,926 |
| Senior High School | 114 | $14,175,039 | 298 | $791,823,625 | $791,823,625 | $1,597,822,289 |
| Span Middle School (i.e. Grades K-8) | 5 | $281,124 | 32 | $25,612,594 | $25,612,594 | $51,506,311 |
| Special Education Center | 4 | $656,316 | 36 | $56,748,648 | $56,748,648 | $114,153,612 |
| **Low Total** | **427** | **$54,832,166** | **2,000** | **$3,228,330,331** | **$3,228,330,331** | **$6,511,492,827** |
| **South Total** | **555** | **$87,272,189** | **2,855** | **$4,642,918,491** | **$4,642,918,491** | **$9,373,109,170** |

Source: USGS Landslide Data 2001, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

*Figure 4-80 LAUSD – Local District West Landslide Susceptibility and Incidence Areas*




Data Source: USGS Landslide Data 2001, LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

*Table 4-127 LAUSD – Local District West Values at Risk in Landslide Susceptibility and Incidence Areas by Site Type*

| Landslide Susceptibility and Incidence Area / Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Combo-High | | | | | | |
| Elementary School | 3 | $164,706 | 14 | $11,636,952 | $11,636,952 | $23,438,611 |
| **Combo-High Total** | **3** | **$164,706** | **14** | **$11,636,952** | **$11,636,952** | **$23,438,611** |
| High | | | | | | |
| Elementary School | 1 | $871,015 | 35 | $18,115,413 | $18,115,413 | $37,101,841 |
| **High Total** | **1** | **$871,015** | **35** | **$18,115,413** | **$18,115,413** | **$37,101,841** |
| Low | | | | | | |
| Admin Facility | 5 | $1,124,397 | 23 | $102,163,062 | $102,163,062 | $205,450,521 |
| Adult Education Facility | 2 | $464,318 | 14 | $20,560,827 | $20,560,827 | $41,585,973 |
| Charter School | 13 | $2,622,891 | 60 | $38,295,116 | $38,295,116 | $79,213,124 |
| Community Day School | 1 | $340,696 | 5 | $2,190,247 | $2,190,247 | $4,721,189 |
| Continuation High School | 1 | $25,486 | 2 | $977,394 | $977,394 | $1,980,273 |
| Currently a Closed School | 1 | $0 | 11 | $6,452,672 | $6,452,672 | $12,905,345 |
| Early Education Center | 2 | $515,658 | 13 | $7,836,983 | $7,836,983 | $16,189,623 |
| Elementary School | 261 | $72,006,365 | 1,581 | $2,030,156,074 | $2,030,156,074 | $4,132,318,512 |
| Middle School | 29 | $33,021,637 | 477 | $1,032,534,523 | $1,032,534,523 | $2,098,090,683 |
| Senior High School | 144 | $80,825,582 | 429 | $1,342,968,906 | $1,342,968,906 | $2,766,763,394 |
| Span Middle School (i.e. Grades K-8) | 3 | $1,991,202 | 24 | $19,568,043 | $19,568,043 | $41,127,288 |
| Special Education Center | 2 | $588,179 | 21 | $59,773,113 | $59,773,113 | $120,134,405 |
| **Low Total** | **464** | **$193,526,411** | **2,660** | **$4,663,476,960** | **$4,663,476,960** | **$9,520,480,330** |
| **West Total** | **468** | **$194,562,132** | **2,709** | **$4,693,229,325** | **$4,693,229,325** | **$9,581,020,782** |

Source: USGS Landslide Data 2001, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

*Table 4-128 LAUSD – Outside Local District Areas Values at Risk in Landslide Susceptibility and Incidence Areas by Site Type*

| Landslide Susceptibility and Incidence Area / Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Moderate | | | | | | |
| Senior High School | 4 | $0 | 22 | $10,084,499 | $10,084,499 | $20,168,998 |
| **Moderate Total** | **4** | **$0** | **22** | **$10,084,499** | **$10,084,499** | **$20,168,998** |
| Low | | | | | | |
| Admin Facility | 1 | $6,025,565 | 1 | $149,306,997 | $149,306,997 | $304,639,558 |

| Landslide Susceptibility and Incidence Area / Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Senior High School | 2 | $0 | 2 | $92,380,788 | $92,380,788 | $184,761,576 |
| **Low Total** | **3** | **$6,025,565** | **3** | **$241,687,785** | **$241,687,785** | **$489,401,134** |
| **Outside Areas Total** | **7** | **$6,025,565** | **25** | **$251,772,284** | **$251,772,284** | **$509,570,132** |

Source: USGS Landslide Data 2001, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

It should be noted that maps and analysis represent best available data. There have been past occurrences of landslides in areas not shown to be at risk to landslide. Generally, landslide risk maps detail areas prone to slope failure; the maps rarely include the runout areas where the failed slope will go. By way of example, a landslide on March 22, 2014, killed 43 people when it wiped out a rural neighborhood in Oso, northeast of Seattle. While the failed slope area was mapped as prone to landslides, the runout area was not. It was the runout area that resulted in devastating loss. Thus, mapping of landslide susceptible areas should be considered as one part of the equation. Damages to the area that could be inundated by such slope failure should also be considered by the District.

### *Populations at Risk*

A separate analysis was performed to determine the LAUSD populations (enrollments) in landslide incidence and susceptibility areas. Using GIS, the USGS dataset was overlayed on the LAUSD facility layer. Enrollment counts by facility were provided by LAUSD. Results were tabulated and are shown in Table 4-129.

*Table 4-129 LAUSD – Total Enrollments by Local District and Landslide Susceptibility and Incidence Areas*

| Landslide Susceptibility and Incidence Area | Total Enrollment |
|---|---|
| **Inside Local District Areas** | |
| **Local District Central** | |
| Combo-High | 0 |
| Low | 78,865 |
| **Central Total** | **78,865** |
| **Local District East** | |
| Low | 78,095 |
| **East Total** | **78,095** |
| **Local District Northeast** | |
| Combo-High | 31,782 |
| High | 8,899 |
| Moderate | 155 |
| Low | 30,588 |
| **Northeast Total** | **71,424** |

| Landslide Susceptibility and Incidence Area | Total Enrollment |
|---|---|
| **Local District Northwest** | |
| Combo-High | 42,210 |
| High | 5,948 |
| Low | 32,772 |
| **Northwest Total** | **80,930** |
| **Local District South** | |
| High | 26,628 |
| Low | 52,866 |
| **South Total** | **79,494** |
| **Local District West** | |
| Combo-High | 297 |
| High | 542 |
| **West Total** | **73,063** |
| **Outside of Local District Areas** | **462,710** |
| Outside of Local District Areas | |
| Moderate | 0 |
| Low | 1,586 |
| **Outside of Local District Areas Total** | **1,586** |
| | |
| **Grand Total** | **464,296** |

Source: USGS, LAUSD

To give further detail on populations of enrolled students in the landslide incidence and susceptibility areas, enrolled populations in these areas were broken out by Local Districts and Site Type. This can be seen for the Central (Table 4-130), East (Table 4-131), Northeast (Table 4-132), Northwest (Table 4-133), South (Table 4-134), West (Table 4-135), and outside Local District (Table 4-136).

*Table 4-130 LAUSD – Local District Central Enrollments by Landslide Incidence and Susceptibility Areas by Site Type*

| Landslide Susceptibility and Incidence Area / Site Type | Total Enrollment |
|---|---|
| Combo-High | |
| Senior High School | 0 |
| **Combo-High Total** | **0** |
| Low | |
| Admin Facility | 0 |
| Adult Education Facility | 0 |
| Charter School | 0 |

| Landslide Susceptibility and Incidence Area / Site Type | Total Enrollment |
|---|---|
| Continuation High School | 52 |
| Currently a Closed School | 0 |
| Early Education Center | 0 |
| Elementary School | 44,303 |
| Middle School | 12,174 |
| Senior High School | 18,009 |
| Span High School (i.e. Grades K-12) | 2,950 |
| Span Middle School (i.e. Grades K-8) | 945 |
| Special Education Center | 432 |
| **Low Total** | **78,865** |
| **Central Total** | **78,865** |

Source: USGS, LAUSD

### *Table 4-131 LAUSD – Local District East Enrollments by Landslide Incidence and Susceptibility Areas by Site Type*

| Landslide Susceptibility and Incidence Area / Site Type | Total Enrollment |
|---|---|
| Low | |
| Admin Facility | 0 |
| Adult Education Facility | 0 |
| Continuation High School | 0 |
| Elementary School | 43,824 |
| Middle School | 12,750 |
| Senior High School | 19,454 |
| Span High School (i.e. Grades K-12) | 1,777 |
| Special Education Center | 290 |
| **Low Total** | **78,095** |
| **East Total** | **78,095** |

Source: USGS, LAUSD

### *Table 4-132 LAUSD – Local District Northeast Enrollments by Landslide Incidence and Susceptibility Areas by Site Type*

| Landslide Susceptibility and Incidence Area / Site Type | Total Enrollment |
|---|---|
| Combo-High | |
| Community Day School | - |
| Continuation High School | - |
| Elementary School | 16,785 |

| Landslide Susceptibility and Incidence Area / Site Type | Total Enrollment |
|---|---|
| Middle School | 5,706 |
| Senior High School | 9,291 |
| **Combo-High Total** | **31,782** |
| **High** | |
| Adult Education Facility | 0 |
| Elementary School | 6,591 |
| Middle School | 1,577 |
| Senior High School | 731 |
| **High Total** | **8,899** |
| **Moderate** | |
| Elementary School | 155 |
| **Moderate Total** | **155** |
| **Low** | |
| Admin Facility | 0 |
| Charter School | 0 |
| Early Education Center | 0 |
| Elementary School | 14,491 |
| Middle School | 6,784 |
| Senior High School | 9,186 |
| Special Education Center | 127 |
| **Low Total** | **30,588** |
| **Northeast Total** | **71,424** |

Source: USGS, LAUSD

***Table 4-133 LAUSD – Local District Northwest Enrollments by Landslide Incidence and Susceptibility Areas by Site Type***

| Landslide Susceptibility and Incidence Area / Site Type | Total Enrollment |
|---|---|
| **Combo-High** | |
| Admin Facility | 0 |
| Adult Education Facility | 0 |
| Charter School | 0 |
| Continuation High School | 0 |
| Currently a Closed School | 0 |
| Elementary School | 21,663 |
| Middle School | 8,423 |
| Senior High School | 8,876 |

| Landslide Susceptibility and Incidence Area / Site Type | Total Enrollment |
|---|---|
| Span High School (i.e. Grades K-12) | 2,679 |
| Special Education Center | 569 |
| **Combo-High Total** | **42,210** |
| **High** | |
| Elementary School | 2,097 |
| Middle School | 1,617 |
| Senior High School | 2,234 |
| **High Total** | **5,948** |
| **Low** | |
| Admin Facility | 0 |
| Adult Education Facility | 0 |
| Charter School | 0 |
| Elementary School | 17,291 |
| Middle School | 9,152 |
| Senior High School | 6,329 |
| **Low Total** | **32,772** |
| **Northwest Total** | **71,424** |

Source: USGS, LAUSD

### *Table 4-134 LAUSD – Local District South Enrollments by Landslide Incidence and Susceptibility Areas by Site Type*

| Landslide Susceptibility and Incidence Area / Site Type | Total Enrollment |
|---|---|
| **Combo-High** | |
| Adult Education Facility | 0 |
| Community Day School | 0 |
| CTR | 0 |
| Elementary School | 11,803 |
| Middle School | 7,442 |
| Senior High School | 7,193 |
| Special Education Center | 190 |
| **High Total** | **26,628** |
| **Low** | |
| Admin Facility | 0 |
| Adult Education Facility | 0 |
| Charter School | 0 |
| Elementary School | 36,548 |

| Landslide Susceptibility and Incidence Area / Site Type | Total Enrollment |
|---|---|
| Middle School | 8,663 |
| Senior High School | 6,546 |
| Span Middle School (i.e. Grades K-8) | 935 |
| Special Education Center | 174 |
| Low Total | 52,866 |
| **South Total** | **79,494** |

Source: USGS, LAUSD

### *Table 4-135 LAUSD – Local District West Enrollments by Landslide Incidence and Susceptibility Areas by Site Type*

| Landslide Susceptibility and Incidence Area / Site Type | Total Enrollment |
|---|---|
| Combo-High | |
| Elementary School | 297 |
| **Combo-High Total** | **297** |
| Low | |
| Admin Facility | 0 |
| Adult Education Facility | 0 |
| Charter School | 0 |
| Continuation High School | 52 |
| Currently a Closed School | 0 |
| Early Education Center | 0 |
| Elementary School | 44,303 |
| Middle School | 12,174 |
| Senior High School | 18,009 |
| Span High School (i.e. Grades K-12) | 2,950 |
| Span Middle School (i.e. Grades K-8) | 945 |
| Special Education Center | 432 |
| **Low Total** | **78,865** |
| **West Total** | **78,865** |

Source: USGS, LAUSD

### *Table 4-136 LAUSD – Outside Local District Areas Enrollments by Landslide Incidence and Susceptibility Areas by Site Type*

| Landslide Susceptibility and Incidence Area / Site Type | Total Enrollment |
|---|---|
| | |
| Senior High School | 0 |

| Landslide Susceptibility and Incidence Area / Site Type | Total Enrollment |
|---|---|
| **Moderate Total** | **0** |
| Low | |
| Admin Facility | 0 |
| Senior High School | 1,586 |
| **Low Total** | **1,586** |
| **Outside Areas Total** | **1,586** |

Source: USGS, LAUSD

### *Overall District Impact*

Landslides, debris flows, and mud flow impacts vary by location and severity of any given event and will likely only affect certain areas of the District during specific times. Based on the risk assessment, it is evident that landslides will continue to have potentially large economic impacts to certain areas of the District Planning Area. However, many of the landslides in the Planning Area are minor, localized events that are more of a nuisance than a disaster. Impacts that are not quantified, but can be anticipated in large future events, include:

- Injury and loss of life;
- LAUSD structure and property damage;
- Disruption of and damage to public infrastructure, utilities, and services;
- Damage to roads/bridges resulting in loss of mobility;
- Economic impact (jobs, sales, tax revenue) to the District; and
- Negative impact on commercial and residential property values

### *Future Development*

Although new growth may fall in the area affected by moderate or higher risk of landslide, given the small chance of a major landslide and the building codes in effect, development in the landslide area will continue to occur. The District requires engineered foundations and grading plans where appropriate, thereby mitigating risk for development in landslide areas. VERIFY AND ADD TO – HOW DOES THE DISTRICT MITIGATE? DO YOU CHOOSE TO SITE OUTSIDE THESE AREAS?

## 4.3.11. Levee Failure

This hazard varies across the LAUSD Planning Area. Table 4-137 breaks out how levee failure vulnerability varies by Local District.

*Table 4-137 LAUSD – Levee Failure Vulnerability by Local District*

| LAUSD Planning Area/ Local Districts | Geographic Extent | Magnitude/ Severity | Probability of Future Occurrences | Vulnerability | Significance |
|---|---|---|---|---|---|
| Central | Significant | Limited | Occasional | Low | Low |

| LAUSD Planning Area/ Local Districts | Geographic Extent | Magnitude/ Severity | Probability of Future Occurrences | Vulnerability | Significance |
|---|---|---|---|---|---|
| East | Significant | Limited | Occasional | Low | Low |
| Northeast | Limited | Negligible | Occasional | Medium | Medium |
| Northwest | Limited | Negligible | Occasional | Medium | Medium |
| South | Significant | Limited | Occasional | Low | Low |
| West | Limited | Negligible | Occasional | Medium | Medium |

Source: LAUSD

Levee failure flooding can occur as the result of partial or complete collapse of an impoundment, and often results from prolonged rainfall and flooding. The primary danger associated with dam or levee failure is the high velocity flooding of those properties downstream of the breach.

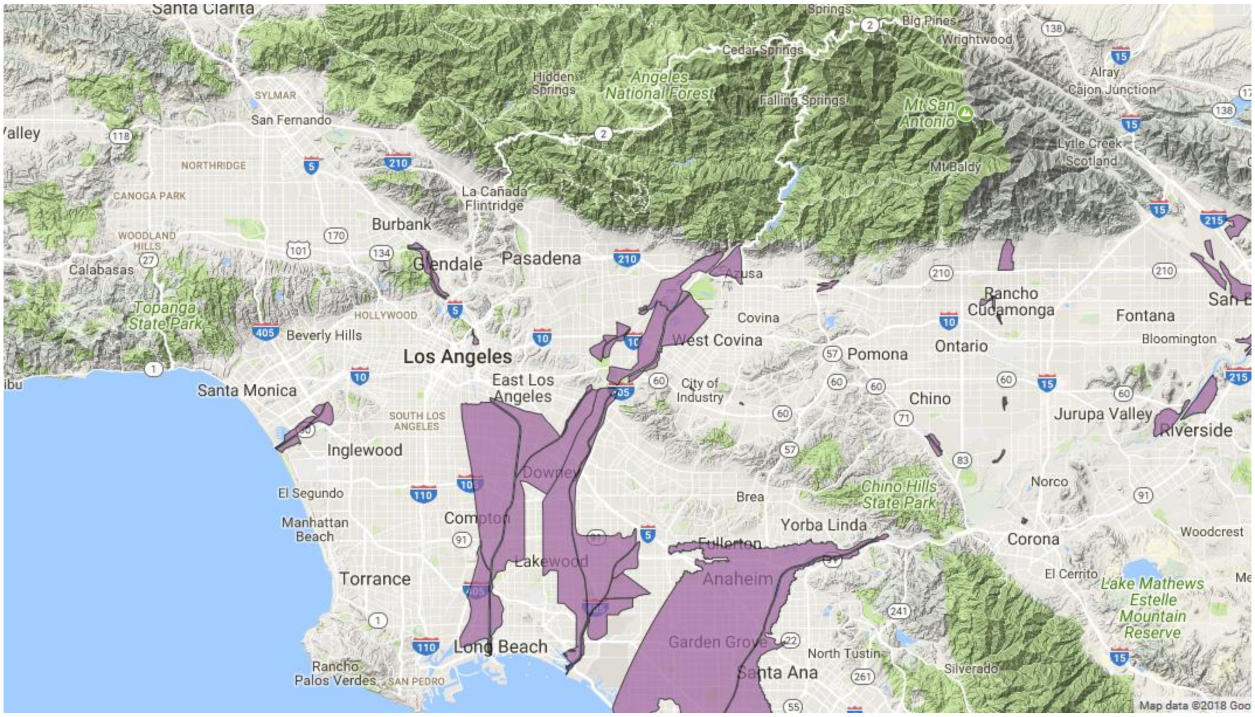
A levee failure can range from a small, uncontrolled release to a catastrophic failure. Vulnerability to levee failures is generally confined to the areas subject to inundation downstream of the facility. Secondary losses would include loss of the multi-use functions of the facility and associated revenues that accompany those functions.

Levee failure flooding would vary in the LAUSD Planning Area depending on which structure fails and the nature and extent of the failure and associated flooding. This flooding presents a threat to life and property, including buildings, their contents, and their use. Large flood events can affect lifeline utilities (e.g., water, sewerage, and power), transportation, jobs, tourism, the environment, agricultural industry, and the local and regional economies.

There are numerous levee systems in Los Angeles County, as discussed in Section 4.2.13. In Los Angeles County, there are over 200 miles of levees that provide protection against floods of 25-year or greater magnitude. Most of these levees are in cities; fewer than 10 percent are in the unincorporated County. There is no available mapped GIS data for the LAUSD Planning Area detailing areas protected by levees. Due to this, no GIS analysis could be performed on leveed zones in the District or greater County. However, with the numbers and types of levees present within the LAUSD Planning Area, LAUSD buildings, enrolled students, and staff in areas protected by levees are vulnerable to the effects of failures.

The National Levee Database (NLD), developed by the USACE, contains some information about the project levees in the County. Authorized by Congress in 2007, the database contains information to facilitate and link activities, such as flood risk communication, levee system evaluation for the NFIP, levee system inspections, flood plain management, and risk assessments. The NLD continues to be a dynamic database with ongoing efforts to add levee data from federal agencies, states, and tribes. It should be noted that the NLD currently contains the majority of levees within the USACE program. The NLD does not contain all levees located in the United States, nor all those within Los Angeles County. The NLD contains the following levee protected areas in their database. These are shown on Figure 4-81. It should be noted that this levee protected area does not necessarily provide protection to the 1% annual chance flood.

*Figure 4-81 Los Angeles County Levee Protected Areas*




Source: National Levee Database

***Note***: After reviewing the hazard profile of levee failure in Section 4.2.13 and in this vulnerability profile, the HMPC decided to lower the priority of this hazard to low. As such, no mitigation actions related to levee failure will be pursued.

## *Future Development*

Future development built in the levee zones is subject to being built to the standards set by the State Architect which generally considers state and local County and city flood protection ordinances. Los Angeles County is also evaluating the feasibility of projects to bring some area levees up to a 1% annual chance or greater level of protection which will also change future development standards in levee protected areas. ANYTHING TO ADD FROM THE DISTRICT REGARDING FUTURE DEVELOPMENT IN LEVEE AREAS?

## 4.3.12. Radon

This hazard varies across the LAUSD Planning Area. Table 4-138 breaks out how radon vulnerability varies by Local District.

*Table 4-138 LAUSD – Local District Radon Vulnerability*

| LAUSD Planning Area/ Local Districts | Geographic Extent | Magnitude/ Severity | Probability of Future Occurrences | Vulnerability | Significance |
|---|---|---|---|---|---|
| Central | Significant | Limited | Likely | Medium | Medium |
| East | Significant | Limited | Likely | Medium | Medium |
| Northeast | Significant | Limited | Likely | Medium | Medium |
| Northwest | Significant | Limited | Likely | High | High |
| South | Significant | Limited | Likely | Medium | Medium |
| West | Significant | Limited | Likely | Medium | Medium |

Source: LAUSD

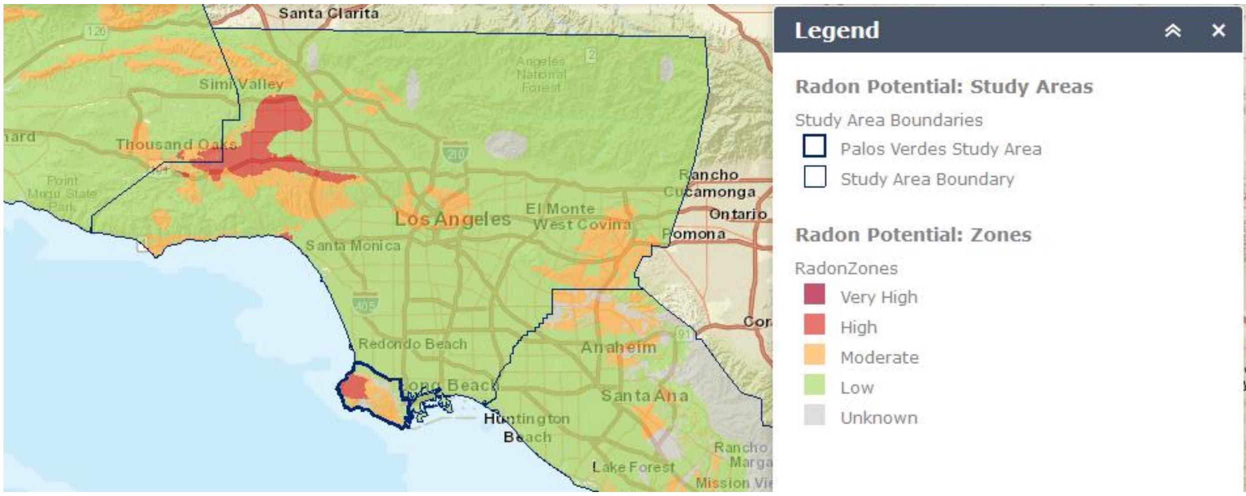
According to the RMS-LB Radon Mitigation Standards for Schools and Large Buildings, Radon is the leading cause of lung cancer among nonsmokers and the second leading cause of lung cancer in the general population. For most school children and staff, the second largest contributor to their radon exposure is likely to be their school. Thousands of classrooms nationwide have elevated radon levels, needlessly exposing hundreds of thousands of students and staff to this serious health risk. With similar implications, a correlation has been observed between radon levels in homes, and workplaces in the same area.

Radon testing in schools is not mandatory in California and there is no state funding specifically set aside to help school districts pay for testing. However, some schools have been able to voluntarily test their classrooms. The only way to determine if a problem exists is to test for it. Radon levels are measured in picocuries per liter of air, often noted as pCi/L. This measurement describes how much radioactivity from radon is in one liter of the air. EPA and the U.S. Surgeon General strongly recommend if there is a 4 pCi/L or more of radon, the facility should be fixed.

There is no known safe level of exposure to radon since lung cancer can result from low exposures to radon. Exposure to radon at the EPA Action Level of 4 pCi/L poses a significant health risk. EPA based the 4 pCi/L Action Level on four factors: the health risk involved; the effectiveness of available mitigation technologies; cost-effectiveness; and, the goal set by Congress to reduce indoor radon levels to as close to the outdoor level as possible. EPA's estimate of radon-related lung cancer deaths is based on the population of the U.S. exposed to the national average indoor radon concentration of 1.3 pCi/L over a lifetime. Existing mitigation technologies allow the radon level in most homes to be reduced to 2 pCi/L or less most of the time.

The California Geological Survey has released an interactive web map providing radon potential information for areas of California with completed radon potential maps. This can be seen in Figure 4-82.

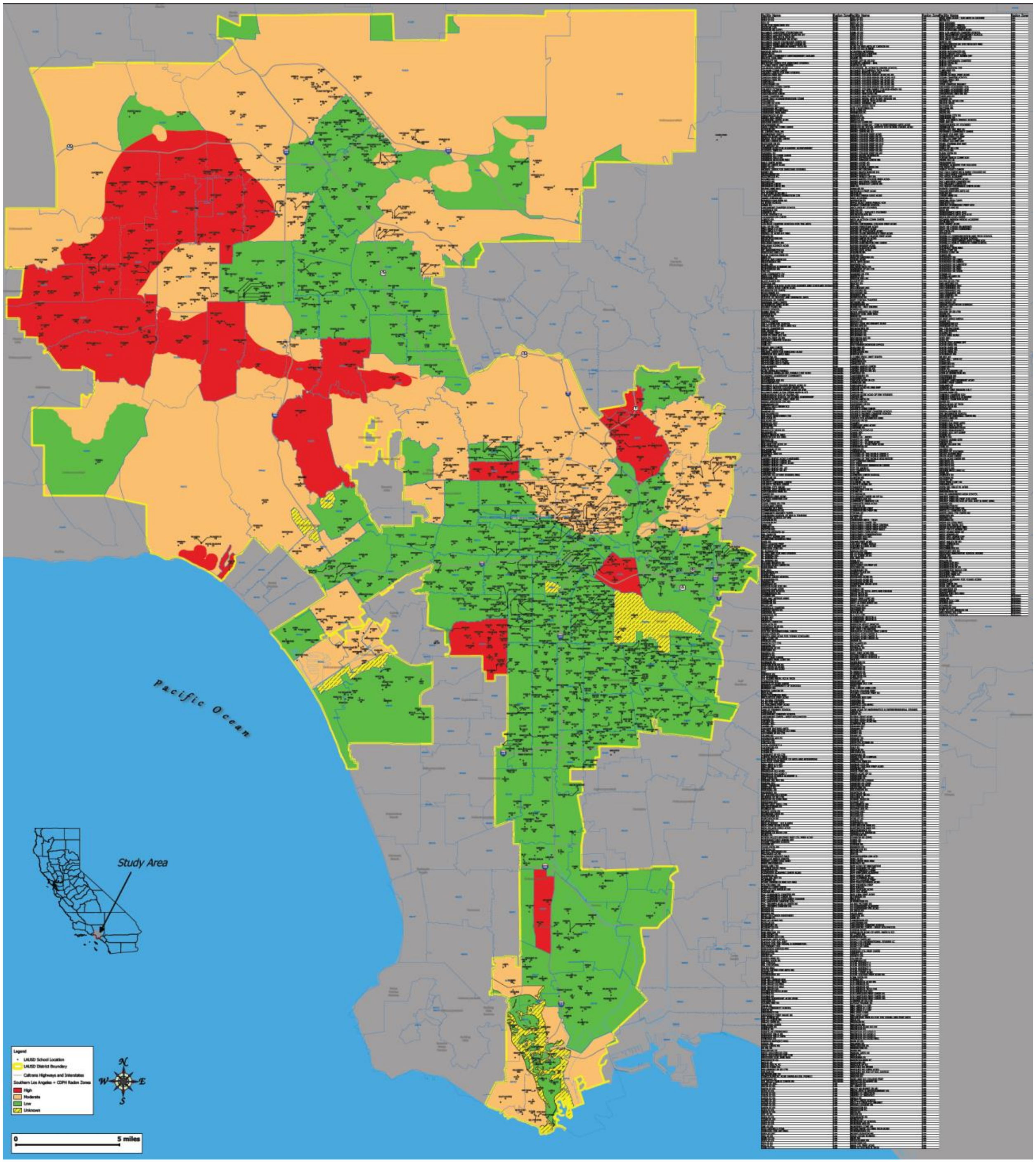
*Figure 4-82 LAUSD – Indoor Radon Potential*




Source: California Geological Survey

In March 2016 OEHS produced a District wide radon map, based all available radon data to date, depicting the locations of all schools and the radon zones within District boundaries. There are three radon zones designated high, moderate, and low. Based on the data there is an increased number of schools in the high radon zone as well as an increased number of schools in the moderate radon zone. A "high" radon zone is defined as having a high potential for radon levels to be above 4 pCi/L. The "high potential" is defined as "greater than or equal to 20% of the homes with indoor radon levels likely to exceed 4 pCi/L". The moderate radon zone is defined as having a moderate potential for radon levels to be above 4 pCi/L. The "moderate potential" is defined as "greater than or equal to between 5% and 19.5% of homes with indoor radon likely to exceed 4 pCi/L". Figure 4-83 shows radon concentrations in the LAUSD Planning Area as of April 2016. This map shows the high, moderate, low and unknown areas with radon exposure in the LAUSD Planning Area.

