East Orange County Water District

2025 Hazard Mitigation Plan

Public Review Draft, October 2025

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CHAPTER 1 –
INTRODUCTION

Plan Purpose and Authority

Hazard events are emergencies due to a natural or human-caused event that has the potential to cause harm. These events can lead to injuries or death, affect the overall health and safety of a community, damage or destroy public and private property, harm ecosystems, and disrupt key services. Although hazard events often get the most attention, it is only part of a larger emergency management cycle.

Emergency planners and responders can take steps during the cycle's response, recovery, mitigation, and preparedness phases to minimize the harm caused by a disaster. The East Orange County Water District (EOCWD, or the District) 2025 Hazard Mitigation Plan (HMP) focuses on optimizing the mitigation phase of the process.

Hazard mitigation is "any sustained action taken to reduce or eliminate long-term risk to people and property from natural or human-caused hazards and their effects."[1] This mitigation involves making a community more resilient so that when hazard events do ultimately occur, the community suffers minor damage and can recover quickly and effectively. Mitigation differs from preparedness, which involves advanced planning for how best to respond when a disaster occurs or is imminent. For example, a policy to make infrastructure structurally stronger so it suffers minor damage during an earthquake is a mitigation action, while fully equipping emergency shelters to accommodate people who lose their homes in an earthquake is a preparedness action. Some activities may qualify as both.

The Emergency Management Cycle

Resiliency is the "capacity of any entity—an individual, a community, an organization, or a natural system—to prepare for disruptions, to recover from shocks and stresses, and to adapt and grow from a disruptive experience."[2]

Like other water districts and communities, EOCWD could suffer severe harm from hazard events. Although large disasters may cause widespread devastation, minor disasters can have more substantial effects. The District cannot make itself completely immune to hazard events, but this HMP can help make the service area a safer place to live, work, and play. This HMP provides a comprehensive assessment of the District's threats from natural and human-caused hazard events, and a coordinated strategy to reduce these threats. It identifies resources and information to help District staff, customers, and local officials understand local threats and make informed decisions. The HMP can also support increased coordination and collaboration

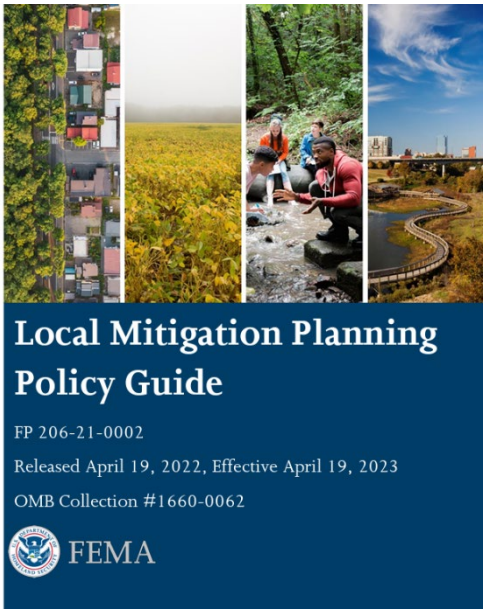
[1] California Governor's Office of Emergency Services. 2017. State of California Emergency Plan. https://www.caloes.ca.gov/wp-content/uploads/Preparedness/Documents/California_State_Emergency_Plan_2017.pdf

[2] Rodin, J. 2014. The Resilience Dividend: Managing Disruption, Avoiding Disaster, and Growing Stronger in an Unpredictable World. New York: Public Affairs.

between EOCWD, its service area customers, other public agencies, local employers, service providers, community members, and other key stakeholders.

Federal Authority

The District is not required to prepare an HMP; however, state and federal regulations encourage its preparation. The federal Robert T. Stafford Disaster Relief and Emergency Act, amended by the Disaster Management Act of 2000, creates a federal framework for local hazard mitigation planning. It states that jurisdictions wishing to be eligible for federal hazard mitigation grant funding must prepare a hazard mitigation plan that meets specific guidelines and submit this plan to the Federal Emergency Management Agency (FEMA) for review and approval. These guidelines are outlined in the Code of Federal Regulations, Title 44, Part 201, and discussed in greater detail in FEMA's Local Mitigation Plan Review Tool.



FEMA's Local Mitigation Planning Policy Guide

This guide provides the official policy and interpretation of the applicable statutes and mitigation planning regulation in 44 Code of Federal Regulations.

State Authority

California Government Code Sections 86859, 65302.6, and 65302(g)(4) identify the compliance requirements for a Local Hazard Mitigation Plan. These requirements only apply to cities and counties within the state. EOCWD is considered a special district, which is exempt from complying with these government code sections.

Plan Organization and Use

The EOCWD HMP is both a reference document and an action plan. It has information and resources to educate readers and decision-makers about hazard events and related issues, and a comprehensive strategy that the District and community members can follow to improve resilience in the District. It is divided into the following chapters:

- **Chapter 1: Introduction.** This chapter describes the Plan's background, its goals and objectives, and the process used in its development.
- **Chapter 2: Community Profile.** This chapter discusses the District's history, physical setting, land use, demographics, and other key characteristics of the service area.
- **Chapter 3: Hazard Assessment.** This chapter identifies and describes the hazards that threaten the District, discussing past and future events and the potential effects of climate change.
- **Chapter 4: Vulnerability Assessment.** This chapter describes each hazard's threat to the District's key facilities and infrastructure.

- **Chapter 5: Mitigation Strategy.** This chapter lists the mitigation actions to reduce the District's vulnerability to hazard events and provides an overview of the District's existing capabilities to improve hazard resilience.
- **Chapter 6: Plan Maintenance.** This chapter summarizes implementing, monitoring, and updating the HMP and opportunities for continued public involvement.

Previous EOCWD HMP

This is an update to EOCWD's 2020 HMP, which will maintain the District's eligibility, once approved and adopted by the Board of Directors, to apply for FEMA grants for hazard mitigation projects and monetary relief during declared emergencies. The content from the previous plan has been included in this document and updated accordingly. As for integrating the previous plan into other planning mechanisms, the District incorporated the Risk and Resilience Assessment, prepared in compliance with the America's Water Infrastructure Act of 2018, into the District's Emergency Operations Plan/ Emergency Response Plan. Key modifications in this plan focus on expanding the risk assessment (understanding potential losses and vulnerable populations) within **Chapter 4** and revised and modified mitigation strategies and actions within **Chapter 5**.

Key updated elements from the previous EOCWD HMP include the following:

- Updated demographic information for EOCWD service area customers
- Updated hazard categories
- Descriptions of recent hazard events
- An updated threat assessment that incorporates recent data
- Updates to the Capabilities Assessment to reflect the most recent framework
- New and revised hazard mitigation actions to better meet the current priorities of the District

Previous Plan Integration

As this is an update to EOCWD's 2020 HMP, the District will be looking to integrate this document into other planning documents and processes. To ensure this future integration occurs, **Chapter 6** of this plan includes additional guidance on how to best integrate the HMP into other planning mechanisms used by the District and the communities it serves.

Plan Goals

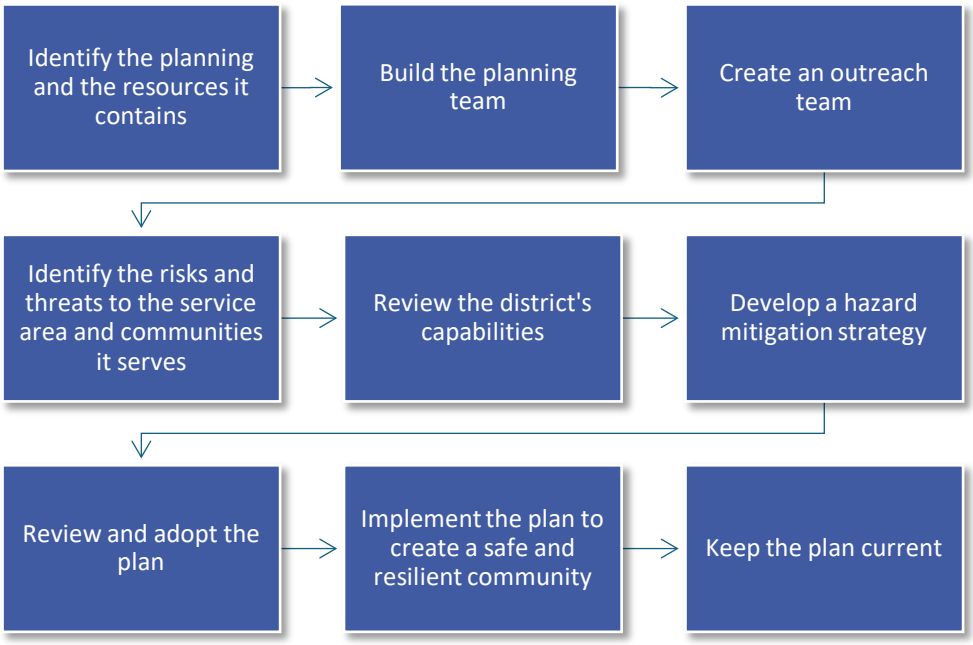
The overarching intent of this updated HMP is to increase resiliency to hazard events in the EOCWD service area. This HMP has six distinct goals to achieve this purpose:

1) Protect life and property.
2) Increase awareness of EOCWDs' efforts to manage risks.
3) Protect natural resources.
4) Facilitate partnerships and implementation coordination.
5) Maintain continuity of essential services.

Planning Process

State and federal guidance for HMPs does not require that jurisdictions follow a standardized planning process. FEMA encourages communities to create a planning process that reflects local values, goals, and characteristics. FEMA does suggest a general planning process that follows the steps identified below:

The planning process used to create this plan for the District is described as follows:



Hazard Mitigation Planning Team

The District established a Hazard Mitigation Planning Team (hereafter referred to as the HMPT). The HMPT comprises representatives from key District departments and stakeholders from local and regional agencies and companies that are key to hazard mitigation activities. **Table 1-1** identifies the members who were invited and/or attended HMPT meetings.

Table 1-1: EOCWD Hazard Mitigation Planning Team (HMPT)

Name	Title
Bobby Young	Engineering Manager
Jerry Mendzer	Operations Manager
Sylvia Prado	Office Manager
David Youngblood	General Manager
Kari Schumaker	Consultant
Aaron Pfannenstiel	Consultant
Claire Patton	Consultant

The District also invited representatives from the following external organizations to participate:

- Municipal Water District of Orange County
- Jurisdictions serviced by the District (Tustin, Orange, Orange County)
- Southern California Edison
- Southern California Gas
- Panorama Elementary School (Orange Unified School District)
- Orange County Emergency Management Organization (OCEMO)
- Orange County Sheriff's Department Emergency Management Division
- Orange County Fire Authority

The Steering Committee held two planning meetings throughout the plan update development process to outline the plan's methods and approach, draft and review content, make revisions, and engage with members of the public.

- **HMPT Meeting #1 (March 31, 2025):** The Steering Committee members confirmed the project goals and responsibilities. They revised the community engagement and outreach strategy, confirmed and prioritized the hazards to be included in the Plan, and identified critical facilities for the threat assessment.

- **HMPT Meeting #2 (August 28, 2025):** Members discussed the results of the hazards assessment and mapping that showed the areas facing an elevated risk. The HMPT also reviewed the hazard prioritization results. The team reviewed the risk assessment results to identify the populations and assets that may face greater harm in a hazard event. Mitigation strategies were reviewed, revised, and prioritized, including those actions from the previous version of the HMP.

Invitations and meeting materials were provided via email. **Appendix A** contains copies of invitations, meeting agendas, sign-in sheets, and other relevant materials distributed for these meetings.

PUBLIC ENGAGEMENT

Under FEMA guidelines, local hazard mitigation planning processes should create opportunities for the public to be involved in plan development—at a minimum, during the initial drafting stage and plan approval. A listing of several key activities of the HMP follows.

EOCWD Website: The District created a webpage that provides information about the HMP, as well as a hyperlink to take the online survey. This webpage, found here, also became the primary location for the public review HMP document that was shared with customers and stakeholders.

EOCWD Online Survey: The District published an online survey to gather feedback and information regarding the HMP planning process, key hazards of concern, and relevant information regarding hazard mitigation and emergency preparedness.

Some key results of the survey include the following:

- Result 1 – Sixty percent of responders indicated that they have been impacted by a hazard event at their current residence, with drought being the hazard that affected the greatest amount of responders.

- Result 2– The greatest hazards of concern to residents and customers include drought, severe winds, and wildfire.
- Result 3– Eighty percent of responders believe that climate change may worsen impacts from existing natural hazards or possibly create new hazardous situations.

EOCWD Social Media: The District also posted information on how to access and participate in the online survey on their social media accounts (Facebook, Instagram, X [formerly Twitter], and YouTube).

The survey was released in August 2025 and closed at the end of October 2025. Five people responded to the survey, providing valuable insight and information that was incorporated back into the LHMP, where relevant.

EOCWD Stakeholder Meetings:

September 11, 2025: The HMPT conducted a meeting with the key stakeholders listed above. The meeting provided an overview of the plan update process, shared key information with attendees, and provided opportunities for discussion and information sharing regarding this update and relevant projects that participants were undertaking within their organizations.

October 8, 2025: The HMPT conducted a second meeting with the key stakeholders who were unable to attend the first meeting. The HMPT wished to provide multiple opportunities for stakeholder participation in the planning process.

Outreach materials used during the planning process are located in **Appendix B**.

Public Review Draft

On October 3, 2025, the District distributed the Public Review Draft of the Plan to the residents and businesses of EOCWD for a 21-day public review period. The Districts' HMP website (https://www.eocwd.com/hazardmitigationplan) hosted public electronic copies of the Plan. Hardcopy versions of the Plan were made available at the following locations:

- **185 N McPherson Rd, Orange, CA, 92869** - East Orange County Water District Main Office

The District received X comments during this review period.

Plan Revision and Adoption

On Month Day, Year, the District submitted the Plan to Cal OES/FEMA to initiate that agency's review process. Upon completion of the process, the EOCWD Board of Directors adopted the Plan. The resolution of adoption is located in **Appendix C**.

Plan Resources

The District referred to several plans, studies, technical reports, datasets, and other resources to prepare the Plan's hazard assessment, mapping, threat assessment, and other components. **Table 1-2** provides some of the HMPT's primary resources to prepare this Plan.

TABLE 1-2: KEY RESOURCES FOR PLAN DEVELOPMENT		
Section	**Key Resources Reviewed**	**Data Incorporated from Resource**
Multiple	• California State Hazard Mitigation Plan 2023 • California Department of Water Resources • EOCWD 2020 Hazard Mitigation Plan • FEMA Local Hazard Mitigation Plan Guidance • National Oceanic and Atmospheric Administration • National Weather Service • US Census Bureau	• Science and background information on various hazard conditions • General data about hazard mitigation plans • Records of past disaster events in and around EOCWD and Orange County • Projected climate conditions in and around EOCWD • Information on the history, current demographics, and characteristics of EOCWD
Community Profile	• Western Regional Climate Center • United States Census • American Community Survey (ACS) 2020-2024	• Current climate conditions in and around EOCWD
Hazard Assessment		
Drought	• Safeguarding California • US Drought Monitor	• History of drought events • Current and projected future drought conditions
Flood	• Orange County Flood Control District • FEMA Map Service Center	• Records of past floods in and around the EOCWD service area • Locations of flood hazard zones in the EOCWD service area
Human-Caused Hazards	• California Department of Toxic Substances Control • California Office of Emergency Services spill release reports • Global Terrorism Database • State Water Resources Control Board • US Environmental Protection Agency	• Locations and status of hazardous material facilities • Historic records of terrorism and hazardous material releases
Seismic Hazards	• Southern California Earthquake Data Center • U.S. Geological Survey (USGS) Earthquake Archive • USGS ShakeMap scenarios • USGS Third Uniform California Earthquake Rupture Forecast	• Locations of fault zones and seismic hazard areas • Records of past seismic events • Future seismic event scenarios
Wildfires	• California Department of Forestry and Fire Prevention • County of Orange/Orange County Fire Authority Hazard Mitigation Plan	• Records of past fire events • Locations of fire zones in and around EOCWD
Note: Sections not individually identified in this table relied primarily on sources identified in multiple sections.		

CHAPTER 2 –
DISTRICT PROFILE

The District profile section of the HMP describes the District's planning area, including information about the service area's physical setting, topography, climate, demographics, and key infrastructure. The Community Profile helps establish the baseline conditions in EOCWD, which informs the development of the hazard mitigation strategies and actions in **Chapter 5**.

Setting and Location

The East Orange County Water District, established in 1961, is situated in Orange County, Southern California. The EOCWD service area encompasses more than 15 square miles in the cities of East Orange and North Tustin. The District is a member of the Orange County Water District, which oversees and manages the local groundwater basin. It is also a member of the Municipal Water District of Orange County (MWDOC), which is a member of the Metropolitan Water District of Southern California (Metropolitan). The District is, therefore, entitled to receive Colorado River and Northern California imported water through the distribution facilities of the Metropolitan system. The District, acting in its wholesale capacity, provides this imported water service to four other local jurisdictions as well as its own retail water service area. Additionally, the District provides local wastewater collection service.

The District was founded on the principles of local community service and fiscal discipline, which it maintains to this day. The District operates under the County Water District Law (Section 30000 of the California Water Code) as an independent special district. It is governed by a Board of Directors elected to four-year terms by the voters within the District. When it formed in 1961, the District served as a wholesale water provider to other water agencies. In July 1985, the District assumed the operations of the County of Orange Waterworks District No. 8, which had been one of the District's wholesale customers until that time. In August 2016, the Orange County Sanitation District transferred ownership of the Local Service Area 7 wastewater system to the District.

TOPOGRAPHY

The topography of the service area generally slopes from the northeast to the southwest. Elevations range from around 70 feet above mean sea level to 900 feet above mean sea level. In the southern portion of the service area, the slopes are more gradual and constant. Generally, north of 17th Street, the slopes start to steepen, and there are hills and valleys throughout the unincorporated communities of Lemon Heights, Orange Park Acres, Cowan Heights, and Panorama Heights.

CLIMATE

The area has a predominantly Mediterranean climate, characterized by pleasant year-round weather. On average, August tends to be the warmest month and December the coolest. Winters are usually mild with no freezing temperatures. As with many areas of California, microclimates are possible in the District.

Most rain falls from December through March, with summer being exceptionally dry, often with rainless periods spanning several months. Rainfall typically manifests as localized cloudbursts, particularly in elevated and desert regions after summer, and as light to moderate rains in winter. The bulk of annual precipitation is delivered during about six to eight heavy rain events. Higher elevations generally receive greater amounts of precipitation.

During most of the year, winds in the area typically blow from the west or northwest. However, these winds are often redirected by mountains, causing local terrain to have a greater influence on wind direction than the general circulation pattern. When a strong high-pressure system develops to the east and an intense low-pressure system approaches the coast from the west, strong and potentially damaging winds can occur from the east or northeast. In Southern California, these winds are known as Santa Ana winds. Santa Ana winds are characterized by very dry, strong, and gusty conditions, with speeds sometimes exceeding 100 mph, particularly where canyons align with the airflow. These conditions can create significant challenges for fire suppression efforts and often result in temporary closures of highways to certain vehicles, such as campers, trucks, and light cars. Additionally, seasonal land and sea breezes, particularly strong in the summer, also impact local air pollution levels.

ADMINISTRATION

The District is governed by a five-member board of directors that are elected to serve 4-year terms. A General Manager manages day-to-day administration and operations. The Board of Directors adopted this plan after receiving approval pending adoption from FEMA. The General Manager of EOCWD will oversee the plans for future implementation and maintenance.

SERVICE AREAS

The service area includes parts of Tustin, Orange, North Tustin, Lemon Heights, Cowan Heights, Orange Park Acres, and Panorama Heights. The area is generally east of the 55 Freeway, north of the 5 Freeway, west of Jamboree Road, and south of Santiago Canyon Road.

Wholesale Zone Water Service Area

The District provides wholesale water to the following agencies:

- City of Tustin
- Golden State Water Company (Cowan Heights/Lemon Heights area)
- City of Orange (Chandler Ranch area)
- Irvine Ranch Water District (emergency use only)
- EOCWD Retail Zone

The total population served by the Wholesale Zone (including the District's own retail customers, described below) is approximately 90,000. The service area in which this population lives is in eastern and central Orange County, encompassing the City of Tustin, a portion of the City of Orange, and the unincorporated communities of East Orange, North Tustin, East Tustin, Red Hill, Lemon Heights, Cowan Heights, Orange Park Acres, and Panorama Heights. Generally speaking, most of the District lies east of the Costa Mesa Freeway (I-55), north of the Santa Ana Freeway (I-5), west of Jamboree Road, and south of Santiago Canyon Road. **Figure 2-1** shows the District's wholesale water service area identified in yellow.

Retail Zone Service Area

Upon acquiring the County of Orange Waterworks District No. 8, the District named this service area the “Retail Zone” to distinguish it from the District’s wholesale operation. The Retail Zone services approximately 1,200 connections and a population of approximately 3,500.

The Retail Zone distribution system is located within the central portion of the Wholesale Zone, on the western side of the District, approximately equidistant from both the northern and southern boundaries. Most of the Retail Zone lies within the unincorporated community of Panorama Heights, generally bounded on the west by Hewes Avenue, on the south by Foothill Boulevard, on the east by Newport Boulevard and Crawford Canyon Road, and on the north by Chapman Avenue. The Retail Zone is shown as blue hash marks in **Figure 2-1**.

Wastewater Service Area

The District has named the service area of the former Orange County Sanitation District Local Service Area 7 wastewater system “Improvement District 1” or “the Sewer Zone.” The system serves approximately 19,000 connections and serves a population of approximately 81,000. The service area encompasses the East Orange, Cowan Heights, Lemon Heights, Panorama Heights, and North Tustin areas, as well as portions of the City of Tustin. These services are for collection and transmission only, and do not include treatment. The wastewater service area is shown as purple hash marks in **Figure 2-1**.

Demographics

The following demographic profiles represent estimates of District demographics based on data from the U.S. Census American Community Survey (ACS) data sets. For this analysis, the 2023 ACS data set was used. Census data is communicated by census tracts and blocks that target municipal boundaries and other census-designated places. These boundaries do not align with the District’s service area boundaries, which encompass most of the City of Tustin, an eastern portion of the City of Orange, and the unincorporated area of North Tustin. The following demographic profiles are based on census data available for Orange County, which include information for the City of Tustin, the North Tustin Census Designated Place (CDP; an unincorporated area designated for analysis by the U.S. Census Bureau), and Panorama Heights CDP.[3]

[3] US Census Bureau 2023: ACS 1-Year

Figure 2-1: EOCWD Service Area Map

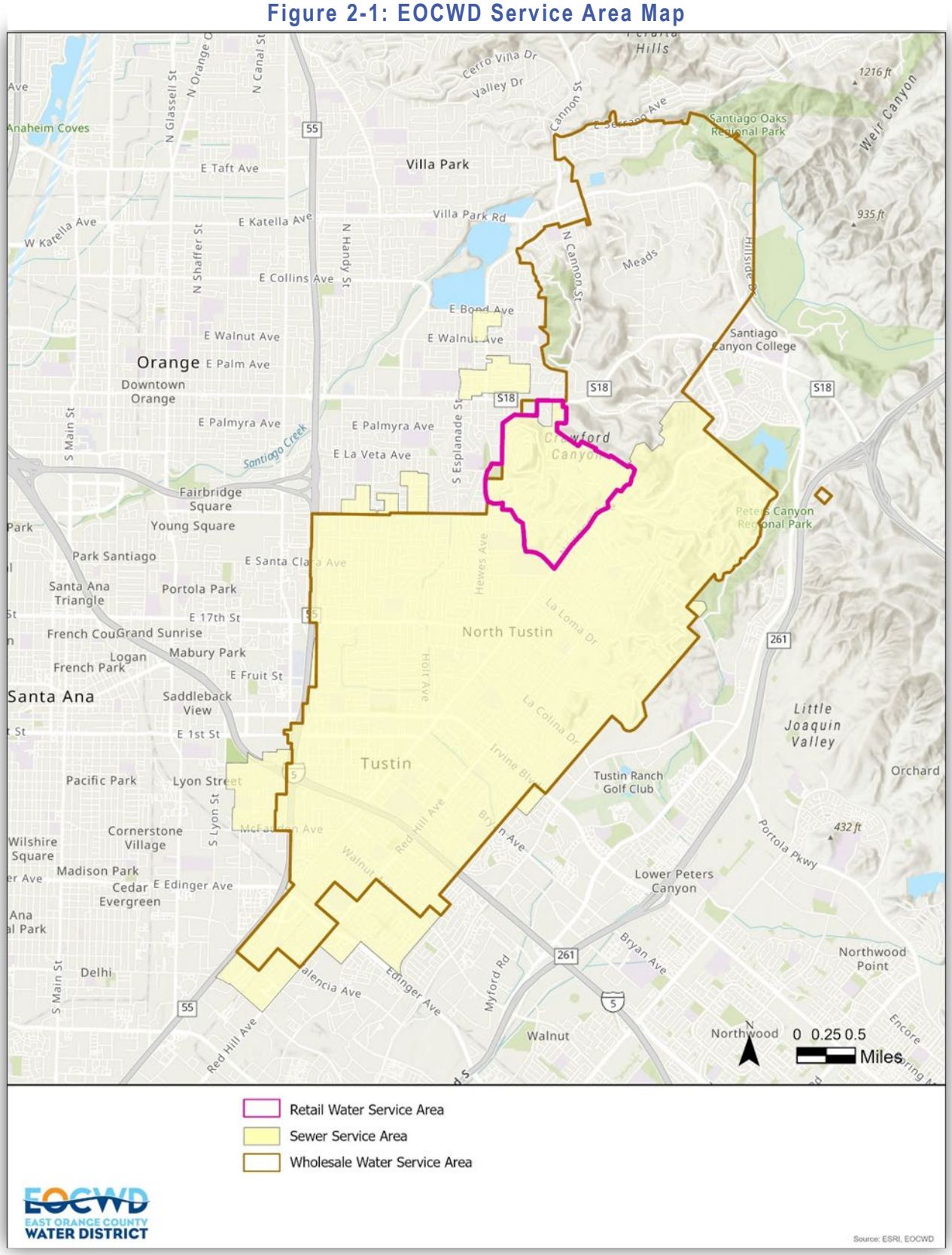


Table 2-1 identifies the basic demographics for EOCWD and Orange County. Compared to all of Orange County, residents in Tustin are slightly younger, have a lower median income, and are more likely to rent their homes. In contrast, residents of North Tustin CDP are older, have a higher median income, and are more likely to own their homes.

TABLE 2-1: BASIC DEMOGRAPHICS
EOCWD (CITY OF TUSTIN AND NORTH TUSTIN CDP) & ORANGE COUNTY

Demographic	Tustin	North Tustin CDP	Orange County
Total Population	79,035	26,038	3,135,755
Percent of children who are less than 10 years old	12.9%	12%	10.3%
Percent of residents who are senior citizens (65+)	11.3%	21.1%	16.9%
Median Age	36.8	46.9	39.7
Total households	26,025	8,926	1,092,528
Median household income	$107,537	$186,250	$110,042
Percent of rental households	47.1%	12.4%	43.0%

Source: U.S. Census Bureau, 2023 American Community Survey (ACS) – EOCWD (City of Tustin and North Tustin CDP) and Orange County

Individuals with Disabilities or Access and Functional Needs

Recognizing that individuals with disabilities may face greater challenges during emergencies, effective emergency planning requires local governments, as the first responders, to prioritize coordinating support for their access and functional needs to ensure safety. Differentiating between functional and medical needs is key to successful evacuation and sheltering strategies. Emergency management personnel can enhance their plans by understanding the population with disabilities within their communities.

Within the District's service area, the American Community Survey (ACS) indicates that Tustin has approximately 7,662 individuals (9.9% of the population) and North Tustin CDP has approximately 2,286 individuals (8.8% of the population) with some form of disability.[4] These people may be elderly, physically disabled, children, or unable to transport themselves. Although the District has no direct authority to create or enforce policies that would affect the populace, it can aid its customers within the service area by ensuring that both water and wastewater services remain functional, especially during emergencies.

Transportation

The Orange County Transportation Authority (OCTA) provides public transportation in Tustin, California, primarily through its OC Bus service. OCTA also operates the iShuttle, which connects the Tustin Metrolink Station to the Irvine Business Complex and John Wayne Airport. Additionally, the Tustin Area Senior Center offers a transportation program for seniors and individuals with disabilities.[5] The Tustin Metrolink Station is a prominent rail facility, offering service on the Metrolink Orange County Line and the Metrolink Inland Empire-Orange County

[4] US Census Bureau 2023: ACS 1-Year

[5] Orange County Transportation Authority, OC Bus overview

Line. The Tustin Metrolink Station offers convenient daily service for residents and is easily accessible from anywhere within the city limits. Metrolink trains connect to other stations and provide connections to the Amtrak Pacific Surfliner. The station is also served by several OCTA bus routes, including 70, 90, 472, and 473. Additionally, the Tustin Branch is a Union Pacific Railroad line that runs through Tustin, though it's primarily used for freight and industrial traffic.[6]

There is no airport located in the District. Currently, the nearest airport with commercial service is John Wayne Airport, approximately 7.5 miles southwest of the District service area. The airport averages approximately 270 flights per day, in and out of the area.

Two major freeways border and intersect with the District service area. Interstate 5 (I-5) bisects the southern portion of the service area, while State Route 55 (SR 55) generally straddles the western border of the service area. These routes allow for access to other major routes (CA-241, CA-261, and other major roadways) connecting the rest of Orange County while also allowing access to the greater regional area, including Los Angeles, San Diego, and Riverside Counties. The I-5 and SR-55 also serve as two of the primary evacuation routes from the region to other parts of Orange County in the event of an emergency.

During an emergency, most of the District's customers/residents have multiple potential evacuation routes available. Generally speaking, multiple avenues for egress would help to expedite an evacuation out of the service area. However, should the need to evacuate during peak commute times, congestion on the streets and freeways could compromise the effectiveness of the evacuation.

Existing Land Use

Located in central Orange County's Panorama Heights area, which is part of unincorporated Orange County, the District's Retail Zone is mainly comprised of single and multi-family residential properties. The District's Wholesale Zone, also situated in central Orange County, covers portions of the Irvine Ranch Water District (IRWD), Golden State Water Company (GSWC), and the Cities of Orange and Tustin. While primarily residential, these communities also contain a mix of commercial, industrial, institutional, and dedicated landscape users.[7]

Development Trends

As a service provider, the District does not have land use authority. That authority belongs to the municipal governments within their service area. However, conducting a land-use analysis can still be a valuable tool for understanding and anticipating service demand. Retail, residential, and population growth throughout the state and Orange County is expected to increase over time.

Future growth within the District's service area is expected to impact demand for its services. The EOCWD 2020 Urban Water Management Plan expects that retail zone dwelling units will increase by up to 35% over the next 20 years. Currently, the retail zone has approximately 1,512 dwelling units, which are expected to grow to approximately 2,039 by 2045. Within the wholesale zone, a more conservative 0.2% growth is expected, from approximately 26,315

[6] Metrolink - https://metrolinktrains.com/rider-info/general-info/stations/tustin/

[7] East Orange County Water District 2020 Urban Water Management Plan - EOCWD UWMP

dwelling units in 2025 to an anticipated 26,361 dwelling units in 2045. **Tables 2-2** and **2-3** show these dwelling unit numbers within the District's retail zone and wholesale zone service areas.

Driven by the demand for affordable housing, California is experiencing a surge in the construction of Accessory Dwelling Units (ADUs), which are small, independent homes built on residential properties. The degree to which ADUs will influence future population growth and housing needs remains a significant area of unknown impact. Most ADUs will be built on parcels zoned for single-family use. The District has seen a rise in ADU permit applications within the service area, and some permits are for multiple ADUs on the same property. Due to the large number of large lots within the District's Retail Zone, it is reasonable to assume that significant portions of these areas could be redeveloped to include properties with more than one ADU added.[8]

TABLE 2-2: EAST ORANGE COUNTY WATER DISTRICT RETAIL ZONE DWELLING UNITS BY TYPE

Dwelling Units	2020	2025	2030	2035	2040	2045
Total	**1,371**	**1,512**	**1,582**	**1,758**	**1.934**	**2,039**
Single Family	1,370	1,497	1,567	1,741	1.915	2,020
All Other*	1	14	15	17	18	19

*Includes duplex, triplex, apartment, condo, townhouse, mobile home, etc. Yachts, houseboats, recreational vehicles, vans, and other similar vehicles are included if they are the primary place of residence. Does not include group-quartered units, cars, railroad boxcars, etc.

Source: EOCWD 2020 Urban Water Management Plan

TABLE 2-3: EAST ORANGE COUNTY WATER DISTRICT WHOLESALE ZONE DWELLING UNITS BY TYPE

Dwelling Units	2020	2025	2030	2035	2040	2045
Total	**26,030**	**26,315**	**26,329**	**26,349**	**26,353**	**26,361**
Single Family	14,998	15,155	15,166	15,182	15,186	15,193
All Other*	11,302	11,160	11,163	11,167	11,167	11,168

*Includes duplex, triplex, apartment, condo, townhouse, mobile home, etc. Yachts, houseboats, recreational vehicles, vans, etc. are included if is primary place of residence. Does not include group quartered units, cars, railroad box cars, etc.

Source: EOCWD 2020 Urban Water Management Plan

[8] East Orange County Water District 2020 Urban Water Management Plan - EOCWD UWMP

Infrastructure Failure

Infrastructure failure occurs when an infrastructure component or network fails, creating a risk of harm to people, property, or other community assets. They often happen because of natural hazards, such as earthquakes or floods. Infrastructure failures may also be caused by human error, deliberate sabotage, or inadequate maintenance, and can occur due to overuse or unrepaired damage.

One type of infrastructure failure—"active" failure—occurs when the failure releases a substance that is harmful or potentially harmful, or the failure directly causes damage or injury. For example, a break in a water pipeline that releases water could cause flooding, create sinkholes if undetected, or aid in the breakdown of other key infrastructure, all of which would be considered an active failure. Alternatively, infrastructure failure may be "passive," which occurs when the infrastructure fails in such a way that it cannot function as intended. The failure itself may not be dangerous, but the loss of function may create a hazardous situation. For example, a clogged storm drain is not harmful, but it could cause flooding if this infrastructure failure happens during heavy rainfall. Some infrastructure failures may qualify as both. For example, a leak in a water tank can be directly hazardous (it releases a large amount of water that could create a flood) and may also pose an indirect risk by decreasing water supplies.

Infrastructure failure may occur anywhere in the District, given the extent of infrastructure networks required to maintain reliable water delivery and wastewater service throughout the service area. However, some sections of the infrastructure network exist only in certain parts of the District, and therefore, the risk of failure from these networks is limited to those locations. Any infrastructure component may fail, although well-maintained infrastructure that is protected from damage is less likely to experience a failure. There is no true scale for measuring infrastructure failure.

The potential for infrastructure failures is expected to exist both in and around the service area. Various natural hazards, such as intense storm systems, landslides, or seismic events, could clog storm drains, break drinking water transmission and wastewater collection pipes, and even potentially bring down power lines. More significant infrastructure failure events are a possibility, particularly if such infrastructure is not well-maintained, but the risk of these major events is unknown.

Climate change may affect some types of infrastructure failures. Affects from climate change may increase the frequency, severity, and intensity of floods, wildfires, storms, and severe weather events. These natural hazards may compromise key pieces of infrastructure, and thus, climate change may indirectly lead to infrastructure failure events occurring more frequently and/or with greater severity.

CHAPTER 3 – RISK ASSESSMENT

Risk assessment is the process of measuring the potential impact on life, property, and the economy resulting from natural hazards. The risk assessment aims to identify, as much as practicable, given the existing and available data, the qualitative and quantitative vulnerabilities of a community. The results of the risk assessment provide a foundation for developing and prioritizing mitigation actions to reduce damage from natural hazards through improved preparedness and response times, as well as better allocation of resources to areas of greatest vulnerability.

This risk assessment section evaluates the potential loss from each hazard by assessing the vulnerability of buildings, infrastructure, and people to its effects. It identifies the characteristics and potential consequences of hazards, the extent to which a hazard could affect the community, and its impact on the community's population and assets. The risk assessment approach consists of two components:

- **Hazard Identification:** Identification and screening of hazards.
- **Hazard Profiles:** Review of historical occurrences and assessment of the potential for future events.

Hazard Identification

HAZARD SCREENING CRITERIA

FEMA guidance identifies several hazards that communities should consider addressing in their hazard mitigation plans. The California Multi-Hazard Mitigation Plan (MHMP) contains additional hazards that may be worth including. Regional hazard plans and records of past disasters are other potential sources for hazards to consider. The Planning Team reviewed an extensive list of hazards before deciding which ones to include in this HMP. **Table 3-1** shows the hazards considered by the Planning Team, and why they were or were not included. The table also indicates which source proposed the hazard for consideration, and whether it has been the subject of a disaster declaration in Orange County.

TABLE 3-1: HAZARD EVALUATION FOR EOCWD HMP

Hazard	Source of Recommendation	Federal Disaster?*	Included in HMP?	Reason for Inclusion or Exclusion
Agricultural pests	California MHMP	No	No	There is no major agricultural activity in the District.
Air pollution	California MHMP	No	No	Air pollution is a state and regional issue addressed through plans and regulations administered by the South Coast Air Quality Management District and the California Air Resources Board.

TABLE 3-1: HAZARD EVALUATION FOR EOCWD HMP				
Hazard	**Source of Recommendation**	**Federal Disaster?***	**Included in HMP?**	**Reason for Inclusion or Exclusion**
Avalanche	FEMA guidance	No	No	Avalanches do not occur in the District.
Climate change	California MHMP Regional plans	No	Yes (as a component of other hazards)	Climate change can affect the frequency, intensity, and/or location of different hazards. It is not a standalone hazard and will be discussed as a complicating factor in other hazards rather than as a distinct event.
Coastal flooding and storms	California MHMP	Yes	No	The District service area is not a coastal area.
Dam failure	California MHMP FEMA guidance Regional plans	No	Yes	The District lies within the inundation zone for dams.
Disease and pest management	California MHMP	No	No	The HMPT did not consider the Plan to be the appropriate place to address disease and pest management hazards.
Drought	California MHMP	No	Yes	Droughts are a recurring and potentially severe hazard of concern for the District.
Earthquake (fault rupture, liquefaction, and seismic shaking)	California MHMP FEMA guidance Regional plans	Yes	Yes	The District is located in a seismically active area and has experienced earthquakes in the past.
Energy shortage	California MHMP	No	No	The HMPT did not consider the plan to be the appropriate venue for discussing energy shortages.
Erosion	California MHMP FEMA guidance	Yes	No	Erosion in the District is not sufficient to be considered a hazard.
Expansive soil	FEMA guidance	No	No	There is no known expansive soil in the District.
Extreme cold	California MHMP FEMA guidance	Yes	No	Temperatures in the District do not typically become cold enough to pose a threat to the community.
Extreme heat	California MHMP FEMA guidance	No	No	Extreme heat events are a recurring hazard in the District, but not a concern for the HMPT.
Flood	California MHMP FEMA guidance Regional plans	Yes	Yes	Floods are an occasional hazard in the District.
Fracking	California MHMP	No	No	Fracking does not occur in the EOCWD.

TABLE 3-1: HAZARD EVALUATION FOR EOCWD HMP				
Hazard	**Source of Recommendation**	**Federal Disaster?***	**Included in HMP?**	**Reason for Inclusion or Exclusion**
Hail	FEMA guidance	No	No	The HMPT found that hail severe enough to constitute a hazard in the District is too rare to be included in this Plan.
Hazardous materials release	California MHMP	No	No	Hazardous material facilities are present in the District; however, the District has no jurisdiction or control over these facilities.
Hurricane	California MHMP FEMA guidance	Yes	No	Hurricanes are too rare in the District to be included in this Plan.
Infrastructure failure	California MHMP	No	Yes	Infrastructure failure may occur in the District and could pose a serious threat to customers. It is discussed within the District profile in Chapter 2.
Landslide	California MHMP FEMA guidance	Yes	Yes	Landslides have occurred in the past in the District.
Levee failure	California MHMP	No	No	Levee failures are not a sufficient hazard in the District to be addressed separately in this Plan.
Lightning	FEMA guidance	No	No	Lightning is not a sufficient hazard to be addressed in this Plan.
Metal theft	California MHMP	No	No	The HMPT did not consider this a sufficient threat in the service area.
Methane-containing soil	Regional plans	No	No	There are no known methane-containing soils in the District.
Nuclear hazard	California MHMP	No	No	There are no known sources of nuclear material that could plausibly create a risk of a nuclear hazard in the District service area.
Power Outage	California MHMP	No	No	The District has been affected by power outage events in the past, usually as a result of heavy winds or fires; however, this wasn't deemed a concern by the HMPT.
Sea level rise	California MHMP FEMA guidance	No	No	The District is not a coastal community and so is not susceptible to sea level rise.
Severe wind	FEMA guidance	Yes	Yes	Severe winds have occurred in the District's service area and have caused damage in the past.
Severe winter weather	FEMA guidance	Yes	No	While this term typically refers to blizzards, ice storms, and related hazards, the HMPT discusses this in the flooding profile.
Storm surge	FEMA guidance	No	No	Storm surge is a coastal hazard, and the District is not located in a coastal community.

TABLE 3-1: HAZARD EVALUATION FOR EOCWD HMP				
Hazard	**Source of Recommendation**	**Federal Disaster?***	**Included in HMP?**	**Reason for Inclusion or Exclusion**
Subsidence	FEMA guidance	No	No	Subsidence is not a hazard of concern for the HMPT within the District service area.
Terrorism	California MHMP	No	No	The HMPT did not consider terrorism to be a hazard of concern for the District.
Thunderstorm	California MHMP Regional plans	No	No	While thunderstorms may occasionally occur in the EOCWD, the threat they pose is adequately addressed by other hazards.
Tornado	California MHMP FEMA guidance	No	No	There is some risk of tornadoes in EOCWD, but other hazards adequately address the threat posed by these events.
Transportation crashes	California MHMP	No	No	The Planning Team determined that this Plan is not the appropriate location to address transportation crashes.
Tsunami	California MHMP FEMA guidance	No	No	Tsunamis are a coastal hazard, and the District service area is not located in a coastal community.
Volcano	California MHMP	No	No	There are no volcanoes near enough to the District to pose a significant risk to its customers.
Wildfire	California MHMP FEMA guidance Regional plans	Yes	Yes	Wildfires have occurred in the past in both the District and the surrounding communities.

* Federal disasters are declared at the county level. A disaster declared for Orange County did not necessarily cause any harm to EOCWD.

The HMPT combined some hazards into a single category to streamline the list:

- Seismic hazards will include seismic shaking and liquefaction.
- Dam failure will be discussed as part of flooding.

Additionally, the Planning Team has renamed “earthquakes” to “seismic hazards” to reflect better the threat posed by factors other than ground shaking.

After the hazard evaluation and organizational changes were made by the HMPT, this Plan discusses eight broad hazard types, along with their respective subcategories, as displayed in **Table 3-2**. Each category will also address climate change as a topic within its relevant hazard profile.

TABLE 3-2: HAZARD CATEGORIES AND SUB-CATEGORIES	
Hazard Category	**Sub-Categories**
Severe Weather	Extreme Heat, Severe Wind
Wildfire	
Seismic Hazards	Seismic Shaking, Liquefaction
Drought	
Landslides	
Flood	Dam Failure

HAZARD SCORING AND PRIORITIZATION

The HMPT followed FEMA guidance for hazard mitigation plans, prioritizing each of the eight hazards and their respective subcategories. In the initial step, it assigned a score of 1 to 4 for each of the hazards for the following criteria:

- **Probability:** The likelihood that the hazard will occur in EOCWD in the future.
- **Magnitude/Severity:** The severity of the direct damage of the hazard to EOCWD.
- **Warning Time:** The time the District has before a disaster event/hazard impacts EOCWD.
- **Duration:** The time that the disaster event will affect EOCWD.

The HMPT assigned a weighting value to each criterion, giving a higher weight to the criteria deemed more important, and multiplied the score for each criterion by weighing the factor in determining the overall score for each criterion. FEMA recommended these weighting values:

- **Probability:** 2.0
- **Location:** 0.8
- **Maximum Probable Extent (Primary Impact):** 0.7
- **Secondary Impacts:** 0.5

After calculating the total impact score for each hazard (sum of the location, maximum probable extent, and the secondary impact), FEMA guidance recommends multiplying the total impact score by the overall probability to determine the final score for each hazard. A final score between 0 and 12 is considered a low-threat hazard, 12.1 to 42 is a medium-threat hazard, and a score above 42 is considered a high-threat hazard. This final score determines the prioritization of the hazards. **Table 3-2** depicts the criteria for the scoring for each hazard previously discussed, including probability, location, primary impact, and secondary impacts.

In compliance with the Disaster Mitigation Act (and as further specified by Interim Final Rule 44 CFR Section 206.401(c)(2)(i)), this HMP addresses, in substantial detail, the primary hazards facing the District. Lower-priority hazards are addressed at a lesser level of detail due to their relatively reduced impacts, as identified in the hazard assessment discussion. **Table 3-3** displays each hazard's criterion scores, final score, and threat level, as determined by the prioritization process outlined above.

TABLE 3-2: CRITERION SCORING				
CPRI Category	Degree of Risk Chart			Assigned Weight Factor
	Level ID	Description	Index	
Probability	Unlikely	• Extremely rare with no documented history of occurrences or events. • Annual probability of less than 0.001	1	45%
	Possible	• Extremely rare with no documented history of occurrences or events. • Annual probability of between 0.01 and 0.001	2	
	Likely	• Occasional occurrence with at least two or more documented historic events. • Annual probability of between 0.1 and 0.01	3	
	Highly Likely	• Frequent events with a well-documented history of occurrence. • Annual probability of greater than 0.1	4	
Magnitude/Severity	Negligible	• Negligible property damages (less than 5% of critical and non-critical facilities and infrastructure) • Injuries or illnesses are treatable with first aid and there are no deaths • Negligible quality of life lost • Shut down of critical facilities for less than 24 hours	1	30%
	Limited	• Slight property damages (greater than 5% and less than 25% of critical and non-critical facilities and infrastructures) • Injuries and illnesses do not result in permanent disability and there are no deaths • Moderate quality of life lost • Shut down of critical facilities for more than 1 day and less than 1 week	2	
	Critical	• Moderate property damages (greater than 25% and less than 50% of critical and non-critical facilities and infrastructures) • Injuries or illnesses result in permanent disability and at least one death • Shut down of critical facilities for more than 1 week and less than 1 month	3	
	Catastrophic	• Severe property damages (greater than 50% of critical and non-critical facilities and infrastructure) • Injuries or illnesses result in permanent disability and multiple deaths • Shut down of critical facilities for more than 1 month	4	
Warning Time	Less than 6 hours	Population will receive less than 6 hours of warning	4	15%
	6 to 12 hours	Population will receive between 6-12 hours of warning	3	
	12 to 24 hours	Population will receive between 12-24 hours of warning	2	
	More than 24 hours	Population will receive greater than 24 hours of warning	1	
Duration	Less than 6 hours	Disaster event will last less than 6 hours	1	10%
	Less than 24 hours	Disaster event will last between 6-24 hours	2	
	Less than one week	Disaster event will last between 24 hours and 1 week	3	
	More than one week	Disaster event will last more than 1 week	4	

TABLE 3-3: EOCWD HAZARD SCORES AND THREAT LEVELS						
		Impact (2.0)				
Hazard	Probability (2.0)	Location (0.8)	Primary Impact (0.7)	Secondary Impact (0.5)	Final Score	Threat Level
Severe Wind	4	3	3	2	44.00	High
Wildfire	4	3	2	3	42.40	High
Seismic Shaking	3	4	2	3	36.60	Medium
Drought	3	4	1	1	26.40	Medium
Landslide	2	2	3	2	18.80	Medium
Liquefaction	2	2	2	3	18.00	Medium
Dam Failure	1	4	4	4	16.00	Medium
Flood	2	2	2	2	16.00	Medium

Hazard Profiles

SEVERE WEATHER

Severe weather is a broad term that can refer to various intense weather events. In this Plan, the term will be used to refer to extreme heat and severe wind.

Description

Extreme Heat

Extreme heat refers to a time when temperatures are substantially higher than normal levels. For the purposes of hazard planning in California, extreme heat is more specifically defined as temperatures about 98 percent of the historic high temperatures for the area, as measured between April and October from 1961 to 1990. The threshold of extreme heat varies by location. For example, the extreme heat threshold in the northern California coast or the Lake Tahoe region may be considered normal temperatures in a desert community.

A series of days with an extreme heat event is called a heat wave. Extreme heat events are a function of both temperature and humidity, as high humidity levels can make the air feel hotter than it really is. The perceived temperature resulting from this effect is called the heat index, which can be significantly higher than the actual temperature. For example, an air temperature of 90°F with 90 percent humidity can make the temperature feel in excess of 120°F.

Extreme heat can cause many heat-related illnesses and other health risks, including heat cramps, heat exhaustion, and (more severely) heat stroke. These events can be particularly damaging to infants and senior citizens, who have less ability to maintain a safe internal body temperature (and therefore can overheat more easily during extreme temperatures), and people who work outdoors or in other exposed areas, such as construction workers. Very high temperatures also reduce the effectiveness of power lines. In combination with increased demand for electricity (to run air conditioning units), extreme heat events can stress electrical infrastructure and increase the rate of failure.

Severe Wind

Wind is the movement of air through the atmosphere due to differences in air pressure, caused by local and regional variations in temperature, topography, and Earth's rotation. Air flows from areas of high pressure to areas of lower pressure. Places where the air pressure changes substantially over a short distance will generally experience the most severe wind, while places with more gradual pressure differences will see calmer breezes.

Severe wind is any wind that can harm people or property. This is generally winds with speeds at or above 47 miles per hour (mph), which is typically the threshold for structural damage (although damage is possible at a lower speed). The primary risk from severe wind is property damage, often caused by fallen tree limbs or airborne debris. People can be struck by debris or broken branches, causing injury or death. Additionally, severe wind can cause enough fallen or windblown material to block roads and railways, interrupting transportation networks and all activities depending on them. Power lines can be knocked down by severe wind, which may spark wildfires in addition to harming electrical service.

Winds may accompany storms (which are areas of low pressure) but may occur independent of storm systems. Many storm systems have some type of high wind event, including tornadoes, which are the most well-known and can cause significant damage due to the extreme wind speeds involved (in excess of 200 mph in the most severe cases). Other types of severe winds associated with strong storm systems include downbursts, microbursts, and derechos. Severe winds that occur independent of storm systems include Southern California's infamous Santa Ana winds.

Location and Extent

Extreme Heat

The risk of extreme heat is generally consistent across the District's service area. The threshold for an extreme heat event in the District is approximately 96.4F°.[9] Extreme heat events may be measured using the temperature or heat index of the event.

Severe Wind

Strong winds can occur anywhere in the District, although they may be strongest at the bottom of the passes and canyons of the Santa Ana Mountains and local foothills. Some areas may be more sheltered from a particular wind event due to local topography and the specific conditions of the event, but such locations may be more exposed to high winds from another event.

Winds are typically measured using the Beaufort scale, which was developed in 1805. It categorizes winds on a scale of *force 0* to *force* 12 based on their speed and observed effects. Winds that rank *force 9* or higher on the Beaufort scale may be considered severe. **Table 3-4** shows the Beaufort scale. Some very severe wind types are measured using more specialized scales. Hurricanes are measured with the Saffir-Simpson Hurricane Wind Scale, and tornadoes are measured with the Enhanced Fujita (EF) scale.

[9] Cal-Adapt - accessed June 2025

TABLE 3-4: BEAUFORT SCALE		
Force	**Speed (mph)**	**Description**
1	0 to 1	**Calm:** Smoke rises vertically, and the sea is flat
2	1 to 3	**Light air:** The direction of wind is shown by smoke drift, but not wind vanes
3	4 to 7	**Light breeze:** Wind is felt on the face, leaves rustle, and wind vanes are moved. Small wavelets appear on the ocean, but do not break.
4	8 to 12	**Gentle breeze:** Leaves and small twigs are in motion, and light flags are extended. Large wavelets appear on the ocean, and crests begin to break
5	13 to 18	**Moderate breeze:** Dust and loose paper become airborne, and small branches are moved. Small waves appear on the ocean
6	19 to 24	**Fresh breeze:** Small trees begin to sway, and moderate waves form
7	25 to 31	**Strong breeze:** Large branches are in motion, making it difficult to use an umbrella. Large waves begin to form.
8	32 to 38	**Near gale:** Whole trees are in motion, and walking against the wind can be hard. Foam from breaking waves is blown in streaks
9	39 to 46	**Gale:** Walking is difficult, and twigs break off trees
10	47 to 54	**Severe gale:** Slight structural damage. Crests of waves begin to topple
11	55 to 63	**Storm:** Trees are uprooted and considerable damage to structures. Very high waves form in long, overhanging crests
12	63 to 72	**Violent storm:** Widespread damage. Exceptionally high waves form, and the ocean is completely covered in foam
*Source: https://www.weather.gov/mfl/beaufort		

Past Events

Orange County has not been included in any federal declarations for extreme heat or high winds.

Extreme Heat

According to the Western Regional Climate Center, the planning area averages 20 days a year with temperatures exceeding 90°F, and those days may be included in a heat wave event. A storm event database maintained by NOAA's National Centers for Environmental Information (NCEI) lists three excessive heat events in the planning area. There have been 11 extreme heat events in the District between 2020 and late 2024:[10]

- **July 2006**—In July 2006, California and Nevada were impacted by a heat wave that was unprecedented with respect to the magnitude and duration of high temperatures, exceptionally high nighttime minimums, great areal extent, as it simultaneously impacted both northern and Southern California; and very high humidity levels (Los Angeles Times, 25 July 2006). The events are credited with 163 deaths in California.

[10] NOAA 2025 Storm Event Database

- **August 30 – September 3, 2007**—The combination of above normal temperatures and relative humidity produced excessive heat across the planning area. Eight fatalities occurred related to the heat. Heat index values ranged from 105 to 112 ºF.
- **June 20 – 21, 2008**—The combination of strong high pressure centered over Arizona and weak offshore flow generated extreme heat conditions across Central and Southern California. Across many sections of the area, afternoon temperatures climbed to between 100°F and 114°F, setting numerous high-temperature records. The extreme heat resulted in several power outages due to excessive electrical use.
- **October 25, 2017—**A strong upper-level ridge settled over the region October 23 – 25, 2017, before weakening slowly over the following two days. High pressure over the Great Basin brought weak to moderate Santa Ana winds that contributed to dry air and compressional warming. Afternoon high temperatures along the coast and in the valleys soared past 100°F on three consecutive days, breaking numerous records. Overnight temperatures in some wind-prone spots failed to drop below 80°F.
- **August 6, 2018—**Orange County inland areas saw hot temperatures, with most areas experiencing temperatures over 95ºF. The highest temperatures were observed on August 9, with Anaheim reaching 100°F and Santa Ana reaching 97°F. Temperatures on August 6–8 were slightly lower but remained above 95°F. Temperatures began to subside on August 10 but remained over 90°F through the weekend.
- **June 10-12, 2019—**A strong upper ridge over the Great Basin brought offshore flow and hot temperatures to Southern California June 9 – 12. Anaheim reached 100ºF on June 10. Anaheim broke a record with a high of 91ºF on June 11.
- **April 24-25, 2020**—High pressure built into Southern California April 22–30. High temperatures in the upper 90s to 100°F were observed in inland Orange County.
- **July 8, 2020**—Inland areas of Orange County likely experienced high temperatures, potentially approaching or reaching triple digits. Orange County had highs between 90 and 100 degrees.
- **August 14, 2020**—Temperatures were well above average, with many inland areas experiencing triple-digit temperatures. Orange County Health Care Agency issued advisories urging residents to take precautions against heat-related illnesses.
- **September 19, 2020**—A record-breaking heatwave hit Southern California, including Orange County. Tustin saw a high temperature of 106 degrees Fahrenheit.
- **October 12, 2020**—A heatwave brought significantly above-average temperatures to Southern California, including Orange County. Inland areas of Orange County experienced some of the highest temperatures. This heatwave exacerbated the Silverado and Blue Ridge fires.
- **June 14, 2021**—Tustin experienced an early summer heatwave that brought unusually high temperatures to the region. This heatwave was part of a larger event impacting the Western United States. Temperatures in the upper 90s to 100°F were observed.

- **August 2, 2020**—Tustin and all of Orange County experienced a heat wave with significantly high temperatures. Temperatures in the upper 90s to 100°F were observed.
- **September 1, 2022**—Tustin and Orange County were affected by a prolonged heatwave that started around August 30th and continued for several days. This heat wave was noted for its duration, record-setting temperatures, and the strain it put on the power grid. Temperatures reached triple digits throughout the county.
- **July 11, 2023**—Southern California was experiencing a heat wave, and it was a day of significantly elevated temperatures in Tustin and the surrounding Orange County area as part of the heat wave.
- **August 28, 2023**—The highest temperature recorded in Tustin that day reached 90.0 degrees Fahrenheit. An Excessive Heat Warning was issued for the area.
- **September 6, 2024**—Orange County experienced a heat wave with high temperatures, which saw temperatures in the mid-90s to 106°F. An excessive heat warning was issued for Orange County.

Severe Wind

Several high-wind events have been reported in and around EOCWD in recent years. Some of the most recent events include:[11]

- **December 2011**—A storm caused wind speeds over 65 mph, knocking down hundreds of trees, downing power lines, and overturning trucks throughout the Orange Valley. Later that month, another strong storm brought winds of 45 to 65 mph, with one recorded gust exceeding 70 mph.
- **January 2012**—A storm system that hit the region and caused wind gusts over 60 mph, knocking down power lines and blowing containers off semi-trucks.
- **March 2012**—strong winds affected the Orange Valley region after a storm event, with gusts of over 60 mph.
- **November 2014**—A Santa Ana wind event caused winds of approximately 50 mph, with damage reported throughout the region.
- **August 1, 2017**—A thunderstorm resulted in wind speeds of 52 mph, knocking a two-foot-diameter tree onto a house in Orange.
- **January 2017**—A series of three storms caused strong winds that knocked down hundreds of trees throughout the region, causing millions of dollars in damage.
- **October 9, 2017**—a strong Santa Ana wind event caused wind gusts of 70 mph.
- **January 22, 2022**—The National Weather Service issued a high wind warning for the region, including Tustin, with winds between 20 to 40 miles per hour and gusts as high as 65 mph. Wind gusts of 82 mph were reported at Fremont Canyon, just east of North Tustin.

[11] NOAA 2025 Storm Event Database

- **November 2022**—Tustin and the surrounding areas experienced multiple severe wind events. These events were part of a larger pattern of strong Santa Ana winds affecting Southern California. These winds raised concerns about wildfires and prompted the National Weather Service to issue alerts regarding potentially dangerous conditions. Winds in the District were on average 18 to 25 mph, with gusts up to 36 mph.
- **March 13, 2024**—Strong Santa Ana winds swept through Southern California, including the District. Wind gusts in some parts of the greater region reached 70 to 80 mph, leading to downed trees, power outages, and hazardous driving conditions. The combination of strong winds and saturated ground from previous rains contributed to an increased risk of trees falling.
- **November 6, 2024**—The National Weather Service issued a High Wind Warning for inland Orange County, including the District, during this period. Wind speeds from the northeast were predicted to be between 25 and 35 mph, with occasional gusts potentially exceeding 60 mph.
- **January 7, 2025**—one of the most severe windstorms in years ripped through Southern California. Winds of 40-60 mph were reported in Orange County and EOCWD, while gusts of 80-100 mph occurred in the mountains of Los Angeles County. Described as particularly dangerous by the National Weather Service, the storm and associated fires prompted numerous emergency alerts, in addition to alerts concerning dust and air quality throughout the region.

Risk of Future Events

Extreme Heat

As extreme heat events have occurred regularly in the District's past, it is all but certain that they will continue to occur in the future. The threshold for what constitutes an extreme heat event may change over time.

Severe Wind

High wind events will likely continue to occur in and around the District, given past occurrences. Winter storms and Santa Ana wind events will likely continue to remain the most common types of severe winds. High winds from tornadoes and tropical storms may occur in the future, but such events are expected to be very rare.

Climate Change Considerations

Extreme Heat

Climate change is expected to have a significant impact on extreme heat events, as warmer temperatures are projected to increase the frequency and intensity of these events. The specific number of extreme heat events is expected to vary depending on the severity of climate change. Under more moderate projections, the District is expected to see an average of approximately 13 extreme heat days (those above 96.4°F) each year between 2070 and 2099. If more severe projections for climate change materialize, the expectations are for the District to experience 26 extreme heat days annually by the end of the 21st century.[12]

[12] Cal-Adapt Climate Change Tool – Extreme Heat Days

Severe Wind

Strong storms may become more intense with climate change (as discussed below). This may result in an increase in the number of storms accompanied by severe wind events and/or a rise in the average intensity of these high winds. It is not yet known if climate change will have any effect on Santa Ana winds. There is a possibility that the increase in storm intensity may lead to more storms that are strong enough to generate tornadoes. However, given the rarity of tornadoes in the Orange County region, it is unlikely that any such effects would be noticeable for this Plan.

WILDFIRES

Description

Wildfires are fires that burn in undeveloped and natural areas. While they are relatively harmless to people when they burn in remote and uninhabited areas, they are dangerous when they move into areas known as the wildland-urban interface (WUI). These areas are the border between natural and urbanized areas and are increasingly developed because they are often desirable places to live. This type of development brings people and property into wildfire-prone areas, creating a significant risk of hazard. Additionally, wildfires may extend beyond the WUI into fully developed areas and thus become urban fires. Development in the WUI throughout California, combined with the historical practice of suppressing naturally occurring wildfires (allowing dry fuel to accumulate), has made wildfires the most common type of hazard event in California. Since 1953, California has experienced 284 federally declared disasters, 183 of which have been associated with fires.[13]

Many things can cause a wildfire, including lightning, a fallen power line, or improperly extinguished campfires. The size and severity of a fire relates to the local topography, weather conditions, and availability of fuel. However, fires do not need to be particularly large to be damaging. The Tunnel Fire in the Oakland Hills killed 25 people and destroyed 2,900 structures in 1991, but it was only 1,600 acres in size. By contrast, the largest single wildfire in California's recorded modern history, the 2017–2018 Thomas Fire, reached close to 282,000 acres, killed 1 person, and destroyed 1,063 structures.[14]

Historically, wildfires occur most often in late summer and fall when temperatures are high and several months have passed since significant precipitation. This is likely to remain the case, although wildfires can still occur in other months; for example, the Thomas Fire began in December, and multiple fatal wildfires started as early as June.[15]

Location and Extent

Wildfires are generally measured by their size (typically the number of acres burned). However, they may also be measured by the number of buildings destroyed or damaged, the number of injuries or deaths caused by the fire, the cost of the damage, or other impact-related metrics. Areas that are prone to wildfires are classified into three categories of fire hazard severity zones (FHSZs): very high, high, and moderate. There is no specific risk level or fire size/intensity that corresponds to each level of FHSZ. Rather, these are qualitative terms that consider factors

[13] FEMA 2025

[14] CAL FIRE 2017a, 2017b

[15] CAL FIRE 2017a, 2017b

such as fire history, terrain, weather conditions, development, and fuel availability, among others.[16]

Fire-prone areas can also be classified by the agency responsible for fire protection. Land protected by federal agencies such as the U.S. Forest Service or the Bureau of Land Management is considered a Federal Responsibility Area (FRA). Land that the California Department of Forestry and Fire Protection (CAL FIRE) is responsible for is called a State Responsibility Area (SRA). Local governments are responsible for fire protection services in Local Responsibility Areas (LRAs). These responsibility areas do not necessarily correspond to jurisdictional boundaries. For example, many local communities contract with CAL FIRE to provide fire protection services inside their boundaries, even for land that is under local jurisdiction.

The FHSZs in the District are generally located along the northern and northeastern borders of the District service area. There is also a small, isolated pocket located along the western border between the service area and Villa Park. These zones generally increase in potential danger, progressing from moderate to very high as they approach the foothills, which are located at higher elevations. **Figure 3-1** depicts the wildfire hazard severity zones located in the District.

Past Events

Incident information from the California Department of Forestry and Fire Protection (CAL FIRE) identifies over 17 wildfires in Orange County since 2005. Orange County has been included in six federal wildfire disaster declarations and five additional federal fire management declaration events, totaling 11 federal declarations since 1978. The following are recent major urban-wildland interface fires that have affected Orange County (as reported by CAL FIRE):

- **February 6 – 12, 2006, Sierra Fire**—Burned 10,584 acres across Orange County and Riverside County
- **October 21 – November 9, 2007, Santiago Fire**—Burned 28,400 acres within Santiago Canyon and Silverado Canyon.
- **November 15, 2008, Freeway Complex Fire**—Burned 30,305 acres between Corona, Chino Hills, Yorba Linda, Brea, and Anaheim
- **September 15 – October 9, 2017, Canyon Fires 1 and 2**—Series of fires in Coal Canyon (1st fire) and East Santa Ana Canyon Road (2nd fire) burned 11,879 acres.
- **August 8, 2018, Holy Fire**—Burned 23,136 acres in the Cleveland National Forest.
- **October 26 – November 7, 2020, Blue Ridge Fire**—Burned 13,694 acres, damaged 10 homes, and destroyed one structure according to CalFire. The fire occurred near the 91 freeway and spread into the foothills and mountains of Orange and Riverside counties.
- **October 26 – November 7, 2020, Silverado Fire**—The fire consumed 13,390 acres, wounded two firefighters, destroyed one structure and two minor structures, and damaged five others in Santiago Canyon in Orange County.

[16] CAL FIRE 2012

- **December 2020, Bond Fire**—The fire consumed 6,686 acres, wounded 2 firefighters, destroyed 31 structures, and damaged 21 structures in Santiago Canyon in Orange County.
- **March 2 – 27, 2022 – Jim Wildfire**—Burned 553 acres, caused three minor injuries to firefighters, but didn't damage any structures in the Holy Jim Canyon area of Cleveland National Forest.
- **November 7 – December 1, 2023, Tustin Hangar Fire**—Engulfed the massive 17-story North Hangar at the former Marine Corps Air Station Tustin, a structure built in 1942 and a prominent landmark in Orange County. While not a wildfire, this event is a notable fire incident within Tustin that caused significant smoke and debris fallout in surrounding neighborhoods.
- **September 9 – October 5, 2024, Airport Fire**—The fire consumed some 23,526 acres, injured 19 firefighters and 2 civilians, and destroyed 160 structures in the Santa Ana Mountains.

Risk of Future Events

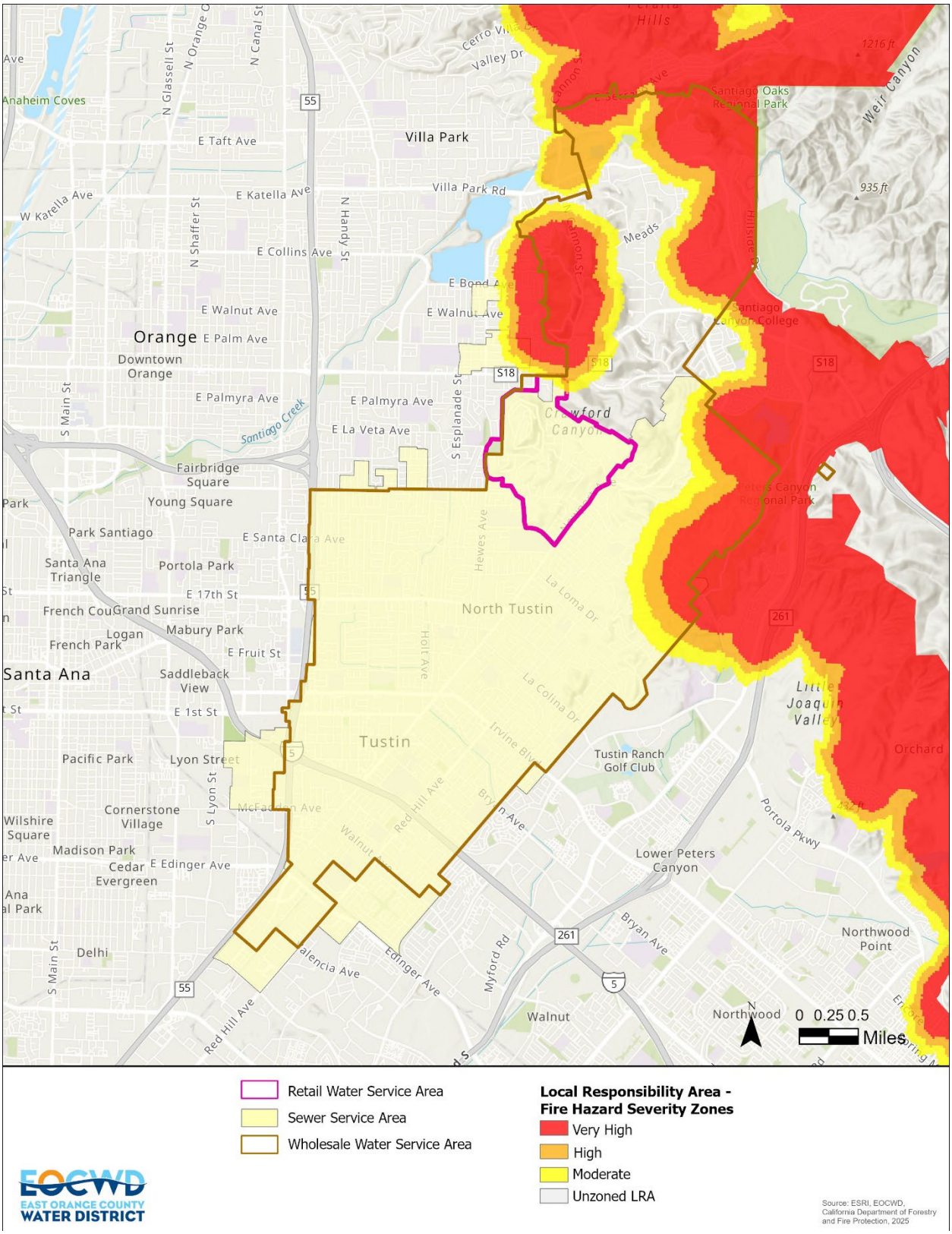
Given that wildfires have occurred in and around the District's service area in the past and that substantial parts of the community remain classified as areas of elevated fire risk, wildfires are likely to continue occurring in and around the service area. The areas of highest risk are expected to remain in the vicinity of foothills and canyon areas, especially in identified FHSZs. Generally, only the District's infrastructure located above ground is vulnerable to wildfire, such as the Peters Canyon Reservoir's wood-construction roof. Those assets located underground are assumed to have minimal vulnerability to wildfires' primary effects.

Climate Change Considerations

Throughout the state, climate change is expected to increase temperatures and cause more frequent and intense drought conditions. This will likely increase the amount of dry brush that can act as fuel for wildfires. As a result, the overall size of areas burned by wildfires in California is expected to increase.[17]

[17] CEC 2018

Figure 3-1: Wildfire Hazard Zones



SEISMIC HAZARDS

Description

Seismic hazards are associated with earthquakes and include seismic shaking and liquefaction. Landslides, which are a potential consequence of earthquakes, are discussed separately under the “geologic hazards” section.

The shifting and movement of the Earth’s tectonic plates are responsible for seismic events. These tectonic plates can pull away from, move toward, or pass by each other. As they do, the plates sometimes lock together. This creates tension, and the built-up tension is eventually released like a springboard. The tension dissipates into the Earth’s crust.

The location at which two tectonic plates join is called a fault line. Fault lines are sometimes visible on the Earth’s crust as sudden rifts or anomalies in the continuity of the landscape. California's major north-south fault line is the San Andreas Fault, where the North American Plate and the Pacific Plate meet. Constant friction between the two plates over the millennia has caused the areas where the two plates intersect to become fragmented, resulting in the creation of new, smaller faults.

The area near a fault line is at risk of damage due to the potential for a fault rupture—the deformation or displacement of land on either side of the fault, which may move a few inches to several feet in opposite directions. Any buildings or infrastructure situated around, on top of, or across a fault line could potentially be severely damaged or destroyed. The direction of the fault rupture depends upon the fault type: dip-slip faults produce vertical shearing; strike-slip faults produce horizontal shearing; and oblique-slip faults produce both vertical and horizontal shearing. A fourth kind of fault, called a “blind” fault, produces virtually no visible land displacement.

Some faults have emerged recently in geologic history. Quaternary faults have developed anytime between the Holocene Era and the present (within the last 1.8 million years). These faults are especially concerning since they are the most likely to be active and cause future earthquakes. The Alquist-Priolo Earthquake Fault Zoning Act enables California’s State Geologist to designate zones surrounding active faults as Alquist-Priolo Special Study Zones, which are special regulatory zone that requires additional study to determine the location of the fault and the limits of the area prohibited from surface construction on top of the known location of an active fault.

Seismic Shaking

Seismic shaking refers to the actual shaking caused by an earthquake and is often the most damaging effect. The shaking is typically strongest at the epicenter, which is the point on the surface directly above the hypocenter (the focus or point of origin underground). It remains strong along the part of the fault that slipped, decreasing with distance from the fault. However, local geology can also influence the severity of seismic shaking. For example, an area located above firm bedrock may experience less shaking. In comparison, an area built on loose rocks and soil may experience more shaking, even if they are the same distance from the epicenter. The shaking can destroy buildings, roads, railways, power lines, utility pipes, and any other structure that cannot resist the force of the earthquake. This damage may cause secondary hazards, such as fires from broken gas mains or downed power lines, floods and sinkholes from broken water pipes, or the release of hazardous materials, among others.

Liquefaction

Liquefaction occurs when a water-saturated, loosely packed material (such as sand or silt) is suddenly shaken, as in an earthquake. This causes the material to temporarily act less like solid ground and more like a liquid. The material loses much of its stability when this occurs and may no longer be able to support any buildings or structures built either on or in it. Buildings, roadways, rail lines, or other structures built on the soil may be damaged or could collapse completely when liquefaction occurs. Pipelines or other utility lines running through a liquefaction zone can be breached during a liquefaction event, potentially leading to flooding or the release of hazardous materials.

Location and Extent

Seismic Shaking

Earthquakes are considered a major threat to Orange County due to the proximity of several fault zones, notably including the San Andreas Fault Zone and the Newport-Inglewood Fault Zone. A significant earthquake along one of the major faults could result in substantial casualties, extensive damage to buildings, roads, and bridges, start fires, and pose other threats to life and property. Aftershocks and secondary effects, such as fires, landslides, and dam failures, could exacerbate the impact. A major earthquake could be catastrophic in its effect on the population and could exceed the response capabilities of local communities and even the State.

The District is situated in a seismically active area, and several different faults could potentially cause seismic shaking. There have been numerous past earthquakes that have affected the service area to various degrees, and the broader Southern California region is well known for seismic activity. The two major faults of concern located near the District include the Peralta Hills and El Modeno Faults. **Figure 3-2** (page 38) displays the primary and secondary faults within the District. All locations within the service area are susceptible to seismic shaking.

The intensity of seismic shaking is usually measured with the Modified Mercalli Intensity (MMI) scale. This is based on the amount of observed damage rather than a physical measurement of the earthquake itself. Different locations will have different MMI measurements, depending on the amount of damage done. The MMI uses Roman numerals on a scale of I (1, the weakest) to XII (12, the strongest). **Table 3-5** shows the MMI scale.

Although the intensity of an earthquake is unlikely to vary significantly across the District service area, its impacts can vary based on local soil characteristics. The National Earthquake Hazard Reduction Program (NEHRP) categorizes soil and rock types to predict their behavior during seismic events. **Table 3-6** summarizes NEHRP soil classifications. The classifications, ranging from A (hard rock) to F (soils requiring site-specific evaluations), inform seismic design and construction to reduce earthquake losses. The areas that are commonly most affected by ground shaking have NEHRP Soils D, E, and F. The District is composed of two types of NEHRP soils, “C,” which is a very dense soil-soft rock, and “D,” which is considered stiff soil. The predominant soil type is “D,” which indicates that there is susceptibility throughout the service area. Risk is similarly increased in areas of identified and mapped liquefaction susceptibility.

Figure 3-2: Fault Lines Within and Near the District Service Area

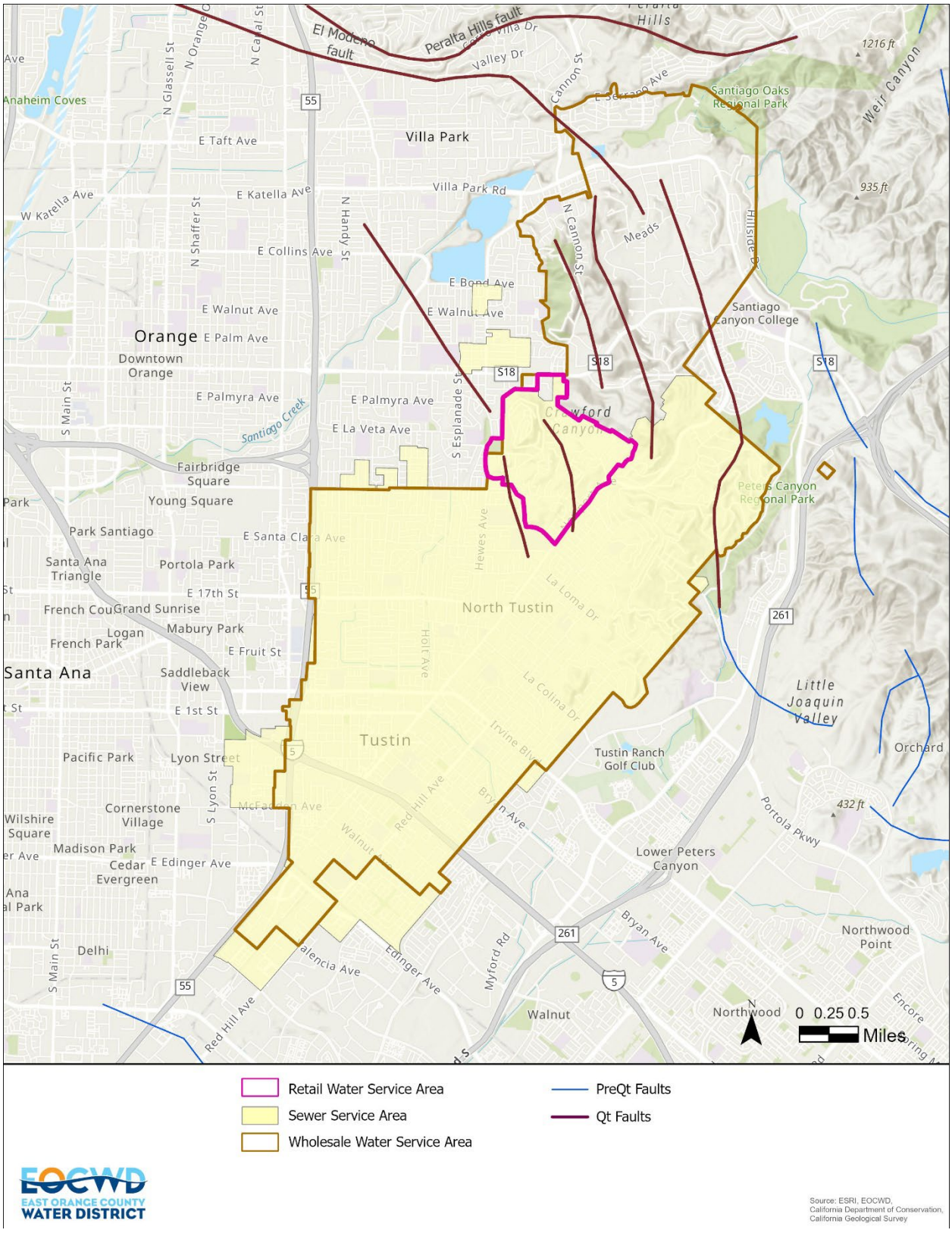


Table 3-5: Modified Mercalli Intensity Scale		
Intensity	**Description**	**Description**
I	Instrumental	Felt only by very few people under especially favorable conditions.
II	Feeble	Felt only by a few people at rest, especially on the upper floors of buildings.
III	Slight	Noticeable by people indoors, especially on upper floors, but not always recognized as an earthquake.
IV	Moderate	Felt by many indoors and by some outdoors. Sleeping people may be awakened. Dishes, windows, and doors are disturbed.
V	Slightly Strong	Felt by nearly everyone, and many sleeping people are awakened. Some dishes and windows will be broken, and unstable objects overturned.
VI	Strong	Felt by everyone. Some heavy furniture is moved, and there is slight damage.
VII	Very Strong	Negligible damage in well-built buildings, slight to moderate damage in ordinary buildings, and considerable damage in poorly built buildings.
VIII	Destructive	Slight damage in well-built buildings, considerable damage and partial collapse in ordinary buildings, and great damage in poorly built buildings.
IX	Ruinous	Considerable damage in specially designed structures. Great damage and partial collapse in substantial buildings, and buildings are shifted off their foundations.
X	Disastrous	Most foundations and buildings with masonry or frames are destroyed, along with some well-built wood structures. Rail lines are bent.
XI	Very Disastrous	Most or all masonry structures are destroyed, along with bridges. Rail lines are greatly bent.
XII	Catastrophic	Damage is total. The lines of sight are distorted, and objects are thrown into the air.
Source:https://www.usgs.gov/media/images/modified-mercalli-intensity-mmi-scale-assigns-intensities		

TABLE 3-6: NEHRP SOIL CLASSIFICATION SYSTEM		
NEHRP Soil Type	**Description**	**Mean Shear Velocity to 30 meters (m/S)**
A	Hard Rock	1,500
B	Firm to Hard Rock	760-1,500
C	Dense Soil/Soft Rock	360-760
D	Stiff Soil	180-360
E	Soft Clays	< 180
F	Special Study Soils (liquefiable soils, sensitive clays, organic soils, soft clays >36 meters thick)	
*Source: https://www.nehrp.gov/		

Liquefaction

Liquefaction is not measured using any specific scale. The severity of a liquefaction event is linked to the type of ground material, the amount of water present, the intensity of the shaking, and the extent of the affected area. The NEHRP creates maps based on soil characteristics to help identify locations that are susceptible to liquefaction. NEHRP Soils B and C can typically sustain ground shaking with minimal effect, depending on the earthquake magnitude. The areas that are commonly most affected by ground shaking have NEHRP Soils D, E, and F. In general, these areas are also most susceptible to liquefaction. The areas of mapped liquefaction potential within the District's service area are:

- Between Santiago Canyon Rd. and Serrano Ave, bisecting the service area as it leads into Santiago Oaks Regional Park.
- The Crawford Canyon area south to Newport Ave.
- The southern section of the service area, south of Irvine Blvd and the I-5 to the Tustin City limits.

These areas are depicted in **Figure 3-3** (page 41), which shows the liquefaction hazard zones within the District.

Seismic Shaking

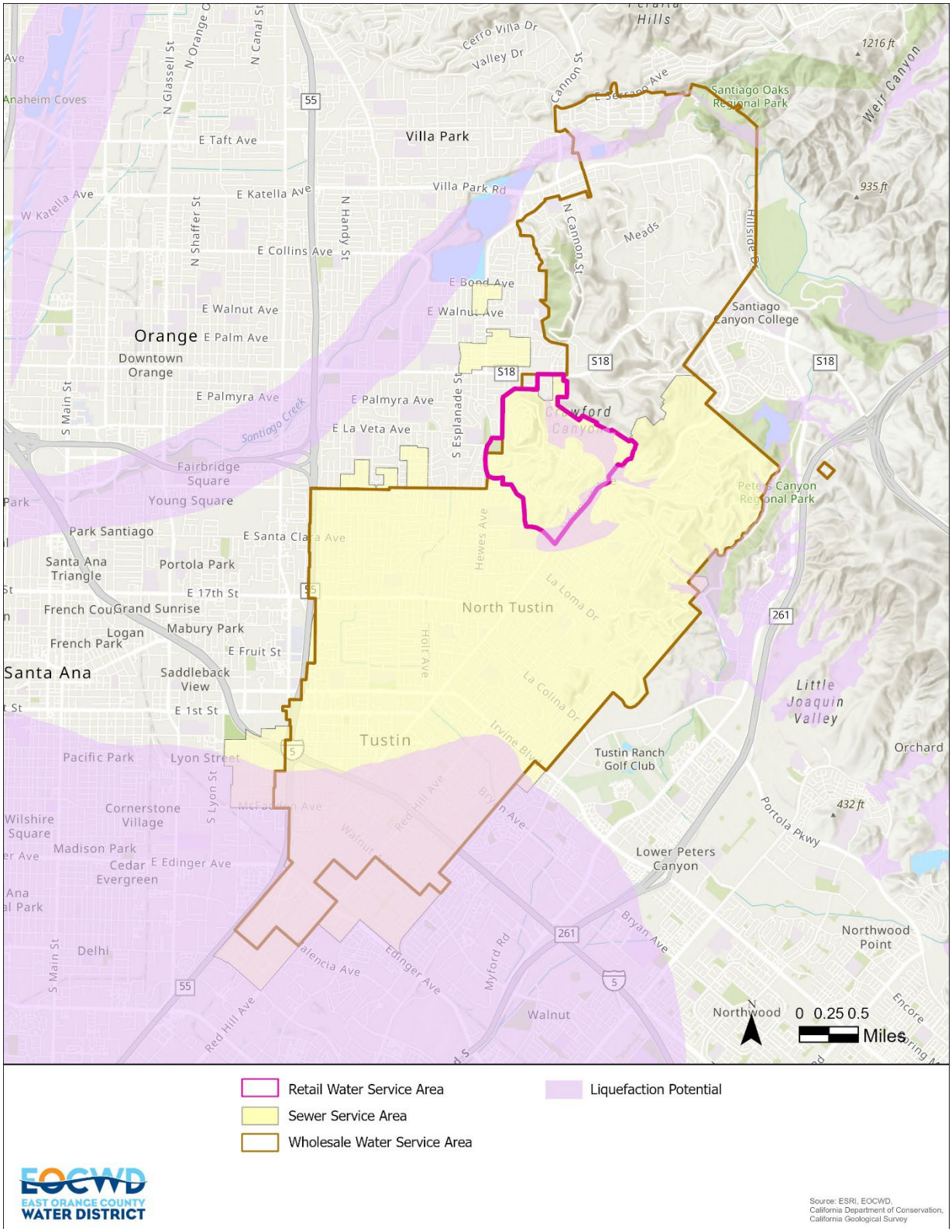
In addition to the UCERF3, the USGS has prepared several scenarios illustrating the potential intensity of different earthquakes based on their location, fault, and magnitude. Several of these scenarios project shaking that would register at least VI (Strong) on the MMI scale. **Table 3-7** presents a sample of these scenarios, highlighting several faults of concern.

TABLE 3-7: SELECTED EARTHQUAKE SCENARIOS

Fault Name	Magnitude (Mw)	Distance (Miles) *	MMI in EOCWD
San Andreas Fault	7.46	46.2	VIII–IX (Destructive to Ruinous)
	7.2	41.5	VIII–IX (Destructive to Ruinous)
	6.9	39.8	VIII (Destructive)
Newport Inglewood Fault	7.15	13.3	VIII (Destructive)
	7.02	15.4	VIII (Destructive)
Whittier Fault	6.8	8.78	VI (Strong)
Puente Hills Fault	6.82	8.10	VIII (Destructive)
Peralta Hills Fault	6.55	2.4	VIII (Destructive)

Source: USGS Earthquake Scenario Map 2025.
* As measured from EOCWD HQ to the modeled epicenter.

Figure 3-3: Areas of Liquefaction Potential within the District Service Area



Seismic shaking may also be measured using the moment magnitude scale (MMS, denoted as Mw or sometimes M), which measures the amount of energy released by the earthquake. The MMS begins at 1.0 and increases as more energy is released. It is what is known as a logarithmic scale, meaning that the difference in energy between two measurements is substantially greater than the difference between the measurements themselves. For example, a 6.5 Mw earthquake releases approximately 1.4 times as much energy as a 6.4 Mw earthquake, and 1,000 times as much energy as a 4.5 Mw earthquake. The MMS replaces the Richter scale, which is a similar scale but less reliable when measuring large earthquakes. **Figure 3-4** displays the seismic shaking potential within the District.

Past Events

Liquefaction

There is no historical record of liquefaction events occurring within the District, although such events have occurred in the wider region. Both the 1994 Northridge earthquake and the 1971 San Fernando earthquake caused liquefaction in the San Fernando Valley area.[18] After the 1992 Landers earthquake, liquefaction was observed east of Big Bear and in the Santa Ana River canyon of the Orange Mountains.[19] Liquefaction also likely occurred as a result of the 1857 Fort Tejon earthquake.[20]

Seismic Shaking

A significant seismic event that impacted the District service area was the 1933 Long Beach earthquake (magnitude 6.4). Although it was centered southeast of Long Beach, the City of Tustin felt the quake and experienced some of its effects. This earthquake also contributed to the implementation of new building codes, particularly for schools, to enhance earthquake resilience in the region.[21]

The largest earthquake to affect the District (Tustin and North Tustin) was the 1994 Northridge earthquake, which registered a magnitude of 6.7. While the epicenter was in the San Fernando Valley, the quake caused significant shaking and damage throughout the Greater Los Angeles area, including Orange County and the District. It caused widespread damage, including collapsed buildings, freeway overpasses, and fires. It also resulted in numerous injuries and fatalities.[22]

There have also been a number of other earthquakes that have not caused substantial impacts to the District but were sufficient to register a magnitude of at least 5.0 or greater within a 100-mile radius of the District. **Table 3-8** shows these events.

[18] Bennet 1989; Holzer et al. 1999

[19] Barrows 1993

[20] Stover and Coffman 1993

[21] Los Angeles Times. (n.d.). *92 years since the Long Beach earthquake*. Los Angeles Times. https://www.latimes.com/00000195-91aa-d081-a195-97ea88a40000-123#:~:text=On%20March%2010%2C%201933%2C%20at%205:54%20p.m.%2C,region%2C%20with%20Long%20Beach%20bearing%20the%20brunt.

[22] Hauksson, E., & Jones, L. M. (1995). Seismology: The Northridge Earthquake and its Aftershocks. *Earthquakes and Volcanoes*, 25(1), 18-30.

Figure 3-4: Seismic Shaking Potential in EOCWD

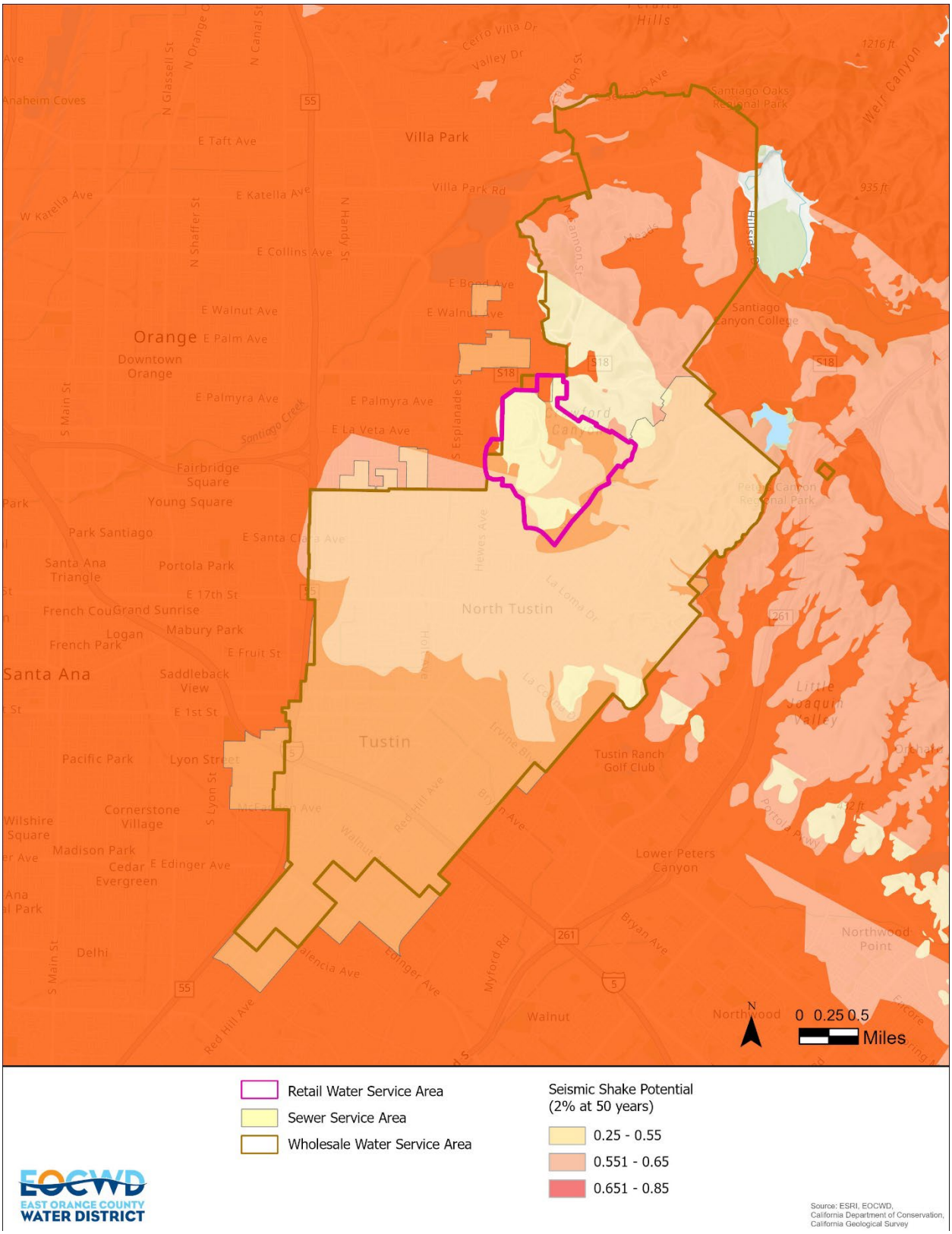


TABLE 3-8: SIGNIFICANT EARTHQUAKES IN THE SOUTHERN CALIFORNIA REGION (5.0+ MW)		
Date	**Magnitude**	**Epicenter Location**
07/23/1923 Los Angeles Earthquake	6.0	3 miles north of Loma Linda, CA
02/18/1926 Channel Islands Earthquake	5.5	3 miles from Santa Cruz Island, CA
3/10/1933 Long Beach Earthquake	6.4	3 miles south of Huntington Beach, CA
03/25/1937 Oasis Earthquake	6.0	10 miles west-southwest of Oasis, CA
12/04/1948 Desert Hot Springs Earthquake	6.0	10 miles east of Desert Hot Springs, CA
12/26/1951 San Clemente Island Earthquake	5.8	7 miles north-northeast of San Clemente Island, CA
02/09/1971 Agua Dulce Earthquakes	6.6, 5.8, 5.8	6 miles south-southwest of Agua Dulce, CA
07/08/1986 Morongo Valley Earthquake	6.0	4 miles south-southwest of Morongo Valley, CA
10/01/1987 Rosemead Earthquake	5.9	1 mile south-southwest of Rosemead, CA
02/28/1990 Claremont Earthquake	5.5	4 miles north-northeast of Claremont, CA
06/28/1991 Sierra Madre Earthquake	5.8	8 miles north-northeast of Sierra Madre, CA
04/23/1992 Thousand Palms Earthquake	6.1	11 miles north-northeast of Thousand Palms, CA
06/28/1992 Landers Earthquake	7.3	In Landers, CA
06/28/1992 Yucca Valley Earthquake	5.8	2 miles northeast of Yucca Valley, CA
06/28/1992 Joshua Tree Earthquake	5.7	1 mile south-southwest of Joshua Tree, CA
06/28/1992 Big Bear Lake Earthquake	5.5	7 miles south-southeast of Big Bear Lake, CA
06/28/1992 Big Bear City Earthquake	6.3	4 miles south-southeast of Big Bear City, CA
06/29/1992 Yucca Valley Earthquake	5.7	2 miles east-southeast of Yucca Valley, CA
01/17/1994 Northridge Earthquake	6.7	1 mile south-southwest of Northridge
01/17/1994 Granada Hills Earthquake	5.9	Half-mile east-northeast of Granada Hills, CA
01/17/1994 Simi Valley Earthquake	5.0	4 miles north-northeast of Simi Valley, CA
10/16/1999 Running Springs Earthquake	5.6	4 miles east-northeast of Running Springs, CA
07/05/2019 Ridgecrest Earthquake Sequence	6.4, 5.4, 7.1	3 miles north of Ridgecrest, CA
07/08/2021 Antelope Valley Earthquake	6.0	20 miles southeast of Markleeville, CA
Source: Southern California Earthquake Data Center, 2025. California Department of Conservation		

Risk of Future Events

Liquefaction

Although there is no record of liquefaction events within the District, certain parts of the service areas are prone to liquefaction. Due to this, a sufficiently strong earthquake in the region could trigger liquefaction in the District, particularly in areas with soil types that are vulnerable to liquefaction. Earthquakes occurring along the Whittier, Newport-Inglewood, Peralta Hills, and El Modeno faults could trigger liquefaction events, given their proximity to the District and their

potential to cause major earthquakes. Earthquakes from other faults are less likely to cause liquefaction, although it remains a possibility.

Seismic Shaking

Seismic shaking is an inevitability in the District, given that the service areas are located near some major and minor fault lines and have experienced substantial seismic shaking from past earthquake events. The Third Uniform California Earthquake Rupture Forecast[23] provides the likelihood of a major earthquake on various faults between 2015 and 2044. **Table 3-9** shows the probabilities of a significant earthquake by magnitude on major fault lines near the District, as estimated by the UCERF3 forecast.

TABLE 3-9: PROBABILITIES OF SIGNIFICANT EARTHQUAKES FOR THE DISTRICT

Fault	Distance (Miles) *	Probability †			
		6.7+ Mw	7.0+ Mw	7.5+ Mw	8.0+ Mw
Peralta Hills	3	0.23	0.15	0.06	-
Puente Hills	7.9	0.95	0.65	0.19	-
Whittier	8.3	1.11	1.00	0.62	<0.01
Elsinore (Glen Ivy)	14.3	3.19	1.68	0.89	<0.01
Newport-Inglewood	15.4	0.71	0.67	0.27	-
Palos Verdes	23.4	2.57	2.34	0.91	-
Sierra Madre	27.1	1.13	1.08	0.73	0.03
San Jacinto	36.9	5.06	5.06	5.01	2.76
San Andreas	39.5	22.34	19.38	16.00	6.70

Source: USGS 2025.

* As measured from EOCWD HQ to the closest part of the fault.

† UCERF3 presents odds of fault rupture by individual fault segment. The odds presented here are the highest odds given for any individual segment.

Based on the UCERF3 probabilities and the various scenarios explored by the USGS, the faults of greatest concern for EOCWD are the San Jacinto and San Andreas faults; significant earthquakes along these faults have the potential to cause significant damage. The San Jacinto Fault is less likely to rupture (it has approximately a 5 percent chance of causing a 6.7 Mw or greater earthquake by 2044), while the San Andreas Fault has a great chance of a major rupture (it has approximately a 22 percent chance of causing a 6.7 Mw or greater earthquake by 2044). Because these faults are farther from the District, the intensity of the earthquakes may be lower. Several other faults can produce earthquakes strong enough to cause damage in the District, including the Whittier, Elsinore, and Palos Verdes. While the odds of these earthquakes experiencing a significant rupture are low, it is still a possibility.

Climate Change Considerations

Liquefaction

Changes to precipitation patterns due to climate change could potentially affect liquefaction by altering groundwater levels, which may make soils more prone to liquefaction during an

[23] UCERF3, 2015

earthquake event. However, it is unknown if these changes to groundwater levels will have any substantive impact on the liquefaction risk in the District.

Seismic Shaking

Climate change is generally unconnected to the tectonic forces that cause earthquakes, although there may be a limited relationship between melting ice and seismic activity. However, these relationships remain uncertain, and the effect may not be substantial enough to alter the risk of earthquakes significantly.[24] Therefore, for all appreciable purposes, climate change is not expected to affect seismic shaking in the District.

DROUGHT

Description

A drought is a long period of time with precipitation levels that are significantly below normal. Most commonly, this results in less water being available for natural environments, causing plants to dry out and making them more susceptible to pests or diseases. An abundance of dry plant matter may also increase the risk of wildfires or cause fires to be more intense. Agricultural areas, particularly those that do not rely on irrigation, can suffer during periods of drought.

In more severe instances, droughts can affect urban areas. A significant enough drought can lead to water shortages, which may force local water suppliers to institute mandatory restrictions on nonessential water use. In extreme cases, there may not be enough water to meet basic health and hygienic needs, requiring communities to find alternative water supplies. Since many communities receive their water from distant sources, such as the Sierra Nevada or Colorado River, it is common in California to experience “long-distance droughts,” where precipitation levels may be normal in the community itself, but low precipitation at the source of the community’s water may result in water shortages.

Droughts can also, counterintuitively, cause an increase in flooding. Soil that has dried out due to drought conditions is harder and less able to absorb water. When precipitation eventually occurs, more water remains on the surface rather than being absorbed, increasing the amount of runoff and potentially exacerbating flooding events. Dry soil also does not bind together as well as moister soils, which can increase the potential for landslides or erosion.

Location and Extent

Droughts are large-scale events; therefore, drought risks and conditions are generally uniform across the District, although the impacts on natural lands differ from those on urban areas.

There are several methods for measuring drought conditions. One of the most common and easy to understand is the US Drought Monitor Classification Scheme, which combines multiple scales into a single descriptive index. **Table 3-10 shows** the US Drought Monitor Classification Scheme.

[24] Johnson et al. 2017

TABLE 3-10: US DROUGHT MONITOR CLASSIFICATION SCHEME		
Category	**Description**	**Possible Impacts**
D0*	Abnormally Dry	Slower growth of crops and pastures
D1	Moderate Drought	Some damage to crops and pastures. Water bodies and wells are low. Some water shortages may occur or may be imminent. Voluntary water use restrictions can be requested.
D2	Severe Drought	Likely crop and pasture losses. Water shortages are common, and water restrictions can be imposed.
D3	Extreme Drought	Major crop and pasture losses. Widespread water shortages and restrictions.
D4	Exceptional Drought	Exceptional and widespread crop and pasture losses. Emergency water shortages develop.

Source: US Drought Monitor
* D0 areas are those under "drought watch," but not technically in a drought. They are potentially heading into drought conditions or recovering from drought but are not yet back to normal.

Past Events

Droughts are a regular feature of California's climate, although with varying lengths, intensities, and frequencies. They have occurred numerous times in the state's recorded history and have frequently led to changes in California's economy, infrastructure, or policies.

- One of the earliest recorded droughts, the "Great Drought" of 1863–1864, followed the largest flood in California's recorded history and devastated the state's cattle industry, finishing off the rancho system in Southern California.
- Another series of droughts from 1928 to 1935, known as the "Dust Bowl Droughts," caused significant harm to California's agriculture and led to the creation of the federal Central Valley Project to enable a reliable source of water for Central Valley farmers.
- Further droughts from 1947 to 1950 and from 1959 to 1960 helped encourage the creation of the State Water Project, which imports water from the Sierra Nevada Mountains to communities throughout the state, including EOCWD.
- A drought from 1976 to 1977 created emergency-level conditions across most of California and resulted in strong water conservation practices that continue to this day.
- A drought from 1987 to 1992 caused significant statewide impacts, particularly to small rural communities and the timber industry, and led to stronger water conservation landscape standards.
- The statewide 2007 to 2009 drought caused further impacts and helped spur regulation for groundwater basins.[25] [26], [27]

[25] California Governor's Office of Emergency Services (Cal OES). 2023. State Hazard Mitigation Plan. https://www.caloes.ca.gov/office-of-the-director/operations/recovery-directorate/hazard-mitigation/state-mitigation-planning/

[26] Kotin, A., and Marion, D. 2014. "A History of Drought: Learning from the Past, Looking to the Future." http://calclimateag.org/a-history-of-drought-learning-from-the-past-looking-to-the-future/

[27] *California's most significant droughts: Comparing historical and recent conditions*. California Water Library. (n.d.). https://cawaterlibrary.net/document/californias-most-significant-droughts-comparing-historical-and-recent-conditions/

The most severe drought in California's recorded history (and considered the most severe in the past 1,200 years) occurred from 2012 to 2017.[28] At its peak, virtually all of California experienced D2 (severe drought) conditions, and nearly 60 percent of the state was classified in D4 (exceptional drought) conditions. Governor Brown declared a statewide emergency, and water conservation standards were strengthened throughout the state. The drought ended with the wet winter of 2016–2017, although a number of water conservation policies enacted during the drought remained in force. Although the winter of 2016–2017 officially ended one of California's most recent significant droughts, a single wet year was not enough to make up for five dry years. The 2017–2018 winter also saw less precipitation than normal across the state.[29] This moderate drought was again abated in late 2018 and early 2019 in the winter season when heavy rains ended any existing drought conditions.

By the end of 2020, however, California was once again experiencing drought throughout the state, with much of the state in D2 (Severe Drought) and D3 (Extreme Drought) conditions, with some areas even falling into the D4 (Exceptional Drought) category. A series of atmospheric rivers that swept through California from December 2022 to March 2023, bringing more than 78 trillion gallons of water, eliminated the drought for most of the state. As of July 2025, much of California is experiencing drought conditions. The majority of Orange County is experiencing D1 (Moderate Drought) and D2 (Severe Drought) conditions. **Figure 3-6** (page 51) shows the drought conditions in California, including Orange County and the District, as of July 22nd, 2025.[30]

Risk of Future Events

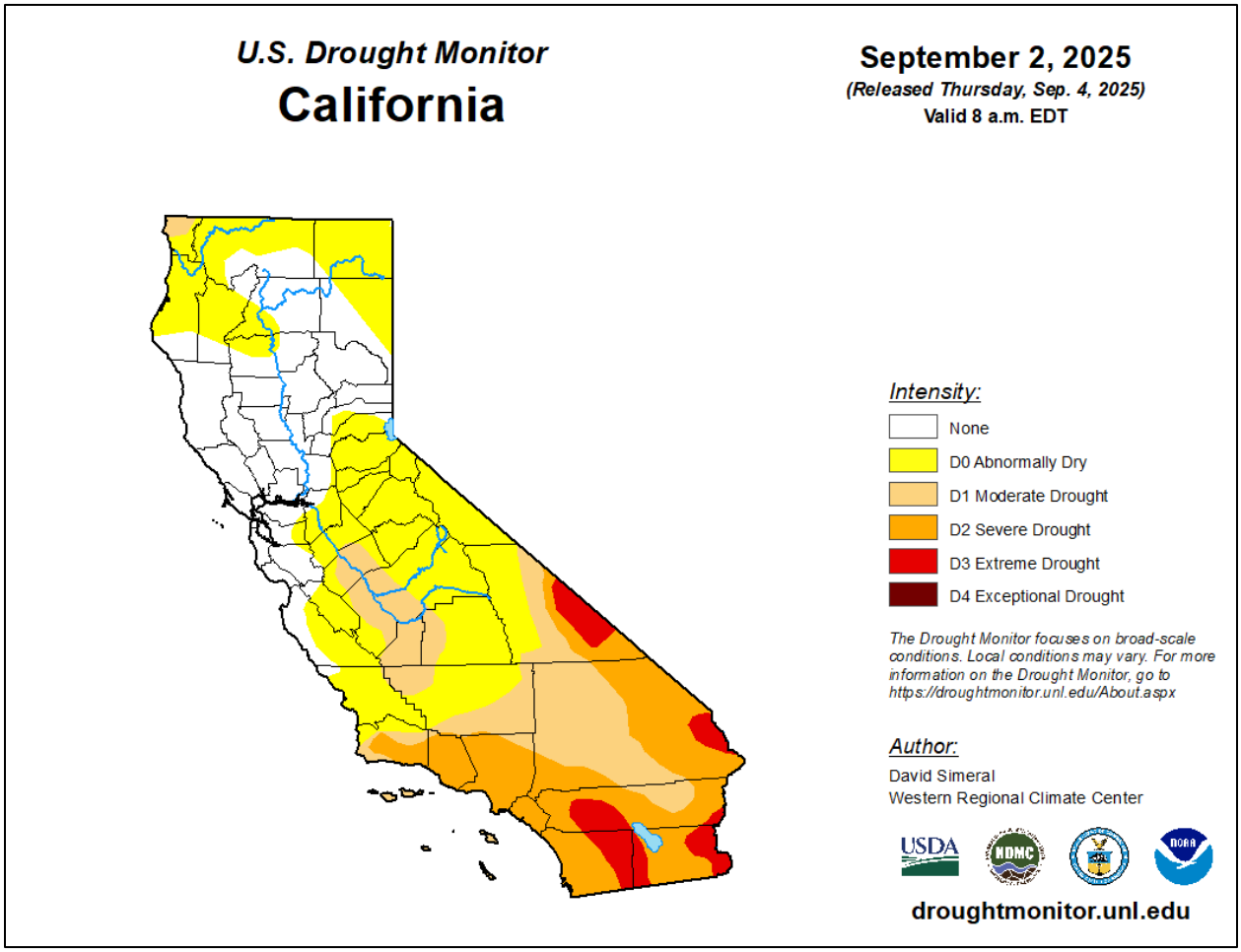
Drought events are likely to continue occurring in the District, given the history of past drought events in the service area and statewide. As most of the District's water supply comes from the Orange County Groundwater Basin, which is supplemented with imported water, the District is somewhat resilient to drought because groundwater supplies are built up over an extended period (a process called recharge). Intermittent droughts do not substantially interrupt this process. However, frequent and prolonged droughts can slow recharge, and excessive groundwater pumping can deplete supplies rather than allowing them to recover naturally. Additionally, the smaller amount of the District's water that comes from imported supplies may be more vulnerable to droughts, as a period of dry years can substantially reduce the water available from these supplies.

[28] Griffin, D., and Anchukaitis, K. J. 2014. "How unusual is the 2012-2014 California drought?" Geophysical Research Letters, 41(24). Pages 9017-2023.

[29] NOAA (National Oceanic and Atmospheric Administration). 2018. "Climate Station Precipitation Summary – California Nevada River Forecast Center." https://www.cnrfc.noaa.gov/awipsProducts/RNOWRKCLI.php.

[30] US Drought Monitor. 2025. "Map Archive: US Drought Monitor, California, July 22, 2025." https://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?CA

Figure 3-6: California Drought Conditions



Climate Change Considerations

Climate change is anticipated to abate drought in certain situations, but on the other hand, it could also intensify and exacerbate it in other cases. In some cases, climate change-intensified weather patterns, like ENSO, may bring more rain to California and the District, which would abate drought conditions for the State's affected parts. In other cases, climate change may also prolong the La Niña phase of ENSO, leading to longer dry periods with no precipitation in California.

Due to climate change, droughts are expected to become more frequent and intense in Orange County and, more broadly, throughout California by mid-century. Scientific studies indicate:

- Climate change is projected to increase temperatures and increase the frequency of warmer seasons, resulting in reduced precipitation and snowpack. These conditions typically result in abnormally dry soils, resulting in more severe or longer periods of drought.
- Modeling studies attribute more frequent coincident warm and dry years and more severe drought conditions in Southern California due to climate change.
- The incidence of extremely dry years (those occurring in 1 out of every 100 years over the historical period) could triple by the end of the century.

- The likelihood of long-duration droughts in Orange County would increase significantly, with some studies showing a more than 80% chance of multidecadal drought by the end of the century.[31]

Climate change is also expected to increase the average temperature and cause more frequent and prolonged heatwaves in California and the District's service area. During these events, the District's customers may divert water supplies for cooling purposes. Hotter temperatures may also lead to increased surface water evaporation, which could contribute to greater water consumption. If a drought were to occur during a future heatwave, it could place water supplies under strain.

From a regional perspective, warmer overall temperatures in California are expected to reduce the state's water supplies. Much of California's water comes from melted snow in the High Sierras, where mountain snowpack acts as a natural reservoir. As the average temperature grows warmer with climate change, the amount of precipitation that falls as snow is expected to shift toward rain. Precipitation, such as rain, will not flow into reservoirs and aqueducts in the same way that snowmelt does. The natural water reservoirs created by the snowpack remain intact as the initial snowpack runoff begins in early spring and continues into early to late summer, depending on the level of the snowpack.[32] The runoff from the snowpack can be managed due to the slow pace at which the snow melts; however, when rain replaces snowfall, there is no practical way to collect and retain the water because it falls much faster. As less snow falls, the amount of melted water from the snowpack in the Sierra Nevada will decrease, resulting in reduced water flowing into the reservoirs and aqueducts that supply Southern California. If regional and local water agencies do not account for increased groundwater withdrawal, the District and the Orange County region could experience greater dependence on imported water.

GEOLOGIC HAZARDS

For this Plan, the term "geologic hazards" refers to landslides and subsidence. Earthquakes and other hazardous conditions related to seismic activity are discussed under the "seismic hazards" section.

Description

Landslide

A landslide occurs when a hillside or slope becomes unstable, and the material of the slope, such as soil and rocks, slides down the side. A landslide may be caused by the shaking of an earthquake, which can decrease the slope's stability or fracture the materials that make it up, causing it to become unstable. Alternatively, moisture-induced landslides occur when the ground soaks up enough water to lose its stability. This usually occurs due to a prolonged or intense period of rainfall, but leaking water pipes or excessive watering of landscapes can also cause landslides. In these cases, the sliding material may become so waterlogged that it turns

[31] Orange County Groundwater Vulnerability Assessment. 2023. https://www.ocfl.net/Portals/0/Library/Environment/docs/GVA%20Final%20Report.pdf

[32] NASA. ("World of Change: Snowpack in the Sierra Nevada." https://earthobservatory.nasa.gov/world-of-change/SierraNevada#:~:text=The%20snowpack%20on%20the%20Sierra%20Nevada%20has%20generally%20peaked%20and,reservoirs%20while%20recharging%20the%20groundwater

to mud, creating a type of landslide known as a mudslide or mudflow. Landslides are usually sudden, although some hillsides may slide very slowly over a long period of time.

Landslides typically occur on slopes with loose and fractured materials, and they are more likely to happen on steep slopes than on those with shallow rises. Excavation of a slope may trigger a landslide or increase the likelihood of one occurring, as it can weaken a hillside. Hillsides that have recently burned in a wildfire are also more likely to experience landslides due to the loss of plant cover—plants help hold a hillside together and allow water to more harmlessly infiltrate the soil—and physical changes to the soil from the intense heat that make it less able to absorb water.[33]

The moving material of a landslide can damage or destroy buildings or structures in its path. People caught in the landslide may be crushed or buried, causing injury or death. A landslide may also cover a roadway or rail line, blocking transportation services until the material can be cleared. Due to their fluid nature, mudslides may travel far beyond hilly areas and affect flat terrain.

Subsidence

Subsidence is when the surface of the ground appears to sink. It happens when soils compact or collapse into empty spaces. Subsidence is often caused by the extraction of groundwater or the pumping of fuels, as these materials help support the weight of the ground above them. When they are pumped out, the soil may be unable to hold itself up and collapse into the empty space, causing the surface to drop with it. Mining activities, natural cave collapses, and seismic activity may also cause soils to subside. Subsidence can occur quickly, although it is more commonly a gradual event that causes damage over a long period of time. Sinkholes are a small-scale, rapid form of subsidence.

Subsidence is hazardous to any structure built on or in the subsiding soils. Buildings built on the soil sink with it, sometimes causing the foundations, walls, or floors of the building to crack. This can damage the building or objects inside it, potentially rendering the building structurally unsound and prone to collapse. Roads, railways, utility lines, and other infrastructure on or in the soil can be broken by subsidence, creating gaps in service networks and potentially causing releases of wastewater, natural gas, or other substances that can create further hazards.

Location and Extent

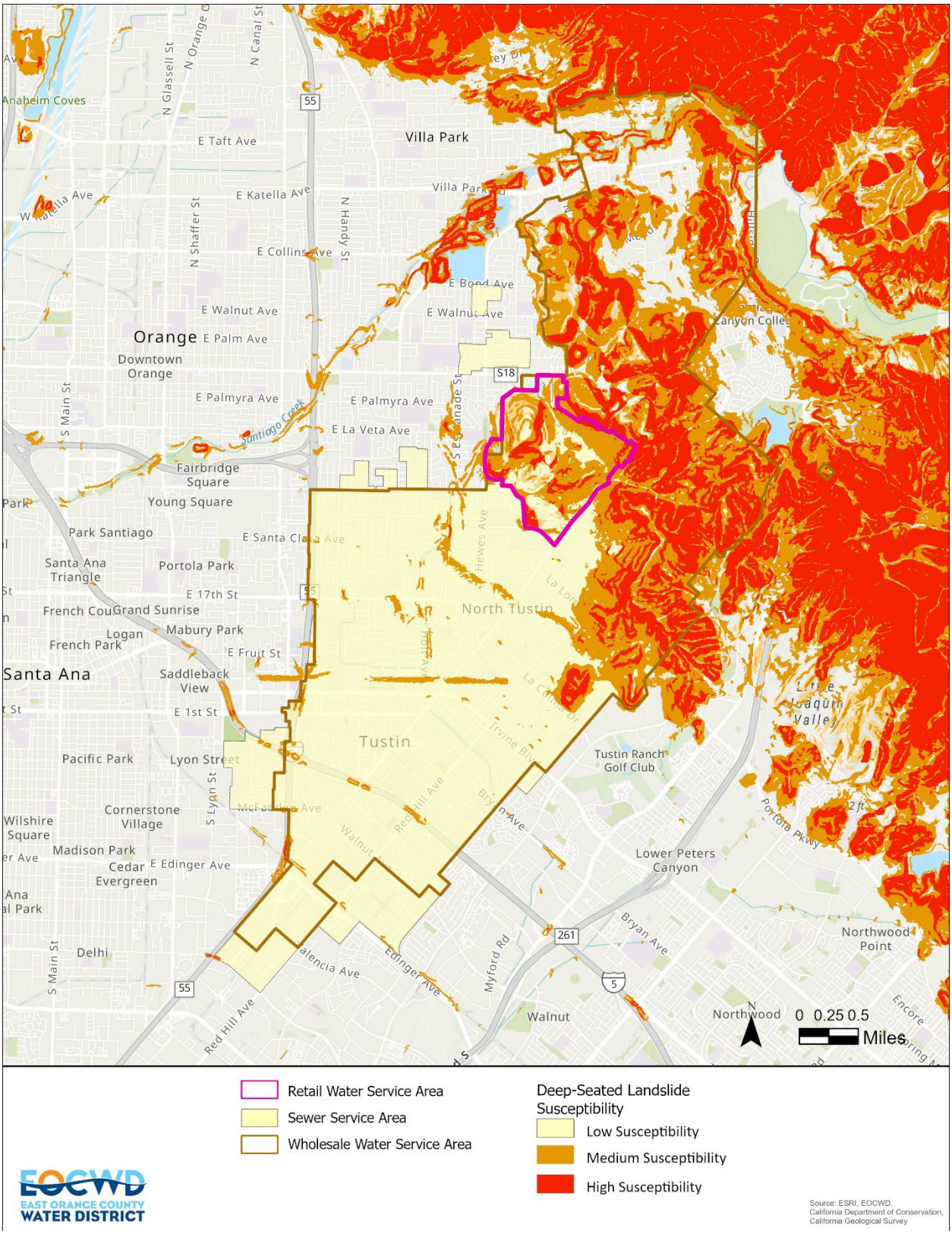
Landslide

Within the District, steep slopes with weak rock formations are more prone to landslides, particularly during intense or prolonged rainfall. These areas are generally in the northeast, including the East Tustin Hillside District near North Tustin communities such as Cowan Heights and Lemon Heights.

There is no standard scale for measuring a landslide, and they are typically assessed by the amount of material that slides during the event. The California Geological Survey has followed a scale of landslide susceptibility based on slope steepness and the strength of the underlying rock, with 0 indicating no susceptibility and 10 indicating the highest susceptibility. For this Plan, an area with a susceptibility of 7 or above is considered a high-risk area. **Figure 3-7** shows all the areas in the District at the greatest risk of deep-seated landslides.

[33] Gaud n.d.

Figure 3-7: Landslide Hazard Zones



Subsidence

The District is located above the Orange County Groundwater Basin. This basin provides a significant portion of the water supply for communities in north and central Orange County, including areas served by the EOCWD.[34] Since this basin is actively pumped for groundwater, subsidence remains a risk throughout the entire community.

Subsidence is generally measured by the distance that the land has sunk (e.g., in feet or inches) or in the rate of subsidence (e.g., inches per year).

Past Events

Landslide

Several notable landslide events have occurred in or near the District within the last 20 years, particularly in areas with steep slopes and during periods of heavy rainfall.

- **February 2005**, a rain-soaked hillside in unincorporated North Tustin began to move, according to the Los Angeles Times. This slow-moving slide broke a water main, damaged a backyard pool, and caused a road to buckle, leading to the evacuation of three homes.[35]
- **December 2010**, a mudslide caused by a failed retaining wall led to the closure of a lane on Foothill Road in North Tustin.[36]

Other notable landslides that have occurred recently within the Orange County region include:

- **March 15-16, 2023,** Multiple landslides occurred in San Clemente, California, impacting apartment buildings and displacing residents. A hillside collapses in the Dover Shores community in Newport Beach, prompting the declaration of a local state of emergency in Orange County.
- **May 16, 2023,** A landslide damaged the historic Casa Romantica Cultural Center and Gardens. a portion of the steep sandstone cliff underlying the cultural center crumbled toward the beach below, dragging with it portions of the iconic ocean terrace and walkways.[37]
- **January 31, 2025**, A popular and heavily trafficked beach in Laguna Beach was closed in the morning after the cliffside that overlooks it gave way and slid onto the sand below.[38]

[34] How water works in Orange County. Orange County Water District. (n.d.). https://www.ocwd.com/learning-center/how-water-works-in-oc/#:~:text=The%20Orange%20County%20Water%20District,more%20reliable%20than%20imported%20water.

[35] IIN, S. (2005, February 26). *Slide forces evacuation of 3 north tustin homes*. Los Angeles Times. https://www.latimes.com/archives/la-xpm-2005-feb-26-me-ocslide26-story.html#:~:text=By%20Sara%20Lin,Advertisement

[36] James, E. (2010, December 29). Mudslide causes north tustin road closure. Orange County Register. https://www.ocregister.com/2010/12/29/mudslide-causes-north-tustin-road-closure/

[37] San Roman, G. (2023, May 16). *After landslide, an Orange County Beach Town finds itself between a bluff and a hard place*. Yahoo! News. https://www.yahoo.com/news/landslide-orange-county-beach-town-120041144.html

[38] Staff writer (2025, February 1). *Landslide in Laguna Beach shuts down Thousand steps beach; portion of iconic steps wiped away*. ABC7 Los Angeles. https://abc7.com/post/landslide-laguna-beach-prompts-closure-thousand-steps-9th-street/15851723/

Subsidence

Subsidence has occurred within the District service area, although at relatively low rates. However, the broader Orange County Water Basin has experienced and continues to face land subsidence. These events have been linked to excessive groundwater pumping during periods of drought and increased water demand. The Orange County Water District actively manages the Orange County Water Basin, which includes monitoring groundwater levels and subsidence throughout the basin to inform management actions and decisions aimed at preventing further subsidence and land sinkage.[39]

Risk of Future Events

Landslide

Parts of the service area face an elevated risk from these events. Landslides are likely to occur in the District at some point in the future, although past records indicate that these events are rare. Moisture-induced landslides are likely to be somewhat more common than seismically induced ones, although they can occur from either source.

Subsidence

Subsidence remains a potential hazard in the District, although effective groundwater management has helped reduce the risk level. It is expected that continued effective management will help decrease the potential, but not eliminate, the risk of subsidence entirely.

Climate Change Considerations

Landslide

There is no evidence that climate change significantly affects seismic activity, and therefore, it is not expected to have any impact on seismically induced landslides. Climate change may increase the frequency and/or intensity of moisture-induced landslides, given a possible increase in the intensity of major storm systems (as discussed in the “Floods” section). Such an increase would likely lead to higher precipitation levels, which could cause slopes to absorb more moisture and become more unstable. As a result, landslides may become larger or occur more often. Climate change may also increase the amount of land burned by wildfires (as discussed in the “Wildfire” section), which could also increase the likelihood of substantial landslides in the District.

Subsidence

Subsidence in and around EOCWD and the Orange County Groundwater Basin has historically been linked to excessive groundwater pumping, causing a decline in groundwater levels and resulting in the soil above compacting into the now-empty space. Climate change is expected to cause an increase in the frequency and severity of drought conditions, which could potentially affect groundwater levels (thus increasing the risk of further soil compaction). However, groundwater is more resilient to the effects of climate change than are other water resources, as discussed in the “Drought” section.

[39] OCWD. (n.d.). *Groundwater management*. Orange County Water District. https://www.ocwd.com/what-we-do/groundwater-management/#:~:text=Anthony%20Water%20Quality%20Laboratory%20administers,Groundwater%20Cleanup

FLOODING

Description

Floods are a common hazard in many parts of California, including the District and its service area. Flooding occurs when an area becomes inundated with more water than it can drain in a specified amount of time. This can range from a small, confined area, such as a grassy field in a park that floods for a few hours after a rainstorm, to entire District sections, such as streets becoming impassable due to floodwaters. When floods are small, they may only represent a minor inconvenience as some recreational pathways and curb cuts become flooded. These smaller instances of flooding, where water collects into a pool of standing water, are referred to as *ponding*. On the other hand, larger flood events can hamper a District's operations. For example, if multiple streets flood simultaneously, the results could prevent emergency workers from reaching people who need assistance. Flooding also has the potential to cause significant damage to critical infrastructure. For instance, unprotected electronic equipment (lift stations, pumps, etc.) can short-circuit if it becomes inundated by floodwaters.

Flooding has the potential to occur from multiple sources. In Southern California, the primary cause of flooding is usually heavy rain occurring during the winter storm season. Most precipitation in California arrives either via atmospheric rivers or the ENSO cycle. *Atmospheric rivers* are channels of moist air located high in the atmosphere. The El Niño-Southern Oscillation (ENSO) cycle is a regional meteorological phenomenon in the southern Pacific Ocean, characterized by variations in ocean water and air temperatures. These variations give rise to two distinct phases: El Niño, characterized by a warm and wet phase, and La Niña, marked by a dry and cold phase. When the El Niño phase is active, California will likely receive higher-than-normal precipitation levels. These higher-than-normal levels of rainfall can quickly overwhelm the capacity of certain sections of land to drain the precipitation before the rainwater begins to pool effectively. Floods that develop very quickly, known as flash floods, are especially dangerous because there may be little warning that one is occurring, but floods can also build over a much longer period.

One subset of a flood event is caused by the partial or complete failure of a piece of infrastructure that transports or stores water, such as a dam, reservoir, pipeline, levee, or storage tank. Of particular concern for the District is the risk of dam failure. When a dam fails, some or all the water impounded by the dam is released in what resembles a flash flood. Dam failures can be caused by geologic or seismic events, such as an earthquake or landslide. Heavy precipitation or high stream flows can erode a dam or its surrounding rock, weakening it and increasing its vulnerability to collapse. Dams may also be poorly located, designed, built, or maintained, increasing the risk of failure. Floods from dam failure are discussed in this section.

Floods are dangerous for several reasons. The floodwaters themselves can be deep enough for people to drown and may move fast enough to sweep people away. Moving water can damage buildings with its own force (in extreme cases, it may move entire structures) or by carrying large debris that damages objects it collides with. Water can cause extensive damage to personal property when it gets into buildings, ruining building materials, furniture, electronics, and numerous other items. Both standing and moving water can serve as a barrier to movement, isolating people and hindering evacuation, rescue, and relief efforts.

Floods are often described in years, such as a 100-year or 500-year flood. This refers to the average chance of an event occurring in any given year. For example, a 100-year flood is one of such magnitude that it has a 1 percent chance (one in 100) of occurring in any year, and a 500-year flood has a 0.2 percent chance (one in 500) of occurring in any year. The greater the number of years used to describe the flood, the more intense it is. The statewide floods that struck California during the winter of 1861–1862, turning the Central Valley into a giant lake up to 300 miles long, were estimated to be a 500- to 1,000-year event.[40] The number of years used to describe a flood is a long-term average, not a precise length of time between events. There may be multiple 100-year floods within a few years, or even in the same year.

Flood-prone areas, known as floodplains, are designated by the severity of the flood event that causes inundation there. For example, an area that is flooded by a 100-year flood is referred to as the 100-year floodplain. Floodplains are defined by FEMA in the 100-year floodplain (the "special flood hazard zone"), the area within the 500-year floodplain but outside of the 100-year plain (the "moderate flood hazard area"), and the area outside of the 500-year floodplain (the "minimum flood hazard area"). Within these three categories, there are a number of more specialized categories. **Table 3-11** shows these detailed floodplain categories.

TABLE 3-11: FEMA FLOODPLAIN ZONES

Zone	Description
A	Within a 100-year floodplain, but the water height of the 100-year flood is not known.
A1-30 or AE	Within a 100-year floodplain, the water height of the 100-year flood is known.
AO	Within a 100-year floodplain, the water height of the 100-year flood is between one and three feet, but this is not specifically known.
A99	Within a 100-year floodplain, protected by flood protection infrastructure such as dams or levees.
AH	Within a 100-year floodplain, the water height of the 100-year flood is between one and three feet and is specifically known.
AR	Within a 100-year floodplain, protected by flood protection infrastructure that is not currently effective, but is being rebuilt to provide protection.
V	Within a 100-year floodplain for coastal floods, but the water height is not known.
V1-30 or VE	Within a 100-year floodplain for coastal floods, the water height is known.
VO	Within a 100-year floodplain for shallow coastal floods with a height between one and three feet.
B	Within a 500-year floodplain or within a 100-year floodplain with a water height less than one foot (found on older maps).
C	Outside of the 500-year floodplain (found on older maps).
X	Outside of the 500-year floodplain (found on newer maps).
X500	Within a 500-year floodplain or within a 100-year floodplain with a water height less than one foot (found on newer maps).
D	Within an area with a potential and undetermined flood hazard.
M	Within an area at risk of mudslides from a 100-year flood event.
N	Within an area at risk of mudslides from a 500-year flood event.
P	Within an area at risk of mudslides from a potential and undetermined flood event.
E	Within an area at risk of erosion from a 100-year flood event.

[40] USGS (United States Geological Survey). 2011. Overview of the ARkstorm Scenario. https://pubs.usgs.gov/of/2010/1312/of2010-1312_text.pdf

Location and Extent

Within the service area, the City of Tustin and the unincorporated area of North Tustin are impacted by several floodplains, flood channels, and control systems, including the Santa Ana River floodplain, Peters Canyon Channel, East Garden Grove-Wintersburg Channel, San Diego Creek, and Santiago Creek. These channels are designed to manage stormwater runoff, diverting it away from residential and commercial areas, thus reducing the risk of flooding during heavy rains or large storm events. FEMA has identified both the 100-year floodplains and 500-year floodplains within the service area. The 100-year flood zones are located in the northern section of the District service area, though there are several small areas of concern, the most significant of which is located near Peters Canyon Regional Park. The 500-year flood zone is a much larger area encompassing large areas in the southwest section of the District service area. **Figure 3-8** shows these FEMA-identified flood-prone areas within the District, although localized flooding may occur outside of these mapped areas.

Several dams could potentially affect the District and its service area. These include the Upper Peters Canyon Dam, Lower Peters Canyon Reservoir, Villa Park Dam, and Santiago Creek Dam.

- **Upper Peters Canyon Dam** – built in 1931, it is an earthen dam that forms the Upper Peters Canyon Reservoir, located in Peters Canyon Regional Park. The reservoir is approximately a 55-acre body of water and is a prominent feature of the park.
- **Lower Peters Canyon Reservoir** – built in 1940 primarily to help regulate the Irvine Company's water supply and conserve runoff. Currently, it serves as a flood control basin in the region.
- **Villa Park Dam** – an earth-fill embankment dam located on Santiago Creek in Orange County, California. It was completed in 1963 and is owned by the County of Orange. Its primary functions include flood control, regulating Santiago Creek's flow into the Santa Ana River, and managing spills from Irvine Lake. It has a capacity of up to 15,600-acre feet.
- **Santiago Creek Dam** – completed in 1931, also known as the Santiago Dam, is a roller-compacted earth and rockfill dam, situated across Santiago Creek at the northwest end of Irvine Lake. The dam forms Irvine Lake, the largest body of fresh water entirely within Orange County. The lake covers about 700 acres and has a maximum storage capacity of 38,800 acre-feet of water.

Figure 3-9 shows the areas in the District that can potentially be affected by the failure of one or more of these critical pieces of water infrastructure. It should be noted that ownership and control of these facilities do not belong to the District. The Upper and Lower Peters Canyon and Villa Park Dam are owned and operated by the County of Orange, while the Santiago Creek Dam is owned and operated by the Irvine Ranch Water District and the Serrano Water District.

Figure 3-8: Flood Hazard Zones

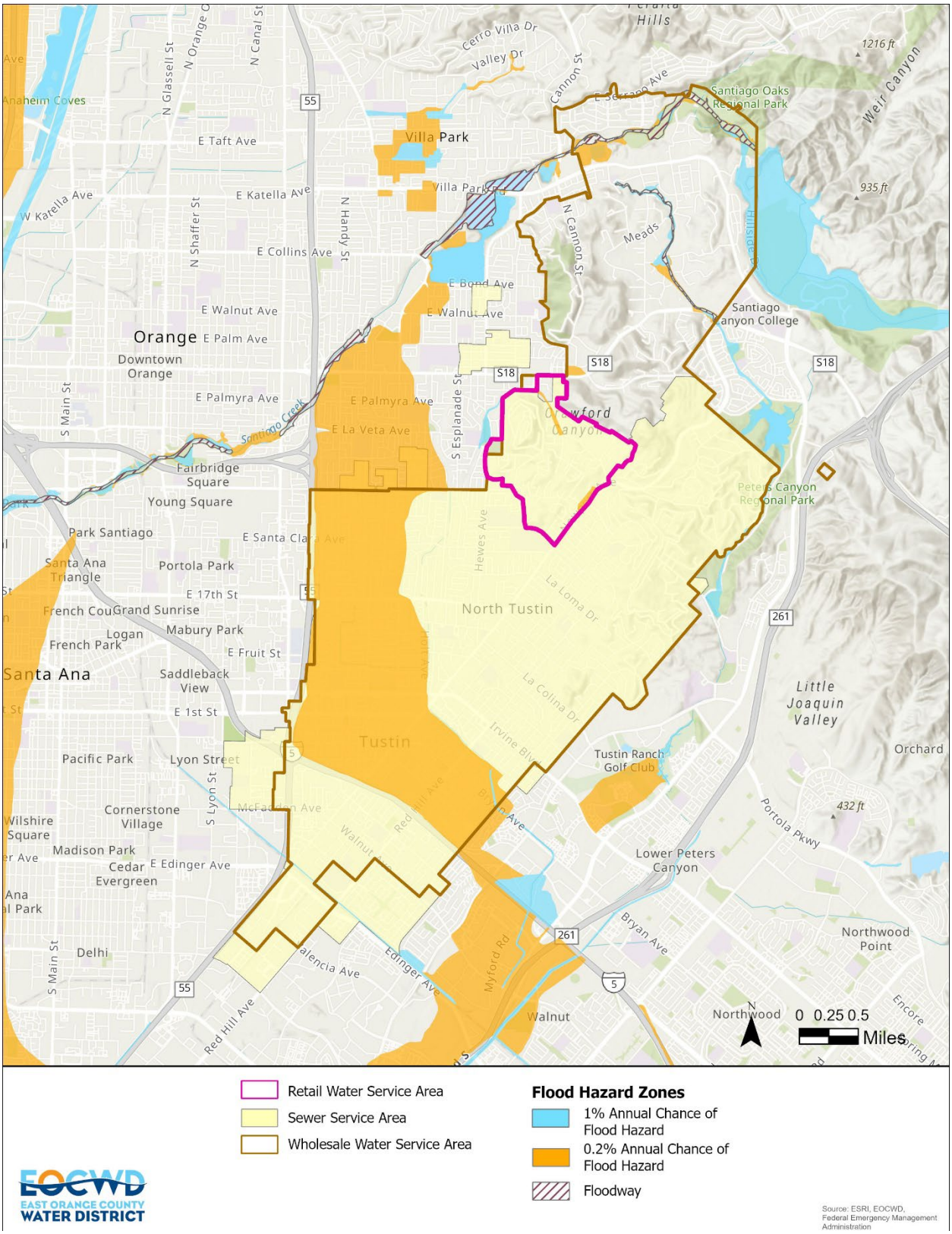
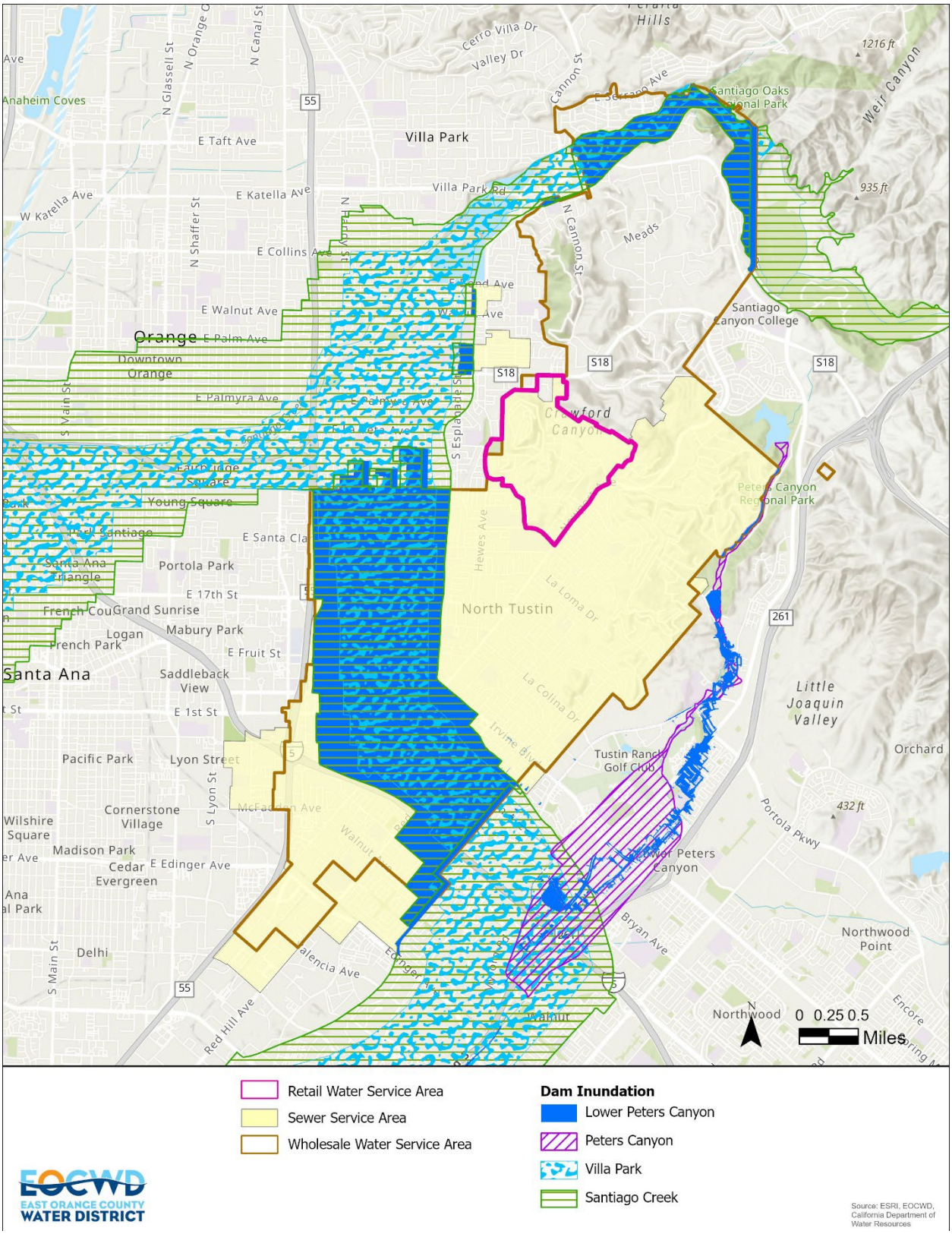


Figure 3-9: Dam Inundation Zone



Past Events

Major flooding has occurred within Orange County since 1969. There have been a total of twelve incidents requiring federal disaster declarations, three of which have occurred since the last Plan update. **Table 3-12** lists these events, highlighting the most recent events.

TABLE 3-12: HISTORY OF FLOOD EVENTS IN ORANGE COUNTY

Date	Declaration #	Type of Event
1/23-1/24/2024	DR-4758	Severe Storm, Flooding, Landslides, and Mudslides
4/3/2023	DR-4699	Severe Winter Storms, Straight-line Winds, Flooding, Landslides, and Mudslides
1/14/2023	DR-4683	Severe Winter Storms, Flooding, Landslides, and Mudslides
1/18 – 1/23/2017	DR-4305	Severe winter storms, flooding, and mudslides
12/17/2010 – 1/4/2011	DR-1952	Severe winter storms, flooding, debris, and mud flows
1/5 – 3/20/1993	DR-979	Severe storm, winter storm, mud & landslides, flooding
2/10 – 2/18/1992	DR-935	Snowstorm, heavy rain, high winds, flooding, and mudslides
1/17 – 1/22/1988	DR-812	Severe storms, high tides, and flooding
1/8/1980	DR-615	Severe storms, mudslides, and flooding
10/09/1978	DR-566	Landslides
2/15/1978	DR-547	Coastal storms, mudslides, and flooding
1/26/1969	DR-253	Severe storms and flooding

Source FEMA: 2025

January 14, 2023 – A series of powerful winter storms impacted Orange County, California, in December 2022 and January 2023, causing significant damage and disruptions. These storms were part of a larger pattern of atmospheric rivers that affected much of California during that period.[41]

April 3, 2023 – In March 2023, Orange County, California, declared a local state of emergency due to severe winter storms that impacted coastal communities and other areas. These storms led to significant damage in several Orange County communities.[42]

January 23-24, 2024 – A series of storms moved across the region and dumped large amounts of rain, causing flooding throughout communities. The strongest in the series of storms, this incident had flooding reported in Orange County, Los Angeles County, and San Diego County.[43]

[41] Staff, N. (2023, January 25). Atmospheric Rivers hit West Coast. National Environmental Satellite, Data, and Information Service. https://www.nesdis.noaa.gov/news/atmospheric-rivers-hit-west-coast#:~:text=From%20late%20Dec.,mechanisms%20of%20freshwater%20on%20Earth.

[42] Torres, D. (2023, March 15). Orange County declares local emergency amid winter storms; governor adds OC to State declaration. Orange County Register. https://www.ocregister.com/2023/03/14/orange-county-declares-local-emergency-amid-winter-storms/

[43] Johnson, K. (2024, January 23). Rain drenches Southern California as strongest in series of storms moves in. FOX 11 Los Angeles. https://www.foxla.com/news/rain-southern-california-forecast-january-22-2024

The District has never experienced a dam failure event, although there have been four substantial dam failure events in California's history.

- In 1916, heavy rainfall caused multiple dam failures in San Diego County, killing over 20 people.[44]
- In 1928, the St. Francis Dam on the Los Angeles Aqueduct experienced a sudden and catastrophic failure, causing a flood that killed at least 430 people, if not more.[45]
- In 1963, the Baldwin Hills Dam in a West Los Angeles neighborhood collapsed, killing five people and destroying 277 homes.[46]
- The 1971 San Fernando (Sylmar) Earthquake damaged the Lower San Fernando Dam so seriously that it was near failure. Over 80,000 people had to evacuate from an 11-square-mile area below the dam, and dam operators had to drain 15 million tons of water from the reservoir. The U.S. Army Corps of Engineers built a new dam in 1975-6 to supplement the Lower San Fernando Dam, which was also upgraded.[47]

More recently, in February of 2017, intense rainfall caused damage to the spillways at Oroville Dam in northern California. Although the dam itself was not threatened, the collapse of the eroding spillways could have released billions of gallons of water. Approximately 188,000 people were evacuated, although ultimately there was no loss of life or damage beyond the dam itself and associated infrastructure.[48]

Risk of Future Events

The Orange County region has an extensive history of flooding. While flood control infrastructure and drainage systems have helped to reduce the intensity of floods, they are not always able to fully contain floodwaters. Floods do not occur at regular times in most of California, including the EOCWD. Flood events may occur in multiple successive years, or there may be decades between one flood and the next. However, all indications suggest that the District will eventually experience another major flood event.

The severity of future flood events remains unknown. The most severe flood event in California's recorded history, the 1861–1862 winter flood, is considered a 500- to 1,000-year event and is likely the most extreme of reasonably possible future events. If a repeat of this flood were to occur, scientists estimate that it would cause approximately $1.7 billion in damage in Orange County, and it would take two weeks to restore power and several days to restore communications.[49]

[44] McGlashan, H. D., and Ebert, F. C. 1918. Southern California Floods of January, 2016. https://pubs.usgs.gov/wsp/0426/report.pdf.

[45] Association of State Dam Safety Officials (ASDSO). 2018a. "Case Study: St. Francis Dam (California, 1928)." https://damfailures.org/case-study/st-francis-dam-california-1928/.

[46] ASDSO. 2018b. "Case Study: Baldwin Hills Dam (California, 1963)." https://damfailures.org/case-study/baldwin-hills-dam-california-1963/.

[47] Page, R.A., Boore, D.M., and Yerkes, R.F., 1995, "The Los Angeles Dam story: U.S. Geological Survey Fact Sheet 096–95."

[48] France, J. W., Alvi, I. A., Dickson, P. A., et al. 2018. Independent Forensic Team Report: Oroville Dam Spillway Incident. https://damsafety.org/sites/default/files/files/Independent%20Forensic%20Team%20Report%20Final%2001-05-18.pdf.

[49] USGS (United States Geological Survey). 2011. Overview of the ARkstorm Scenario. https://pubs.usgs.gov/of/2010/1312/of2010-1312_text.pdf

Dams are critical infrastructure pieces with potentially catastrophic consequences if they fail. Dams are heavily engineered to minimize the risk, especially newer dams such as the Villa Park Dam. Older dams, such as the Upper and Lower Peters Canyon dams and the Santiago Creek Dam, may pose a greater risk of failure as they age. Regular maintenance, inspections, and modern retrofitting are reliable ways to mitigate this failure potential. Additionally, as most infrastructure is designed primarily to impound water during flood events, dam failure would likely create a substantial hazard during or shortly after a flood. There is some risk of experiencing a complete dam failure, but the risk is likely very low.

Climate Change Considerations

Climate change is expected to affect precipitation patterns in California, which are likely to influence future flood events. A recent study found that the number of very intense precipitation days in California is projected to more than double by the end of the century, increasing 117 percent [50] and making it likely that flood events will become more frequent. More flooding events could slightly increase the risk of dam failure, as it would require the Seven Oaks Dam to be used more frequently and potentially hold back more water.

The potential increase in intense precipitation days may be due, at least in part, to expected changes to phenomena called atmospheric rivers (ARs), which are bands of very moist air that can create intense storms. Although only approximately a dozen of these storms occur in an average year, 40 to 50 percent of California's precipitation is caused by AR events. [51] These storms often cause flooding due to their intensity. In Southern California, the number of AR storms is expected to remain constant, although the storms are projected to become 10 to 20 percent more intense on average, increasing the odds that an individual AR storm will cause flooding. [52]

Another potentially contributing factor is the El Niño-Southern Oscillation (ENSO, referred to as El Niño), a natural cycle in water temperatures and wind patterns in the eastern tropical Pacific Ocean. Conditions change between three states (warm, neutral, and cold) as part of the regular ENSO cycle, which affects precipitation in California. The warm phase (also called El Niño) usually increases precipitation in California, and the cool phase (called La Niña) generally decreases it. Scientists have not yet identified if climate change may affect the ENSO cycle, [53] but there may be significant ramifications for flood events in Southern California if there is a connection. [54]

[50] Polade, S. D., Gershunov, A., Cayan, D. R., et al. 2017. Precipitation in a warming world: Assessing project hydro-climate changes in California and other Mediterranean climate regions. Scientific Reports

[51] Dyches, P. 2017. "NASA estimates global reach of atmospheric rivers." https://climate.nasa.gov/news/2645/nasa-estimates-global-reach-of-atmospheric-rivers/.

[52] Oskin, B. 2014. "'Atmospheric Rivers' to Soak California as Climate Warms." https://www.livescience.com/49225-atmospheric-rivers-double-climate-change.html.

[53] Chen, C., Cane, M. A., Wittenberg, A. T., et al. 2016. "ENSO in the CMIP5 Simulations: Life Cycles, Diversity, and Responses to Climate Change." Journal of Climate, 30. Pages 775-801

[54] Keupp, L., Pollinger, F., Paeth, H. 2016. Assessment of future ENSO changes in a CMIP3/CMIP5 multi-model and multi-index framework. International Journal of Climatology, 37(8). Pages 3439-3451

CHAPTER 4 –
THREAT AND VULNERABILITY

Each of the hazards discussed in **Chapter 3** can have varying effects on different populations and District assets within the EOCWD service area. For example, while an extreme heat event will be equally severe across the EOCWD service area, some customers may be more severely impacted than others. This chapter examines how various hazard conditions may impact the EOCWD and which populations and District assets are more vulnerable to threats.

Threat Assessment Process

The threat assessment process looks at the harm that a hazard may cause to three different groups: the physical threat to key facilities, the threat to vulnerable populations/customers, and the threat to any other District assets (noncritical facilities, key services, etc.), and estimated replacement values (if available).

KEY FACILITIES

A key facility is a building or structure that plays an important role in protecting the health, safety, and well-being of District customers and residents. It includes major District facilities and critical pieces of infrastructure. Most of the key facilities are owned by the EOCWD, while others are owned by other government agencies or private organizations.

Table 4-1 shows the number of key facilities by category and function type (e.g., reservoir, connector, tank). **Appendix D** contains a complete list of all key facilities.

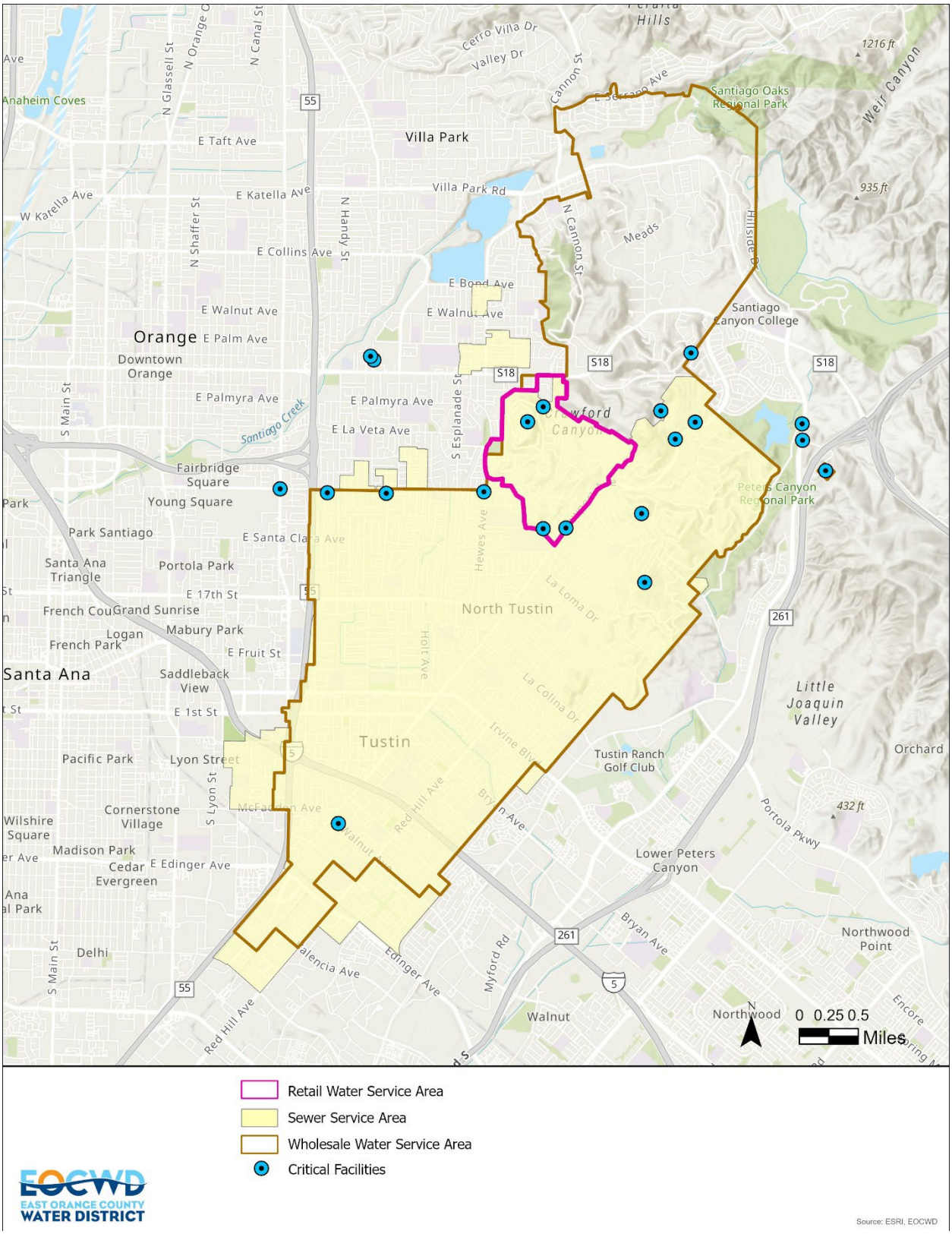
The likelihood that all facilities are completely damaged simultaneously is extremely remote. Most impacts are anticipated to be isolated to specific locations based on the hazard. This estimate does not include the value of underground infrastructure and surface drainage facilities owned and operated by the Cities in which the service area is located.

TABLE 4-1: KEY CRITICAL FACILITIES AND INFRASTRUCTURE		
Facility/Infrastructure Type	**Number of Facilities**	**Replacement Value***
Buildings (EOCWD Headquarters, Warehouse)	3	$8,800,000
Production Wells	2	$13,000,000
Pump Stations	3	$1,500,000 (Cost includes only the pumps and building)
Reservoirs	4	$33,500,000
System Connections	18	$7,400,000
Tanks (Surge/Pressure)	4	$40,000
PFAS Treatment Plant (includes 3 tanks, 2 cartridge filters, and 4 ion exchange vessels)	1	$11,000,000
Pipelines (Includes Sewer Main, Water Lateral, and Water Main)	216.4 (linear miles)	$856,287,082
Total	**35**	**$931,527,082**
*Potential loss data are estimates only, as replacement values for some facilities were not available. Actual losses may be greater than the estimate presented in this table.		

The threat assessment examines the number and types of key facilities located within areas of elevated risk for various hazards. These facilities and key pieces of infrastructure face the risk of damage or destruction during a hazard event, reducing their ability to function or rendering them entirely nonfunctional. Facilities outside of the elevated risk areas may still be affected by hazards, although the risk of damage is lower. The threat assessment will also evaluate how key facilities may be impacted by hazard types that extend beyond specific risk areas, such as extreme heat. **Figure 4-1** shows the location of key facilities in the District, except for those whose locations are restricted for security reasons.

If a hazard event destroys any key facility, the cost to replace the facility (paid by insurers, the District, other agencies, or private companies) will likely be considerable. The specific value of a handful of key facilities owned by the District is known. The threat assessment will identify the replacement costs of key facilities at risk of various hazards, if any of the facilities with a known value are within a mapped hazard zone.

Figure 4-1: Key Facilities in EOCWD



THREATENED POPULATIONS

All people within the District service area depend on reliable water supplies for safe drinking, sanitation, and hygiene. However, in a disaster affecting water and wastewater infrastructure, some populations in the District service area may be more vulnerable should these services become disrupted. These populations include individuals reliant upon care provided by others, such as young children, individuals with disabilities/impaired mobility, people who rely on medical equipment, and those experiencing lower socioeconomic levels. All of whom can be disproportionately impacted by such hazards.

The threat analysis examines how individuals with various characteristics may be more susceptible to the threat of hazardous events and, therefore, may be considered vulnerable populations. This Plan assesses the following characteristics:

- **Disability status.** Persons with disabilities often have reduced mobility, and in some cases may have challenges taking care of themselves. This can reduce their ability to mitigate hazards to themselves, their homes, and their property, particularly if they lack assistance from others.
- **Income levels.** Lower-income individuals are less likely to have sufficient financial resources to undertake mitigation activities on their own homes and properties, particularly if assistance programs are not available. Limited financial resources can also make them more vulnerable to disruptions in the local economy from hazard events, which could cause significant financial hardship. Households below the poverty line are more vulnerable to the impacts of hazardous events.
- **Senior citizens.** Residents who are at least 65 years of age are more likely to have reduced mobility and physical or mental disabilities, which can decrease their ability to mitigate hazard events. Physical and mental characteristics may also make senior citizens more likely to be injured and more likely to suffer health complications from any injuries during a hazard event. Senior citizens who live alone face even higher levels of vulnerability.

Table 4-2 presents the metrics for District service area customers/residents who meet at least one of the criteria for being a threatened or vulnerable population. **Chapter 2** provides additional demographic details for the community.

TABLE 4-2: EOCWD SERVICE AREA THREATENED POPULATION METRICS	
Vulnerable Population Metric	**EOCWD Service Area**
Population	89,542
Households	30,322
Median household income	$120,028
Renter Households	39.8%
Median Age	40.1
Percentage of households with at least one person living with a disability	20.8%
Percentage of households living below the poverty limit	8.3%
Percentage of households with one member aged 65+	32.6%
Area Affected by Hazard (Sq Mile and Pct of Service Area)	16.33 sq miles
Sources: ESRI 2025, US Census 2020 Decennial data, 2019-2023 American Community Survey Note: Due to data limitations, the population data used for the threat assessment may not be consistent with the Census demographic figures given in Chapter 2. The demographic data are used in the threat assessment for comparative purposes only and are not meant to replace the more accurate demographic data in Chapter 2. The demographics shown in this table include people living in EOCWD's service area.	

In addition to vulnerable populations included in Census counts, other vulnerable individuals may not be as easily measured but face a similar risk to other socially vulnerable groups.

- Persons without access to lifelines (such as cars and basic telecommunication services) can have a difficult time getting information about hazard mitigation. They may not have the necessary resources to adequately prepare for future hazard events.
- Although the unhoused population in the District service area is fairly small (City of Tustin and unincorporated areas), an estimated 423 people (City of Tustin) and 35 people (unincorporated county areas) were unhoused in 2024. Of the combined 458 individuals, 349 are listed as being sheltered, and 109 are listed as being unsheltered.[55] Without shelter, they are exposed to the direct effects of hazards (natural and human-caused) far more than other populations; they have very few (if any) resources to help make themselves more resilient to hazard conditions; social services may be limited or nonexistent; and it can be difficult to communicate information about potential hazard events to unhoused persons effectively.
- Undocumented persons also face increased vulnerability from hazard events in the District. They frequently have lower income levels and may live in substandard housing, which can render their homes more susceptible to damage and make it more difficult for them to retrofit their homes to be more resilient. Although there is no accurate count of undocumented persons in EOCWD, the total population in Orange County is estimated at 236,000, 46 percent of whom have limited English proficiency and an estimated 10 percent of whom live below the poverty level.[56]

[55] Staff, O. C. (n.d.). 2024 point in time summary. https://unitedtoendhomelessness.org/wp-content/uploads/2024/05/2024-Point-In-Time-Count-Summary-FINAL.pdf

[56] Migration Policy Institute. (n.d.). County data (6059): Unauthorized population | migrationpolicy.org. https://www.migrationpolicy.org/data/unauthorized-immigrant-population/county/6059

Land Use and Development Trends/Changes in Development

The District provides water and wastewater services to the City of Tustin, Orange, and unincorporated areas, including North Tustin, Lemon Heights, Cowan Heights, Orange Park Acres, and Panorama Heights. The estimated population within the service area is approximately 89,542 people. Depending on the hazard's magnitude and duration, a considerable number of people and businesses could be impacted. The primary concern for the EOCWD would be a partial or complete interruption of water and wastewater services to its customers. A hazard could result in direct physical damage to water/wastewater infrastructure, including indirect damage resulting from interference with everyday business operations.

Much of the service area is predominantly built out, reflecting the urbanized, developed nature of Orange County in general. According to the City of Tustin's *2021-2029 Housing Element*, the City expects to see population growth of approximately 6.3 percent from 2025 to 2045[57] This population growth exceeds the expected 3.3 percent in Orange County.[58] This includes projected increases in population, employment, and housing. An increase in population will also lead to an expansion of water and wastewater infrastructure, facilities, and transportation and delivery systems necessary to meet this increased demand. Many Orange County cities have seen shifts in development toward higher-density residential and mixed-use development projects in response to the demand for housing, potentially occurring in the service area as well.

The service area includes a wide variety of residential and non-residential land uses. EOCWD will continue to work with the communities and agencies it serves to identify service requirements, including the expansion of new or modification of current water and wastewater infrastructure and facilities. Project planning and completion require coordination with these communities to ensure adherence to relevant codes and regulations, including the consideration of potential hazards during construction.

Continued population growth and development are anticipated within the EOCWD service area, despite inherent risks from natural hazards, including earthquakes, liquefaction, flood risk, and wildfires. Recent droughts have highlighted the need for new developments to have a reliable water supply, as well as the importance of planning for long-term dry periods. In response, EOCWD and all of Orange County's water and wastewater agencies are working together to meet community needs, improve local infrastructure, and prepare for potential emergencies.

Disaster Declaration Connections

The following major disasters, emergency declarations, and fire management events (**Table 4-3**) have been issued by FEMA in Orange County. The EOCWD participates in a regional emergency response system coordinated by the Water Emergency Response Organization of Orange County (WEROC), rather than maintaining its own separate emergency response center. WEROC manages county-wide emergency planning and response for all of Orange County's water and wastewater utilities. The regional WEROC program maintains a dedicated

[57] Tustin, C. of. (2022, September). *2021-2029 housing element*. 2021-2029 Housing Element | Tustin, CA. https://www.tustinca.org/1211/Housing-Element-Update

[58] California State Fullerton. (2025, June). *Orange County - Profiles-* . Orange County Facts and Figures. https://www.fullerton.edu/cdr/_resources/pdf/profiles/profilesv12n1.pdf

Emergency Operations Center (EOC) that serves as the central point of coordination for water-related emergency and disaster response.[59]

TABLE 4-3: DISASTER DECLARATION – ORANGE COUNTY (2019-2024)

Year	Declaration Number	Declaration Title	Incident Type	Affected the District	Activated WEROC's EOC or Requested PA
2024	FM-5537-CA	BRIDGE FIRE	Fire	No	No
2024	FM-5535-CA	LINE FIRE	Fire	No	No
2024	DR-4769-CA	CALIFORNIA SEVERE WINTER STORMS, TORNADOES, FLOODING, LANDSLIDES, AND MUDSLIDES	Severe Storm	No	No
2023	DR-4750-CA	CALIFORNIA TROPICAL STORM HILARY	Severe Storm	No	No
2023	DR-4699-CA	SEVERE WINTER STORMS, STRAIGHT-LINE WINDS, FLOODING, LANDSLIDES, AND MUDSLIDES	Severe Storm	No	No
2023	EM-3591-CA	SEVERE WINTER STORMS, FLOODING, AND MUDSLIDES	Flood	No	No
2023	EM-3592-CA	SEVERE WINTER STORMS, FLOODING, LANDSLIDES, AND MUDSLIDES	Flood	No	No
2021	DR-4569-CA	WILDFIRES	Fire	No	No
2021	FM-5381-CA	BLUE RIDGE FIRE	Fire	No	No
2020	DR-4482-CA	COVID-19 PANDEMIC	Biological	No	No
2020	EM-3428-CA	COVID-19	Biological	No	No
2020	FM-5350-CA	EL DORADO FIRE	Fire	No	No
2020	FM-5325-CA	APPLE FIRE	Fire	No	No
2020	FM-5301-CA	HILLSIDE FIRE	Fire	No	No
2019	EM-3415-CA	EARTHQUAKES	Earthquake	No	No

DR = Major Disaster
EM = Emergency Declaration
FM = Fire Management

Relevant past events identified earlier in this plan have been identified in connection with these events in the "Past Events" sections within each Hazard Profile located in **Chapter 3** of this Plan.

[59] WEROC. (n.d.). *Emergency management*. MWDOC. https://www.mwdoc.com/your-water/emergency-management/#:~:text=What%20is%20WEROC,your%20retail%20water%20provider%20directly.

Threat Profiles

Severe Weather

Key Facilities

Extreme Heat

Most key facilities are unlikely to be harmed by extreme heat. However, electrical facilities such as substations and power plants could be affected by very high temperatures, as such conditions place increased stress on the electrical grid. If demand is not properly managed, it is possible that electrical facilities may be damaged during extreme heat events, impacting infrastructure and facilities that rely on electrical power.

Severe Wind

Severe wind could cause damage to key facilities, particularly if they have not been well-built or have been poorly maintained. This could range from relatively minor damage, such as some lost roofing material, to more significant structural damage or even some degree of destruction in extreme cases.

Vulnerable Populations

Extreme Heat

All types of severe weather events may occur anywhere in the District, so there are no specific risk zones to analyze for social vulnerability. Extreme heat likely poses the greatest potential to cause disproportionate harm to District residents and customers, as it is particularly hazardous to young children, senior citizens, and individuals who live or work outdoors. This can create significant health risks, particularly for seniors who do not live near a cooling center (or have no way of reaching one), seniors who rely on help from another person to ensure their basic needs are met, and residents who do not live in a home with air conditioning. Other exposed people, like outdoor workers (such as gardeners and construction workers) and homeless individuals, also face an elevated risk from extreme heat events.

Severe Wind

Severe wind may be harmful to people who live or work within the District service area in buildings that have not been well constructed or well maintained, or to people who live in prefabricated homes. Such structures are more likely to be damaged by strong winds. People living or working within the service area who have limited financial resources may face additional hardships if their dwellings are damaged, as reconstruction can be a significant economic burden.

Other Service Area Assets

Extreme Heat

Severe weather poses a particular threat to electrical service in the District. Extreme heat events cause power lines and related infrastructure to function at reduced efficiency, and the increased electrical demand that is common during extreme heat events (due to greater air conditioning needs) can put further stress on the electrical grid. This may lead to blackouts in part or all of the District service area without backup power generation.

Severe Wind

Severe wind can topple power lines, leading to similar outages. Throughout the service area, there is a potential risk of severe wind damage to buildings, particularly those that are poorly constructed or have been poorly maintained. Even if such buildings are not considered key facilities, damage to these structures may pose a safety hazard and could affect the local economy or increase demand for service.

Changes in Population and Land Use Development

Extreme Heat

There could be minor changes in population patterns due to extreme heat if people cannot continue to live in older structures with limited insulation and older cooling units. The anticipated population growth in the EOCWD service area is not expected to impact the District's vulnerability to extreme heat significantly. However, if extreme heat becomes more common, both current and prospective residents/customers may move to places that do not experience triple-digit temperatures, leading to lower population and economic growth.

The District has no jurisdiction or policy-making authority within its service area. The District may participate as an interested stakeholder during the development phase of various planning documents (LHMP, General Plan, Safety Element, and Housing Element updates, etc.) and provide critical feedback, including technical input, during the public participation periods of the planning process.

Severe Wind

Severe windstorms occur periodically (primarily during the fall months) and generally do not affect populations to the degree that they would need to migrate in and out of the District service area. The anticipated population growth within the EOCWD is not expected to have a significant impact on the District's vulnerability to severe windstorms. There is the potential that older structures in the District may be impacted more severely than newer structures. Potential damage to overhead powerlines and mature trees may be difficult to mitigate the potential impact to District infrastructure.

The District has no jurisdiction or policy-making authority within its service area. The District may participate as an interested stakeholder during the development phase of various planning documents (LHMP, General Plan, Safety Element, and Housing Element updates, etc.) and provide critical feedback, including technical input, during the public participation periods of the planning process.

WILDFIRES

Key Facilities

Although the wildfire hazard zone covers a sizeable part of the northeastern EOCWD service area, most key facilities are in urbanized or other non-wildland areas. As a result, there are only five key facilities located in Very High FHSZ areas, including one building, two reservoirs, and two system connections, which have known replacement values totaling approximately $16,150,000. **Table 4-4** shows the types of key facilities located within the Very High FHSZs. **Figure 4-2** displays the key facilities that are located within the Very High FHSZs.

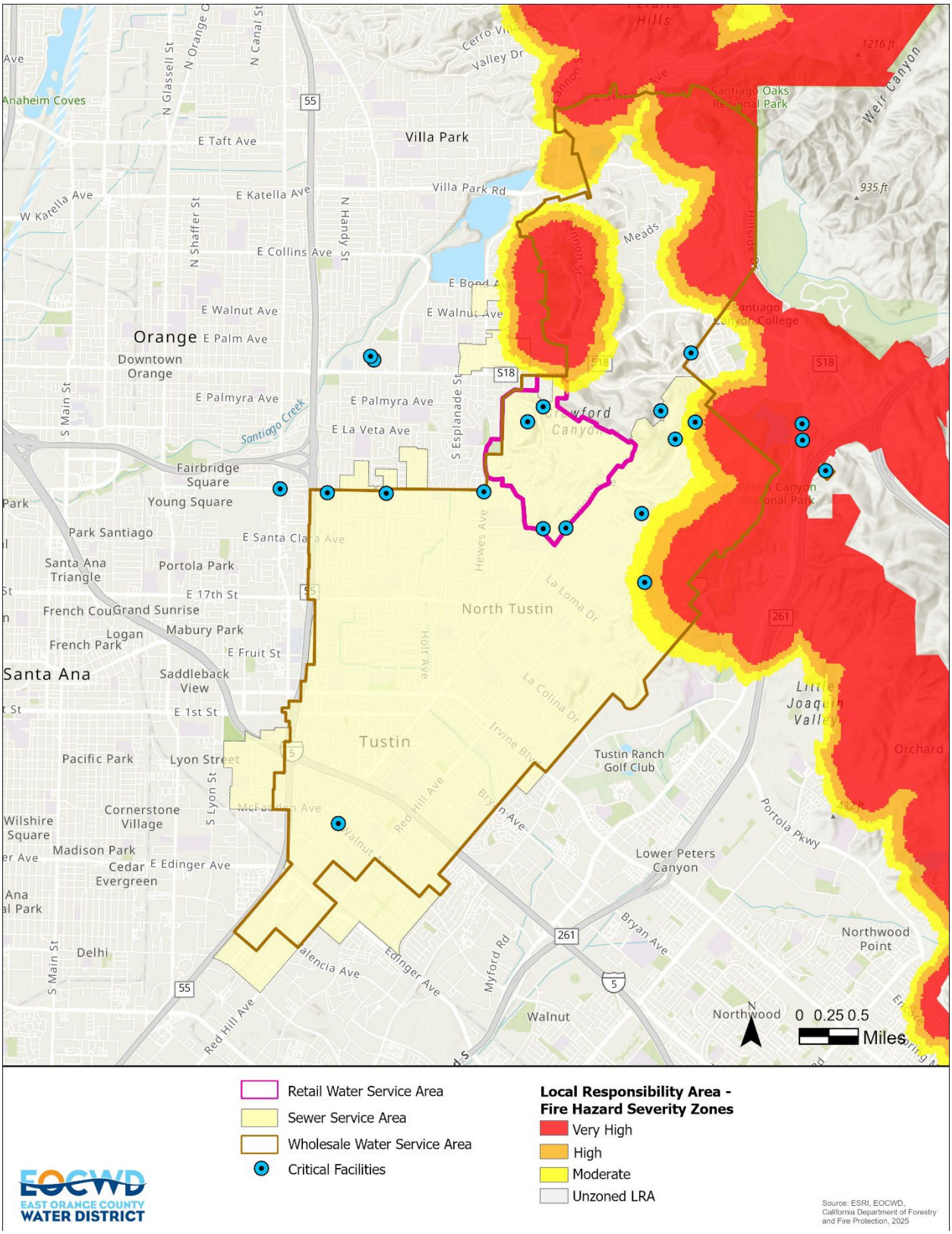
TABLE 4-4: KEY FACILITIES IN WILDFIRE HAZARD ZONES		
Facility Type	**Facility Totals**	**Potential Loss***
Buildings	1	$800,000
Cartridge Filter	0	$-
Ion Exchange Vessel	0	$-
Production Well	0	$-
Pump Station	0	$-
Reservoir	2	$13,500,000
System Connection	2	$1,850,000
Tank	0	$-
Treatment Plant	0	$-
Well Station	0	$-
Total	**5**	**$16,150,000**
*Potential loss data are estimates only, as replacement values for some facilities were not available. Actual losses may be greater than the estimate presented in this table.		

Vulnerable Populations

The District service area's Very High FHSZs include approximately 6,204 residents. There are higher rates of senior citizens in both the Very High FHSZs when compared to the rest of the service area. As senior citizens are more likely to have disabilities and reduced mobility, areas with higher percentages of senior citizens can have more challenges with evacuation and preparatory activities. Households in the Very High FHSZs have income levels higher than the rest of the service area. These individuals may have an easier time preparing their homes and properties to be more resilient to wildfire. **Table 4-5** shows the social vulnerability of residents/customers located in the Very High FHSZs.

TABLE 4-5: WILDFIRE HAZARD ZONE VULNERABILITY METRICS		
Threatened Population Metric	**Very High FHSZ**	**EOCWD Service Area**
Population	6,204	89,542
Households	2,372	30,322
Median household income	$165,239	$120,028
Renter Occupied Households	14.7%	39.8%
Median Age	47.3	40.1
Percentage of households with at least one person living with a disability	19.5%	20.8%
Percentage of households living below the poverty limit	5.8%	8.3%
Percentage of households with one member aged 65+	40.1%	32.6%
Area Affected by Hazard (Sq miles and Pct of Service Area)	2.27 sq miles (13.9%)	16.33 sq miles
Sources: ESRI 2025, US Census 2020 Decennial data, 2019-2023 American Community Survey		

Figure 4-2: Key Facilities Located within the Very High Fire Hazard Severity Zones



Wildfires can have more widespread impacts on socially vulnerable people. Children, senior citizens, and persons with respiratory conditions can be disproportionately affected by ash and smoke inhalation, creating or exacerbating health impacts throughout the service area and in the broader region.

Other Community Assets

The FHSZs located in the service area are primarily residential in nature. Buildings of all types in wildfire-prone areas are at risk of significant damage or destruction from any blazes, requiring temporary housing and lengthy reconstruction activities. Wildfire events can disrupt transportation networks by burning too close to roads or railways, necessitating their closure for public safety and facilitating easy access for emergency responders. In addition to creating significant congestion, such a move could hamper evacuation efforts. Wildfires often damage or destroy power lines and may also interrupt natural gas pipelines, causing them to be shut down for safety reasons, and resulting in energy service outages.

Changes in Population and Land Use Development

If a large wildfire were to occur, it is feasible that changes to population patterns could fluctuate. Future land use designations, redevelopment, or new development in these areas could be restricted or even prohibited, especially in the Very High FHSZs. The anticipated population growth in the service area is not expected to significantly impact the District's vulnerability to wildfire, assuming residential development is limited in fire-prone areas. The demand for water and the necessity for new, additional, or modified water district infrastructure construction will also be anticipated to increase.

The District has no jurisdiction or policy-making authority within its service area. The District may participate as an interested stakeholder during the development phase of various planning documents (LHMP, General Plan, Safety Element, and Housing Element updates, etc.) and provide critical feedback, including technical input, during the public participation periods of the planning process.

SEISMIC HAZARDS

Key Facilities

Seismic Shaking

Severe seismic shaking potentially poses a threat to all key facilities. Any of them may face damage or destruction in a sufficiently strong earthquake. In general, facilities that are older and have not been well-maintained, or facilities that were poorly constructed to begin with, face the greatest threat. Without a more detailed seismic evaluation of key facilities, it cannot be said which structures are more likely to be damaged or destroyed. **Table 4-6** displays which key facilities and infrastructure are in the highest risk zones within the service area. In total, there are 12 facilities located in this area, including a building, two reservoirs, and nine system connections, with an approximate replacement value of $33.6 million. **Figure 4-3** displays the seismic shaking that can potentially affect the District and its key facilities.

Figure 4-3: Key Facilities and Seismic Shaking Potential

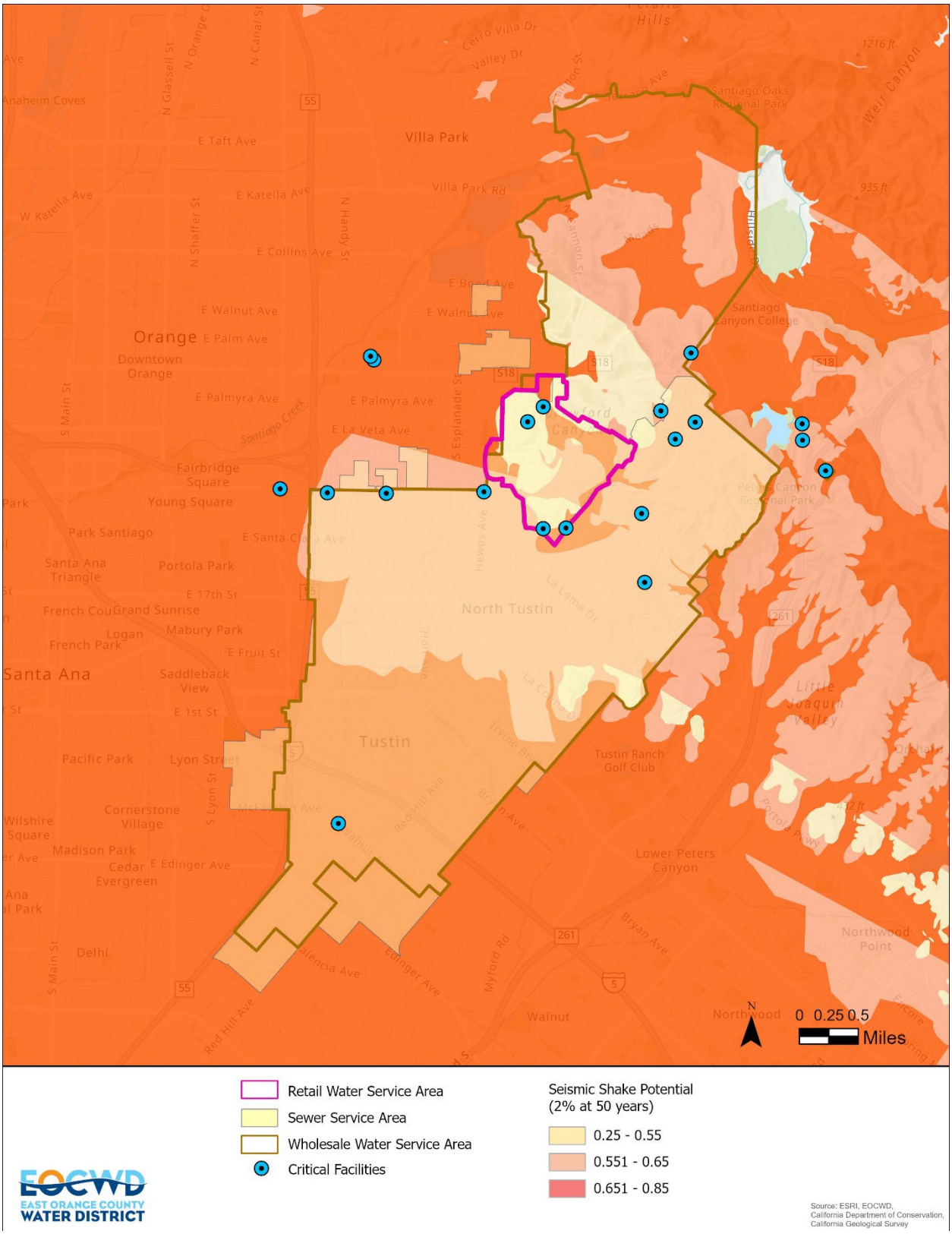


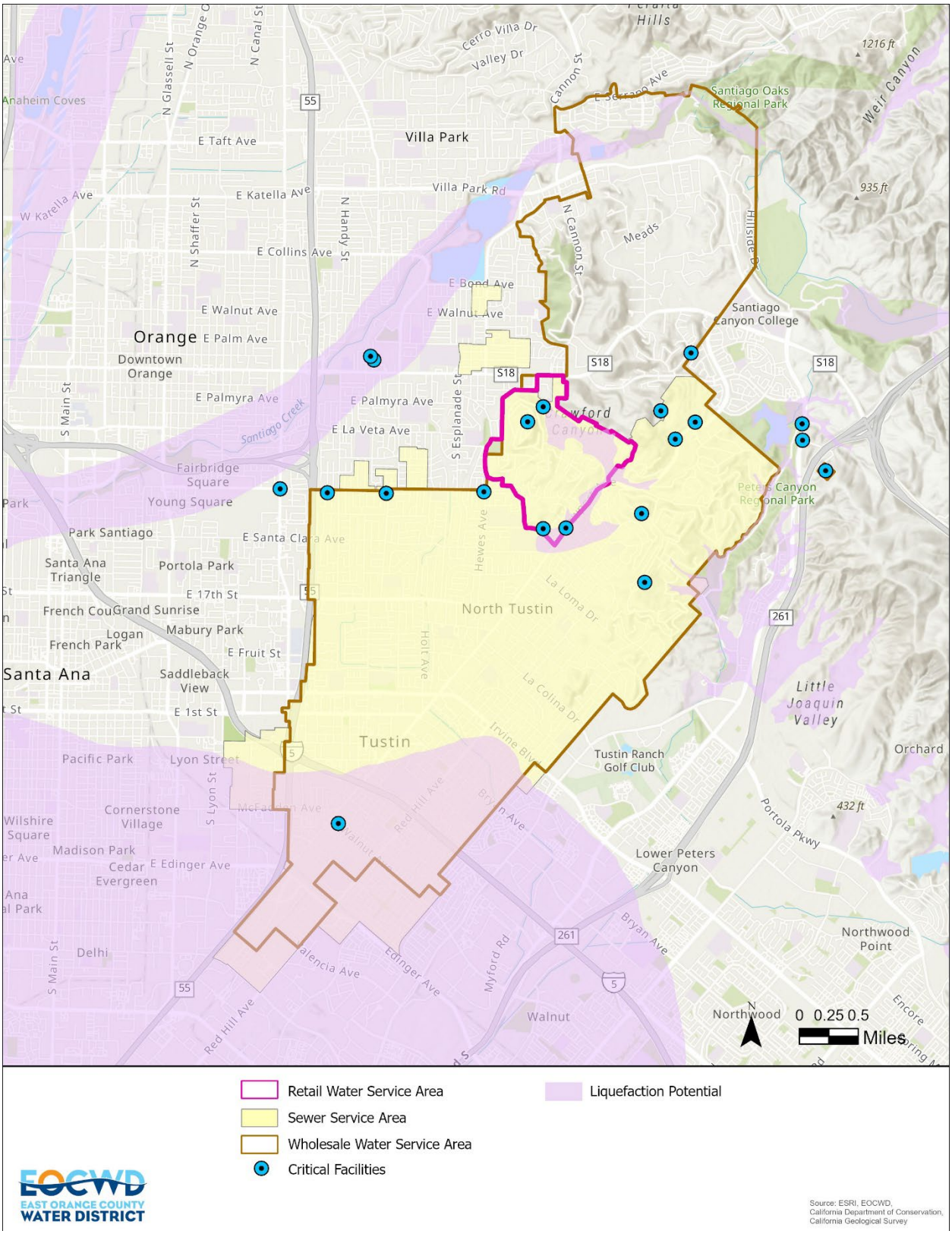
TABLE 4-6: KEY FACILITIES IN SEISMIC SHAKING ZONES (BETWEEN 0.65 AND .95G)		
Facility Type	**Facility Totals**	**Potential Loss***
Buildings	1	$800,000
Cartridge Filter	0	$-
Ion Exchange Vessel	0	$-
Production Well	0	$-
Pump Station	0	$-
Reservoir	2	$28,500,000
System Connection	9	$4,300,000
Tank	0	$-
Treatment Plant	0	$-
Well Station	0	$-
Total	**12**	**$33,600,000**
*Potential loss data are estimates only, as replacement values for some facilities were not available. Actual losses may be greater than the estimate presented in this table.		

Liquefaction

In total, 21 key facilities are currently located in the high-susceptibility liquefaction hazard zone, as shown in **Table 4-7**. These key facilities include two buildings, two cartridge filters, four ion exchange vessels, six system connections, two tanks, one treatment plant, and one well station with an approximate replacement value of $27,750,000. Not all the key facilities located in these high liquefaction potential hazard zones have known replacement values. **Figure 4-4** shows the key facilities that are located in this high-susceptibility liquefaction hazard zone.

TABLE 4-7: KEY FACILITIES IN HIGH LIQUEFACTION POTENTIAL ZONES		
Facility Type	**Facility Totals**	**Potential Loss***
Buildings	2	$8,000,000
Cartridge Filter	2	$-
Ion Exchange Vessel	4	$-
Production Well	3	$6,500,000
Pump Station	0	$-
Reservoir	0	$-
System Connection	6	$2,250,000
Tank	2	$-
Treatment Plant	1	$11,000,000
Well Station	1	$-
Total	**21**	**$27,750,000**
*Potential loss data are estimates only, as replacement values for some facilities were not available. Actual losses may be greater than the estimate presented in this table.		

Figure 4-4: Key Facilities in High Liquefaction Potential Hazard Zones



Vulnerable Populations

Seismic Shaking

All residents/customers in the District service area are at risk of seismic shaking. Approximately 6,627 individuals in the service area population reside within a 500-foot buffer of a known fault (none are identified as active Alquist-Priolo Special Study Zones). Senior citizens (especially those living alone) and persons with disabilities could have a harder time strengthening their homes against seismic activity, and lower-income households and persons in poverty may not have the financial resources to do so. Individuals with limited financial resources are also more likely to be affected by the economic downturn that would likely accompany a significant earthquake. **Table 4-8** shows the social vulnerability of residents in the seismic hazard zones.

Liquefaction

An estimated 38,122 residents/customers live in an area with an elevated liquefaction risk. Residents in high liquefaction risk areas have a substantially lower level of household income, which decreases their ability to harden their homes against liquefaction and makes them more susceptible to economic damage from seismic activity. Seniors living alone may have a harder time hardening their homes against liquefaction or receiving information about risk levels, particularly if they lack regular assistance from formal or informal support networks. **Table 4-8** shows the social vulnerability of residents in the seismic hazard zones.

TABLE 4-8: SEISMIC HAZARD THREATENED POPULATION VULNERABILITY METRICS

Threatened Population Metric	500 ft Buffer of a Fault	High Liquefaction	EOCWD Service Area
Population	6,827	38,122	89,542
Households	2,518	12,357	30,322
Median household income	$158,756	$92,707	$120,028
Renter Occupied Households	17.9%	63.7%	39.8%
Median Age	46.2	35.3	40.1
Percentage of households with at least one person living with a disability	17.6%	20.2%	20.8%
Percentage of households living below the poverty limit	4.1%	11.5%	8.3%
Percentage of households with one member aged 65+	41.5%	23.4%	32.6%
Area Affected by Hazard (Sq mile and Pct of Service Area)	1.86 sq miles (11.4%)	3.47 sq miles (21.2%)	16.33 sq miles

Sources: ESRI 2025, US Census 2020 Decennial data, 2019-2023 American Community Survey

Other Community Assets

Seismic Shaking

Seismic shaking may affect other community assets throughout EOCWD. Older buildings of all types that have not been seismically retrofitted may be at risk of harm. As mentioned in **Chapter 3**, an earthquake on the Newport-Inglewood Fault could cause shaking that would rank as VIII (Destructive) on the MMI scale, similar to the level of intensity of the 1994 Northridge earthquake

in the areas of strongest shaking. Such shaking could damage or destroy roads, rail lines, bridges, and utility lines, resulting in transportation congestion and utility service outages. There is also the possibility that a strong earthquake could rupture hazardous material storage containers, causing potentially several hazardous material releases into the District's water and wastewater infrastructure and local groundwater supplies.

Liquefaction

Liquefaction could also damage Interstate 5, railroad lines, and any utility lines that run through the liquefaction hazard zone. In addition to creating service outages, impacts to these pieces of infrastructure can cause regional traffic congestion. Liquefaction could harm the residential buildings and retail stores located in the service area, affecting the local economy.

Changes in Population and Land Use Development

Seismic Shaking

Based on the current Housing Element data, the service area's various jurisdictions anticipate residential/population growth, which is expected to increase the District's potential vulnerability to seismic hazards as development increases. While this may also be true concerning land use and development, if a strong earthquake impacts the service area, there is the potential that older structures may be damaged more severely than newer structures and developments within the District service area.

The District has no jurisdiction or policy-making authority within its service area. The District may participate as an interested stakeholder during the development phase of various planning documents (LHMP, General Plan, Safety Element, and Housing Element updates, etc.) and provide critical feedback, including technical input, during the public participation periods of the planning process.

Liquefaction

Liquefaction is being monitored by jurisdictions and agencies throughout the hazard-prone locations in the service area. These zones are generally located in certain locations within the service area, meaning that the potential for damage is limited to these areas. Despite this potential, liquefaction is unlikely to cause changes in population patterns. However, land use designations and new development may be limited in these areas out of precaution, or subject to policies developed by the jurisdiction and agency documents, such as the HMP and the General Plan's Land Use, Housing, and Safety Elements.

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DROUGHT

Key Facilities

The primary threat from drought events is a reduced water supply. There is not likely to be any damage to key facilities from drought events, although it is possible that any water delivery

infrastructure that is not used or used less during drought conditions may fall into some degree of disrepair if regular maintenance is deferred.

Vulnerable Populations

Drought conditions are generally consistent across the service area, so there is no specific hazard area to evaluate. In urbanized areas, drought conditions are highly unlikely to become severe enough that a lack of water supplies poses a health or safety risk.

Low-income people can be the most vulnerable to drought because of rising water rates and fines, which can create severe financial strain. This is especially true if they lack the money to pay for these higher bills or fines, and potentially receive poor communication about new policies and conservation methods. Additionally, community members who work in businesses that suffer during drought (e.g., swimming pool services, some types of farming) or in industries that rely on large amounts of water (nurseries, car washes, restaurants, and hospitality) may also face economic hardship

A drier climate and less watering of outside spaces often lead to increased dust and other air pollutants. This, in turn, aggravates allergies and respiratory diseases in people who already have them and increases their prevalence among the general population. Drought can also shrink open bodies of water (such as lakes and ponds) and, by limiting replenishment and circulation, cause them to become stagnant, creating breeding areas for mosquitoes. The California Department of Public Health documented a rise in West Nile Virus cases during the 2013-16 drought; decreased availability of open water forced birds and mosquitoes into closer contact, promoting the spread of the disease to humans.[60]

Other Community Assets

Water service could be impacted during droughts; the greater the length or severity of the drought, the more extensive the impact. It is possible that water supplies may need to be rationed or otherwise subjected to strict controls during worse-than-normal droughts. The resulting dry flowerbeds and dead lawns can promote the infiltration of dust and plant spores into homes and businesses, leading to chronic heat and abrasive stress on electronics, appliances, and machinery, as well as increases in disease (as discussed above). Dead or non-existent landscaping can have a serious effect on the market value of both residential and commercial property, eventually leading to decreasing property-tax assessments and receipts. Cutting back on normal watering may also damage the urban forest, killing trees.

Changes in Population and Land Use Development

Droughts occur periodically (primarily during the summer/fall months) and generally do not affect populations to the degree that they would need to migrate in and out of the service area. Drought's main effects are the slow degradation of the quality of life, a slowdown or end to development, and a loss of water-intensive industries. Water shortages or expensive water, coupled with an increase in high-heat days, may cause current residents to move to less rigorous conditions and may cause potential residents to look elsewhere.

It is unlikely that a "normal" drought – that is, the kind that has become semi-permanent in Southern California – will affect land use and development because the development review

[60] Reese, P. (2024, October 23). *California drought threatens water quality: Plumbing solutions*. The Sacramento Bee. https://alwaysaffordableplumbing.com/blog/california-drought-threatens-water-quality/

process required by most of the service area jurisdictions will take steps to mitigate or minimize the impacts and vulnerability of drought. However, a lengthy, severe drought or a long-term reduction of the District's water supply may force drastic changes. Faced with a water shortage that has no foreseeable end, service area jurisdictions and agencies, in coordination with the District, may have to enact a moratorium on new water hookups or on new development in general. This may kill housing or commercial projects that were years in the making, become subject to legal action, and deprive future economic benefits from the foregone development within the service area.

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GEOLOGICAL HAZARDS

Key Facilities

Landslide

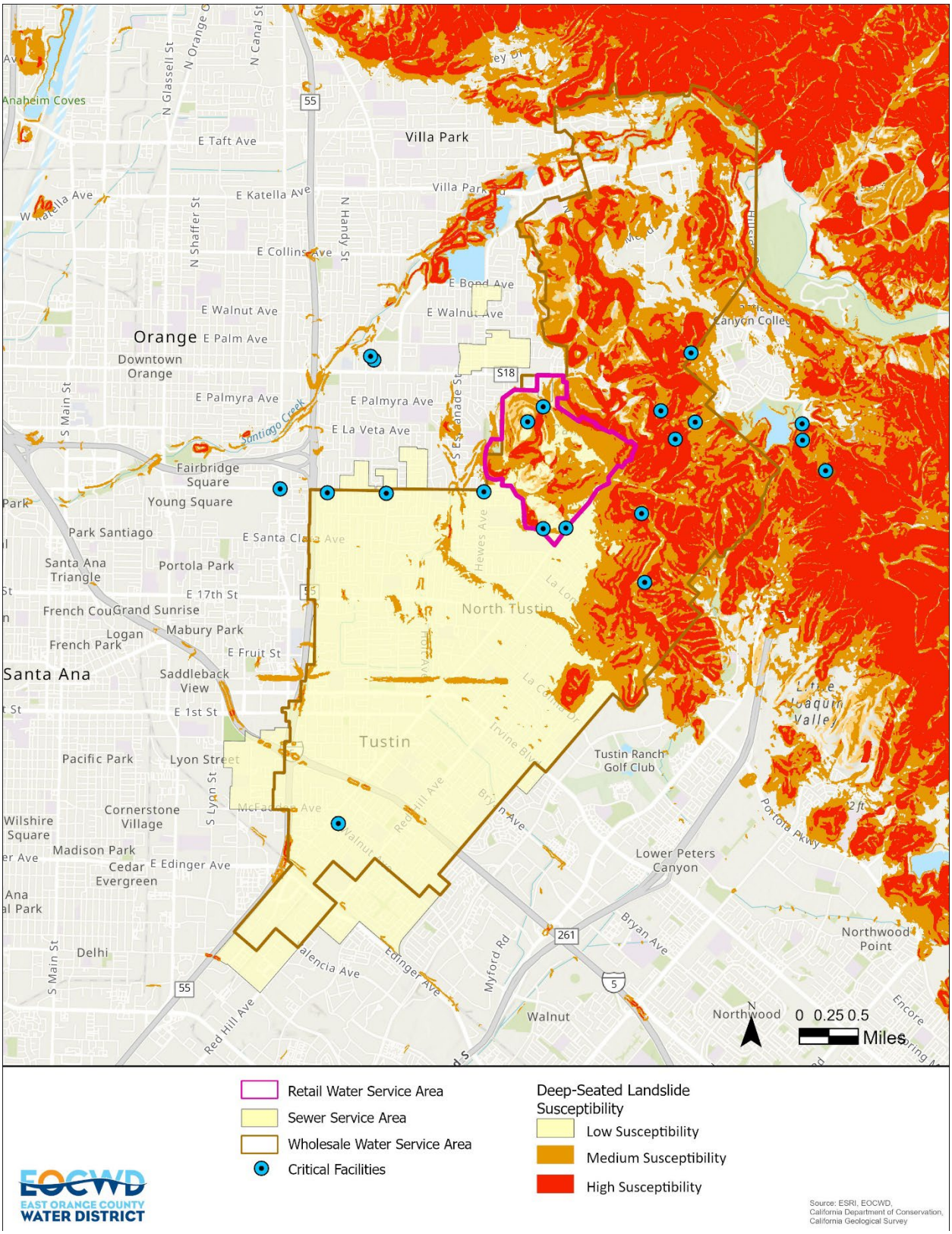
There are six key facilities in the high landslide susceptibility hazard zones, which include one pump station, one reservoir, three system connections, and one tank, totaling approximately $16,050,000 in replacement value. **Table 4-9** shows the types of key facilities in the landslide hazard zone. **Figure 4-5** displays the key facilities located within the deep-seated landslide high susceptibility zones in the District.

TABLE 4-9: KEY FACILITIES IN DEEP-SEATED LANDSLIDE HIGH SUSCEPTIBILITY ZONES

Facility Type	Facility Total	Potential Loss*
Buildings	0	$-
Cartridge Filter	0	$-
Ion Exchange Vessel	0	$-
Production Well	0	$-
Pump Station	1	$350,000
Reservoir	1	$15,000,000
System Connection	3	$700,000
Tank	1	$-
Treatment Plant	0	$-
Well Station	0	$-
Total	**6**	**$16,050,000**

*Potential loss data are estimates only, as replacement values for some facilities were not available. Actual losses may be greater than the estimate presented in this table.

Figure 4-5: Key Facilities Located in Deep-Seated Landslide High Susceptibility Zones



Subsidence

Subsidence is not ongoing within EOCWD, but there is some potential for it to resume if groundwater levels are not effectively managed. If such an event happens, it could pose a threat to all key facilities in the District, although the greatest threat would presumably be in areas with the fastest rate of subsidence. Since subsidence has not been measured in EOCWD for several decades, it is not possible to determine which parts of the service area are most at risk if this hazard were to resume.

Vulnerable Populations

The area of high landslide risk covers approximately 2.56 square miles and is home to an estimated 5,915 people. By most metrics, the residents of this area are substantially less socially vulnerable than the average District resident/customer. However, there is a somewhat higher proportion of senior citizens in the high landslide risk zone compared to the service area. Senior citizens may face challenges evacuating an area, particularly when given short notice, which is of particular concern for fast-moving landslide events. Similar challenges can affect people who lack access to vehicles. **Table 4-10** shows the social vulnerability of residents in the high landslide risk zone.

TABLE 4-10:HIGH LANDSLIDE RISK ZONE THREATENED POPULATION VULNERABILITY METRICS

Threatened Population Metric	High Susceptibility	EOCWD Service Area
Population	5,915	89,542
Households	2,292	30,322
Median household income	$202,853	$120,028
Renter Occupied Households	9.3%	39.8%
Median Age	50.6	40.1
Percentage of households with at least one person living with a disability	16.8%	20.8%
Percentage of households living below the poverty limit	3.8%	8.3%
Percentage of households with one member aged 65+	42.7%	32.6%
Area Affected by Hazard (Sq miles and Pct of Service Area)	2.56 sq miles (15.7%)	16.33 sq miles

Sources: ESRI 2025, US Census 2020 Decennial data, 2019-2023 American Community Survey

Other Community Assets

Homes and businesses are typically damaged or destroyed by landslides. In addition to potentially causing significant injuries or fatalities, this can cause economic harm and create a need for long-term emergency sheltering and temporary housing until these buildings can be reconstructed. Landslides often block roadways or railways and may do so for weeks or even months after the event takes place. Long-term disruption to transportation networks can increase roadway congestion, harm public transit, delay response time for emergency services, and harm the local economy. Utility lines, such as power lines or water pipes, may be broken by a landslide, interrupting important services.

If subsidence did resume in EOCWD, the impact could be widespread. In addition to potentially damaging buildings throughout the community, subsidence could damage roads and rail lines as well as underground pipes such as water, wastewater, and natural gas. This could create more congestion within EOCWD's water and wastewater distribution and collection systems and interrupt key utility services.

Changes in Population and Land Use Development

Land sliding is being monitored throughout the hazard-prone areas in the service area; the impacts can cause damage to structures located within these zones. However, these zones are generally found in certain locations within the service area, meaning that the damage potential is limited to these areas. Despite this potential, landslides are unlikely to cause changes in population patterns. However, land use designations and new development may be limited in these areas out of precaution. Based on the current Housing Element data, the anticipated residential/population growth in the service area could increase EOCWD's potential vulnerability to landslides should they develop in these areas and the construction of required District infrastructure to ensure adequate water and wastewater service.

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FLOODING

Key Facilities

There are 18 key facilities within the 500-year floodplain. **Figure 4-6** displays the critical facilities located within the 100-year and 500-year flood zones. These facilities include two buildings, one treatment plant, four wells, two tanks, and nine other smaller pieces of infrastructure, which, if damaged during a flood event, have a combined total replacement value of $ 26.7 million. Extreme examples, facilities outside of the 500-year floodplain may be impacted. It is also possible that facilities outside of the 500-year floodplain could be damaged by ponding or other localized flooding. **Table 4-11** lists the key facilities located in the flood hazard zones.

Figure 4-6: Key Facilities Located in the 100-Year and 500-Year Flood Zones

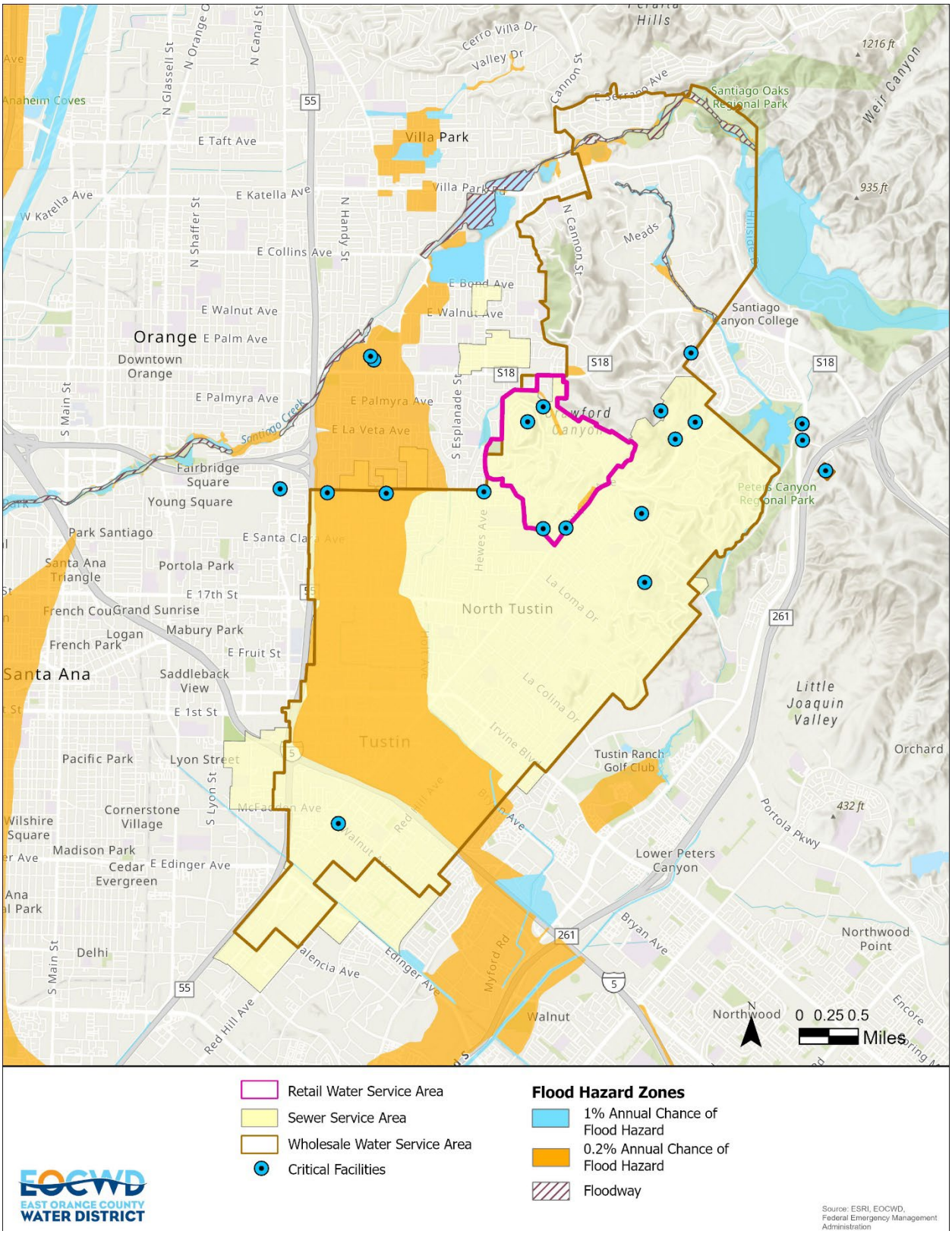
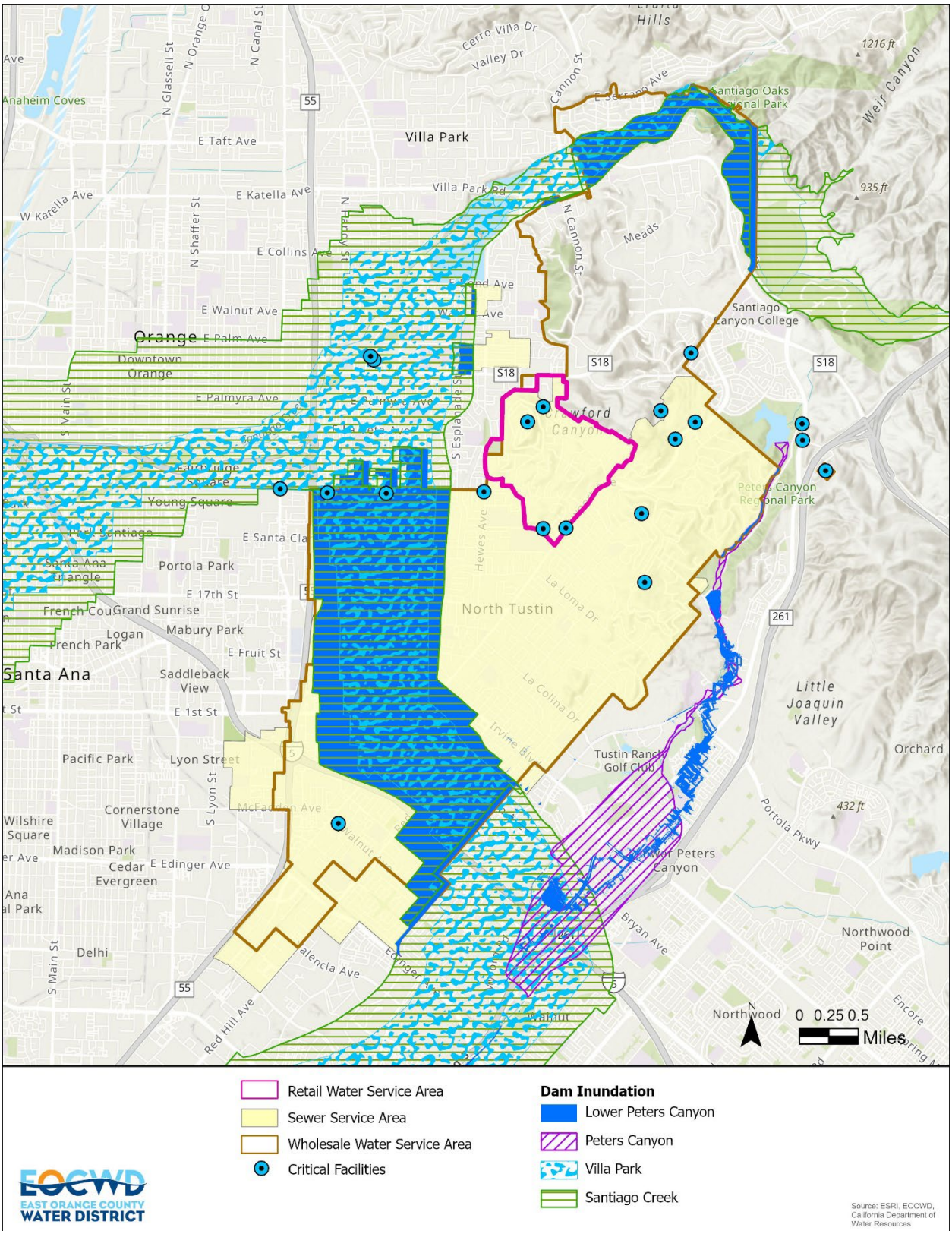


TABLE 4-11: KEY FACILITIES IN 100-YEAR AND 500-YEAR FLOOD ZONES			
	FEMA Flood Zones		
Facility Type	100-Year	500-Year	Potential Loss*
Building	0	2	$8,000,000
Cartridge Filter	0	2	$-
Ion Exchange Vessel	0	4	$-
Production Well	0	3	$6,500,000
Pump Station	0	0	$-
Reservoir	0	0	$-
System Connection	0	3	$1,200,000
Tank	0	2	$-
Treatment Plant	0	1	$11,000,000
Well Station	0	1	$-
Total	**0**	**18**	**$26,700,000**
*Potential loss data are estimates only, as replacement values for some facilities were not available. Actual losses may be greater than the estimate presented in this table.			

There are 19 key facilities that are located in the inundation zones for both the Villa Park and Santiago Creek Dams. These facilities include two buildings, two tanks, one treatment plant, three production wells, one well station, and ten other various pieces of smaller infrastructure. **Figure 4-7** displays the key facilities located within the dam inundation zones. There are 10 of those key facilities located in Villa Park and the Santiago Creek Dams inundation zone that have known replacement values. The total cost to replace these seven facilities is estimated at $27.2 million. **Table 4-12** shows the types of key facilities in the dam failure hazard zones.

TABLE 4-12: KEY FACILITIES IN DAM INUNDATION ZONES			
	Dam Inundation Zones		
Facility Type	Villa Park Dam	Santiago Creek Dam	Potential Loss*
Building	2	2	$8,000,000
Cartridge Filter	2	2	$-
Ion Exchange Vessel	4	4	$-
Production Well	3	3	$6,500,000
Pump Station	0	0	$-
Reservoir	0	0	$-
System Connection	4	4	$1,700,000
Tank	2	2	$-
Treatment Plant	1	1	$11,000,000
Well Station	1	1	$-
Total	**19**	**19**	**$27,200,000**
*Potential loss data are estimates only, as replacement values for some facilities were not available. Actual losses may be greater than the estimate presented in this table.			

Figure 4-7: Key Facilities Located in Dam Inundation Zones



Vulnerable Populations

The 100-year floodplain is relatively limited and is home to a fairly small population. By contrast, the 500-year floodplain and the dam failure hazard zone are home to thousands of people who such an event could harm, approximately 19,628 people. People in the 500-year floodplain and the dam failure hazard zones generally have a lower median income than the rest of the service area, meaning they may be less able to afford flood insurance premiums or make flood-proofing retrofits. Therefore, these persons could face disproportionate harm from flood events. There is also an above-average level of senior citizens in the 100-year floodplain who are more likely to need assistance preparing their homes for floods or evacuating.

There are an estimated combined 43,713 people located within both the Villa Park and Santiago Creek Dams' inundation zones, covering approximately 43 percent of the service area. These residents account for approximately 48 percent of the population. **Table 4-13** shows the social vulnerability of residents in the 100 and 500-year flood hazard and dam inundation zones.

TABLE 4-13: FLOOD AND DAM FAILURE HAZARD ZONE VULNERABLE POPULATION METRICS

Vulnerable Population Metric	100-Year Floodplain	500-Year Floodplain	Villa Park Dam	Santiago Creek Dam	EOCWD Service Area
Population	74	19,628	16,651	27,062	89,542
Households	31	7,042	5,858	9,411	30,322
Median household income	$184,812	$115,701	$124,976	$117,729	$120,028
Renter Occupied Households	12.9%	43.5%	39.8%	42.4%	39.8%
Median Age	51.2	40.3	40.7	40	40.1
Percentage of households with at least one person living with a disability	22.7%	20.9%	19.7%	20.7%	20.8%
Percentage of households living below the poverty limit	4.5%	9.9%	8.4%	8.5%	8.3%
Percentage of households with one member aged 65+	40.9%	30.7%	31.9%	31.7%	32.6%
Area Affected by Hazard (Sq Mile and Pct of Service Area)	0.16 sq miles (1%)	3.09 sq miles (18.9%)	2.88 sq miles (17.6%)	4.2 sq miles (25.7%)	16.33 sq miles

Source: ESRI 2024.

Note: Due to data limitations, the population data used for the threat assessment may not be consistent with the Census demographic figures given in Chapter 2. The demographic data are used in the threat assessment for comparative purposes only and are not meant to replace the more accurate demographic data in Chapter 2. The demographics shown in this table include people living in EOCWD's sphere of influence.

*N/A - Dam failure area too small of population to measure statistically

Floods, particularly flash floods, can also be dangerous for other groups of socially vulnerable people. Residents without access to lifelines can be unaware of impending flash floods and may not have the means to evacuate on their own. Homeless persons are more likely to suffer injuries during a flood event due to their greater exposure. Additionally, a lack of flood insurance for some people in the floodplains, especially among renters, can render them highly vulnerable to suffering economic harm if a flood event does occur.

Other Community Assets

Floods can cause extensive damage to homes, businesses, and other buildings located in the service area, which could cause significant financial hardship to the community and potentially affect the District's economic growth. Floodwater or debris deposited by floods may block road or rail networks, impede transportation, and harm the assets that depend on transportation systems, such as public transit and emergency response services. Electrical and communication systems could be damaged by floods, interrupting these services. Serious floods could potentially cause breaks in pipelines such as water, wastewater, and natural gas pipes, leading to further service interruptions, although such events are rare.

Changes in Population and Land Use Development

Given the current percentage of people residing in FEMA flood zones, it is possible that flooding will affect the service area's population patterns and growth. The service area's anticipated residential/population growth over the next five years is also expected to increase the District's potential vulnerability to flood-related hazards (including dam failure) as it must retrofit, maintain, and build new infrastructure to maintain adequate water and wastewater service.

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CHAPTER 5 –

HAZARD MITIGATION STRATEGY

Strategy Development Process

EOCWD's hazard mitigation strategy is a comprehensive set of actions intended to reduce the impact of hazard events. These hazard mitigation actions will help protect the safety and well-being of key facilities, the local economy, key services, and the residents/customers that live in the service area.

Use Of Hazard And Threat Assessment

The HMPT relied partly on the hazard profiles and threat assessments in this Plan to develop the mitigation strategy's actions. A comprehensive set of mitigation actions was prepared to respond to the relevant hazard situations and protect key facilities, critical water and wastewater infrastructure required for adequate service, the businesses, and the people living within the District service area. The HMPT ensured that the mitigation actions would help reduce damage from the most frequent types of hazard events, the most significant that may reasonably occur, and those with the greatest potential to harm the District. The HMPT also drafted mitigation actions to help protect the most vulnerable community members and the most vulnerable local assets within the service area.

Capabilities Assessment

As part of the effort to draft mitigation actions, the District completed a capabilities assessment, which included reviewing existing policies, personnel, and technical resources to support hazard mitigation activities in the EOCWD. The hazard mitigation actions build on the existing success of these resources and leverage their capabilities to support improved resiliency in the community. The capabilities assessment looked at the following types of resources:

- **Personnel resources:** District employees and volunteers, and employees and volunteers at other agencies
- **Plan resources:** Advisory or enforceable plans adopted by the District or other agencies
- **Policy resources:** Policies adopted and implemented by the District or other agencies
- **Technical resources:** Data and tools available to the District
- **Financial resources:** Funding mechanisms available to the District that support mitigation activities

Capabilities Improvement/Expansion

The ability to expand current mitigation capabilities will generally be reliant upon the budget allocated for each department/program for that fiscal year. The level at which these programs

may or may not be expanded upon will depend upon the amount of funding received. FEMA has released a series of guides over the past few years that highlight some of the ways in which jurisdictions can expand mitigation. Some strategies for increasing current mitigation capabilities may include:

1) The District should actively identify, adopt, and enforce the most current set of development codes and standards available. Strongly encouraging new development to be constructed to higher standards than currently required, increasing resilience within the community.
2) Engaging parts of the community that may not be actively involved in mitigation efforts.
3) Expanding the number and types of organizations involved in mitigation planning and implementation, increasing both efficiency and bandwidth.
4) Fostering new relationships to bring underrepresented populations and partners into the hazard mitigation planning process.
5) During the annual HMP review, the committee should look for opportunities to fund and expand/enhance the effectiveness of current mitigation actions.

Table 5-1 shows the capabilities assessment for EOCWD.

TABLE 5-1: EOCWD CAPABILITIES ASSESSMENT

Resource	Resource Description	Connection to Current Mitigation/Future Opportunities for Expansion and Improvement
Legal and Regulatory Capabilities Summary		
Retail Zone Water Conservation Ordinance (No. 2009-01)	Seeks to minimize or mitigate the effects and hardships of potential water shortages to the greatest extent possible. To that end, it establishes a Water Conservation Program for the Retail Zone, designed to reduce water consumption (demand) through conservation, enable effective water supply planning, assure reasonable and beneficial use of water, and prevent waste of water while maximizing efficient use in the District.	This can help establish mitigation actions for the District, addressing water supply droughts and other hazards.
District Urban Water Management Plan	This UWMP provides a detailed summary of present and future water resources and demands within the District's service area, assessing the District's water resource needs. The UWMP provides water supply planning for a 25-year planning period, divided into five-year increments, and identifies the water supplies needed to meet existing and future demands.	This can help establish mitigation actions for the District, addressing water supply droughts and other hazards. An update to the UWMP is currently underway.

TABLE 5-1: EOCWD CAPABILITIES ASSESSMENT		
Resource	**Resource Description**	**Connection to Current Mitigation/Future Opportunities for Expansion and Improvement**
District Sewer System Management Plan	State law requires local sewer agencies to create and implement sewer system management plans as part of their efforts to prevent sanitary sewer overflows.	This can help to establish mitigation actions for the District to maintain adequate wastewater service during floods and other hazards. The updated plan is being adopted in 2025.
Retail Zone Master Plan	Provides a baseline database of information about infrastructure assets of the Retail Zone, assesses current conditions, and develops a capital improvement program (CIP). The CIP guides the District in planning, developing, and budgeting for Retail Zone water system improvement projects, which are required to meet system performance criteria for existing retail customers and to support anticipated demands through 2040.	In addition, the CIP in this plan includes a prioritized schedule of the rehabilitation and replacement of existing infrastructure. This plan can be used as a source of information on district assets for the hazard mitigation planning effort, as well as the identification of projects in the Retail Zone.
Wholesale Zone Master Plan	A strategic document that outlines infrastructure improvements, financial planning, and operational strategies to ensure a reliable and cost-effective water supply for the retail water agencies it serves. It provides a roadmap for maintaining and upgrading the wholesale water system to meet current and future demands.	This plan can be used as a source of information on district assets for the hazard mitigation planning effort, as well as the identification of projects in the Wholesale Zone.
Sewer Master Plan	Contains an evaluation of the capacity of the sewer system under existing and future development conditions, and identification of deficiencies that need to be addressed.	This can be used to aid in mitigation actions related to flooding by identifying areas to improve storm and wastewater collection.

TABLE 5-1: EOCWD CAPABILITIES ASSESSMENT		
Resource	**Resource Description**	**Connection to Current Mitigation/Future Opportunities for Expansion and Improvement**
AWIA Plan	The primary objectives of the America's Water Infrastructure Act of 2018 (AWIA), are to improve drinking water and water quality, deepen infrastructure investments, enhance public health and quality of life, increase jobs, and bolster the economy.	The law specifies the components that the risk assessments and emergency response plans must address and establishes deadlines by which water systems must certify to the EPA the completion of the risk assessment and emergency response plan.
Administrative/Personnel and Technical Capabilities Summary		
EOCWD Board of Directors	The Board of Directors for the Water District oversees the District's operations, sets policies, approves budgets, establishes rates, and hires/supervises the general manager, ensuring efficient and effective delivery of water services.	Setting policies that can mitigate risk from hazards can directly improve the efficacy of the HMP. The Board assures that Plan updates are adopted and implemented.
General Manager	The General Manager of the Water District is responsible for overseeing all aspects of the District's operations, including water management, treatment, and distribution, as well as managing staff and budgets, and ensuring compliance with regulations.	The GM can ensure that mitigation projects are completed and aid in enforcing the policies as identified in the HMP.
Engineering Manager	An engineering manager for the Water District oversees all engineering-related functions, including planning, design, and management of water infrastructure projects, while also managing and coordinating engineering staff and ensuring efficient operations and compliance.	The Engineering Manager assists by providing technical assistance during the mitigation action project implementation phase, as prioritized in the HMP.
Operation Manager	An operations manager for the Water District is responsible for the day-to-day operations, maintenance, and customer service of the water system, including water treatment, distribution, and ensuring regulatory compliance.	The Operations Manager ensures the physical completion of mitigation action projects as prioritized within the HMP.

TABLE 5-1: EOCWD CAPABILITIES ASSESSMENT		
Resource	**Resource Description**	**Connection to Current Mitigation/Future Opportunities for Expansion and Improvement**
GIS Manager	A GIS manager for the Water District oversees all GIS-related functions, including data collection, workflows, and management of water and sewer activities, while also managing key performance indicators and coordinating efficient operations and compliance records.	Can assist in organizing and managing District assets and infrastructure, as well as the impact of natural hazards on them. This data can be used as a tool during HMP mitigation action planning.
Engineering and Operations Committee	An engineering and operations committee for the Water District typically focuses on the technical aspects of water management, including reviewing ongoing projects and planning for the future.	The committee can assist mitigation efforts by making recommendations to the Board of Directors on matters related to water infrastructure and operations in the HMP and other planning documents.
Financial Capabilities Summary		
Administration and Finance Committee	The Administration and Finance Committee for the Water District oversees the District's financial health, budgeting, and administrative functions, ensuring responsible management of resources and compliance with policies.	Ensures that the financing and administrative requirements necessary to complete mitigation action projects are available and current for the District.

TABLE 5-1: EOCWD CAPABILITIES ASSESSMENT		
Resource	**Resource Description**	**Connection to Current Mitigation/Future Opportunities for Expansion and Improvement**
Budgets/Funds	The District has multiple types of budgets/funds, including: ***Wholesale Zone Operating Budget*** - funds budgeted for the day-to-day operation of the "Wholesale Zone," so called because these facilities provide imported water on a wholesale cost basis. These costs include everything from the cost of the water itself to the materials, tools, and equipment used for facility repairs, as well as the salaries and benefits of the employees working on the WZ. ***Wholesale Zone Capital Improvement Program Budget*** - These funds are used solely to build, replace, or rehabilitate infrastructure projects like reservoirs and pipelines. ***Retail Zone Operating Budget*** - These funds are budgeted for the day-to-day operations of the "Retail Zone," for providing water directly to consumers in the service area. ***Retail Zone Capital Improvement Program Budget*** - these funds are used to pay for the building, replacement, or rehabilitation of large capital facilities. ***Improvement District 1 (Sewer) Zone Operating Budget*** - These funds are budgeted to pay for the day-to-day operations of the sewer system, including the salaries and benefits of the employees working on the sewer system. ***Improvement District 1 (Sewer) Zone Capital Budge*t - These funds are budgeted to pay for replacement or rehabilitation projects of the sewer system.	Funding from operational budgets and capital improvement programs can be used to fund mitigation actions and strategies. While this funding can be used, it typically requires augmentation with grant funding to support mitigation opportunities.
Grant Writer	The Grant Writer will identify, define, and develop funding sources to support existing and planned program activities, as well as lead the development, writing, and submission of grant proposals to federal, state, and private funding agencies.	Can assist mitigation efforts further for the District by researching grants and other funding opportunities for future planning efforts.

TABLE 5-1: EOCWD CAPABILITIES ASSESSMENT		
Resource	**Resource Description**	**Connection to Current Mitigation/Future Opportunities for Expansion and Improvement**
Education and Outreach Capability Summary		
Alert OC	AlertOC, Orange County's mass notification system, informs residents and businesses about emergencies, including those affecting water districts, by sending time-sensitive voice messages, text messages, and emails to registered devices.	This program can continue to conduct outreach to expand the database and increase the percentage of residents who are subscribers and raise awareness of the systems.
Orange County Emergency Management Division Page	Responsible for the comprehensive development and implementation of the four phases of emergency management.	It can expand and enhance upon the District's HMP homepage.
District's Online/Social Media Resources	Provides disaster preparedness, alert, and warning information. Provides weather information and other public safety content. Contains information on home and individual preparedness. ***District Website*** - https://www.eocwd.com/ ***Facebook*** - https://www.facebook.com/EOCWD ***X*** - https://x.com/EastOCWD ***Instagram*** - https://www.instagram.com/eocwd/ ***YouTube*** - https://www.youtube.com/channel/UCkWWuEhfNLZ-IPHOfxItotA	These resources can support education and outreach by providing a link to FEMA, State, and County websites and social media accounts. Provide comprehensive personal/family preparedness information on these media.

Hazard Mitigation Strategies

Hazard Mitigation Goals

The goals identified in **Chapter 1** help develop policies to protect community members, ecosystems, and other important assets from hazard events. These goals informed the development of mitigation actions and acted as checkpoints to help District staff determine implementation progress.

Evaluation of Potential Hazard Mitigation Actions

The HMPT prepared a set of potential mitigation actions based on the hazard profiles, threat assessment, capabilities assessment, community survey results, discussions among HMPT members, and existing best practices. Next, the HMPT evaluated these potential actions using the following criteria:

FEMA requires local governments to evaluate potential mitigation actions' monetary and non-monetary costs and benefits. While local governments are not required to assign specific dollar values to each action, they should identify the general size of costs and benefits. The HMPT may elect to include measures with high costs or low benefits, but such measures should benefit the community and make appropriate use of local resources.

Also, FEMA directs local governments to consider the following questions as part of the financial analysis:

1) What is the frequency and severity of the hazard type to be addressed by the action, and how vulnerable is the community to this hazard?
2) What impacts of the hazard will the action reduce or avoid?
3) What benefits will the action provide to the community?

The HMPT also reviewed and revised the potential hazard mitigation actions using the STAPLE/E (Social, Technical, Administrative, Political, Legal, Economic, and Environmental) criteria (**Table 5-2**). The HMPT did not formally assess every potential mitigation action under all STAPLE/E criteria but used the criteria to guide and inform the discussion. The HMPT also discussed how the criteria might evaluate grant applications the District may submit to receive funding for HMP implementation.

TABLE 5-2: STAPLE/E CRITERIA	
Issues	**Criteria**
Social	• Is the action socially acceptable to EOCWD community members? • Would the action mistreat some individuals? • Is there a reasonable chance of the action causing social disruption?
Technical	• Is the action likely to reduce the risk of the hazard occurring, or will it reduce the hazard's effects? • Will the action create new hazards or make existing hazards worse? • Is the action the most useful approach for EOCWD to take, given the District and community members' goals?
Administrative	• Does the District have the administrative capabilities to implement the action? • Are there existing District staff who can lead and coordinate the measure's implementation, or can the District reasonably hire new staff for this role? • Does the District have enough staff, funding, technical support, and other resources to implement the action? • Are there administrative barriers to implementing the action?
Political	• Is the action politically acceptable to District officials and other relevant jurisdictions and political entities? • Do community members support the action?
Legal	• Does the District have the legal authority to implement and enforce the action? • Are there potential legal barriers or consequences that could hinder or prevent the implementation of the action? • Is there a reasonable chance that the implementation of the action would expose the District to legal liabilities? • Could the action reasonably face other legal challenges?
Economic	• What are the monetary costs of the action, and do the costs exceed the monetary benefits? • What are the start-up and maintenance costs of the action, including administrative costs? • Has the funding for action implementation been secured, or is a potential funding source available? • How will funding the action affect the District's financial capabilities? • Could the implementation of the action reasonably burden the EOCWD economy or tax base? • Could there reasonably be other budgetary and revenue impacts to the District?
Environmental	• What are the potential environmental impacts of the action? • Will the action require environmental regulatory approvals? • Will the action comply with all applicable federal, state, regional, and local environmental regulations? • Will the action reasonably affect any endangered, threatened, or otherwise sensitive species of concern?

Relative Cost Estimates

The HMPT identified relative cost estimates to meet the hazard mitigation planning process's cost estimation requirements based on their understanding of the mitigation action intent and their experience developing identical or similar programs/implementing projects. Three cost categories based on the District's typical cost criteria were used for budgeting purposes:

- **Low cost ($):** Less than $75,000 - The action could be funded under the existing budget. The action is part of or can be part of an ongoing existing program. Grant funding would expedite this type of action.
- **Medium cost ($$):** $75,001 - $199,999 -The action could be implemented with existing funding, but would require a re-apportionment of the budget or a budget amendment, or the cost of the action would have to be spread over multiple years. Grant funding would expedite this type of action and ensure implementation would have adequate funding for completion.
- **High cost ($$$):** Greater than $200,000 - Existing funding will not cover the cost of the action; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases).

Prioritization

As part of the mitigation actions development and review, the HMPT also prioritized the actions. The prioritization efforts looked at the risks and threats of each hazard, financial costs and benefits, technical feasibility, and community values. HMPT members were asked to identify their priority actions through a voting exercise. Items are prioritized based on the number of votes the HMPT members receive. These quantitative scores were then converted to low, medium, and high priority qualitative categories.

2025 Hazard Mitigation Actions

Based on the criteria and evaluation processes used during Plan development, the HMPT prepared a prioritized list of mitigation actions (**Table 5-3**) to improve the EOCWD's resilience to hazard events. These actions collectively form the District's hazard mitigation strategy.

The list of actions also includes preparedness activities that are intended to improve emergency response for the District when hazard events occur or are imminent. Although these actions are not considered mitigation activities, they are expected to decrease the harm the community faces from hazard events and so support the same goals as mitigation actions.

Actions identified in blue are previous actions from the 2020 LHMP that have been carried over to the 2025 LHMP update.

TABLE 5-3: MITIGATION ACTIONS IMPLEMENTATION PLAN							
Action #	**Mitigation Action Item**	**Hazard(s) Addressed**	**Potential Funding Source**	**Responsible Agency**	**Relative Cost**	**Time Frame**	**Priority**
Multi-Hazard							
Action #1	Reconstruct Peters Canyon Reservoir to avoid future seismic, landslide, and wildfire risks. HMP grant is in process.	Earthquake, Landslide, Wildfire	District reserves, FEMA HMA Funding,	District	High ($20 Million)	Phase 1 Underway / Phase 2 - 2026	High
Action #2	Develop an outreach protocol for District projects and programs to ensure effective and timely information sharing and status updates on mitigation-related efforts through the various methods of communication used by the District.	All Hazards	District Funds	District	Low	Ongoing	High
Action #3	Upgrade facilities that would allow the District to remotely close valves at major reservoirs to protect an existing water source in times of emergency. Phase project one turnout is complete; additional turnouts to be completed.	All Hazards	District Reserves, DHS-EMPG Funding HMA Grant Funding	District	High	Long Term	Low
Action #4	Incorporate components of this hazard mitigation plan into other District plans and programs.	All Hazards	District Funds	District	Low	Ongoing	Medium
Action #5	Develop a technical communications plan to build redundancy and evaluate the cost/benefit and feasibility of different communications systems.	All Hazards	District Funds (Annual Operating Budget)	District	Low	Short Term	High

TABLE 5-3: MITIGATION ACTIONS IMPLEMENTATION PLAN							
Action #	**Mitigation Action Item**	**Hazard(s) Addressed**	**Potential Funding Source**	**Responsible Agency**	**Relative Cost**	**Time Frame**	**Priority**
Action #6	Build redundancy into the wastewater collection system to mitigate major structural defects.	All Hazards	District Funds (Annual Operating Budget)	District	High	Short Term	Medium
Action #7	Maintain Water Emergency Response Organization of Orange County (WEROC) membership for communication and collaboration opportunities with regional water districts, including identification and implementation of mitigation actions with shared benefits.	All Hazards	District Funds (Annual Operating Budget)	District	Low	Ongoing	High
Action #8	As repair and rehabilitation needs are identified in vertical structural facilities, consider options that increase stability and resiliency as needed. Make improvements in accordance with current codes.	All Hazards	District Funds (Annual Operating Budget)	District	High	Short Term	Medium
Action #9	Explore opportunities to partner with external agencies (such as WEROC, local/county police, local/county fire, customer cities, and other water/wastewater providers) to expand opportunities for education regarding hazards and hazard mitigation. By collaborating with other agencies, outreach will engage larger audiences across a variety of platforms.	All Hazards	District Funds (Annual Operating Budget)	District	Medium	Ongoing	Low
Action #10	Develop and maintain Specific Hazard Response Plans (SHRPs) as vulnerabilities become apparent. Include SHRPs in regular training and exercise programs.	All Hazards	District Funds (Annual Operating Budget)	District	Low	Short Term, Update as Needed	Low

TABLE 5-3: MITIGATION ACTIONS IMPLEMENTATION PLAN							
Action #	**Mitigation Action Item**	**Hazard(s) Addressed**	**Potential Funding Source**	**Responsible Agency**	**Relative Cost**	**Time Frame**	**Priority**
Action #11	Develop a policy and protocol for evaluating any structural damage to critical structures and facilities.	All Hazards	District Funds (Annual Operating Budget)	District	Low	Short Term, Update as Needed	Medium
Action #12	Provide ongoing training for EOCWD employees to identify danger signs of potential system failures associated with physical damage, communications failure, loss of function, etc.	All Hazards	District Funds (Annual Operating Budget)	District	Low	Short Term Ongoing	High
Action #13	Update and implement the District's Cybersecurity Plan, with future work focused on the inclusion of a disaster recovery (DR) plan.	All Hazards	District Funds (Annual Operating Budget)	District	Low	Short Term, Update as Needed	High
Action #14	Train and exercise staff on cybersecurity procedures and protocols.	All Hazards	District Funds (Annual Operating Budget)	District	Low	Ongoing	High
Action #15	Participate in neighboring jurisdictions, OC San, and OCFA mutual aid response teams training exercises. Develop/update mutual aid agreements with these entities to provide support during an emergency.	All Hazards	District Funds (Annual Operating Budget)	District	Low	Ongoing	Low
Severe Wind							
Action # 16	Establish procedures for staging District vehicles, materials, and equipment at alternative work locations before significant storm events.	Severe Wind, Flood, Landslide	District Funds (Annual Operating Budget)	District	Low	Short Term, Ongoing	Low

TABLE 5-3: MITIGATION ACTIONS IMPLEMENTATION PLAN							
Action #	**Mitigation Action Item**	**Hazard(s) Addressed**	**Potential Funding Source**	**Responsible Agency**	**Relative Cost**	**Time Frame**	**Priority**
Action # 17	Upon SCE's possible PSPS event notification, ensure that adequate staff are available to pre-position supplies/ equipment, and confirm that adequate generator capacity is available. Maintain communications with SCE during the PSPS power outage event.	Severe Wind, Wildfire	District Funds (Annual Operating Budget)	District	Low	Ongoing, as needed	Medium
Earthquake (Seismic Shaking, Liquefaction)							
Action #18	Assess water transmission pipelines that interface liquefiable soils and replace vulnerable pipelines to mitigate future impacts from earthquakes.	Earthquake	District reserves, FEMA HMA Funding,	District	High	Long Term	Medium
Action #19	Complete sewer line replacements when vulnerabilities are identified.	Earthquake	District reserves and debt financing, FEMA HMA Funding	District	High	Short Term, DOF	Medium
Action #20	If any EOCWD-owned critical facility is determined to be seismically vulnerable, identify a plan to conduct structural retrofitting, including funding sources.	Earthquake	District Funds (Annual Operating Budget)	District	Low	Ongoing	High
Action #21	Assess seismic vulnerability for all structures and facilities (non-critical).	Earthquake	District Funds (Annual Operating Budget)	District	Low	Short Term	Low

TABLE 5-3: MITIGATION ACTIONS IMPLEMENTATION PLAN							
Action #	**Mitigation Action Item**	**Hazard(s) Addressed**	**Potential Funding Source**	**Responsible Agency**	**Relative Cost**	**Time Frame**	**Priority**
Landslide							
Action #22	Identify and protect EOCWD assets with a high relative vulnerability to the effects of landslides or mudslides.	Landslide	District Funds (Annual Operating Budget)	District	Low	Long Term	Low
Action #23	Implement erosion control and slope stabilization measures at existing vulnerable critical infrastructure locations.	Landslide	District Funds (Annual Operating Budget)	District	High	Ongoing	Medium
Wildfire							
Action #24	Evaluate opportunities to enhance infrastructure building hardscape (including protective walls) and undergrounding power lines as appropriate.	Wildfire	District Funds (Annual Operating Budget)	District	Medium	Short Term Ongoing	Low
Action #25	Annually review defensible space, brush clearing, and weed abatement needs for all vulnerable EOCWD critical facilities and infrastructure, to reduce fuel sources and decrease fire vulnerability.	Wildfire	District Funds (Annual Operating Budget)	District	Low	Short Term Ongoing	High
Action #26	Annually update and share a list of EOCWD facilities in Fire Hazard Severity Zones with OCFA.	Wildfire	District Funds (Annual Operating Budget)	District	Low	Short Term	Medium
Action #27	Adopt a policy for the design of non-combustible facilities to reduce the threat and impact of structure fires.	Wildfire	District Funds (Annual Operating Budget)	District	Medium	Short Term Ongoing	Low

TABLE 5-3: MITIGATION ACTIONS IMPLEMENTATION PLAN							
Action #	**Mitigation Action Item**	**Hazard(s) Addressed**	**Potential Funding Source**	**Responsible Agency**	**Relative Cost**	**Time Frame**	**Priority**
Action #28	Construct new facilities and retrofit existing facilities with non-combustible building materials.	Wildfire	District reserves and debt financing, FEMA HMA Funding	District	High	Long Term	Medium
Drought							
Action #29	Monitor well efficiencies during drought conditions and establish a threshold for investment into a new/ deeper well.	Drought	District reserves and debt financing, FEMA HMA Funding	District	High	Long Term	Medium
Flood/ Dam Failure							
Action #31	Protect and reinforce facilities within floodplain areas or relocate facilities out of harm's way.	Flood/ Dam Failure	District Funds (Annual Operating Budget)	District	High	Long Term	Medium
Action #32	Coordinate with police and public safety agencies for EOCWD-preferred response actions during localized flooding incidents, to prevent increased flood waters impacting EOCWD facilities and the service area.	Flood/ Dam Failure	District Funds (Annual Operating Budget)	District	Low	Ongoing	High
Cost Estimates							
$ (Low) - Less than $75,000							
$$ (Medium) $??? – $??? 75k - 200k							
$$$ (High) – Greater than $??? + 200k							

Existing Mitigation Measures

The District's previous HMP was adopted in 2020. Most of the mitigation actions in the previous HMP have been incorporated into the mitigation strategy presented in this updated Plan. In many cases, the 2020 actions have either been directly copied into the updated Plan or have been integrated through multiple actions in the new Plan. Some 2020 actions are not part of the updated mitigation strategy because they have been addressed elsewhere in the HMP planning process or are more general HMP goals that are not suitable as a specific mitigation action under current best practices.

Table 5-4 shows the 2020 mitigation actions and how they have been addressed in this updated HMP.

TABLE 5-4: STATUS OF MITIGATION ACTIONS IN 2020 HMP

2020 Mitigation Actions	Status in Updated HMP
Action #1: Construct a new emergency operations center/administrative building outside the dam inundation area and flood zone, to meet appropriate seismic codes and standards.	Completed as part of the Admin Bldg. project.
Action #3: Foothill Regional Environmentally Sustainable H2O (FRESH) project that involves the capture of stormwater runoff to attenuate stormwater impacts and pumping the captured stormwater to an impounded storage facility.	Further analysis of the project showed it was economically unfeasible.
Action #4: Acquire fixed-place generators of sufficient size and capacity for the three district wells that currently do not have them, and convert Barrett Reservoir, OC 70 Pump, and the Administrative Building from portable generator support to fixed-place generator support.	Projects completed. Wells and Admin Bldg. have fixed generators.
Action #5: Upgrade the hardware and software of the District's SCADA system to provide increased security for District facilities.	SCADA upgrade projects completed.
Action #9: Replace existing wells that are considered to be sub-standard for code compliance due to their age, to mitigate future impacts from earthquakes.	Project completed.
Action #11: Replace the seismically vulnerable Vista Panorama Reservoir.	Project completed.
Action #14: Treatment plant rehabilitation is needed to mitigate seismic vulnerability due to its location within susceptible soils.	The Treatment Plant was demolished.
Action #15: Coordinate and collaborate with other Orange County stakeholders with a stake in hazard mitigation and planning to increase the regional resilience of the Orange County operation area that interfaces with District assets and interests***.***	The District coordinates with WEROC, which supports these efforts for all participating water agencies in Orange County
Action # 16: Replace exposed wastewater pipes that cross waterways and flood channels with ductile pipe to better withstand dam failure, flood, and earthquake impacts	The District recognized that there are no pipelines under this condition. This action is no longer needed as a result.

Source: EOCWD Staff and HMPT members 2025

CHAPTER 6 –
PLAN MAINTENANCE

For this HMP to remain effective and useful to the community of EOCWD, it must remain up to date. An updated version of the HMP will continue to guide EOCWD's hazard mitigation activities and help keep the District eligible for state and federal hazard mitigation funding. The HMPT has structured this HMP so individual sections can easily be updated as new information becomes available and new needs arise, helping to keep this Plan current.

This chapter discusses updating this Plan to comply with applicable state and federal requirements. This chapter also describes how the District can incorporate the mitigation actions described in **Chapter 5** into existing programs and planning mechanisms and how public participation will remain an important part of Plan monitoring and future update activities.

Plan Adoption

The EOCWD Board of Directors is responsible for adopting future updates to this Plan as well as all future updates. HMPs are subject to review by FEMA to determine whether the Plan meets all applicable federal requirements and thus provides additional funding benefits for the District. Once the Plan is consistent with FEMA's requirements, FEMA will notify the District that the Plan is Approved Pending Adoption. At this point, the Board of Directors can formally adopt the Plan. Following adoption, the HMPT will send a copy of the adopted Plan, including the resolution of adoption, to FEMA.

Plan Implementation

The Plan's effectiveness depends on the successful implementation of the mitigation actions. Implementation includes integrating mitigation actions into existing District plans, policies, programs, and other implementation mechanisms. The mitigation actions in this Plan are intended to reduce the damage from hazard events, help the District secure funding, and provide a framework for hazard mitigation activities. HMPT members prioritized the hazard mitigation actions in **Table 5-3** in **Chapter 5**. These priorities will guide the implementation of these actions through new or existing District mechanisms as resources are available. The HMP project manager is responsible for overseeing the implementation, promotion, and maintenance of this Plan and facilitating meetings and coordinating activities related to Plan implementation and maintenance.

Coordinating Body

Implementation will be the responsibility of the individual District departments and other agencies tasked with each mitigation action, as identified in the overall mitigation strategy. Implementation will be coordinated through the HMPT. A list of current Planning Team members is given in **Chapter 1**.

In future years, representatives from District Departments (either current Planning Team members or others), as well as key stakeholders/support agencies, should be included in meetings of the Planning Team:

Staff from other organizations that participated in the preparation of this Plan should be invited to participate in future Planning Team meetings, as well as any other applicable agencies. Based on the composition of the Planning Team during the preparation of this Plan, the other organizations that should be asked to participate are:

- Cities located within the EOCWD Service Area
- Orange County
- Orange County Fire Authority
- Orange County Sheriff's Office

The Engineering Manager is the staff member responsible for coordinating the implementation of the HMP and future meetings of the Planning Team. The Engineering Manager may designate this role to another staff member if warranted.

Plan Maintenance Process

The District's plan maintenance process will rely on the EOCWD Mitigation Implementation Handbook, located in **Appendix E**. The handbook is designed to serve as a standalone document, providing concise and accessible guidance to staff on implementing and maintaining the Plan. A key component is the specific mechanisms that the District can use to integrate this plan into the other District planning mechanisms.

Plan Monitoring And Evaluation

When members of the HMPT are not updating the Plan, they should meet at least once a year to review mitigation action implementation and assess the Plan's effectiveness. These meetings should include:

1) Discussion of the timing of mitigation action implementation
2) Mitigation action implementation evaluation and determination of success
3) Mitigation action prioritization revisions, if deemed necessary
4) Mitigation action integration into other mechanisms, as needed

The first of these meetings will be held in the 2026-2027 fiscal calendar year. To the extent possible, HMPT meetings should be scheduled at a time that aligns with the District's annual budgeting process, which will help ensure that funding and staffing needs for mitigation actions are considered.

When the HMPT meets to evaluate the Plan, members should consider these questions:

- What hazard events, if any, have occurred in EOCWD in the past year? What were the impacts of these events on the community? Were the impacts mitigated, and if so, how?
- What mitigation actions have been successfully implemented? Have any mitigation actions been implemented but not successfully, and if so, why?

- What mitigation actions, if any, have been scheduled for implementation but have not yet been implemented?
- What is the schedule for implementing future mitigation actions? Is this schedule reasonable? Does the schedule need to be adjusted for future implementation, and are such adjustments appropriate and feasible?
- Have any new concerns arisen, including hazard events in other communities or regions not covered by existing mitigation actions?
- Is new data available to inform the Plan's updates, including data relevant to the hazard profiles and threat assessments?
- Are there any new planning programs, funding sources, or other mechanisms to support hazard mitigation activities in EOCWD?

Plan Updates

The information in this Plan, including the hazard profiles, threat assessments, and mitigation actions, is based on the best available information, practices, technology, and methods available to the District and HMPT when this Plan was prepared. As factors change, including technologies, community demographics and characteristics, best practices, and hazard conditions, it is necessary to update the Plan to remain relevant. Additionally, Title 44, Section 201.6(d)(3) of the Code of Federal Regulations requires that HMPs be reviewed, revised, and resubmitted for approval every five years to remain eligible for federal benefits.

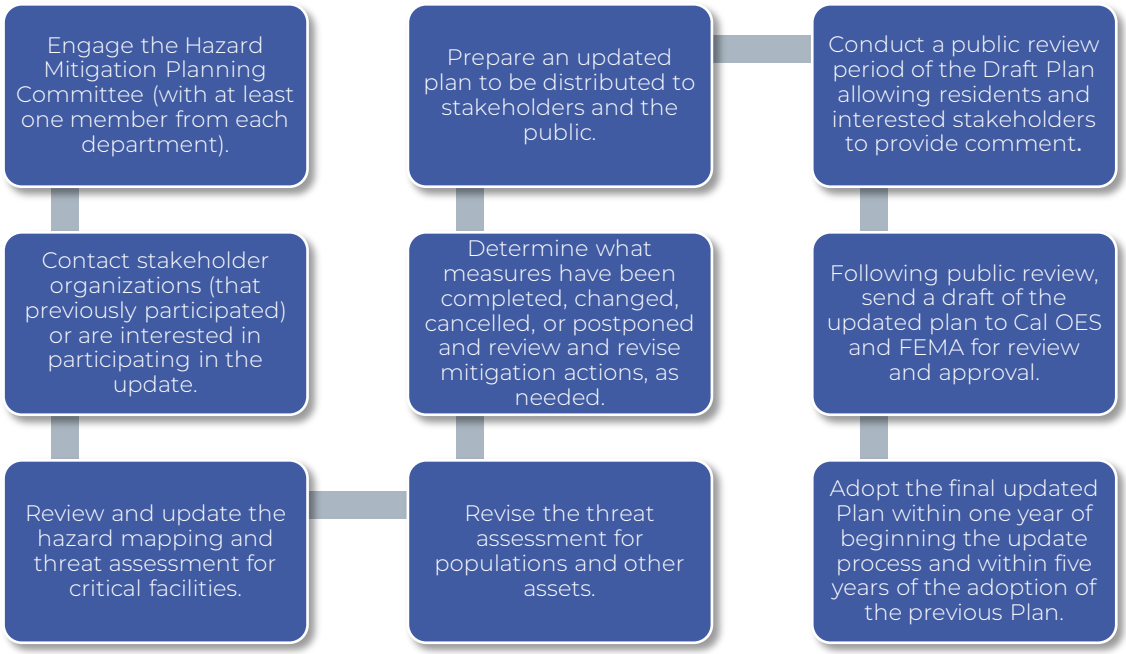
Update Method And Schedule

The update process will begin no later than four years after this Plan is adopted, allowing a year for the update process before the Plan expires. However, it is recommended that you begin the update process three years after plan adoption if the funding source for the plan will be a mitigation grant. Depending on the circumstances, the HMP project manager or their designee may also choose to begin the update process sooner.

Some reasons for accelerating the update process may include:

- A presidential disaster declaration for EOCWD or an area that includes part of or the entire District.
- A hazard event that results in one or more fatalities in EOCWD.

The update process will add new and updated methods, demographic data, community information, hazard data and events, considerations for threat assessments, mitigation actions, and other necessary information, keeping the Plan relevant and current. The HMPT will determine the best process for updating the Plan, which should include the following steps:



Update Adoption

The EOCWD Board of Directors is responsible for adopting this Plan and all future updates. As previously mentioned, adoption should occur every five years. The District should begin the update process at least one year before expiration to ensure the plan remains active. If the District has a grant application that relies on the HMP, an update to the plan should occur no later than 18 months before expiration. Adoption should take place after FEMA notifies the District that the Plan is Approved Pending Adoption. Once the District Board of Directors adopts the Plan following FEMA's approval, the adopted plan should be transmitted to FEMA.

Incorporation into Existing Planning Mechanisms

Incorporating the mitigation strategy into existing District plans, policies, programs, and other efforts helps to promote successful implementation.

This HMP should be incorporated into other District documents as applicable. Mitigation actions that involve the construction of new District buildings or infrastructure, or major retrofits to existing structures, should be reflected in updates to the Capital Improvement Program. Mitigation actions that improve resiliency in new construction by increasing the standards for new construction should be reflected in updates to EOCWD's Rules and Regulations, and Standard Drawings and Specifications. **Appendix E** provides guidance on best practices to accomplish this integration.

Continued Public Involvement

The District will continue to keep members of the public informed about the Planning Team's actions to review and update the Plan. When updating the Plan, the Planning Team will develop a revised community engagement strategy that reflects the District's updated needs and

capabilities. This updated strategy should include a schedule and plan for public meetings, recommendations about the appropriate use of the District website and social media accounts, and any sample content for public outreach documentation. The Planning Team should also consider distributing annual progress reports about Plan implementation to EOCWD service area customers/residents. Options for receiving feedback include a comment portal on the District's website and an email address for individuals to submit their comments to the District.

Point Of Contact

The EOCWD Engineering Manager is the primary point of contact for this Plan and for future updates. At the time of writing, Bobby Young is the primary point of contact, who can be contacted at (714) 538-5815 or byoung@eocwd.com.

APPENDIX A

HMPT Meeting Materials

2025 EOCWD Hazard Mitigation Planning Team Attendees

TABLE 1-1: EOCWD HAZARD MITIGATION PLANNING TEAM (HMPT)	
Name	**Title**
Bobby Young	Engineering Manager
Jerry Mendzer	Operations Manager
Sylvia Prado	Office Manager
David Youngblood	General Manager
Kari Schumaker	Consultant
Aaron Pfannenstiel	Consultant
Claire Patton	Consultant

EOCWD

LOCAL HAZARD MITIGATION PLAN UPDATE

HMPC MEETING #1 AGENDA

I. **Team Introductions**

II. **Local Hazard Mitigation Plan Overview**

III. **Project Goals and Expectations**

IV. **Hazard Mitigation Planning Team Roster**

V. **Data Needs (Critical Facilities List, vulnerable populations, recent/past hazards, GIS)**

VI. **Community Engagement and Outreach Strategy**

VII. **Hazard Identification/Prioritization**

VIII. **Next Steps and To-Do List**

Hazard Mitigation Planning Process	**April 2025 - September 2025**
Community Outreach	Ongoing
Administrative Draft LHMP	September 2025
Public Review Draft LHMP Document	October 2025
Cal OES/FEMA Review Draft Document	November 2025

Criteria	1	2	3	4
Probability: *Estimated Likelihood that the hazard will occur in the future.*	**Unlikely**	**Occasionally**	**Likely**	**Highly Likely**
Location: *The size of the affected area from a typical future occurrence.*	**Negligible**	**Limited**	**Significant**	**Extensive**
Maximum Probable Extent: *The estimated damage to facilities from a typical failure.*	**Weak –** little to no damage	**Moderate –** some damage, loss of service for days	**Severe –** devastating damage, loss of service for months	**Extreme –** catastrophic damage, uninhabitable conditions
Secondary Impacts: *The effects to the community beyond physical damage*	**Negligible –** no loss of function, downtime, and/or evacuations	**Limited –** minimal loss of function, downtime, and/or evacuations	**Moderate –** some loss of function, downtime, and/or evacuations	**High –** major loss of function, downtime, and/or evacuations

2025 EOCWD Hazard Mitigation Plan Update

WHAT | WHO | WHY

UPDATE OF THE LOCAL HAZARD MITIGATION PLAN (LHMP)

LED BY EOCWD

FUTURE MITIGATION GRANT OPPORTUNITIES

Fitting the Pieces Together

WHAT DOES AN LHMP DO?

Discuss District hazards

Analyzes hazard risks

Identifies Policies / Projects to Reduce Risk

Provides direction to implement and monitor

WHAT DOES AN LHMP DO?

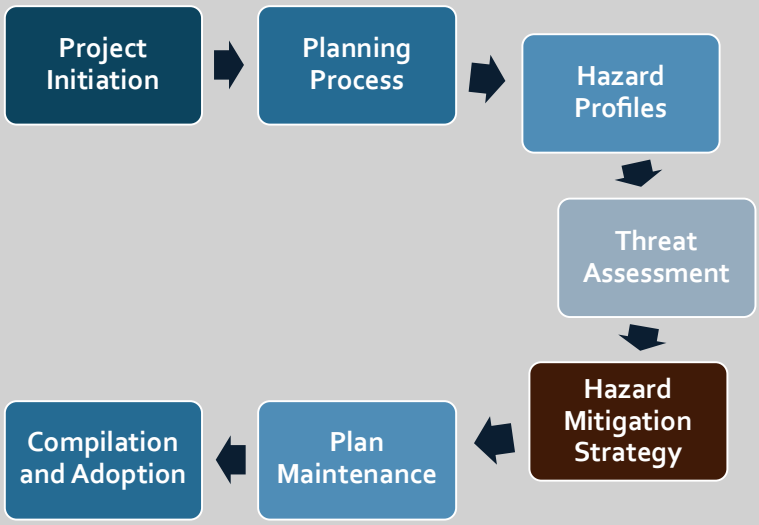
Discuss District hazards

Analyzes hazard risks

Identifies Policies / Projects to Reduce Risk

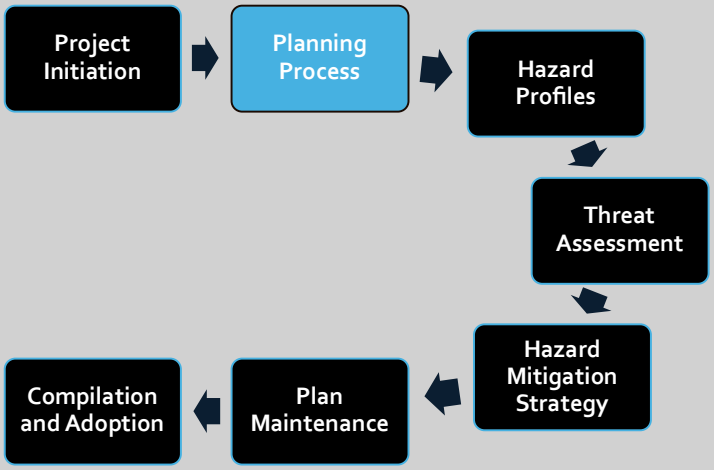
Provides direction to implement and monitor

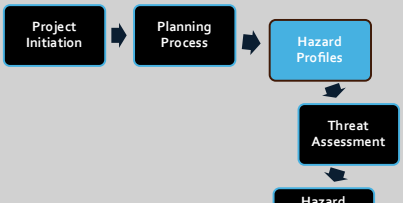
LHMP Development Process



Planning Process

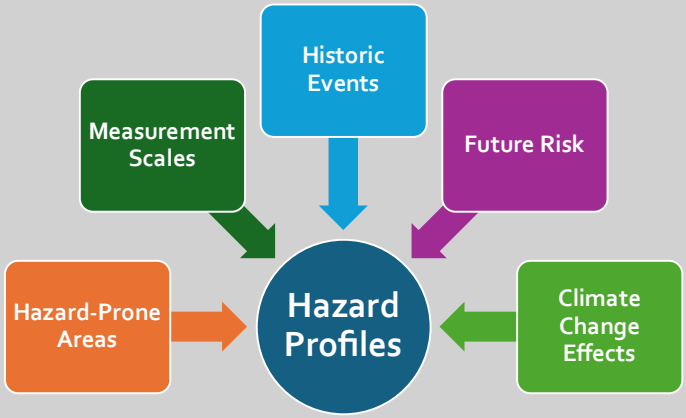
- Hazard Mitigation Planning Team (HMPT) meetings
- Community Engagement/Outreach

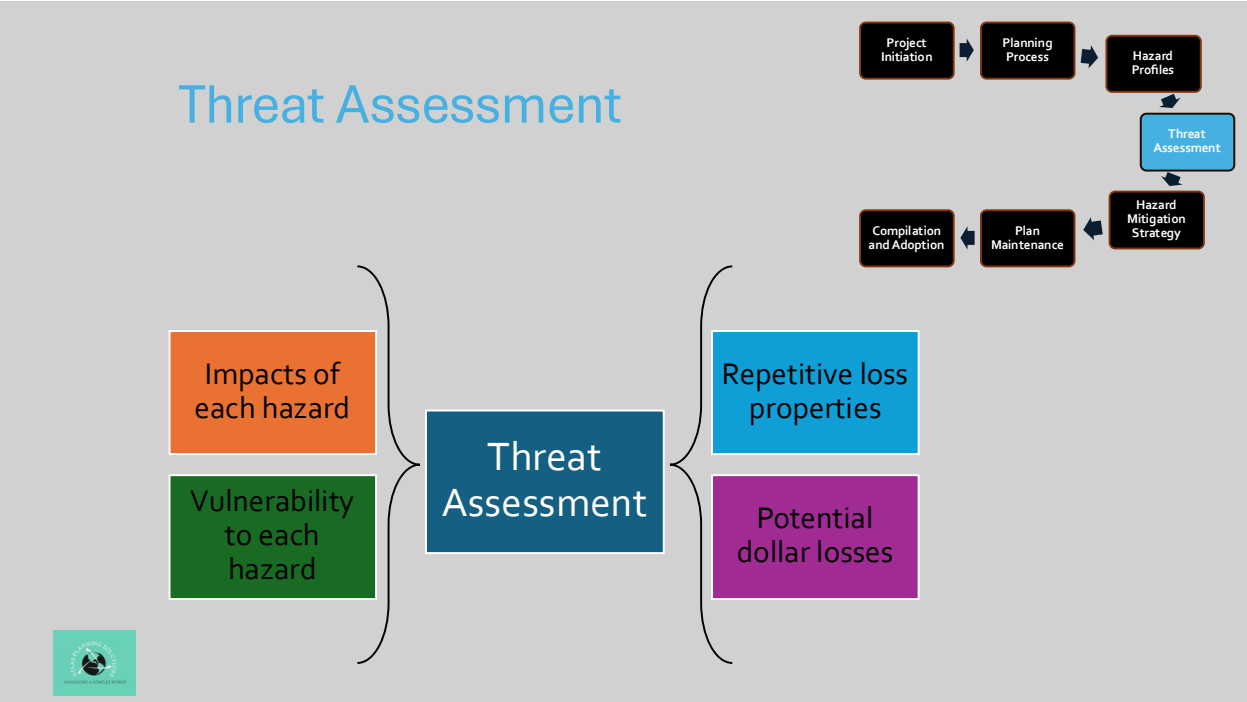


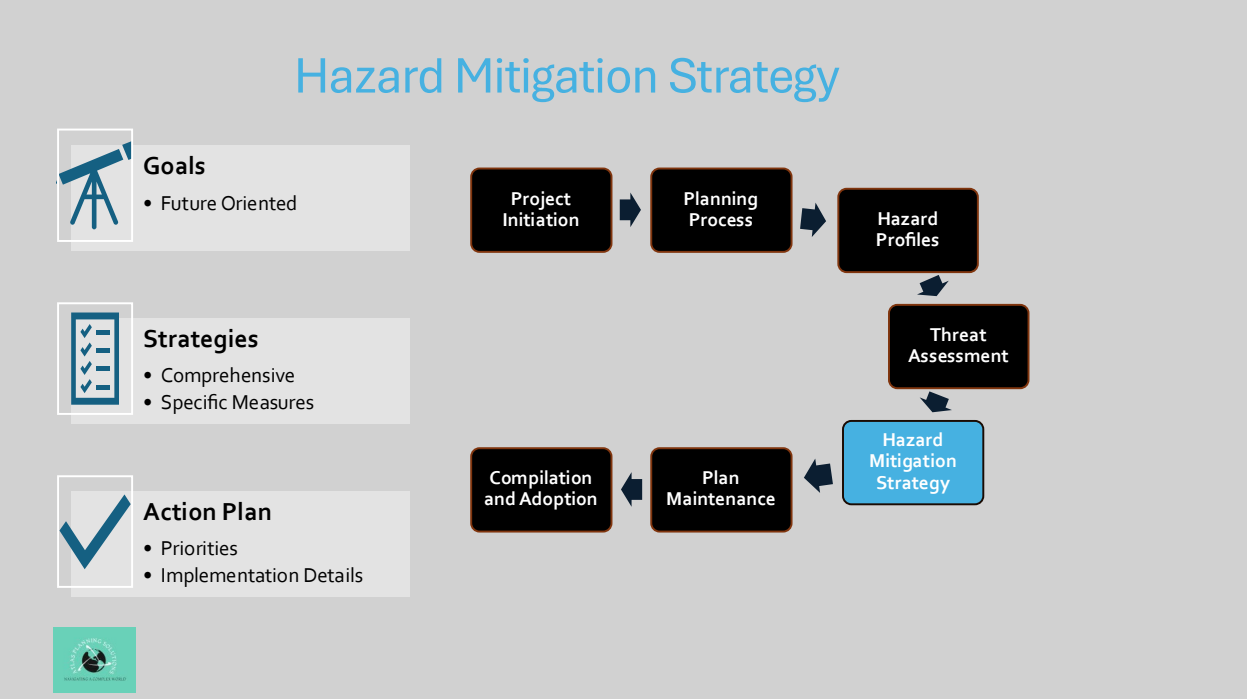


Hazard Profiles

- Identifies the potential hazards in the District
- Explains why some hazards are excluded



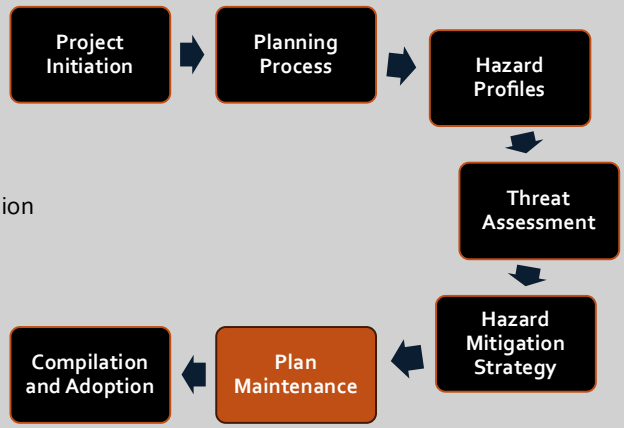

Threat Assessment
Project Initiation
Planning Process
Hazard Profiles
Threat Assessment
Hazard Mitigation Strategy
Plan Maintenance
Compilation and Adoption
Impacts of each hazard
Vulnerability to each hazard
Threat Assessment
Repetitive loss properties
Potential dollar losses


Hazard Mitigation Strategy
Goals
• Future Oriented
Strategies
• Comprehensive
• Specific Measures
Action Plan
• Priorities
• Implementation Details
Project Initiation
Planning Process
Hazard Profiles
Threat Assessment
Hazard Mitigation Strategy
Plan Maintenance
Compilation and Adoption

Time: 2:00 – 4:00 PM

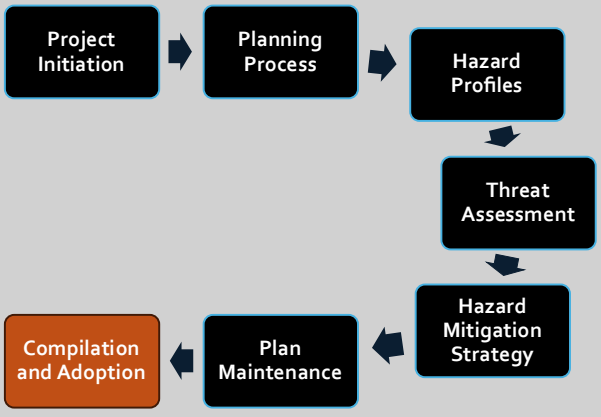
Plan Maintenance

- Ensure plan remains valid for five years
- Includes regular updates on implementation
- Provides guidance for future updates



Compilation and Adoption

- Public Review Period
- Cal OES and FEMA Review/Approval
- Board of Directors Adoption



Why Prepare an MJHMP?

Reduces injury, loss of life, property damage, and loss of services from natural disasters.

Eligibility for FEMA Grants:

- Building Resilient Infrastructure and Communities (BRIC) replaces Pre-Disaster Mitigation Grant Program
- Flood Mitigation Assistance (FMA)
- Hazard Mitigation Grant Program (HMGP)

Public Participation

Online Engagement

- Online Survey
- Online Promotion
  - Local Hazard Mitigation Plan Webpages
  - Social Media Postings
  - Newsletters,
  - Blogs,
  - Bill Inserts
  - Other Materials

In Person Engagement

- Engagement Kick Off (Information Sharing)
- Public Review Period (Draft Plan)
- Final Adoption

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EOCWD

LOCAL HAZARD MITIGATION PLAN UPDATE
HMPC MEETING #2 AGENDA

I. Introductions

II. Review of Project Goals

- Protect life and property.
- Increase awareness of EOCWDs' efforts to manage risks.
- Protect natural resources.
- Facilitate partnerships and implementation coordination.
- Maintain continuity of essential services.

Plans and Regulations	• Ordinances, Regulations
Structural Projects	• Utility Undergrounding, Structural Retrofits
Natural Systems Protection	• Stream restoration, erosion control
Education Programs	• Outreach materials, websites, presentations
Preparedness and Response Actions	• Mutual aid agreements, equipment purchases, notification protocols

III. Overview of Mitigation Strategies

IV. Discussion of STAPLE/E Criteria

Issue	Criteria
Social	• Is the action socially acceptable to community members? • Would the action treat some individuals unfairly? • Is there a reasonable chance of the action causing a social disruption?
Technical	• Is the action likely to reduce the risk of the hazard occurring, or will it reduce the effects of the hazard? • Will the action create new hazards or make existing hazards worse? • Is the action the most useful approach for the City to take, given the City's goals and community members?
Administrative	• Does the City have the administrative capabilities to implement the action? • Are there existing City staff who can lead and coordinate the measure's implementation, or can the City reasonably hire new staff for this role? • Does the City have enough staff, funding, technical support, and other resources to carry out implementation? • Are there administrative barriers to implementing the action?
Political	• Is the action politically acceptable to City officials and other relevant jurisdictions and political entities? • Do community members support the action?
Legal	• Does the City have the legal authority to implement and enforce the action? • Are there potential legal barriers or consequences that could hinder or prevent the implementation of the action? • Is there a reasonable chance that implementation of the action would expose the City to legal liabilities? • Could the action reasonably face other legal challenges?
Economic	• What are the monetary costs of the action, and do the costs exceed the economic benefits? • What are the start-up and maintenance costs of the action, including administrative costs? • Has the funding for action implementation been secured, or is a potential funding source available? • How will funding the action affect the City's financial capabilities? • Could the implementation of the action reasonably burden the City's economy or tax base? • Could there reasonably be other budgetary and revenue impacts to the City?
Environmental	• What are the potential environmental impacts of the action? • Will the action require environmental regulatory approvals? • Will the action comply with all applicable federal, state, regional, and local environmental regulations? • Will the action reasonably affect any endangered, threatened, or otherwise sensitive species of concern?

V. Discussion of Relative Cost Estimates

Example Cost Categories: **City-specific values will be determined with the HMPC in the meeting.**	
$	Less than $XX,000
$$	$XX,001 to $XXX,XXX
$$$	Greater than $XXX,XXX

VI. Review and Discussion of Draft Mitigation Strategies

VII. Next Steps

Hazard Mitigation Planning Process	**April 2025 - September 2025**
Community Outreach	Ongoing
Administrative Draft LHMP	September 2025
Public Review Draft LHMP Document	October 2025
Cal OES/FEMA Review Draft Document	November 2025

Stakeholder Meeting Presentation

East Orange County Water District Local Hazard Mitigation Plan Update

Stakeholder Meeting

September 11, 2025

KEY PROJECT ELEMENTS



WHAT

- Update of The Local Hazard Mitigation Plan (LHMP)

WHO

- EOCWD Staff

WHY

- Future Mitigation Grant Opportunities

WHAT IS HAZARD MITIGATION?

Sustained actions taken to reduce or eliminate long-term risk to life and property from hazards

Actions that make the community less vulnerable to natural hazards before disasters strike

Communities reduce their vulnerability through the development of a Local Hazard Mitigation Plan (LHMP)

WHAT DOES AN LHMP DO?

Discuss Community hazards

Analyzes hazard risks

Identifies Policies / Projects to Reduce Risk

Provides direction to implement and monitor

WHO IS PARTICIPATING IN THE LHMP PLANNING PROCESS?

General Manager	Engineering Manager	Operations Manager
Key Staff	District Consultants	Key Stakeholders

WHY PREPARE AN LHMP?

Reduces injury, loss of life, property damage, and loss of services from natural disasters.

Eligibility for FEMA Grants:

- Building Resilient Infrastructure and Communities (BRIC) replaces PDM
- Flood Mitigation Assistance (FMA)
- Hazard Mitigation Grant Program (HMGP)

Eligible Activities	HMGP HAZARD MITIGATION GRANT PROGRAM	PDM PRE-DISASTER MITIGATION	FMA FLOOD MITIGATION ASSISTANCE
1. Mitigation Projects	✓	✓	✓
Safe Room Construction	✓	✓	✗
Infrastructure Retrofit	✓	✓	✓
Soil Stabilization	✓	✓	✓
Wildfire Mitigation	✓	✓	✗
Post-Disaster Code Enforcement	✓	✗	✗
5% Initiative Projects	✓	✗	✗
2. Hazard Mitigation Planning	✓	✓	✓
3. Management Costs	✓	✓	✓

Eligible Activities	HMGP HAZARD MITIGATION GRANT PROGRAM	PDM PRE-DISASTER MITIGATION	FMA FLOOD MITIGATION ASSISTANCE
1. Mitigation Projects	✓	✓	✓
Property Acquisition & Structure Demolition	✓	✓	✓
Property Acquisition & Structure Relocation	✓	✓	✓
Structure Elevation	✓	✓	✓
Mitigation Reconstruction	✓	✓	✓
Dry Floodproofing of Historic Residential Structures	✓	✓	✓
Dry Floodproofing of Non-Residential Structures	✓	✓	✓
Minor Localized Flood Reduction Projects	✓	✓	✓
Structural Retrofitting of Existing Buildings	✓	✓	✓
Non-Structural Retrofitting of Existing Bld. & Facilities	✓	✓	✓

WHAT HAZARDS ARE IN THE LHMP?

* Addressed under each relevant hazard

7

HOW ARE THE HAZARDS PRIORITIZED?

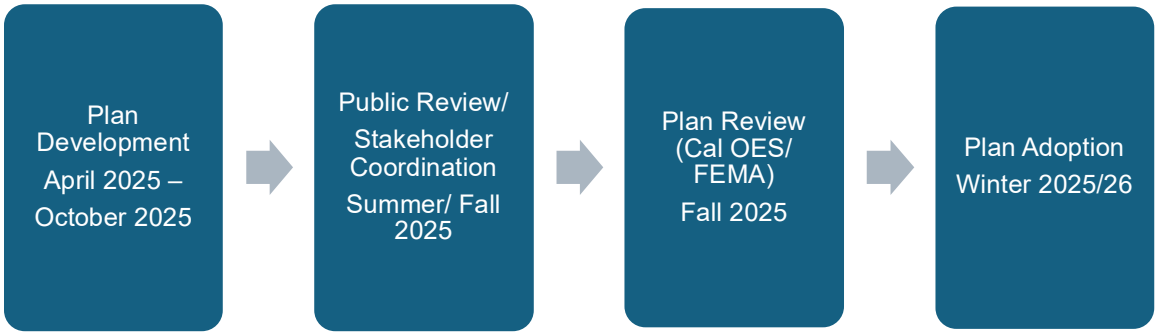
TABLE 3-2: HAZARD CATEGORIES AND SUB-CATEGORIES

Hazard Category	Sub-Categories
Severe Weather	Extreme Heat, Severe Wind
Wildfire	
Seismic Hazards	Seismic Shaking, Liquefaction
Drought	
Landslides	
Flood	Dam Failure

TABLE 3-3: EOCWD HAZARD SCORES AND THREAT LEVELS

Hazard	Probability (2.0)	Impact (2.0)			Final Score	Threat Level
		Location (0.8)	Primary Impact (0.7)	Secondary Impact (0.5)		
Severe Wind	4	3	3	2	44.00	High
Wildfire	4	3	2	3	42.40	High
Seismic Shaking	3	4	2	3	36.60	Medium
Drought	3	4	1	1	26.40	Medium
Landslide	2	2	3	2	18.80	Medium
Liquefaction	2	2	2	3	18.00	Medium
Dam Failure	1	4	4	4	16.00	Medium
Flood	2	2	2	2	16.00	Medium

LHMP DEVELOPMENT PROCESS



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OUTREACH AND PUBLIC PARTICIPATION

Our Approach includes both:

Online Engagement

Online Survey

LHMP Webpage
https://www.eocwd.com/hazardmitigationplan

In Person Engagement

Stakeholder Meeting – September 11, 2025
Public Review Draft Plan Release – October 2025
Board Meetings/ Adoption – December 2025/ January 2026

10

QUESTIONS?

Please Contact:

Bobby Young, P.E., Engineering Manager

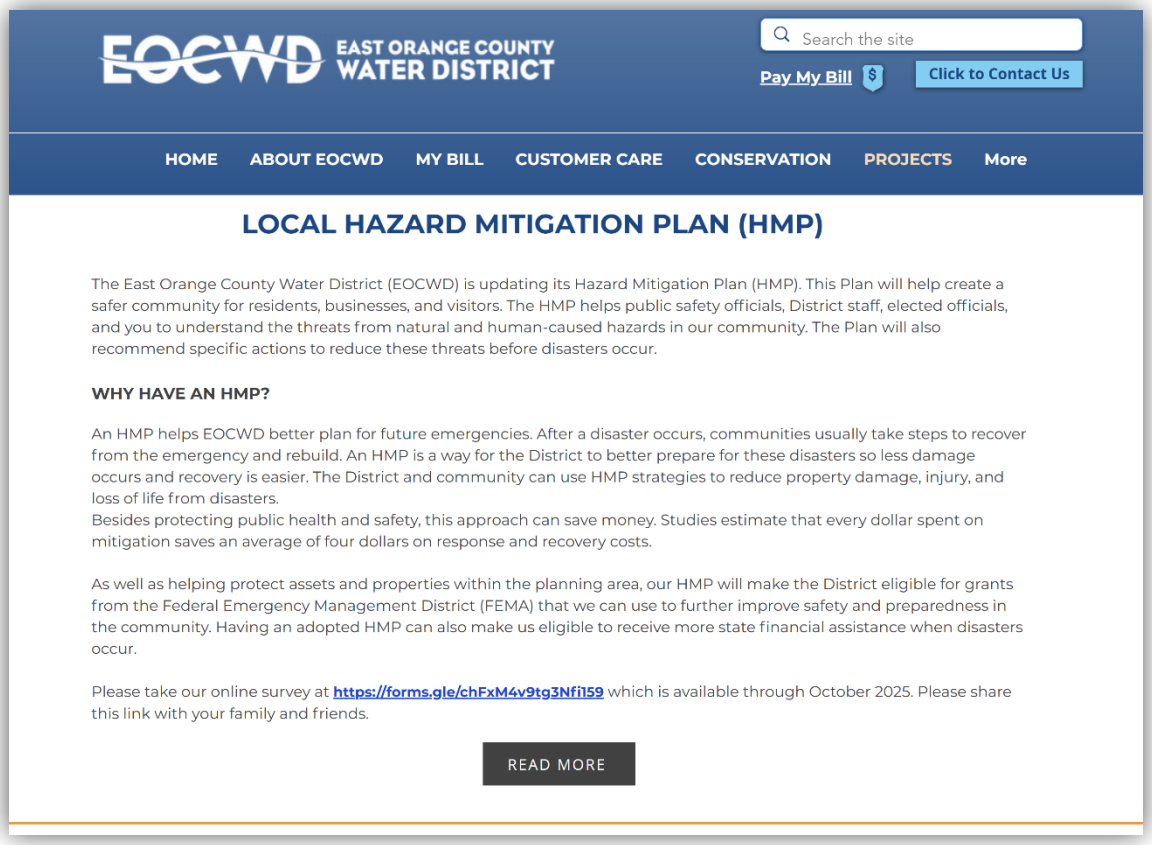
Email: byoung@eocwd.com

APPENDIX B

Appendix B – Outreach Engagement Materials

East Orange County Water District 2025 LHMP Update Project Website

https://www.eocwd.com/hazardmitigationplan



2025 East Orange County Water District (EOCWD) Hazard Mitigation Plan Survey

I. Local Hazard Mitigation Plan Survey

Dear Community Member,

The East Orange County Water District (EOCWD) is preparing an update to its Hazard Mitigation Plan, or HMP. EOCWD knows it could be impacted by hazardous events, and is using this plan to help identify those hazards, better understand our agency's capabilities, and develop potential projects to increase our resilience.

Your responses will help us prepare the Plan. Thank you for your time and cooperation.

II. Hazard Awareness

1. **Have you been impacted by a hazard event in your current residence?**
   a. Yes
   b. No

2. **If you answered yes to the previous question, please select the type of hazard event that you have been impacted by (select all that apply).**

Climate Change	Seismic Hazard – Liquefaction
Dam/Reservoir Failure	Severe Winds/Santa Ana Winds
Drought	Wildfire
Landslide/Mudflow	Other
Seismic Hazard – Ground Shaking	

If you selected "other" above, please list any additional hazards that have previously impacted your neighborhood or home.

3. **The following hazards could potentially impact the City. Please mark the THREE (3) hazards that are of the greatest concern to your neighborhood or home.**

Climate Change	Seismic Hazard – Liquefaction
Dam/Reservoir Failure	Severe Winds/Santa Ana Winds
Drought	Wildfire
Landslide/Mudflow	Other
Seismic Hazard – Ground Shaking	

If you selected "other" above, please list any additional hazards that present a threat to your neighborhood or home.

4. **The planning team uses various data sources to identify hazards in your community; however, some of these data sources do not provide data at a general citywide level. Are there any small-scale issues that you would like the planning team to consider, such as ponding at a specific intersection during rain?**

   a. I am not aware of local hazards

   b. I am aware of local hazards

Please provide as much detail as possible, including location and type of hazard.

5. **Do you believe that our climate is changing?**

   a. Yes (go to Question 6)

   b. No (go to Question 8)

6. **How concerned are you that climate change may create new hazardous situations in Colton or worsen existing natural hazards?**

   a. Very concerned.
   b. Somewhat concerned.
   c. Somewhat unconcerned.
   d. Not at all concerned.
   e. Unsure.

7. **When do you think climate change will pose a threat to your health, property, livelihood, or overall wellbeing?**

    a. It already is.
    b. Within the next five years.
    c. In five to twenty years.
    d. Not for at least another twenty years.
    e. Never, or not in my lifetime.

8. **If you have taken any action to protect yourself against natural hazards, how confident are you that these actions will be sufficient to protect against more severe hazards in the future?**

    a. Very confident.
    b. Somewhat confident.
    c. Somewhat unconfident.
    d. Not at all confident.
    e. Unsure.

9. **If you are a homeowner, do you have adequate homeowners' insurance to cover the hazards that could impact your home?**

    a. Yes, my insurance coverage should be adequate.
    b. No, I don't believe my insurance coverage would be adequate for a major disaster.
    c. Unsure.
    d. I do not have an insurance policy.
    e. Not applicable; I rent my current residence.

10. **If you rent your residence, do you have renters' insurance?**

    a. Yes
    b. No
    c. Not applicable; I own my residence.

11. **Do you have flood insurance for your home?**

    a. Yes, I own my home and have flood insurance.
    b. Yes, I rent my home and have flood insurance.
    c. No, but I am interested in reviewing flood insurance options (http://www.floodsmart.gov/floodsmart/).

12. **Do you have earthquake insurance for your home?**

    d. Yes, I own my home and have earthquake insurance.
    e. Yes, I rent my home and have earthquake insurance.
    f. No, but I am interested in earthquake insurance resources (https://www.earthquakeauthority.com/)

13. **Have you done anything to your home to make it less vulnerable to hazards such as earthquakes, floods, and fires?**

    a. Yes
    b. No
    c. Not applicable; I rent my residence.

14. If a severe hazard event occurred today such that all services were cut off from your home (power, gas, water, sewer) and you were unable to leave or access a store for 72 hours, which of these items do you have readily available?

a. Potable water (3 gallons per person)
b. Cooking and eating utensils
c. Can opener
d. Canned/non-perishable foods (ready to eat)
e. Gas grill/camping stove
f. Extra medications and contact lenses (if applicable)
g. First aid kit/supplies
h. Portable AM/FM radio (solar-powered, hand crank, or batteries)
i. Handheld "walkie-talkie" radios (with batteries)
j. Important family photos/documentation in a water- and fireproof container
k. Extra clothes and shoes
l. Blanket(s) / sleeping bag(s)
m. Cash
n. Flashlight (with batteries)
o. Gasoline
p. Telephone (with batteries)
q. Pet supplies
r. Secondary source of heat

What else do you have in your emergency kit? For more information on emergency kits, visit: https://www.ready.gov/kit

15. **Do you know if your neighbors have any physical, mental, or situational circumstances that a hazard situation could make worse (may include limited mobility, severe medical conditions, memory impairments, language barriers, or no access to a vehicle)?**
    a. Yes
    b. No

16. **How can the Agency help you become better prepared for a disaster? (choose all that apply)**
    a. Provide effective emergency notifications and communication.
    b. Provide training and education to residents and business owners on how to reduce future damage.
    c. Provide community outreach regarding emergency preparedness.
    d. Create awareness of special needs and vulnerable populations.
    e. Other (please specify)

17. **Does your employer have a plan for disaster recovery in place?**
    a. Yes
    b. No
    c. I don't know

18. **Does your employer have a workforce communications plan to implement following a disaster, so they can contact you?**
    I. Yes
    II. No

III. Recommendations and Future Participation

19. **Would you like to be contacted when the Draft 2025 EOCWD Hazard Mitigation Plan is available for review?**
    a. Yes; please notify me using my contact information in the next question.
    b. No

20. **If you would like to be notified of future opportunities to participate in hazard mitigation and resiliency planning, please provide your name and e-mail address. If you do not have an e-mail address, please provide your mailing address. This information will be kept confidential.**

Full Name:	
E-Mail Address:	
Street Address:	
City, State, Zip:	

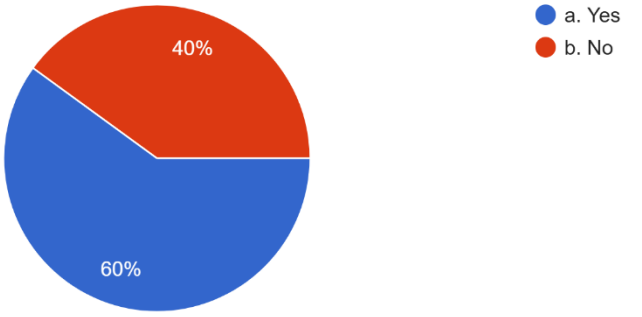
21. **Please provide us with any additional comments/suggestions/questions about your risk of future hazard events.**

Thank you for taking the time to complete this survey. If you have any questions, or if you know of other people/organizations that should be involved, please contact the Project Team at eoch2o@eocwd.com.

The DISTRICT Hazard Mitigation Plan Survey Results

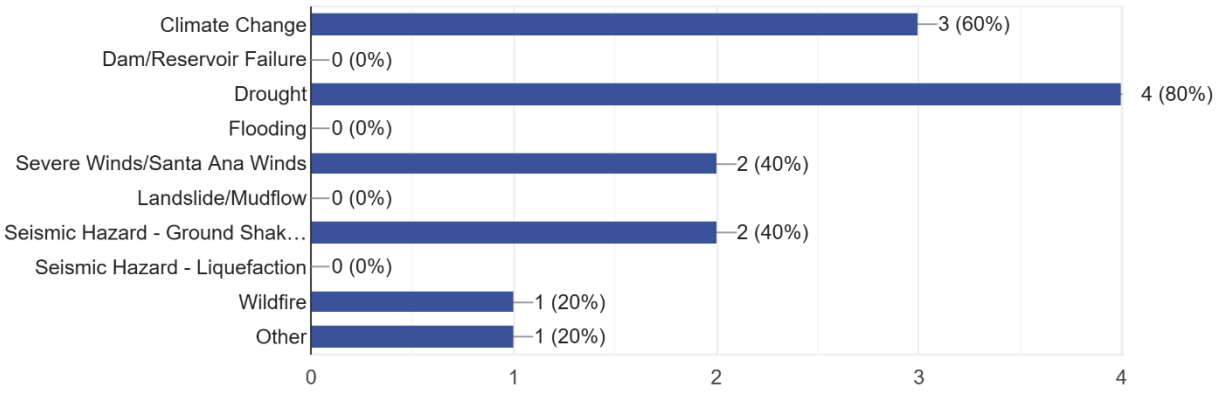
1. Have you been impacted by a hazard event in your current residence?

5 responses



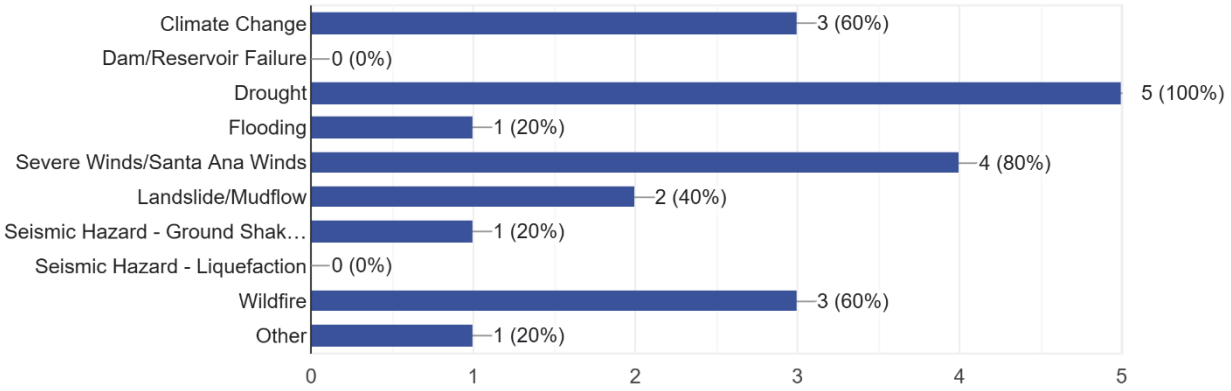
2. If you answered yes to the previous question, please select the type of hazard event that you have been impacted by (select all that apply).

5 responses



3. The following hazards could potentially impact the planning area. Please mark the FIVE (5) hazards that most concern your neighborhood or home.

5 responses



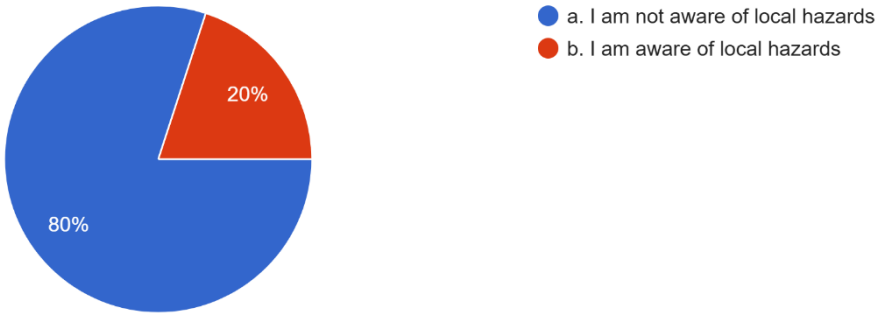
If you selected "Other" above, please list any additional hazards that have previously impacted your neighborhood or home.

1 response

Groundwater plume

4. The Planning Team uses various data sources to identify hazards in your community. Sometimes these sources do not capture smaller events. Are th... rain storms) that you'd like share with our team?

5 responses



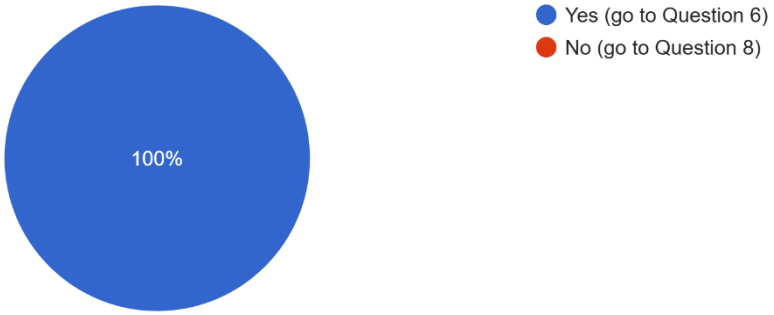
Please provide as much detail as possible, including location and type of hazard.

1 response

Groundwater plume decreasing ground supply use. Wind blowing debris and damaging vehicles/property

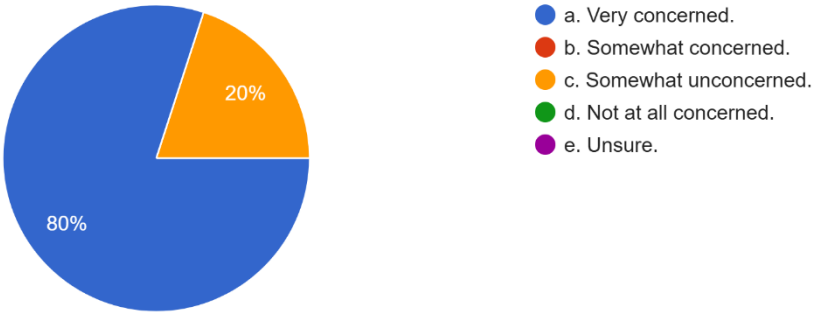
5. Do you believe that our climate is changing?

5 responses



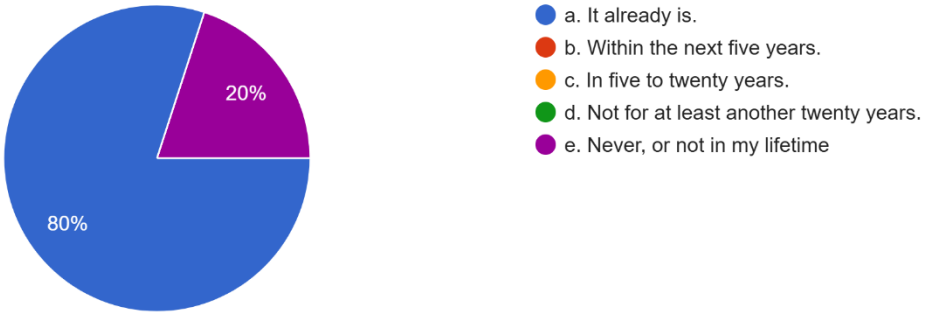
6. How concerned are you that climate change may create new hazardous situations or worsen existing natural hazards?

5 responses



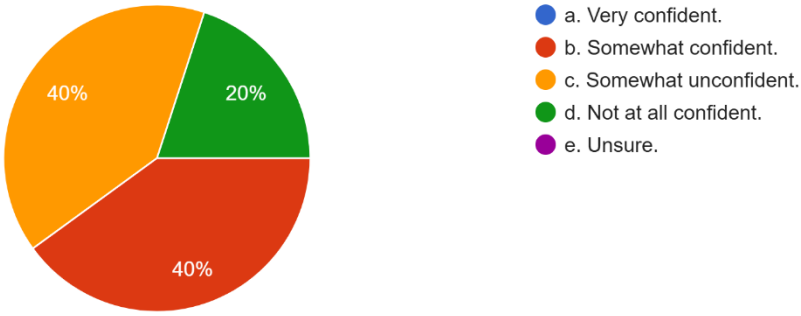
7. When do you think climate change will pose a threat to your health, property, livelihood, or overall wellbeing?

5 responses



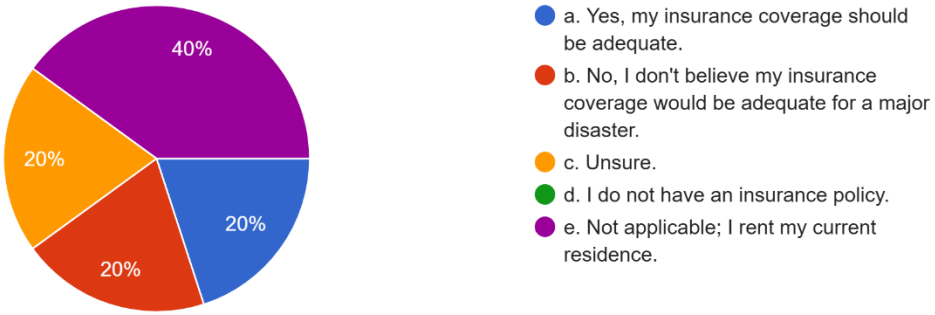
8. If you have taken any action to protect yourself against natural hazards, how confident are you that these actions will be sufficient to protect against more severe hazards in the future?

5 responses



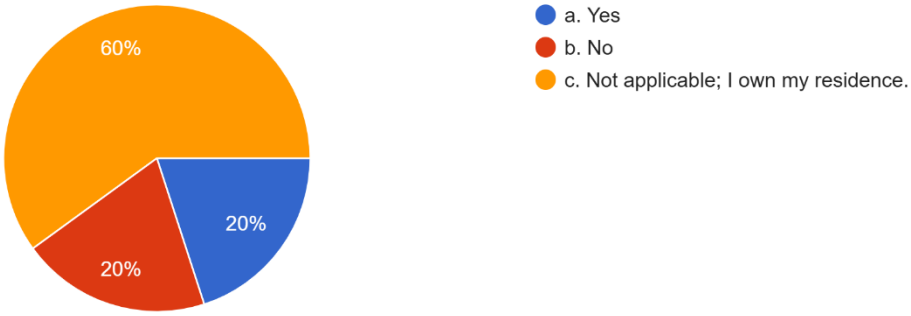
9. If you are a homeowner, do you have adequate homeowners' insurance to cover the hazards that could impact your home?

5 responses



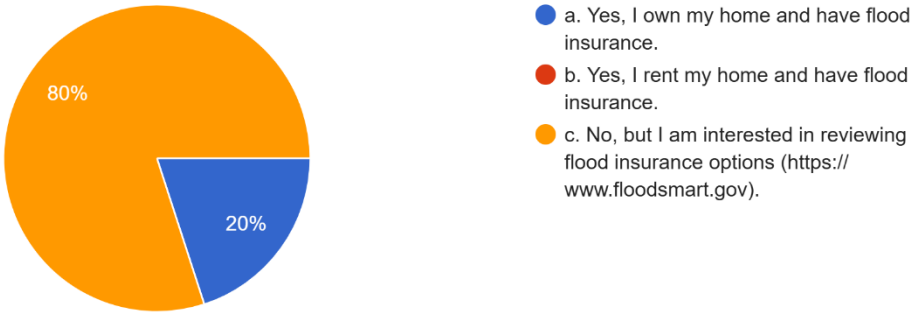
10. If you rent your residence, do you have renters' insurance?

5 responses



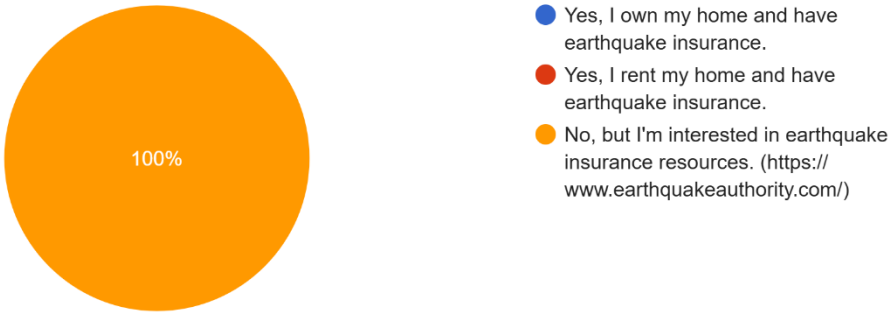
11. Do you have flood insurance for your home?

5 responses



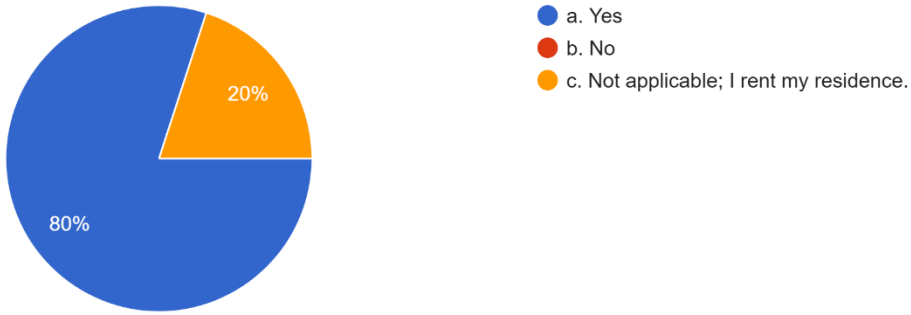
12. Do you have earthquake insurance for your home?

5 responses



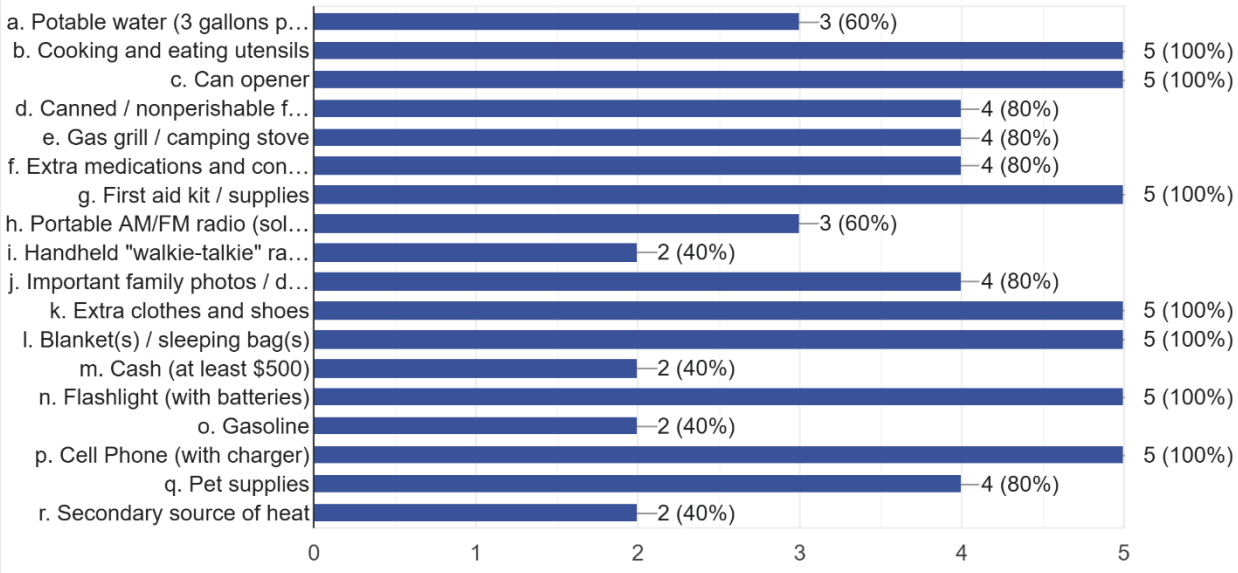
13. Have you done anything to your home to make it less vulnerable to hazards such as earthquakes, floods, and fires?

5 responses



14. If a severe hazard event occurred today such that all services were cut off from your home (power, gas, water, sewer) and you were unable to l...hich of these items do you have readily available?

5 responses



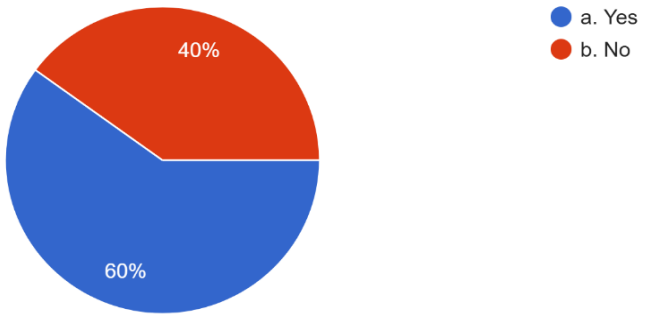
What else do you have in your emergency kit? For more information on emergency kits, visit https://www.ready.gov/kit

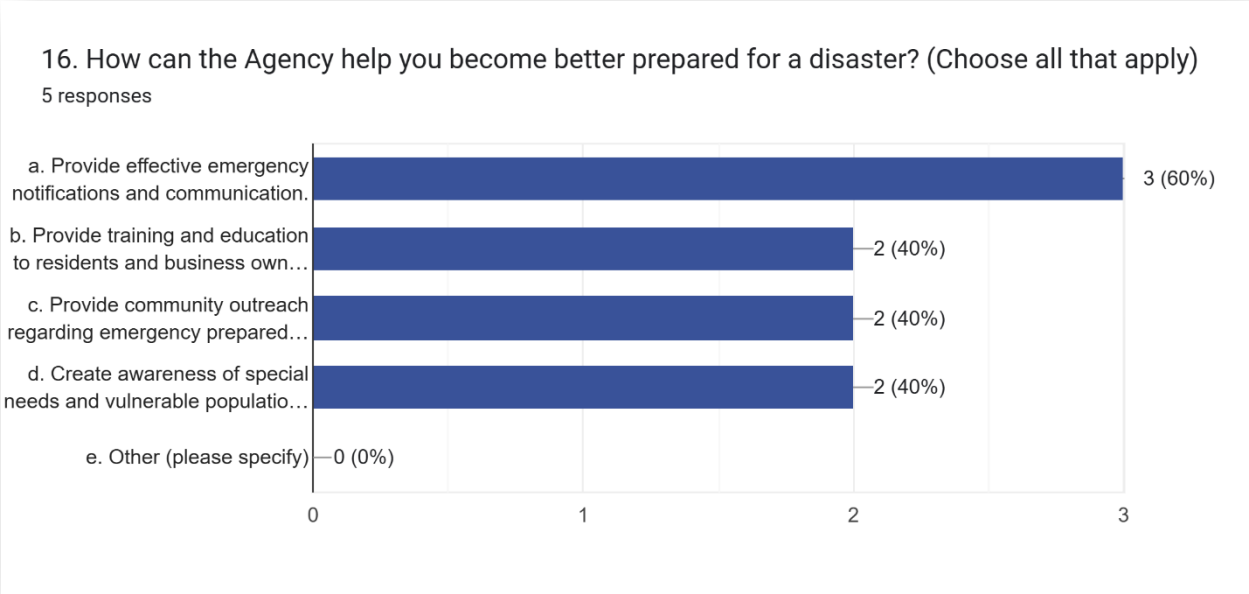
1 response

Extra food, water, space blanket, knife, whistle, firestarter, matches, compass

15. Do you know if your neighbors have any physical, mental, or situational circumstances that a hazard situation could make worse (may include limi...ts, language barriers, or no access to a vehicle)?

5 responses





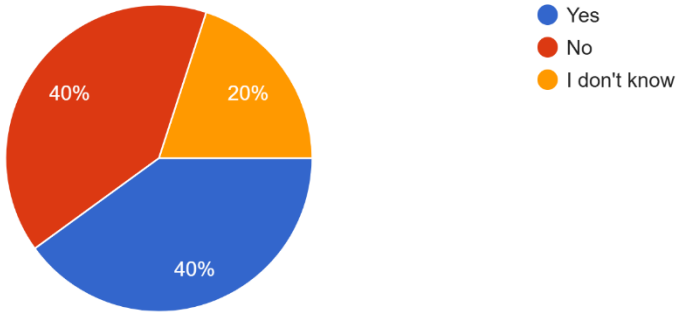
If you selected “Other” above, please describe.

0 responses

No responses yet for this question.

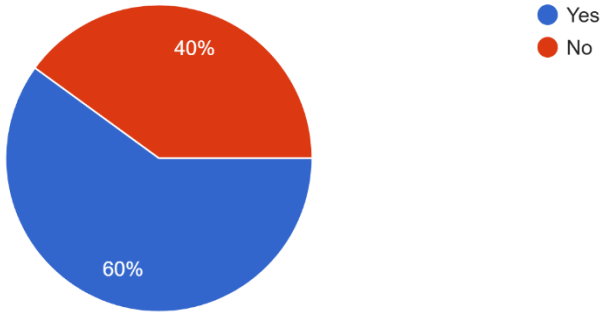
17. Does your employer have a plan for disaster recovery in place?

5 responses



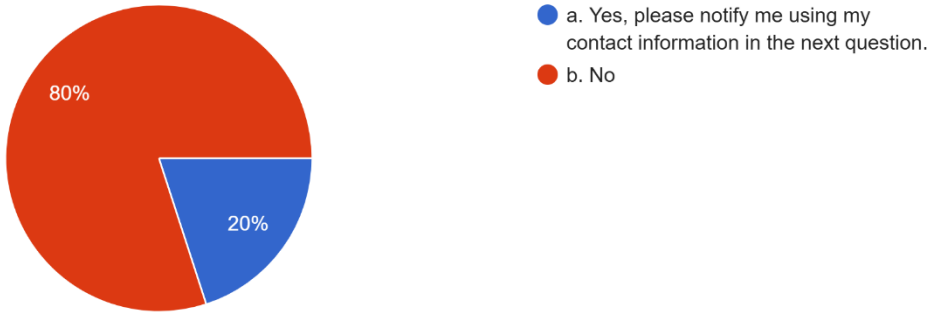
18. Does your employer have a workforce communications plan so they can contact you following a disaster?

5 responses



19. Would you like to be contacted when the Draft 2025 EOCWD Hazard Mitigation Plan is available for review?

5 responses



20. If you would like to be notified of future opportunities to participate in hazard mitigation and resiliency planning, please provide your name and e-mail address. If you do not have an e-mail address, please provide your mailing address. This information will be kept confidential.

1 response

Provided Emails are Confidential

21. Please give us any other comments/suggestions/questions about your risk of future hazard events.

1 response

Climate change needs to be accounted for in our area planning regardless of feelings on facts. We need to take into account what is happening based on evidence not feelings.

Thank you for taking the time to complete this survey. If you have any questions, or if you know of other people/organizations that should be involved, please contact the Project Team at eoch2o@eocwd.com.

APPENDIX C

Appendix C - Resolution of Adoption

(TO BE INSERTED AFTER BOARD OF DIRECTORS APPROVAL)

APPENDIX D

Appendix D- List of Key Facilities

TABLE 4-1: KEY CRITICAL FACILITIES AND INFRASTRUCTURE		
Facility/Infrastructure Type	**Number of Facilities**	**Replacement Value***
Buildings (EOCWD Headquarters, Warehouse)	3	$8,800,000
Production Wells	2	$13,000,000
Pump Stations	3	$1,500,000 (Cost includes only the pumps and building)
Reservoirs	4	$33,500,000
System Connections	18	$7,400,000
Tanks (Surge/Pressure)	4	$40,000
PFAS Treatment Plant (includes 3 tanks, 2 cartridge filters, and 4 ion exchange vessels)	1	$11,000,000
Pipelines (Includes Sewer Main, Water Lateral, and Water Main)	216.4 (linear miles)	$856,287,082
Total	**35**	**$931,527,082**

*Potential loss data are estimates only, as replacement values for some facilities were not available. Actual losses may be greater than the estimate presented in this table.

Not all critical facility locations are listed here. Only those locations that have been made accessible to public records have been listed to maintain facility site integrity and security.

APPENDIX E

Appendix E – Hazard Mitigation Implementation Handbook

Hazard Mitigation Plan Implementation Handbook

October 2025

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What Is This Handbook?

The Local Hazard Mitigation Plan (LHMP) for the District features an evaluation of the District's hazards as well as a variety of corresponding mitigation actions. These actions are intended to preserve public safety, maintain critical municipal government operations and services when hazard events emerge, and empower community members to take on hazard mitigation at an individual level. This Implementation Handbook (Handbook) is intended for use by District staff and decision-makers after the LHMP is adopted. It will:

- Give clear instructions following the adoption of the LHMP.
- Simplify future updates to the LHMP.
- Assist the District in preparing grant funding applications related to hazard mitigation.
- Guide annual plan review actions.

How do I Use This Handbook?`

This Handbook can help District staff and decision-makers in several different situations. If and when the events listed below occur, consult the respective sections of this Handbook for advice on how best to proceed:

- A disaster proclamation has been issued by the EOCWD Board of Directors
- A disaster proclamation has been issued by the State of California
- A disaster declaration has been signed by the Federal Government
- I want to apply for mitigation grant funding
- The District is undergoing its budgeting process
- The District is holding its annual meeting of the Hazard Mitigation Planning Team
- The District is updating the following policy and regulatory documents:
    - The Local Hazard Mitigation Plan
    - District Urban Water Management Plan
    - District Sewer System Management Plan
    - Retail/Wholesale Zone Master Plans
    - Sewer Master Plan

Who Maintains This Handbook?

The Hazard Mitigation Planning Team (HMPT) leader is responsible for maintaining this Handbook. At the time of writing, the current HMPT leader is Bobby Young, the EOCWD Engineering Manager. The HMPT may delegate this responsibility to someone else should they choose.

What to do when a disaster has been proclaimed or declared

Disasters may be proclaimed or declared by the EOCWD Board of Directors, the State of California, or the federal government. Responsibilities may differ depending on who proclaims or declares the disaster. If multiple organizations proclaim or declare a disaster, consult all applicable lists.

The EOCWD Board of Directors

If the EOCWD Board of Directors proclaims a Local Emergency, take the following steps:

- ☐ Update **Attachment** 1 with information about the disaster. Include information about cumulative damage, including any damage outside of the District.
- ☐ Discuss opportunities for local assistance with the representatives from the California Office of Emergency Services (Cal OES).
- ☐ If the disaster damages local infrastructure or District-owned facilities, repair or rebuild the structure to be more resilient, following applicable hazard mitigation actions. A list of actions, organized by hazards, is included in **Attachment 4**.
- ☐ **Chapter 6** of the EOCWD LHMP states that the District should consider updating the LHMP if a disaster causes a loss of life in the District, even if there is no state disaster proclamation or federal disaster declaration that includes part or all of the District. If there is a loss of life in the District, consider updating the LHMP. Consult the section on updating the LHMP in this Handbook for details.

The State of California

If the State of California proclaims a disaster for the District service area, or an area that includes part or all of the District, take the following steps:

- ☐ Update **Attachment 1** with information about the disaster. Include information about cumulative damage, including any damage outside of the District.
- ☐ Collaborate with representatives from Cal OES to assess the damage from the event.
- ☐ Discuss opportunities for local assistance with representatives from Cal OES.
- ☐ If the disaster damages local infrastructure or District-owned facilities, repair or rebuild the structure to be more resilient, following applicable hazard mitigation actions. A list of actions, organized by hazards, is included in **Attachment 4.**
- ☐ If the disaster may escalate into a federal disaster declaration, begin any necessary coordination with representatives from the Federal Emergency Management Agency (FEMA).
- ☐ **Chapter 6** of the EOCWD LHMP states that the District should consider updating the LHMP if a disaster leads to a state disaster proclamation or federal disaster declaration that includes part or all of the District, even if there is no loss of life. Consider updating the LHMP. Consult the section on updating the LHMP in this Handbook for details.

The Federal Government`

If the federal government declares a disaster for the District service area, or any area that includes part or all of the District, take the following steps:

- ☐ Update **Attachment 1** with information about the disaster. Include information about cumulative damage, including any damage outside of the District.
- ☐ Collaborate with Cal OES and FEMA representatives to assess the damage.
- ☐ Determine if the District will be eligible for public assistance funds related to the federal disaster declaration. These funds can be used to reimburse the District for response and recovery activities. If the District is eligible, work with FEMA and Cal OES representatives to enact the necessary requirements and receive funding.
- ☐ If the disaster damages local infrastructure or District-owned facilities, repair or rebuild the structure to be more resilient, following applicable hazard mitigation actions. A list of actions, organized by hazards, is included in **Attachment 4**.
- ☐ The Hazard Mitigation Grant Program (HMGP) is a FEMA program that helps fund hazard mitigation activities after a disaster event. The District may be eligible for funding because of the federal disaster declaration, although not all activities may meet the program's requirements. If the District is eligible, work with FEMA to apply for this funding.
- ☐ **Chapter 6** of the EOCWD LHMP states that the District should consider updating the LHMP if a disaster leads to a state disaster proclamation or federal disaster declaration that includes part or all of the District service area, even if there is no loss of life. Consider updating the LHMP. Consult the section on updating the LHMP in this Handbook for details.

I Want to Apply for Mitigation Grant Funding

There are three potential grant funding programs that FEMA administers for hazard mitigation activities. Two of these programs, the Building Resilient Infrastructure and Communities (BRIC)[1] and Flood Mitigation Assistance (FMA) funding sources are available to jurisdictions/agencies with an LHMP that complies with FEMA guidelines and has been adopted within the past five years. The third funding program is the Hazard Mitigation Grant Program (HMGP), which is available for communities that are part of a federal disaster declaration. This section discusses the BRIC and FMA programs and how to apply for them. The HMGP is discussed under the "Federal Government" subsection of the above "What to Do When a Disaster Has Been Proclaimed or Declared" section.

Building Resilient Infrastructure and Communities (BRIC)

Building Resilient Infrastructure and Communities (BRIC) will support states, local communities, tribes, and territories as they undertake hazard mitigation projects, reducing the risks they face from disasters and natural hazards. BRIC is a FEMA pre-disaster hazard mitigation program that replaced the Pre-Disaster Mitigation (PDM) program.

The BRIC program's guiding principles are supporting communities through capability- and capacity-building, encouraging and enabling innovation, promoting partnerships, enabling large projects, maintaining flexibility, and providing consistency.

Development projects must be identified in a hazard mitigation plan that meets FEMA guidelines and has been adopted within the past five years. When applying to this program, review the list of hazard mitigation actions in **Attachment 4** to see which projects may be eligible. Planning

[1] The BRIC Program still exists; however, it is currently not being funded.

efforts for communities that lack a valid hazard mitigation plan may be eligible for funding if the effort would create a valid hazard mitigation plan. All BRIC grant applications are processed through the State. To learn more, consult with Cal OES representatives or visit the FEMA webpage for the program. At the time of writing, this webpage is available at https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities.

TAKE THE FOLLOWING STEPS TO APPLY FOR BRIC FUNDING:

- ☐ Confirm that the program is currently accepting funding applications. Check with representatives from Cal OES or consult the Cal OES webpage on the BRIC program. At the time of writing, this webpage is available at https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities.
- ☐ Identify the actions from the hazard mitigation strategy (see Attachment 4) that call on the City to pursue funding or list grants as a potential funding source. Confirm that the actions are consistent with the requirements of the BRIC grant.
- ☐ Coordinate with Cal OES representatives to compile and submit materials for the grant application.

Flood Mitigation Assistance

The FMA grant program is a competitive, national program that awards funding for physical development projects and planning efforts that mitigate against long-term damage from flooding. The funding is only available to communities participating in the National Flood Insurance Program (NFIP), which Colton currently does. Communities must also have a valid hazard mitigation plan that meets FEMA guidelines to be eligible, and all projects must be consistent with the list of actions in the hazard mitigation strategy. When applying to this program, review the list of hazard mitigation actions in **Attachment 4** to see which projects may be eligible. As with the BRIC program, applications for the FMA program must be processed through the State. To view more information, consult with Cal OES representatives or visit the FEMA webpage on the program. At the time of writing, this webpage is available at https://www.fema.gov/grants/mitigation/floods.

TAKE THE FOLLOWING STEPS TO APPLY FOR FMA FUNDING:

- ☐ Confirm that the program is currently accepting funding applications. Check with representatives from Cal OES or consult the Cal OES webpage on the FMA program. At the time of writing, this webpage is available at https://www.fema.gov/grants/mitigation/floods.
- ☐ Identify the actions from the hazard mitigation strategy (**see Attachment 4**) that call on the City to pursue funding or list grants as a potential funding source. Confirm that the actions are consistent with the requirements of the FMA grant.
- ☐ Coordinate with Cal OES representatives to compile and submit materials for the grant application.

EOCWD is going through the budgeting process

The District's budget process is an ideal opportunity to secure funding for hazard mitigation actions and to ensure that hazard mitigation efforts are incorporated into the District's fiscal priorities. The District currently operates on an annual budget cycle that runs from July 1st to June 30th, which covers both the Wholesale Zone's capital improvement projects and the Retail Zone's day-to-day operations.

During this process, District staff should take the following steps to incorporate hazard mitigation into the District's annual budget:

- ☐ Include hazard mitigation activities into the District's list of Capital Improvement Projects (CIP). Review the list of hazard mitigation actions in Attachment 4 and identify the projects that can be included in the CIP or can support efforts within the CIP.
- ☐ Review the risk and threat assessments in the LHMP (Chapter 3 and Chapter 4) to ensure that all items in the CIP list are planned, designed, and constructed to minimize the threat from hazard events.
- ☐ Identify opportunities to identify stand-alone hazard mitigation actions through the annual budget process. Include appropriate items from Attachment 4 in the budget as stand-alone line items, particularly items that the Hazard Mitigation Planning Team (Planning Team) considered a high priority.
- ☐ Set aside staff to conduct hazard mitigation activities, including time to participate in Planning Team meetings and research, prepare, and submit BRIC and FMA grant opportunities (consult the "I Want to Apply for Mitigation Grant Funding" section above).
- ☐ Ensure hazard mitigation activities are reflected in each department's priorities and earmarked time for specific goals.

EOCWD is Conducting its Annual meeting of the Hazard Mitigation Planning Team

The hazard mitigation planning process brings together representatives from multiple District departments as well as other relevant stakeholders. It provides a forum to discuss the hazards in the District and how to mitigate them effectively. As mentioned in **Chapter 6** of the LHMP, the Planning Team should meet at least once each year, beginning a year after the LHMP is adopted. During these meetings, the Planning Team should discuss implementation progress and integration of hazard mitigation actions in other District documents. At these meetings, the Planning Team can review the status of the hazard mitigation actions and discuss whether completed or in-progress actions are working as expected. These meetings also allow the Planning Team to strategically plan for the upcoming year.

It may help for the Planning Team to meet early in the year, in advance of annual budget activities. **Attachment 3** contains an example of a Planning Team Meeting Agenda.

The annual meeting should include representatives from City departments and other organizations that originally prepared the LHMP. Representatives from other relevant organizations should also be invited. During the preparation of the current LHMP, the following individuals were part of the Planning Team:

TABLE 1-1: EOCWD HAZARD MITIGATION PLANNING TEAM (HMPT)	
Name	**Title**
Bobby Young	Engineering Manager
Jerry Mendzer	Operations Manager
Sylvia Prado	Office Manager
David Youngblood	General Manager

In advance of Planning Team meetings, consider using **Attachment 1** to maintain an accurate list of recent disaster events that have occurred in and around the District since the LHMP was adopted. At the Planning Team meeting, review the Plan Maintenance Table **(Attachment 2**) to identify any gaps in the LHMP or any other component of the plan that needs updating. This also allows Planning Team members the opportunity to review the actions in the hazard mitigation strategy **(Attachment 4)** and ensure that they are implemented as intended.

EOCWD is updating its policy and regulatory documents

If the District is updating the LHMP, consult the following section and use it as a guide for the update process. If the District is updating any regulatory documents such as the District Urban Water Management Plan, District Sewer System Management Plan, Retail/Wholesale Zone Master Plans, or Sewer Master Plan, the District can use this section as a template/guide to incorporate the documents.

Local Hazard Mitigation Plan

All LHMPs should be updated every five years. This helps keep the plan up to date and ensures that it reflects the most recent guidance, requirements, science, and best practices. An updated LHMP also helps keep the District eligible for hazard mitigation grants that require a valid, recent LHMP (see "I Want to Apply for Mitigation Grant Funding"), along with an increased amount of post-disaster recovery funds.

The update process for the LHMP takes approximately one year. To ensure that a new LHMP comes into effect before the previous one expires, the update process should begin no later than four years after the plan is adopted. Updates may occur sooner at the District's discretion. Potential reasons for updating the LHMP sooner may include a state disaster proclamation or federal disaster declaration that covers part or all of the District, or if a disaster leads to a loss of life in the District service area (see the "What to Do When a Disaster Has Been Proclaimed or Declared" section), as discussed in **Chapter 6** of the LHMP.

Take the following steps to update the LHMP:

ASSEMBLE THE HAZARD MITIGATION PLANNING TEAM

- ☐ Convene a Planning Team meeting no later than four years after the LHMP is adopted. Invite the regular Planning Team members, along with representatives from other organizations that may have a role to play in the update process.
- ☐ Review the current status of mitigation actions, including if there are any that are not being implemented as planned or are not working as expected. Determine if there have been any changes in hazard events, regulations, best practices, or other items that should be incorporated into an updated LHMP.
- ☐ Decide if there is a need for a technical consultant to assist with the LHMP update and conduct consultant selection activities if needed. If a consultant is desired, the selection process should begin a few months before the update begins.
- ☐ Create and implement a community engagement strategy based on the strategy prepared for the existing LHMP. Describe in-person and online engagement strategies and materials, including ideas for meetings and workshops, draft community surveys, content for websites and press releases, and other materials that may be useful.

UPDATE THE RISK AND THREAT ASSESSMENTS

- ☐ Review and update the risk assessment to reflect the most recent conditions in the District. Consider recent hazard events, new science associated with hazards and climate change, new development and land use patterns, and other recent changes in local conditions.

- ☐ Evaluate the status of all key District facilities. Update this list if new facilities have been constructed or if existing facilities have been decommissioned. Re-assess the threat to key facilities.
- ☐ Review the demographics of community residents and update the threat assessment for vulnerable populations and other district service area members.
- ☐ Assess any changes to the threat to all other community assets, including key services, other facilities, and economic drivers.

UPDATE THE MITIGATION ACTIONS

- ☐ Update the existing hazard mitigation actions to reflect actions in progress. Remove actions that have been completed or revise them to increase their effectiveness. Revise actions that have been abandoned or delayed to make them more feasible or remove them from the list of mitigation actions if they are no longer appropriate for the District.
- ☐ Develop mitigation actions to improve the status of hazard mitigation activities in the District by addressing any issues not covered by the existing LHMP.
- ☐ The ability to expand current mitigation capabilities will generally be reliant upon the budget allocated for each department/program for that fiscal year. The level at which these programs may or may not be expanded upon will be dependent upon the amount of funding received. FEMA has released a series of guides over the past few years that highlight some of the ways in which jurisdictions can expand mitigation. Some strategies for increasing current mitigation capabilities may include:
  - The District should actively identify, adopt, and enforce the most current set of development codes and standards available. Strongly encouraging new infrastructure development to be constructed to higher standards than currently required, increasing resilience within the district service area.
  - Engaging parts of the district that may not be actively involved in mitigation efforts.
  - Expanding the number and types of organizations involved in mitigation planning and implementation, increasing both efficiency and bandwidth.
  - Fostering new relationships to bring underrepresented populations and partners to the hazard mitigation planning process.
  - During the annual LHMP review, the HMPT should look for opportunities to fund and expand/enhance the effectiveness of current mitigation actions.
  - During annual budgeting processes, the District should identify new funding sources (bonds, grants, assessment districts, etc.) that can be used to support existing capabilities enhancements.
- ☐ Ensure that the feedback from the community engagement activities is reflected in the new and updated mitigation actions.

REVIEW AND ADOPT THE UPDATED PLAN

- ☐ Review the other chapters and appendices of the LHMP to reflect any changes made through the update process.
- ☐ Release the updated plan to the Planning Team members and revise the plan to

reflect any comments by Planning Team members.

- ☐ Distribute the updated Plan to any appropriate external agencies not included in the Planning Team and revise the plan as appropriate in response to any comments.
- ☐ Release the updated plan publicly for review and make revisions to the plan to reflect public comments.
- ☐ Submit the plan to Cal OES and FEMA for approval and make any necessary revisions.
- ☐ Submit the plan to the EOCWD Board of Directors for adoption.

Attachment 1: Disaster Information Table

Use this table to fill out the information about any disaster events that have occurred in the District service area or nearby and have affected the community. Include the date and location of the disaster event, the damages associated with the event, and any information about disaster proclamations or declarations resulting from the event.

Date	Location	Damages *	Declaration Details †

* Includes number and type of injuries, number of deaths, and cost of physical damage
† If the disaster was proclaimed or declared by the local, state, and/or federal government

Attachment 2: Plan Maintenance Table

Use this table when reviewing the LHMP as part of the Planning Team's annual activities. For each section of the LHMP, note if any changes should be made to make the plan more effective for the community. This includes noting if anything in the LHMP is incorrect or if any important information is missing. Make revisions consistent with these notes as part of the next update to the LHMP.

Section	Is Anything Incorrect?	Is Anything Missing?	Should Any Other Changes Be Made?
Multiple sections or throughout			
Chapter 1: Introduction			
Chapter 2: Community Profile			
Chapter 3: Risk Assessment			
Chapter 4: Threat Assessment			
Chapter 5: Mitigation Strategy			
Chapter 6: Plan Maintenance			
Appendices			

Attachment 3: Sample Agenda and Topics for the Hazard Mitigation Planning Team

This attachment includes a sample agenda and discussion topics for the annual meeting of the Planning Team. Meetings do not have to follow this order or structure, but the items included in this attachment should be addressed as part of the annual meeting. During the update process for the LHMP, it is likely that the Planning Team will meet more frequently. The meetings of the Planning Team during the update process will involve different discussion topics.

ITEM 1: RECENT HAZARD EVENTS

1.1. What hazard events have occurred this past year in the District service area or nearby in a way that affected the community?
- Identify events that caused loss of life or significant injury to the District customers, significant property damage to District assets, or widespread disruption to the District.
- More minor events should also be identified if there is a need for a community response to mitigate against future such events.

1.2. What are the basic facts and details behind any such hazard events?
- Consider the size and location of the affected area, any measurements of severity, any injuries and deaths, the cost of any damage, the number of people displaced or otherwise impacted, and other relevant summary information.
- Ensure that these facts and details are clearly recorded for future plan updates, including using the Disaster Information Table (**Attachment 1**).

ITEMS 2: MITIGATION ACTION ACTIVITIES

2.1. What mitigation actions have been fully implemented? Are they working as expected, or do they need to be revised?

2.2. What mitigation actions have started to be implemented since the Planning Team last met? Is the implementation of these actions proceeding as expected, or are there any barriers or delays? If there are barriers or delays, how can they be removed?

2.3. What mitigation actions are scheduled to begin implementation in the next year? Are there any factors that could delay implementation or weaken the effectiveness of the actions? How can these factors be addressed?

2.4. What resources are needed to support planned, in-process, or ongoing mitigation actions? Does the District have access to these resources? If not, how can the District obtain access to these resources?

ITEM 3: INFORMATION SHARING

3.1. Is the District communicating with all appropriate local jurisdictions, including neighboring communities, Orange County, and other special districts? This should include information on district-specific hazard situations, mitigation actions, and other relevant information.

3.2. Is the District communicating with the appropriate state and federal agencies? Is the District receiving information about new regulations, best practices, and data related to hazard mitigation activities?

3.3. Are there opportunities for the District to improve coordination with local, state, and federal jurisdictions and agencies?

ITEM 4: BUDGETARY PLANNING

4.1. What are the financial needs for the District to support the implementation of planned and in-process mitigation actions, including ongoing items? Is there sufficient funding for all measures in the LHMP that are planned for the next year, including in-process and ongoing items? If sufficient funding is unavailable, how can the District obtain these funds?

4.2. If it is not feasible for the District to support all planned, in-process, or ongoing mitigation actions, which ones should be prioritized?

4.3. Are there hazard-related activities not included in the LHMP that should be budgeted for? Can the District obtain the necessary funding for these activities?

ITEM 5: STRATEGIC PLANNING

5.1. Which grants are available for hazard mitigation activities, and which activities are best positioned to secure funding?

5.2. How should the agencies and other organizations represented on the Planning Team coordinate to maximize the chances of receiving funding?

5.3. Are there any scheduled or anticipated updates to other District documents that could relate to hazard mitigation activities? How can the Planning Team share information with staff and any technical consultants responsible for these updates, and ensure that the updates will enhance community resiliency?

5.4. What capital projects are scheduled or anticipated? Are these capital projects being designed and built to be resistant to hazard events? Are there opportunities for these projects to support hazard mitigation activities?

5.5. How can Planning Team members coordinate efforts with those responsible for capital projects to take advantage of economies of scale that will make implementing hazard mitigation activities easier?

5.6. Has it been four years since the adoption of the LHMP? If so, lay out a timeline for plan update activities, including additional meetings of the Planning Team. Identify if a technical consultant is needed and begin the contracting process.

5.7. Are there any other opportunities for Planning Team members and the organizations they represent to coordinate efforts?

ITEMS 6: NEW BUSINESS

6.1. Are there any other items related to the Planning Team's mission?

Attachment 4: Hazard Mitigation Strategy

TABLE 5-3: MITIGATION ACTIONS IMPLEMENTATION PLAN							
Action #	**Mitigation Action Item**	**Hazard(s) Addressed**	**Potential Funding Source**	**Responsible Agency**	**Relative Cost**	**Time Frame**	**Priority**
Multi-Hazard							
Action #1	Reconstruct Peters Canyon Reservoir to avoid future seismic, landslide, and wildfire risks. HMP grant is in process.	Earthquake, Landslide, Wildfire	District reserves, FEMA HMA Funding,	District	High ($20 Million)	Phase 1 Underway / Phase 2 - 2026	High
Action #2	Develop an outreach protocol for District projects and programs to ensure effective and timely information sharing and status updates on mitigation-related efforts through the various methods of communication used by the District.	All Hazards	District Funds	District	Low	Ongoing	High
Action #3	Upgrade facilities that would allow the District to remotely close valves at major reservoirs to protect an existing water source in times of emergency. Phase project one turnout is complete; additional turnouts to be completed.	All Hazards	District Reserves, DHS-EMPG Funding HMA Grant Funding	District	High	Long Term	Low
Action #4	Incorporate components of this hazard mitigation plan into other District plans and programs.	All Hazards	District Funds	District	Low	Ongoing	Medium
Action #5	Develop a technical communications plan to build redundancy and evaluate the cost/benefit and feasibility of different communications systems.	All Hazards	District Funds (Annual Operating Budget)	District	Low	Short Term	High

TABLE 5-3: MITIGATION ACTIONS IMPLEMENTATION PLAN							
Action #	**Mitigation Action Item**	**Hazard(s) Addressed**	**Potential Funding Source**	**Responsible Agency**	**Relative Cost**	**Time Frame**	**Priority**
Action #6	Build redundancy into the wastewater collection system to mitigate major structural defects.	All Hazards	District Funds (Annual Operating Budget)	District	High	Short Term	Medium
Action #7	Maintain Water Emergency Response Organization of Orange County (WEROC) membership for communication and collaboration opportunities with regional water districts, including identification and implementation of mitigation actions with shared benefits.	All Hazards	District Funds (Annual Operating Budget)	District	Low	Ongoing	High
Action #8	As repair and rehabilitation needs are identified in vertical structural facilities, consider options that increase stability and resiliency as needed. Make improvements in accordance with current codes.	All Hazards	District Funds (Annual Operating Budget)	District	High	Short Term	Medium
Action #9	Explore opportunities to partner with external agencies (such as WEROC, local/county police, local/county fire, customer cities, and other water/wastewater providers) to expand opportunities for education regarding hazards and hazard mitigation. By collaborating with other agencies, outreach will engage larger audiences across a variety of platforms.	All Hazards	District Funds (Annual Operating Budget)	District	Medium	Ongoing	Low
Action #10	Develop and maintain Specific Hazard Response Plans (SHRPs) as vulnerabilities become apparent. Include SHRPs in regular training and exercise programs.	All Hazards	District Funds (Annual Operating Budget)	District	Low	Short Term, Update as Needed	Low

TABLE 5-3: MITIGATION ACTIONS IMPLEMENTATION PLAN							
Action #	**Mitigation Action Item**	**Hazard(s) Addressed**	**Potential Funding Source**	**Responsible Agency**	**Relative Cost**	**Time Frame**	**Priority**
Action #11	Develop a policy and protocol for evaluating any structural damage to critical structures and facilities.	All Hazards	District Funds (Annual Operating Budget)	District	Low	Short Term, Update as Needed	Medium
Action #12	Provide ongoing training for EOCWD employees to identify danger signs of potential system failures associated with physical damage, communications failure, loss of function, etc.	All Hazards	District Funds (Annual Operating Budget)	District	Low	Short Term Ongoing	High
Action #13	Update and implement the District's Cybersecurity Plan, with future work focused on the inclusion of a disaster recovery (DR) plan.	All Hazards	District Funds (Annual Operating Budget)	District	Low	Short Term, Update as Needed	High
Action #14	Train and exercise staff on cybersecurity procedures and protocols.	All Hazards	District Funds (Annual Operating Budget)	District	Low	Ongoing	High
Action #15	Participate in neighboring jurisdictions, OC San, and OCFA mutual aid response teams training exercises. Develop/update mutual aid agreements with these entities to provide support during an emergency.	All Hazards	District Funds (Annual Operating Budget)	District	Low	Ongoing	Low
Severe Wind							
Action # 16	Establish procedures for staging District vehicles, materials, and equipment at alternative work locations before significant storm events.	Severe Wind, Flood, Landslide	District Funds (Annual Operating Budget)	District	Low	Short Term, Ongoing	Low

TABLE 5-3: MITIGATION ACTIONS IMPLEMENTATION PLAN							
Action #	**Mitigation Action Item**	**Hazard(s) Addressed**	**Potential Funding Source**	**Responsible Agency**	**Relative Cost**	**Time Frame**	**Priority**
Action # 17	Upon SCE's possible PSPS event notification, ensure that adequate staff are available to pre-position supplies/ equipment, and confirm that adequate generator capacity is available. Maintain communications with SCE during the PSPS power outage event.	Severe Wind, Wildfire	District Funds (Annual Operating Budget)	District	Low	Ongoing, as needed	Medium
Earthquake (Seismic Shaking, Liquefaction)							
Action #18	Assess water transmission pipelines that interface liquefiable soils and replace vulnerable pipelines to mitigate future impacts from earthquakes.	Earthquake	District reserves, FEMA HMA Funding,	District	High	Long Term	Medium
Action #19	Complete sewer line replacements when vulnerabilities are identified.	Earthquake	District reserves and debt financing, FEMA HMA Funding	District	High	Short Term, DOF	Medium
Action #20	If any EOCWD-owned critical facility is determined to be seismically vulnerable, identify a plan to conduct structural retrofitting, including funding sources.	Earthquake	District Funds (Annual Operating Budget)	District	Low	Ongoing	High
Action #21	Assess seismic vulnerability for all structures and facilities (non-critical).	Earthquake	District Funds (Annual Operating Budget)	District	Low	Short Term	Low

TABLE 5-3: MITIGATION ACTIONS IMPLEMENTATION PLAN							
Action #	**Mitigation Action Item**	**Hazard(s) Addressed**	**Potential Funding Source**	**Responsible Agency**	**Relative Cost**	**Time Frame**	**Priority**
Landslide							
Action #22	Identify and protect EOCWD assets with a high relative vulnerability to the effects of landslides or mudslides.	Landslide	District Funds (Annual Operating Budget)	District	Low	Long Term	Low
Action #23	Implement erosion control and slope stabilization measures at existing vulnerable critical infrastructure locations.	Landslide	District Funds (Annual Operating Budget)	District	High	Ongoing	Medium
Wildfire							
Action #24	Evaluate opportunities to enhance infrastructure building hardscape (including protective walls) and undergrounding power lines as appropriate.	Wildfire	District Funds (Annual Operating Budget)	District	Medium	Short Term Ongoing	Low
Action #25	Annually review defensible space, brush clearing, and weed abatement needs for all vulnerable EOCWD critical facilities and infrastructure, to reduce fuel sources and decrease fire vulnerability.	Wildfire	District Funds (Annual Operating Budget)	District	Low	Short Term Ongoing	High
Action #26	Annually update and share a list of EOCWD facilities in Fire Hazard Severity Zones with OCFA.	Wildfire	District Funds (Annual Operating Budget)	District	Low	Short Term	Medium

TABLE 5-3: MITIGATION ACTIONS IMPLEMENTATION PLAN							
Action #	**Mitigation Action Item**	**Hazard(s) Addressed**	**Potential Funding Source**	**Responsible Agency**	**Relative Cost**	**Time Frame**	**Priority**
Action #27	Adopt a policy for the design of non-combustible facilities to reduce the threat and impact of structure fires.	Wildfire	District Funds (Annual Operating Budget)	District	Medium	Short Term Ongoing	Low
Action #28	Construct new facilities and retrofit existing facilities with non-combustible building materials.	Wildfire	District reserves and debt financing, FEMA HMA Funding	District	High	Long Term	Medium
Drought							
Action #29	Monitor well efficiencies during drought conditions and establish a threshold for investment into a new/ deeper well.	Drought	District reserves and debt financing, FEMA HMA Funding	District	High	Long Term	Medium
Flood/ Dam Failure							
Action #31	Protect and reinforce facilities within floodplain areas or relocate facilities out of harm's way.	Flood/ Dam Failure	District Funds (Annual Operating Budget)	District	High	Long Term	Medium

TABLE 5-3: MITIGATION ACTIONS IMPLEMENTATION PLAN							
Action #	**Mitigation Action Item**	**Hazard(s) Addressed**	**Potential Funding Source**	**Responsible Agency**	**Relative Cost**	**Time Frame**	**Priority**
Action #32	Coordinate with police and public safety agencies for EOCWD-preferred response actions during localized flooding incidents, to prevent increased flood waters impacting EOCWD facilities and the service area.	Flood/ Dam Failure	District Funds (Annual Operating Budget)	District	Low	Ongoing	High
Cost Estimates							
$ (Low) - Less than $75,000							
$$ (Medium) $??? – $??? 75k - 200k							
$$$ (High) – Greater than $??? + 200k							