Local Hazard Mitigation Plan

Timber Cove County Water District

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Section 1.0 Introduction

The Board of Directors of the Timber Cove County Water District (TCCWD) authorized the development of this Local Hazard Mitigation Plan (LHMP) with a vision to incrementally reduce its exposure to natural hazards and improve the reliability of its services to the public. This plan was developed in accordance with the Federal Disaster Mitigation Act (DMA) 2000 (Public Law 106-390), Title 44 Code of Federal Regulations (CFR) Part 201, an "Approval Pending Adoption" letter was sent to TCCWD noting tentative approval by the Federal Emergency Management Agency (FEMA) on September 14, 2026 and adopted by the Board of Directors of TCCWD on September 26, 2026, with FEMA issuing a Final Approval on October 14, 2026 A FEMA-approved LHMP is a prerequisite for receiving grants under FEMA's Hazard Mitigation Assistance Programs and other federal assistance during declared emergencies. FEMA requires LHMPs to be updated every five years.

1.1 Purpose of the Plan

The objective of this plan is to provide TCCWD and the public with a thorough evaluation of the natural hazard risks and vulnerabilities affecting TCCWD's infrastructure, and to outline an action plan to address these vulnerabilities. By conducting this assessment, educating the public, and implementing the plan, TCCWD will be better equipped to meet its responsibilities in the event of a natural di saster.

Natural disasters historically impose significant costs on the public, including loss of life, human suffering, property damage, and economic loss. A lack of preparedness can prolong recovery, making it a lengthy and challenging process that can affect a region long after the physical damage has been repaired. In response to this, the Federal Government enacted the Disaster Mitigation Act of 2000 (DMA 2000), amending the Stafford Act of 1988 (Public Law 100-707), to promote and reward pre-disaster planning at all levels of government. To implement the DMA 2000 planning requirements, FEMA published an Interim Final Rule in the Federal Register on February 26, 2002. This rule (44 CFR Part 201, Section 201.6) established the current mitigation planning requirements for states, tribes, and local communities. To ensure that Local Hazard Mitigation Plans (LHMPs) comply with both the DMA 2000 and 44 CFR Part 201, FEMA released the Local Mitigation Planning Policy Guide in April 2025 and the Local Mitigation Planning Handbook in June 2025, to assist local, tribal, and state governments in preparing and reviewing LHMPs. Together, these documents form the regulatory foundation for all LHMPs.

To encourage pre-disaster mitigation planning, the DMA 2000 established a pre-disaster hazard mitigation program. FEMA's Hazard Mitigation Assistance (HMA) programs become available upon adoption of a LHMP and provide funding for eligible mitigation projects that reduce future disaster risks to life and property, helping communities build long-term resilience nationwide. FEMA's HMA grant programs include:

-Hazard Mitigation Grant Program (HMGP)

-Hazard Mitigation Grant Program Post-Fire (HMGP Post-Fire)

-Pre-Disaster Mitigation Congressionally Directed Spending

-Flood Mitigation Assistance (FMA)

-Building Resilient Infrastructure and Communities (BRIC)

-Safeguarding Tomorrow Revolving Loan Fund (Safeguarding Tomorrow RLF).

A comprehensive LHMP is prepared in recognition of TCCWD's responsibility to provide reliable, potable water to the Timber Cove community. TCCWD's water supply and infrastructure is very localized (590 acres), which increases the vulnerabilities of the system so that a relatively small disruption can have a greater impact on the District's ability to serve the community. TCCWD is situated in an area affected by

multiple natural hazards, including floods, wildfires, and landslides. Due to its proximity to multiple fault lines, including the San Andreas Fault system, one of the world's major active fault systems, TCCWD faces a very high potential for earthquake hazards.

Section 2.0 TCCWD and Community Profile

2.1 TCCWD Profile

2.1.1 Background

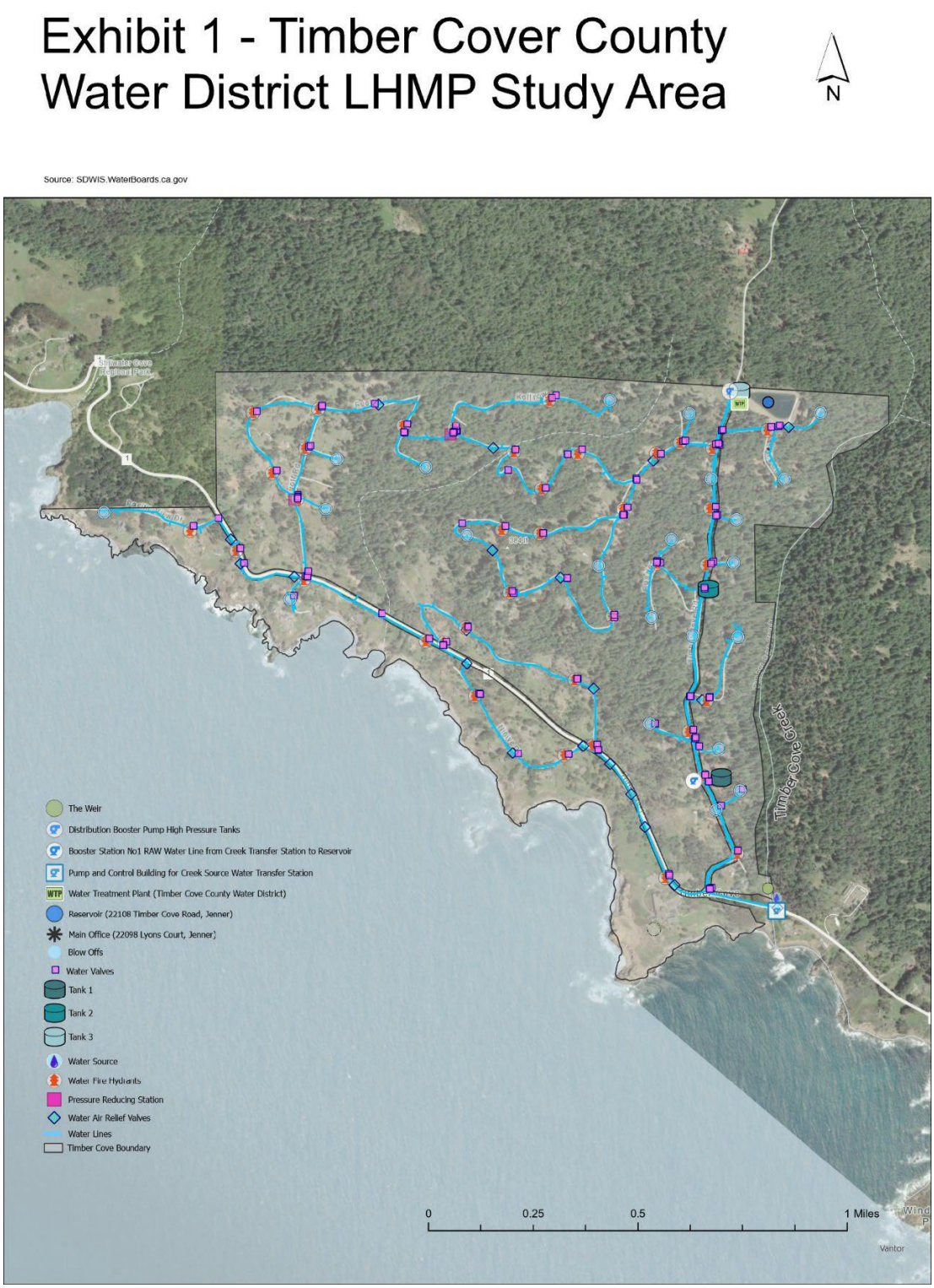
The TCCWD service area is located in the unincorporated census-designated place (CDP) of Timber Cove, in Sonoma County, California. The community of Timber Cove is located approximately 70 miles northwest of the City of San Francisco and approximately 30 miles northwest of the City of Santa Rosa located within the heavily wooded foothills of Northern California along the Pacific Coast. The area is designated a high fire hazard severity zone (FHSZ), is subject to severe weather during winter months, may be subject to the impacts of climate change, and is vulnerable to earthquakes due to seismic activity along several adjacent earthquake faults.

TCCWD was first established in 1978 as a mutual water company to provide the residents of Timber Cove with essential potable water. Since 1984, the TCCWD has been a Special Government Water District that provides water to approximately 270 customers in two units. Unit 1 consists of 56 residential connections and one commercial connection. Unit 2 consists of 214 connections within the Timber Cove Homeowner's Association, with the vast majority being residential connections. Currently, 3 to 5 new houses are built within TCCWD's service area per year, and the District is anticipating this trend to continue. (Personal communication with TCCWD General Manger). TCCWD extracts water from Timber Cove Creek as its only water source. Exhibit 1, *Timber Cove County Water District LHMP Study Area* shows TCCWD's current boundaries and critical infrastructure, derived from the Timber Cove County Water District 2023 Water Rate Study.

TCCWD's water infrastructure and assets consists of 50,604 liner feet of water main pipeline of various sizes depending on the different needs within the system, a 9.9 million gallon (40-acre feet) capacity raw water reservoir (approximately 2 years of District water demand), 3 water storage tanks, a weir for water collection in Timber Cove Creek, a water treatment facility, assorted pumps and tanks within the distribution system, an emergency generator, a new 1,000 sq ft office building, and other buildings, roads, and structures related to the maintenance and administration of the water district, see Table 2-3 Timber Cove County Water District Facilities. The District ensures that water quality meets state and federal standards through regular testing and maintenance to safeguard public health. The District's only source of water is surface water from Timber Cove Creek. The State of California is requiring TCCWD to identify a reliable secondary water source by 2028 and develop it if feasible. TCCWD is investigating assorted options such as new wells or contractual agreements with neighboring water agencies or private entities to provide alternative water sources. The remote location of the District provides challenges to this goal as there are no other large water agencies' infrastructure within proximity to Timber Cove.

Timber Cove is the sole water source for TCCWD. The District collects water from Timber Cove Creek by diversion via concrete weir, equipped with a subsurface polyethylene cut-off wall within the creek channel. This structure, along with screened infiltration galleries, captures and channels water to dual submersible raw water pumps. These pumps, equipped with level probes and an automatic shut-off feature, pump water to a 3,000-gallon polyethylene tank and then flow by gravity to the 40-acre-foot reservoir located at the treatment plant site. From the reservoir, water is withdrawn using a flexible hose situated two feet below the surface and is transported through ductile iron piping to the water treatment plant. Additionally, the reservoir

Exhibit 1: Timber Cove County Water District LHMP Study Area



is equipped with an overflow weir and a 12-inch pipe that directs excess water into a drainage ditch, allowing it to flow back into Timber Creek.

The District's water treatment plant utilizes aluminum sulfate injection, static mixing, clarification, filtration, disinfection, tank mixing, and ventilation. The water enters the system and is injected with aluminum sulfate to remove the finer particles (such as silt) by combining them via static mixing into heavier particles. The resulting particles are removed in the clarification tanks. The water passes through a filtration process to remove any remaining particles. The last step at the water treatment facility is disinfection of the water. Once disinfected, the water is pumped into Tank 3. Tank 3 has an internal tank mixer and ventilation system. These systems eliminate thermal stratification, reduce residual loss, and lowers residual disinfection chemicals by mixing and diluting the chemicals within the total water volume in the tank. Tank 3 is the start of the distribution system for TCCWD.

The District's existing pipelines (distribution and supply mains and connections) include diverse sizes of pipes depending upon the location of the line and the number of properties it serves within the community. The pipelines range in size from small diameter pipes for residential connections to larger mains for distribution throughout Timber Cove. Table 1: **Storage Tank Capacity** and Table 2: **Pipeline Inventory** provides the number and capacity of the supply tanks and the varying pipeline lengths per size within the TCCWD distribution system. Approximately 40,500 feet of the pipeline network is composed of C900 Polyvinyl Chloride (PVC) pipes, which is a standard material for municipal water distribution systems. Three sections of the system, Amanita Circle, Pine Court, and Cypress Court, uses asbestos concrete piping. Additionally, many of the shorter streets have 2" Schedule 40 PVC mains. Schedule 40 PVC is not permitted for water distribution main and is more common in residential construction.

Table 1: Storage Tank Capacity

Location	Capacity (gallon)
Tank 1	64700
Tank 2	21900
Tank 3	101000

(TCCWD Water Distribution System Evaluation, 2024)

Table 2: Pipeline Inventory

Pipe Diameter (inches)	Length (Linear Feet)
2"	13,321
3"	5,146
4"	2,556
6"	28,375
8"	1,206
Total	**50,604**

(TCCWD Water Distribution System Evaluation, 2024)

The District's critical infrastructure facilities and costs are presented in Table 3: **Timber Cove County Critical Facilities and Infrastructure**.

Table 3: Timber Cove County Critical Facilities and Infrastructure

Facility or Infrastructure Component	Estimated Replacement Cost[3]	Estimate Total Value[3]
Weir	185,000	185,000
Booster Pump System	28,500	28,500
Water Storage (natural reservoir and associated systems)	821,959	821,959
Water Treatment Plant (including tanks, pumps, chemicals and associated systems)	340,099	340,099
Emergency Generator (Water Treatment Plant)	76,000	76,000
Water Storage Tank #1	79,000	79,000
Water Storage Tank #2	101,000	101,000
Water Storage Tank #3	280,000	280,000
"Koftinaw" Pump Station (abandoned)	n/a	n/a
Amanita Circle, Pacific View Distribution Lines (replacement costs)	1,215,885	1,215,885
Tool Shed Reservoir	10,500	10,500
Distribution Piping, Values, and Meters Throughout TCCWD[1]	8,944,400	8,944,400
Fire Hydrants	156,172	156,172
Tools and other maintenance equipment	92,986	92,986
Pump and Control Building	22,666	22,666
Roadways at the Water Treatment Plant	13,754	13,754
Storage Building and Management Office	350,000	350,000
Steel Container Storage Shed	15,750	15,750
Fencing	48,910	48,910
Plant Office -22108 Timber Cover Rd[2]	260,000	260,000
Management Office-22098 Lyons Court	500,000	500,000

1. Total does not include Amanita Circle, Pacific View Distribution Lines replacement costs for the replacement of the existing asbestos concrete water lines with C900 PVC lines.
2. Including a Ford truck and water trailer for maintenance crew use.
3. All costs estimates provided by the Reserve Study Component Analysis and Reserve Final completed for Timber Cove County Water District, 2025, and TCCWD management.

2.1.2 Geography

TCCWD serves the unincorporated area of Timber Cove. Timber Cove is situated on approximately 590 acres of land located along the Pacific Ocean coastline in Sonoma County. Timber Cove is located 2 miles north of the Fort Ross State Historic Park and 3.1 miles south of Walsh Landing. Timber Cove is 30 miles northwest of Santa Rosa, the county seat of Sonoma County.

TCCWD's service area is bisected on the western edge by California State Route 1 (SR-1), as TCCWD maintains water lines, meters, and other infrastructure to the west of SR-1 for several houses and commercial uses along the Pacific Coast. Timber Cove Road delineates the southeastern boundary, Ruoff Road and Koftinow Road mark the eastern boundary, and Amanita Circle, Ruoff Road, SR-1 (also named Shoreline Highway), and Pacific View Drive constitutes the northern boundary of the service area.

2.1.3 Topography

TCCWD's service area is located along the low, rolling hills along California's northern coastline. The service area's elevation ranges from 100 feet above sea level at the western boundary of the service area to Storage Tank 3, at 623 feet above sea level on a hill located in the northeast corner of the water district. TCCWD's distribution and supply lines, and other infrastructure are arrayed in a roughly triangular shape through the forested hills east of the Pacific Ocean's coastline; refer to Exhibit 1. Approximately 37 residential water meters and the only commercial water meter are installed to service the properties along the bluffs above the coastline that constitutes TCCWD's western boundary. SR-1 bisects the properties along the western edge of the TCCWD boundary with a steep elevation rise of approximately 200 feet to the majority of the TCCWD service area to the east of the highway. The southern boundary is along the base of the steep northern bank of Timber Cove Creek from the head of the creek to the coastline.

2.1.4 Climate

The climate in Timber Cove is generally mild and temperate due to the marine influence of the Pacific Ocean. Temperatures range from a high in July of 82.3 degrees to a low of 56.9 degrees in January. An average of 43.5 inches of precipitation falls per year, with the majority falling between October and April. Timber Cove averages 260 sunny days and 71 days of precipitation. Average wind speed is 19.91 miles per hour. During severe weather events sustained wind speeds can be 30 miles per hour with gusts over 60 miles per hour being recorded.

2.2 Timber Cove Census Designated Place Community Profile

Population, housing, and other economic factors are vital when considering the relative impact of a major natural disaster on various sections of the community. The U.S. Census Bureau has defined the community of Timber Cove as a census designated place (CDP). A CDP is the statistical equivalent of a legally incorporated city. CDPs are given a geographical name that represents closely settled, unincorporated communities that are locally recognized, have geographical boundaries that are associated with the inhabitants' regular use, and can be identified by name.

Timber Cove CDP encompasses an area of approximately 5.7 square miles. Most of the housing within the CDP is in the unincorporated community of Timber Cove. Timber Cove is situated on approximately 590 acres of land at the northwest corner of the CDP and is served by the TCCWD, which provides water to approximately 269 residences and 1 commercial customer.

Timber Cove has a 53.5% employment rate with a median household income of $110,938 and $66,322 per capita income. Approximately 70.3% of Timber Cove residents commute to work, leaving 29.7% to work remotely at home. Construction is the largest employer of Timber Cove residents at 28.6% of the workforce.

The next highest industry category is arts, entertainment, recreation and hospitality at 23.1%, professional, scientific, and management careers employed 14.3%, education and health care, public administration, and transportation provided employment for the remainder with 9.9%, 5.5%, and 2.2%, respectively. No residents of the Timber Cove CDP are below the poverty line.

Timber Cove CDP has approximately 199 residents with a median age of 63, The residents are predominantly white (67%), with the remainder of the residents being Hispanic (22%) and Pacific Islander (8%). Over 92% of these residents have graduated high school and just over 43% attained a bachelor's degree or higher.

Approximately 97% of the dwellings are single unit homes, in which 72% of these are owner occupied. At the time of the Census, approximately 53% of the homes were vacant. Noting these demographic datapoints, the community is comprised of a mixture of primary and secondary homes.

Section 3.0 Planning Process

3.1 The Planning Process

3.1.1 How the Plan Was Prepared

TCCWD is the lead agency for the development of the LHMP. This LHMP is the first to be prepared by TCCWD and utilizes consultant support to prepare the plan. The overall approach to this inaugural LHMP was to review and assess the natural and manmade hazards to TCCWD and to determine ways to reduce those risks, and to prioritize and outline potential mitigation strategies. As part of this, TCCWD staff provided subject matter expertise about their infrastructure, operations, procedures, processes, rules, reports, studies, or other regulations.

This LHMP was undertaken and prepared in accordance with FEMA standards and 44 CFR §201.6(d)(3).

In January 2025, TCCWD began the process of preparing its first LHMP. Key subject-matter experts and personnel from the District were identified for participation in the LHMP development process as part of the Planning Team. An in-depth review of the existing Sonoma County LHMP was undertaken as the first step in understanding regional hazards, preparing the Planning Team for better understanding the context of local hazards.

A LHMP Planning Kickoff Meeting was held with the Planning Team and consultant team. The Planning Team consisted of members of the Board of Directors and the General Manager of TCCWD. At this kick-off meeting, stakeholders were identified as were initial hazards and potential impacts hazards could have on District infrastructure and operations.

Shortly after the LHMP Planning Kickoff Meeting, the consultant team, using information derived from the kickoff meeting, conducted hazard identification research by reviewing models, data sets, maps, and District guidance to draft the Hazard Identification portion of this LHMP. This draft was reviewed by the Planning Team with feedback shared with the consultant team. This revised draft was then shared with the public and stakeholders to invite further feedback and comment.

A similar process was followed for the Vulnerability Assessment portion of the LHMP, where the consultant team acquired the type and location of all TCCWD assets, mapped hazard overlays against TCCWD assets, and drafted the initial Vulnerability Assessment. This draft Assessment was reviewed by the Planning Team, updated, and shared with the public for a second round of engagement and feedback.

Finally, mitigation strategies were developed and vetted in a similar fashion beginning with consultant development of initial strategies, District review and feedback, and a collaborative process of prioritizing strategies informed by public input.

Public input and feedback were, and continues to be, sought throughout the planning process. During the development of the LHMP, the District updated its LHMP landing page on its website to facilitate review and feedback of the plan simple and accessible for the whole community as it was being developed. In June 2026, the completed draft plan was placed on this site for public comments. Once the plan is approved and adopted, the plan will always remain on the website for public review and comment.

3.2 Opportunities for Communities and Agencies to be Involved in the Planning Process

As this is the District's first LHMP, it created a new page on its website in May 2025 to advertise the plan and allow residents to provide feedback year-round at https://www.timbercovecountywaterdistrict.org/tccwd-local-hazard-mitigation-plan. This site will remain active on an ongoing basis to allow residents access to view and comment on the plan at any time. On the site, the community can access the plan and provide feedback via a dedicated email address.

In addition to the webpage access of the plan year-round for the public, the District also participated in outreach activities to solicit input from the community. Below is a list of the highlights of these activities.

3.2.1 Opportunities for Stakeholder Involvement in the Planning Process

During the LHMP Planning Team Kickoff Meeting, stakeholders were identified. These stakeholders were notified of the LHMP effort being undertaken by the District via email and were individually invited to participate in the three public outreach meetings and to give feedback on the draft plan. No comments from these specific stakeholders have been received at this time. Specific stakeholders engaged in the LHMP process included:

- Fort Ross School – Gena Owen
- Timber Cove Fire Protection District
- Timber Cove Homeowners Association
- Timber Cove Resort – Margaret Grahame
- Timber Cove Ranch – John Rosson
- Scott Farmer – Timber Cove resident, Coast MAC representative

3.3 Public Involvement During Drafting

3.3.1 Opportunities for Public Involvement During Drafting and Incorporation of Feedback into Plan

On May 17, 2025, the District conducted a public presentation at one of its regularly scheduled Board meetings, where the LHMP was introduced to the public and discussed at length. A presentation of what the LHMP is and what it is intended to do was given, as well as an initial assessment of hazards. The presentation concluded with a Q&A period where members of the community offered important insight and lived experience that helped inform the understanding of hazards present with TCCWD. The draft hazard assessment was posted on the webpage, and the community was encouraged to visit the page and share additional feedback with the Planning Team.

On March 3, 2026, the District conducted a second public presentation, its regularly scheduled Board meeting. This meeting focused on the Vulnerability Assessment, which assesses the impacts of the identified hazards on District infrastructure and operations. A presentation of methods and findings were shared, and the session concluded with Q&A where feedback and insight was gathered from attendees. The draft Vulnerability Assessment was posted on the LHMP webpage for public viewing and comment.

Public comments directly influenced hazard identification and provided history, location, extent, and magnitude of wildfire, drought, and severe storm. Public comments provided collaborative input regarding the development of appropriate mitigation actions that are within TCCWD's authority.

On July 21, 2026 the District conducted a third and final public outreach meeting, to present the LHMP to the Board of Directors and community at large. The public was encouraged to view the plan on the District's website and to leave comments via the dedicated email address.

For each public outreach event, the district sent e-blast notifications to every customer with an email address on file, and the presentations were listed in the Board's meeting agendas. Meetings were recorded and placed on the LHMP website for public viewing at any time.

3.3.2 Outreach to authorities that regulate development.

TCCWD is a Special District within California and has sole authority regarding infrastructure development and policy creation. The California Division of Drinking Water provides a plan review for all water treatment and distribution infrastructure projects. Sonoma County provides permits for non-water treatment and distribution construction projects. Sonoma County was notified via email of the Draft LHMP and no comments from the county were received.

3.4 Incorporation of Existing Plans, Studies, Reports, and Information

Hazard mitigation planning must include review and incorporation of existing plans, studies, reports and technical information. The TCCWD LHMP Planning Team reviewed and assessed existing plans, studies, and data available from local, state, and federal sources. Documents reviewed and incorporated as part of the LHMP planning process are shown in **Table 4: Existing Plans, Studies, Reports, and Other Technical Data/Information**. A complete list of references is included in the "References" section.

Table 4: Existing Plans, Studies, Reports, and Other Technical Data/Information

Existing Plans, Studies, Reports, and Other Technical Data/Information	Planning Process/Area of Document Inclusion
California Department of Conservation	Hazard Profiles
California Department of Forestry and Fire Protection	Hazard Profiles
California Geological Survey	Hazard Profiles
Cal OES California State Hazard Mitigation Plan (2023)	Hazard Profiles
FEMA Flood Insurance Rate Maps	Hazard Profiles
FEMA Hazard Mitigation Assistance Program and Policy Guide (2025)	LHMP Plan Development
FEMA Local Mitigation Planning Handbook (2025)	Local Plan Integration Methods
FEMA Mitigation Ideas: A Resource for Reducing Risk to Natural Hazards (2013)	Mitigation Strategy Development

Existing Plans, Studies, Reports, and Other Technical Data/Information	Planning Process/Area of Document Inclusion
Sonoma County Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) Update (2021)	Hazard Profiles
Sonoma County Operational Area Emergency Operations Plan (2014)	Hazard Profiles
Southern California Earthquake Data Center	Hazard Profiles
Timber Cove County Water District Conservation Action Plan for Source Capacity Study	Mitigation Strategy Development
Timber Cove County Water District Emergency/ Disaster Response Plan (2025)	Mitigation Strategy Development
Timber Cove County Water District Phased Strategic Plan (2022)	Community Profile, Mitigation Strategy Development
Timber Cove County Water District Water Distribution System Evaluation (2024)	Community Profile, Mitigation Strategy Development
Timber Cove Fire Protection District Master Plan (2024)	Hazard Profile
U.S. Geological Survey	Hazard Profiles
U.S. Drought Monitor	Hazard Profiles
U.S. Census Bureau	Community Profile

Section 4.0 Hazard Identification and Risk Assessment

Natural hazard risk assessment is the process of measuring the potential impact to life, property and economic impacts resulting from natural hazards. The intent of the risk assessment is to identify, as much as practicable given existing/available data, the qualitative and quantitative vulnerabilities of a community. The results of the risk assessment provide a framework for a better understanding of potential impacts to the community and a foundation on which to develop and prioritize mitigation actions (see Section 5.0).

Mitigation actions can reduce damage from natural disasters, and an implementation strategy can direct scarce resources to areas of greatest vulnerability described in this section. This risk assessment follows the methodology described in FEMA publication, *Understanding Your Risks—Identifying Hazards and Estimating Losses* (FEMA 386-2, 2002), which outlines a four-step process:

1) Identify Hazards
2) Profile Hazard Events
3) Inventory Assets
4) Estimate Losses

Information gathered during the TCCWD planning process related to the above four steps are incorporated into the following discussions in this chapter.

Section 4.1: Hazard Identification identifies and prioritizes the natural hazards that threaten the TCCWD and Timber Cove community.

Section 4.2 through Section 4.9: Hazard Profiles describe each of the natural hazards that pose a threat to the TCCWD and Timber Cove community. Information includes the location, extent/magnitude/severity, previous occurrences, and the likelihood of future occurrences.

Section 4.10: Vulnerability Summary presents the TCCWD's exposure to natural hazards, identifying at-risk populations and assets, including TCCWD facilities and other critical facilities. Where the information was available, potential dollar loss estimates for facilities are provided to show a partial representation of the financial cost of a disaster to a community.

4.1 Hazard Identification

Per FEMA Guidance, the first step in developing the Risk Assessment is identifying the hazards. Since this LHMP will be TCCWD's first document of its kind, the TCCWD LHMP Planning Team does not have previous hazard mitigation planning documentation available to review. As such, the TCCWD LHMP Planning Team reviewed the Sonoma County Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) