Draft 2021 Local Hazard Mitigation Plan

Palmdale Water District

Palmdale, CA

July 26, 2021

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Acronyms and Abbreviations

CFR	Code of Federal Regulations
cfs	cubic feet per second
CIP	Capital Improvement Plan
District	Palmdale Water District
DMA	District Mitigation Act
du	dwelling unit
DWR	Department of Water Resources
EPA	Environmental Protection Agency
FEMA	Federal Emergency Management Agency
HMGP	Hazard Mitigation Grant Program
HMP	Hazard Mitigation Plan
LCID	Littlerock Creek Irrigation District
LHMP	Local Hazard Mitigation Plan
mgd	million gallons per day
mL	milliliters
mph	miles per hour
MPN	most probable number
NFIP	National Flood Insurance Program
PWRP	Palmdale Water Reclamation Plant
RRA	Risk and Resilience Assessment
SARS	severe acute respiratory syndrome
SCADA	Supervisory Control and Data Acquisition
SR	State Route
SWP	State Water Project
USAF	United States Air Force
UWMP	Urban Water Management Plan
WHO	World Health Organization

1 Introduction

The purpose of this Local Hazard Mitigation Plan (LHMP) is to reduce long-term risks to people and property from either natural or anthropogenic, man-made and technological hazards. The Palmdale Water District (District) LHMP is the representation of the District's commitment to reduce risks from hazards and serves as a guide for decision-makers as they commit resources to reducing the effects of hazards.

This LHMP complies with the Disaster Mitigation Act of 2000 (DMA 2000), Federal Register 44 Code of Federal Regulations (CFR) Parts 201 and 206, which modified the Robert T. Stafford Disaster Relief and Emergency Assistance Act – Mitigation Planning. This law, as of November 1, 2004, requires local governments develop and submit hazard mitigation plans as a condition of receiving Hazard Mitigation Grant Program (HMGP) funding and other disaster assistance and mitigation funding. The overall intent of this LHMP is to reduce or prevent injury and damage from hazards. It identifies past and present mitigation activities, current policies and programs, and mitigation strategies for the future. This LHMP also guides hazard mitigation activities by establishing hazard mitigation goals and objectives.

Federal law and the State of California's requirements for hazard mitigation plans require coverage of only natural hazards. The District's 2020 Risk and Resilience Assessment/Emergency Response Plan includes technological and human-caused hazards as well as natural hazards. The planning team decided to cover both natural and technological/human-caused hazards for the LHMP, including a description and analysis of each hazard.

The LHMP is a "living document" that will be reviewed and updated regularly to reflect changing conditions and improvements from new information, especially information on local planning activities. The Federal Emergency Management Agency (FEMA) has produced a Local Mitigation Plan Review Tool Regulation Checklist (Appendix A**)**. The Plan Review Tool has a regulation checklist that provides a summary of FEMA's evaluation of whether the plan has addressed all requirements. The planning requirements set forth in the CFR are identified throughout this plan, mirroring the order of the FEMA Regulation Checklist in the Local Mitigation Plan Review Tool.

1.1 Grant Programs with Mitigation Plan Requirements

The District applied for a grant to update its LHMP and on April 23, 2020 FEMA approved it (HMGP #4407-238-25P) The grant obligates federal funds pay for 75 percent of the cost and requires the District to pay the remaining 25 percent. The final LHMP must comply with the *Standard Hazard Mitigation Grant Program Conditions* as amended in August 2018. All work must be completed no later than October 23, 2022. If these conditions are not met, federal funds may be de-obligated. In compliance with the National Environmental Policy Act , this undertaking is categorically excluded from the need to prepare either an environmental assessment or an environmental impact statement.

2 Planning Process

Hazard mitigation is any sustained action taken to reduce or eliminate the long-term risk to human life and property from hazards. In general, hazard mitigation is work done to minimize the impact of a hazard event before it occurs, with the goal of reducing losses from future disasters. For the District, hazard mitigation planning is a process in which the District will:

- Identify and profile hazards that affect the service area.
- Analyze their facilities and equipment at risk from those hazards.
- Develop a mitigation strategy and actions to lessen or reduce the impact of the profiled hazards.
- Implement the strategy and actions that may involve planning, policy changes programs, project, and other activities.

The requirements for documentation of the LHMP planning process are described below in the FEMA Regulation Checklist: Planning Process. This section summarizes the planning team's hazard mitigation planning efforts in 2021. Additionally, the section describes public and stakeholder outreach efforts as part of the LHMP planning process. The section also summarizes the review and incorporation of existing plans, studies, and reports used to develop the LHMP. Documentation of the 2021 LHMP planning process for the Hazard Mitigation Planning Team is provided in Appendix B; documentation of the process for the public and stakeholders is found in Appendix C. These appendices document the planning meetings and outreach and include meeting agendas, presentations, sign-in sheets, minutes, social media materials, and other documentation used to conduct the planning process.

FEMA REGULATION CHECKLIST: PLANNING PROCESS

Documentation of the Planning Process

44 CFR § 201.6(c)(1): The plan shall include documentation of 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.

Elements

A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? 44 CFR § 201.6(c)(1).

A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? 44 CFR 201.6(b)(2)

A3. Does the Plan document how the public was involved in the planning process during the drafting stage?

44 CFR 201.6(b)(1) and 201.6(c)(1)

A4. Does the Plan document the review and incorporation of existing plans, studies, reports, and technical information? 44 CFR 201.6(b)(3)

Source: FEMA, *Local Mitigation Planning Handbook Review Tool,* March 2013.

The planning process began with the District establishing the planning area and emailing stakeholders within the planning area to invite them to participate in the process. In addition, the District identified the financial and technical resources required to update the LHMP. Once all the District's financial and technical resources were identified, the District established the planning team and created a schedule for the process.

2.2 Plan History

The 2021 LHMP is an update of the Palmdale Water District Local Hazard Mitigation Plan December 2008 Plan (2008 HMP/Plan). It updates and consolidates hazards analyzed in the previous plan and adds new hazards. The 2021 LHMP contains many of the mitigation actions listed in the 2008 version as mitigation activities are ongoing and still relevant.

2.3 Plan Purpose and Authority

The purpose of the LHMP is to identify natural, technological, and anthropogenic-caused hazards that impact the District, to assess the vulnerability and risk posed by those hazards to District-wide human and structural assets, to develop strategies for mitigation of those identified hazards, to present future maintenance procedures for the plan, and to document the planning process. It is prepared in compliance with DMA 2000 requirements and represents an updated LHMP.

The resolution adopting this plan by the Palmdale Water District Board can be found in Appendix D. [Note to Public Reviewer: This appendix will be added after the District Board adopts this Hazard Mitigation Plan at the end of this process.]

FEMA REGULATION CHECKLIST: PLAN ADOPTION

<u>Adoption by the Local Governing Body</u>

44 CFR § 201.6(c)(5): The local hazard mitigation plan shall include "[d]documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, County Commissioner, Tribal Council).

<u>Element</u>

E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval?

Source: FEMA, Local Mitigation Plan Review Tool, March 2013.

2.4 Participation in the Planning Process

In March 2021, the planning process for the 2021 LHMP began. Select District staff were invited to join the Hazard Mitigation Planning Team (planning team) to develop the 2021 LHMP. The planning team can be found below in Table 2-1Documentation is located in Appendix B and Appendix C.

Email solicitations were sent to other utility companies and cities within the service area, requesting participation in the LHMP planning process. Documentation of the emails is contained in Appendix C, Public and Stakeholders Involvement.

2.5 Planning Team

Members of the core LHMP planning team are listed in Table 2-1.

Table 2-1. Planning Team

Department or Agency	Member Name	Key Role
Palmdale Water District	Chris Bligh	Data Input & Reviewer
Palmdale Water District	Jennifer Emery	Grant Manager & Reviewer
Palmdale Water District	Adam Ly	Project Manager & Reviewer
Palmdale Water District	Mynor Masaya	Data Input & Reviewer
Palmdale Water District	Heather Oates	Reviewer
Palmdale Water District	Judy Shay	Coordinator & Reviewer

2.6 Planning Team Activities

In progress.

2.7 Community Engagement

In progress.

2.8 Review of Existing Plans, Reports, Technical Documents, and Data

The planning team used various resource documents and references to update the LHMP. Table 2-2 contains a comprehensive list of guidance tools incorporated to create the current Plan.

Table 2-2. List of Existing Information

Referenced Document or Technical Source	Resource Type	Description of Reference and Its Use
Palmdale Water District Local Hazard Mitigation Plan December 2008	Hazard Mitigation Plan	The LHMP assesses hazard vulnerabilities and identifies mitigation actions that jurisdictions will pursue to reduce the level of injury, property damage, and community disruption that might otherwise result from such events.
2020 Risk and Resilience Assessment for Water	Risk and Resilience Assessment	Risk and resilience refer to the preparation that utilities must undergo to avoid disruptions in water quality and delivery due to emergencies such as natural disasters, accidents. or international acts.
2020 Urban Water Management Plan (UWMP) Draft	UWMP	The UWMP Act requires water agencies to develop UWMPs to provide a framework for long-term water planning and information regarding long-term resource planning to ensure sufficient water supplies are available to meet existing and future demands. Urban water suppliers must report, describe, and evaluate water deliveries and uses, water supply sources, efficient water uses, demand management measures, and water shortage contingency planning.
Littlerock Dam Emergency Action Plan	Response Plan	The District has developed an Emergency Action Plan to prepare for and mitigate the effects of a dam failure. The response procedures and organization strategies provide a step-by-step guide to response and operations during a failure.
Palmdale Water District Emergency Response Plan December 2020	Response Plan	In compliance with the America's Water Infrastructure Act, The District updated its emergency response plan to better prepare for, respond to, recover from, and mitigate natural and man-made disasters.
Los Angeles County Operational Area Emergency Response Plan	Comprehensive Response Plan	All hazards emergency response plan.
Federal Emergency Management Agency	Technical and Planning Resource	Resource for LHMP guidance (how-to series), floodplain and flood-related National Flood Insurance Program (NFIP) data (mapping, repetitive loss, NFIP statistics), and historic hazard incidents. Used in the risk assessment and mitigation strategy.

Table 2-2. List of Existing Information

Referenced Document or Technical Source	Resource Type	Description of Reference and Its Use
National Centers for Environmental Information https://www.ncdc.noaa.gov/data-access	Technical Resource	Online resource for weather-related data and historic hazard event data. Used in the risk assessment.
National Integrated Drought Information System (2019) https://www.drought.gov/drought/	Technical Resource	Source for drought-related projections and conditions. Used in the risk assessment.
National Inventory of Dams (2018) https://www.fema.gov/2018-national-inventory-dams	Technical Resource	Database used in the dam failure hazard profiling. Used in the risk assessment.
National Weather Service https://www.weather.gov/	Technical Resource	Source for hazard information, data sets, and historical event records. Used in the risk assessment.
United States Geological Survey (2018). Earthquake Hazards Program. https://earthquake.usgs.gov/hazards/hazmaps/conterminous/	Technical Data	Source for geological hazard data and incident data. Used in the risk assessment.
Western Regional Climate Center https://wrcc.dri.edu/	Website Data	Online resource for climate data used in climate discussion.

3 Palmdale Water District Profile

3.1 Location

the City of The District is located in Palmdale, California, within the Antelope Valley in Los Angeles County, and approximately 60 miles north of the City of Los Angeles and 50 miles west of the City of Victorville. The District's primary service area includes the central, eastern, and southern portions of the City of Palmdale and adjacent unincorporated areas of Los Angeles County. The District encompasses approximately 187 square miles and serves approximately 126,000 people through about 27,000 service connections.

In addition to the primary service area, there is a federal land area of approximately 65 square miles upstream of Littlerock Dam in the Angeles National Forest. The lands in the area presently served by the District slope gently upward to the foot of the northeast-facing slopes of the San Gabriel Mountains. Elevations range from approximately 2,600 feet to 3,800 feet above sea level. Figure 3-1 indicates the service area and the boundaries of the Littlerock Dam land area.

3.1.1 Governing Bodies

The Palmdale Water District is an independent special district governed by a five-member Board of Directors. With the District's water service boundaries divided into five different areas, or divisions, a Director is elected to serve a 4-year term from each of these divisions. Directors must live in the division they are elected to serve and are elected by customers within the division boundaries.

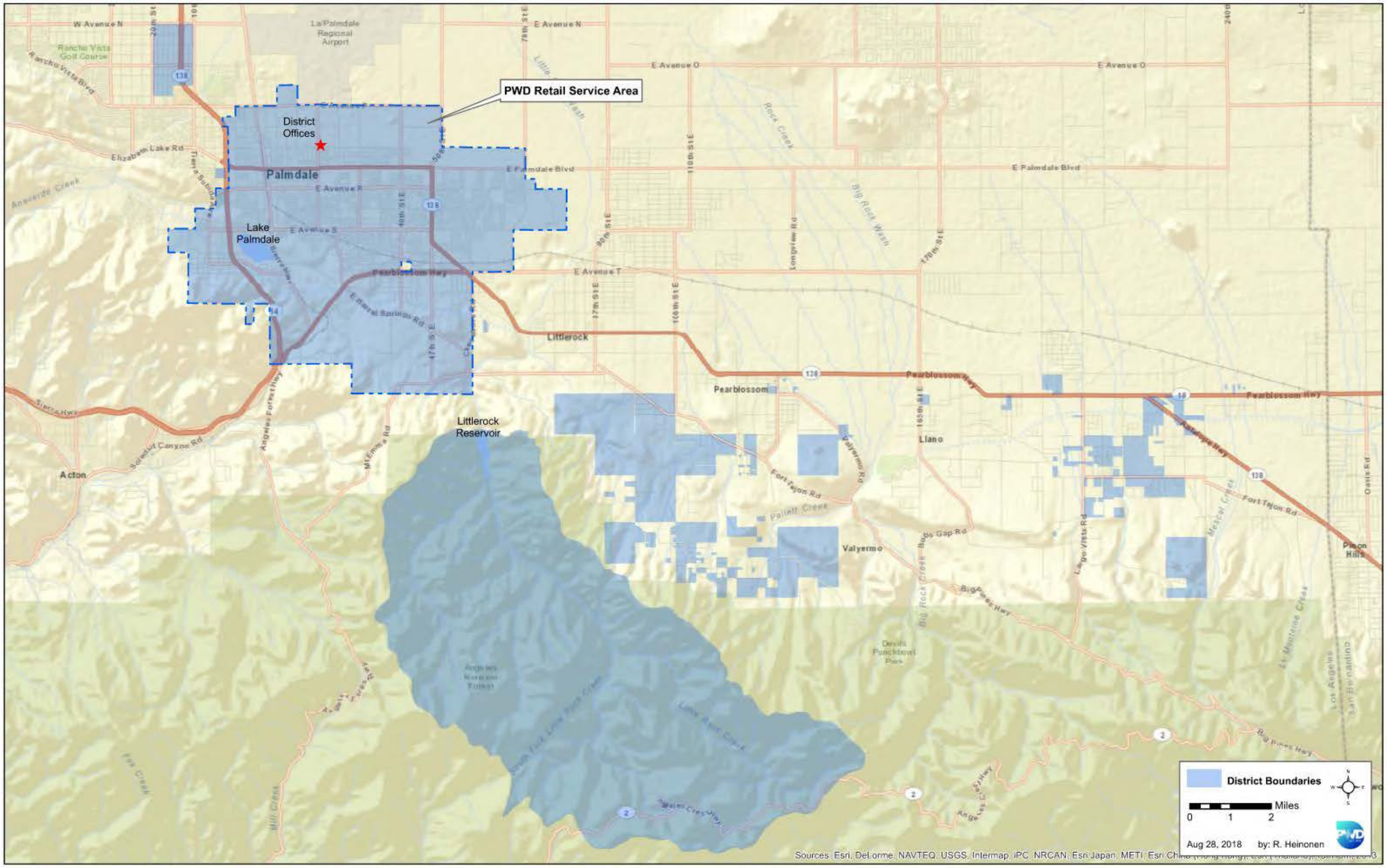
The Board of Directors has two regular meetings each month. They are held on the second and fourth Mondays. All meetings of the Board of Directors use Robert's Rules of Order as a guideline and are governed by the Ralph M. Brown Act pursuant to the California Government Code sections 54950 et seq. The public is welcome to attend and there is a period reserved on each agenda for public comment.

3.1.2 Water Supply

The Palmdale Water District receives water from three sources: (1) Littlerock Dam and Reservoir; (2) the State Water Project (SWP) (imported water from Oroville to Southern California via the Sacramento River, the Bay-Delta, and the California Aqueduct); and (3) groundwater. The District acts as a retailer of water supplies for domestic, commercial, and industrial users. There are no agricultural deliveries made within the service area boundaries.

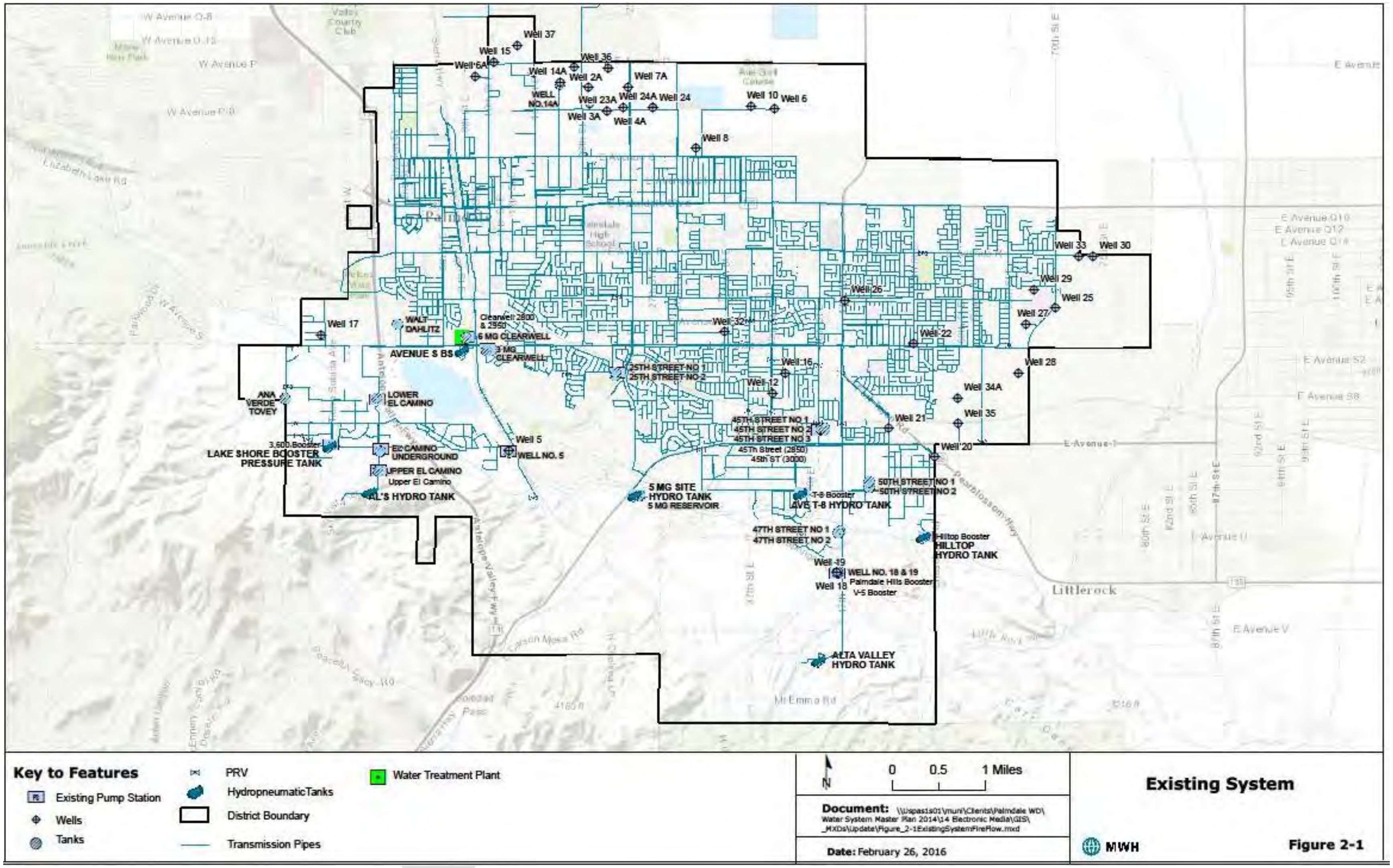
Figure 3-1 and Figure 3-2 show the Palmdale Water District's Boundaries and water supply system, respectively.

Figure 3-1. District Boundaries



PALMDALE WATER DISTRICT BOUNDARIES

Figure 3-2. Existing Water Supply System



The District uses Little Rock Creek as its local surface water supply source. The watershed is defined by the area tributary to Littlerock Reservoir, Palmdale Ditch, and Lake Palmdale. The SWP water is also stored in Palmdale Lake before delivery to the Palmdale Water Treatment Plant.

Littlerock Dam and Reservoir

The principal stream tributaries to the District's service area are Little Rock and Big Rock creeks, which flow north from the San Gabriel Mountains along the southern district boundary. Numerous intermittent streams also flow into the service area; however, run-off is meager. The Littlerock Dam and Reservoir intercepts flows from the Little Rock and Santiago canyons. Runoff from the 65 square mile watershed in the Angeles National Forest to the reservoir is seasonal and varies widely from year to year. For the period 1953-1999, average inflow was 13,285 acre-feet per year. The median inflow for this same period was 6,707 acre-feet per year. The difference between the median and average demonstrates that dry years occur more frequently than wet years and that wet years tend to be more extreme.

Littlerock Dam and Reservoir is located about 8.5 miles from the City of Palmdale and diverts water from Little Rock Creek. Since 1922, the District has shared water from this source with Littlerock Creek Irrigation District (LCID). The District and LCID jointly hold long-standing water rights to divert 5,500 acre-feet per year from Little Rock Creek flows. Per an agreement between the two districts, the first 13 cubic feet per second (cfs) of creek flows is available to LCID. Any flow above 13 cfs is shared between the two districts with 75 percent going to the Palmdale Water District and 25 percent to LCID. Each of the districts is entitled to 50 percent of the reservoir's storage capacity. Water from Littlerock Dam Reservoir is conveyed to Lake Palmdale through an open canal that is known as Palmdale Ditch.

In 1992, during renegotiations of the districts' agreement, a plan to rehabilitate the existing dam was implemented. The plan involved reinforcing the original multiple-arch construction with a roller-compacted concrete buttress, raising the dam by 12 feet to increase capacity, providing recreational facilities around the reservoir, and replacing the historic wooden trestle between the creek and the reservoir with an underground siphon. The entire project was completed by the end of 1995. This agreement gives the District the authority to manage the reservoir. LCID granted ownership of its water rights to the District for the 50-year term of the agreement in lieu of contributing financial resources for the rehabilitation work. LCID is entitled to purchase from the District, in any one calendar year, 1,000 acre-feet of water, or 25 percent of the yield, from Littlerock Reservoir, whichever is less. Upon expiration of the 1992 Agreement in 2042, the terms of the 1922 Agreement will again define and govern the rights and responsibilities of the District and LCID with respect to the dam and the waters stored in the reservoir.

California State Water Project

The SWP is the primary source for imported water in the Antelope Valley. The main transport structure of the SWP is the California Aqueduct, which conveys water from northern to southern California. This facility is managed by the California Department of

Water Resources (DWR). The aqueduct is an artificial concrete-lined water transport channel that is about 450 miles long.

The District is one of 29 contracting agencies having entitlements to water supplies from the SWP. The District has been able to take delivery of SWP water since 1985 from the east branch of the California Aqueduct, which passes through the service area. The District receives its entitlement from a 30 cfs connection on the east branch, where SWP water is conveyed to Lake Palmdale via a 30-inch-diameter pipeline. Lake Palmdale acts as a forebay for the District's 30 million gallons/day (mgd) water treatment plant and stores approximately 4,250 acre-feet of SWP water and Little Rock Creek water.

Groundwater

Groundwater is obtained from underground aquifers via 22 active wells scattered throughout the District and chlorinated prior to distribution. Three of the District's wells also pump water from deposits that are within the San Andreas Rift Zone. Because the water quality of the groundwater meets state and federal standards, the wells pump directly into the District's distribution system or into nearby holding tanks without the need for treatment, except for chlorination. Water is conveyed from the wells or treatment plant to the consumers via a distribution system with pipe sizes ranging between 2- and 42-inches in diameter. The District maintains 19 storage tanks within the distribution system, with a total capacity of 44.6 million gallons.

The District produces about 20,500 acre-feet annually, composed of approximately 60 percent surface water and 40 percent groundwater. The District is usually more dependent on groundwater in the winter, prior to the snowmelt.

Water Treatment Plant

The Palmdale Water District also owns and operates a water treatment plant known as the Leslie O. Carter Water Treatment Plant, which provides treatment for water extracted from Lake Palmdale. Lake Palmdale receives water from the two sources noted in the previous sections: the SWP and Littlerock Dam and Reservoir. Water is conveyed from the SWP via a 30-inch-diameter pipeline while water from Littlerock Dam and Reservoir is conveyed through the Palmdale Ditch. The treatment plant consists of chemical addition, flocculation, sedimentation, filtration, and disinfection. The capacity of the existing plant is 30 mgd. However, a water supply permit from the Department of Health Services requires that one filter be kept off-line as a redundant source. This limits the capacity of the plant to 28 mgd. The District upgraded the treatment plant to meet more stringent water quality regulations. These upgrades were completed in two phases. The upgrades now allow the treatment capacity of the plant to be increased to approximately 35 mgd.

3.2 Climate

The City of Palmdale is in the high desert (altitude - 2,600 to 3,800 feet above sea level), where the summers are very hot and dry, and winters are cold and windy. Palmdale has over 280 days of sunshine each year. The same weather pattern that brings the marine layer stratus and afternoon sea breeze to the Los Angeles Basin brings gusty winds to

Palmdale, especially near the foothills on the south side. Gusty southwest winds blow over Palmdale almost every afternoon and evening all year round.

- Average annual rainfall: 8.8 inches per year
- Average winter temperature: 63 degrees F (high); 37 degrees F (low)
- Average summer temperature: 95 degrees F (high); 63 degrees F(low)

3.3 History

The Palmdale Water District evolved from several private water companies. The first water agency, the Palmdale Irrigation Company, was established in 1886 to acquire land and water, and then rent, lease, and sell both as they were developed. As a means of providing water for these purposes, they constructed a 6.5-mile irrigation ditch to divert water from nearby Little Rock Creek to Palmdale.

Not long after, it became apparent that water storage facilities were needed. In 1895, the South Antelope Valley Irrigation Company constructed an earthen dam forming Harold Reservoir, known today as Lake Palmdale. To connect the water from Little Rock Creek to Harold Reservoir, they constructed another earthen ditch, including a flume and wooden trestle, parallel to the ditch used by the Palmdale Irrigation Company.

By the early 1900s, it was decided that one or more dams on Little Rock Creek were necessary. By this time, the Palmdale Water Company and Littlerock Creek Irrigation District had acquired the facilities of earlier water companies. Together, they studied the costs and options for constructing one or more dams on Little Rock Creek. It was determined that forming a public irrigation district was the best way to finance this construction. The Palmdale Irrigation District was then formed in 1918 by a vote of the public. It maintained a service area of about 4,500 acres and acquired the added facilities of the Palmdale Water Company.

Together with Littlerock Creek Irrigation District, financing and construction of the Littlerock Dam began on Little Rock Creek in August of 1922 and took 2 years to complete. At a height of 175 feet and a water storage capacity of 4,200-acre feet, it was noted as the highest reinforced concrete, multiple-arch dam in the U.S. However, controversy surrounded the design of Littlerock Dam, and by 1932, the State of California declared Littlerock Dam an unsafe structure and ordered renovations be made. By 1938, renovations had still not been completed. Subsequently, a 2-day storm caused major damage to the Littlerock Dam spillway as well as the flume and wooden trestle downstream of the dam. Repairs were made to the damage and by 1940, the re-construction of Littlerock Dam was considered complete.

Until the 1950s, the area within Palmdale Irrigation District's boundaries was primarily agricultural. However, with the activation of Air Force Plant 42 and the increased use of Edwards Air Force Base, agricultural water use diminished. As populations grew within the valley, the shift to domestic water began.

In 1963, the Palmdale Irrigation District entered into an agreement to purchase water from the newly planned SWP (also known as the California Aqueduct). This agreement guaranteed the District would have sufficient alternative source water to supply projected population growth well into its future. To contain the increased water supply, bonds were sold to rebuild and expand Lake Palmdale (formerly known as Harold Reservoir) to an increased capacity of over 4,100 acre-feet. This bond financing also allowed the construction of a new treatment facility adjacent to the lake. As a result, this new water supply enabled the Palmdale Irrigation District to service a broader area of Palmdale.

It was decided in 1973, that the Palmdale Irrigation District's name should be changed to the more appropriate Palmdale Water District. Founded as an irrigation district supplying water mainly to farms for agricultural use, the District's boundaries had expanded with Palmdale's rapid population growth, and the District shifted to providing predominantly municipal and industrial water. To put this substantial growth in perspective, from 1965 to 1985, water production grew from 4,100-acre feet per year to over 8,000-acre feet per year and then more than doubling the next 5 years. To keep up with demand, in 1987, the District constructed the Leslie O. Carter Water Treatment Plant that could process 12 million gallons of water per day. Later that year, Palmdale Water District and Littlerock Creek Irrigation District started planning new renovations to the Littlerock Dam.

Following extensive environmental and design work, in 1993, the Palmdale Water District and Littlerock Creek Irrigation District began to rehabilitate the dam in three phases. The first phase involved reinforcing the original multiple-arch construction with a roller-compacted concrete buttress. At the same time, the original dam was raised 12 feet, which doubled the reservoir's capacity.

The second phase of construction provided new recreational facilities around the reservoir. A dedication ceremony was held June 23, 1995, marking the re-opening of the Littlerock Dam area, which had remained closed during the renovation construction process. The final phase of construction included replacing the historic wooden trestle with an underground siphon, which was completed shortly thereafter.

As Palmdale's population continued to grow, it was determined that the water treatment plant built in 1987 would not support Palmdale's future water usage needs. An expansion of the facility was determined necessary and was completed in 1993, increasing the District's production capacity from 12 million to 30 million gallons of water per day.

From 1995 to 2020 the Palmdale Water District continued to improve and add to its water distribution and storage facilities. The District's boundaries now encompass approximately 187 square miles of land in northeastern Los Angeles County, consisting of more than 30 noncontiguous areas scattered throughout the Antelope Valley with the District's primary service area within the City of Palmdale's planning area. The distribution system has over 414 miles of pipeline ranging in size from 4 inches to 48 inches in diameter, 22 active water wells, 14 booster pumping stations, and 20 water tanks with a total storage capacity of 50 million gallons of water.

3.4 Demographics

According to the 2021 AV EDGE Economic Roundtable Report, there were 181,148 people living in the City of Palmdale. The median age is 32 years old. Approximately 45 percent of the population is white and 61 percent Hispanic or Latin. Spanish is spoken by 42 percent of the population.

Palmdale is policed by the Los Angeles County Sheriff's Department and the City is served by the Los Angeles County Fire Department.

3.5 Land Use and Development Trends

Historically, the Palmdale Water District has been primarily agricultural. However, in the mid-1970s, the District's service area shifted from agricultural to municipal and industrial uses. In the 2016 Water System Master Plan Update, the District's land use types were grouped into five categories: Residential, Commercial, Industrial, Open Space, and Other.

Residential-low density consists of those parcels that are zoned for 0-2 dwelling unit (du)/acre. Residential medium consists of those parcels zoned for 2-6 du/acre, which consists of most single-family homes. Residential-high density consists of those parcels zoned for 10-16 du/acre and consists mainly of apartment buildings, condominiums, and townhouses.

Commercial land use consists of the following land use types: business parks, downtown commercial, community commercial, neighborhood commercial, and regional commercial. Industrial land use consists of the following land use types: airport, community manufacturing, and industrial. Open space land use consists of open space and public facilities such as schools and public buildings.

Figure 3-3 presents a map of the City of Palmdale's Land Uses.

Figure 3-3. Land Use

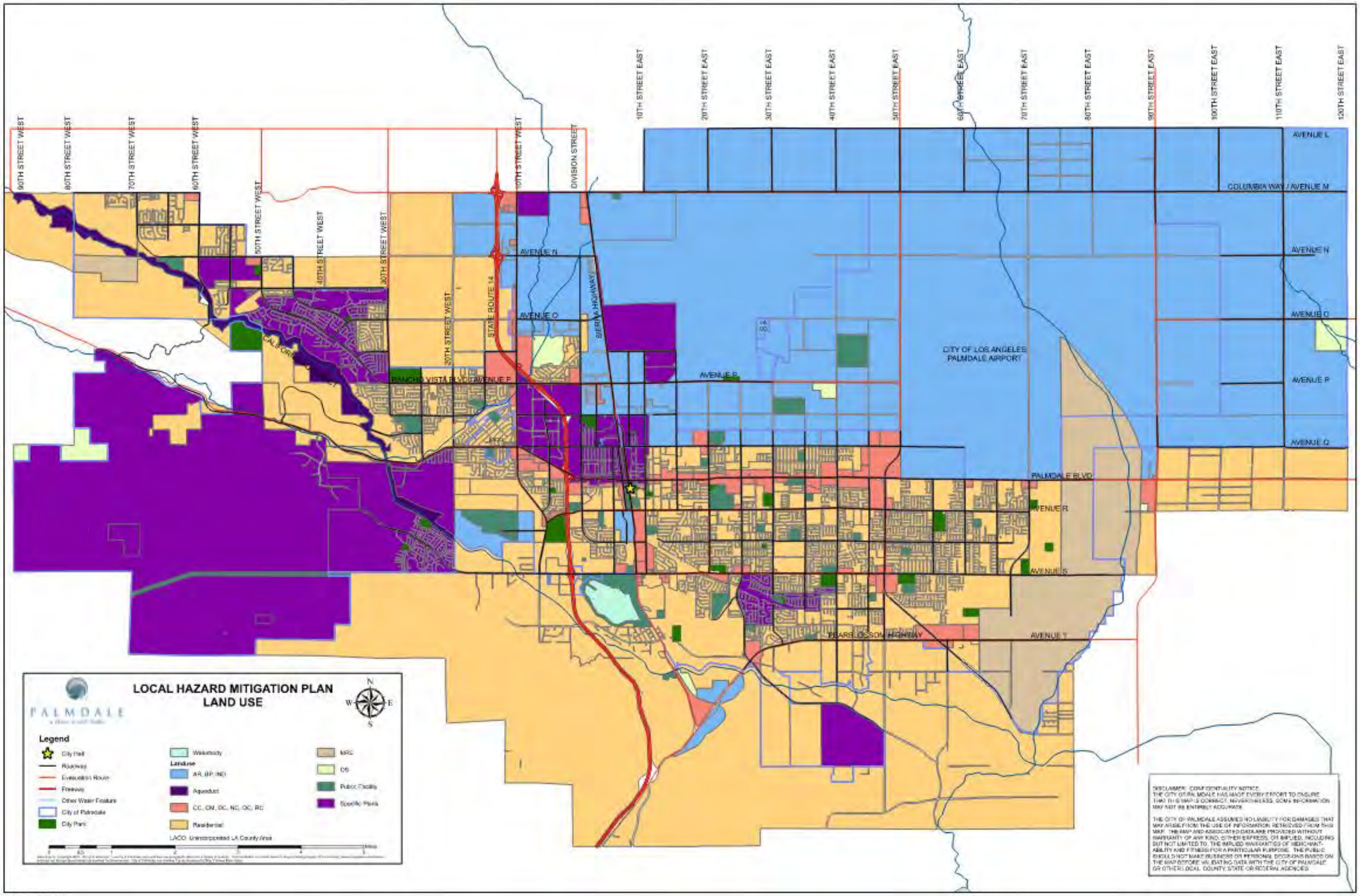


Table 3-1. Land Use Method Demand Projects

Land Use Type (Vacant Parcels)	Area (acres)	WDR (gpd/acre)	Demand (mgd)	Demand (acre-ft/yr)
Commercial	4,950	1,258	6.23	6,980
Industrial	650	1,074	0.70	790
Public	200	2,500	0.50	570
Low Density Residential	10,010	717	7.18	8,040
Medium Density Residential	1,620	3,309	5.36	6,000
High Density Residential	370	4,130	1.53	1,702
Non-Recreational Open Space	350	1,357	0.47	524
Unknown	3737	330	0.12	140
Total Vacant Parcel Demand				24,800
Existing Demand (2010)				19,800
Total Demand Excluding Conservation				**44,600**

Topographic constraints to development exist along the south and west portions of the planning area in the form of fault zones and foothills of the San Gabriel and Sierra Pelona Mountains. The San Andreas rift zone traverses the planning area from northwest to southeast and is designated as an Alquist-Priolo special study area requiring development setbacks. Within the rift zone are springs and wetland areas that have been preserved through the development process. A number of natural drainage courses and flood hazard areas traverse the planning area. Hills and ridges to the south and west of the developed portions of the City of Palmdale rise to over 4,500 feet in elevation, while developed portions of the city generally range in elevation from 2,400 to 2,700 feet.

The Palmdale Water District's Engineering Department is responsible for establishing any requirements or conditions and any estimates of fees and charges for providing water service to unserved properties within the District. To assist landowners through the process of providing water service to their newly developed properties, the District has developed guidelines to use to begin meeting the requirements set forth by the District.

4 Capabilities Assessment

The federal regulations require local mitigation plans to identify mitigation strategies for reducing long-term vulnerabilities to the identified hazards in the planning area that the District is capable of implementing and its ability to expand and/or improve its ability, see below.

FEMA REGULATION CHECKLIST: CAPABILITY ASSESSMENT

44 CFR § 201.6(c)(3): – The plan must include mitigation strategies based on the jurisdiction's "existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools."

Elements

C1. Does the plan document the jurisdiction's existing authorities, policies, programs and resources, and its ability to expand on and improve these existing policies and programs? 44 CFR § 201.6(c)(3).

C2. Does the Plan address the jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? 44 CFR § 201.6(c)(3)(ii).

Source: FEMA, *Local Mitigation Planning Handbook Review Tool,* March 2013.

A hazard mitigation plan's primary focus is the mitigation strategy. It represents the efforts selected by the District to reduce or prevent losses resulting from the hazards identified in the risk assessment. The strategy includes mitigation actions and projects to address the risk and vulnerabilities discovered in the risk assessment. The mitigation strategy consists of the following steps:

- Identify and profile hazards and risks within the service area.
- Identify projects and activities that can prevent or mitigate damage and injury to the population and buildings.
- Develop a mitigation strategy to implement the mitigation actions.
- Develop an action plan to prioritize, implement, and administer the mitigation actions.
- Implement the LHMP mitigation action plan.

A capability assessment was conducted of the District's authorities, policies, programs, and resources. From the assessment, goals and mitigation actions were developed. The planning team also developed a plan to prioritize, implement, and administer the mitigation actions to reduce risk to existing buildings and new development.

4.2 Planning, Program, and Regulatory Capabilities

An assessment of authorities, policies and programs, and resources was conducted to identify capabilities that reduce vulnerability to hazards. The capabilities include authorities and policies such as legal and regulatory resources, fiscal resources, and staff (e.g., technical personnel such as planners/engineers with knowledge of land development and land management practices, engineers trained in construction practices related to building and infrastructure, planners and engineers with an understanding of natural or human-caused hazards, floodplain managers, surveyors, personnel with GIS skills, and staff with expertise of the hazards in the planning area).

Planning and regulatory capabilities include local ordinances, policies, and laws to manage growth and development. Examples include land use plans, capital improvement plans, transportation plans, emergency preparedness and response plans, building codes, and zoning ordinances. These capabilities may be used to inform and support mitigation planning or may be modified as a mitigation action. Table 4-1 and Table 4-2 list District planning and regulatory capabilities. Under the Description column is an explanation of the District's ability to use the LHMP to expand on and improve these existing policies and programs

Table 4-1. Local Planning Capabilities

Name	Description (Effect on Hazard Mitigation)	Hazards Addressed	Version/ Date	Capability Type
UWMP	Describes the impact of climate change and actions such as rate changes during drought conditions. Expansion: Updates to the LHMP must address climate change per California SB 379. These updates can inform the UWMP sections on climate change	Climate Change, Drought	June 2021	Planning, Regulatory, Technical
Risk and Resilience Assessment (RRA)	Describes District hazards and vulnerabilities/response actions to address them. Expansion: The RRA and the LHMP should use the same source data and similar language to describe hazards that are contained in both. Hazard analysis and risk/vulnerability updates to one document should be reviewed for inclusion in both.	Drought Earthquake Extreme Heat Source Water Contamination Civil Disturbance Cybersecurity Dam Failure	2020	Planning, Regulatory
Capital Improvement Plan (CIP)	CIPs are created through master planning documents and urgent needs. They may include activities to mitigate hazards. Expansion: The District will review the mitigation action plan in the LHMP as it updates its CIP. Several mitigation actions address facility improvement and resiliency. Grant funding for these projects may support CIP projects	All	Updated annually	Planning, Technical

Table 4-2. Local Ordinances and Regulations

Local Ordinances and Regulations	Description
Palmdale Water District Resolution No. 08-7	The Board of Directors approves entering into the agreement for participation in the supply and conveyance of water by the Department of Water Resources of the State of California through the Yuba County Purchase Agreement for the Yuba Accord under the Dry Year Water Purchase Program.
Palmdale Water District Rules and Regulations, Article 10, Section 10.07	Capital Improvement Fee. To provide funds for the construction of District facilities to meet water demands created by future development, the Board has determined that developers shall be required to contribute toward the cost of constructing the additional facilities required to meet increasing demands for water service.

Table 4-2. Local Ordinances and Regulations

Local Ordinances and Regulations	Description
Palmdale Water District Rules and Regulations, Article 10, Section 10.06	Assessment Parity Charge. Every applicant for water service from any of the lines or works of the District who has not, either in person or through the predecessor in interest, paid an Assessment Parity Charge (previously called an Acreage Supply Charge) or the equivalent thereof or requests modification of service or change in land use, with respect to the land to be served, shall, before such application will be acted on by the District, or water furnished pursuant thereto, pay to the District an Assessment Parity Charge computed at a per acre rate set forth in Appendix G of the District Rules and Regulations.
Palmdale Water District Rules and Regulations, Article 11, Section 11.12	Related to minimum fire flow requirements.
Palmdale Water District Water Conservation Regulations	The District adopted water conservation regulations in February 1991. The regulations prohibit the use of water for hose washing of sidewalks, walkways, buildings, and driveways. They also establish limits on a variety of water uses, including washing motor vehicles, filling decorative fountains, serving drinking water at restaurants, and watering landscaped areas.
Water Code Law 10632(c)	The Palmdale Water District Urban Water Management Plan includes actions to be taken by the urban water supplier to prepare for and implement during a catastrophic interruption of water supplies including, but not limited to, a regional power outage, an earthquake, or other disaster.
Reliable Water Supply Bond Act of 2008 - SB 59	Contains provisions for conservation, additional surface storage, and delta conveyance system.
Disaster Preparedness and Flood Prevention Bond Act of 2006 – Proposition 1E	This act rebuilds and repairs California's most vulnerable flood control structures to protect homes and prevent loss of life from flood-related disasters, including levee failures, flash floods, and mudslides. Protects California's drinking water supply system by rebuilding delta levees that are vulnerable to earthquakes and storms.
Cobey-Alquist Floodplain Management Act	The Cobey-Alquist Floodplain Management Act encourages local governments to plan, adopt, and enforce land use regulations for floodplain management to protect people and property from flooding hazards. This act also identifies requirements jurisdictions must meet to receive state and financial assistance for flood control.
Flood Damage Prevention Code, Earthquake Hazard Reduction in Existing Building Code	These codes address safety issues associated with flooding and earthquakes directly.
Alquist-Priolo Earthquake Fault Zoning Act	The Alquist-Priolo Earthquake Fault Zoning Act requires the state geologist to identify earthquake fault zones along traces of both recently and potentially active major faults. The Alquist-Priolo Zones are usually one-quarter mile or less in width and proposed development plans within these fault zones must be accompanied by a geotechnical report prepared by a geologist describing the likelihood of surface rupture and other seismically induced hazards.

Table 4-2. Local Ordinances and Regulations

Local Ordinances and Regulations	Description
Earthquake Safety and Public Buildings Rehabilitation Bond Act (Proposition 122)	In 1990, the State of California passed the Earthquake Safety and Public Buildings Rehabilitation Bond Act (Proposition 122). Up to $50 million was allocated for the seismic retrofit of essential services facilities. Many local governments and special districts have retrofitted their essential services buildings with local funds.
Uniform Fire Code	This code may be adopted by local jurisdictions, with amendments, and provides minimum standards for many aspects of fire prevention and suppression activities. These standards include provisions for access, water supply, fire protection systems, and the use of fire-resistant building materials.
California Health and Safety Code and the Uniform Building Code	The Health and Safety Code provides regulation pertaining to the abatement of fire related hazards. It also requires that local jurisdictions enforce the Uniform Building Code, which provides standards for fire-resistive building and roofing materials, and other fire-related construction methods.
Title 19 California Code of Regulations	These regulations pertain to fire prevention and engineering measures for new construction.

4.3 Administrative and Technical Capabilities

Following are the human and technical resources available to engage in mitigation planning processes and a list of financial resources and funding sources that affect or promote mitigation.

Table 4-3. Administrative and Technical Capabilities

Human Resources	Department
Emergency Managers	General Managers Department Heads Risk Management and Safety Officer Engineering Department
Planner(s) or Engineer(s) with knowledge of land development, land management practices, construction practices related to buildings and/or infrastructure	Engineering Department Facilities Department Construction Supervisor
GIS specialist	Engineering Department
CAD specialist	Engineering Department
IT specialist	IT Department
Grant writers	District Managers Engineering Managers

4.4 Fiscal Capabilities

The following funding opportunities were identified for the District.

- General Fund
- Capital Improvement Fee (developer's fee)
- Development fees (restricted to expansion costs for new development)
- Assessment Parity Charge (previously called an Acreage Supply Charge)
- Fees for water service
- Impact fees for homebuyers or developers for new developments/homes
- State Funding Sources:
  - Commerce and Economic Development Program
  - Infrastructure State Revolving Fund Program
  - Proposition 13
  - Proposition 84 Integrated Regional Water Management Program
  - Proposition 1E Disaster Preparedness and Flood Prevention Bond Act of 2006
  - California State Department of Water Resources, Division of Local Assistance, Davis-Grunsky Act Program
  - California State Water Resources Control Board Proposition 40
  - California State Water Resources Control Board Proposition 50
  - Clean Water State Revolving Fund Program
  - Watershed Protection Program
- Federal Funding Sources:
  - FEMA (Pre-Disaster Mitigation Program, Flood Mitigation Assistance Program)
  - U.S. Army Corp of Engineers
  - United States Bureau of Reclamation
  - Natural Resources Conservation Service
  - Small Watershed Program
  - Flood Prevention Program
  - Emergency Watershed Protection Program
  - Homeland Security Grants (Terrorism)
  - Bureau of Land Management Programs
  - Water Infrastructure Act of 2021

4.5 Education and Outreach Capabilities

These capabilities include fire safety programs, hazard awareness campaigns, and public information or communications. Education and outreach capabilities can be used to inform the public on current and potential mitigation activities.

Table 4-4. Education and Outreach Resources

Name	Description	Hazards Addressed	Version/Date	Capability Type
Public Affairs Department	Develops and delivers outreach and engagement programs that promote hazard awareness, safety of drinking water, and water conservation methods	All	N/A	Technical
District Website	Provides easily accessed information about the District. Used for LHMP public outreach and engagement.	All	N/A	Technical
Facebook and Twitter Accounts	Provides easily accessed information about the District. Used for LHMP public outreach and engagement.	All	N/A	Technical

4.6 National Flood Insurance Program Participation

The District does not participate in the NFIP; however, the City of Palmdale is currently participating in it.

The Palmdale Water District has not experienced any property damage due to flooding and has no repetitive loss properties.

The Palmdale Water District does not have direct regulatory or enforcement authority over its watershed. They rely on the regulatory powers of other agencies and through them are active in promoting watershed protection by means of a variety of different venues, including education, regulatory review, and participation in Best Management Practice implementation. The District has taken an active role in protecting its sources of water supply from contamination, and in preparing to deal with accidents, should they occur.

5 Hazard Characterization and Profiles

This section of the LHMP includes requirements for hazard profiles and a risk assessment, as provided in the CFR.

FEMA REGULATION CHECKLIST: RISK ASSESSMENT

Hazard Identification

44 CFR § 201.6(c)(2)(i): The risk assessment shall include a description of the type of all natural hazards that can affect the jurisdiction.

Elements

B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect the jurisdiction? Requirement § 201.6(c)(2)(i).

B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for the jurisdiction? See 44 CFR § 201.6(c)(2)(i).

B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? Requirement § 201.6(c)(2)(ii).

B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? Requirement § 201.6(c)(2)(ii).

Source: FEMA, *Local Mitigation Planning Handbook Review Tool,* March 2013.

5.2 Hazard Characterization and Profiles

The Palmdale Water District is subject to potential negative impacts from a broad range of hazards and threats. There are three broad categories of hazards that threaten the District:

- Natural Hazards:
  - Earthquakes
  - Floods
  - Wildfire
  - Extreme weather (drought/windstorms/sudden heavy rain)
  - Water supply contamination (waterborne diseases)
- Technological Hazards:
  - Dam failure
  - Hazardous materials (Hazmat) incidents
- Domestic Security Threats:
  - Terrorism (Chemical, Biological, Radiological, Nuclear, Explosive, Cyber)
  - Criminal Activity

Table 5-1 describes how and why the hazards listed above were identified by the District in preparing its LHMP.

Table 5-1. District Hazards

Hazard	How and Why Identified
Earthquakes	History of events; presence of fault lines and geologic activity
Flooding	History of events
Dam failure	History of events; presence of dams
Wildfire	History of events
Extreme weather (drought, sudden heavy rain, windstorms)	History of events
Water supply contamination (waterborne diseases)	History of events
Hazmat incidents	History of events
Terrorism	Heightened sense of awareness since September 2001

Following are details of the identified hazards faced by the Palmdale Water District as identified by the planning team. The hazards also indicate the risk probability and severity assessment identified by the planning as related to the District.

For the rating of "probability" of occurrence, for each of the following hazards, the planning team were asked to provide ratings of the likelihood that an event would occur in the future. The ratings that were used were:

- High Probability (highly likely to occur)
- Medium Probability (likely to occur)
- Low Probability (not very likely to occur)

These were subjective, order-of-magnitude ratings that the participants could relate to whether they were highly skilled in a hazards area or not. This approach facilitated utilizing a consensus approach with the planning team.

For the rating of "magnitude," the planning team was asked to provide ratings of the likely magnitude of an event, assuming one occurred in the future. The ratings that were used were:

- High (extensive loss of life and/or property)
- Medium (moderate loss of life and/or property)
- Low (relatively modest loss of life and/or property)

These were subjective, order-of-magnitude ratings that the participants could relate to whether they were highly skilled in a hazards area or not. This approach facilitated utilizing a consensus approach with the planning team.

5.2.1 Earthquake

Description

An earthquake is a sudden, rapid shaking of the ground caused by the breaking and shifting of rock beneath the earth's surface. For hundreds of millions of years, the forces of plate tectonics have shaped the earth as the huge plates that form the earth's surface move slowly over, under, and past each other. Sometimes the movement is gradual; at other times, the plates are locked together, unable to release the accumulating energy. When the accumulated energy grows strong enough, the plates break free causing the ground to shake. Most earthquakes occur at the boundaries where the plates meet; however, some earthquakes occur in the middle of plates.

The major form of direct damage from most earthquakes is damage to construction. Bridges are particularly vulnerable to collapse, and dam failure may generate major downstream flooding. Buildings vary in susceptibility, dependent on construction and the types of soils on which they are built. Earthquakes destroy power and telephone lines; gas, sewer, or water mains; which, in turn, may set off fires and/or hinder firefighting or rescue efforts. The hazards of earthquakes vary from place to place, depending on the regional and local geology. Ground shaking may occur in areas 65 miles or more from the epicenter (the point on the ground surface above the focus). Ground shaking can change the mechanical properties of some fine grained, saturated soils, whereupon they liquefy and act as a fluid (liquefaction).

Where earthquakes have struck before, they will strike again. Earthquakes can strike suddenly, without warning. Earthquakes can occur at any time of the year and at any time of the day or night.

Ground movement during an earthquake is seldom the direct cause of death or injury. Most earthquake-related injuries result from collapsing walls, flying glass, and falling objects as a result of the ground shaking, or people trying to move more than a few feet during the shaking. Much of the damage in earthquakes is predictable and preventable.

With increasing magnitude (i.e., larger earthquakes) ground motions are stronger, last longer, and are felt over larger areas. Earthquake "intensity" refers to the effects of earthquake ground motions on people and buildings. Earthquake intensity is often more useful than magnitude when discussing the damaging effects of earthquakes. The most common intensity scale is the Modified Mercalli Intensity scale, which ranges from I to XII.

Table 5-2. Richter Scale and Modified Mercalli Intensity Scale

Descriptor	Richter Scale	Mercalli Intensity	Description
Very Minor	1.0-3.0	I	I. Not felt except by a very few under especially favorable conditions.
Minor	3.0-3.9	II-III	II. Felt only by a few persons at rest, especially on upper floors of buildings.
Light	4.0-4.9	IV-V	III. Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations similar to the passing of a truck. Duration estimated.
Moderate	5.0-5.9	VI-VII	IV. Felt indoors by many, outdoors by few during the day. Some awakened at night. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked noticeably.
Strong	6.0-6.9	VIII-IX	V. Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.
Major	7.0-7.9	X-XI	VI. Felt by all, many frightened. Some heavy furniture moved; a few cases of fallen plaster. Damage slight.

History

The Palmdale Water District is in a seismically active region. The dominant seismic feature affecting the District is the San Andreas Fault, which traverses the southernmost portion of the planning area. The San Andreas Fault is the boundary where the North American plate and the Pacific plate meet. Relative movement of the plates along this boundary causes earthquakes. This fault is considered one of the most dangerous in the State of California in terms of destructive potential.

Figure 5-1 through Figure 5-5 illustrate California Earthquake Events State of Emergency Proclamations by County between 1950 and 2003 and disaster declarations from 2004 and 2019. During that period, there were five earthquake State of Emergency Proclamations for Los Angeles County.

Figure 5-1. California Proclaimed States of Emergency by County 1950 – 2003, Earthquakes

Figure 5-2. California [Earthquake] Disaster Declaration 2004

Figure 5-3. California [Earthquake] Disaster Declaration 2010

Figure 5-4. California [Earthquake] Disaster Declaration 2014

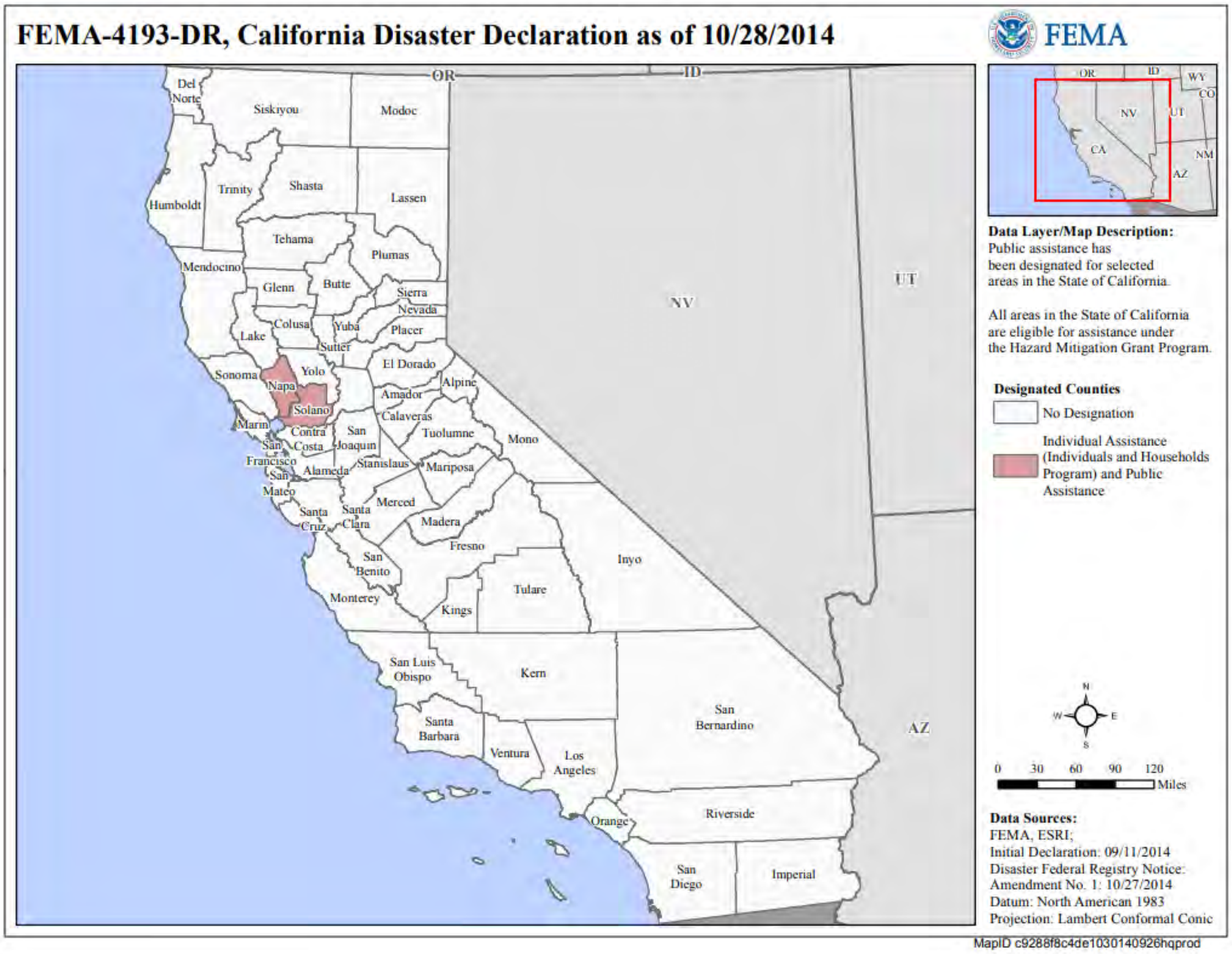
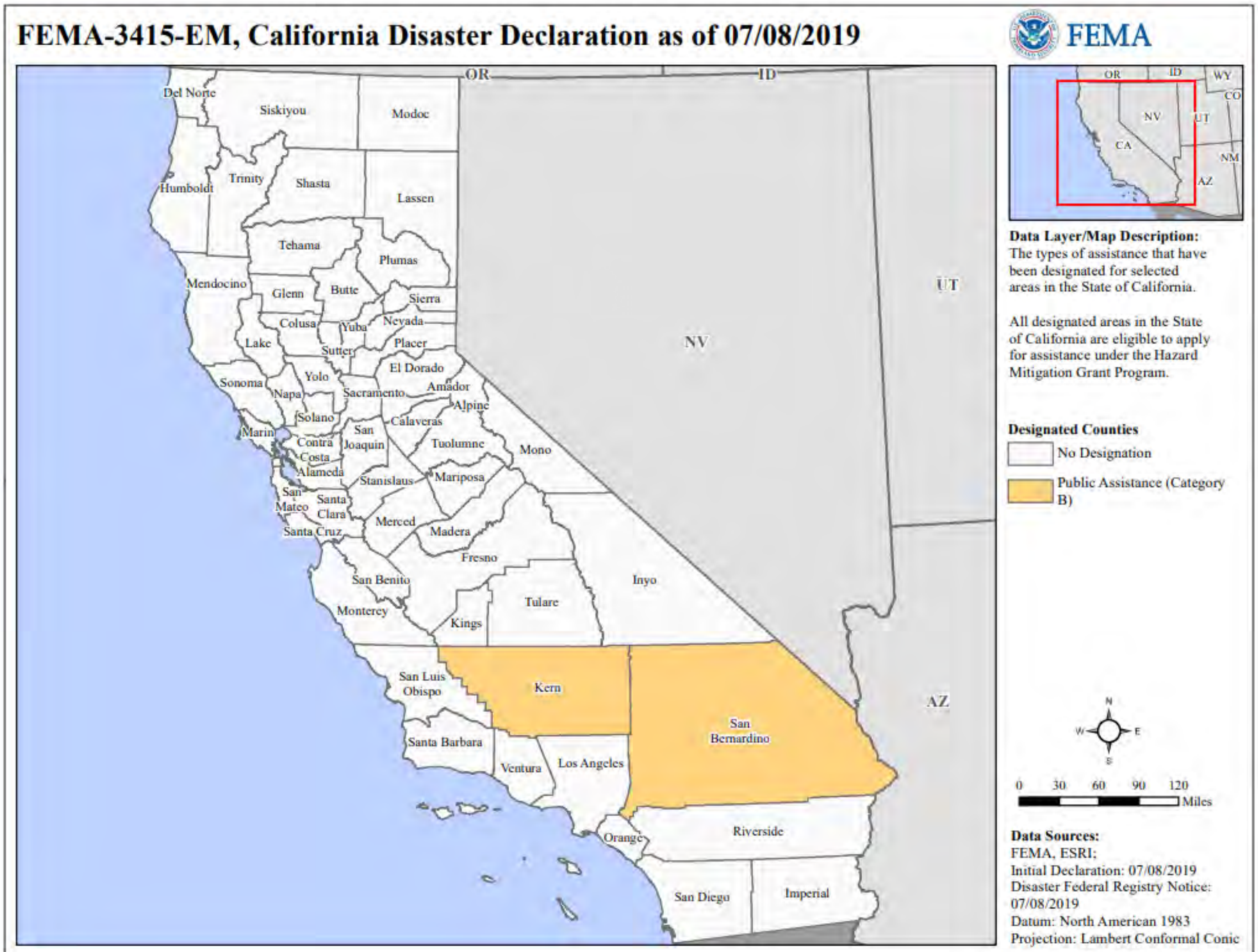


Figure 5-5. California [Earthquake] Disaster Declaration 2019



MapID 49ede4234490708192111hqprod

Table 5-3 is a list of historical earthquakes with a magnitude of 5.0 or greater occurring in Los Angeles County and felt in the Palmdale area.

Table 5-3. Historical Earthquakes

Location	Date/Time	Richter	Mercalli	Deaths and Property Damage
Northridge	01/17/1994 4:31 a.m.	6.7	—	Fifty-seven deaths; more than 9,000 injured; estimated $40 billion in property damage. In Palmdale, there was damage to masonry fences, sidewalks, a few chimneys, a few windows, and stucco and plaster walls cracked. A few items were shaken off store shelves; a few people ran outdoors. The Vincent electric power substation was significantly damaged.
Sierra Madre	06/28/1991 7:44 a.m.	5.8	—	Two deaths; $40 million in property damage
Malibu	01/19/1989 10:38 p.m.	5.0	—	No deaths; slight damage
Pasadena	12/03/1988 11:38 p.m.	5.0	—	No deaths; no appreciable damage
Whittier-Narrows	10/01/1987 7:42 a.m.	5.9	—	Eight deaths; $358 million in property damage
Malibu	01/01/1979 3:15 p.m.	5.2	—	No deaths; minor damage
San Fernando	02/09/1971 6:01 a.m.	6.6	—	Sixty-five deaths; $505 million in property damage
San Clemente Island	12/25/1951 4:46 p.m.	5.9	—	No deaths; no appreciable damage
Long Beach	03/10/1933 5:54 p.m.	6.4	IX	One hundred twenty deaths; $40 million in property damage
Tejon Pass Region	10/23/1916 2:44 p.m.	5.3	—	No information
Fort Tejon	01/09/1857 4:24 p.m.	7.9	IX	Two deaths. Were the Fort Tejon shock to occur today, the damage would easily run into the billions of dollars and the loss of life would probably be substantial. Some of the present day communities that lie on or near the 1857 rupture area are Palmdale, Wrightwood, Frazier Park, and Taft.
L.A. Area	07/11/1855 4:15 a.m.	6.0	VIII	Bells of Mission San Gabriel torn down; 26 buildings damaged in L.A.
L.A. Area	09/24/1827 4:00 a.m.	5.5	—	No information
L.A. Area	12/08/1812 3:00 p.m.	7.0	VII	Forty deaths, Mission San Juan Capistrano severely to moderately damaged. Mission San Gabriel moderately damaged.
L.A. Area	07/28/1769	6.0	VIII	No information

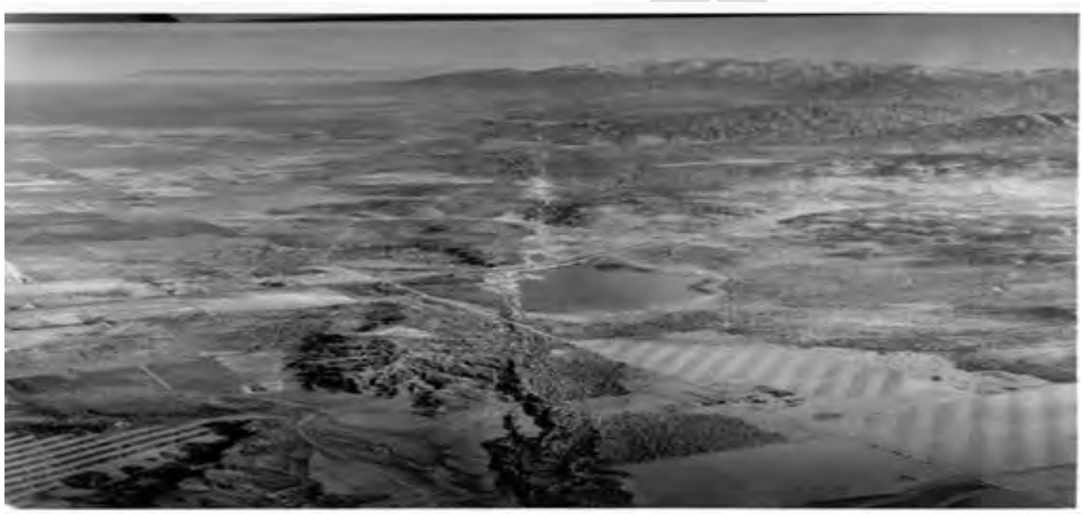
Source: NOAA National Climatic Data Center

Location

The San Andreas Fault extends over 600 miles from the Salton Sea, northwest toward the Pacific Ocean at Point Arena. Two of the three largest (8.0+ Richter) earthquakes in the state have occurred along the San Andreas Fault: the 1906 San Francisco earthquake, which caused 21-foot offsets, and the 1857 Fort Tejon earthquake, which left a trace at the surface 225 miles long and caused the surface of the earth to shift along the fault about 30 feet.

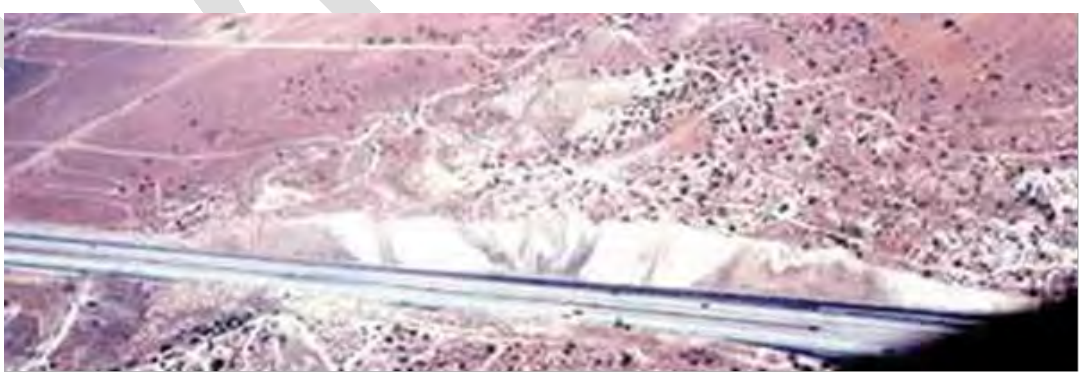
The photo below in Figure 5-6 is an aerial view of the San Andreas Fault line from just west of the Palmdale Reservoir to Big Pine.

Figure 5-6. Aerial View of the San Andreas Fault Line



The San Andreas Fault is a large system of faults and to pinpoint its location can prove difficult where motion is expressed along many sub-parallel fault strands. This complexity warrants using the term: San Andreas Fault Zone. Evidence for this line of reasoning is expressed in the following picture of the roadcut (Figure 5-7.

Figure 5-7. San Andreas Fault Zone, Roadcut



The roadcut outside Palmdale along Highway 14 in the westernmost Mojave Desert exposes highly folded and faulted lakebed sediments caught up within the San Andreas Fault Zone. The roadcut slices through rocks deformed by the powerful and extensive movement of rocks along the San Andreas Fault. The geology at the roadcut demonstrates that the deformation along a fault can be very complex.

Figure 5-8 and Figure 5-9 show a complex series of folds, but no clear apparent fault. However, the rocks on the left side of the picture differ greatly from the rocks on the right side of the picture, indicating some sort of geologic boundary. On closer inspection, one finds a multitude of minor faults interspersed within and near the folds. These minor faults more or less have the same orientation, and, if considered to be part of one large fault, comprise the much larger and substantial San Andreas Fault Zone.

Figure 5-8. Palmdale Roadcut Looking Towards the South

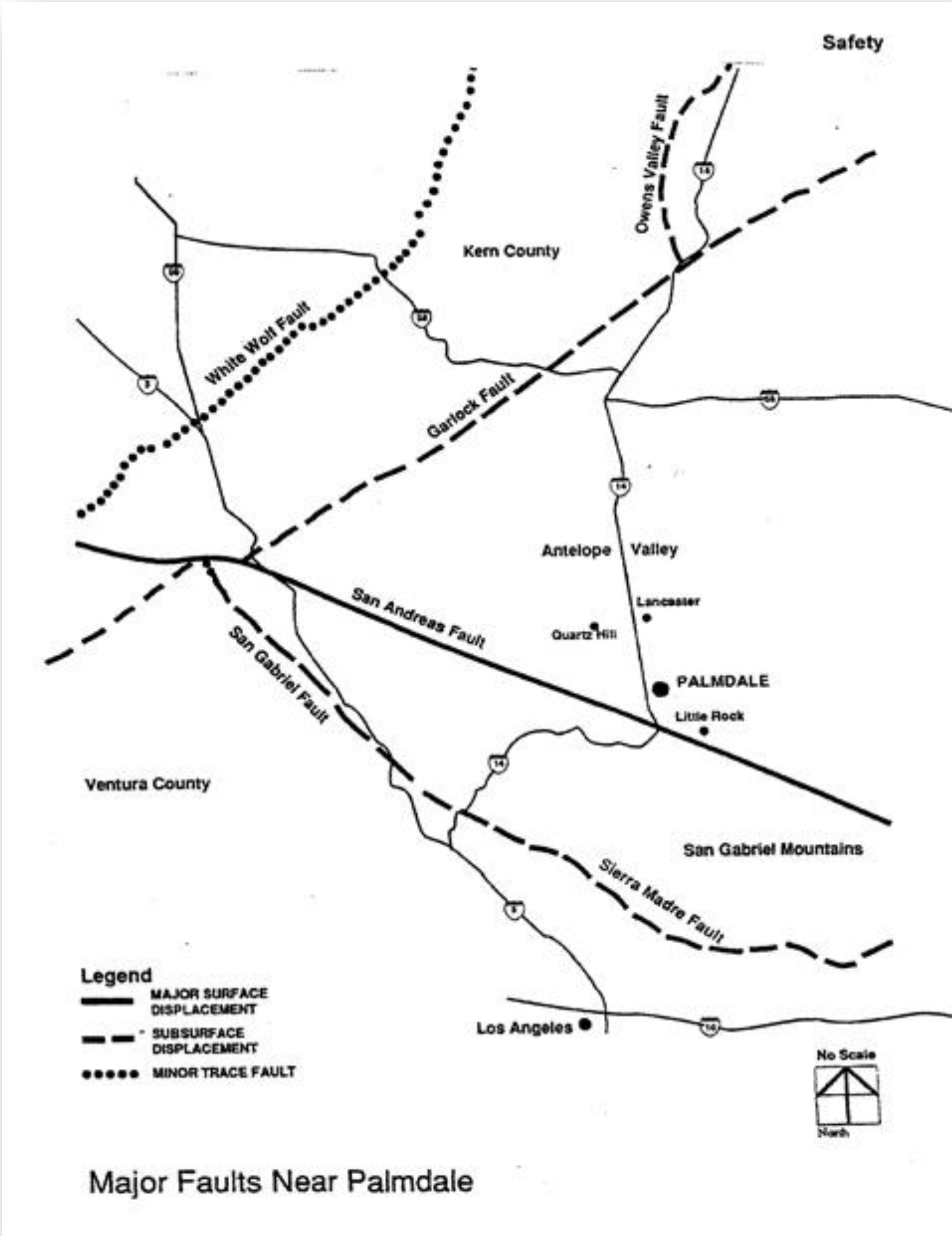
Figure 5-9. Aerial Photograph of the Roadcut

Several fault traces branch off from the primary fault within the San Andreas Fault Zone. The major fault traces for the San Andreas system in the Palmdale area are the Cemetery Fault, the Nadeau Fault, and the Littlerock Fault. All three faults are active splays of the San Andreas Fault. Thus, movement on the San Andreas Fault may activate one or all of these subsidiary faults. The Nadeau, Cemetery and Littlerock Fault traces are located in the City of Palmdale. Other splays of the San Andreas Fault found in Palmdale are the Powerline Fault and the eastern end of the Clearwater Fault.

In addition to the San Andreas Fault system, other principal faults that could produce damaging earthquakes in the Palmdale area are the Sierra Madre-San Fernando, Garlock, Owens Valley, and White Wolf faults. The Sierra Madre Fault is located at the base of the San Gabriel Mountains approximately 20 miles from Palmdale; the Garlock and White Wolf faults are northeast-trending faults located 30 to 60 miles, respectively, northwest of Palmdale. The Owens Valley fault is 60 miles to the northeast and runs north-south.

Several other faults located in the Southern California region could be responsible for earthquakes that would affect the Palmdale area, although no major damage is expected to occur. Figure 5-10 indicates the relative location of the major faults and earthquake fault zones near Palmdale.

Figure 5-10. Major Faults near Palmdale



Scientists have recently discovered that Palmdale is in the center of a 120-mile-long, kidney-shaped area of land that rose as much as 10 inches in the early 1960s. The Palmdale “bulge,” as the uplift is called, could be an early warning signal of a major—and potentially disastrous—earthquake.

Between November 1976 and November 1977, a swarm of small earthquakes (local magnitude <3) occurred on or near the San Andreas Fault near Palmdale. This swarm was the first observed along this section of the San Andreas since cataloging of instrumental data began in 1932. The activity followed partial subsidence of the 35-centimeter vertical crustal uplift of the Palmdale bulge along this “locked” section of the San Andreas, which last broke in the great 1857 Fort Tejon earthquake. The swarm events exhibit characteristics previously observed for some foreshock sequences such as tight clustering of hypocenters and time-dependent rotations of stress axes inferred from focal mechanisms. However, because of the present lack of understanding of the processes that precede earthquake faulting, the implications of the swarm for future large earthquakes on the San Andreas Fault are unknown.

Recent studies have shown that the ground rose noticeably before the 1971 San Fernando quake that killed 58 people in California’s last major tremblor. The location of the Palmdale bulge has added to scientists’ concern. The swelling lies along a stretch of the 600-mile San Andreas Fault, a deep fracture that runs from below the Mexican border to about 100 miles north of San Francisco, where it meets the Pacific Ocean. The fault is actually the boundary of two tectonic plates, huge sections of the earth’s outer layer that are sliding in opposite directions. A western sliver of California, on the Pacific plate, is moving northwest. The remainder of the state is being carried by the North American plate toward the southeast.

As the two plates grind past each other, friction causes them to stick together briefly at some places. Then, driven by powerful and little-understood forces deep within the earth, they tear apart to resume their journeys, causing minor to moderate tremors. But in the Palmdale region, they have apparently been firmly locked for more than a century, while adjoining parts of the plate have slid as much as 30 feet. Someday, seismologists warn, the stalled sections are going to have to catch up with the main bodies of the plates. Strains are inexorably building up in the crustal rock. When the rock finally fractures, the plates will jolt ahead, causing a major earthquake.

What scientists fear is that the Palmdale bulge could be caused by dilatancy, a phenomenon that takes place in rocks before they break under stress. Tiny cracks open in the rock, increasing its volume; this could account for the uplift of land. Dilatancy has already been linked to such quake precursors as unexpected variations in velocities of seismic waves through the earth and changes in local magnetic fields as well as in electrical conductivity of rocks; all have been used to make successful forecasts in the emerging science of earthquake prediction.

Extent

In the event of an earthquake, the location of the epicenter as well as the time of day and season of the year would have a profound effect on the number of deaths, casualties, property damage, agricultural and environmental damage, and disruption of normal government and community services and activities. The effects could be aggravated by collateral emergencies such as dam failure, flooding, hazardous material spills, utility disruptions, fire, landslides, and transportation emergencies.

Aside from ground shaking and ground surface rupture, earthquake hazards include the fissuring or cracking of bedrock, landslides, liquefaction, and ground settlement. Structures most likely to be affected by earthquakes are those that are old or near earthquake faults in areas that may be prone to liquefaction. Dams along earthquake faults may be subject to failure and may cause flooding of the surrounding areas. Critical damage may also occur to reservoirs and underground pipes, structures that provide emergency services (hospitals, fire stations, schools, emergency shelters). Roads and utility lines for water, gas, power, telephone, sewer, and storm drainage may be disjointed and services cut off.

The City of Palmdale's General Plan, Safety Element states: "In case of a major earthquake on the San Andreas Fault within or near Palmdale, damage to the following structures is expected:

- Palmdale and Littlerock Reservoirs could sustain surface rupture and cause area flooding.
- The California Aqueduct may rupture, causing flooding of the surrounding area and loss of water supply to the region.
- Water lines, sewer pipes, and telephone lines may be truncated.
- High voltage lines may be damaged, causing power failure in the area.
- Damage may be sustained by residential and other structures located close to the fault rupture due to intense ground shaking and slope failure."

Vulnerabilities specific to the Palmdale Water District include the structures (and lake) listed in Section 5.3.1. As the chart of assets in Section 7 shows, the approximate damage or loss to identified assets as a result of earthquake is estimated to be 75 percent of the structure and contents values provided in the table.

- **Effects on people and housing.** In any earthquake, the primary consideration is saving lives. Time and effort must also be dedicated to providing for mental health by reuniting families, providing shelter to displaced persons, and restoring basic needs and services. Major efforts will be required to restore and re-establish public services and utilities, remove debris and clear roadways, demolish unsafe structures, and provide continuing care and temporary housing for affected citizens.
- **Effects on infrastructure.** The damage caused by both surface rupture and ground shaking can lead to the disruption of essential District facilities and systems (dams, water, pipelines, and drainage systems).

Table 5-4 lists their maximum probable magnitudes. A maximum probable earthquake is the largest event expected to occur within 100 years.

Table 5-4. Fault Magnitudes

Faults	Maximum Probable Magnitude (Moment*)
San Andreas	8.0+
Sierra Madre – San Fernando	6.6
Garlock	7.5
Owens Vallev	7.4
White Wolf	7.2

* The Moment Magnitude is preferred to the Richter Magnitude for earthquakes larger than 6M. As the magnitude surpasses 6.5M (Richter), all events begin to take on the same magnitude values. The Moment Magnitude keeps its integrity and delineates the different values greater than 6.5M.

Source: California Department of Mines and Geology.

Probability of Future Events and Magnitude

The risk probability and risk severity assessment listed in Table 5-5 was identified by the planning team.

Table 5-5. Probability of Future Events and Magnitude: Earthquakes

Probability	Magnitude
Low	High

5.2.2 Drought

Description

Palmdale Water District officials noted that 2006 was the driest in recorded history in the high desert, with a scant 1.4 inches of rainfall, about one-fifth of the normal precipitation. The Littlerock Reservoir, which normally catches rain and snow runoff from the north slopes of the San Gabriel Mountains, got no inflows that year at all. In June 2008, California's Governor declared the first statewide drought in 17 years – setting the state for drastic cutbacks and diverting supplies from the relatively water-rich to the water-poor. The Governor called for a 20 percent reduction in water use statewide and urged local agencies to bolster conservation programs and to work with federal and other authorities to help farmers who were suffering huge financial losses and abandoning crops in droves. California's Governor lacked the authority to impose statewide rationing; however, the State Department of Water Resources could slash water supplies to local agencies, which then would be forced to institute rationing.

The Governor's pronouncement followed the driest spring on record and 2 years of below-normal precipitation for the state. Snowpack in the Sierra Nevada, the backbone of the state's water supply, stood at two-thirds of normal; dusty banks lined many important reservoirs; and environmental rulings slashed water pumped from the crucial Sacramento-San Joaquin River Delta – all while California's booming population threatened to overwhelm some of the state's key infrastructure.

Unlike most other natural hazards, drought is not a sudden, catastrophic occurrence. Droughts occur over several years. In fact, it is almost impossible to tell when a drought begins and often difficult to determine when it ends.

According to the Glossary of Meteorology (1959), drought is defined as "A period of abnormally dry weather sufficiently prolonged for the lack of water to cause serious hydrologic imbalance in the affected area."

However, Tannehill noted in Drought and Its Causes and Effects (1959), "We may say truthfully that we scarcely know a drought when we see one. We welcome the first clear day after a rainy spell. Rainless days continue for a time and we are pleased to have a long spell of such fine weather. It keeps on and we are a little worried. A few days more and we are really in trouble. The first rainless day in a spell of fine weather contributes as much to the drought as the last, but no one knows how serious it will be until the last dry day is gone and the rains have come again…we are not sure about it until the crops have withered and died."

Droughts may be measured by a number of indicators, including:

- Levels of precipitation
- Soil conditions (moisture)
- Temperature

There are four ways in which droughts can be viewed:

Meteorological – a measure of departure of precipitation from normal. Due to climatic differences, what may be considered a drought in one location of the country might not be a drought in another location.

Agricultural – refers to a situation where the amount of moisture in the soil no longer meets the needs of a particular crop.

Hydrological – occurs when surface and subsurface water supplies are below normal.

Annual Indicators – the California Department of Water Resources uses three indicators to evaluate water conditions in California. These are snowpack, precipitation, and reservoir storage as percentages of the annual average.

History

Very limited data is available to evaluate periods of drought in California before the 1900s. Droughts frequently occur in California. Recent periods of drought include:

- **1976–1977:** 1977 had been the driest year in state history to date. According to the *Los Angeles Times*, "Drought in the 1970s spurred efforts at urban conservation and the state's Drought Emergency Water Bank came out of drought in the 1980s."
- **1986–1992:** California endured one of its most prolonged droughts ever, observed from late 1986 through late 1992. Drought worsened in 1988 as much of the U.S. also suffered from severe drought. In California, the 6-year drought ended in late 1992 as a significant El Niño event in the Pacific Ocean (and the eruption of Mount Pinatubo in June 1991) most likely caused unusual persistent heavy rains.

- **2007–2009:** Saw 3 years of drought conditions, the 12th worst drought period in the state's history, and the first drought for which a statewide proclamation of emergency was issued. The drought of 2007–2009 also saw greatly reduced water diversions from the SWP. The summer/fall of 2007 saw some of the worst wildfires in Southern California history.
- **2011–2017:** The period between late 2011 and 2014 was the driest in California history since recordkeeping began. The drought led to Governor Jerry Brown instituting mandatory 25 percent water restrictions in June 2015. Many millions of trees died from the drought – approximately 102 million, including 62 million in 2016 alone. By the end of 2016, 30 percent of California had emerged from the drought, mainly in the northern half of the state, while 40 percent of the state remained in the extreme or exceptional drought levels. Heavy rains in 2017 ended the drought except for the southernmost area of the state.

Location

When a drought is in effect, the entire district is affected.

Extent

The National Integrated Drought Information System Act of 2006 (Public Law 109-430) describes an interagency approach for drought monitoring, forecasting, and early warning. The National Integrated Drought Information System maintains the U.S. Drought Portal, a web-based database to several drought-related resources, including the U.S. Drought Monitor and the U.S. Seasonal Drought Outlook.

The primary indicators for drought maps for the Western U.S. are the Palmer Hydrologic Drought Index and the 60-month Palmer Z-index. The Palmer Drought Severity Index is a commonly used index that measures the severity of drought for agriculture and water resource management. It is calculated from observed temperature and precipitation values and estimates soil moisture.

Probability of Future Events and Magnitude

The risk probability and risk severity assessment listed in Table 5-6 was identified by the planning team.

Table 5-6. Probability of Future Events and Magnitude: Drought

Probability	Magnitude
Low (High)	High

5.2.3 Waterborne Diseases/Water Contamination/Algae Blooms

Description

Water is basic to life and health. In the U.S., the drinking water supply is normally safe; yet diseases that spread through water are still a very real problem. Microorganisms are responsible for more than 90 percent of the reported waterborne disease outbreaks in the U.S.; enteric viruses, such as hepatitis A, are identified as causing almost 10 percent of these. However, in 50 percent of the outbreaks, no causative agent is identified due to limitations in the ability to isolate and detect viruses in water samples. Historically, consumption of contaminated groundwater has been the source of one-half of the reported outbreaks; in recent years, that fraction has risen to more than two-thirds. The most frequently reported source of contamination in these outbreaks is domestic sewage from septic tanks, leaking sewer lines, and cesspools.

Waterborne diseases in the U.S. are caused by viruses, bacteria, and intestinal parasites. The burden of disease from waterborne pathogens is substantial. According to the Department of Health and Human Service's Centers for Disease Control and Prevention, during the period from 1920 to 2000, 883,806 illnesses related to waterborne diseases were reported – an average of 40,648 cases per year.

Following are descriptions of the types of waterborne diseases in the U.S.:

- Bacteria are microorganisms often composed of single cells shaped like rods, spheres, or spiral structures. Prior to widespread chlorination of drinking water, bacteria like Vibrio cholerae, Salmonella typhii, and several species of Shigella routinely inflicted serious diseases such as cholera, typhoid fever, and bacillary dysentery, respectively. As recently as 2000, a drinking water outbreak of E. coli in Walkerton, Ontario, sickened 2,300 residents and killed seven when operators failed to properly disinfect the municipal water supply. Developed nations have largely conquered waterborne bacterial pathogens through the use of chlorine and other disinfectants.
- Viruses are infectious agents that can reproduce only within living host cells. Shaped like rods, spheres, or filaments, viruses are so small that they pass through filters that retain bacteria. Enteric viruses, such as hepatitis A, Norwalk virus, and rotavirus are excreted in the feces of infected individuals and may contaminate water intended for drinking. Enteric viruses infect the gastrointestinal or respiratory tracts and are capable of causing a wide range of illness, including diarrhea, fever, hepatitis, paralysis, meningitis, and heart disease.
- Protozoan parasites are single-celled microorganisms that feed on bacteria found in multicellular organisms such as animals and humans. Several species of protozoan parasites are transmitted through water in dormant, resistant forms, known as cysts and oocysts. According to the World Health Organization (WHO), Cryptosporidium parvum oocysts and Giardia lamblia cysts are introduced to waters all over the world by fecal pollution. The same durable form that permits them to persist in surface waters makes these microorganisms resistant to normal drinking water chlorination (WHO 2002). Water systems that filter raw water may successfully remove protozoan parasites.

Waterborne Disease Patterns

Several waterborne diseases show seasonal patterns, suggesting that they are subject to environmental influences. Specific environmental influences have been documented for several specific pathogens. Environmental changes have effects on pathogen replication, survival, and persistent rates; transmission rates; and disease ranges overall.

Temperature and precipitation, both of which will increase with climate change, affect the spread of waterborne diseases. In general, increased temperature results in higher pathogen replication, persistence, survival, and transmission for bacterial pathogens, and has mixed effects on viral pathogens but often reduces the overall transmission rate. Higher temperatures seem to produce a greater number of waterborne parasitic infections as well.

Overall, increased precipitation is associated with increased burdens of disease for bacteria, viruses, and parasites, though the causes of these increases differ by pathogen and ecologic setting.

The U.S. is fortunate to have one of the best supplies of drinking water in the world. Although tap water that meets federal and state standards is generally safe to drink, threats to drinking water quality in the U. S. still exist. Outbreaks of drinking water-associated illness and water restrictions during droughts demonstrate that we cannot take our drinking water for granted. In the U. S., contaminated drinking water in homes and businesses is usually a result of water main breaks or other emergency situations.

History

According to the 2008 Watershed Sanitary Survey and Source Water Assessment Update, the following is a summary of available water quality data from the Palmdale Water Treatment Plant from 2002 through 2007. Data on both raw and treated water is presented, focusing on microbial contaminants. Additionally, brief summaries of trace metals, physical constituents, and organic/inorganic contaminants monitored by the Department of Public Health (DPH) and/or the Environmental Protection Agency (EPA), are included.

Total coliforms are a measure of the concentration of bacteria in a water sample. Bacteria are usually present in raw water samples. Their presence alone is not cause for concern; however, their source should be identified and controlled if possible. Daily coliform data for the District's water treatment plant raw water were available from January 2000 through September 2007. Overall, total coliform counts were well below 200 most probable number (MPN) per 100 milliliters (mL), with coliform spikes above 200 MPN/100 mL approximately 8 percent of the time. Additionally, the spikes have decreased in frequency and magnitude over the last 6 years. The largest period of spikes occur during the latter portion of the winter months, primarily in February and March of each year. The cause of these spikes is unclear; however, they may be related to weather changes and migratory birds.

Fecal coliforms are also a measure of the concentration of bacteria in a water sample but are focused on bacteria found in human (and other animals) intestinal tracts. Hence, it is assumed that the presence of these bacteria in water samples is indicative of the presence of fecal matter and possible pathogenic organisms, which may be of human origin. Much like the total coliform counts for the Lake Palmdale intake, fecal coliform counts have also been low. The data available for fecal coliforms span the same sampling dates as total coliforms, covering nearly 6 years. During this period of time, there was more than 40 percent incidence rate where fecal coliforms exceeded 20 MPN/100 mL, with the percentage of incidents decreasing yearly. The spikes occur in the winter months and are most likely related to first flush events and weather.

Giardiasis and Cryptosporidiosis are both serious waterborne diseases caused by the protozoa Giardia lamblia and Cryptosporidium parvum, respectively. The protozoa are found in the intestinal tracts of infected humans and animals and can be passed in their stool. The protozoa can survive for a long period of time outside the body, making water an ideal medium for the protozoa to spread. Both show a fairly high resistance to typical disinfection chemicals, such as chlorine. Effects of the diseases can range from mild intestinal cramps in healthy individuals to serious and life threatening problems in persons with compromised immune systems. Palmdale Water District has maintained records of tests for Giardia and Cryptosporidium from the raw water intake. Data was available beginning in January 2003 through September 2007. Sampling and testing was performed on a monthly basis. The detection method used has always been the current EPA-prescribed method at the time of testing; currently Palmdale Water District uses EPA Method 1623. Overall, the data shows little to no evidence of any Giardia or Cryptosporidium problems or potential problems. In the period of available data there were no detects of Cryptosporidium, and only seven detects of Giardia, all of which were four total oocyts per liter or lower.

Algae has historically been a water quality concern in Lake Palmdale and the District has taken steps to reduce algae production and the need for chemical treatment with copper sulfate. Lake Palmdale appears to be home to several species of diatoms year round. In 2002 the District applied 2,000 pounds of copper sulfate per week for 20 weeks from April through September. It is important to note that copper sulfate application dropped from this weekly application before the installation of the SolarBee mixers to twice during the 2003 season after installation. Copper sulfate addition continues to remain infrequent and at low concentrations.

In 2000, drinking water tested in the City of Palmdale had the third-highest level of the carcinogen chromium 6 found in a countywide study. Drinking water was sampled at 110 courthouses, medical clinics, libraries, and other public facilities in 71 cities on orders of the County Board of Supervisors, who were prompted by newspaper articles about the presence of chromium 6 in drinking water in the San Fernando Valley.

The State has established a "public health goal" of 0.2 parts per billion, or less than one-thirtieth the level found in Palmdale. The federal standard for total chromium is 100 parts per billion, and the State standard is 50 parts per billion. Palmdale water normally tests at 10 or 15 parts per billion of total chromium. The county test found 10.1 parts per billion of total chromium.

In 2003, Palmdale Water District notified customers that total trihalomethanes measured during the spring had topped a recently stiffened maximum allowable level. Trihalomethanes are a byproduct of the treatment plant disinfection process. They form through reaction of chlorine, used as a disinfectant, with organic material in the water. The District's increase use of well water brought the levels down. Unlike water from the California Aqueduct, which provides much of Palmdale's water, well water does not contain the quantities of organic materials and salt that react with chlorine used in water purification to form trihalomethanes.

Table 5-7 lists the selected reportable disease cases in Los Angeles County in 2017 from the County of Los Angeles, Public Health Department.

Table 5-7. Historical Waterborne Disease Events in Los Angeles County

Outbreaks	Number
Gastroenteritis (unknown etiology)	160
Giardiasis	372
Viral Gastroenteritis	427
Shigellosis	732
Campylobacteriosis	1,807
Salmonellosis	1,107
E. coli Diarrhea	309
Hepatitis A	87
Typhoid	76
Vibriosis	53

Location

The Palmdale Water District's Operations Department operates the Leslie O. Carter Water Treatment Plant to treat surface water from Lake Palmdale, which receives water from the SWP and the Littlerock Dam and Reservoir via the Palmdale Ditch. The Operations Department also monitors and maintains operational control of the District's 22 active ground water wells, 17 reservoir sites, 15 booster stations, 14 pressure regulating stations, 9 hydro pneumatic tanks, and hypo-chlorite disinfection equipment at 32 of the above sites.

Extent

Standards for safe drinking water have been established by the U.S. EPA and in the State of California by the Department of Health Services. Palmdale Water District meets or exceeds all these standards. Samples of water are taken regularly from selected points in the distribution system for bacteriological and chemical analysis to ensure that the water is always safe for human consumption.

Vulnerabilities specific to the Palmdale Water District include most of the structures listed in Section 5.3.1

- **Effects on People, Economics, and Housing.** Water supply contamination is a hazard that is of particular interest to a water district. Depending on levels of contamination and exposure, effects could range from minimal to devastating.

Probability of Future Events and Magnitude

The risk probability and risk severity assessment listed in Table 5-8 was identified by the planning team.

Table 5-8. Probability of Future Events and Magnitude: Waterborne Diseases/Water Contamination

Probability	Magnitude
Low	High

5.2.4 Wildfire

Description

A wildfire is an uncontrolled fire spreading through vegetative fuels, posing danger and destruction to property. Wildfires can occur in undeveloped areas and spread to urban areas where structures and other human development are more concentrated.

Fires that occur within the urban-wildland interface areas affect natural resources as well as life and property. This type of fire is described as “a fire moving from a wildland environment, consuming vegetation for fuel, to an environment where structures and buildings are fueling the fire” (California Resources Agency 1996).

While some wildfires start by natural causes, humans cause four out of every five wildfires. Wildfires started by humans are usually the result of debris burns, arson, or carelessness. As a natural hazard, a wildfire is often the direct result of a lightning strike that may destroy personal property and public land areas, especially on state and national forest lands. The predominant dangers from wildfires are:

- Injury or loss of life to people living in the affected area or using the area for recreational facilities.
- The destruction of property, timber, and wildlife.

History

Wildfires are common in the hills throughout California and in the coastal communities of Southern California. Fire has always been a trait of the area’s chaparral and grassland ecosystems. The largest fires in southern California have historically occurred in the autumn, when Santa Ana winds can develop with high temperatures (conditions are characterized by low relative humidity, high temperatures, and strong northeasterly winds). Conditions that are more conducive to fires can occur with hotter and drier summers and greater amount of vegetation resulting from wetter winters. Plant pests and pathogens can also raise the risk of fire by increasing the number of dead trees in an area.

The hot dry climate of the planning area keeps the grass dry and readily combustible. The Santa Ana winds can spread fires into adjacent areas. Steep slopes bring grass and brush within reach of upward flames while impeding the access of firefighting equipment. Within Palmdale, wildfire hazards areas exist within the southern and western portions of the area. The fire season in the Palmdale area occurs roughly from September to November when the Santa Ana winds blow. If rains are minimal, grass may dry as early as May and brush as early as July. From December to April, in the rainy season, wildfires rarely occur.

The Palmdale Water District and surrounding areas have had a history of wildfires. Table 5-9 depicts some of the most recent incidents.

Table 5-9. Historical Wildfire Events

Location	Date	Type	Reported Property Damage/Description
Palmdale	June 2021	Wildfire	King Fire began in 90th Street West and West Avenue K and approximately 350 acres were burned.
Palmdale	May 2021	Wildfire	Pine Fire burned approximatively 442 acres east of Palmdale.
Lancaster	08/13/2019	Wildfire	West Fire started on August 13, 2019 off of 120th Street West and Coppermill Road, Lancaster in Los Angeles County. 90 acres burned
Palmdale	04/12/2007	Wildfire	Brush fire fanned by heavy winds. 150 firefighters fought a 15- to 20-acre blaze in the desert City of Palmdale. Homes were threatened for a time before most of the active flames were knocked down.
Palmdale (Cheseboro Fire)	2006	Wildfire	Cause: Arson; 142 acres burned.
Palmdale (Sierra Fire)	2005	Wildfire	Cause: Playing with fire; 364 acres burned.
Palmdale (Tovey Fire)	2005	Wildfire	Wildfire burned 983 acres; cause unknown.
Los Angeles/South of Palmdale (Crown Fire)	07/21/2004	Wildfire	More than 900 personnel were assigned to fight this fire that threatened 500 homes near the town of Acton, about 10 miles southwest of Palmdale. More than 11,970 acres had burned. A Red Cross evacuation center was set up in Palmdale.
Los Angeles/Leona Fire (12 miles west of Palmdale)	09/04/2002	Wildfire	Leona fire threatened the communities of Leona Valley, Quartz Hill, Ritter Ranch, and Lost Valley; about 500 homes. The 3,200-acre fire destroyed three or four homes and forced the mandatory evacuation of 200 people from Leona Valley and Lost Valley. One injury was related to the fire.
Palmdale	08/08/1998	Wildfire	Fire destroyed a home while blazing a 200-acre path across the north end of Palmdale. More than 200 Los Angeles County firefighters battled the blaze.

Source: NOAA National Climatic Data Center

Location

Fire can occur in any structure. Wildland fires may spread to urban areas resulting in urban fires. Structures within the District's service area are primarily single-family dwellings away from the wildland/urban interface. While a large, urban fire may occur in any neighborhood, they are not likely to expand throughout the service area.

Extent

Vulnerabilities specific to the Palmdale Water District include the structures listed in Section 5.3.1.

- **Effects on People and Structures.** Wildfires are damaging to natural environments and wildfire smoke can create health hazards. Wildfires can injure and kill residents and firefighters, as well as damage or destroy structures and personal property. The quantity and quality of water supplies can be dramatically affected by fire.
- **Effects on Infrastructure.** In addition to damaging residences and structures and injuring and killing residents and firefighters, wildfires also deplete water reserves, down power lines, disrupt telephone service, and block roads. They can also indirectly cause floods, if flood control facilities are inadequate to handle an increase in storm runoff, sediment, and debris that is likely to be generated from barren, burned-over hillsides.

Probability of Future Events and Magnitude

The risk probability and risk severity assessment listed in Table 5-10 was identified by the planning team.

Table 5-10. Probability of Future Events and Magnitude: Wildfires

Probability	Magnitude
Medium	Low

5.2.5 Extreme Weather

Description

Extreme weather hazards for the Palmdale Water District include:

- Thunderstorms/Windstorms
- Heavy Rain/Hailstorms
- Extreme Heat/Drought (discussed in Section 5.2.2)

History

Drought, thunderstorms, heavy winds, and heavy rainfall have all caused damage to the Palmdale Water District planning area in the past and will no doubt occur again in the future. The Palmdale Water District planning area has had a history of extreme weather hazards. Table 5-11 depicts some of the most recent extreme weather incidents.

Table 5-11. Historical Extreme Weather Events

Location	Date	Type	Reported Property Damage/Description
Countywide	06/01/2008	Drought	In June 2008, following the driest spring on record and 2 years of below-normal precipitation for the state, California's Governor declared the first statewide drought in 17 years – setting the state for drastic cutbacks and diverting supplies from the relatively water-rich to the water-poor.
Antelope Valley	03/02/2008	High Winds	High winds knocked out power to over 23,000 customers in the Antelope Valley. Visibility was reported to be zero at times on the Antelope Valley Freeway between Palmdale and Rosamond, causing one truck to blow over and forcing California Highway Patrol officials to escort traffic.
Antelope Valley	08/23/2006 through 08/28/2006 09/05/2006 June 2021 July 2021	Extreme Heat	The California Office of Emergency Services issued an "extreme heat advisory" for Antelope Valley where triple digit temperatures were expected for two or more days. Cooling centers were open.
Los Angeles Countywide	01/07/2005 through 01/11/2005	Heavy Rain	Property damage: $5M. A powerful Pacific storm brought heavy rain, snow, flash flooding, high winds, and landslides to Central and Southern California. During the 5-day event, rainfall totals ranged from 3 to 10 inches over coastal areas with up to 32 inches in the mountains. With such copious rainfall, flash flooding was a serious problem across Santa Barbara, Ventura, and Los Angeles Counties. Across Los Angeles County, flash flooding killed a homeless man in Elysian Park, flooded a mobile home park in Santa Clarita, closed Highway 1, and caused numerous problems in Palmdale. In the mountains, 4 to 12 feet of snowfall was recorded, along with southeast winds between 30 and 50 miles per hour (mph) with higher gusts. Overall, damage estimates for the entire series of storms that started December 27th, 2004 and ended on January 11th, 2005 were easily over $200 million with the most damage incurred by agricultural interests in Ventura County.
Los Angeles Countywide	12/31/2004	Heavy Rain	A powerful Pacific storm brought more heavy rain, snow, and flash flooding to Central and Southern California. Total rainfall amounts ranged from 1 to 3 inches on the coastal plain to between 3 and 6 inches in the mountains. The heavy rain resulted in numerous reports of urban and rural flooding. In the mountains of Ventura and Los Angeles counties, snow levels dropped to around 4500 feet, resulting in snow accumulations between 8 and 16 inches. Gusty south to southeast winds between 25 and 40 mph produced mountain visibilities near zero in blowing snow.

Table 5-11. Historical Extreme Weather Events

Location	Date	Type	Reported Property Damage/Description
Los Angeles Countywide	12/27/2004 through 12/29/2004	Heavy Rain	A powerful Pacific storm brought heavy rain, snow, and tornados to Central and Southern California. Total rainfall amounts ranged from 2 to 8 inches on the coastal plain to between 6 and 13 inches in the mountains. With such heavy rain, there were many hydrologic problems. Urban flooding was widespread across all of San Luis Obispo, Santa Barbara, Ventura, and Los Angeles Counties. In Los Angeles County, flash flooding and debris flows in the mountains and Santa Clarita valley closed down Interstate 5 and Hasley Canyon Road. In the mountains of Ventura and Los Angeles Counties, winter storm conditions prevailed. Between 12 and 36 inches of snow fell above the 5000 foot elevation, while southeast winds between 30 and 50 mph with gusts to 75 mph resulted in near zero visibility in blowing snow. On the coastal plain of Los Angeles County, weak tornados were reported in Long Beach, Inglewood, and Whittier. The tornados only produced minor damage, including downed trees and damaged roofs.
Los Angeles Countywide	03/04/2001 through 03/06/2001	Heavy Rain	A powerful and slow-moving storm brought heavy rain, strong winds and snow to Central and Southern California. Across Ventura and Los Angeles Counties, rainfall totals were somewhat less, but still very significant. Los Angeles County received 1 to 3 inches of rain. Across Central and Southern California, strong southeasterly winds accompanied the storm. Widespread winds between 30 and 50 mph with stronger gusts were reported from the coastal areas to the mountains. In the mountains of Ventura and Los Angeles Counties, winter storm conditions developed with snowfall accumulations of 6 to 12 inches, gusty southeast winds, and visibility near zero in blowing snow and dense fog.
Los Angeles Countywide	02/24/2001	Heavy Rain	A Pacific storm brought rain, snow, and wind to Central and Southern California. Overall, rainfall totals were between 1 to 4 inches, producing numerous reports of urban flooding. In the mountains, snowfall totals were 8 to 16 inches, mainly above 6000 feet. Along with the snow, south winds gusting to 50 mph developed in the mountains.

Table 5-11. Historical Extreme Weather Events

Location	Date	Type	Reported Property Damage/Description
Los Angeles Countywide	02/11/2001–02/13/2001	Heavy Rain	A powerful Pacific storm brought heavy rain, heavy snow, and gusty winds to Central and Southern California. Overall, 2 to 8 inches of rain fell across the area, producing numerous reports of urban flooding. With the storm, snow levels fell to around 1,500 feet in some areas. Ski resorts reported between 3 to 7 feet of new snowfall. With such low snow levels, the Cuyama and Antelope Valleys reported between 4 to 8 inches of snowfall. Along with the precipitation, gusty south winds of 40 to 60 mph developed in the mountains. Across coastal and valley areas of Ventura and Los Angeles counties, southeast winds of 30 to 50 mph developed and produced some damage.
Los Angeles Countywide	01/10/2001	Heavy Rain	A powerful winter storm brought heavy rain, heavy snow, and strong winds to Central and Southern California. Total rainfall amounts ranged from 2 to 5 inches across coastal areas, with between 5 to 10 inches of liquid equivalent precipitation in the mountains. Due to very dry soil conditions, flash flooding did not occur. However, numerous reports of urban flooding were received. This storm also dropped snow levels down to around 3,000 feet, producing very significant snowfall in the mountains. At resort levels, above 6,000 feet, snowfall totals ranged between 2 and 4 feet. Between 3 000 and 6 000 feet, snowfall totals ranged from 8 to 24 inches. Along with the heavy snow, southerly winds of 30 to 40 mph with gusts to 60 mph produced widespread visibilities of one mile or less in blowing snow across the mountains.
Palmdale	07/13/1999	Thunderstorm/ Wind/Hail/ Lightning	Injuries: 1. Strong thunderstorms produced heavy rain, strong winds, and dangerous lightning across the Antelope Valley and the mountains of Santa Barbara, Ventura, and Los Angeles Counties. In Palmdale, lightning struck a steam-roller operator while strong thunderstorm winds snapped small trees. Heavy rain resulted in many reports of flash flooding across the area. In the Antelope Valley, flash flooding was reported in both Palmdale and Lancaster.
Palmdale	05/23/1999	Thunderstorm/ Lightning	Fatality: 1. A U.S. Forest Service firefighter was struck and killed by lightning as a pair of rare spring thunderstorms pummeled Palmdale and across the Southland. Thunderstorms also knocked out electricity throughout the area.
Antelope Valley	04/03/1999 through 04/04/1999	High Wind 56 knots	Strong northwest winds developed across Central and Southern California. Sustained wind speeds of at least 35 to 45 mph with gusts up to 65 mph were reported. Widespread power outages and felled trees were reported.

Table 5-11. Historical Extreme Weather Events

Location	Date	Type	Reported Property Damage/Description
Los Angeles County	12/21/1998 through 12/24/1998	Freeze	$200K crop damage. An unseasonably cold air mass produced a three-night period of sub-freezing temperatures across Central and Southern California. Agricultural interests suffered heavy crop losses. The California Department of Food and Agriculture reported over $83 million in crop losses across the four-county area.
Palmdale Airport	08/31/1998	Thunderstorm/ Wind	The official observation from the Palmdale Airport reported a thunderstorm wind gust of 58 mph.
Palmdale	08/12/1998	Lightning/ Thunderstorm/ Rain	Lightning, thunder, and rain cut a swath across the Antelope Valley, as residents were treated to an afternoon of muggy weather, power outages and flash flood warnings.
Palmdale/Antelope Valley	08/04/1998	Extreme Heat	For the 19th time since June 21, the area experienced temperatures in the triple digits, driving residents indoors and pushing statewide electricity use to new heights.
Antelope Valley	02/07/1998 through 02/08/1998	High Wind 61 knots	Strong winds, gusting up to 70 mph, knocked down many trees and power lines. Rainfall totals ranged from 1 to 4 inches over the coasts, up to 7 inches in the mountains. Widespread reports of urban and rural flooding were reported.
Antelope Valley	02/05/1998 through 02/06/1998	High Wind 61 knots	Strong winds, gusting up to 70 mph, knocked down many trees and power lines. Rainfall totals ranged from 1 to 3 inches over coastal areas, up to 6 inches in the mountains. Numerous flooding problems were reported across the area. Most highways, including the 1, 101, 126, and 154 were closed due to flooding or mudslides.
Antelope Valley	02/02/1998 through 02/03/1998	Flood/High Wind 78 knots	Powerful winds buffeted the entire area. Winds gusting in excess of 70 mph were reported. Hundreds of trees and power lines were blown down, resulting in numerous power outages. On average, rainfall totals ranged from 2 to 8 inches over coastal areas, up to 12 inches in the mountains. Widespread flooding was reported in all areas. Flooding and mudslides closed parts of most major roadways across the area.

Source: NOAA National Climatic Data Center

Location

When extreme weather is in effect, the entire district is affected.

Extent

Vulnerabilities specific to the Palmdale Water District include the structures and lake listed in Section 5.3.1.

Effects on people, housing, commercial and industrial structures, and infrastructure. Extreme weather incidents as noted above can cause extensive and costly damage to housing, commercial and industrial structures, infrastructure, and even injury or loss of life. The danger is multiplied by the risks of power line downing, floods, and landslides/mudslides.

Probability of Future Events and Magnitude

The risk probability and risk severity assessment listed in Table 5-12 was identified by the planning team.

Table 5-12. Probability of Future Events and Magnitude: Extreme Weather

Probability	Magnitude
High	High

5.2.6 Terrorism/Criminal Activity

Description

Terrorism is defined in 28 CFR Section 0.85 as "…the unlawful use of force and violence against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives." Since September 11, 2001, terrorism has become a fact of life for all Americans. Planning for response to potential terrorist incidents has long been part of California's Emergency Preparedness Planning effort. California provides a target-rich environment for terrorists, with many facilities and venues providing an easy place to hide in California's diverse population.

Until recently, contamination of water with biological, chemical, or radiological agents generally resulted from natural, industrial, or unintentional man-made accidents. Unfortunately, recent terrorist activity in the U.S. has forced the medical community, public health agencies, and water utilities to consider the possibility of intentional contamination of U.S. water supplies as part of an organized effort to disrupt and damage important elements of our national infrastructure. In his 2002 State of the Union Address, President Bush noted that confiscated Al Qaeda documents included detailed maps of several U.S. municipal drinking water systems. Apprehension regarding a terrorist assault on drinking water has also been reinforced by news reports and recent arrests of suspects charged with threatening to poison water supplies in the U.S. In addition, the National Academy of Sciences reported to Congress that water supply system contamination and disruption should be considered a possible terrorist threat in the U.S. As a result of these reports, there continues to be concern that water may represent a potential target for terrorist activity and that deliberate contamination of water is a potential public health threat.

Terrorists often use threats to create fear among the public, to try to convince citizens that their government is powerless to prevent terrorism, and to get immediate publicity for their causes. Terrorist acts or acts of war may cause casualties, extensive property damage, fires, flooding, and other ensuing hazards. Terrorism takes many forms, including:

Chemical. Chemical weapons have been used primarily to terrorize an unprotected civilian population and not as a weapon of war. This is because of fear of retaliation and the likelihood that the agent would contaminate the battlefield for a long period of time.

Some analysts suggest that the possibility of a chemical attack would appear far more likely than either the use of nuclear or biological materials, largely due to the easy availability of many of the necessary precursor substances needed to construct chemical weapons. Additionally, the rudimentary technical knowledge needed to build a working chemical device is taught in every college level chemistry course in the world. Some chemical agents are odorless and tasteless and are difficult to detect. They can have an immediate effect (a few seconds to a few minutes) or a delayed effect (several hours to several days).

A terrorist would not have to build a complicated chemical release device. During favorable weather conditions an already existing chemical plant could be sabotaged or bombed, releasing a toxic cloud to drift into a populated area. The result could be just as dangerous as having placed a smaller chemical device in a more confined space. This type of incident would cause the maximum amount of fear, trepidation, and potential panic among the civilian population, and thus achieve a major terrorist objective

Biological. Biological weapons are defined as any infectious agent such as a bacteria or virus used to produce illness or death in people, animals, or plants. This definition is often expanded to include biologically derived toxins and poisons. Biological agents can be dispersed as aerosols or airborne particles. Terrorists may use biological agents to contaminate food or water because the agents are extremely difficult to detect. The agents are cheap, easy to make, and simple to conceal. Even small amounts, if effectively deployed, could cause massive injuries, and overwhelm emergency rooms. The production of biological weapons can be carried out virtually anywhere — in simple laboratories, on a farm, or even in a home.

However, experts say it remains very difficult to transform a deadly virus or bacterium into a weapon that can be effectively dispersed. A bomb carrying a biological agent would likely destroy the germ as it explodes. Dispersing the agents with aerosols is challenging because biomaterials are often wet and can clog sprayers. Most agree that, while a biological attack could be devastating in theory, in reality, the logistical challenges of developing effective agents and then dispersing them makes it less likely a terrorist could carry out a successful widespread assault.

Radiological. A radioactive material is a material made up of unstable atoms that give off excess energy in the form of radiation through the process of radioactive decay. Radiation cannot be detected by human senses. Wherever radioactive materials are used, transported, or stored, there is potential for a radiological accident to occur. Under extreme circumstances an accident or intentional explosion involving radiological materials can cause very serious problems. Consequences may include death, severe health risks to the public, damage to the environment, and extraordinary loss of, or damage to, property. Some of their most common uses include use:

- By doctors to detect and treat serious diseases.
- By educational institutions and companies for research.
- By the military to power large ships and submarines.

- By companies in the manufacture of products.
- As a critical base material to help produce the commercial electrical power that is generated by a nuclear power plant.
- As one of the critical components in nuclear weapons, which are relied upon to help deter the threat of war.

Nuclear. The possibility exists that a terrorist organization might acquire the capability of creating a small nuclear detonation. A single nuclear detonation in the U.S. would likely produce fallout affecting an area many times greater than that of the blast itself. There is also the possibility that a terrorist will construct a “dirty bomb,” a bomb that is used to distribute nuclear contaminated materials. It would have less of an effect than a “traditional” nuclear bomb, but the terror effect on the population would be great.

Explosive. The possibility exists that a terrorist may attack with conventional explosives, particular in a public setting. Innumerable incidents have occurred around the world involving car bombs, truck bombs, and bombs attached directly to terrorist individuals. Explosive terrorist attacks may have consequences, including death and damage to property.

Cyber-terrorism. Cyber-terrorism is the use of computer network tools to shut down critical government infrastructures such as energy, transportation, and government operations, or to coerce or intimidate a government or civilian population. The premise of cyber-terrorism is that as nations and critical infrastructure become more dependent on computer networks for their operation, new vulnerabilities are created. A hostile nation or group could exploit these vulnerabilities to penetrate a poorly-secured computer network and disrupt or even shut down critical public or business operations.

The goal of cyber-terrorism is believed to be aimed at hurting the economy of a region or country, and to amplify the effects of a traditional physical terrorist attack by causing additional confusion and panic.

Criminal Activity. Among the highest amount of crimes reported from October 2019 to February 2020 were aggravated assaults, burglary, auto theft, and other property theft crimes. Criminal activity levels can change based on a variety of outside influences, including socioeconomic impacts, shifts in political impressions, and various other factors. At this time, none of the research identified any specific criminal or terror targeting of the District. All crimes, however, have the potential to impact District staff away from the work environment. Also, because the District covers a large geographical area, its facilities are spread out, making it challenging to easily monitor all facilities. As such, the facilities that are in less populated areas are susceptible to vandalism and unauthorized entry into the compounds. Using proper safety and security habits will help reduce the likelihood or impact on staff, District facilities, and the District’s mission.

Active Shooter. The U.S. Department of Homeland Security defines the active shooter as “an individual actively engaged in killing or attempting to kill people in a confined and populated area; in most cases, active shooters use firearms, and there is no pattern or method to their selection of victims.” Active shooters may also use explosive devices during assaults to increase the likelihood of casualties or to commit suicide. Most incidents occur at locations in which the killers find little impediment in pressing their attack. Locations are generally described as soft targets that have limited security measures to protect members of the public. In most instances, shooters commit suicide, are shot by police, or surrender when confrontation with responding law enforcement becomes unavoidable.

History

September 11th and subsequent news reports indicated that some terrorists in the U.S. have obtained drivers licenses for transporting hazardous materials, including hazardous wastes, calling attention to a new form of hazardous material threat.

Fortunately, the Palmdale Water District has no history of incidents of chemical, biological, radiological, nuclear, explosive, cyber-terrorism, criminal activity, or active shooters.

Location

The form and locations of many natural hazards are identifiable and, even in some cases, predictable; however, there is no defined geographic boundary for terrorism.

Extent

The damage caused by a terror attack is dependent on the method of attack. Large bomb attacks could destroy major infrastructure, kill many people, and disrupt regional functioning for a significant time. Cyber-terrorism would cause very different types of damage, possibly severely hampering local government operations and local businesses with no direct injuries or loss of life. In addition to direct physical damage, terrorist attacks breed fear. Even an unsuccessful attempt to attack the region would seriously impact the comfort level of residents and could affect local businesses.

Probability of Future Events and Magnitude

The risk probability and risk severity assessment listed in Table 5-13 was identified by the planning team.

Table 5-13. Probability of Future Events and Magnitude: Criminal Activity/Terrorism

Probability	Magnitude
Low	High

5.2.7 Cyber-attack/Cybersecurity Breach

Description

A cyber-attack is an intentional and malicious crime that compromises the digital infrastructure of a person or organization, often for financial or terror-related reasons. Such attacks vary in nature and are perpetrated using digital mediums or sometimes social engineering to target human operators. Generally, attacks last minutes to days, but large-scale events and their impacts can last much longer. As information technology continues to grow in capability and interconnectivity, cyber-attacks become increasingly frequent and destructive. Types of cyber-attack cyber-threats differ by motive, attack type, and perpetrator profile. Motives range from the pursuit of financial gain to political or social aims.

Cyber-threats are difficult to identify and comprehend. Types of threats include using viruses to erase entire systems, breaking into systems, and altering files, using someone's personal computer to attack others, or stealing confidential information. The spectrum of cyber-risks is limitless, with threats having a wide range of effects on the individual, community, organizational, and national threat (FEMA 2013).

While all cyber-terrorism is a form of cyber-attack, not all cyber-attacks are cyber-terrorism. Public and private computer systems are likely to experience a variety of cyber-attacks, from blanket malware infection to targeted attacks on system capabilities. Cyber-attacks specifically seek to breach Information Technology security measures designed to protect an individual or organization.

Since 2013, a new type of cyber-attack is becoming increasingly common against individuals and small- and medium-sized organizations. This attack is called cyber-ransom. Cyber-ransom occurs when an individual downloads ransom malware, or ransomware, often through phishing or drive-by download. The subsequent execution of code results in encryption of all data and personal files stored on the system. The victim then receives a message that demands a fee in electronic currency or cryptocurrency, such as Bitcoin.

History

Cyber-attacks on U.S. companies occur daily, and the quantity and quality of information being hacked, stolen, destroyed, or leaked is becoming more and more of a problem for consumers, government entities, and businesses.

In late April 2020, Israel's National Cyber Directorate received reports about an attempted major cyber-attack on its water infrastructure. According to a statement issued by the directorate, the attack consisted of "assault attempts on control and control systems of wastewater treatment plants, pumping stations, and sewers."

The City of Atlanta was crippled by a ransomware attack in March 2018, which disrupted city utilities, courts, and other operations. For roughly a week, employees with the Atlanta Department of Watershed Management were unable to turn on their work computers or gain wireless internet access, and 2 weeks after the attack, Atlanta completely took down its water department website "for server maintenance and updates until further notice." It took Atlanta months and estimated costs of up to $5 million in recovery efforts to address the attack.

Location

Cyber-attacks are not characterized by location. Attacks can originate from any computer to affect any other computer in the world. If a system is connected to the Internet or operating on a wireless frequency, it is susceptible to exploitation. Targets of cyber-attacks can be individual computers, networks, organizations, business sectors, or governments. Financial institutions and retailers are often targeted to extract personal and financial data that can be used to steal money from individuals and banks. The most affected sectors are finance, energy and utilities, and defense and aerospace, as well as communication, retail, and health care.

Extent

All critical facilities and infrastructure, such as water systems operated by electricity and/or a computer system, are vulnerable to cyber-attacks. Cyber-attacks may affect structures if any critical electronic systems suffer service disruption. For instance, a cyber-attack may cripple the electronic system that controls a cooling system or pressure system within critical infrastructure. This scenario may result in physical damage to the structure from components overheating or an explosion if pressure relief systems are rendered inoperable.

The District's Supervisory Control and Data Acquisition (SCADA) system and financial, human resources, and administrative systems are vulnerable to cyber-attack.

Common Mechanisms for Cyber-Attacks include:

- **Socially Engineered Trojans** - Programs designed to mimic legitimate processes (e.g., updating software, running fake antivirus software) with the end goal of human-interaction-caused infection. When the victim runs the fake process, the Trojan is installed on the system.
- **Unpatched Software** - Nearly all software has weak points that may be exploited by malware. Most common software exploitations occur with Java, Adobe Reader, and Adobe Flash. These vulnerabilities are often exploited as small amounts of malicious code often downloaded via drive-by download.
- **Phishing** - Malicious email messages that ask users to click a link or download a program. Phishing attacks may appear as legitimate emails from trusted third parties.
- **Password Attacks** - Third-party attempts to crack a user's password and subsequently gain access to a system. Password attacks do not typically require malware but rather stem from software applications on the attacker's system. These applications may use a variety of methods to gain access, including generating large numbers of generated guesses, or dictionary attacks, in which passwords are systematically tested against all of the words in a dictionary.
- **Drive-by Downloads** - Malware is downloaded unknowingly by the victims when they visit an infected site.
- **Denial of Service Attacks** - Attacks that focus on disrupting service to a network in which attackers send high volumes of data until the network becomes overloaded and can no longer function.
- **Man-in-the-Middle** - These attacks mirror victims and endpoints for online information exchange. In this type of attack, the attacker communicates with the victims, who believe they are interacting with a legitimate endpoint website. The attacker is also communicating with the actual endpoint website by impersonating the victim. As the process goes through, the attacker obtains entered and received information from both the victim and endpoint.
- **Malvertising** - Malware downloaded to a system when the victim clicks on an affected ad.

- **Advanced Persistent Threat** - An attack in which the attacker gains access to a network and remains undetected. Advanced persistent threat attacks are designed to steal data instead of cause damage.

Probability of Future Events and Magnitude

While there is little evidence to indicate the likelihood of a cyber-attack against the District, there is 100 percent certainty that cyber-attacks will continue.

An initial attack is often followed by more severe attacks to cause harm, stealing data, or financial gain. As cyber-attacks become more sophisticated and numerous, all of the District's digital infrastructure is at risk.

5.2.8 Power Failure

Description

Power outages are a region-wide problem in Los Angeles County. It is not unusual to experience several outages a year. In the past, outages have ranged between a few minutes to several hours, from half a day to several days in some areas of the County. If an outage affects several areas of the County, Palmdale is usually affected.

Power failures of longer durations are usually caused by natural events that damage or disrupt large areas of the power transmission and/or distribution systems. Some of the causes of longer duration power failures have been severe winter storms, often accompanied by high winds and extreme heat waves, causing equipment failure and excessive power demands leading to brownouts.

Another cause is high-pressure induced windstorms, which can last from 3 to 5 days and disrupt the power distribution system. Vehicular accidents involving power poles or transmission lines and trees falling on transmission lines are often the causes of localized outages of shorter duration.

Those individuals or facilities at greatest risk from loss of power are the elderly, home health care patients, health care facilities, emergency services providers/facilities, and similar entities.

History

Rather than list all of the power outages Southern California Edison has experienced in Los Angeles County, listed are those that impacted the Antelope Valley. A sampling of outages over the past 7 years includes:

- 2001 – deliberate rotating outages due to statewide energy shortage
- 2005 – 500,00 without power due to failure of a key transmission line
- 2007 – thousands without power due to faulty distribution transformers

There have been other more localized power failures due to downed utility poles and faulty or failed equipment, including the loss of power to 11,500 in September 2007.

Location

Power outages can occur throughout the District service area and affect the entire region.

Extent

Power outages are typically measured by the number of customers without power. This number is two to three times lower than the number of people affected.

Probability of Future Events and Magnitude

There is always the possibility that equipment will fail, and as Los Angeles County and Palmdale continue to grow and be subjected to weather cycles that place high demands on power, the probability of future power failures/outages is high.

5.2.9 Public Health Emergency/ Pandemic

Description

Human health hazards include transmittable diseases and environmental hazards such as adverse weather. The following sections describe commonly recognized human health hazards.

- **Coronaviruses /SARS -** The current (2020) COVID-19 pandemic is spread by a coronavirus. Coronaviruses cause a large percentage of colds and upper respiratory infections. Severe acute respiratory syndrome (SARS) is a viral respiratory disease caused by a SARS-associated coronavirus. It was first identified at the end of February 2003 during an outbreak that emerged in China and spread to four other countries.
- **Influenza** - Flu epidemics and pandemics occur routinely, typically in the fall and winter. Because flu seasons fluctuate in length and severity, a single estimate cannot be used to summarize influenza-associated deaths. The U.S. Centers for Disease Control and Prevention estimates that from the 1976 through 1977 flu season to the 2006 through 2007 season, flu-associated deaths ranged from a low of about 3,000 to a high of about 49,000.
- **Insect/Tick-Borne Disease -** Insects such as mosquitos and ticks can transmit a variety of diseases.

  Diseases that can be contracted through a tick bite include:

  - Colorado tick fever
  - Ehrlichiosis
  - Lyme disease
  - Rocky Mountain spotted fever
  - Tularemia

  Diseases that mosquitoes carry include:

  - Eastern equine encephalitis

- Malaria
- West Nile virus
- Zika virus

- **Plague** - Plague is caused by the bacteria Yersinia pestis, a zoonotic bacterium usually found in small mammals and their fleas. Plague is transmitted between animals and humans by the bite of infected fleas, direct contact with infected tissues, and inhalation of infected respiratory droplets. There are two primary clinical forms of plague infection: bubonic and pneumonic. Bubonic plague is the most common form and is characterized by painful swollen lymph nodes or 'buboes.'

  Plague can be a very severe disease in people, with a case-fatality ratio of 30 percent to 60 percent for the bubonic type and is always fatal for the pneumonic kind when left untreated.

- **Anthrax** - Anthrax is a serious infectious disease caused by gram-positive, rod-shaped bacteria known as Bacillus anthracis. Although it is rare, people can get sick with anthrax if they come in contact with infected animals or contaminated animal products. Anthrax has the potential for and has been used as a biological weapon.

- **Hemorrhagic Fevers** - Viral hemorrhagic fevers are a group of illnesses caused by several distinct families of viruses. In general, the term "viral hemorrhagic fever" is used to describe a severe multisystem syndrome. Characteristically, the overall vascular system is damaged, and the body's ability to regulate itself is impaired. These symptoms are often accompanied by hemorrhage (bleeding); however, the bleeding is itself rarely life-threatening. While some types of hemorrhagic fever viruses can cause relatively mild illnesses, many of these viruses cause severe, life-threatening disease. Hemorrhagic fevers include Ebola and Yellow Fever.

History

Pandemics have occurred throughout history. Some of the largest scale public health and pandemic incidents include:

- **2020–Present COVID-19:** Beginning in December 2019, in the region of Wuhan, China, a new ("novel") coronavirus appeared and rapidly spread. COVID-19, a shortened form of "coronavirus disease of 2019," has affected every nation on the planet. It is the largest pandemic since the 1918-1919 Spanish Influenza.

- **1976–Present HIV/AIDS** (Peak 2005-2012): HIV/AIDS was first identified in the Democratic Republic of the Congo in 1976. HIV/AIDS is a global pandemic, having killed more than 36 million people since 1981. Currently, there are between 31 and 35 million people living with HIV infections.

- **1968:** A Category 2 flu pandemic, sometimes referred to as "the Hong Kong Flu," the 1968 flu pandemic was caused by the H3N2 strain of the Influenza A virus. Within three months, it had spread to the Philippines, India, Australia, Europe, and the U.S. While the 1968 pandemic had a comparatively low mortality rate (0.5 percent), it still resulted in the deaths of more than a million people, including 500,000 residents of Hong Kong; approximately 15 percent of its population at the time.

- **1956–1958:** The Asian Flu was a pandemic outbreak of Influenza A of the H2N2 subtype that originated in China in 1956 and lasted until 1958. In its 2-year infectious duration, it resulted in approximately 2 million deaths worldwide and 69,800 in the US.
- **1918–1920:** A strain of H1N1 influenza resulted in a deadly outbreak that tore across the globe, infecting over a third of the world's population and ending the lives of 20 to 50 million people. Of the 500 million people infected in the 1918 infection wave, mortality rates were estimated at 10 percent to 20 percent, with up to 25 million deaths in the first 25 weeks alone.
- **1346 to 1353:** The Black Death was an outbreak of Bubonic Plague that ravaged Europe, Africa, and Asia, with an estimated death toll between 75 and 200 million people. Thought to have originated in Asia, the pandemic most likely jumped continents via the fleas living on the rats found aboard merchant ships.

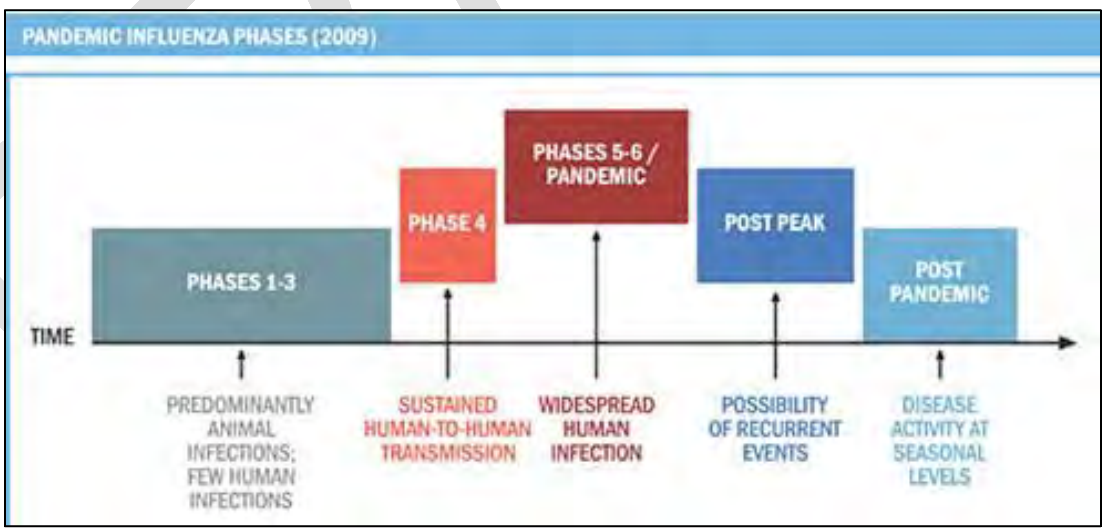
Location

Pandemics occur worldwide. Smaller-scale public health incidents or epidemics may be localized, such as the Ebola outbreak in a region of Africa. All locations are susceptible to pandemics and local public health hazard incidents.

Extent

The WHO currently uses the Pandemic Influenza Phases to characterize pandemics, as shown in Figure 5-11.

Figure 5-11. WHO Pandemic Influenza Phases



In nature, influenza viruses circulate continuously among animals, especially birds. Even though such viruses might theoretically develop into pandemic viruses.

- In Phase 1, no viruses circulating among animals have been reported to cause infections in humans.

- In Phase 2, an animal influenza virus circulating among domesticated or wild animals is known to have caused infection in humans and is, therefore, considered a potential pandemic threat.
- In Phase 3, an animal or human-animal influenza reassortant virus has caused sporadic cases or small clusters of disease in people but has not resulted in human-to-human transmission sufficient to sustain community-level outbreaks. Limited human-to-human transmission may occur under some circumstances, for example, when there is close contact between an infected person and an unprotected caregiver. However, limited transmission under such restricted circumstances does not indicate that the virus has gained the level of transmissibility among humans necessary to cause a pandemic.
- Phase 4 is characterized by verified human-to-human transmission of an animal or human-animal influenza reassortant virus able to cause “community-level outbreaks.” The ability to cause sustained disease outbreaks in a community marks a significant upwards shift in the risk for a pandemic. Any country that suspects or has verified such an event should urgently consult with WHO so that the situation can be jointly assessed, and a decision made by the affected country if implementation of a rapid pandemic containment operation is warranted. Phase 4 indicates a significant increase in the risk of a pandemic but does not necessarily mean that a pandemic is a forgone conclusion.
- Phase 5 is characterized by human-to-human spread of the virus into at least two countries in one WHO region. While most countries will not be affected at this stage, the declaration of Phase 5 is a strong signal that a pandemic is imminent and that the time to finalize the organization, communication, and implementation of the planned mitigation measures is short.
- Phase 6, the pandemic phase, is characterized by community-level outbreaks in at least one other country in a different WHO region in addition to the criteria defined in Phase 5. Designation of this phase will indicate that a global pandemic is underway.

Probability of Future Events and Magnitude

Although the timing of the outbreak of a pandemic or other public health emergency is difficult to predict, they will continue to occur continually and have a greater than 1 percent chance of occurring in any year.

5.2.10 Hazardous Materials and Hazardous Incidents

Description

A hazardous material is any material whose physical, chemical, or biological characteristics, quantity, or concentration may cause or contribute to adverse effects in organisms or their offspring; pose a substantial present or future danger to the environment; or result in damage to or loss of equipment, property, or personnel.

Hazardous materials consist of substances that by their nature, lack of containment, and reactivity, have the capability for inflicting harm. Hazardous materials pose a threat to health and the environment when improperly managed and can be toxic, corrosive, flammable, explosive, reactive, an irritant, or a strong sensitizer. Hazardous materials substances also include certain infectious agents, radiological materials, oxiders, oil, used oil, petroleum products, and industrial solid waste substances. Hazardous materials can pose a threat where they are manufactured, stored, transported, or used. They are used in almost every manufacturing operation and by retailers, service industries, and homeowners.

Geologic resources (i.e., soil and groundwater) are susceptible to contamination from the surface. Releases of hazardous chemicals such as petroleum products and solvents have resulted in soil contamination at military installations. Contaminated soil or groundwater may require physical removal or extensive remediation to ensure the protection of public health and safety.

Hazardous material incidents are one of the most common technological threats to public health and the environment. Incidents may occur as the result of natural disasters, human error, and/or accident. Hazardous materials incidents typically take three forms:

- Pipeline incidents
  - Pipelines carry natural gas and petroleum. Breakages in pipelines carry differing amounts of danger, depending on where and how the break occurs, and what is in the pipe.
- Fixed facility incidents
  - It is reasonably possible to identify and prepare for a fixed site incident, because laws require those facilities to notify state and local authorities about what is being used or produced there.
- Transportation incidents
  - Transportation incidents are more difficult to prepare for because it is impossible to know what material(s) could be involved until an accident actually happens.

History

Numerous sites in the City of Palmdale area generate, use, or store hazardous substances, including the US Air Force (USAF) Plant 42, Lockheed Martin Aeronautics Company, and the Palmdale Water Reclamation Plant (PWRP).

The USAF Plant 42 operations include assembly of test aircraft and pilot training. Hazardous materials and wastes used and generated on site include various petroleum products, paints, solvents, and corrosives. USAF Plant 42 is listed on the EPA's Comprehensive Environmental Response, Compensation, and Liability Information System database as a potentially contaminated site. The California Department of Health Services has also identified USAF Plant 42 as a hazardous waste site targeted for cleanup. Twenty-eight contaminated areas have been identified; however, information available to date indicates that no hazardous waste exposure to public health or the environment exists at this time.

Lockheed Martin Aeronautics Company Joint Strike Fighter assembly area uses 54 hazardous materials in their operation; this is down from between 400 and 500 hazardous materials that were used to support predecessor aircraft.

The PWRP was constructed in 1953 in an unincorporated county area adjacent to the City of Palmdale. As the PWRP began operating, most of the effluent was managed using evaporation/percolation ponds. In 1959, PWRP District No. 20 began contracting with local farmers to provide effluent from the PWRP for agricultural irrigation. Throughout the 1960s, District No. 20 supported the use of effluent for agricultural irrigation; however, only a small portion of the total effluent managed was actually reused. By the 1970s, approximately one-third of the treated effluent from the PWRP was reused for crop irrigation with the remainder being sent to the evaporation/percolation ponds.

Major gas lines also come into Southern California over the San Andreas at several points, including Palmdale, Indio, the Cajon Pass, and the Tejon Ranch. Officials at the Southern California Gas Company expressed confidence that the system could withstand a strong earthquake, noting they have been upgrading the pipeline for years.

Currently there are no hazardous waste landfills located in the Palmdale Water District Planning Area. The Palmdale Disposal Plant is a non-hazardous Class II landfill. Groundwater and surface water are protected from contamination by wastes deposited at the landfill through required waste management practices in place at the landfill.

Hazardous Material Hazard Incidents

A review of the U.S. Department of Transportation's Hazardous Material Incident Reporting System identified 15 spills between 2002 and 2007 in the City of Palmdale but did not identify a location with enough accuracy to determine if they were in the watershed.

There were two occasions between 2002 and 2007 (*as of October 26, 2007*), where vehicles crashed into Palmdale Ditch. Both occurred at bar screen No. 8, Pearblossom Highway Underpass (just off Pearblossom Highway to the south, approximately 150 feet west of Barrel Springs Road). Both vehicles were traveling east on Pearblossom Highway and unable to stop for traffic stopped at the traffic light.

The Palmdale Water District and surrounding areas have had a history of hazardous materials spill incidents. Table 5-14 depicts some of the most recent recorded incidents.

Table 5-14. Hazardous Material Events

Date	Substance/Type	Reported Property Damage/Description
6/11/2021	Petroleum	A traffic collision involving a semitruck was the cause of a petroleum release. The release impacted a dirt shoulder and no waterways were involved with this incident.
5/10/2021	Petroleum	A semi-truck crashed into a pick-up truck resulting in the release of petroleum onto the right shoulder of the roadway.
3/14/2021	Petroleum	A vehicle collided with a power pole and caused a release of non-PCB mineral oil from a capacitor bank.
3/4/2021	Petroleum	A bucket truck overturned causing the release of petroleum.

Table 5-14. Hazardous Material Events

Date	Substance/Type	Reported Property Damage/Description
2/1/2021	Petroleum	A hydraulic oil leak coming from a garbage truck which spanned several streets.
1/11/2021	Other	PFOA released onto soil by the fire hydrant at Airforce Plant 42.
1/4/2021	Chemical	A plumbing leak that leaked on a foam panel and caused the foam cannon to operate within the hangar. The release entered a trench within the hangar and approximately 500 gallons of the fire-fighting foam overflowed and released outside the hangar and was static on the asphalt.
12/10/2020	Petroleum	A collision a vehicle was turned on its side causing a release of oil.
9/16/2020	Petroleum	A traffic collision caused release of petroleum from a fuel tank that was punctured.
9/2/2020	Vapor	3/4-inch steel natural gas line was damaged causing a release.
9/1/2020	Vapor	½-inch residential service gas line was damaged which causing a release.

Source: California Office of Emergency Services

Location

Several state agencies monitor hazardous materials/waste facilities. Potential and known contamination sites are monitored and documented by the California Department of Health Services and the Regional Water Quality Control Board (WQCB). A review of the leaking underground storage tank list produced by the Regional Water Quality Control Board and the Hazardous Waste and Substances Sites List produced by the Office of Planning and Research indicates two hazardous waste sites located in Palmdale as noted in Table 5-15.

Table 5-15. Hazardous Sites

Address	Problem	Source
Palmdale Regional Airport 394441 North 25th Street Palmdale	Tank Leak	WQCB
Lockheed 2500 East Avenue M Palmdale	Tank Leak	WQCB

Transport of Hazardous Materials

Transportation of hazardous materials/wastes and explosives through the Planning Area is regulated by the California Department of Transportation. State Route (SR)-14 and SR-138 are open to vehicles carrying hazardous materials/wastes. Palmdale City streets and unincorporated county areas are generally not designated as hazardous materials/wastes transportation routes; however, a permit may be granted on a case-by-case basis. Transporters of hazardous wastes are required to be certified by the Department of Transportation and manifests are required to track the hazardous waste during transport.

Although no spills have been reported, the danger of hazardous materials/waste spills during transport exists and will potentially increase as industrial development in the planning area increases. At present, the Los Angeles County Fire Department is responsible for hazardous materials accidents at all locations within the Palmdale Water District planning area.

Extent

The extent of a hazardous material spill may vary from significant impacts causing injuries and evacuation to minor impacts requiring minimal cleanup. Hazardous materials releases can be harmful in the following ways:

- Chemical, biological, and radiological agents can cause significant health risks to those exposed to them; biological agents can be additionally dangerous if they are infectious. Flammable and explosive materials also present life safety concerns when exposed to heat.
- Oil spills can present an immediate fire hazard and can contaminate drinking water supplies. Any release of hazardous material requires a thorough and careful clean-up of the site and decontamination of those exposed. Clean-up and recovery are time and cost consuming.
- Delays caused by hazardous materials releases and the ensuing evacuation and cleanup processes could lead to significant economic losses due to traffic delays (mobile releases) or operational shutdown (fixed facilities).
- Overall, hazardous materials can cause death, serious injury, long-lasting health effects, and damage to buildings, the environment, homes, and other property.

Probability of Future Events and Magnitude

The risk probability and risk severity assessment listed in Table 5-16 was identified by the planning team.

Table 5-16. Probability of Future Events and Magnitude: Hazardous Materials and Hazardous Incidents

Probability	Magnitude
Low	High

5.2.11 Dam Failure

Description

Dam break floods are usually associated with intense rainfall, prolonged flood conditions, or earthquakes. Dam failure may also be caused by faulty design, construction, and operational inadequacies. The cause can be due to a flood event or earthquake larger than the dam was designed to accommodate. The degree and extent of damage depends on the size of the dam and circumstances of failure. A small dam retaining water in a stock pond may break resulting in little more damage that the loss of the structure itself. An even larger dam failure might bring about considerable loss of property, utilities, roads, and loss of life. Other consequences can include loss of income, disruption of services, and environmental devastation.

Dams are a critical part of our national infrastructure. Millions of Americans rely on dams for water supply, power generation, flood control, irrigation, and recreation. But many of our dams are beyond their life span and are in desperate need of repair. Despite efforts by states to improve dam conditions, far too many unsafe dams remain at risk of failure, threatening life and property.

A dam failure is the partial or complete collapse of an impoundment, with the associated downstream flooding. Flooding of the area below the dam may occur as the result of structural failure of the dam, overtopping, or a seiche. Dam failures are caused by natural and manmade conditions. The list of causes includes earthquake, erosion of the face or foundation, improper sitting, structural/design flaws, and prolonged rainfall and flooding. The primary danger associated with a dam failure is the swift, unpredictable flooding of those areas immediately downstream of the dam.

There are three general types of dams: earth and rock fill, concrete arch or hydraulic fill, and concrete gravity. Each of these types of dams has different failure characteristics. The earth and rock fill dam will fail gradually due to erosion of the breach; a flood wave will build gradually to a peak and then decline until the reservoir is empty. A concrete arch or hydraulic fill dam will fail almost instantaneously, with a very rapid build-up to a peak and then a gradual decline. A concrete gravity dam will fail somewhere in between instantaneous and gradual, with corresponding buildup of flood wave.

History

The Palmdale Water District evolved from several private water companies. The first water agency, the Palmdale Irrigation Company, was established in 1886 to acquire land and water, and then rent, lease, and sell both as they were developed. As a means of providing water for these purposes, they constructed a 6.5-mile irrigation ditch to divert water from nearby Little Rock Creek to Palmdale. Not long after, it became apparent that water storage facilities were needed.

On July 22, 1918, the Palmdale Irrigation District, which later became Palmdale Water District, was formed and the task to build the Littlerock Dam for storage commenced. Littlerock Creek Irrigation District was a partner in the project. When the dam was completed in 1924, it was the tallest multiple-arch dam in the U.S.

In 1987, after years of study, Palmdale Water District and Littlerock Creek Irrigation District decided to rehabilitate the Littlerock Dam in three phases. The first phase involved reinforcing the original multiple-arch construction with a roller-compacted concrete buttress. At the same time, the original dam was raised 12 feet, which doubled the reservoir's capacity. Shotcrete with steel reinforcement was applied to the upstream surface of the dam, further strengthening the structure, but also improving its appearance cosmetically. Larger outlet pipes and controls were installed to provide greater safety when releasing stored water.

The second phase of construction provided new recreational facilities around the reservoir, including a new boat launching facility; improved picnic areas and campsites; an interpretive display center overlooking the dam; and improved parking and restroom facilities.

The final phase of construction included replacing a historic wooden trestle with an underground siphon.

Financed partly with funds from the Davis-Grunsky Act, California Department of Boating and Waterways, and the issuance of Certificates of Participation, the $22 million Littlerock Dam renovation project was completed in 1995. Key factors in its completion were cooperative efforts between local, state, and federal agencies.

Location

Lake Palmdale. In 1895, the South Antelope Valley Irrigation Company constructed an earthen dam forming Harold Reservoir, known today as Lake Palmdale. To connect the water from Little Rock Creek to Harold Reservoir, they constructed another earthen ditch, including a flume and wooden trestle, parallel to the ditch being used by the Palmdale Irrigation Company.

Littlerock Dam. Located on U.S. Forest Service land in the southern Antelope Valley, construction of Littlerock Dam was completed in 1924. At that time, it was the highest reinforced concrete multiple arch-dam in the U.S. with a capacity of 4,200-acre feet of water. Much controversy surrounded the design of Littlerock Dam, and in 1932 it was determined by the State of California that it was an unsafe structure in its then-present condition, and renovations were ordered. By 1938, renovations had still not been completed and a 2-day storm caused major damage to the dam and spillway as well as the flume. By 1940, renovations were completed, and reconstruction of Littlerock Dam was considered once again complete. However, it was reconstructed again in 1966 after the State Division of Safety of Dams studies indicated that the dam would not withstand a major earthquake.

Figure 5-12. Littlerock Dam

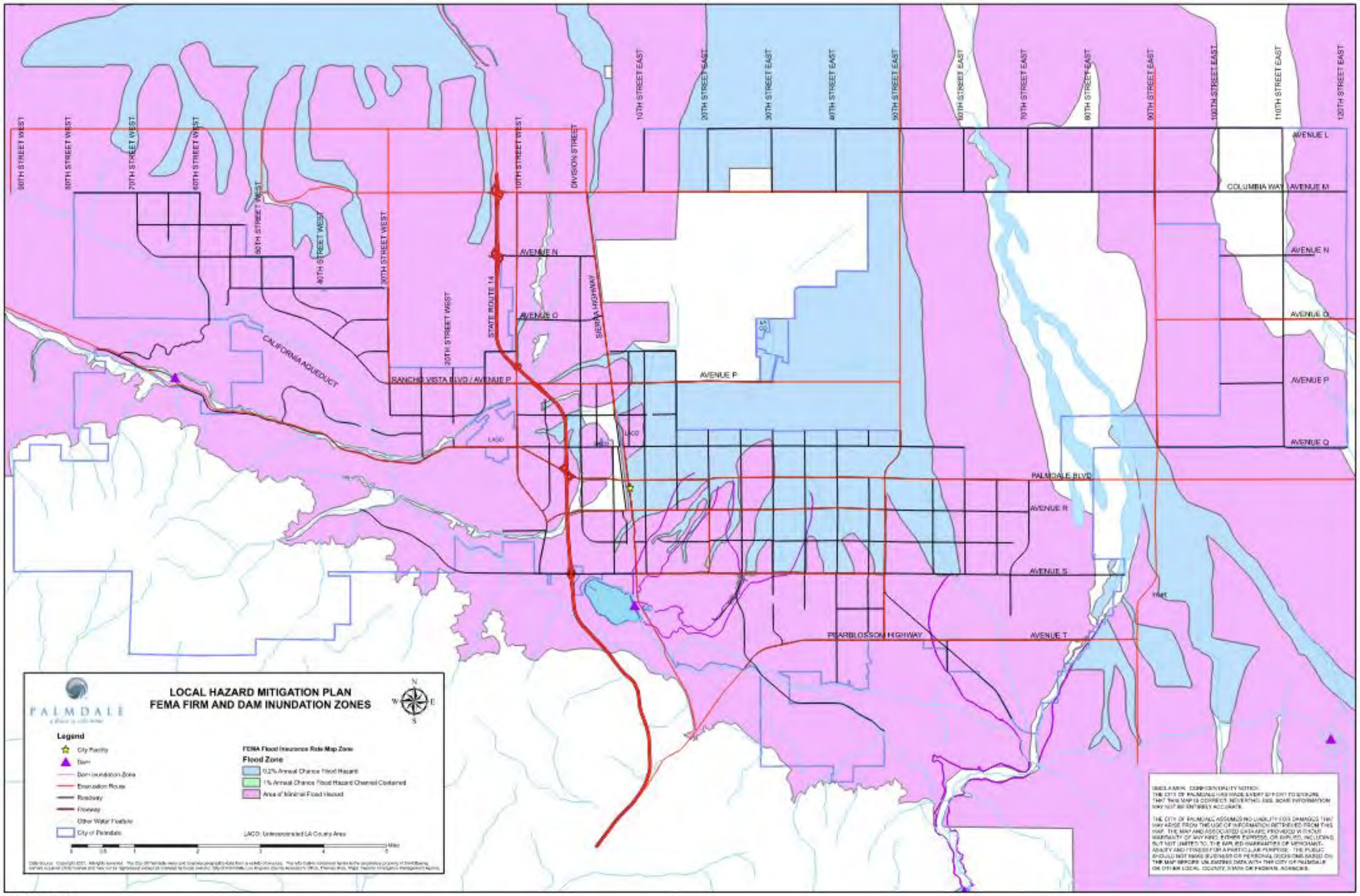
Extent

Surface rupture and ground shaking from earthquakes may result in the rupture of the Palmdale and Littlerock Dams, causing flooding. Flood waters could be as deep as 50 feet immediately downstream of the Littlerock Dam. Failure of the Littlerock Dam would result in the inundation of a 300-foot-wide area for 0.25 mile north of the dam. Along this length, the water depth would vary from 50 to 15 feet. Ten minutes after failure, the flood water would veer eastward for 800 feet to Avenue U where the depth would be reduced to 10 feet. Trending north from Avenue U, the water would eventually dissipate so that the depth would no longer be a risk to downstream developments.

In addition to dam failure and subsequent flooding, a seismic event could cause a water wave, or seiche to occur at Lake Palmdale, which could potentially overtop the dam. The design report for the dam considers a reflection of the wave on return unlikely. Also, wave volume above the dam would not be substantial (approximately 1 acre-foot) and would not result in damaging floods. Overpour on the downstream side of the dam would not cause any damage by erosion as the existing rockfill was designed to withstand it.

Figure 5-13 indicates the inundation areas in the event of a dam break.

Figure 5-13. Inundation Map



Probability of Future Events and Magnitude

The risk probability and risk severity assessment listed in Table 5-17 was identified by the planning team.

Table 5-17. Probability of Future Events and Magnitude: Dam Failure

Probability	Magnitude
Low	High

5.3 Risk Assessment

A risk assessment involves evaluating vulnerable assets, describing potential impacts, and estimating losses for each hazard. The intention of a risk assessment is to help the community understand the greatest risks facing the District. The risk assessment defines and quantifies vulnerable staff, buildings, critical facilities, and other assets at risk from hazards and is based on the best available data and the significance of the hazard. The risk assessment further examines the impact of the identified hazards on the District, determines which areas of the District are most vulnerable to each hazard, and estimates potential losses to District facilities for each hazard.

5.3.1 Assets (Services and Facilities)

The assets shown in Table 5-18 were identified for the District during the 2020 RRA workshops.

Table 5-18. Critical Assets

1	Tank and Booster 1 - Lower El Camino
2	Tank and Booster 2 - 3M (includes Well 5/Booster Station)
3	Tank and Booster 3 - 6M
4	Tank and Booster 4 - 25th Street
5	Tank and Booster 5 - 45th Street (includes 47th and 50th)
6	Tank and Booster 6 - Walt's
7	Tank and Booster 7 - Underground
8	SCADA
9	Leslie O. Carter Water Treatment Plant (includes Lake Palmdale and Intake)
10	Generic Wells
11	Service Connection from the SWP

Table 5-18. Critical Assets

12	Generic Transmission Pipelines
13	Staff
14	Littlerock Dam, Reservoir, & Palmdale Ditch
15	AVEK Connection (Receive and Distribute)

5.3.2 Cultural and Natural Resources Inventory

There are no cultural or natural resources that the District is cognizant of. The District does not have watershed management responsibilities.

5.3.3 Risk Assessment and Potential Loss

The risk assessment and potential losses for physical damage for district facilities are listed in Table 5-19 through Table 5-33. Because the District provides a critical lifeline infrastructure support system, potential losses beyond physical damage must be considered. Loss of potable water service due to nondestructive events results in community hardship, economic loss, and reputational damage. Computing potential losses from these risks is beyond the scope of this LHMP and must be considered in the context of the impact on the entire county and region.

Table 5-19. Risk Assessment/Potential Losses: Tank and Booster 1 – Lower El Camino

Hazard	Potential Losses
Earthquake	$1,908,900
Drought	$551,500
Waterborne Diseases/Water Contamination/Algae Blooms	$37,750
Wildfire	$422,400
Extreme Weather	$57,000
Criminal Activity	$420,750
Water Contamination	$3,352,500
Cyber Attack	$276,750
Power Outage	$129,000
Public Health Emergency/Pandemic/Loss of Staff	$9,750
Hazardous Materials and Hazardous Incidents	$37,750
Dam Failure/ Flooding	$4,500

Table 5-20. Risk Assessment/Potential Losses: Tank and Booster 2 – 3M (includes Well 5/Booster Station)

Hazard	Potential Losses
Earthquake	$1,961,925
Drought	$551,500
Waterborne Diseases/Water Contamination/Algae Blooms	$37,750
Wildfire	$422,400
Extreme Weather	$57,000
Criminal Activity	$420,750
Water Contamination	$3,352,500
Cyber Attack	$276,750
Power Outage	$129,000
Public Health Emergency/Pandemic/Loss of Staff	$9,750
Hazardous Materials and Hazardous Incidents	$37,750
Dam Failure	$5,100

Table 5-21. Risk Assessment/Potential Losses: Tank and Booster 3 – 6M

Hazard	Potential Losses
Earthquake	$1,961,925
Drought	$551,500
Waterborne Diseases/Water Contamination/Algae Blooms	$37,750
Wildfire	$211,200
Extreme Weather	$57,000
Criminal Activity	$420,750
Water Contamination	$3,352,500
Cyber Attack	$276,750
Power Outage	$64,500
Public Health Emergency/Pandemic/Loss of Staff	$9,750
Hazardous Materials and Hazardous Incidents	$37,750
Dam Failure	$4,500

Table 5-22. Risk Assessment/Potential Losses: Tank and Booster 4 – 25th Street

Hazard	Potential Losses
Earthquake	$1,930,110
Drought	$551,500
Waterborne Diseases/Water Contamination/Algae Blooms	$37,750
Wildfire	$422,400
Extreme Weather	$57,000
Criminal Activity	$420,750
Water Contamination	$3,352,500
Cyber Attack	$276,750
Power Outage	$129,000
Public Health Emergency/Pandemic/Loss of Staff	$9,750
Hazardous Materials and Hazardous Incidents	$37,750
Dam Failure	$4,500

Table 5-23. Risk Assessment/Potential Losses: Tank and Booster 5 – 45th Street (includes 47th and 50th)

Hazard	Potential Losses
Earthquake	$1,930,110
Drought	$551,500
Waterborne Diseases/Water Contamination/Algae Blooms	$37,750
Wildfire	$211,200
Extreme Weather	$57,000
Criminal Activity	$420,750
Water Contamination	$3,352,500
Cyber Attack	$276,750
Power Outage	$129,000
Public Health Emergency/Pandemic/Loss of Staff	$9,750
Hazardous Materials and Hazardous Incidents	$37,750
Dam Failure	$4,500

Table 5-24. Risk Assessment/Potential Losses: Tank and Booster 6 – Walt's

Hazard	Potential Losses
Earthquake	$1,961,925
Drought	$551,500
Waterborne Diseases/Water Contamination/Algae Blooms	$37,750
Wildfire	$211,200
Extreme Weather	$57,000
Criminal Activity	$420,750
Water Contamination	$3,352,500
Cyber Attack	$276,750
Power Outage	$129,000
Public Health Emergency/Pandemic/Loss of Staff	$9,750
Hazardous Materials and Hazardous Incidents	$37.750
Dam Failure	$4,500

Table 5-25. Risk Assessment/Potential Losses: Tank and Booster 7 – Underground

Hazard	Potential Losses
Earthquake	$1.908.900
Drought	$551.500
Waterborne Diseases/Water Contamination/Algae Blooms	$37,750
Wildfire	$211,200
Extreme Weather	$57,000
Criminal Activity	$420,750
Water Contamination	$3,352,500
Cyber Attack	$276,750
Power Outage	$129,000
Public Health Emergency/Pandemic/Loss of Staff	$9,750
Hazardous Materials and Hazardous Incidents	$37,750
Dam Failure	$4,500

Table 5-26. Risk Assessment/Potential Losses: SCADA

Hazard	Potential Losses
Earthquake	$212,100
Drought	$220,600
Waterborne Diseases/Water Contamination/Algae Blooms	$15,100
Wildfire	$211,200
Extreme Weather	$57,000
Criminal Activity	$70,500
Water Contamination	$447,000
Cyber Attack	$327,600
Power Outage	$129,000
Public Health Emergency/Pandemic/Loss of Staff	$15,600
Hazardous Materials and Hazardous Incidents	$15.100
Dam Failure	$600

Table 5-27. Risk Assessment/Potential Losses: Leslie O. Carter Water Treatment Plant (includes Lake Palmdale and Intake)

Hazard	Risk Cost
Earthquake	$1.908.900
Drought	$1.985.400
Waterborne Diseases/Water Contamination/Algae Blooms	$37,750
Wildfire	$528,000
Extreme Weather	$57,000
Criminal Activity	$420,750
Water Contamination	$3,352,500
Cyber Attack	$276,750
Power Outage	$129,000
Public Health Emergency/Pandemic/Loss of Staff	$9,750
Hazardous Materials and Hazardous Incidents	$37,750
Dam Failure	$5,100

Table 5-28. Risk Assessment/Potential Losses: Generic Wells

Hazard	Risk Cost
Earthquake	$1,908,900
Drought	$1,985,400
Waterborne Diseases/Water Contamination/Algae Blooms	$37,750
Wildfire	$211,200
Extreme Weather	$57,000
Criminal Activity	$420,750
Water Contamination	$3,352,500
Cyber Attack	$276,750
Power Outage	$129,000
Public Health Emergency/Pandemic/Loss of Staff	$9,750
Hazardous Materials and Hazardous Incidents	$37.750
Dam Failure	$4,500

Table 5-29. Risk Assessment/Potential Losses: Service Connection from State Water Project

Hazard	Risk Cost
Earthquake	$1.908.900
Drought	$551.500
Waterborne Diseases/Water Contamination/Algae Blooms	$37,750
Wildfire	$211,200
Extreme Weather	$57,000
Criminal Activity	$420,750
Water Contamination	$3,352,500
Cyber Attack	$276,750
Power Outage	$129,000
Public Health Emergency/Pandemic/Loss of Staff	$9,750
Hazardous Materials and Hazardous Incidents	$37,750
Dam Failure	$4,500

Table 5-30. Risk Assessment/Potential Losses: Generic Transmission Pipelines

Hazard	Risk Cost
Earthquake	$1,908,900
Drought	$551,500
Waterborne Diseases/Water Contamination/Algae Blooms	$37,750
Wildfire	$211,200
Extreme Weather	$57,000
Criminal Activity	$420,750
Water Contamination	$3,352,500
Cyber Attack	$276,750
Power Outage	$129,000
Public Health Emergency/Pandemic/Loss of Staff	$9,750
Hazardous Materials and Hazardous Incidents	$37,750
Dam Failure	$4,500

Table 5-31. Risk Assessment/Potential Losses: Staff

Hazard	Risk Cost
Earthquake	$212,100
Drought	$220,600
Waterborne Diseases/Water Contamination/Algae Blooms	$15,100
Wildfire	$211,200
Extreme Weather	$11,400
Criminal Activity	$420,750
Water Contamination	$447,000
Cyber Attack	$276,750
Power Outage	$25,800
Public Health Emergency/Pandemic/Loss of Staff	$15,600
Hazardous Materials and Hazardous Incidents	$15,100
Dam Failure	$600

Table 5-32. Risk Assessment/Potential Losses: Littlerock Dam, Reservoir, and Palmdale Ditch

Hazard	Risk Cost
Earthquake	$1,908,900
Drought	$551,500
Waterborne Diseases/Water Contamination/Algae Blooms	$37,750
Wildfire	$422,400
Extreme Weather	$57,000
Criminal Activity	$420,750
Water Contamination	$3,352,500
Cyber Attack	$276,750
Power Outage	$129,000
Public Health Emergency/Pandemic/Loss of Staff	$9,750
Hazardous Materials and Hazardous Incidents	$37,750
Dam Failure	$4,500

Table 5-33. Risk Assessment/Potential Losses: AVEK Connection (Receive and Distribute)

Hazard	Risk Cost
Earthquake	$1,908,900
Drought	$551,500
Waterborne Diseases/Water Contamination/Algae Blooms	$37,750
Wildfire	$211,200
Extreme Weather	$57,000
Criminal Activity	$420,750
Water Contamination	$3,352,500
Cyber Attack	$276,750
Power Outage	$129,000
Public Health Emergency/Pandemic/Loss of Staff	$9,750
Hazardous Materials and Hazardous Incidents	$37,750
Dam Failure	$4,500

6 Mitigation Strategy

Federal regulations require local mitigation plans to identify goals for reducing long-term vulnerabilities to the identified hazards in the planning area.

FEMA REGULATION CHECKLIST: CAPABILITY ASSESSMENT

44 CFR § 201.6(c)(3): – The plan must include mitigation strategies based on the jurisdiction's "existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools."

Elements
C1. Does the Plan document the jurisdiction's existing authorities, policies, programs and resources, and its ability to expand on and improve these existing policies and programs? 44 CFR § 201.6(c)(3).
C2. Does the Plan address the jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? 44 CFR § 201.6(c)(3)(ii).
C3. Does the Plan include goals to reduce or avoid long-term vulnerabilities to identified hazards? 44 CFR § 201.6(c)(3)(i).
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for the jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? See 44 CFR § 201.6(c)(3)(ii).
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost-benefit review), implemented, and administered by the jurisdiction? 44 CFR § 201.6(c)(3)(iii).
C6. Does the plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate?

Source: FEMA, *Local Mitigation Planning Handbook Review Tool,* March 2013.

A hazard mitigation plan's primary focus is the mitigation strategy. It represents the efforts selected by the District to reduce or prevent losses resulting from the hazards identified in the risk assessment. The strategy includes mitigation actions and projects to address the risk and vulnerabilities discovered in the risk assessment. The mitigation strategy consists of the following steps:

- Identify and profile hazards and risk within the District.
- Identify projects and activities that can prevent or mitigate damage and injury to the population and buildings.
- Develop a mitigation strategy to implement the mitigation actions.
- Develop an action plan to prioritize, implement, and administer the mitigation actions.
- Implement the LHMP mitigation action plan.

A capability assessment was conducted of District authorities, policies, programs, and resources. Based on this assessment and the hazard analysis and risk assessment, goals and mitigation actions were developed. The planning team also developed a process to prioritize, implement, and administer the mitigation actions to reduce risk to existing facilities and new development.

6.2 Overview

The 2021 LHMP represents the District's commitment to creating a safer, more resilient community by taking actions to reduce risk and by committing resources to lessen the effects of hazards on the people and property of the District.

Mitigation goals are guidelines that represent what the community wants to accomplish through the mitigation plan. Goals are broad statements that represent a long-term, community-wide vision. The planning team reviewed the example goals and objectives from the previous LHMP and determined which goals best met the District's objectives for mitigation. The 2021 goals are new, as this is the District's first LHMP since 2008. In addition to the overarching hazard mitigation goals, the District worked to develop the strategies aligned with the District CIP and Urban Water Management Plan.

Mitigation Goals

1. Protect life and property and reduce the potential injuries from natural or anthropogenic hazards.
2. Improve the public's understanding, support, and need for hazard mitigation measures.
3. Elevate disaster resilience for the District's natural, existing, and future environment.
4. Hone partnerships and collaborating efforts to implement hazard mitigation activities.
5. Improve the District's ability to immediately and effectively respond to hazards.

6.3 Mitigation Actions/Projects and Implementation Strategy

Mitigation actions are specific activities or projects that serve to meet the goals that the community has identified. Mitigation actions and projects are more specific than goals or objectives and often include a mechanism such as an assigned time frame, to measure the success and ensure the actions are accomplished. The planning team conducted a review of the mitigation actions and strategies from the State Hazard Mitigation Plan and from other cities' planning efforts to develop new mitigation actions and projects to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure, if needed.

The requirements for prioritization of mitigation actions, as provided in the federal regulations implementing the Stafford Act as amended by DMA 2000, are described below.

FEMA REGULATION CHECKLIST: MITIGATION STRATEGY; PLAN AND REVISION

44 CFR § 201.6(c)(3)(iii): – The mitigation strategy section shall include "an action plan describing how the actions identified in section (c)(3)(iii) will be prioritized, implemented, and administered by the local jurisdiction.

Elements

C1. Does the Plan document the jurisdiction's existing authorities, policies, programs and resources, and its ability to expand on and improve these existing policies and programs? 44 CFR § 201.6(c)(3).
C2. Does the Plan address the jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? 44 CFR § 201.6(c)(3)(ii).
C3. Does the Plan include goals to reduce or avoid long-term vulnerabilities to identified hazards? 44 CFR § 201.6(c)(3)(i).
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for the jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? See 44 CFR § 201.6(c)(3)(ii).
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost-benefit review), implemented, and administered by the jurisdiction? 44 CFR § 201.6(c)(3)(iii).
C6. Does the plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate?

Source: FEMA, *Local Mitigation Planning Handbook Review Tool,* March 2013.

Based on these criteria, the District prioritized potential mitigation projects and included them in the mitigation action plan discussed below in Section 6.3.3. The mitigation action plan developed by the planning team includes the action items that the District intends to implement during the next 5 years, assuming funding availability. The action plan includes the implementing department, an estimate of the timeline for implementation, and potential funding sources.

6.3.2 Previous Mitigation Actions/Projects Assessment

FEMA REGULATION CHECKLIST: PLAN REVIEW AND REVISION

Progress in Local Mitigation Efforts

44 CFR § 201.6(c)(d)(3): "A local jurisdiction must review and revise its plan to reflect . . . progress in local mitigation efforts . . .."

Element

D2. Was the Plan revised to reflect progress in local mitigation efforts? 44 CFR § 201.6(d)(3).

Source: FEMA, Local Mitigation Plan Review Tool, March 2013.

The 2008 HMP contained 12 mitigations actions. Many of the mitigation actions were completed or carried out to some degree or are considered ongoing. Some of the mitigation actions were duplicative; others were better categorized as emergency preparedness or recovery activities, and others were either not addressed during the time period or were not feasible to accomplish. Table 6-1 provides the status of mitigation actions from the 2008 HMP.

Table 6-1. 2008 Hazard Mitigation Plan Activity Status

Hazard and Plan No.	Activity	Status
Earthquake, 1	Fit potable water tanks with seismically triggered valves.	In Progress
Earthquake, 2	Increase stockpile of replacement materials (pipes, fittings, valves, etc.).	Complete
Earthquake, 3	Purchase additional generators for remaining critical sites.	In Progress
Earthquake, 4	Implement backup communication capability.	In Progress
Flooding/ Dam Failure, 1	Mitigate the risks of flood occurrence by improving drainage.	Yes
Flooding/ Dam Failure, 2	Acquire additional heavy equipment and pre-position near vulnerable assets and population to mitigate the severity of damage when an event occurs.	Yes
Flooding/ Dam Failure, 3	Establish a program to regularly turn rock stockpiles as they get compacted to mitigate the severity of damage when an event occurs.	No
Wildfire, 1	Install sprinklers at remote booster stations.	No
Wildfire, 2	Re-roof remote sites with fire-retardant materials.	In Progress
Wildfire, 3	Install backup generators at remote sites.	No
Extreme Weather, 1	Mitigate severity of impact of an event by increasing public awareness.	In Progress
Extreme Weather, 2	Consider new City Ordinances regarding water conservation requirements to mitigate severity of impact of an event on assets of the Water District.	Yes
Extreme Weather, 3	Continue to educate the public regarding water conservation to mitigate severity of impact of an event on assets of the Water District.	Yes
Waterborne Diseases, 1	Acquire portable disinfecting units.	No
Waterborne Diseases, 2	Acquire backup incubator/laboratories to run waterborne disease tests.	No
Hazardous Materials, 1	Acquire additional hazmat removal equipment and pre-position at plant or, as an alternative, store in a mobile trailer.	In Progress
Hazardous Materials, 2	Update the Emergency Response Plan to note who has been trained in hazardous materials and to what extent, i.e., 8 hours, 24 hours, or 40 hours of training courses.	No training established. ERP is updated.
Terrorism, 1	Tie-in the SCADA security system into law enforcement agency.	No
Terrorism, 2	Acquire improved/higher quality CCTV system.	No

6.3.3 New Mitigation Actions

Mitigation actions are specific activities or projects that serve to meet the goals that the community has identified. Mitigation actions and projects are more specific than goals or objectives and often include a mechanism such as an assigned time period, to measure the success and ensure actions are accomplished. The planning team conducted a review of the mitigation actions and strategies from the 2008 HMP. With information from the risk assessment, capability assessment, and status of the actions implemented since the 2008 HMP, the planning team developed new/ongoing mitigation actions and projects to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure.

Table 6-2 lists the initial, potential mitigation actions developed by the planning team. For each mitigation action, the following information is listed: the goal that each action addresses as listed Section 6.2, type of mitigation project; hazard(s) addressed, type of development affected by action; and the source of the mitigation project idea.

Table 6-2. Potential Mitigation Actions 2021

Goal	Action Item No.	Action Description	Mitigation Type	Related Hazards	Implementing Organizations
1. Protect life and property and reduce the potential injuries from natural or anthropogenic hazards.	1.1	Increased signage using a "No Trespassing" sign. The name of the facility will be omitted. Discuss with sheriff and counsel.	Prevention	Criminal Activity	Operations
	1.2	Evaluate onsite physical security protection at all reservoir sites.	Preparedness	Criminal Activity	Operations
	1.3	Conduct a seismic evaluation for the reservoir storage tanks and the water treatment plant.	Preparedness	Earthquake	Operations
	1.4	Evaluate redundant connections for the SWP.	Preparedness	All	Operations
	1.5	Assess and implement flexible piping joints at above-ground storage reservoirs as appropriate.	Prevention	Seismic	Operations
2. Improve the public's understanding, support, and need for hazard mitigation measures.	2.1	Continue educating the public about the impact of natural hazards on water operations through community involvement.	Preparedness	All	Administrative
	2.2	Include hazard education (e.g., earthquake kits and preparedness) through District water bill inserts.	Preparedness	Earthquake	Administrative
	2.3	Build a public education center to provide customers information on water conservation. Include a model garden that incorporates water saving equipment and installations.	Preparedness	Extreme Weather	Administrative
3. Elevate disaster resilience for the District's natural,	3.1	Secure steel tanks to footings and add seismic valves to inlet and outlet pipes.	Preparedness	Earthquake	Operations

Table 6-2. Potential Mitigation Actions 2021

Goal	Action Item No.	Action Description	Mitigation Type	Related Hazards	Implementing Organizations
existing, and future environment.	3.2	Continue to institute water shortage contingency measures during extreme drought periods	Prevention	Drought	All
	3.3	Develop an external/mobile Emergency Operations Center.	Preparedness	All	Administrative
	3.4	Regularly train, drill, and exercise staff on the ERP and on specific disaster scenarios.	Preparedness	All	All
	3.5	Identify and confirm that pipe specifications are compatible with engineering and earthquake specifications.	Prevention	Seismic	Operations
	3.6	Provide backup power generation as part of critical facility design.	Preparedness	Loss of Power/ PSPS	Operations
4. Hone partnerships and collaborating efforts to implement hazard mitigation activities.	4.1	Continue dig alert program to ensure contractors mark where pipes are located.	Prevention	Water Contamination	Operations
	4.2	Coordinate with law enforcement to convey the importance of a water distribution system.	Prevention	All	Administrative
5. Improve the District's ability to immediately and effectively respond to hazards.	5.1	Train employees in the policies and procedures associated with fire response and notification procedures.	Prevention	Wildfire	Operations
	5.2	Provide employee education and resources for extreme heat hazards.	Prevention	Extreme Heat	Operations
	5.3	Procure and install remotely observable security cameras at key locations at District operating facilities.	Prevention	Terrorism	Operations

Table 6-2. Potential Mitigation Actions 2021

Goal	Action Item No.	Action Description	Mitigation Type	Related Hazards	Implementing Organizations
	5.4	Upgrade the SCADA system to better address cyber-security concerns and integrate cameras.	Prevention	Cyber-attack	Operations
	5.5	Develop and implement a pandemic/influenza emergency response plan module.	Preparedness	Public Health	Administrative
	5.6	Consider training employees in the pandemic/influenza procedures	Preparedness	Pandemic	All
	5.7	Purchase satellite phones that are interoperable with appropriate county satellite phones.	Response	All	Administrative

6.3.4 Mitigation Action Implementation Plan

6.3.5 Incorporation into Other Plans (In Progress)

The 2008 LHMP was not incorporated into other planning mechanisms systematically. The 2021 LHMP will be coordinated with and integrated into the following other planning mechanisms.

- The District Emergency Operations Plan contains a list of hazards. The LHMP provides a similar, more detailed description of these hazards. Updates to the LHMP can inform revisions to the Emergency Operations Plan. Hazards in both plans should be correlated.
- The American Water Infrastructure Act required both the RRA and the LHMP to use the same source data and similar language to describe hazards that are contained in both. Hazard analysis and risk/vulnerability updates to one document should be reviewed for inclusion in both. For the 2021 LHMP, the planning team used portions of the RRA to develop new mitigation actions.

The District will review the mitigation action plan in the LHMP as it updates its CIP. Several mitigation actions address facility improvement and resiliency. Grant funding for these projects may support CIP projects.

7 Monitoring and Evaluation

Implementation and maintenance of the plan is vital to the overall success of hazard mitigation. This section details the process that the District will use to monitor, update, and evaluate the plan within the 5-year cycle of the plan's revision to ensure the LHMP remains an active, relevant, and useful document.

When it is time to maintain or revise the LHMP, data can be easily located and incorporated, resulting in an easy method to keep the plan current and relevant.

FEMA REGULATION CHECKLIST: PLANNING PROCESS

Documentation of the Planning Process
44 CFR § 201.6(c)(1): The plan shall include documentation of 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.

Elements
A5. Is there discussion on how the community will continue public participation in the plan maintenance process? 44 CFR 201.6(c)(4)(iii)
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? 44 CFR 201.6(c)(4)(i)

Source: FEMA, *Local Mitigation Planning Handbook Review Tool,* March 2013.

The planning team will convene annually to perform reviews of the LHMP and its implementation. The planning team will include representation from residents, citizen groups, and stakeholders within the planning area.

If planning team members can no longer serve on the planning team, the Project Manager will assign another staff person to be on the planning team so that every District department is represented.

7.2 Plan Maintenance Procedures

The HMP includes a range of action items to reduce losses from hazard events. Together, the action items provide a framework for activities that the District can choose to implement over the next 5 years. The effectiveness of the plan depends on the incorporation of the action items into existing District plans, policies, and programs. Although the Project Manager will have primary responsibility for the LHMP's continual review, coordination, and promotion, plan implementation, and evaluation will be a shared responsibility among all departments and agencies that contributed to the Plan.

The Project Manager and department supervisors will be jointly responsible for the Plan's implementation and maintenance through existing District programs. Operations supervisors will be responsible for implementing mitigation strategies and actions specific to their department operations. The Project Manager will assume the lead responsibility for facilitating plan maintenance and coordinating the planning team.

Each April, the planning team will begin the process of reviewing the LHMP and the implementation of mitigation actions to develop an annual progress report. This process can also assist the budget review process by providing information on mitigation projects and activities that have been completed or implemented. The annual progress report process will serve to align annual reviews of the HMP and to incorporate information. As updates to the LHMP are completed, the public will be made aware of the changes and asked to make recommendations or comments.

The planning team will monitor the hazard mitigation strategies during the year, and at a meeting held in January of each year, team members will provide information for the evaluation of the progress of the 2021 LHMP. This evaluation will include:

- A summary of any hazard events that occurred during the prior year and their impact on the planning area.
- A review of successful mitigation initiatives identified in the 2021 Plan.
- A brief discussion about the targeted strategies that were not completed.
- A re-evaluation of the action plan to determine if the timeline for identified projects needs to be amended, and the reason for the amendment, e.g., funding issues.
- Any recommendations for new projects.
- Any changes in or potential for new funding options (grant opportunities).
- Any impacts of other planning programs or initiatives in the District that involve hazard mitigation.

The planning team will write a progress report that will be provided to the District's budget planning team for review and incorporation in the budget process as mitigation projects are completed or implemented. The hazard mitigation plan progress report will also be posted on the District website on the page dedicated to the hazard mitigation plan, provided to the local media through a press release, and presented in the form of a report to the District Board. The planning team will strive to complete the progress report process by March of each year.

7.3 Plan Update

Section 201.6.d.3 of 44CFR requires that local hazard mitigation plans be reviewed, revised as appropriate, and resubmitted for approval to remain eligible for benefits awarded under the Disaster Mitigation Act. The District intends to update its hazard mitigation plan on a 5-year cycle.

Based on needs identified by the planning team, the update will, at a minimum, include the following elements:

- The hazard risk assessment will be reviewed and updated using the most recent information and technologies.
- The action plan will be reviewed and revised to account for any initiatives completed, dropped, or changed and to account for changes in the risk assessment.
- Any new District policies identified under other planning mechanisms, as appropriate.
- The draft LHMP update will be sent to appropriate agencies and organizations for comment.
- The public will be given an opportunity to comment on the updated version prior to adoption.
- The District Board will adopt the updated plan.

At a minimum of 6 months prior to the expiration date of the 2021 LHMP, the planning team will implement a plan revision schedule to formally update the 2021 Plan. The Plan will be revised using the latest FEMA hazard mitigation guidance documents, such as the Mitigation Planning Tool and Regulation Checklist, to confirm compliance with current hazard mitigation planning regulations.

7.4 Continued Public Involvement

The overall success of the LHMP is through implementation of the plan's hazard mitigation strategy and activities to reduce the effects of hazards, protect people and property, and improve the District's efforts to respond to and recover from disasters. Members of the public and the District will ultimately benefit from the implementation of the LHMP and must be given the opportunity to provide input to the continuous cycle of LHMP planning.

The District will strive to keep the public aware of hazard mitigation projects that take place as a result of the LHMP. Public information will be released through press releases, District website announcements, public hearings as required, board meetings, social media, and the District e-news blast to subscribers.

Projects that mitigate hazards are included in the District's annual budget planning process. The public will be made aware of the planning through District board meetings and press releases during this time. The budget planning process will serve as an annual opportunity to conduct outreach to the public on updates to the hazard mitigation planning process.

A survey can be developed to gather input on how the community feels about the progress being made on LHMP activities. The District will also provide press releases and information about hazard mitigation projects to the public regularly. At a minimum, the public will be engaged to learn about current LHMP activities and given the opportunity to provide comments and information on an annual basis to update and maintain the LHMP. The team tasked with public outreach will be responsible for ensuring the public is included and involved in the annual public plan update and outreach.

When the time comes to begin revising the 2021 LHMP, the plan update process will be implemented, which will include continued public involvement and input through attendance at designated public meetings, web postings, through press releases to local media, community fairs and events, and surveys. As part of this effort, a series of public meetings will be held, and public comments will be solicited on the revisions to the LHMP according to the 5-year cycle.

Appendix A. Local Mitigation Plan Review Tool Regulation Checklist

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Appendix B. Hazard Mitigation Planning Team

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Appendix C. Public and Stakeholders Involvement

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Appendix D. Palmdale Water District's Adoption Resolution

This appendix will be added after the Palmdale Water District Board adopts this Hazard Mitigation Plan.

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