*Figure 4-83 LAUSD – Radon Locations by Concentrations*




Source: LAUSD

## *Future Development*

Development in areas where previous radon levels have been significantly high will continue to be more susceptible to exposure. New incidents of concentrated exposure may occur with future development or deterioration of older structures. Exposure can be limited with proper testing for both past and future development and appropriate mitigation measures.

On May 9, 2017, the Board of Education adopted the revised Los Angeles Unified School District Procedures for Implementing the California Environmental Quality Act. This Reference Guide provides procedural guidelines to ensure proposed projects are evaluated and approved in accordance with State law. This Reference Guide provides procedural guidelines to ensure proposed projects are evaluated and approved in accordance with State law.

The presence of potentially toxic or hazardous conditions on or in the vicinity of a proposed or existing District facility must be addressed to ensure the health and safety of students and staff, as well as protection of the environment. Based upon the location and scope of the proposed project, the following studies may be required:

- School Safety Certification (CCR Title 5, Section 14010) – This certification is required by the California Department of Education (CDE) for State-funded projects. Completion of this task requires that an evaluation be completed to document that the project will not create a new significant safety hazard or exacerbate an existing safety hazard to students.
- Site Screening – A site reconnaissance, aerial photograph review, and environmental database search is required to identify all potential sources of risk which may impact the health and safety of individuals attending a proposed elementary or secondary school. The results are compared to the OEHS Distance Criteria for School Siting/Screening (Attachment 2) to determine the proximity of the project site to any rail lines, pipelines, oil fields, methane zones, methane buffer zones, radon zones, freeways, landfills, industrial facilities, and high voltage power lines. All sources of environmental risk are evaluated further and may include one or more of the following specialized studies.
- Radon Assessment – to characterize potential indoor air risks from radon gas intrusion.

## 4.3.13. Severe Weather: Extreme Heat Vulnerability Assessment

This hazard can vary across the LAUSD Planning Area. Table 4-139 breaks out how extreme heat vulnerability varies by Local District.

*Table 4-139 LAUSD – Extreme Heat Vulnerability by Local District*

| LAUSD Planning Area/ Local Districts | Geographic Extent | Magnitude/ Severity | Probability of Future Occurrences | Vulnerability | Significance |
|---|---|---|---|---|---|
| Central | Extensive | Limited | Highly Likely | Medium | Medium |
| East | Extensive | Limited | Highly Likely | Medium | Medium |
| Northeast | Extensive | Limited | Highly Likely | Medium | Medium |
| Northwest | Extensive | Limited | Highly Likely | Medium | Medium |
| South | Extensive | Limited | Highly Likely | Medium | Medium |
| West | Extensive | Limited | Highly Likely | Medium | Medium |

Source: LAUSD

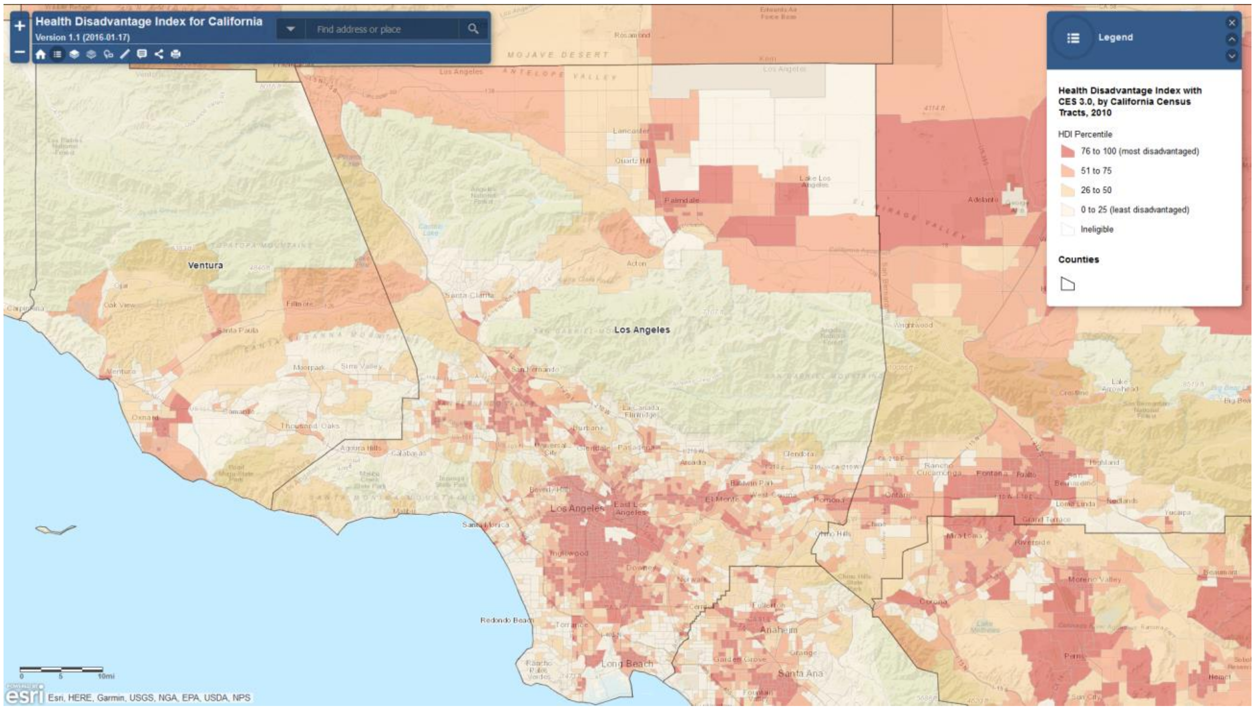
Limited data on temperature extreme impacts on the District was available during the development of this hazard's profile. Extreme heat occurs in Los Angeles County and the District each year. Extreme heat normally does not impact structures as there may be a limited number of days where the temperatures stay high which gives the structure periodic relief between hot and cool temperature cycles. Areas prone to excessively high temperatures are identified normally on a nation-wide assessment scale, which doesn't allow detailed results on specific structures.

Recent research indicates that the impact of extreme temperatures, particularly on populations, has been historically under-represented. The risks of extreme temperatures are often profiled as part of larger hazards, such as drought (see Section 4.3.7). However, as temperature variances may occur outside of larger hazards or outside of the expected seasons but still incur large costs, it is important to examine them as stand-alone hazards. Extreme heat may overload demands for electricity to run air conditioners in school facilities during prolonged periods of exposure and presents health concerns to individuals outside in the temperatures. A brownout or blackout could have detrimental effects to LAUSD schools and buildings. Extreme heat may also be a secondary effect of droughts, or may cause drought-like conditions in a temporary setting. For example, several weeks of extreme heat increases evapotranspiration and reduces moisture content in vegetation, leading to higher wildfire vulnerability for that time period even if the rest of the season is relatively moist.

Because of its expansive urban size, Los Angeles is identified as an urban heat island (UHI). UHIs develop in urban areas where natural surfaces are paved with asphalt or covered by buildings. Radiation from the sun is absorbed by these surfaces during the day and re-radiated at night, raising ambient temperatures. UHIs have high nighttime minimum temperatures compared to neighboring areas. Waste heat from air conditioners, vehicles, and other equipment contributes to the UHI effect.

The Public Health Alliance has developed a composite index to identify cumulative health disadvantage in California. Factors such as those bulleted above were combined to show what areas are at greater risk to hazards like extreme heat. This is shown on Figure 4-84.

*Figure 4-84 Health Disadvantage Index by California Census Tract*




Source: Public Health Alliance of Southern California

Vulnerable populations to extreme heat include:

- Homeless
- Infants and children under age five
- Elderly (65 and older)
- Individuals with disabilities
- Individuals dependent on medical equipment
- Individuals with impaired mobility

For the District, children and youth who are homeless, disabled, or economically disadvantaged are at greater risk of exposure to extreme heat. During times of extreme heat, locations without air conditioning face hot classrooms. Playground equipment and asphalt can also be too hot to touch during periods of extreme heat.

### *Future Development*

HOW WILL FUTURE DEVELOPMENT TAKE EXTREME HEAT INTO ACCOUNT?

## 4.3.14. Severe Weather: Heavy Rains and Storms Vulnerability Assessment

This hazard can vary across the LAUSD Planning Area. Table 4-140 breaks out how heavy rain and storm vulnerability varies by Local District.

*Table 4-140 LAUSD – Heavy Rain and Storm Vulnerability by Local District*

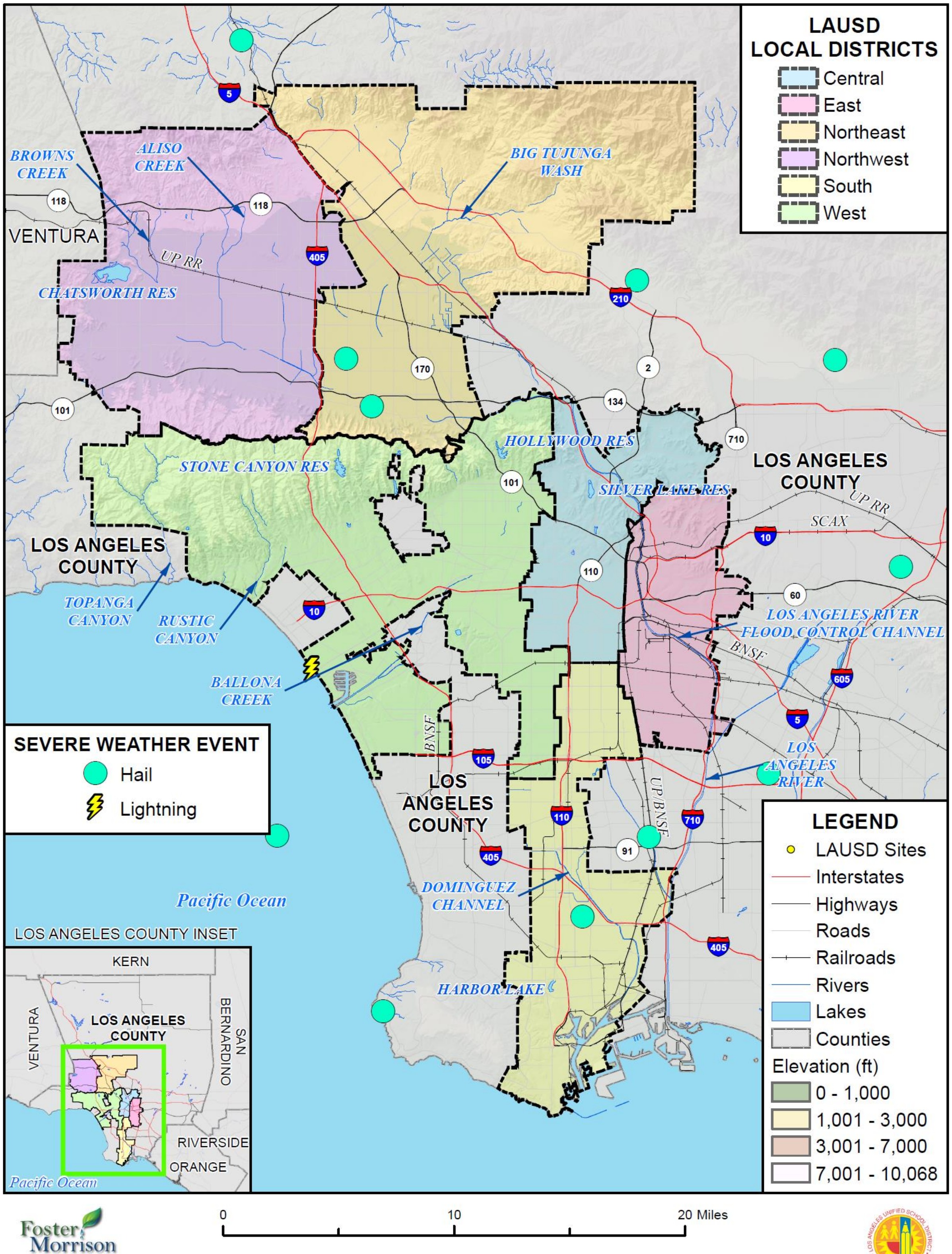
| LAUSD Planning Area/ Local Districts | Geographic Extent | Magnitude/ Severity | Probability of Future Occurrences | Vulnerability | Significance |
|---|---|---|---|---|---|
| Central | Extensive | Limited | Highly Likely | Medium | Medium |
| East | Extensive | Limited | Highly Likely | Medium | Medium |
| Northeast | Extensive | Limited | Highly Likely | Medium | Medium |
| Northwest | Extensive | Limited | Highly Likely | Medium | Medium |
| South | Extensive | Limited | Highly Likely | Medium | Medium |
| West | Extensive | Limited | Highly Likely | Medium | Medium |

Source: LAUSD

According to historical hazard data, severe weather is an annual occurrence in Los Angeles County and District Planning Area. Damage and disaster declarations related to severe weather have occurred and will continue to occur in the future. Heavy rain and thunderstorms are the most frequent type of severe weather occurrences in the District Planning Area. Lightning can accompany these storms and have caused damage in the District Planning Area in the past. Hail is rare in the District and greater County. The NCDC database has limited tracking of heavy rains and storms. These are shown on Figure 4-85.

Actual damage associated with the primary effects of severe weather have been limited. It is the secondary hazards caused by weather, such as floods, fire, and associated losses that have had the greatest impact on the County and District. The risk and vulnerability associated with these secondary hazards are discussed in other sections of this plan (Section 4.3.7 Flood: 1%/0.2% Annual Chance, Section 4.3.9 Flood: Localized Stormwater, Section 4.3.11, and Section 4.3.3 Dam Failure).

*Figure 4-85 LAUSD – Hail and Lightning Incidence Locations*




Data Source: NCDC/NOAA/NCEI (1950-2017), LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

### *Future Development*

New facilities should be built to withstand hail, lightning, and thunderstorm winds. While minimal damages have occurred to District facilities in the past due to lightning, hail, or heavy rains, there still remains future risk.

## 4.3.15. Severe Weather: High Winds and Tornadoes

This hazard can vary across the LAUSD Planning Area. Table 4-141 breaks out how winds and tornado vulnerability varies by Local District.

*Table 4-141 LAUSD – High Winds and Tornado Vulnerability by Local District*

| LAUSD Planning Area/ Local Districts | Geographic Extent | Magnitude/ Severity | Probability of Future Occurrences | Vulnerability | Significance |
|---|---|---|---|---|---|
| Central | Extensive | Limited | Highly Likely | Medium | Medium |
| East | Extensive | Limited | Highly Likely | Medium | Medium |
| Northeast | Extensive | Limited | Highly Likely | Medium | Medium |
| Northwest | Extensive | Limited | Highly Likely | Medium | Medium |
| South | Extensive | Limited | Highly Likely | Medium | Medium |
| West | Extensive | Limited | Highly Likely | Medium | Medium |

Source: LAUSD

The County and District Planning Area is subject to potentially destructive straight-line winds, as well as tornadoes. High winds are common throughout the LAUSD Planning Area and can happen during most times of the entire year. Santa Ana winds are more common in the late spring and early summer. Straight line winds are primarily a public safety and economic concern. Windstorms and tornadoes can cause damage to structures and power lines which in turn can create hazardous conditions for people. Debris flying from high wind events can shatter windows in structures and vehicles and can harm people that are not adequately sheltered.

Future losses from straight line winds and tornadoes in the LAUSD Planning Area include:

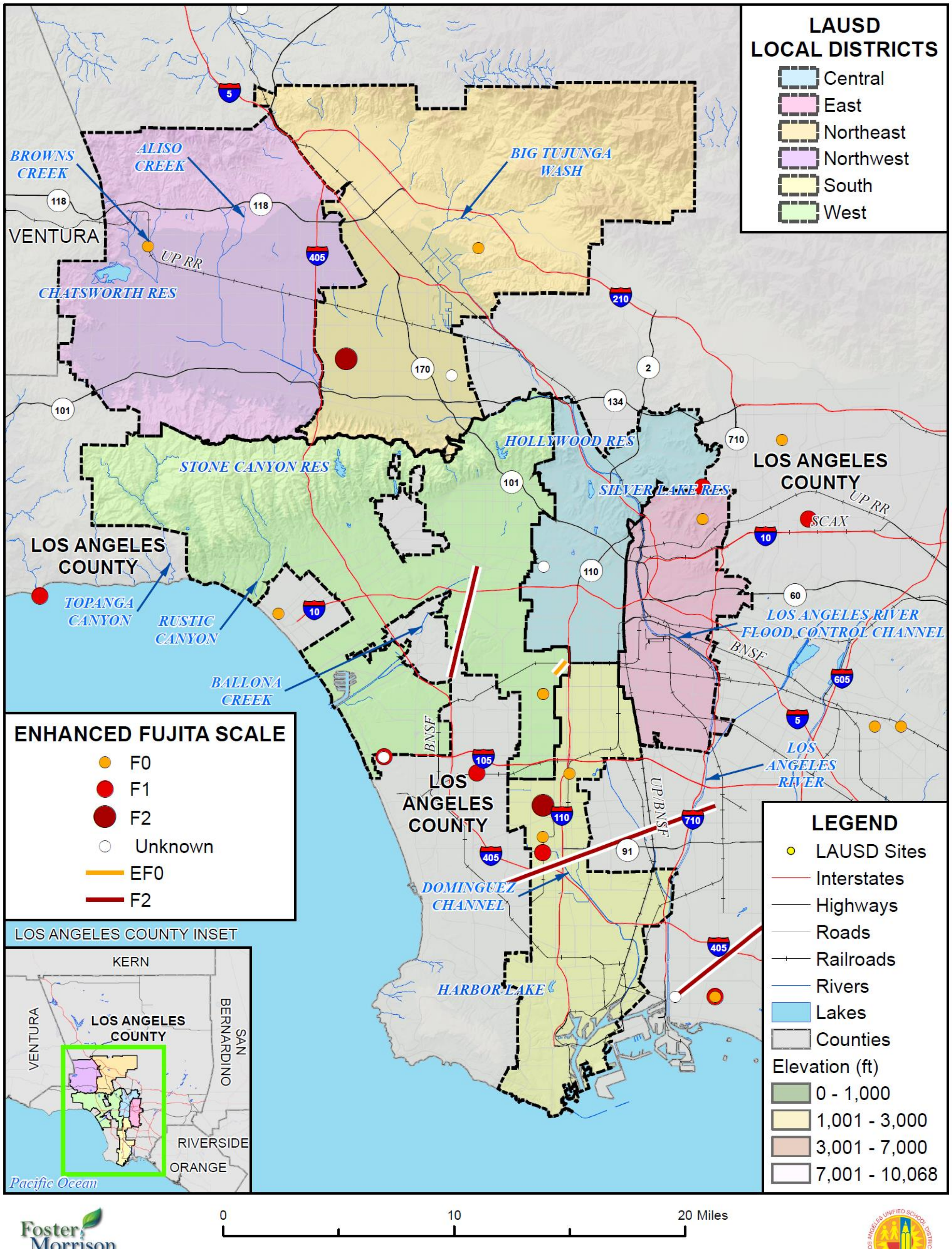
- Increased wildfire risk
- Downed trees
- Power line impacts and economic losses from power outages
- Occasional building damage, primarily to roofs of schools or outbuildings

Outbuildings, barns, and sheds in the LAUSD Planning Area and their contents are particularly vulnerable as windstorm and tornado events in the region can be sufficient in magnitude to overturn these lighter structures. Overhead power lines are vulnerable and account for the majority of historical damages. State highways can be vulnerable to high winds and dust storms, where high profile vehicles may be overturned by winds and lowered visibility can lead to multi-car accidents. The greatest threat to the County and

District Planning Area from wind is not from damage from the winds themselves, but from the spread of wildfires and smoke during windy days.

Figure 4-86 shows the NCDC mapped tornado touchdowns and paths that have affected the District areas.

*Figure 4-86 LAUSD – Past Touchdowns and Tornado Paths*




Data Source: NCDC/NOAA/NCEI (1950-2017), LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

### *Future Development*

Future development projects should consider winds and tornadoes hazards at the planning, engineering, and architectural design stage with the goal of reducing vulnerability. Applicable building codes and building standards should mitigate high winds and tornadoes for the District.

## 4.3.16. Tsunami Vulnerability Assessment

This hazard varies across the LAUSD Planning Area. Table 4-53 breaks out how tsunami vulnerability varies by Local District.

*Table 4-142 LAUSD – Tsunami Vulnerability by Local District*

| LAUSD Planning Area/ Local Districts | Geographic Extent | Magnitude/ Severity | Probability of Future Occurrences | Vulnerability | Significance |
|---|---|---|---|---|---|
| Central | Limited | Negligible | Unlikely | Low | Low |
| East | Limited | Negligible | Unlikely | Low | Low |
| Northeast | Limited | Negligible | Unlikely | Low | Low |
| Northwest | Limited | Negligible | Unlikely | Low | Low |
| South | Limited | Limited | Occasional | Medium | Medium |
| West | Limited | Limited | Occasional | Medium | Medium |

Source: LAUSD

Tsunamis are a threat to life and property to anyone living near the ocean. From 1970 to 2016, 375 tsunamis and tsunami effects were recorded globally. The overwhelming majority of these events occurred in the Pacific basin. Recent tsunamis have struck in Chile, Alaska Peninsula, New Guinea, Indonesia, and Japan. Historically, tsunamis originating in the northern Pacific and along the west coast of South America have caused more damage on the west coast of the United States than tsunamis originating in Japan and the Southwest Pacific.

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

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

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

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

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

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

### Methodology

LAUSD has mapped tsunami inundation areas.  The 2011 tsunami inundation areas data was produced collectively by tsunami modelers, geologic hazard mapping specialists, and emergency planning scientists from CGS, Cal OES, and the Tsunami Research Center at the University of Southern California. The tsunami inundation maps for California cover most residentially and transient populated areas along the state's coastline. Coordinated by Cal OES, these official maps are developed for all populated areas at risk to tsunamis in California and represent coastal areas that might be inundated by tsunami waves during a tsunami event for each area.  According to the source information and the varying tsunami events, the inundation areas may not represent the actual inundation area for a major tsunami event; a major tsunami event could be greater or lesser in each area depending on the location and magnitude of the actual event. Additional information regarding the development of the tsunami inundation areas can be accessed through the following website: http://www.conservation.ca.gov/cgs/geologic_hazards/Tsunami/.

The 2011 Tsunami data was obtained for the Los Angeles County area for the LAUSD Planning Area. LAUSD's facilities database, including information on building replacement values, was used as the basis for the inventory of all facilities within LAUSD. The County's Assessor's data and parcel layer was joined to the facilities database to obtain information on assessed land values and to create a parcel inventory of LAUSD properties. As previously described, CRVs were calculated and added to building replacement values and the assessed land values, to determine the overall potential values at risk. In some cases there are parcels within and outside of the tsunami inundation areas. GIS was used to overlay the parcel polygon data onto the tsunami inundation areas to determine which parcels were within the inundation areas. For the purposes of this analysis, the parcel polygon that intersected an inundation area was assigned within or outside of the tsunami inundation area for the entire parcel. The parcels were segregated and analyzed in this fashion for the LAUSD planning area. This analysis assumes that the impacts of a tsunami event has the potential to damage land, structures, and structure contents. Results are provided in this plan for LAUSD with analysis broken out by the six Local Districts, both in summary form and by site type. Appendix ?? includes additional details on the specific LAUSD facilities organized by site type for each of the six Local Districts.

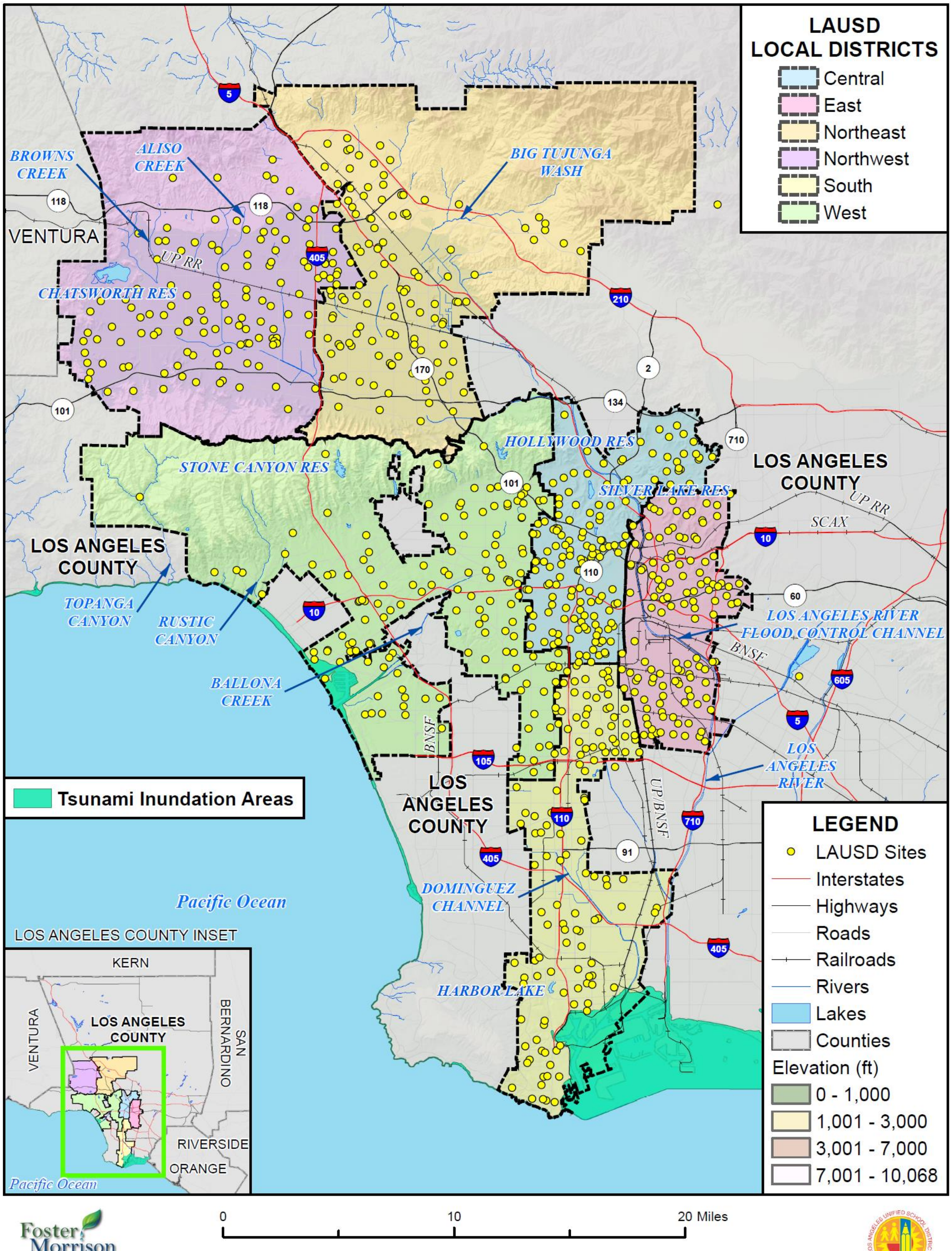
#### Limitations

It should be noted that the resulting tsunami inundation loss estimates may actually be more or less than that presented in the below tables as LAUSD may include structures located on parcels within the inundation area that are actually outside the inundation boundaries or otherwise elevated and located outside of the area of impact. Further, depending on the magnitude, storm surge, or other factors of a tsunami event, the inundation loss estimates may also be more or less than that presented in the below tables due to the varying impacts to land, structures, and their contents and therefore their respective values. Also, it is important to keep in mind that the assessed land value may be below the actual market value of improved parcels due to Proposition 13.

### *Values at Risk*

Tsunami areas exist in the South and West Local Districts. The Cal OES tsunami layer was overlaid with the LAUSD facility layer in GIS to obtain results. This section includes summary tables by Local District for the LAUSD Planning Area and tables broken out by Local District and Site Type, while Appendix ?? includes detailed tables by Local District and Site Type with details on specific facilities affected. Areas of tsunami inundation in the District Planning Area is shown in Figure 4-87. Table 4-143 illustrates the potential estimated damages to LAUSD Planning Area from tsunami.

*Figure 4-87 LAUSD –Tsunami Inundation Areas*




Data Source: 2011 CalOES/Earthquake and Tsunami Program, LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

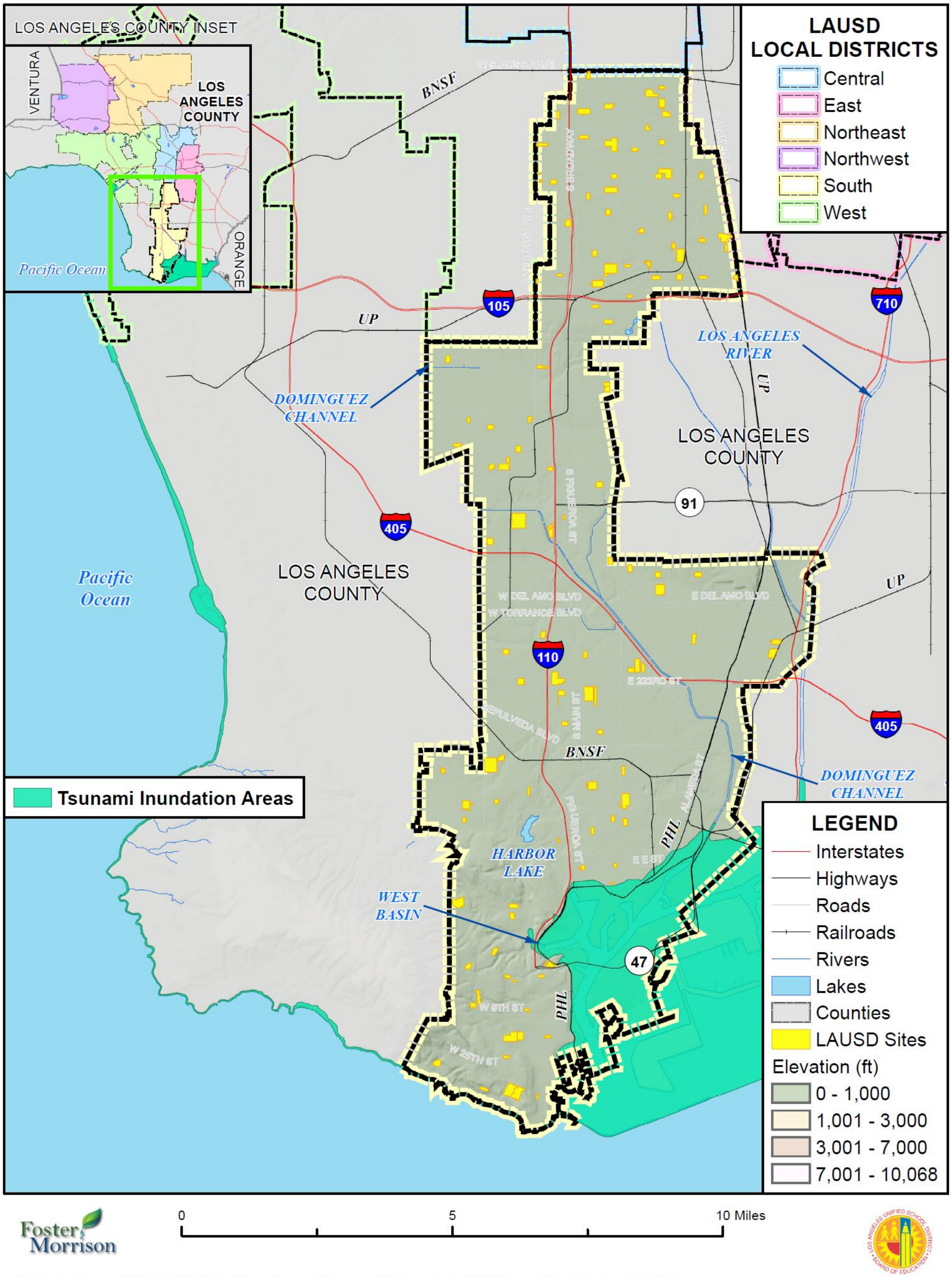
*Table 4-143 LAUSD – Local District Summary Values at Risk in Tsunami Inundation Areas*

| LAUSD Local Districts | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Inside Local District Areas | | | | | | |
| Central | 0 | $0 | 0 | $0 | $0 | $0 |
| East | 0 | $0 | 0 | $0 | $0 | $0 |
| Northeast | 0 | $0 | 0 | $0 | $0 | $0 |
| Northwest | 0 | $0 | 0 | $0 | $0 | $0 |
| South | 1 | $298,428 | 25 | $54,800,725 | $54,800,725 | $109,899,878 |
| West | 3 | $2,714,919 | 25 | $34,405,407 | $34,405,407 | $71,525,733 |
| **Inside Areas Total** | **4** | **$3,013,347** | **50** | **$89,206,132** | **$89,206,132** | **$181,425,611** |
| Outside of Local District Areas | | | | | | |
| Outside Areas Total | 0 | $0 | 0 | $0 | $0 | $0 |
| | | | | | | |
| **Grand Total** | **4** | **$3,013,347** | **50** | **$89,206,132** | **$89,206,132** | **$181,425,611** |

Source: Cal OES, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

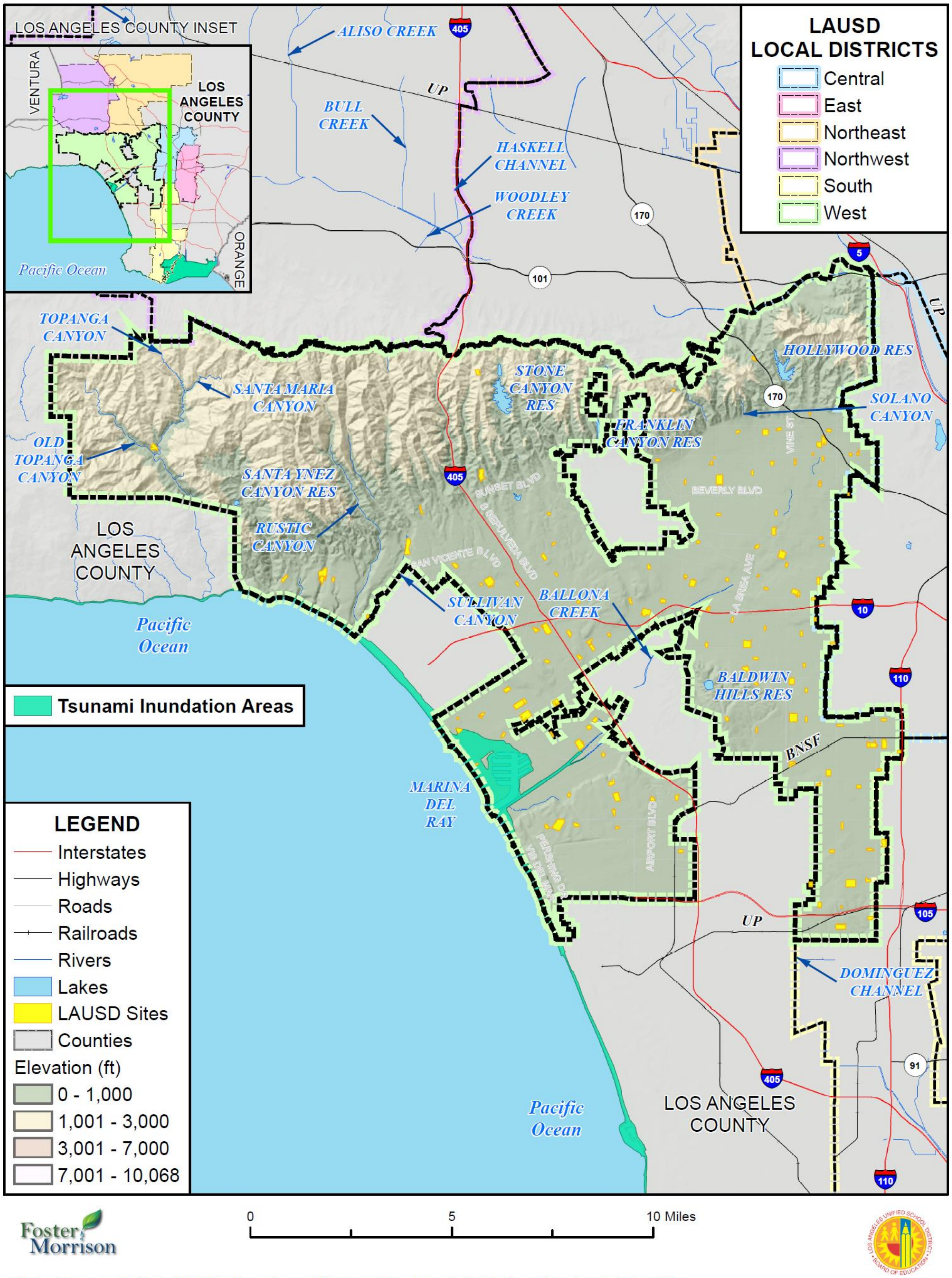
Tsunami inundation area maps and analysis were broken out for the LAUSD by Local District and Site Type. There are only two districts with tsunami risk. Maps for the south (Figure 4-88) and west (Figure 4-89) districts show locations of tsunami inundation areas and facilities by Local District; while Table 4-144 show the parcel counts, building counts, land values, contents values, and total values at risk to tsunami for both districts.

## *Figure 4-88 LAUSD – Local District South Tsunami Inundation Areas*




Data Source: 2011 CalOES/Earthquake and Tsunami Program, LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

*Figure 4-89 LAUSD – Local District West Tsunami Inundation Areas*




Data Source: 2011 CalOES/Earthquake and Tsunami Program, LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

*Table 4-144 LAUSD – Local District South and West Values at Risk in Tsunami Inundation Areas by Site Type*

| Local District/ Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Inside Local District Areas | | | | | | |
| **Local District South** | | | | | | |
| Adult Education Facility | 1 | $298,428 | 25 | $54,800,725 | $54,800,725 | $109,899,878 |
| **South Total** | **1** | **$298,428** | **25** | **$54,800,725** | **$54,800,725** | **$109,899,878** |
| **Local District West** | | | | | | |
| Elementary School | 1 | $1,065,715 | 9 | $23,107,751 | $23,107,751 | $47,281,217 |
| Span Middle School (i.e. Grades K-8) | 2 | $1,649,204 | 16 | $11,297,656 | $11,297,656 | $24,244,517 |
| **Local District West Total** | **3** | **$2,714,919** | **25** | **$34,405,407** | **$34,405,407** | **$71,525,733** |
| **Inside Areas Total** | **4** | **$3,013,347** | **50** | **$89,206,132** | **$89,206,132** | **$181,425,611** |
| **Grand Total** | **4** | **$3,013,347** | **50** | **$89,206,132** | **$89,206,132** | **$181,425,611** |

Source: Cal OES, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

## *Populations at Risk*

The populations most vulnerable to the tsunami hazard are those who reside near beaches, low-lying coastal areas, tidal flats and river deltas that empty into ocean-going waters and are elderly or very young, or are individuals with disabilities or others with access and functional needs. In the event of a local tsunami generated in or near the planning area, there would be little warning time, so more of the population would be vulnerable. This would be true in the South and West Local District.

A separate analysis was performed to determine the LAUSD populations (enrollments) by facility in tsunami areas. Using GIS, the USGS dataset was overlayed on the LAUSD facility layer. Enrollment counts by facility were provided by LAUSD. Results were tabulated and are shown in Table 4-145.

*Table 4-145 LAUSD – Total Enrollments by Local District and Tsunami Inundation Area*

| Inside Tsunami Inundation Area | Total Enrollment |
|---|---|
| Inside Local District Areas | |
| Central | 0 |
| East | 0 |
| Northeast | 0 |
| Northwest | 0 |

| Inside Tsunami Inundation Area | Total Enrollment |
|---|---|
| South | 0 |
| West | 795 |
| **Total Inside Areas** | **795** |
| Outside of Local District Areas | |
| – | 0 |
| **Outside of Local District Areas Total** | **0** |
| | |
| **Grand Total** | **795** |

Source: Cal OES, LAUSD

To give further detail on populations of enrolled students in the tsunami inundation areas, enrolled populations in these areas were broken out by Local Districts and Site Type. This can be seen for the South (Table 4-134), West (Table 4-135).

*Table 4-146 LAUSD – Local District South Enrollments by Tsunami Inundation Areas and Site Type*

| Inside Tsunami Inundation Area / Site Type | Total Enrollment |
|---|---|
| Adult Education Facility | 0 |
| **South Total** | **0** |

Source: Cal OES, LAUSD

*Table 4-147 LAUSD – Local District West Enrollments by Tsunami Inundation Areas and Site Type*

| Inside Tsunami Inundation Area / Site Type | Total Enrollment |
|---|---|
| Elementary School | 411 |
| Span Middle School (i.e. Grades K-8) | 384 |
| **West Total** | **795** |

Source: Cal OES, LAUSD

## *Overall District Impact*

Tsunami inundation flood impacts vary by location and severity of any given event and will likely only affect certain areas of the District during specific times. Impacts that are not quantified, but can be anticipated in future events, include:

- Injury and loss of life;
- LAUSD structure and property damage;
- Disruption of and damage to public infrastructure and services;
- Health hazards associated with mold and mildew, contamination of drinking water, etc.;
- Damage to roads/bridges resulting in loss of mobility;

- Significant economic impact (jobs, sales, tax revenue) causing lost revenues to District;
- Negative impact on commercial and residential property values which the District tax base relies on;
- Significant disruption to students and teachers as temporary facilities and relocations would likely be needed; and
- Impact on the overall mental health of the community.

***Note***: After reviewing the hazard profile of tsunami in Section 4.2.15 and in this vulnerability profile, the HMPC decided to lower the priority of this hazard to low. As such, no mitigation actions related to tsunami will be pursued.

### *Future Development*

As land area likely to be inundated by tsunami waves increases, exposure and vulnerability to the tsunami hazard may increase for District facilities, enrolled students, and staff. Changes to the tsunami hazard from climate change may result in more direct economic impacts on a greater number of businesses and economic centers, as well as the infrastructure systems that support those businesses. This in turn could lower the tax base the District uses to fund District activities.

HOW IS FUTURE DEVELOPMENT IN THE DISTRICT SPECIFICALLY AFFECTED BY TSUNAMI? HOW DOES THE DISTRICT MITIGATE? DO YOU CHOOSE TO SITE OUTSIDE THESE AREAS?

## 4.3.17. Wildfire Vulnerability Assessment

This hazard can vary across the LAUSD Planning Area. Table 4-53 breaks out how wildfire vulnerability varies by Local District.

*Table 4-148 LAUSD – Local District Wildfire Vulnerability Summary*

| LAUSD Planning Area/ Local Districts | Geographic Extent | Magnitude/ Severity | Probability of Future Occurrences | Vulnerability | Significance |
|---|---|---|---|---|---|
| Central | Significant | Limited | Likely | Medium | Medium |
| East | Significant | Limited | Likely | Medium | Medium |
| Northeast | Significant | Limited | Likely | Medium | Medium |
| Northwest | Significant | Limited | Likely | Medium | Medium |
| South | Limited | Negligible | Unlikely | Low | Low |
| West | Significant | Limited | Likely | Medium | Medium |

Source: LAUSD

Risk and vulnerability to the LAUSD Planning Area from wildfire is of significant concern, with some areas of the District being at greater risk than others as described further in this section. High fuel loads in areas of the District, along with geographical and topographical features, create the potential for both natural and human-caused fires that can result in loss of life and property. These factors, combined with natural weather conditions common to the area, including periods of drought, high temperatures, low relative humidity, and periodic winds, can result in frequent and sometimes catastrophic fires. During the May to

October fire season, the dry vegetation and hot and sometimes windy weather, combined with continued growth in the WUI areas, results in an increase in the number of ignitions. Any fire, once ignited, has the potential to quickly become a large, out-of-control fire.

Although the physical damages and casualties arising from wildland-urban interface fires may be severe, it is important to recognize that they also cause significant economic impacts by resulting in a loss of function of buildings and infrastructure. In some cases, the economic impact of this loss of services may be comparable to the economic impact of physical damages or, in some cases, even greater. Economic impacts of loss of transportation and utility services may include traffic delays/detours from road and bridge closures and loss of electric power, potable water, and wastewater services. Fires can also cause major damage to power plants and power lines needed to distribute electricity to operate facilities. All of these can have effects on the District.

In Los Angeles County, past wildfires have caused major damages to the County. The County has suffered loss of recreation and tourism, loss of structures, loss of tax revenue, high costs to battle fires, and loss of lives. HOW HAS THE DISTRICT BEEN SPECIFICALLY AFFECTED BY PAST WILDFIRES?

The District has historical, cultural and natural resources located throughout the LAUSD Planning Area as previously described. In addition, there are other natural resources at risk when wildland-urban interface fires occur. One is the watershed and ecosystem losses that occur from wildland fires. This includes impacts to water supplies and water quality as well as air quality. Another is the aesthetic value of the area, which can add value to properties, increasing the District tax base. Major fires that result in visible damage detract from that value. Other assets at risk include wildland recreation areas, wildlife and habitat areas, and rangeland resources. The loss to these natural resources can be significant. Any historical, cultural, or natural resource in the fire zones is potentially at risk to wildfire.

### *Tree Mortality*

Drought can weaken trees, making them less resistant to bark beetles and other pests and diseases. These types of infestations attack trees, weaken them, and can kill them. These trees then become fuel for wildfires.

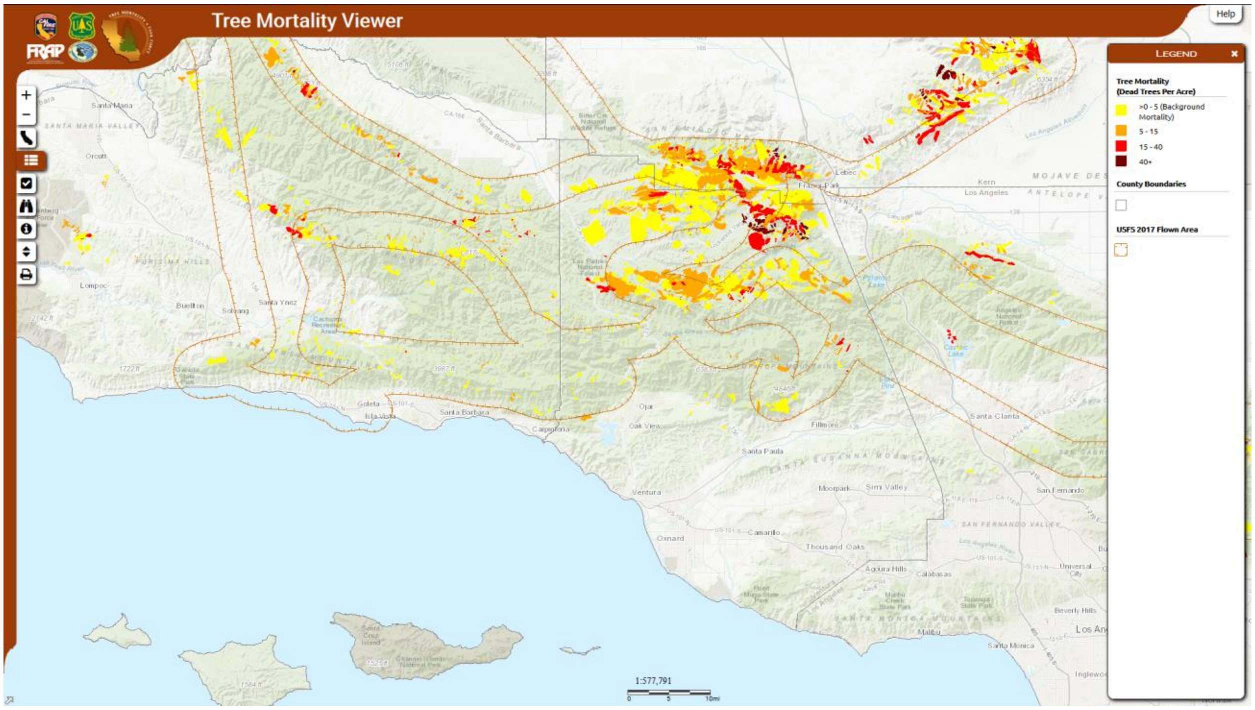
On October 30, 2015, Governor Brown proclaimed a State of Emergency and included provisions to expedite the removal and disposal of dead and dying hazardous trees. As a result, costs related to identification, removal, and disposal of dead and dying trees caused from drought conditions may be eligible for California Disaster Assistance Act (CDAA) reimbursement.

Many areas in Los Angeles County have seen increases in tree mortality. The County has mapped these areas, and that map is shown in Figure 4-90. Shown are results of 2012-2017 aerial tree-mortality surveys. Using a color legend, the map shows:

- Deep burgundy depicting areas with more than 40 dead trees per acre
- Red depicting 40 - 15 dead trees per acre
- Orange depicting 15 - 5 dead trees per acre
- Yellow depicting 5 or less dead trees per acre

It should be noted that not all of the County has been surveyed for tree mortality. The flown areas for 2017 cover very little of the District territory.

### *Figure 4-90 Los Angeles County – Tree Mortality Areas*




Source: CAL FIRE

## *Wildfire (Smoke) and Air Quality*

During many summer months in past years, Los Angeles County residents have had to breathe wildfire smoke, from fires both within and outside of the County. Smoke from wildfires is made up of gas and particulate matter, which can be easily observed in the air. While the summer of 2015 brought terrible wildfires along with severe smoke impacts to numerous locations in California, impacts in Los Angeles County were of a shorter duration then previous summers. During the summers of 2013 and 2014, several wildfire incidents occurred in Southern California and Los Angeles County which significantly influenced the PM2.5 concentration measurements within Los Angeles County.

Air quality standards have been established to protect human health with the pollutant referred to as PM2.5 which consists of particles 2.5 microns or less in diameter. These smaller sizes of particles are responsible for adverse health effects because of their ability to reach the lower regions of the respiratory tract.

Cal-Adapt is an online tool put together by the California Energy Commission that downscales global climate models to the California level with projections for sea-level rise, drought, temperature increase, heat, and wildfire, from 2020 out to 2099. Figure 4-41 in Section 4.2.16 showed the 2085 wildfire projection for Los Angeles County. Air quality in these areas of the District Planning Area would be lower due to wildfire if the scenario projected is accurate.

## *Wildfire Analysis*

The LAUSD Planning Area has mapped CAL FIRE fire hazard severity zones based on fire responsibility areas as further described below, based on CAL FIRE data specific to the Los Angeles County area. GIS was used to determine the possible impacts of wildfire within the District and how the wildfire risk varies across the Planning Area. The wildfire analysis includes an analysis of affected parcels by CAL FIRE's Fire Hazard Severity Zones.

### Fire Hazard Severity Zone Analysis

As part of the Fire and Resource Assessment Program (FRAP), CAL FIRE was mandated to map areas of significant fire hazards based on fuels, terrain, weather, and other relevant factors. These zones, referred to as Fire Hazard Severity Zones (FHSZ), then define the application of various mitigation strategies to reduce risk associated with wildland fires.

Fire hazard is a way to measure the physical fire behavior so that people can predict the damage a fire is likely to cause. Fire hazard measurement includes the speed at which a wildfire moves, the amount of heat the fire produces, and most importantly, the burning fire brands that the fire sends ahead of the flaming front.

The fire hazard model developed by CAL FIRE considers the wildland fuels. Fuel is that part of the natural vegetation that burns during the wildfire. The model also considers topography, especially the steepness of the slopes. Fires burn faster as they burn up-slope. Weather (temperature, humidity, and wind) has a significant influence on fire behavior. The model recognizes that some areas of California have more frequent and severe wildfires than other areas. Finally, the model considers the production of burning fire brands (embers) how far they move, and how receptive the landing site is to new fires.

In 2007, CAL FIRE updated its Fire Hazard Severity Zone (FHSZ) maps for the State of California to provide updated map zones, based on new data, science, and technology that will create more accurate zone designations such that mitigation strategies are implemented in areas where hazards warrant these investments. The zones will provide specific designation for application of defensible space and building standards consistent with known mechanisms of fire risk to people, property, and natural resources. The program is still ongoing with fire hazard severity zone maps being updated based on designated responsibility areas: FRA, SRA, and LRA.

The CAL FIRE data, detailing FHSZs within Los Angeles County and the LAUSD Planning Area, was utilized to determine the locations, numbers, types, and values of LAUSD land and facilities falling within each FHSZ. The following sections provide details on the methodology and results for this analysis.

### Methodology

As previously described, CAL FIRE mapped the State Responsibility Area (SRA) FHSZs, or areas of significant fire hazard, based on fuels, terrain, weather, and other relevant factors. Zones are designated with Very High, High, Moderate, Non-Very High hazard classes. The combination of the Adopted SRA FHSZ (hszs06_3_19) dated December 2007 and the "Recommended" FHSZ (c19fhszl06_5) dated June 2008 layer was used to get a complete coverage of Fire Hazards.

Analysis was performed using these two FHSZ datasets. LAUSD's facilities database, including information on building replacement values, was used as the basis for the inventory of all facilities within LAUSD. The County's Assessor's data and parcel layer was joined to the facilities database to obtain information on assessed land values and to create a parcel inventory of LAUSD properties. As previously described, CRVs were calculated and added to building replacement values and the assessed land values, to determine the overall potential values at risk. Using GIS, the parcel layer was overlaid on the Adopted and Recommended FHSZ layers. The parcel polygon was used to determine which FHSZ to assign to each parcel, and since it is possible for any given parcel to intersect with multiple FHSZs, for purposes of this analysis, the higher fire hazard severity zone was assigned to the polygon. Results are provided in this plan for LAUSD with analysis broken out by the six Local Districts, both in summary form and by site type. Appendix ?? includes additional details on the specific LAUSD facilities organized by site type for each of the six Local Districts.

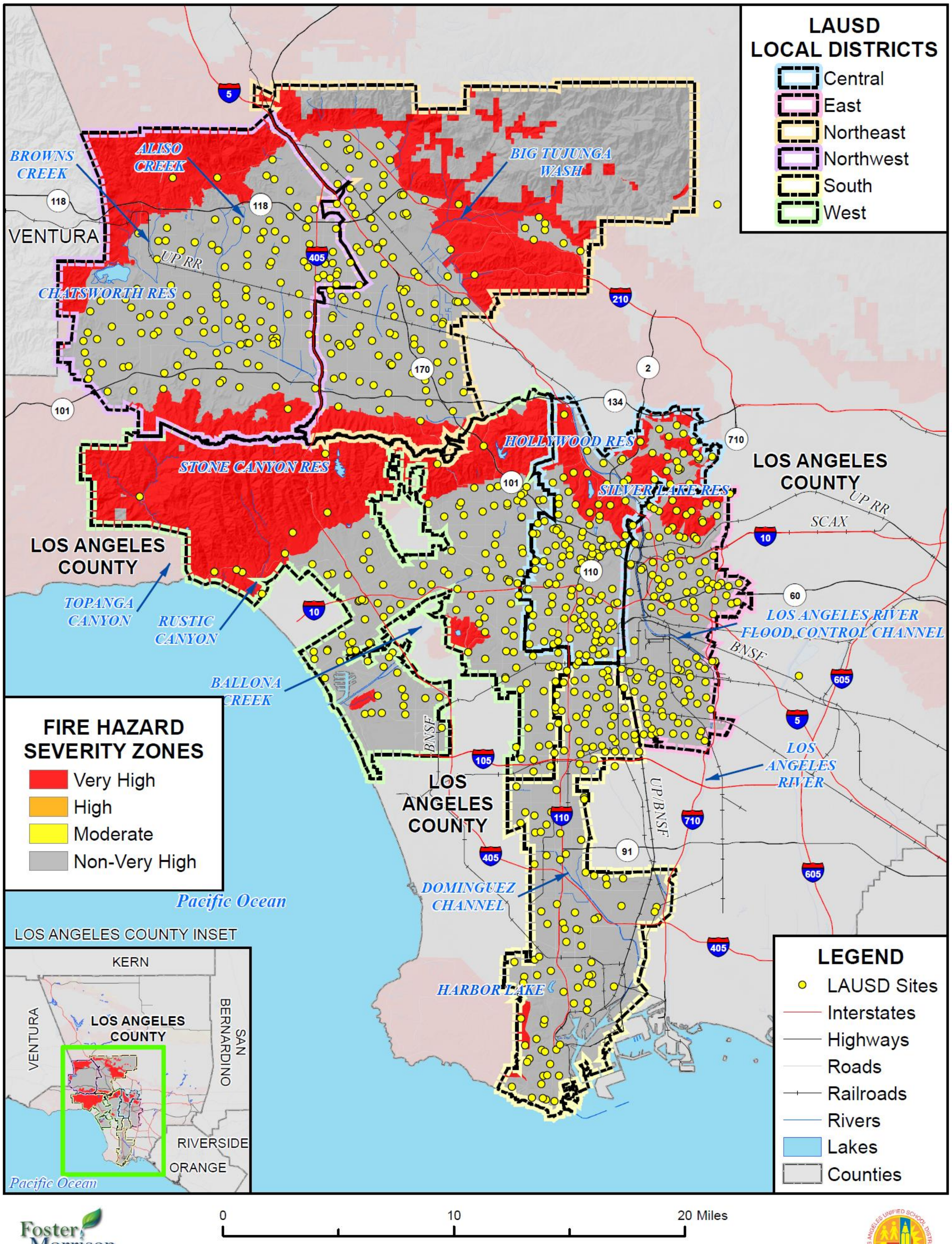
### Limitations

It should be noted that the resulting fire loss estimates may actually be more or less than that presented in the below tables. Depending on the magnitude of the fire, loss estimates may also be more or less than that presented in the below tables due to the varying impacts to land, structures, and their contents and therefore their respective values. Also, it is important to keep in mind that the assessed land value may be below the actual market value of improved parcels due to Proposition 13.

### Fire Hazard Severity Zones and Values at Risk

The Fire Hazard Severity Zones are shown in Figure 4-91. Analysis results for the LAUSD Planning Area is summarized in Table 4-149, which summarizes by total parcel counts, improved parcel counts, and their improved and land values and the estimated contents replacement values.

*Figure 4-91 LAUSD – Fire Hazard Severity Zones*




Data Source: CAL FIRE (Recommended LRA 6/2008 - c19fhszl06_5, Adopted SRA 12/2007 - fhszs06_3_19), LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

*Table 4-149 LAUSD – Local District Summary Values at Risk in Fire Hazard Severity Zones*

| Local District/Fire Hazard Severity Zones | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Inside Local District Areas | | | | | | |
| **Local District Central** | | | | | | |
| Very High | 43 | $5,631,171 | 292 | $416,233,228 | $416,233,228 | $838,097,626 |
| Non-Very High | 1,215 | $352,895,492 | 1,617 | $7,333,372,703 | $7,333,372,703 | $15,019,640,898 |
| **Central Total** | **1,258** | **$358,526,663** | **1,909** | **$7,749,605,930** | **$7,749,605,930** | **$15,857,738,524** |
| **Local District East** | | | | | | |
| Very High | 22 | $1,430,191 | 237 | $448,128,169 | $448,128,169 | $897,686,529 |
| Non-Very High | 992 | $84,385,525 | 2,146 | $4,643,475,603 | $4,643,475,603 | $9,371,336,731 |
| **East Total** | **1,014** | **$85,815,716** | **2,383** | **$5,091,603,772** | **$5,091,603,772** | **$10,269,023,260** |
| **Local District Northeast** | | | | | | |
| Very High | 6 | $951,687 | 106 | $121,707,736 | $121,707,736 | $244,367,159 |
| Non-Very High | 254 | $86,019,341 | 3,079 | $3,834,264,444 | $3,834,264,444 | $7,754,548,229 |
| **Northeast Total** | **260** | **$86,971,028** | **3,185** | **$3,955,972,180** | **$3,955,972,180** | **$7,998,915,388** |
| **Local District Northwest** | | | | | | |
| Very High | 3 | $512,134 | 66 | $88,501,307 | $88,501,307 | $177,514,749 |
| Non-Very High | 163 | $71,801,493 | 3,415 | $4,116,288,903 | $4,116,288,903 | $8,304,379,299 |
| **Northwest Total** | **166** | **$72,313,627** | **3,481** | **$4,204,790,211** | **$4,204,790,211** | **$8,481,894,048** |
| **Local District South** | | | | | | |
| Very High | 2 | $0 | 89 | $80,867,005 | $80,867,005 | $161,734,010 |
| Non-Very High | 553 | $87,272,189 | 2,766 | $4,562,051,486 | $4,562,051,486 | $9,211,375,161 |
| **South Total** | **555** | **$87,272,189** | **2,855** | **$4,642,918,491** | **$4,642,918,491** | **$9,373,109,170** |
| **Local District West** | | | | | | |
| Very High | 18 | $8,878,762 | 249 | $230,837,037 | $230,837,037 | $470,552,836 |
| Non-Very High | 450 | $185,683,370 | 2,460 | $4,462,392,288 | $4,462,392,288 | $9,110,467,946 |
| **West Total** | **468** | **$194,562,132** | **2,709** | **$4,693,229,325** | **$4,693,229,325** | **$9,581,020,782** |
| **Inside Total** | **3,721** | **$885,461,355** | **16,522** | **$30,338,119,909** | **$30,338,119,909** | **$61,561,701,173** |
| Outside of Local District Areas | | | | | | |
| Non-Very High | 7 | $6,025,565 | 25 | $251,772,284 | $251,772,284 | $509,570,132 |
| **Outside Total** | **7** | **$6,025,565** | **25** | **$251,772,284** | **$251,772,284** | **$509,570,132** |
| | | | | | | |
| **Grand Total** | **3,728** | **$891,486,920** | **16,547** | **$30,589,892,192** | **$30,589,892,192** | **$62,071,271,305** |

Source: CAL FIRE, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

Fire hazard severity zone maps and analysis were broken out for the LAUSD by Local District by site type. These maps show locations of the various types of fire hazard severity zones and facilities by Local District;

while the tables show the parcel counts, land values building counts, building replacement values, estimated contents values, and total values for the following Local Districts by site type:

- Central (Figure 4-92 and Table 4-150)

East (Source: CAL FIRE, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

- Figure 4-93 and Table 4-151)

Northeast (Source: CAL FIRE, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

- Figure 4-94 and Table 4-152)

Northwest (Source: CAL FIRE, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

- Figure 4-95 and Table 4-153)

South (Source: CAL FIRE, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

- Figure 4-96 and Table 4-154)

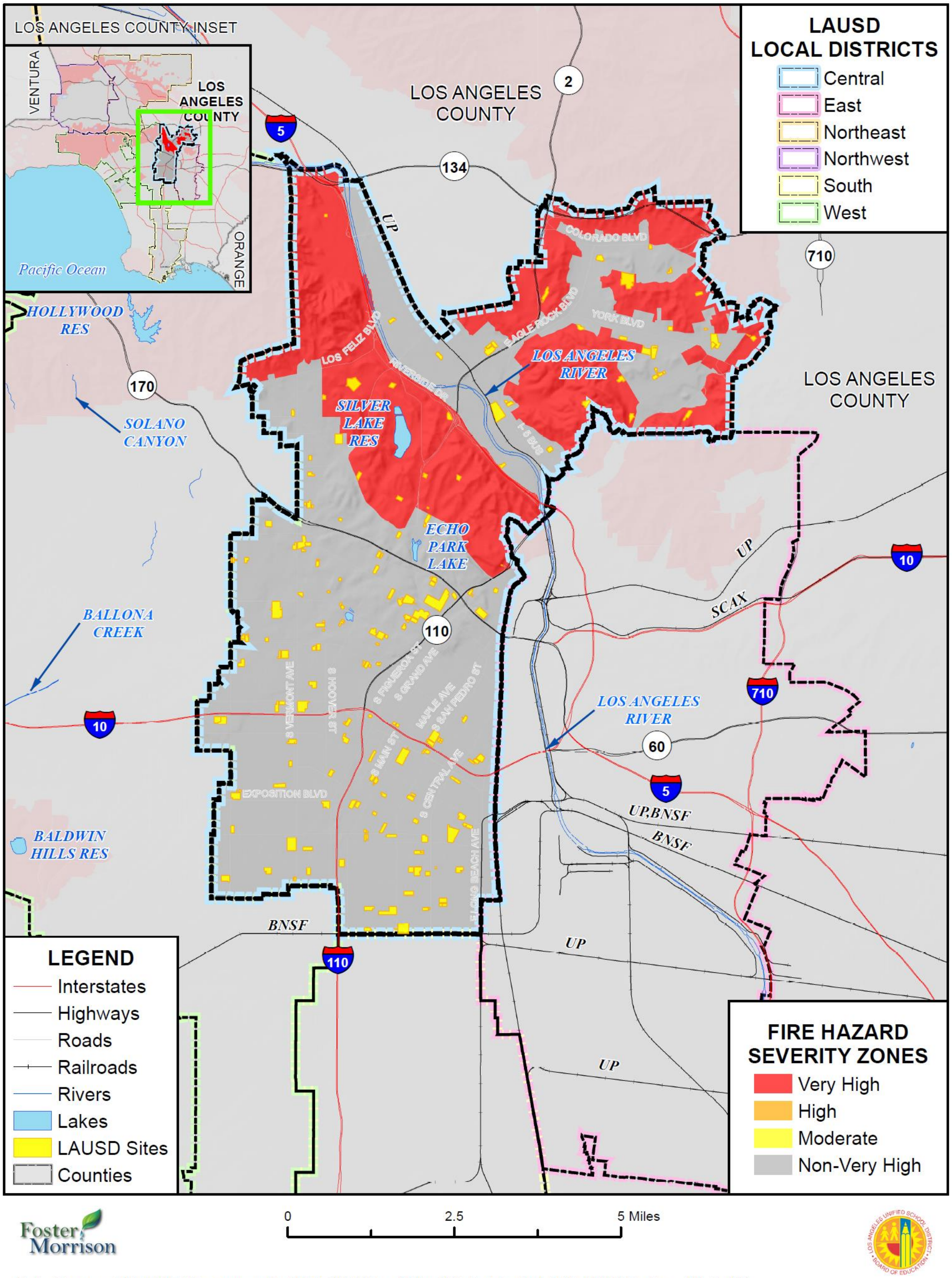
West (Source: CAL FIRE, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

- Figure 4-97 and Table 4-155)

Outside of Local District Areas (Source: CAL FIRE, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

- Table 4-156)

*Figure 4-92 LAUSD – Local District Central Fire Hazard Severity Zones*



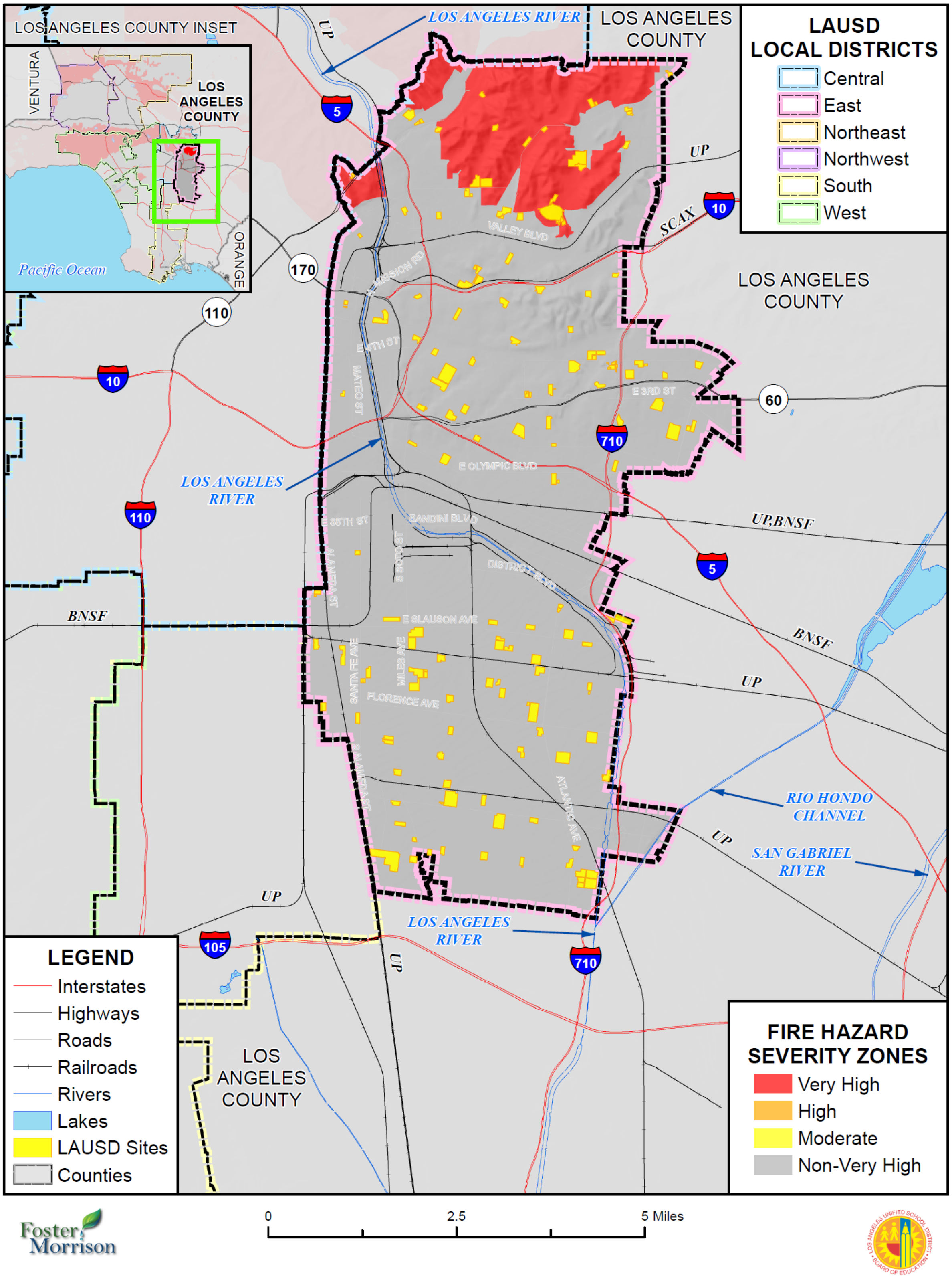

Data Source: CAL FIRE (Recommended LRA 6/2008 - c19fhszl06_5, Adopted SRA 12/2007 - fhszs06_3_19), LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

*Table 4-150 LAUSD – Local District Central Values at Risk by Site Type*

| Fire Hazard Severity Zones / Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Very High | | | | | | |
| Early Education Center | 1 | $44,185 | 1 | $14,500 | $14,500 | $73,184 |
| Elementary School | 33 | $3,246,035 | 177 | $196,851,623 | $196,851,623 | $396,949,280 |
| Senior High School | 8 | $2,225,672 | 97 | $209,542,786 | $209,542,786 | $421,311,245 |
| Span Middle School (i.e. Grades K-8) | 1 | $115,279 | 17 | $9,824,319 | $9,824,319 | $19,763,917 |
| **Very High Total** | **43** | **$5,631,171** | **292** | **$416,233,228** | **$416,233,228** | **$838,097,626** |
| Non-Very High | | | | | | |
| Admin Facility | 15 | $8,872,068 | 36 | $1,972,164,776 | $1,972,164,776 | $3,953,201,621 |
| Adult Education Facility | 5 | $1,896,367 | 32 | $251,887,155 | $251,887,155 | $505,670,676 |
| Charter School | 23 | $2,691,373 | 7 | $43,573,968 | $43,573,968 | $89,839,310 |
| Continuation High School | 1 | $0 | 9 | $20,410,184 | $20,410,184 | $40,820,369 |
| Currently a Closed School | 6 | $236,076 | 7 | $8,655,330 | $8,655,330 | $17,546,735 |
| Early Education Center | 14 | $424,232 | 19 | $9,453,947 | $9,453,947 | $19,332,126 |
| Elementary School | 627 | $89,868,927 | 862 | $2,199,471,698 | $2,199,471,698 | $4,488,812,322 |
| Middle School | 203 | $43,945,746 | 234 | $873,988,910 | $873,988,910 | $1,791,923,565 |
| Senior High School | 288 | $201,803,971 | 296 | $1,752,296,303 | $1,752,296,303 | $3,706,396,577 |
| Span High School (i.e. Grades K-12) | 8 | $1,397,102 | 65 | $108,594,905 | $108,594,905 | $218,586,912 |
| Span Middle School (i.e. Grades K-8) | 20 | $845,723 | 28 | $39,512,389 | $39,512,389 | $79,870,502 |
| Special Education Center | 5 | $913,907 | 22 | $53,363,138 | $53,363,138 | $107,640,182 |
| **Non-Very High Total** | **1,215** | **$352,895,492** | **1,617** | **$7,333,372,703** | **$7,333,372,703** | **$15,019,640,898** |
| **Central Total** | **1,258** | **$358,526,663** | **1,909** | **$7,749,605,930** | **$7,749,605,930** | **$15,857,738,524** |

Source: CAL FIRE, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

*Figure 4-93 LAUSD – Local District East Fire Hazard Severity Zones*



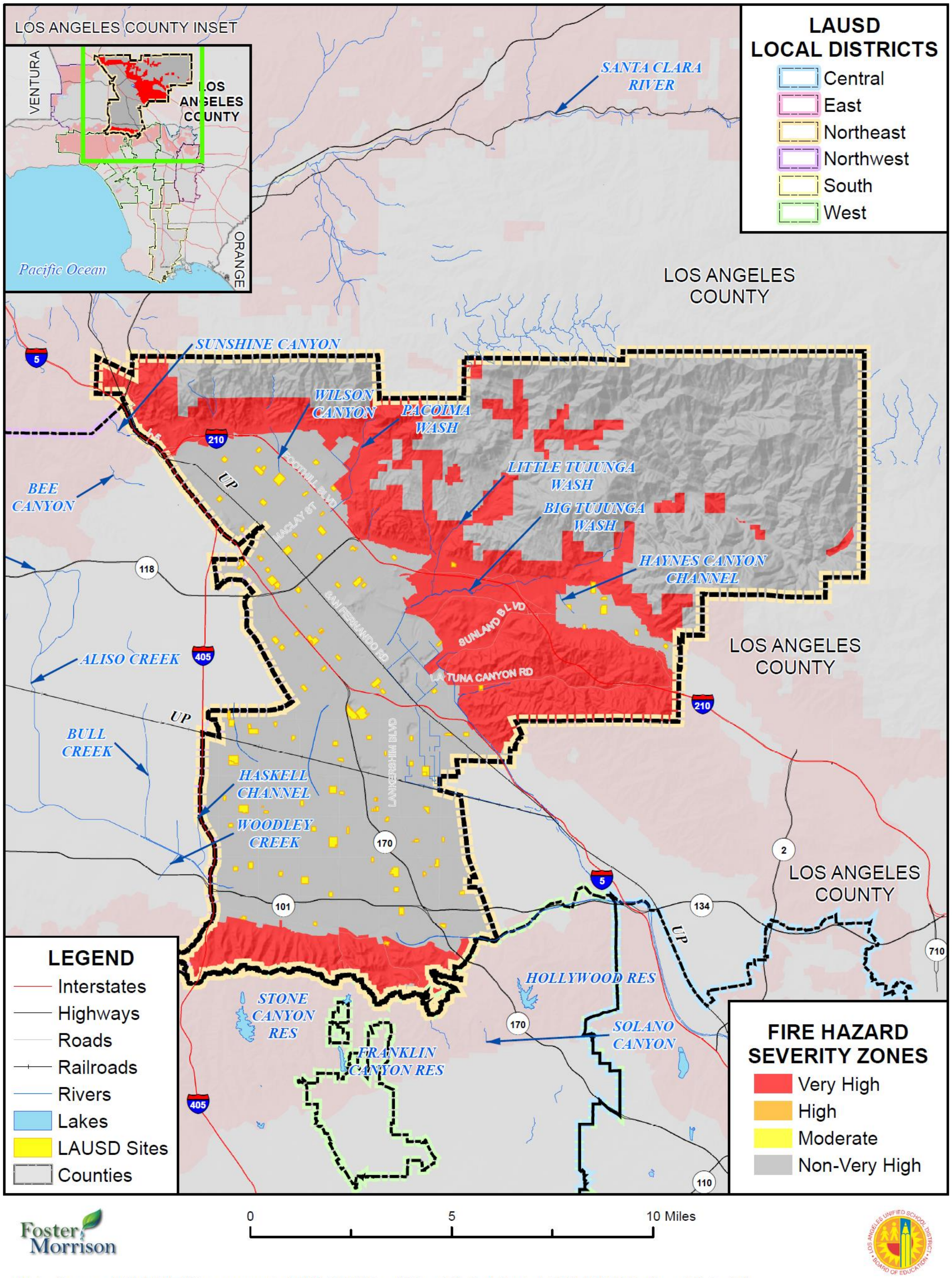

Data Source: CAL FIRE (Recommended LRA 6/2008 - c19fhszl06_5, Adopted SRA 12/2007 - fhszs06_3_19), LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

## *Table 4-151 LAUSD – Local District East Values at Risk by Site Type*

| Fire Hazard Severity Zones / Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Very High | | | | | | |
| Admin Facility | 5 | $215,741 | 7 | $12,778,347 | $12,778,347 | $25,772,434 |
| Elementary School | 9 | $624,714 | 89 | $116,165,369 | $116,165,369 | $232,955,452 |
| Middle School | 1 | $257,928 | 54 | $82,958,811 | $82,958,811 | $166,175,549 |
| Senior High School | 7 | $331,808 | 87 | $236,225,643 | $236,225,643 | $472,783,093 |
| **Very High Total** | **22** | **$1,430,191** | **237** | **$448,128,169** | **$448,128,169** | **$897,686,529** |
| Non-Very High | | | | | | |
| Admin Facility | 7 | $1,481,156 | 40 | $127,587,395 | $127,587,395 | $256,655,946 |
| Adult Education Facility | 3 | $752,102 | 60 | $84,433,230 | $84,433,230 | $169,618,562 |
| Continuation High School | 1 | $0 | 7 | $6,199,487 | $6,199,487 | $12,398,974 |
| Elementary School | 614 | $44,981,493 | 1,225 | $2,213,409,067 | $2,213,409,067 | $4,471,799,628 |
| Middle School | 83 | $5,967,913 | 313 | $691,531,943 | $691,531,943 | $1,389,031,799 |
| Senior High School | 268 | $29,159,620 | 426 | $1,407,909,853 | $1,407,909,853 | $2,844,979,326 |
| Span High School (i.e. Grades K-12) | 14 | $1,480,933 | 62 | $66,133,229 | $66,133,229 | $133,747,391 |
| Special Education Center | 2 | $562,308 | 13 | $46,271,398 | $46,271,398 | $93,105,105 |
| **Non-Very High Total** | **992** | **$84,385,525** | **2,146** | **$4,643,475,603** | **$4,643,475,603** | **$9,371,336,731** |
| **East Total** | **1,014** | **$85,815,716** | **2,383** | **$5,091,603,772** | **$5,091,603,772** | **$10,269,023,260** |

Source: CAL FIRE, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

*Figure 4-94 LAUSD – Local District Northeast Fire Hazard Severity Zones*



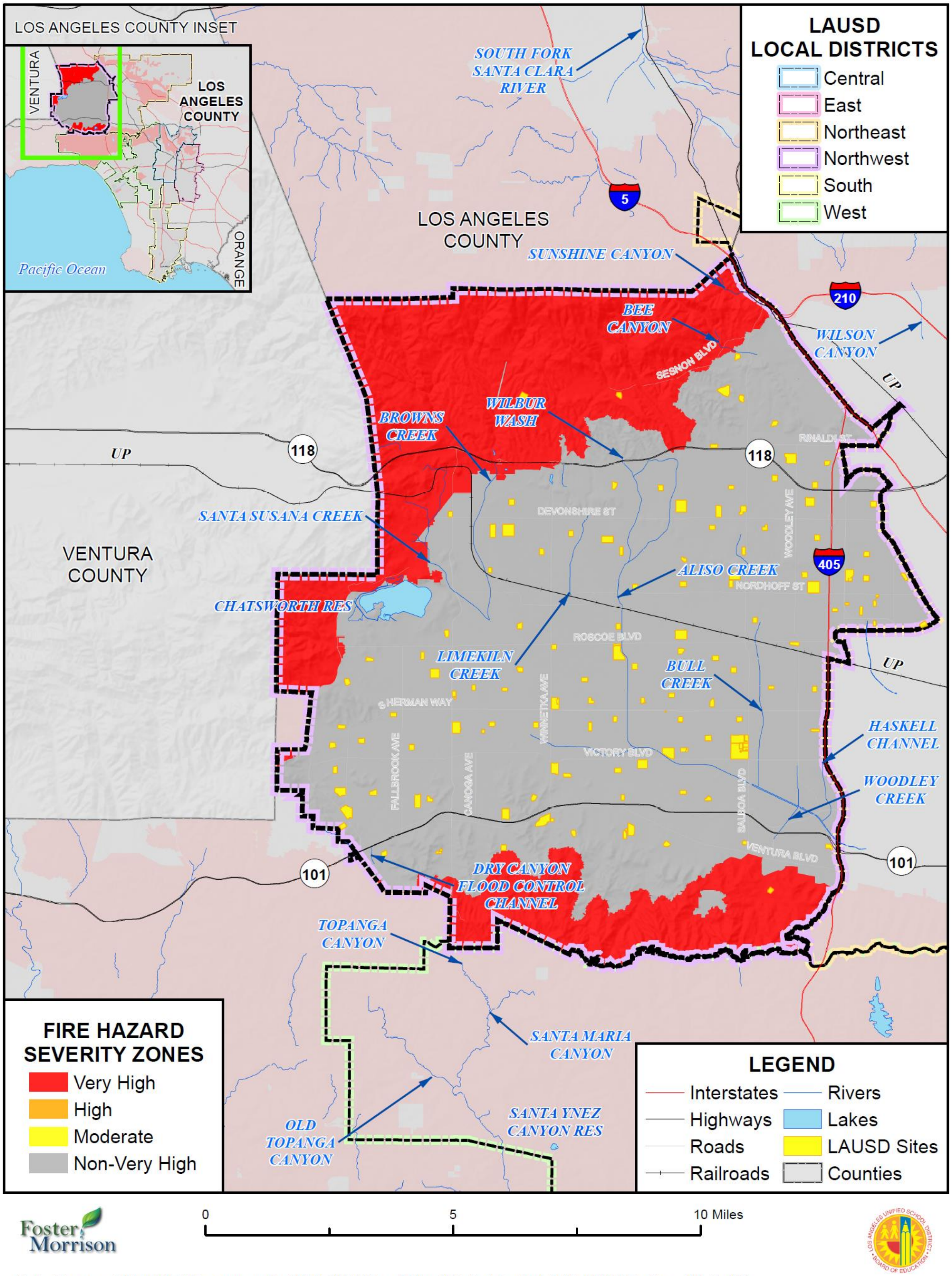

Data Source: CAL FIRE (Recommended LRA 6/2008 - c19fhszl06_5, Adopted SRA 12/2007 - fhszs06_3_19), LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

*Table 4-152 LAUSD – Local District Northeast Values at Risk by Site Type*

| Fire Hazard Severity Zones / Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Very High | | | | | | |
| Elementary School | 4 | $651,965 | 73 | $56,660,352 | $56,660,352 | $113,972,669 |
| Middle School | 2 | $299,722 | 33 | $65,047,384 | $65,047,384 | $130,394,491 |
| **Very High Total** | **6** | **$951,687** | **106** | **$121,707,736** | **$121,707,736** | **$244,367,159** |
| Non-Very High | | | | | | |
| Admin Facility | 6 | $1,307,581 | 36 | $21,067,878 | $21,067,878 | $43,443,337 |
| Adult Education Facility | 2 | $156,899 | 47 | $35,642,716 | $35,642,716 | $71,442,331 |
| Charter School | 4 | $519,256 | 115 | $53,190,070 | $53,190,070 | $106,899,396 |
| Community Day School | 1 | $21,532 | 2 | $466,236 | $466,236 | $954,005 |
| Continuation High School | 2 | $46,847 | 4 | $1,843,111 | $1,843,111 | $3,733,070 |
| Early Education Center | 2 | $49,926 | 8 | $6,577,296 | $6,577,296 | $13,204,518 |
| Elementary School | 153 | $22,087,941 | 1,752 | $1,556,983,562 | $1,556,983,562 | $3,136,055,066 |
| Middle School | 34 | $23,720,708 | 437 | $809,369,153 | $809,369,153 | $1,642,459,015 |
| Senior High School | 49 | $37,929,328 | 656 | $1,324,224,860 | $1,324,224,860 | $2,686,379,047 |
| Special Education Center | 1 | $179,323 | 22 | $24,899,561 | $24,899,561 | $49,978,445 |
| **Non-Very High Total** | **254** | **$86,019,341** | **3,079** | **$3,834,264,444** | **$3,834,264,444** | **$7,754,548,229** |
| **Northeast Total** | **260** | **$86,971,028** | **3,185** | **$3,955,972,180** | **$3,955,972,180** | **$7,998,915,388** |

Source: CAL FIRE, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

*Figure 4-95 LAUSD – Local District Northwest Fire Hazard Severity Zones*



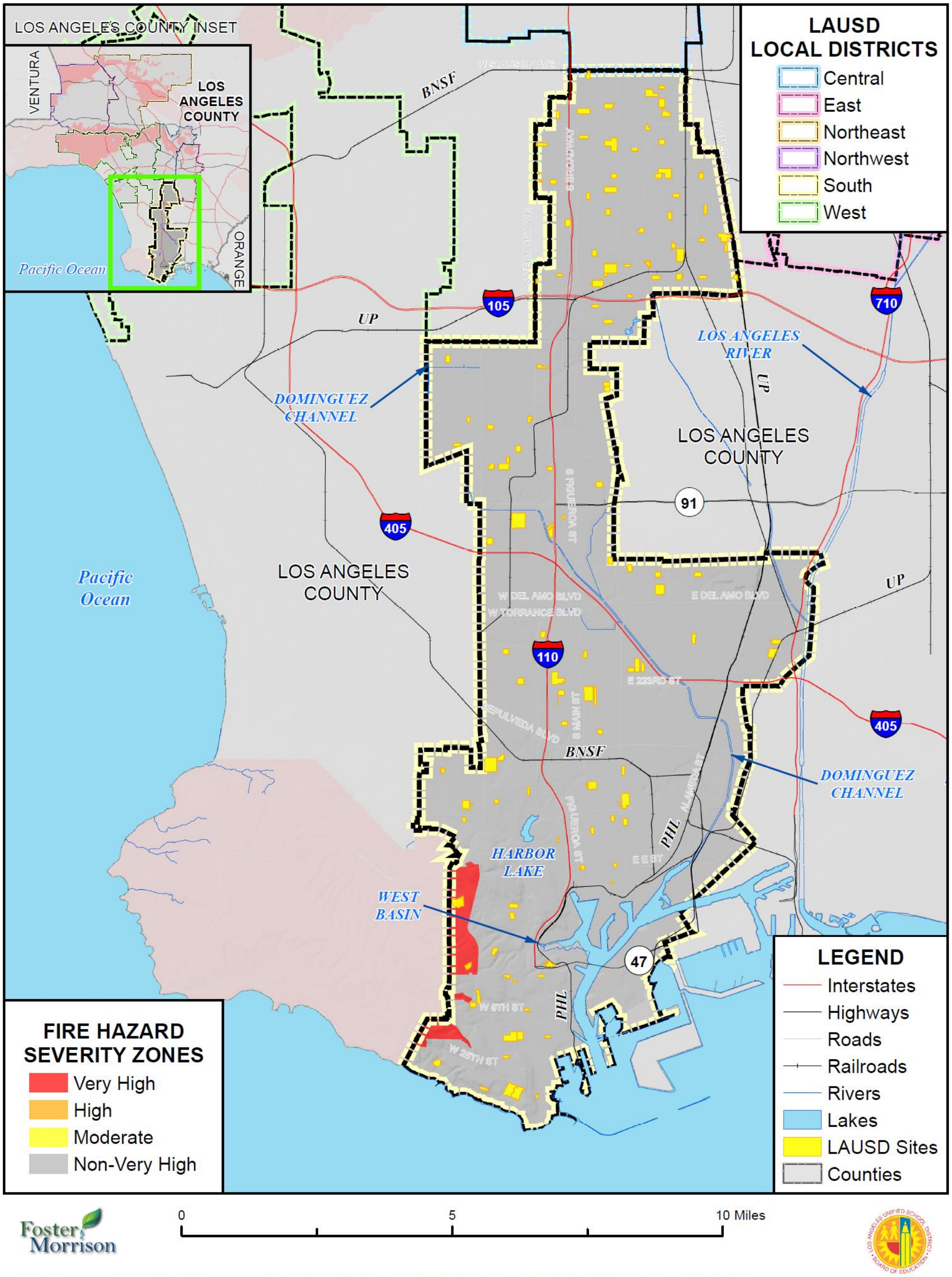

Data Source: CAL FIRE (Recommended LRA 6/2008 - c19fhszl06_5, Adopted SRA 12/2007 - fhszs06_3_19), LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

*Table 4-153 LAUSD – Local District West Values at Risk by Site Type*

| Fire Hazard Severity Zones / Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Very High | | | | | | |
| Elementary School | 3 | $512,134 | 66 | $88,501,307 | $88,501,307 | $177,514,749 |
| **Very High Total** | **3** | **$512,134** | **66** | **$88,501,307** | **$88,501,307** | **$177,514,749** |
| Non-Very High | | | | | | |
| Admin Facility | 6 | $1,238,978 | 58 | $93,175,364 | $93,175,364 | $187,589,706 |
| Adult Education Facility | 3 | $1,594,627 | 112 | $96,247,597 | $96,247,597 | $194,089,821 |
| Charter School | 5 | $7,738,031 | 165 | $249,309,542 | $249,309,542 | $506,357,115 |
| Continuation High School | 2 | $368,630 | 21 | $6,170,822 | $6,170,822 | $12,710,274 |
| Currently a Closed School | 5 | $2,242,855 | 91 | $73,354,713 | $73,354,713 | $148,952,282 |
| Elementary School | 104 | $26,111,592 | 1,787 | $1,513,860,659 | $1,513,860,659 | $3,053,832,910 |
| Middle School | 15 | $13,222,980 | 501 | $955,855,203 | $955,855,203 | $1,924,933,385 |
| Senior High School | 18 | $16,129,606 | 552 | $983,400,901 | $983,400,901 | $1,982,931,408 |
| Span High School (i.e. Grades K-12) | 2 | $2,073,119 | 73 | $80,414,559 | $80,414,559 | $162,902,238 |
| Special Education Center | 3 | $1,081,075 | 55 | $64,499,543 | $64,499,543 | $130,080,161 |
| **Non-Very High Total** | **163** | **$71,801,493** | **3,415** | **$4,116,288,903** | **$4,116,288,903** | **$8,304,379,299** |
| **Northwest Total** | **166** | **$72,313,627** | **3,481** | **$4,204,790,211** | **$4,204,790,211** | **$8,481,894,048** |

Source: CAL FIRE, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

*Figure 4-96 LAUSD – Local District South Fire Hazard Severity Zones*



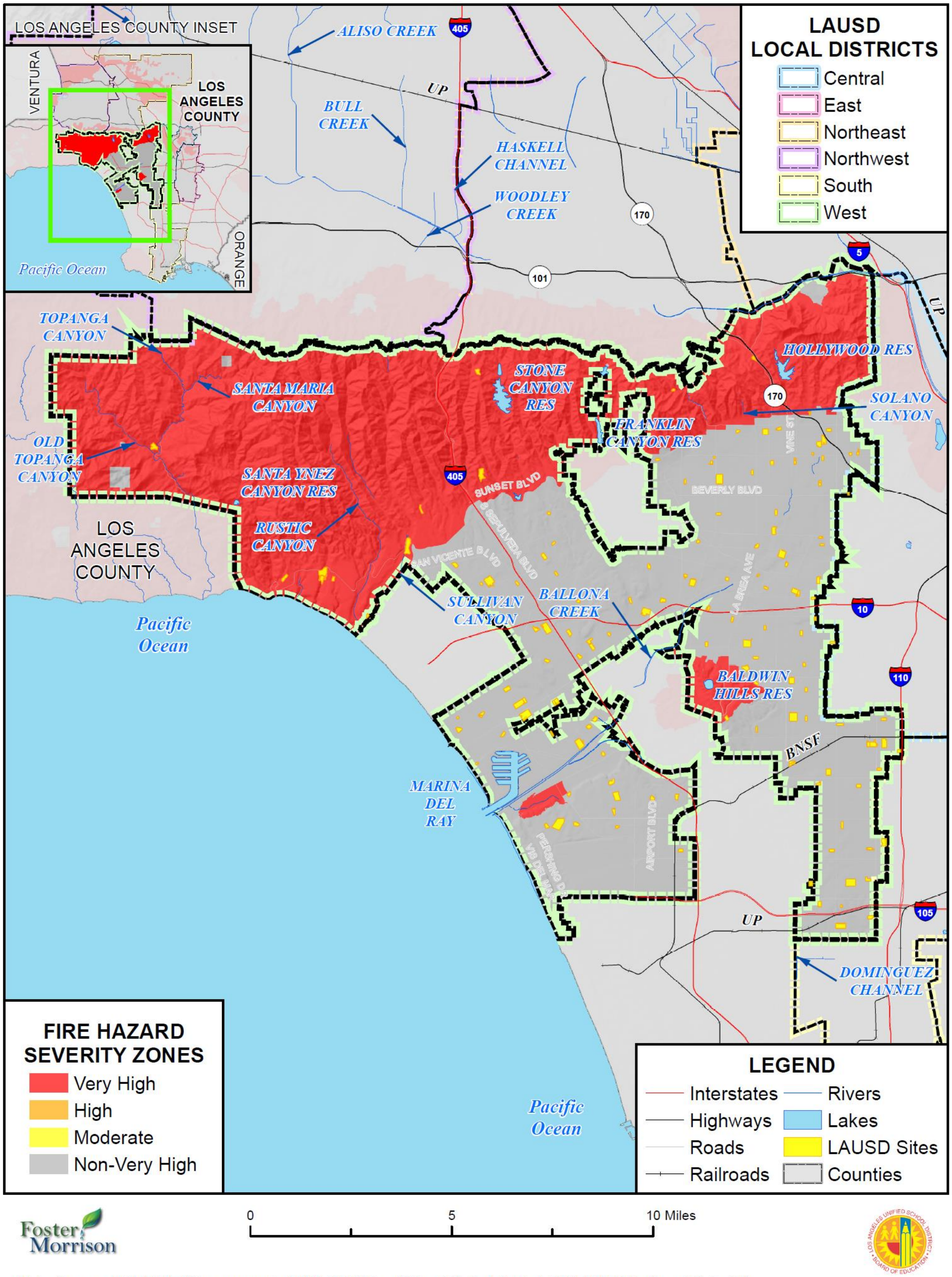

Data Source: CAL FIRE (Recommended LRA 6/2008 - c19fhszl06_5, Adopted SRA 12/2007 - fhszs06_3_19), LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

***Table 4-154 LAUSD – Local District South Values at Risk by Site Type***

| Fire Hazard Severity Zones / Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| **Very High** | | | | | | |
| Elementary School | 1 | $0 | 36 | $16,787,862 | $16,787,862 | $33,575,725 |
| Middle School | 1 | $0 | 53 | $64,079,143 | $64,079,143 | $128,158,285 |
| **Very High Total** | **2** | **$0** | **89** | **$80,867,005** | **$80,867,005** | **$161,734,010** |
| **Non-Very High** | | | | | | |
| Admin Facility | 6 | $779,044 | 12 | $21,083,165 | $21,083,165 | $42,945,374 |
| Adult Education Facility | 31 | $1,739,597 | 54 | $85,949,987 | $85,949,987 | $173,639,570 |
| Charter School | 11 | $794,745 | 28 | $69,236,652 | $69,236,652 | $139,268,050 |
| Community Day School | 1 | $488,024 | 21 | $3,893,022 | $3,893,022 | $8,274,069 |
| CTR | 1 | $22,538 | 3 | $1,126,899 | $1,126,899 | $2,276,336 |
| Elementary School | 308 | $40,063,973 | 1,582 | $2,150,033,939 | $2,150,033,939 | $4,340,131,851 |
| Middle School | 57 | $18,960,190 | 475 | $868,558,550 | $868,558,550 | $1,756,077,290 |
| Senior High School | 120 | $22,634,376 | 506 | $1,243,790,184 | $1,243,790,184 | $2,510,214,745 |
| Span Middle School (i.e. Grades K-8) | 5 | $281,124 | 32 | $25,612,594 | $25,612,594 | $51,506,311 |
| Special Education Center | 13 | $1,508,578 | 53 | $92,766,493 | $92,766,493 | $187,041,565 |
| **Non-Very High Total** | **553** | **$87,272,189** | **2,766** | **$4,562,051,486** | **$4,562,051,486** | **$9,211,375,161** |
| **South Total** | **555** | **$87,272,189** | **2,855** | **$4,642,918,491** | **$4,642,918,491** | **$9,373,109,170** |

Source: CAL FIRE, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

*Figure 4-97 LAUSD – Local District West Fire Hazard Severity Zones*




Data Source: CAL FIRE (Recommended LRA 6/2008 - c19fhszl06_5, Adopted SRA 12/2007 - fhszs06_3_19), LAUSD, Los Angeles County GIS, Cal-Atlas; Map Date: 01/2018.

*Table 4-155 LAUSD – Local District West Values at Risk by Site Type*

| Fire Hazard Severity Zones / Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Very High | | | | | | |
| Charter School | 3 | $1,448,571 | 21 | $10,899,892 | $10,899,892 | $23,248,356 |
| Elementary School | 14 | $5,016,109 | 172 | $151,023,931 | $151,023,931 | $307,063,971 |
| Middle School | 1 | $2,414,082 | 56 | $68,913,213 | $68,913,213 | $140,240,509 |
| **Very High Total** | **18** | **$8,878,762** | **249** | **$230,837,037** | **$230,837,037** | **$470,552,836** |
| Non-Very High | | | | | | |
| Admin Facility | 5 | $1,124,397 | 23 | $102,163,062 | $102,163,062 | $205,450,521 |
| Adult Education Facility | 2 | $464,318 | 14 | $20,560,827 | $20,560,827 | $41,585,973 |
| Charter School | 10 | $1,174,320 | 39 | $27,395,224 | $27,395,224 | $55,964,768 |
| Community Day School | 1 | $340,696 | 5 | $2,190,247 | $2,190,247 | $4,721,189 |
| Continuation High School | 1 | $25,486 | 2 | $977,394 | $977,394 | $1,980,273 |
| Currently a Closed School | 1 | $0 | 11 | $6,452,672 | $6,452,672 | $12,905,345 |
| Early Education Center | 2 | $515,658 | 13 | $7,836,983 | $7,836,983 | $16,189,623 |
| Elementary School | 251 | $68,025,977 | 1,458 | $1,908,884,508 | $1,908,884,508 | $3,885,794,992 |
| Middle School | 28 | $30,607,555 | 421 | $963,621,309 | $963,621,309 | $1,957,850,174 |
| Senior High School | 144 | $80,825,582 | 429 | $1,342,968,906 | $1,342,968,906 | $2,766,763,394 |
| Span Middle School (i.e. Grades K-8) | 3 | $1,991,202 | 24 | $19,568,043 | $19,568,043 | $41,127,288 |
| Special Education Center | 2 | $588,179 | 21 | $59,773,113 | $59,773,113 | $120,134,405 |
| **Non-Very High Total** | **450** | **$185,683,370** | **2,460** | **$4,462,392,288** | **$4,462,392,288** | **$9,110,467,946** |
| **West Total** | **468** | **$194,562,132** | **2,709** | **$4,693,229,325** | **$4,693,229,325** | **$9,581,020,782** |

Source: CAL FIRE, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

*Table 4-156 LAUSD – Outside Local District Areas Values at Risk by Site Type*

| Fire Hazard Severity Zones / Site Type | Total Parcel Count | Total Assessed Land Value | Total Building Count | Total Building Replacement Value | Estimated Contents Value | Total Value |
|---|---|---|---|---|---|---|
| Non-Very High | | | | | | |
| Admin Facility | 1 | $6,025,565 | 1 | $149,306,997 | $149,306,997 | $304,639,558 |
| Senior High School | 6 | $0 | 24 | $102,465,287 | $102,465,287 | $204,930,574 |
| **Outside Areas Total** | **7** | **$6,025,565** | **25** | **$251,772,284** | **$251,772,284** | **$509,570,132** |

Source: CAL FIRE, Los Angeles County GIS, LAUSD Facility Database, Los Angeles County 2016 Parcel/Assessor's Data

## *Population at Risk*

A separate analysis was performed to determine the LAUSD populations (enrollments) in flood zones. Using GIS, the CAL FIRE Fire Hazard Severity Zone dataset was overlayed on the LAUSD facility layer.

Enrollment counts by facility were provided by LAUSD. Results were tabulated and are shown in Table 4-157.

*Table 4-157 LAUSD – Total Enrollment at Risk by Fire Hazard Severity by Local District*

| Jurisdiction | Total Enrollment |
|---|---|
| Inside Local District Areas | |
| Central – Very High | 9,723 |
| Central – Non-Very High | 69,142 |
| **Central Total** | **78,865** |
| East – Very High | 4,517 |
| East – Non-Very High | 73,578 |
| **East Total** | **78,095** |
| Northeast – Very High | 2,083 |
| Northeast – Non-Very High | 69,341 |
| **Northeast Total** | **71,424** |
| Northwest – Very High | 2,490 |
| Northwest – Non-Very High | 78,440 |
| **Northwest Total** | 80,930 |
| South – Very High | 2,138 |
| South – Non-Very High | 77,356 |
| **South Total** | **79,494** |
| West – Very High | 6,390 |
| West – Non-Very High | 67,512 |
| **West Total** | **73,902** |
| **Inside Areas Total** | **462,710** |
| Outside of Local District Areas | |
| Non-Very High | 1,586 |
| **Outside Areas Total** | **1,586** |
| | |
| **Grand Total** | **464,296** |

Source: CAL FIRE; LAUSD

To give further detail on populations of enrolled students in the fire hazard severity zones, enrolled populations in fire hazard severity zones were broken out by Local Districts. This can be seen for the Central (Table 4-158), East (Table 4-159), Northeast (Table 4-160), Northwest (Table 4-161), South (Table 4-162), West (Table 4-163), and outside Local District (Table 4-164).

*Table 4-158 LAUSD – Local District Central Enrollment at Risk by Fire Hazard Severity Zone and Site Type*

| Site Type | Total Enrollment |
|---|---|
| Very High | |
| Early Education Center | 0 |
| Elementary School | 4,430 |
| Senior High School | 4,735 |
| Span Middle School (i.e. Grades K-8) | 558 |
| **Very High Total** | **9,723** |
| Non-Very High | |
| Admin Facility | 0 |
| Adult Education Facility | 0 |
| Charter School | **0** |
| Continuation High School | 52 |
| Currently a Closed School | 0 |
| Early Education Center | 0 |
| Elementary School | 39,873 |
| Middle School | 12,174 |
| Senior High School | 13,274 |
| Span High School (i.e. Grades K-12) | 2,950 |
| Span Middle School (i.e. Grades K-8) | 387 |
| Special Education Center | 432 |
| Non-Very High Total | **69,142** |
| | |
| **Central Grand Total** | **78,865** |

Source: CAL FIRE; LAUSD

*Table 4-159 LAUSD – Local District East Enrollment a at Risk by Fire Hazard Severity Zone and Site Type*

| Site Type | Total Enrollment |
|---|---|
| Very High | |
| Admin Facility | 0 |
| Elementary School | 1,744 |
| Middle School | 1,156 |
| Senior High School | 1,617 |
| **Very High Total** | **4,517** |
| Non-Very High | |
| Admin Facility | 0 |

| Site Type | Total Enrollment |
|---|---|
| Adult Education Facility | 0 |
| Continuation High School | 0 |
| Elementary School | 42,080 |
| Middle School | 11,594 |
| Senior High School | 17,837 |
| Span High School (i.e. Grades K-12) | 1,777 |
| Special Education Center | 290 |
| Non-Very High Total | **73,578** |
| | |
| **East Grand Total** | **78,095** |

Source: CAL FIRE; LAUSD

### *Table 4-160 LAUSD – Local District Northeast Enrollment at Risk by Fire Hazard Severity Zone and Site Type*

| Site Type | Total Enrollment |
|---|---|
| Very High | |
| Elementary School | 1,314 |
| Middle School | 769 |
| **Very High Total** | **2,083** |
| Non-Very High | |
| Admin Facility | 0 |
| Adult Education Facility | 0 |
| Charter School | **0** |
| Community Day School | **0** |
| Continuation High School | 0 |
| Early Education Center | 0 |
| Elementary School | 36,708 |
| Middle School | 13,298 |
| Senior High School | 19,208 |
| Special Education Center | 127 |
| **Non-Very High Total** | **69,341** |
| | |
| **Northeast Grand Total** | **71,424** |

Source: CAL FIRE; LAUSD

*Table 4-161 LAUSD – Local District Northwest Enrollment at Risk by Fire Hazard Severity Zone and Site Type*

| Site Type | Total Enrollment |
|---|---|
| Very High | |
| Elementary School | 2,490 |
| **Very High Total** | **2,490** |
| Non-Very High | |
| Admin Facility | 0 |
| Adult Education Facility | 0 |
| Charter School | 0 |
| Continuation High School | 0 |
| Currently a Closed School | 0 |
| Elementary School | 38,561 |
| Middle School | 19,192 |
| Senior High School | 17,439 |
| Span High School (i.e. Grades K-12) | 2,679 |
| Special Education Center | 569 |
| **Non-Very High Total** | **78,440** |
| | |
| **Northwest Grand Total** | **78,865** |

Source: CAL FIRE; LAUSD

*Table 4-162 LAUSD – Local District South Enrollment at Risk by Fire Hazard Severity Zone and Site Type*

| Site Type | Total Enrollment |
|---|---|
| Very High | |
| Elementary School | 408 |
| Middle School | 1,730 |
| **Very High Total** | **2,138** |
| Non-Very High | |
| Admin Facility | 0 |
| Adult Education Facility | 0 |
| Charter School | 0 |
| Community Day School | 0 |
| CTR | 0 |
| Elementary School | 47,943 |
| Middle School | 14,375 |
| Senior High School | 13,739 |

| Site Type | Total Enrollment |
|---|---|
| Span Middle School (i.e. Grades K-8) | 935 |
| Special Education Center | 364 |
| Non-Very High Total | 77,356 |
| | |
| **South Grand Total** | **78,865** |

Source: CAL FIRE; LAUSD

### *Table 4-163 LAUSD – Local District West Enrollment at Risk by Fire Hazard Severity Zone and Site Type*

| Site Type | Total Enrollment |
|---|---|
| Very High | |
| Charter School | 0 |
| Elementary School | 4,249 |
| Middle School | 2,141 |
| **Very High Total** | **6,390** |
| Non-Very High | |
| Admin Facility | - |
| Adult Education Facility | - |
| Charter School | 617 |
| Community Day School | - |
| Continuation High School | - |
| Currently a Closed School | - |
| Early Education Center | - |
| Elementary School | 38,300 |
| Middle School | 11,254 |
| Senior High School | 16,449 |
| Span Middle School (i.e. Grades K-8) | 634 |
| Special Education Center | 258 |
| Non-Very High Total | 67,512 |
| | |
| **West Grand Total** | **73,902** |

Source: CAL FIRE; LAUSD

*Table 4-164 LAUSD – Outside Local District Enrollment at Risk by Fire Hazard Severity Zone and Site Type*

| Site Type | Total Enrollment |
|---|---|
| Non-Very High | |
| Admin Facility | 0 |
| Senior High School | 1,586 |
| **Non-Very High Total** | **1,586** |
| | |
| **Outside Areas Grand Total** | **1,586** |

Source: CAL FIRE; LAUSD

### *Overall District Impacts*

The overall impact to the from a severe wildfire includes:

- Injury and loss of life;
- Commercial and residential structural and property damage;
- Decreased water quality in area watersheds;
- Increase in post-fire hazards such as flooding, sedimentation, and debris flows/mudslides;
- Damage to natural resource habitats and other resources, such as crops, timber and rangelands;
- Loss of water, power, roads, phones, and transportation, which could impact, strand, and/or impair mobility for emergency responders and/or area residents;
- Economic losses (jobs, sales, tax revenue) associated with loss of commercial structures;
- Negative impact on commercial and residential property values;
- Loss of churches, which could severely impact the social fabric of the community;
- Loss of schools, which could severely impact the entire school system and disrupt families and teachers, as temporary facilities and relocations would likely be needed; and
- Impact on the overall mental health of the community.

### *Future Development*

IS FUTURE GROWTH PLANNED IN WILDFIRE AREAS? HOW WILL IT/ IS IT BE MITIGATED?

## 4.4 Capability Assessment

Thus far, the planning process has identified the natural hazards posing a threat to the LAUSD Planning Area and described, in general, the vulnerability of the District to these risks. The next step is to assess what loss prevention mechanisms are already in place. This part of the planning process is the mitigation capability assessment. Combining the risk assessment with the mitigation capability assessment results in the District's net vulnerability to disasters, and more accurately focuses the goals, objectives, and proposed actions of this plan.

The HMPC used a two-step approach to conduct this assessment for the District. First, an inventory of common mitigation activities was made through the use of a matrix. The purpose of this effort was to identify policies and programs that were either in place, needed improvement, or could be undertaken if deemed appropriate. Second, the HMPC conducted an inventory and review of existing policies, regulations, plans, and programs to determine if they contributed to reducing hazard-related losses or if they inadvertently contributed to increasing such losses.

This section presents the District's mitigation capabilities and discusses select state and federal mitigation resources that are applicable to the District. These are in addition to, and supplement, the many plans, reports, and technical information reviewed and used for this LHMP Update as identified in Chapters 3 and in Chapter 4.

Similar to the HMPC's effort to describe hazards, risks, and vulnerability of the District, this mitigation capability assessment describes the District's existing capabilities, programs, and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This assessment is divided into four sections: regulatory mitigation capabilities are discussed in Section 4.4.1; administrative and technical mitigation capabilities are discussed in Section 4.4.2; fiscal mitigation capabilities are discussed in Section 4.4.3; and mitigation education, outreach, and partnerships are discussed in Section 4.4.4. A discussion of other mitigation efforts follows in Section 4.4.5.

## 4.4.1. LAUSD's Regulatory Mitigation Capabilities

Table 4-165 lists planning and land management tools typically used by LAUSD to implement hazard mitigation activities and indicates those that are in place in the District. Excerpts from applicable policies, regulations, and plans and program descriptions follow to provide more detail on existing mitigation capabilities. FILL OUT REMAINDER OF TABLE.

*Table 4-165 LAUSD's Regulatory Mitigation Capabilities*

| Plans | Y/N Year | Does the plan/program address hazards?<br>Does the plan identify projects to include in the mitigation strategy?<br>Can the plan be used to implement mitigation actions? |
|---|---|---|
| Comprehensive/Master Plan | | |
| Capital Improvements Plan | | |
| Economic Development Plan | N | |
| Local Emergency Operations Plan | | |
| Continuity of Operations Plan | | |
| Transportation Plan | | |
| Stormwater Management Plan/Program | Y | NPDES. It addresses hazards, has a mitigation strategy, and is being implemented. |
| Engineering Studies for Streams | N | |
| Community Wildfire Protection Plan | N | |
| Other special plans (e.g., brownfields redevelopment, disaster recovery, coastal zone management, climate change adaptation) | | |

| Building Code, Permitting, and Inspections | Y/N | Are codes adequately enforced? |
|---|---|---|
| Building Code | Y | Version/Year: Specific code prescribed requirements for the design of projects proposed to be located in designated flood hazard areas, and submitted to the Division of the State Architect (DSA) for review and approval are under the 2016 or 2013 California Building Code (CBC). |
| Building Code Effectiveness Grading Schedule (BCEGS) Score | N | Score: |
| Fire department ISO rating: | N | |
| Site plan review requirements | | |
| **Property Use Planning and Ordinances** | **Y/N** | **Is the ordinance an effective measure for reducing hazard impacts?<br>Is the ordinance adequately administered and enforced?** |
| Zoning ordinance | N | This ordinance is enforced by the cities or unincorporated County that the District facilities lie in. |
| Subdivision ordinance | N | This ordinance is enforced by the cities or unincorporated County that the District facilities lie in. |
| Floodplain ordinance | N | This ordinance is enforced by the cities or unincorporated County that the District facilities lie in. |
| Natural hazard specific ordinance (stormwater, steep slope, wildfire) | N | This ordinance is enforced by the cities or unincorporated County that the District facilities lie in. |
| Flood insurance rate maps | N | This ordinance is enforced by the cities or unincorporated County that the District facilities lie in. |
| Elevation Certificates | N | This ordinance is enforced by the cities or unincorporated County that the District facilities lie in. |
| Acquisition of land for open space and public recreation uses | N | This ordinance is enforced by the cities or unincorporated County that the District facilities lie in. |
| Erosion or sediment control program | N | This ordinance is enforced by the cities or unincorporated County that the District facilities lie in. |
| Other | | |
| **How can these capabilities be expanded and improved to reduce risk?** | | |
| Most of these capabilities fall under the purview of the cities or unincorporated County that the District facilities fall in. The District will work, when available, with these jurisdictions to expand and improve on risk reduction methods when available and appropriate. | | |

As indicated in the tables above, LAUSD has several plans and programs that guide the District's mitigation of development of hazard-prone areas. These are described in more detail below.

***INSERT PLANS***

ADD ISSP FROM EMAIL

## *Extreme Heat Policy and Guidelines*

To counteract heat stress, all District personnel must pay attention to weather conditions and use common sense and good judgment for modifying activities and/or school days. This policy applies to all school sponsored activities.

The Office of Environmental Health and Safety will provide advisories upon receipt of heat alert notices from the local public health department and may send additional information during periods of inclement weather; however, all schools and offices must comply with this Policy Bulletin regardless if an advisory has been distributed.

The decision to modify school activities will be made by the school principal after consulting with the Local Educational Service Center, Administrator of Operations who may consult with the Assistant Superintendent School Operations.

Students with certain health problems may require more attention. If students complain about the heat, allow them to rest and inform the school nurse who may want to have their health status clarified by a parent or guardian. Employees with specific health problems making them more sensitive to heat should alert the site administrator.

On very hot, humid days, administrators, teachers, and other staff should be aware of the following procedures to help minimize possible heat stress:

- Faculty and staff must be informed at the beginning of each semester/track, and as needed thereafter, about the school's program for preventing heat stress, and the most efficient methods for reducing heat and maximizing ventilation in classrooms.
- Doors and windows must be closed in air-conditioned rooms, and any air- conditioning equipment malfunction should be reported at once.
- When possible, all air-conditioned rooms should be used as classrooms.
- Non-air conditioned classrooms should be surveyed by teacher or principal's designee when temperatures require that maximum cooling efforts be instituted, including:
  - ✓ Windows, doors, casements, and venetian blinds should be adjusted for maximum ventilation and air circulation.
  - ✓ Electric fans, where available, should be placed to bring in fresh air and exhaust stale air rather than just blowing it around the room. Fans should be placed in or next to an open window at one end of the room to bring in air, and a window or door (not one that opens into a hall) at the opposite end of the room should be opened to exhaust air. For rooms with unusual heat problems, installing an electric fan in one window or casement and covering the opening with a security screen should be considered. Fans should be turned on as early as possible.
  - ✓ Adjusting custodial hours should be considered to permit early entry into classrooms to open doors, windows, casements, and turn on fans.
  - ✓ Precautions should be taken to ensure that when fans, coolers, or other devices are used they meet safety standards and that cooling strategies do not place an overload on existing electrical systems.
- When classroom temperatures exceed 91° F, consideration should be given to moving students to cooler rooms or other appropriate areas, such as the auditorium, multipurpose room, library, or shaded outdoor

areas. When possible, classes should be combined in air-conditioned rooms not to exceed the occupancy load.

- Teachers, especially at the elementary level, may adjust their programs to use the cooler early hours for physical activity.
- Water must be available. Personal water containers are recommended for use when heat is excessive as a means to prevent dehydration. Use at other times should be a local school option. School sites and secondary physical education departments should establish policies for use of water containers and inform students and parents. A personal water container is a firm, non-breakable plastic receptacle which is no more than 9" high and 4" wide that will hold no more than 32 ounces of water. The container may have a pressure seal, screw or pop-up cap, or a straw drink device on its top. The use of all other types of personal water containers is prohibited. The following are recommended precautions:
  - ✓ For health reasons, water containers should not be shared.
  - ✓ For safety reasons, 1) students should not run with straws or containers in mouth, and 2) containers may not be used while riding District buses.
  - ✓ Students should not bring containers to physical education activity areas unless given permission by the physical education teacher.
- Staff and all personnel supervising physical activities, including Youth Services personnel, should observe students during activity periods and modify activities as recommended in Attachment B. Students known to have health problems should be closely observed and their activity modified or restricted.

### *Flood Design and Project Submittal*

The Division of the State Architect (DSA) consulted with other government agencies and agreed to implement the updated requirements, effective January 1, 2014. Note that relocatable buildings less than 2,160 square feet placed on existing campuses located in designated flood hazard areas are no longer exempt from meeting the flood design and documentation requirements of CBC. This procedure addresses flood hazard area documentation requirements for projects designed under the 2016 and 2013 CBC. For flood design requirements see CBC Section 1612A (1612*) and code-referenced standard ASCE 24-05 – Flood Resistant Design and Construction.

If located in a flood hazard area, the project must comply with flood hazard area documentation requirements. This provision applies to installation of temporary relocatable buildings, including those placed for emergency purposes. This provision also applies to open structures supported only on columns, such as canopies, lunch shelters or carports, on sites with the potential for high velocity water flow, or where the scope of work includes electrical elements that do not meet the waterproofing requirements of ASCE 24, Section 7.2 (e.g., solar carports).

If located in a flood hazard area, the project must comply with flood hazard area documentation requirements only if the value of the project exceeds 50 percent of the market value of the structure prior to the improvements being made. Reporting requirements are waived if the value is below the trigger amount.

Flood zones identified by the letter "D" designate areas where the flood hazard is undetermined. Those flood zones identified by the letters "A" and "V", not followed by a letter or number, designate areas where the flood elevation and flood hazard factors are undetermined. The design flood elevation in these areas shall be determined either by a ruling by the local jurisdiction or by using one of the methods outlined in CBC Section 1612A.3.1 (1612.3.1*) with acceptance by the local jurisdiction affirming that the flood elevation is no less than that they would otherwise accept. If the local jurisdiction will not issue acceptance as a matter of policy, DSA will review the study or report submitted and make a reasonable determination.

For projects not located in a floodplain, a supporting flood hazard map or verification from the local authority having jurisdiction in which the project resides must be provided to show that the project is not in a floodplain.

### *State and Federal Programs*

A number of state and federal programs exist to provide technical and financial assistance to local communities for hazard mitigation. Some of the primary agencies/departments that are closely involved with local governments in the administration of these programs include:

- California Office of Emergency Services
- State of California Multi-Hazard Mitigation Plan;
- California Department of Water Resources;
- California Department of Forestry and Fire Protection (CAL FIRE);
- California Environmental Protection Agency;
- California Department of Fish and Game;
- California State Parks and Recreation Department
- California State Lands Commission;
- Federal Emergency Management Agency (Region IX);
- U.S. Army Corps of Engineers;
- Bureau of Reclamation;
- USDA Forest Service;
- National Parks Service;
- USDA Natural Resources Conservation Service;
- U.S. Environmental Protection Agency (Region IX); and
- American Red Cross.

## 4.4.2. LAUSD's Administrative/Technical Mitigation Capabilities

Table 4-166 identifies the District personnel responsible for activities related to mitigation and loss prevention in the District. FILL OUT TABLE

*Table 4-166 LAUSD's Administrative/Technical Mitigation Capabilities*

| Administration | Y/N | Describe capability<br>Is coordination effective? |
|---|---|---|
| Planning Commission | | |
| Mitigation Planning Committee | | |
| Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems) | | |

| | | |
|---|---|---|
| Mutual aid agreements | | |
| Other | | |
| **Staff** | **Y/N FT/PT** | **Is staffing adequate to enforce regulations? Is staff trained on hazards and mitigation? Is coordination between agencies and staff effective?** |
| Chief Building Official | | |
| Floodplain Administrator | | |
| Emergency Manager | | |
| Community Planner | | |
| Civil Engineer | | |
| GIS Coordinator | | |
| Other | | |
| **Technical** | **Y/N** | **Describe capability Has capability been used to assess/mitigate risk in the past?** |
| Warning systems/services (Reverse 911, outdoor warning signals) | | |
| Hazard data and information | | |
| Grant writing | | |
| Hazus analysis | | |
| Other | | |
| **How can these capabilities be expanded and improved to reduce risk?** | | |
| | | |

ADD FROM BRENNA'S TEMPLATES

### 4.4.3. LAUSD's Fiscal Mitigation Capabilities

Table 4-167 identifies financial tools or resources that the District could potentially use to help fund mitigation activities. FILL OUT TABLE

*Table 4-167 LAUSD's Fiscal Mitigation Capabilities*

| Funding Resource | Access/ Eligibility (Y/N) | Has the funding resource been used in past and for what type of activities? Could the resource be used to fund future mitigation actions? |
|---|---|---|
| Capital improvements project funding | | |
| Authority to levy taxes for specific purposes | | |
| Fees for water, sewer, gas, or electric services | | |
| Impact fees for new development | | |
| Storm water utility fee | | |

| Funding Resource | Access/ Eligibility (Y/N) | Has the funding resource been used in past and for what type of activities? Could the resource be used to fund future mitigation actions? |
|---|---|---|
| Incur debt through general obligation bonds and/or special tax bonds | | |
| Incur debt through private activities | | |
| Community Development Block Grant | | |
| Other federal funding programs | | |
| State funding programs | | |
| Other | | |
| **How can these capabilities be expanded and improved to reduce risk?** | | |
| | | |

## 4.4.4. Mitigation Education, Outreach, and Partnerships

Table 4-168 identifies education and outreach programs and methods already in place that could be/or are used to implement mitigation activities and communicate hazard-related information. FILL OUT TABLE

*Table 4-168 LAUSD's Mitigation Education, Outreach, and Partnerships*

| Program/Organization | Yes/No | Describe program/organization and how relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities? |
|---|---|---|
| Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc. | | |
| Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education) | | |
| Natural disaster or safety related school programs | | |
| StormReady certification | Y | The District has prepared for storms, and was awarded StormReady certification in 2015. That will be renewed in 2018. |
| Firewise Communities certification | | |
| Public-private partnership initiatives addressing disaster-related issues | | |
| Other | Y | KLCS TV Station, CAL FIRE grants |
| **How can these capabilities be expanded and improved to reduce risk?** | | |
| | | |

## *KLCS Television Station (Channel 58)*

### The Station

KLCS-TV/HD – The Education Station – is a noncommercial educational television station licensed to the Los Angeles Unified School District and is a member of the Public Broadcasting Service (PBS). A multiple Emmy® Award winner, KLCS broadcasts on channels 58.1 through 58.3 to a potential audience of over sixteen million viewers throughout Southern California. KLCS is also carried on all major satellite/fiber (AT&T U-verse, DirecTV, DISH Network, and Frontier) and cable (AT&T, Time Warner, Charter, Spectrum, Cox, Mediacom and Comcast) systems. KLCS averages 1.3 million viewers per week.

### Our Mission

KLCS-TV is a multimedia education channel that inspires learners of all ages to higher levels of achievement and personal and professional growth through the use of programs and services that educate inform and enlighten.

### Coverage Area

Broadcasting from Mt. Wilson atop the San Gabriel Mountain range in the Angelus National Forest, the KLCS coverage area extends from Santa Barbara to San Diego reaching a potential viewing audience of over 5 million households in Los Angeles, Orange, San Bernardino, Riverside, Ventura and San Diego Counties. The Los Angeles Nielsen DMA (Designated Market Area) is the second largest in the United States and is comprised of over 16,000,000 people; 6% of the U.S. population. KLCS instructional television programming reaches over 150 school districts throughout Southern California.

### History

The LAUSD began to produce instructional television programming for in-school viewing in October of 1957. In 1963, LAUSD received the channel designation of UHF-58 and began the process of acquiring its own broadcast license from the Federal Communications Commission (FCC).

On July 1, 1967 submitted an application to the State Department of Education and the U.S. Office of Education under Title III of the Elementary and Secondary Education Act of 1965 to build and equip a broadcast facility for the LAUSD. This Act provided grants for the demonstration of innovative programs in schools.

In the summer of 1967, advocates testified before the FCC in Washington, DC on behalf of the District's application for the channel 58 license. Speakers attested to the benefits that would accrue to the students, as well as to staff, parents and the community at large. The District was granted its broadcast license for Channel 58 on March 3, 1972, and began broadcasting on November 5, 1973.

Today KLCS is the only remaining PBS station that broadcasts from the city of Los Angeles.

KLCS Statistics

- KLCS is one of only six television stations in the nation licensed to a K – 12 school district
- KLCS broadcasts 24/7 on its main channel, achieving approximate annual totals listed in the following categories:
  - ✓ 3,100 hours of Classroom Instructional Television (KLCS Classroom Instructional Television (CITV) provides schools with direct access to more than 140 curriculum-matched series and over 1600 individual program titles).
  - ✓ 1,500 hours of LAUSD Board of Education and Los Angeles County Board of Supervisors meetings, allowing the greater Los Angeles population access to government proceedings
  - ✓ 2,000 hours of informational programming, continuing education, college credit, how-to, self-improvement, personal development, entertainment, documentaries and specials.
- KLCS broadcasts more Spanish Language programming than any other non-Spanish-language television station in the Los Angeles DMA.
- KLCS Magazine, publishes a monthly schedule of evening and weekend programming, is distributed to all schools and offices and is available by subscription to Friends of KLCS members.
- KLCS provides an extensive outreach program that includes hands on workshops and the award winning Video in the Classroom (VIC) Awards program.
- KLCS provides Secondary Audio Program (SAP) capability, which enables Board meetings and other programs to be simulcast in Spanish.

### KLCS Future

KLCS continues to seek advice and expertise of the District's learning community in helping to shape its role in the future. Community focus groups provide input in determining the most effective programs, schedules and services.

With a portion of the station's FCC Spectrum Auction proceeds we have invested in a complete overhaul/upgrade of KLCS' station broadcast facility. In the Fall of 2018, we will be opening the first Ultra High Definition (UHD) High Dynamic Range studio on the West coast. Additionally we have completed the design and are in the process of purchasing an ATSC 3.0 antenna for our Mt. Wilson broadcast facility in preparation for the next generation of over the air broadcast television.

### FEMA Post Disaster Cooperation

KLCS has a history of cooperation with FEMA and the LAUSD in post disaster situations.

For example in the aftermath of the Northridge earthquake for a two month period in the winter of 1994 KLCS surrendered its broadcast schedule six hours a day, for a two month period to serve as a "light house" station allowing FEMA to continuously directly broadcast disaster information and resources to the affected communities.

In December of 2017 when two separate wildfires threatened several schools in the San Fernando Valley KLCS immediately went on-air broadcasting the new locations of evacuated students. As air quality for the entire San Fernando Valley continued to deteriorate the decision was made to close all schools in the affected area for a four day period. Due to the high percentage of students in the federal free and reduced price meals program the LAUSD set-up two mobile food distribution sites so students would still have access to the program benefits. KLCS was instrumental in running crawls and advertising the location of these emergency sites so students would not go hungry for a four day period.

### FEMA Pre- Disaster Mitigation

As a member of the Southern California Broadcaster's Association we have a perfect record for Emergency Alert System tests. Additionally KLCS successfully participated in the National ETRS EAS broadcast in September of 2017.

KLCS is also an active participant in LAUSD Emergency Operations Center (EOC) training. KLCS has three trained staff members on EOC procedures, including one who has completed the Safety Training for Emergency Preparedness (STEP) program, to serve as responders during declared activations.

In preparation for future disasters the station is equipped with an Uninterrupted Power Supply (UPS) system, including a diesel powered generator (which is tested weekly) that can supply power for up to five days to allow the station to continue to broadcast, during local power outages, when local electricity is unavailable. KLCS has also invested in a LIVE-U portable system to allow broadcasting from the field in emergencies using cellular technology.

### Ongoing public education/information programs

KLCS has a long history of providing public education informational programming on a wide variety of potential disasters.

The station has a continuous program running Public Service Announcements (PSA) in partnership with the National Ad Council, FEMA, The National Parks Service, U.S. Forestry, and the Los Angeles Department of Water and Power (DWP). Topics include Earthquake Preparedness, Resource Conservation, Drought Awareness, Water Conservation and Wild Fire Prevention.

KLCS also provides annual earthquake preparedness coverage of the California Great Shake drill and how schools are prepared for future seismic occurrences and the steps for home safety, while encouraging preparedness.

KLCS has also produced local content regarding the drought and water conservation. A 30-minute program was produced in studio with drought/conservation experts including the opportunity for the community to call in to ask questions. Additionally, KLCS produced and aired several news briefs featuring members of the Board of Education and LAUSD students with water conservation tips.

KLCS used considerable airtime promoting the LAUSD Community Emergency Plan App for mobile devices. The spots were created to promote the simple download process for the LAUSD Emergency App for students, parents and the general public. The app includes information/procedures for a wide variety of scenarios including; Preparedness, Response, Family Reunification, Fire, Earthquakes, Shelter in Place, Lockdown and numerous locations for additional resources including the American Red Cross, FEMA, and CERT.

### *CAL FIRE Coordination*

The tree canopy and plant databases and garden video were developed by CWH under a Cal Fire grant. We also may have received some Cal Fire grants for gardens and garden-related items. The CWH project was initiated by the Garden Specialists.

## 4.4.5. Other Mitigation Efforts

The District has many other mitigation efforts that are being worked towards that have not been previously captured in this capability assessment. They are discussed in detail below.

- $51M is being spent in projects to reduce the carbon footprint and emissions.
- With specific reference to hazard concerns/issues, the Eagle Rock HS seismic retrofit projects (North Gym, South Gym and Auditorium) is an example of the precautions that LAUSD is taking to mitigate known hazards. Because the Tier 2 structural evaluations confirmed the entire site as being in a liquefaction zone, the geotechnical engineer advocated the inclusion of an approach to mitigate this hazard consisting of soil compaction grouting below the load points for each building between the depths of 20' and 40' below grade. As a result of this inclusion, the construction documents now include, on average, about between 500 and 600 soil compaction grout cores in each building to strengthen and stabilize the ground below each building.
- The District was awarded both StormReady and TsunamiReady certifications as of 2015.
- The District participates in the Step Program. All courses in the STEPS program are available to LAUSD through the Learning Zone. Courses are categorized by intended audience but open to all LAUSD employees. Classes include:
  - ✓ 101- Employee Duties during an Emergency
  - ✓ 102- Basic Emergency Preparedness for Home
  - ✓ 201 – What to Do if There is a Fire at School
  - ✓ 202 – What to Do if There is an Earthquake at School
  - ✓ 203 – What to do if There is a Lockdown at School
  - ✓ 204 – What to Do if There is a Shelter-in-Place at School
  - ✓ 205 – What to Do if There is a Radiological Incident at School
  - ✓ 206 – Classroom Hazard Mitigation – Making Classrooms Safer Before the Emergency
  - ✓ 207 – Mediating Student Conflicts
  - ✓ 208 – Responding to Threats on Campus
  - ✓ 210 – Assisting Students with Special Needs during an Emergency
  - ✓ 211 – Common Pediatric Medical Emergency Considerations
  - ✓ 212 – What to Do When a Student is in Crisis
  - ✓ 213 – Duties of the School Emergency First Aid Team
  - ✓ 214 – Duties of the School Search and Rescue Team
  - ✓ 215 – How to Conduct a Random Metal Detector Search
  - ✓ 301 – Responding to Student and Adult Threats for Los Angeles School Police
  - ✓ Department Personnel
  - ✓ 302 – School Police Response to a Lockdown
  - ✓ 400 - Basics of School Site Emergency Management
  - ✓ 401 –Planning for and Responding to a Fire at School

- ✓ 402 –Planning for and Responding to an Earthquake at School
- ✓ 403 –Planning for and Responding to a Lockdown at School
- ✓ 404 –Planning for and Responding to a Shelter in Place at School
- ✓ 405 –Planning for and Responding to a Radiological Emergency at School
- ✓ 406 – Conducting a Vulnerability Assessment
- ✓ 407 – Communication Methods during an Emergency
- ✓ 408 – Threat/Risk Assessment and Management
- ✓ 409 – Crisis Preparedness, Response, and Recovery
- ✓ 410 – Emergency Management for Students with Special Needs
- ✓ 411 –Using the School Intrusion Alarm System
- ✓ 412 – Preparing for a Routine Safe School Inspection
- ✓ 416 – How to Use the Public Health Emergency Toolkit
- ✓ 417 – What to Know about Food Safety at School – the LAUSD Food Defense Plan
- ✓ 418 – Operating the School Fire Alarm System
- ✓ 419 – Student Release and Parent Reunification Procedures Following an Emergency
- ✓ 420 – Incident Command System – Structuring your Emergency Response Plan
- ✓ 421 – Principles of Unified Command – Working with First Responders and Outside
- ✓ Agencies
- ✓ 422 – Identifying your Most Vulnerable Students
- ✓ 423 – Updating and Submitting the Integrated Safe School Plan

- ➢ The District is doing a build out of the Secondary Data Center (ECOPOD) in Van Nuys with data replication to serve as a Disaster Recovery Site
- ➢ The District is adding a Generator to the Gardena Network Node – to keep network communications equipment working during power outages
- ➢ The District is evaluating the potential of
  - ✓ Move existing Radio Core from Soto Street to less risky environment
  - ✓ Addition of a 2nd Radio Core to provide redundancy in case of an outage of the main core -- radio communications are vital for school bus operations, school police and the white fleet delivery vehicles
- ➢ INSERT ANY MITIGATION ACTIVITY/ PAST PROJECTSNOT CAPTURED IN THE PREVIOUS SECTIONS

# Chapter 5 Mitigation Strategy

**Requirement §201.6(c)(3): [The plan shall include] a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.**

This section describes the mitigation strategy process and mitigation action plan for the LAUSD Local Hazard Mitigation Plan (LHMP) Update. It describes how the District met the following requirements from the 10-step planning process:

- Planning Step 6: Set Goals
- Planning Step 7: Review Possible Activities
- Planning Step 8: Draft an Action Plan

## 5.1 Mitigation Strategy: Overview

The results of the planning process, the risk assessment, the goal setting, the identification of mitigation actions, and the hard work of the Hazard Mitigation Planning Committee (HMPC) led to the mitigation strategy and mitigation action plan for this LHMP Update. As part of the LHMP Update process, a comprehensive review and update of the mitigation strategy portion of the plan was conducted by the HMPC. Some of the initial goals and objectives from the 2012 plan were refined and reaffirmed, some goals were deleted, and others were added. The end result was a new set of goals, reorganized to reflect the completion of any 2012 actions, the updated risk assessment and the new priorities of this LHMP Update. To support the new LHMP goals, the mitigation actions from 2012 were reviewed and assessed for their value in reducing risk and vulnerability to the Planning Area from identified hazards and evaluated for their inclusion in this LHMP Update (See Chapter 2 What's New). Section 5.2 below identifies the new goals and objectives of this LHMP Update and Section 5.4 details the new mitigation action plan.

Taking all of the above into consideration, the HMPC developed the following umbrella mitigation strategy for this LHMP Update:

- Communicate the hazard information collected and analyzed through this planning process as well as HMPC success stories so that the community better understands what can happen where and what they themselves can do to be better prepared.
- Implement the action plan recommendations of this plan.
- Use/enforce existing rules, regulations, policies, and procedures already in existence.
- Monitor multi-objective management opportunities so that funding opportunities may be shared and packaged, and broader constituent support may be garnered.

### 5.1.1. Continued Compliance with NFIP

To participate in the National Flood Insurance Program (NFIP), a community must adopt and enforce floodplain management regulations that meet or exceed the minimum requirements of the Program. These requirements are intended to prevent loss of life and property and to reduce taxpayer's costs for disaster relief as well as minimize economic and social hardships that result from flooding. A community, as defined for the NFIP's purposes, is any state, area, or political subdivision; any Indian tribe, authorized tribal organization, or Alaska native village; or authorized native organization that has the authority to adopt and enforce floodplain management ordinances for the area under its jurisdiction. In most cases, a community is an incorporated city, town, township, borough, or village, or an unincorporated area of a county or parish.

Since the District does not meet the NFIP definition of a community, it does not administer its own floodplain management program under the NFIP, but instead, complies with the flood requirements established by the State of California based on the communities in which its facilities are located. As such, the District is committed to reducing flood loss through compliance with these established floodplain management regulations. Further evidence of the District's commitment to reducing flood loss is included in the flood mitigation actions contained in this LHMP that support their ongoing efforts to minimize the risk and vulnerability of the District to their flood hazard and to enhance their overall internal floodplain management program. The District will continue to manage their existing and future facilities in continued compliance with the NFIP as established by applicable communities.

### 5.1.2. Integration of Mitigation with Post Disaster Recovery and Mitigation Strategy Funding Opportunities

Hazard Mitigation actions are essential to weaving long-term resiliency into all community and District recovery efforts so that at-risk infrastructure, development, and other District assets are stronger and more resilient for the next severe storm event. Mitigation measures to reduce the risk and vulnerability of a community to future disaster losses can be implemented in advance of a disaster event and also as part of post-disaster recovery efforts.

Mitigation applied to recovery helps jurisdictions become more resilient and sustainable. It is often most efficient to fund all eligible infrastructure mitigation through FEMA's Public Assistance mitigation program if the asset was damaged in a storm event. Mitigation work can be added to project worksheets if they can be proven to be cost-beneficial.

Integration of mitigation into post disaster recovery efforts should be considered by all jurisdictions as part of their post disaster redevelopment and mitigation policies and procedures. As previously described in Section 4.4, the Capability Assessment for LAUSD, post-disaster redevelopment and mitigation policies and procedures are being evaluated and updated as part of the Emergency Operations Plan (EOP) updates for the District.

The District's EOP, through its policies and procedures, seek to mitigate the effects of hazards, prepare for measures to be taken which will preserve life and minimize damage, enhance response during emergencies and provide necessary assistance, and establish a recovery system in order to return LAUSD to its normal state of affairs. Mitigation is emphasized as a major component of recovery efforts.

### *Mitigation Strategy Funding Opportunities*

An understanding of the various funding streams and opportunities will enable the jurisdictions to match identified mitigation projects with the grant programs that are most likely to fund them. Additionally, some of the funding opportunities can be utilized together. Mitigation grant funding opportunities available pre- and post- disaster include the following.

#### FEMA HMA Grants

Cal OES administers three main types of HMA grants: (1) Hazard Mitigation Grant Program, (2) Pre-Disaster Mitigation Program, and (3) Flood Mitigation Assistance Program. Eligible applicants for the HMA include state and local governments, certain private non-profits, and federally recognized Indian tribal governments. While private citizens cannot apply directly for the grant programs, they can benefit from the programs if they are included in an application sponsored by an eligible applicant

#### FEMA Public Assistance Section 406 Mitigation

The Robert T. Stafford Disaster Relief and Emergency Assistance Act provides FEMA the authority to fund the restoration of eligible facilities that have sustained damage due to a presidentially declared disaster. The regulations contain a provision for the consideration of funding additional measures that will enhance a facility's ability to resist similar damage in future events.

## 5.2 Goals and Objectives

**Requirement §201.6(c)(3)(i): [The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.**

Up to this point in the planning process, the HMPC has organized resources, assessed hazards and risks, and documented mitigation capabilities. The resulting goals, objectives, and mitigation actions were developed based on these tasks. The HMPC held a series of meetings and exercises designed to achieve a collaborative mitigation strategy as described further throughout this section. Appendix C documents the information covered in these mitigation strategy meetings, including information on the goals development and the identification and prioritization of mitigation alternatives by the HMPC.

During the initial goal-setting meeting, the HMPC reviewed the results of the hazard identification, vulnerability assessment, and capability assessment. This analysis of the risk assessment identified areas where improvements could be made and provided the framework for the HMPC to formulate planning goals and objectives and to develop the mitigation strategy for the LAUSD Planning Area.

Goals were defined for the purpose of this mitigation plan as broad-based public policy statements that:

- Represent basic desires of the District;
- Are nonspecific, in that they refer to the quality (not the quantity) of the outcome;
- Are future-oriented, in that they are achievable in the future; and
- A time-independent, in that they are not scheduled events.

Goals are stated without regard to implementation. Implementation cost, schedule, and means are not considered. Goals are defined before considering how to accomplish them so that they are not dependent on the means of achievement. Goal statements form the basis for objectives and actions that will be used as means to achieve the goals. Objectives define strategies to attain the goals and are more specific and measurable.

HMPC members were provided with the list of goals from the 2012 plan as well as a list of other sample goals to consider. They were told that they could use, combine, or revise the statements provided or develop new ones, keeping the risk assessment in mind. Each member was given three index cards and asked to write a goal statement on each. Goal statements were collected and grouped into similar themes during the meeting. The goal statements were then grouped into similar topics. New goals from the HMPC were discussed until the team came to consensus. Some of the statements were determined to be better suited as objectives or actual mitigation actions and were set aside for later use. Next, the HMPC developed objectives that summarized strategies to achieve each goal.

Based on the risk assessment review and goal setting process, the HMPC identified the following goals and objectives, which provide the direction for reducing future hazard-related losses within the LAUSD Planning Area.

### Goal 1: Minimize risk and vulnerability of LAUSD to natural hazards and protect lives and prevent losses to property, public heath, economy, and the environment.

- Continue to promote disaster-resistant schools
- Reduce exposure to hazard-related losses.
- Continue to provide for the safety, health, and welfare of LAUSD staff, students, and visitors.
- Protect existing and future development from future disaster related losses.
- Protect critical facilities, infrastructure, utilities, and services from future disaster related losses.
- Support building systems that are physically safe, secure, efficient, and meet all state standards.

### Goal 2: Increase LAUSD community outreach, education, and awareness of risk and vulnerability to natural hazards.

- Inform and educate the LAUSD community (employees, students, families, and partners) about natural hazards in the area, the impacts of those hazards, and what they can do to mitigate exposure or damages.

### Goal 3: Improve LAUSD's capabilities and capacity to prevent/mitigate hazard-related losses

- Ensure that mitigation actions and projects are aligned with instructional requirements and vision.
- Define and quantify Community Disaster Resilience to natural disasters; establish resiliency indicators to support continuous improvement of resiliency capabilities.
- Maintain current service levels, including transportation, emergency response, food services, etc.
- Continued improvements to emergency readiness and management and resilience capabilities and capacity including interagency coordination to mitigate, prepare for, respond to adapt, and recover from hazard events.
- Ensure functionality, redundancy, and resiliency of communications, information technology, and other critical systems prior to, during and after hazard events.
- Increase use of existing technologies and pursuit of emerging technologies that support disaster readiness.

## 5.3 Identification and Analysis of Mitigation Actions

**Requirement §201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.**

In order to identify and select mitigation actions to support the mitigation goals, each hazard identified in Section 4.1 was evaluated. Only those hazards that were determined to be a priority hazard for purposes of mitigation action development were considered further in the development of hazard-specific mitigation actions.

These priority hazards (in alphabetical order) are:

- Climate Change and Sea Level Rise
- Dam Failure
- Drought and Water Shortage
- Earthquake
- Earthquake Liquefaction
- Flood: 1%/0.2% Annual Chance
- Flood: Localized/Stormwater
- Landslide, Mud, and Debris Flows
- Levee Failure
- Radon
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rains and Storms (winds, hail, lightning)
- Severe Weather: High Winds and Tornadoes
- Wildfire

The HMPC eliminated the hazards identified below from further consideration in the development of mitigation actions because the risk of a hazard event in the District is unlikely or nonexistent, the vulnerability of the District is low, capabilities are already in place to mitigate negative impacts, or the District does not have the authority or control over mitigation of the hazard. The eliminated hazards are:

- Dam Failure
- Levee Failure
- Tsunami

It is important to note, however, that **all the hazards addressed in this plan are included in the District's multi-hazard public awareness mitigation action as well as in other multi-hazard, emergency management actions.**

Once it was determined which hazards warranted the development of specific mitigation actions, the HMPC analyzed viable mitigation options that supported the identified goals and objectives. The HMPC was provided with the following list of categories of mitigation actions, which originate from the NFIP's Community Rating System:

- Prevention
- Property protection
- Structural projects
- Natural resource protection
- Emergency services
- Public information

The HMPC was provided with examples of potential mitigation actions for each of the above categories. The HMPC was also instructed to consider both future and existing buildings in considering possible mitigation actions. A facilitated discussion then took place to examine and analyze the options. Appendix C provides a detailed review and discussion of the six mitigation categories to assist in the review and identification of possible mitigation activities or projects. Also utilized in the review of possible mitigation measures is FEMA's publication on Mitigation Ideas, by hazard type. Prevention type mitigation alternatives were discussed for each of the priority hazards. This was followed by a brainstorming session that generated a list of preferred mitigation actions by hazard.

### 5.3.1. Prioritization Process

Once the mitigation actions were identified, the HMPC was provided with several decision-making tools, including FEMA's recommended prioritization criteria, STAPLEE sustainable disaster recovery criteria; Smart Growth principles; and others, to assist in deciding why one recommended action might be more important, more effective, or more likely to be implemented than another. STAPLEE stands for the following:

- Social: Does the measure treat people fairly? (e.g., different groups, different generations)
- Technical: Is the action technically feasible? Does it solve the problem?
- Administrative: Are there adequate staffing, funding, and other capabilities to implement the project?
- Political: Who are the stakeholders? Will there be adequate political and public support for the project?
- Legal: Does the jurisdiction have the legal authority to implement the action? Is it legal?
- Economic: Is the action cost-beneficial? Is there funding available? Will the action contribute to the local economy?
- Environmental: Does the action comply with environmental regulations? Will there be negative environmental consequences from the action?

In accordance with the DMA requirements, an emphasis was placed on the importance of a benefit-cost analysis in determining action priority. Other criteria used to assist in evaluating the benefit-cost of a mitigation action includes:

- Contribution of the action to save life or property
- Availability of funding and perceived cost-effectiveness
- Available resources for implementation
- Ability of the action to address the problem

In addition to reviewing and incorporating some of the actions from the 2012 plan, the committee also considered and defined numerous new actions. A comprehensive review of mitigation measures was performed using the criteria (alternatives and selection criteria) in Appendix C.

With these criteria in mind, HMPC members were each given a set of nine colored dots, three each of red, blue, and green. The dots were assigned red for high priority (worth five points), blue for medium priority (worth three points), and green for low priority (worth one point). The team was asked to use the dots to prioritize actions with the above criteria in mind. The point score for each action was totaled. Appendix C contains the total score given to each identified mitigation action.

The process of identification and analysis of mitigation alternatives allowed the HMPC to come to consensus and to prioritize recommended mitigation actions. During the voting process, emphasis was placed on the importance of a benefit-cost review in determining project priority; however, this was not a quantitative analysis. The team agreed that prioritizing the actions collectively enabled the actions to be ranked in order of relative importance and helped steer the development of additional actions that meet the more important objectives while eliminating some of the actions which did not garner much support.

Benefit-cost was also considered in greater detail in the development of the Mitigation Action Plan detailed below in Section 5.4. The cost-effectiveness of any mitigation alternative will be considered in greater detail through performing benefit-cost project analyses when seeking FEMA mitigation grant funding for eligible actions associated with this plan.

Recognizing the limitations in prioritizing actions from multiple jurisdictions and departments and the regulatory requirement to prioritize by benefit-cost to ensure cost-effectiveness, the HMPC decided to pursue actions that contributed to saving lives and property as first and foremost, with additional consideration given to the benefit-cost aspect of a project. This process drove the development of a determination of a high, medium, or low priority for each mitigation action, and a comprehensive prioritized action plan for the LAUSD Planning Area.

## 5.4 Mitigation Action Plan

**Requirement §201.6(c)(3)(iii): [The mitigation strategy section shall include] an action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.**

This action plan was developed to present the recommendations developed by the HMPC for how the LAUSD Planning Area can reduce the risk and vulnerability of people, property, infrastructure, and natural and cultural resources to future disaster losses. Emphasis was placed on both future and existing development. The action plan summarizes who is responsible for implementing each of the prioritized actions as well as when and how the actions will be implemented. Each action summary also includes a discussion of the benefit-cost review conducted to meet the regulatory requirements of the Disaster Mitigation Act.

Table 5-1 identifies all mitigation actions for all participating jurisdictions to this LHMP Update. For each mitigation action item included in Table 5-1, the section that follows includes a detailed mitigation implementation strategy by mitigation action for all District actions.

Table 5-1 identifies the mitigation actions and lead agency or department for each action. The action plan detailed below contains both new action items developed for this LHMP Update as well as old actions that were yet to be completed from the 2012 plan. Table 5-1 indicates whether the action is new or from the 2012 plan and Chapter 2 contains the details for each 2012 mitigation action item indicating whether a given action item has been completed, deleted, or deferred.

As described throughout this LHMP Update, LAUSD has many risks and vulnerabilities to identified hazards. Although many possible mitigation actions, as detailed in Appendix C, were brainstormed and prioritized during the mitigation strategy meetings, the resulting mitigation strategy presented in this Chapter 5 of this LHMP focuses only on those mitigation actions that are both reasonable and realistic for the District to consider for implementation over the next 5-years covered by this plan. Thus, only a portion of the actions identified in Appendix C have been carried forward into the mitigation strategy presented in Table 5-1. Although many good ideas were developed during the mitigation action brainstorming process, the reality of determining which priority actions to develop and include in this plan came down to the actual priorities of the District, individuals and departments based in part on department direction, staffing, and available funding. The overall value of the mitigation action table in Appendix C is that it represents a wide-range of mitigation actions that can be consulted and developed for this plan during annual plan reviews and the formal 5-year update process.

It is also important to note that the District has numerous existing, detailed action descriptions, which include benefit-cost estimates, in other planning documents and programs, such as LAUSD's modernization program, earthquake and other hazard programs, and capital improvement budgets and programming. These actions are considered to be part of this plan, and the details, to avoid duplication, should be referenced in their original source document. The HMPC also realizes that new needs and priorities may arise as a result of a disaster or other circumstances and reserves the right to support new actions, as necessary, as long as they conform to the overall goals of this plan.

Further, it should be clarified that the actions included in this mitigation strategy are subject to further review and refinement; alternatives analyses; and reprioritization due to funding availability and/or other criteria. The District is not obligated by this document to implement any or all of these projects. Rather this mitigation strategy represents the desires of the District to mitigate the risks and vulnerabilities from identified hazards. The actual selection, prioritization, and implementation of these actions will also be further evaluated in accordance with the mitigation categories and criteria contained in Appendix C.

It should be noted that some of these mitigation efforts are collaborative efforts among multiple local, state, and federal agencies. In addition, the public outreach action, as well as many of the emergency services actions, apply to all hazards regardless of hazard priority. Collectively, this LAUSD multi-hazard mitigation strategy includes only those actions and projects which reflect the actual priorities and capacity of the District to implement over the next 5-years covered by this plan.

*Table 5-1 LAUSD's Mitigation Actions*

| Action Title | Goals Addressed | Responsible Agency(ies) | New Action/ 2012 Action | Address Current Development | Address Future Development | Continued Compliance with NFIP | CRS Category |
|---|---|---|---|---|---|---|---|
| **Multi-Hazard Actions** | | | | | | | |
| Action 1. Comprehensive Modernization Projects: New Construction and Seismic Retrofits; Infrastructure Improvements/Replacement; Barrier Removal; Technology Upgrades. | 1, 2, 3 | Facilities Services | New action | X | X | | |
| Action 2. Barrier Removal Projects | 1, 2, 3 | Facilities Services | New action | X | X | | |
| Action 3.Energy Efficient Lighting Retrofit/ LAUSD Lighting Retrofit Project | 1, 2, 3 | Facilities Services | New action | X | X | | |
| Action 4.Tree Management: Planting and Maintenance Projects/ Windsor Hills Elementary School Playground Repair and Greening Project | 1, 2, 3 | Facilities Services | New action | X | X | | |
| Action 5. Solar Photovoltaic (PV) Carport Installation / LAUSD Solar PV Carport Project | 1, 2, 3 | Facilities Services | New action | X | X | | |
| Action 6. Radio System Modernization | 1, 2, 3 | Information Technology | New action | X | X | | |
| Action 7.ITD - Redundant Radio Core | 1, 2, 3 | Information Technology | New action | X | X | | |
| Action 8.Continuity of Operations Plan (Continuation from prior FEMA report) | 1, 2, 3 | Information Technology | 2012 action | X | X | | |
| Action 9.Disaster Recovery Project (Information Technology) | 1, 2, 3 | Information Technology | New action | X | X | | |
| Action 10. Generator for the Gardena Network Node | 1, 2, 3 | Information Technology | New action | X | X | | |

| Action Title | Goals Addressed | Responsible Agency(ies) | New Action/ 2012 Action | Address Current Development | Address Future Development | Continued Compliance with NFIP | CRS Category |
|---|---|---|---|---|---|---|---|
| **Drought Actions** | | | | | | | |
| Action 11. Fixture (plumbing) retrofits/ LAUSD Water Fixture Retrofit Program | 1, 2, 3 | Maintenance & Operations Staff, Los Angeles Department of Water and Power | New action | X | X | | |
| Action 12. Expand Use of Reclaimed Water/ LAUSD Recycled Water Project | 1, 2, 3 | Multiple – see action | New action | X | X | | |
| **Earthquake, Liquefaction, and Landslide Action** | | | | | | | |
| Action 13. Seismic Safety | 1, 2, 3 | Facilities Services | New action | X | X | | |
| Action 14. Extreme Event: Earthquake | 1, 2, 3 | Emergency Services | New action | X | X | | |
| Action 15. Earthquake Early Warning | 1, 2, 3 | Emergency Services, ITD, Facilities, USGS, CalTech, Early Warning Labs | New action | X | X | | |
| **Extreme Heat Actions** | | | | | | | |
| Action 16. HVAC Program/ LAUSD Heating Ventilation Air Conditioning Replacement Project | 1, 2, 3 | Facilities Services | New action | X | X | | |
| **Radon Actions** | | | | | | | |
| Action 17. Radon Mitigation in All New Buildings Constructed in "High" Radon Zones and Where Feasible in Existing School Buildings. | 1, 2, 3 | Office of Environmental Health and Safety/Facilities Services Division, Project Execution, Maintenance and Operations. | New action | X | X | | |

## *Multi-Hazard Actions*

### *Action 1. Comprehensive Modernization Projects: New Construction and Seismic Retrofits; Infrastructure Improvements/Replacement; Barrier Removal; Technology Upgrades.*

**Hazards Addressed**: Earthquakes, Fire, Dam Inundation, Radon, Liquefaction, Landslide, Climate Change, Severe Weather Hazards

**Goals Addressed**: 1, 2, 3

**Issue/Background**: Under the Comprehensive Modernization Program (CMP), projects are developed to address a particular category, or type of need, and align with the Program's goals and principles: schools should be safe and secure, school building systems should be sound and efficient, and facilities should align with instructional requirements and vision.

**Project Description**: The proposed Projects would address the deficiencies identified in the campus-wide survey through demolition of structures and systems that are beyond repair, construction of new buildings, improvements to existing buildings, upgrades to infrastructure and utilities, upgrades to hardscape and landscape, and various upgrades to comply with the Americans with Disabilities Act. As suggested by the "Comprehensive" title and the priority for "safety", these projects mitigate for all proximal natural hazards. Given the level of and potential for seismic events, this is the primary natural hazard addressed in every CMP project.

**Other Alternatives**: Build new facilities or continue to maintain and operate existing facilities.

**Existing Planning Mechanism(s) through which Action Will Be Implemented**: Comprehensive Modernization Program

**Responsible Office/Partners**: LAUSD Facilities Services Division

**Cost Estimate**: $3.6 billion

**Benefits (Losses Avoided)**: Life Safety, Property Protection

**Potential Funding**: Approximately $4.2 Billion in local Bonds of the overall Program funding is targeted to support the development of "comprehensive modernization" projects that will renovate, modernize, and/or reconfigure school sites.

**Timeline**: 2015 - 2024

**Project Priority**: High

### *Action 2. Barrier Removal Projects*

**Hazards Addressed**: Multi-hazard

**Goals Addressed**: 1, 2, 3

**Issue/Background**: During its meeting on Oct. 10, the school board approved the Self-Evaluation and Transition Plan, which utilizes approximately $600 million that was allocated in 2015 to remove barriers to program accessibility. The plan enables the District to further its efforts to comply with Title II of the ADA while satisfying accessibility requirements for students, employees, parents/guardians and community members.

**Project Description**: Projects will improve ADA-related paths of travel and infrastructure across the campuses. Infrastructure improvements include making facilities like drinking fountains accessible (to mitigate against impacts of Climate Change via heat related dehydration and to provide for emergency shelter for a vulnerable population). Path of travel will ensure safe and efficient passage in the case of Natural Emergencies, again, for a vulnerable part of the student/staff population.

**Other Alternatives**: Maintain and operate or abandon non-compliant facilities

**Existing Planning Mechanism(s) through which Action Will Be Implemented**: Facilities Services Division Asset Management, Project Execution and Access Compliance Units

**Responsible Office/Partners**: LAUSD Facilities Services Division

**Cost Estimate**: $600 million

**Benefits (Losses Avoided)**: Life Safety, especially of those with access and functional needs

**Potential Funding**: Approximately $600 million in local Bonds of the overall Program funding is targeted to support barrier removal and accessibility issues at school sites

**Timeline**: 2015 - 2025

**Project Priority**: Moderate as it pertains to Hazard Mitigation

### *Action 3. Energy Efficient Lighting Retrofit/ LAUSD Lighting Retrofit Project*

**Hazards Addressed**: Climate Change and SLR, Earthquake, Severe Weather, and Wildfire

**Goals Addressed**: 1, 2, 3

**Issue/Background**: The goal of the proposed energy efficient lighting retrofit project is to ensure adequate lighting to optimize the learning environment for students. The proposed project will replace existing lighting fixtures at 24 LAUSD schools with energy efficient light-emitting diode (LED) lights and controllers resulting in reducing the District's yearly energy usage by more than 3,521 megawatt hours (mWh). These schools were identified by energy audits which discovered that 40% of the District’s average annual electric usage is from lighting, 22% from cooling and 10% from ventilation. The 24 schools are located within the Environmental Justice (EJ) area where 10% of the population falls below the Federal poverty level, and particulate matter (PM) 2.5 microns.

**Project Description**: The proposed project for energy efficient lighting will replace existing lighting fixtures and bulbs at the designated schools. The work will be contracted to qualified vendors as mentioned above to replace lighting fixtures as old as ten years old.

The lighting retrofit project will follow technical specification guidelines to upgrade school lighting using LED luminaires, modules, drivers, wiring, and lighting controls. The project will use products and materials from approved manufacturers such as Osram, Philips, and General Electric. The specification guidelines provide descriptions of luminaire types (e.g. ceiling surface-mounted with wraparound diffusers, linear suspended direct/indirect, ceiling recessed troffer, enclosed and vandal resistant, etc.), where, and how they should be applied depending on the space (e.g. classroom, library, multi-purpose room) and where they will be physically located (e.g. wall or ceiling).

The project will comply with regulatory requirements and industry standards for installation, testing, hazardous waste disposal, protection, and cleanup, such as Illuminating Engineering Society of North America calculations, California Health and Safety Code, and other relevant regulatory standards.

**Other Alternatives**: N/A

**Existing Planning Mechanism(s) through which Action Will Be Implemented**: The LAUSD Facilities Services Division (FSD) is responsible for the execution of the District's school construction bond programs, the maintenance and operations of schools, the utilization of existing assets, and master planning for future capital projects. FSD completed the largest public works program in the nation building over 155 new schools valued at over valued at $27.5 billion. To date, more than 600 new construction projects providing more than 170,000 new seats have been delivered reducing overcrowding and reverting back to the traditional two-semester instructional calendar.

A LAUSD project manager will be assigned and the project managed by the Maintenance and Operations Branch of LAUSD’s Facilities Services Division.

**Responsible Office/Partners**: LAUSD Facilities Services Division (FSD)

**Cost Estimate**: $18 M

**Benefits (Losses Avoided)**:

- Continue to promote disaster resistant schools
- Reduce exposure to hazard related losses.
- Provide for the safety, health, and welfare of LAUSD staff, students, and visitors.
- Provide protection for existing and future development.
- Provide protection for critical facilities, utilities, and services.
- Support building systems that are physically safe, secure, efficient, and meet all state standards.

**Potential Funding**: FEMA and other grant programs; LAUSD budgets

**Timeline**: 18 Months

**Project Priority**: High

### *Action 4. Tree Management: Planting and Maintenance Projects/ Windsor Hills Elementary School Playground Repair and Greening Project*

**Hazards Addressed**: Earthquake, Liquefaction, Extreme Heat, Drought/, Heavy Rains and Storms, High Winds, Climate Change

**Goals Addressed**: 1, 2, 3

**Issue/Background**: The purpose of the proposed Playground Repair and Greening project is to mitigate the effects of an earthquake fault line in the playground and provide a safe play area for the elementary school students. This vertical and horizontal movement of the fault also creates a safety hazard by creating tripping hazards and by sink holes.

**Project Description**: The District proposes to mitigate this issue by removing the asphalt from fault line area and create a vegetated bio swale. The proposed project will also involve tree planting to address air quality (nitrogen oxides and sulfur oxides) and adding solar reflective coating to the playground to reduce heat gain.

- Eliminate or reduce asphalt maintenance in the earthquake fault line area.
- Create a visually appealing greenbelt in the playground.
- Create an educational opportunity for students to learn about sustainability, native plants, and the environment.
- Cool the playground by planting additional canopy trees.

**Other Alternatives**: No action

**Existing Planning Mechanism(s) through which Action Will Be Implemented**: This work will be contracted to qualified vendors in compliance with the District's procurement process. A project manager will be assigned to the project who will report to the program management team.

**Responsible Office/Partners**: LAUSD Facilities Services Division

**Cost Estimate**: $1.5M

**Benefits (Losses Avoided)**:

- Continue to promote disaster resistant schools
- Reduce exposure to hazard related losses.
- Provide for the safety, health, and welfare of LAUSD staff, students, and visitors.
- Provide protection for existing and future development.
- Provide protection for critical facilities, utilities, and services.
- Support building systems that are physically safe, secure, efficient, and meet all state standards.

**Potential Funding**: FEMA and other grant funding; LAUSD budgets

**Timeline**: 12 months

**Project Priority**: High

### *Action 5. Solar Photovoltaic (PV) Carport Installation / LAUSD Solar PV Carport Project*

**Hazards Addressed**: Climate Change and SLR, Severe Weather and Wildfire

**Goals Addressed**: 1, 2, 3

**Issue/Background**: The proposed project will increase non-carbon based energy capacity through renewable energy sources by installation of solar photovoltaic (PV) systems at five LAUSD schools. The proposed project will add approximately 1.5 megawatts (MW) of solar PV system to LAUSD's current portfolio of 21 MW. The proposed solar PV carport systems will be installed at schools located in the Environmental Justice (EJ) areas resulting in emission reductions from adjacent power-plants and zero emissions from on-site. The proposed project will also improve energy efficiency through reduced transmission losses.

**Project Description**: The contractor will provide and install a fully operational turnkey solar electric PV generating system for five (5) District school sites anticipated to generate a minimum of 1.5 MW direct-current (DC) including:

- preparation of engineering and design plans and specifications
- necessary permits and approval requirements
- products and materials
- complete installation
- connection to power grid
- prepare documentation for local electric utility for interconnection and all incentives
- maintenance of the systems for ten years from the commissioning date

The 1.5 MW solar PV system is expected to generate 2,425.6 mWh per year and generate zero emissions. Emission reductions were calculated based on the greenhouse gas emissions avoided from displacement of grid electricity from LADWP. Emissions per mWh from LADWP power plants were estimated using U.S. Environmental Protection Agency's Emissions & Generation Resource Integrated Database (eGRID).

**Other Alternatives**: Ground mounted solar pv systems

**Existing Planning Mechanism(s) through which Action Will Be Implemented**: The proposed project is to install solar PV carport systems at five schools through a design-build contract. One entity will be contracted to deliver the project by providing both design and construction services from initial concept to completion. The selected contractor will provide, on a turnkey basis, equipment procurement, supervision, labor, materials, equipment, and any other items for the proper execution and completion of the project, in accordance with contract documents and specifications

**Responsible Office/Partners**: A LAUSD project manager will be assigned and the project managed by the Maintenance and Operations Branch of LAUSD's Facilities Services Division.

**Cost Estimate**: $ 10M

**Benefits (Losses Avoided)**:

- Continue to promote disaster resistant schools
- Reduce exposure to hazard related losses.
- Provide for the safety, health, and welfare of LAUSD staff, students, and visitors.
- Provide protection for existing and future development.

- Provide protection for critical facilities, utilities, and services.
- Support building systems that are physically safe, secure, efficient, and meet all state standards.

**Potential Funding**: FEMA and other grant funding; LAUSD budgets

**Timeline**: 18 Months

**Project Priority**: High

### *Action 6. Radio System Modernization*

**Hazards Addressed**: All Hazards

**Goals Addressed**: 1, 2, 3

**Issue/Background**: Current radio systems are not interoperable between the School Buses and the School Police providing a limited number of channels for emergency communications. Critical Emergency Operations require radio communications

**Project Description**: This Radio Modernization project is to replace the two aging Radio Systems with one Unified Mission Critical Radio System that meets daily and emergency communication needs. The system is to be interoperable with other first responder public safety radio and communication networks. It will expand on current call capacity, availability and reliability.

**Other Alternatives**: No action

**Existing Planning Mechanism(s) through which Action Will Be Implemented**: ITD Strategic Plan, Bond Oversight Committee

**Responsible Office/Partners**: Information Technology Division, School Police, Transportation Services Division, School Operations, Emergency Operations

**Cost Estimate**: $38,088,893

**Benefits (Losses Avoided)**: Increases the number of communication channels available in an emergency. Thus allows the needs to be known at each site and responded with less lag time.

**Potential Funding**: BOND

**Timeline**: Completed by June 30, 2021

**Project Priority**: High

### *Action 7. ITD – Redundant Radio Core*

**Hazards Addressed**: All Hazards

**Goals Addressed**: 1, 2, 3

**Issue/Background**: Current Radio Systems have a singular CORE for the operations and routing of all radio communications. A failure in the core results in an outage of radio communications.

**Project Description**: Add a 2nd Radio Core to provide redundancy and improve reliability of the radio communications for emergency response.

On 10/15/2015 the District experienced an outage of the radio core for greater than 4 hrs severely limiting vital radio communications. School Police were able to borrow a channel from LA Police Department to vital communications (less channels than normal operations). The School Buses were limited to Radio to Radio communications.

**Other Alternatives**: No action

**Existing Planning Mechanism(s) through which Action Will Be Implemented**: Not Currently Planned

**Responsible Office/Partners**: Information Technology Division, School Police, Transportation Services Division, School Operations, Emergency Operations

**Cost Estimate**: $10 Million

**Benefits (Losses Avoided)**: Provide greater resiliency of the radio communication systems to insure availability for emergency communications at all times

**Potential Funding**: FEMA and other grants, BOND

**Timeline**: Not Planned

**Project Priority**: Medium

### *Action 8. Continuity of Operations Plan (Continuation from prior FEMA report)*

**Hazards Addressed**: All Hazards

**Goals Addressed**: 1, 2, 3

**Issue/Background**: Most District Offices / Divisions / Branches do not have a documented Business Continuity Plan. In the case of an emergency / loss of facility / loss of technology infrastructure, each business unit would be developing a plan on the fly to resume critical business functions

**Project Description**: Continuation of the Business Continuity project. Assist each business unit develop a business continuity plan for their organization. Coordinate tests / exercises of the business continuity plans. As of May 2018, 77 branches have started a Business Continuity Plan, 35 branches have "baselined" their plans and 1 branch has conducted an exercise of their plan.

**Other Alternatives**: Handle each emergency situation uniquely resulting in a loss of time and money for the District.

**Existing Planning Mechanism(s) through which Action Will Be Implemented:** Information Technology Division / Enterprise Planning Services. Executed as part of the Disaster Recovery Project.

**Responsible Office/Partners**: Information Technology Division and all Business Units

**Cost Estimate**: Executed as part of the Disaster Recovery Project

**Benefits (Losses Avoided)**: Each business unit has a base plan to operate from in an emergency situation to resume critical business functions in a timely manner.

**Potential Funding**: BOND for development; TBD for on-going maintenance and testing of the plans

**Timeline**: Baselined Plans complete by June 2020

**Project Priority**: Medium

### *Action 9. Disaster Recovery Project (Information Technology)*

**Hazards Addressed**: All Hazards

**Goals Addressed**: 1, 2, 3

**Issue/Background**: Currently the District's information assets are controlled in a single data center located in the Beaudry Headquarters Building.

**Project Description**: The building of a Secondary Data Center (ECOPOD) in Van Nuys that will serve as a Disaster Recovery site for the District's information assets and a co-located or cloud hosted Tertiary Data Center located out of the state of California in case of a large scale regional disaster that could hamper both District Data Centers

**Other Alternatives**: No action

**Existing Planning Mechanism(s) through which Action Will Be Implemented**: ITD Project Bond Over-Sight Committee

**Responsible Office/Partners**: Information Technology Division

**Cost Estimate**: $73,941,748

**Benefits (Losses Avoided)**: In the event a hazard causes an outage of the Main Data Center in the Beaudry Headquarters building. TIER 1 applications can resume within 24 hrs with minimal to no data loss. The remaining production application systems should be functional with 1 week of the declared disaster.

**Potential Funding**: BOND funded (95%) / General Fund (5%)

**Timeline**: Target Completion: June 2020

**Project Priority**: High

### *Action 10. Generator for the Gardena Network Node*

**Hazards Addressed**: All Hazards

**Goals Addressed**: 1, 2, 3

**Issue/Background**: In the event of a power outage all network communications equipment at the Gardena Network node would cease working and possibly be damaged by excessive heat.

**Project Description**: Add a generator to the Gardena Network node site to insure vital network communications equipment will remain running and cooled in the event of an electrical outage caused by a natural hazard.

**Other Alternatives**: No action

**Existing Planning Mechanism(s) through which Action Will Be Implemented**: ITD Disaster Recovery Program

**Responsible Office/Partners**: Information Technology Department

**Cost Estimate**: $790,000

**Benefits (Losses Avoided)**: Reliability of the District's network in times of electrical outage at the Gardena Network Node site.

**Potential Funding**: BOND

**Timeline**: Target Completion – August 2018

**Project Priority**: Medium

## *Drought Actions*

### *Action 11. Fixture (plumbing) retrofits/ LAUSD Water Fixture Retrofit Program*

**Hazards Addressed**: Drought & Water Supply

**Goals Addressed**: 1, 2, 3

**Issue/Background**: The water conservation fixture replacement program is intended to replace outdated fixtures and valves that are currently allowing high volumes of water to be wasted per flush with more water efficient toilets and urinals.

**Project Description**: The project proposes to remove older water closet assemblies that use 3.5 gallons per flush (gpf) and replace them with new fixtures using 1.28 gpf. Standard flush urinals can be replaced with .125 gpf urinals. These efforts can conserve water while generating continual cost savings through lower water bills over the long term.

**Other Alternatives**: No action

**Existing Planning Mechanism(s) through which Action Will Be Implemented**: The LAUSD Maintenance & Operations staff will plan and perform the work. The staffing will consist of 3 Plumbers and 3 Maintenance Workers. There is the potential to receive rebates from the LADWP for the material expenditures.

**Responsible Office/Partners**: LAUSD Maintenance & Operations Staff, Los Angeles Department of Water and Power

**Cost Estimate:** $1.5M

**Benefits (Losses Avoided)**:

- Continue to promote disaster resistant schools
- Reduce exposure to hazard related losses.
- Provide for the safety, health, and welfare of LAUSD staff, students, and visitors.
- Provide protection for existing and future development.
- Provide protection for critical facilities, utilities, and services.
- Support building systems that are physically safe, secure, efficient, and meet all state standards.

**Potential Funding**: FEMA and other grant funding; LAUSD Budgets

**Timeline**: 12 months

**Project Priority**: High

### *Action 12. Expand Use of Reclaimed Water/ LAUSD Recycled Water Project*

**Hazards Addressed**: Drought & Water Supply

**Goals Addressed**: 1, 2, 3

**Issue/Background**: The Los Angeles Unified School District (LAUSD) encourages the use of recycled water for landscape watering and other beneficial uses at selected schools. By implementing beneficial uses of recycled water, LAUSD can substantially reduce potable water usage, thereby conserving scarce resources and reducing water costs. LAUSD intends to install recycled water systems at selected new schools and retrofit existing potable water systems to accommodate recycled water at selected existing schools.

**Project Description**: The local water utility company will supply recycled water from the local wastewater treatment plant, which meets the minimum requirements for irrigation of landscape, parks, playgrounds, schoolyards and other publicly accessible areas.

The goal of the project is to convert irrigated areas at this site to recycled water that are currently served by potable water for irrigation. Through this project, LAUSD will be able to conserve potable supplies and will benefit being provided with reliable source of water that will not be restricted in terms of drought and will be charged a lesser rate.

**Other Alternatives**: No action

**Existing Planning Mechanism(s) through which Action Will Be Implemented**: All irrigation field upgrades for the reception of recycled water will be planned, designed and implemented by the LAUSD Maintenance & Operations Division personnel with coordination from the Los Angeles Department of Water and Power.

**Responsible Office/Partners**:

- Los Angeles Unified School District (LAUSD) Facilities Services Division
- California Department of Public Health
- California Department of Water Resources
- City of Burbank Water Reclamation Plant
- Los Angeles Bureau of Sanitation
- Los Angeles Department of Public Health
- Los Angeles Department of Water and Power
- Metropolitan Water District of Southern California

**Cost Estimate**: $500K

**Benefits (Losses Avoided)**:

- Continue to promote disaster resistant schools
- Reduce exposure to hazard related losses.
- Provide for the safety, health, and welfare of LAUSD staff, students, and visitors.
- Provide protection for existing and future development.
- Provide protection for critical facilities, utilities, and services.
- Support building systems that are physically safe, secure, efficient, and meet all state standards.

**Potential Funding**: FEMA and other grant funding; LAUSD budgets

**Timeline**: 12 months

**Project Priority**: High

## *Earthquake, Liquefaction, and Landslide Action*

### *Action 13. Seismic Safety*

**Hazards Addressed**: Earthquakes, Liquefaction, Landslide

**Goals Addressed**: 1, 2, 3

**Issue/Background**: Assembly Bill (AB) 300, enacted in 1999, required the Department of General Services to survey the State's public school buildings (Kindergarten through grade 12) for earthquake safety, and to submit a report of its findings to the Legislature. AB 300 identified 269 of the LAUSD's nearly 13,000 buildings for seismic evaluation. In 2006, upon further analysis by LAUSD staff, including site visits and field investigations, a total of 667 buildings were identified for seismic evaluation based upon AB 300 criteria and LAUSD's higher standards.

**Project Description**: Seismic evaluations have been performed on school buildings identified to be the most seismically vulnerable, and projects have been developed to address the buildings determined to be in the greatest need of structural upgrades. These projects prioritize mitigation for damage from earthquakes.

**Other Alternatives**: Maintain and operate or abandon non-compliant structures

**Existing Planning Mechanism(s) through which Action Will Be Implemented**: Facilities Services Division asset management program, Project Execution, A/E Services and Maintenance & Operations branches.

**Responsible Office/Partners**: LAUSD Facilities Services Division

**Cost Estimate**: $400 million

**Benefits (Losses Avoided)**: Life Safety, property protection

**Potential Funding**: Approximately $750 million in local Bonds of the overall Program funding is targeted to support the development of “comprehensive modernization” projects that will renovate, modernize, and/or reconfigure school sites. FEMA grant funding.

**Timeline**: 2012 - 2020

**Project Priority**: High

### *Action 14. Extreme Event: Earthquake*

**Hazards Addressed**: Earthquake; also multi-hazards

**Goals Addressed**: 1, 2, 3

**Issue/Background**: Extreme Event is a one-hour serious game for adults simulating disaster preparedness and response. It was designed to increase players' understanding of Community Disaster Resilience, and it does a remarkable job.

**Project Description**: Create game materials customized for LAUSD needs/roles. Promote game as a valuable preparedness activity for school staff and departments.

**Other Alternatives**: Promote use of standard, available Extreme Event materials.

**Existing Planning Mechanism(s) through which Action Will Be Implemented**: Emergency Services Programs

**Responsible Office/Partners**: Emergency Services

**Cost Estimate**: Staff time

**Benefits (Losses Avoided)**: Increases understanding of role the entire community plays in disaster prep and response; understanding of the role of the school District in larger community and interdependence with others in community. promotes thinking with a community-forward approach.

**Potential Funding**: None needed

**Timeline**: Two years to develop and test LAUSD materials

**Project Priority**: Medium

### *Action 15. Earthquake Early Warning*

**Hazards Addressed**: Earthquake, Liquefaction

**Goals Addressed**: 1, 2, 3

**Issue/Background**: Earthquake early warning systems use earthquake science and the technology of monitoring systems to alert devices and people when shaking waves generated by an earthquake are expected to arrive at their location. The seconds to minutes of advance warning can allow people and systems to take actions to protect life and property from destructive shaking. The USGS has been working to develop EEW for the United States, with the help of several cooperating organizations The goal is to create and operate an EEW system for the highest risk areas of the United States beginning with the West Coast states.

**Project Description**: In February of 2016 the USGS, along with its partners, rolled-out the next-generation ShakeAlert™ early warning test system in California. This "production prototype" has been designed for redundant, reliable operations. The system includes geographically distributed servers, and allows for automatic fail-over if connection is lost. This next-generation system will not yet support public warnings but will allow selected early adopters to develop and deploy pilot implementations that take protective actions triggered by the ShakeAlert™ warnings in areas with sufficient coverage. LAUSD plans to pilot the system in several schools, and if successful, expand to all schools.

**Other Alternatives**: None currently available. Option would be to wait for public warning system; even then, we would need our own system in schools.

**Existing Planning Mechanism(s) through which Action Will Be Implemented**: LAUSD Earthquake Program

**Responsible Office/Partners**: Emergency Services, ITD, Facilities, USGS, CalTech, Early Warning Labs

**Cost Estimate**: Unknown at this time.

**Benefits (Losses Avoided)**: Fewer deaths and injuries

**Potential Funding**: FEMA and other grant funding

**Timeline**: 18 months for pilot, then rollout to all within 5 years.

**Project Priority**: Medium

## *Extreme Heat Actions*

### *Action 16. HVAC Program/ LAUSD Heating Ventilation Air Conditioning Replacement Project*

**Hazards Addressed**: Extreme Heat, Climate Change, Sustainability

**Goals Addressed**: 1, 2, 3

**Issue/Background**: The HVAC replacement project was identified by schools with existing systems that were deteriorating or past their useful life.

The proposed Heating Ventilation and Air Conditioning Replacement (HVAC) project will provide adequate heating and cooling for students to optimize their learning environment. The project will involve replacement of deteriorating HVAC systems with energy efficient HVAC systems at eight (8) schools.

The work will involve demolition of existing HVAC systems and replacement with new HVAC systems. The proposed project will result in mitigating emissions from off-site sources and reduce energy consumption. The new system will include web-based energy management system for monitoring and set-point adjustment

**Project Description**: The proposed project will demolish existing HVAC systems to be replaced with new energy efficient systems resulting in reducing the District's yearly energy usage by 598,695 kilowatts hours (kWh). The schools are located within the Environmental Justice (EJ) area where 10% of the population falls below the Federal poverty level, and particulate matter (PM) 2.5 microns.

The HVAC replacement project will follow technical specifications to upgrade existing deteriorated systems located at various buildings on the school campus which may include cafeterias, administrative buildings, classrooms, auditoriums, and bungalows. The project will involve demolition of the existing system which may be a composite of various pieces and installation of a new energy efficient system. The LAUSD design team will utilize an approach to provide improved intake and meet current code requirements. The preferred HVAC system by LAUSD and estimated capacity are described in the technical specifications and will be customized for each school.

**Other Alternatives**: No action

**Existing Planning Mechanism(s) through which Action Will Be Implemented**: This work will be contracted to qualified vendors in compliance with the District's procurement process. A project manager will be assigned to the project who will report to the program management team.

**Responsible Office/Partners**: (LAUSD Facilities Services Division

**Cost Estimate**: $34M

**Benefits (Losses Avoided)**:

- Continue to promote disaster resistant schools
- Reduce exposure to hazard related losses.

- Provide for the safety, health, and welfare of LAUSD staff, students, and visitors.
- Provide protection for existing and future development.
- Provide protection for critical facilities, utilities, and services.
- Support building systems that are physically safe, secure, efficient, and meet all state standards.

**Potential Funding**: FEMA and other grant funding; LAUSD budgets

**Timeline**: 24 Months

**Project Priority**: High

## *Radon Actions*

### *Action 17. Radon Mitigation in All New Buildings Constructed in "High" Radon Zones and Where Feasible in Existing School Buildings.*

**Hazards Addressed**: Radon concentrations in indoor air above 4.0 Pico Curries per liter of air (pCi/L)

**Goals Addressed**: 1, 2, 3

**Issue/Background**: LAUSD has approximately 152 properties including Early Education Centers, Elementary Schools, and High Schools in "High" radon zones.

**Project Description**: Incorporate radon mitigation measures in all new buildings constructed and where feasible in existing school buildings located in "High" radon zones. May include installation of airtight liners in the bottom of building foundations along with a vented crawl space above the foundation with fans capable of blowing radon-impacted air through piping to the roof for venting to the atmosphere.

**Other Alternatives**: Upgrading existing HVAC systems in all current buildings in "High" radon zones.

**Existing Planning Mechanism(s) through which Action Will Be Implemented**: During implementation of the LAUSD's Strategic Execution plan, evaluate/investigate radon impacts at school campuses located in "High" radon zones as part of the environmental due diligence process to identify appropriate mitigation measures.

**Responsible Office/Partners**: LAUSD-Office of Environmental Health and Safety/Facilities Services Division, Project Execution, Maintenance and Operations.

**Cost Estimate**: Approximately $30 per square foot (includes bi-annual radon testing)

**Benefits (Losses Avoided)**: Lung cancer in staff and students who occupy these buildings multiple hours daily over 100 days per year. US EPA estimates 20,000 deaths in the USA due to radon annually.

**Potential Funding**: TBD

**Timeline**: Policy enacted June 12, 2017. No end date.

**Project Priority**: High radon zones only at this time

# Chapter 6 Plan Adoption

**Requirement §201.6(c)(5): [The local hazard mitigation plan shall include] documentation that the plan has been formally approved by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, county commissioner, Tribal Council).**

The purpose of formally adopting this plan is to secure buy-in from LAUSD, raise awareness of the plan and the risks and vulnerabilities of natural hazards in the community, and to formalize the plan's implementation. The adoption of this plan completes Planning Step 9 of the 10-step planning process: Adopt the Plan, in accordance with the requirements of the Disaster Mitigation Act (DMA) of 2000. A resolution was created for LAUSD. A copy of the generic resolution and the executed copies are included in Appendix D: Adoption Resolution.

# Chapter 7 Plan Implementation and Maintenance

**Requirement §201.6(c)(4): [The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.**

Implementation and maintenance of this 2018 LHMP Update is critical to the overall success of hazard mitigation planning. This is Planning Step 10 of the 10-step planning process. This chapter provides an overview of the overall strategy for plan implementation and maintenance and outlines the method and schedule for monitoring, updating, and evaluating the Plan. The chapter also discusses incorporating the Plan into existing planning mechanisms and how to address continued public involvement.

Chapter 3 Planning Process includes information on the implementation and maintenance process since the 2012 LHMP Update was adopted. This section includes information on the implementation and maintenance process for this 2018 LHMP Update.

## 7.1 Implementation

Once adopted, this plan faces the truest test of its worth: implementation. While this plan contains many worthwhile actions, the District will need to decide which action(s) to undertake first. Two factors will help with making that decision: the priority assigned the actions in the planning process and funding availability. Low or no-cost actions most easily demonstrate progress toward successful plan implementation.

An important implementation mechanism that is highly effective and low-cost is incorporation of the hazard mitigation plan recommendations and their underlying principles into other plans and mechanisms, such as strategic plans, earthquake and stormwater plans, Emergency Operations Plans (EOPS), evacuation plans, and other hazard and emergency management planning efforts for LAUSD. The District already implements policies and programs to reduce losses to life and property from hazards. This plan builds upon the momentum developed through previous and related planning efforts and mitigation programs and recommends implementing actions, where possible, through these other program mechanisms.

Mitigation is most successful when it is incorporated into the day-to-day functions and priorities of the LAUSD. Implementation can be accomplished by adhering to the schedules identified for each action and through constant, pervasive, and energetic efforts to network and highlight the multi-objective, win-win benefits to each program and the LAUSD community and its stakeholders. This effort is achieved through the routine actions of monitoring agendas, attending meetings, and promoting a safe, sustainable community. Additional mitigation strategies could include consistent and ongoing enforcement of existing policies and vigilant review of programs for coordination and multi-objective opportunities.

Simultaneous to these efforts, it is important to maintain a constant monitoring of funding opportunities that can be leveraged to implement some of the more costly recommended actions. This could include creating and maintaining a bank of ideas on how to meet local match or participation requirements. When funding does become available, the District will be in a better position to capitalize on the opportunity. Funding opportunities to be monitored include special pre- and post-disaster funds, state and federal programs and earmarked funds, benefit assessments, and other state and federal grant programs, including those that can serve or support multi-objective applications.

### *Responsibility for Implementation of Goals and Activities*

The appointed officials and staff appointed to head each department within the District are charged with implementation of various activities in the plan. During the quarterly reviews as described later in this section, an assessment of progress on each of the goals and activities in this LHMP Update should be determined and noted. At that time, recommendations were made to modify timeframes for completion of activities, funding resources, and responsible entities. On a annual basis, the priority standing of various activities may also be changed. Some activities that are found not to be doable may be deleted from the LHMP Update entirely and activities addressing problems unforeseen during plan development may be added.

### 7.1.1. Role of Hazard Mitigation Planning Committee (HMPC) in Implementation and Maintenance

With adoption of this plan, LAUSD will be responsible for the plan implementation and maintenance. The HMPC identified in Appendix A (or a similar committee) will reconvene annually each year to ensure mitigation strategies are being implemented and the District continues to maintain compliance with the NFIP and other applicable mitigation programs. As such, LAUSD will continue its relationship with the HMPC, and:

- Act as a forum for hazard mitigation issues;
- Disseminate hazard mitigation ideas and activities to all participants;
- Pursue the implementation of high-priority, low/no-cost recommended actions;
- Ensure hazard mitigation remains a consideration for District decision makers;
- Maintain a vigilant monitoring of multi-objective cost-share opportunities to help the District implement the plan's recommended actions for which no current funding exists;
- Monitor and assist in the implementation and update of this plan;
- Report on plan progress and recommended changes to the District governing board; and
- Inform and solicit input from the public.

The primary duty of the District is to see the LHMP Update successfully carried out and to report to their governing board and the public on the status of plan implementation and mitigation opportunities. Other duties include reviewing and promoting mitigation proposals, considering stakeholder concerns about hazard mitigation, passing concerns on to appropriate entities, and posting relevant information on the District website.

## 7.2 Maintenance

Plan maintenance implies an ongoing effort to monitor and evaluate plan implementation and to update this plan as progress, roadblocks, or changing circumstances are recognized.

### 7.2.1. Maintenance Schedule

The LAUSD Office of Environmental Health and Safety (OEHS) is responsible for initiating plan reviews. In order to monitor progress and update the mitigation strategies identified in the mitigation action plan, LAUSD OEHS and the HMPC will revisit this plan annually each year and following a hazard event. The HMPC will meet annually to review progress on plan implementation. The HMPC will also submit a five-year written update to the State and FEMA Region IX, unless disaster or other circumstances (e.g., changing regulations) require a change to this schedule. With this plan update anticipated to be fully approved and adopted in late 2018, the next plan update for the LAUSD Planning Area will occur in 2023.

### 7.2.2. Maintenance Evaluation Process

Evaluation of progress can be achieved by monitoring changes in vulnerabilities identified in the plan. Changes in vulnerability can be identified by noting:

- Decreased vulnerability as a result of implementing recommended actions;
- Increased vulnerability as a result of failed or ineffective mitigation actions; and/or
- Increased vulnerability as a result of new development (and/or annexation).
- Increased vulnerability resulting from unforeseen or new circumstances.

Updates to this plan will:

- Consider changes in vulnerability due to action implementation;
- Document success stories where mitigation efforts have proven effective;
- Document areas where mitigation actions were not effective;
- Document any new hazards that may arise or were previously overlooked;
- Incorporate new data or studies on hazards and risks;
- Incorporate new capabilities or changes in capabilities;
- Incorporate growth and development-related changes to infrastructure inventories; and
- Incorporate new action recommendations or changes in action prioritization.

Changes will be made to this plan to accommodate for actions that have failed or are not considered feasible after a review of their consistency with established criteria, time frame, District priorities, and/or funding resources. All mitigation actions will be reviewed as well during the monitoring and update of this plan to determine feasibility of future implementation. Updating of this plan will be by written changes and submissions, as the HMPC deems appropriate and necessary, and as approved by the District governing board. In keeping with the five-year update process, the HMPC will convene public meetings to solicit public input on this plan and its routine maintenance and the final product will be again adopted by the District Board.

#### *Annual Plan Review Process*

For the LHMP Update review process, LAUSD OEHS, as lead will be responsible for facilitating, coordinating, and scheduling reviews and maintenance of the plan. The LHMP is intended to be a living document. The review of the 2018 LHMP Update will normally occur on a annual basis each year and will be conducted by the HMPC as follows:

- The LAUSD OEHS will place an advertisement in the local newspaper advising the public of the date, time, and place for each annual review of the LHMP Update and will be responsible for leading the meeting to review the plan.
- Notices will be mailed to the members of the HMPC, federal, state, and local agencies, non-profit groups, local planning agencies, representatives of business interests, neighboring communities, and others advising them of the date, time, and place for the review.
- District officials will be noticed by email and telephone or personal visit and urged to participate.
- Prior to the review, department heads and others tasked with implementation of the various activities will be queried concerning progress on each activity in their area of responsibility and asked to present a report at the review meeting.
- The local news media will be contacted, and a copy of the current plan will be available for public comment on the LAUSD OEHS website.
- After the review meeting, minutes of the meeting and an annual report will be prepared by the HMPC and forwarded to the news media (public) and all District departments. The report will also be presented to the District Board of Education for review, and a request will be made that the Board take action to recognize and adopt any changes resulting from the review.
- A copy of the 2018 LHMP Update will be continually posted on the District's website as will the annual status report.

### *Criteria for Annual Reviews*

The criteria recommended in 44 CFR 201 and 206 will be utilized in reviewing and updating the plan. More specifically, the reviews should include the following information:

- District growth or change in the past year.
- The number of substantially damaged or substantially improved structures by flood zone.
- The renovations to District infrastructure including water, sewer, drainage, roads, bridges, gas lines, and buildings.
- Natural hazard occurrences that required activation of the Emergency Operations Center (EOC) and whether or not the event resulted in a presidential disaster declaration.
- Natural hazard occurrences that were not of a magnitude to warrant activation of the EOC or a federal disaster declaration but were severe enough to cause damage in the District or closure of offices, schools, or public services.
- The dates of hazard events descriptions.
- Documented damages due to the event.
- Closures of places of employment or schools and the number of days closed.
- Road or bridge closures and other school access routes due to the hazard and the length of time closed.
- Assessment of the number of District buildings damaged and whether the damage was minor, substantial, major, or if buildings were destroyed.
- Review of any changes in federal, state, and local policies to determine the impact of these policies on the District and how and if the policy changes can or should be incorporated into the LHMP. Review of the status of implementation of projects (mitigation strategies) including projects completed will be noted. Projects behind schedule will include a reason for delay of implementation.

## 7.2.3. Incorporation into Existing Planning Mechanisms

Another important implementation mechanism that is highly effective and low-cost is incorporation of the 2018 LHMP Update recommendations and their underlying principles into other District plans and mechanisms. Where possible, the District will use existing plans and/or programs to implement hazard mitigation actions. As previously stated in Section 7.1 of this plan, mitigation is most successful when it is incorporated into the day-to-day functions and priorities of government and development. The point is re-emphasized here. As described in this plan's capability assessment, the District already implements policies and programs to reduce losses to life and property from hazards. This plan builds upon the momentum developed through previous and related planning efforts and mitigation programs and recommends implementing actions, where possible, through these other program mechanisms. These existing mechanisms include:

- District master and strategic plans
- District Emergency Operations Plans and other emergency management efforts
- District regulations and requirements
- Flood/stormwater management/master plans
- Fire protection plans
- Capital improvement plans and budgets
- Other plans and policies outlined in the capability assessment
- Other plans, regulations, and practices with a mitigation focus

HMPC members involved in these other planning mechanisms will be responsible for integrating the findings and recommendations of this plan with these other plans, programs, etc., as appropriate. As described in Section 7.1 Implementation, incorporation into existing planning mechanisms will be done through the routine actions of:

- monitoring other planning/program agendas;
- attending other planning/program meetings;
- participating in other planning processes; and
- monitoring community budget meetings for other District program opportunities.

The successful implementation of this mitigation strategy will require constant and vigilant review of existing plans and programs for coordination and multi-objective opportunities that promote a safe, sustainable community.

Examples of incorporation of the LHMP into existing planning mechanisms include:

1. As recommended by Assembly Bill 2140, the County should adopt (by reference or incorporation) this LHMP into the Safety Element of their General Plan. Evidence of such adoption (by formal, certified resolution) shall be provided to CAL OES and FEMA.
2. Integration of wildfire actions identified in this mitigation strategy and those established in existing CWPPs, such as the Lake County CWPP. Key people responsible for development of the Lake County CWPP participated on the HMPC. Key projects were identified and integrated into the this LHMP. Actual implementation of these projects will likely occur through the CWPP process.
3. Integration of flood actions identified in this mitigation strategy with implementation priorities in existing Watershed and Stormwater Drainage Plans. Key people responsible for development and implementation of the County's Watershed Master Plans and Stormwater Master Plan participated on the HMPC. Key projects were identified and integrated specifically into this LHMP, while others currently of lessor priority should be referenced in their source document. Actual implementation of these projects will likely occur through the watershed and stormwater plans' processes through the efforts of each responsible department.

4. Use of risk assessment information to inform future updates of the hazard analysis in the LAUSD Emergency Operations Plan.

Efforts should continuously be made to monitor the progress of mitigation actions implemented through these other planning mechanisms and, where appropriate, their priority actions should be incorporated into updates of this hazard mitigation plan.

### 7.2.4. Continued Public Involvement

Continued public involvement is imperative to the overall success of the plan's implementation. The update process provides an opportunity to solicit participation from new and existing stakeholders and to publicize success stores from the plan implementation and seek additional public comment. The plan maintenance and update process will include continued public and stakeholder involvement and input through attendance at designated District meetings, web postings, press releases to local media, and through public hearings.

#### *Public Involvement Process for Annual Reviews*

The public will be noticed by placing an advertisement in the newspaper specifying the date and time for the review and inviting public participation. The HMPC, local, state, and regional agencies will be notified and invited to attend and participate.

#### *Public Involvement for Five-year Update*

When the HMPC reconvenes for the update, they will coordinate with all stakeholders participating in the planning process—including those that joined the committee since the planning process began—to update and revise the plan. In reconvening, the HMPC will identify a public outreach strategy involving the greater public. The strategy will include a plan for public involvement and will be responsible for disseminating information through a variety of media channels detailing the plan update process. As part of this effort, public meetings will be held and public comments will be solicited on the plan update draft.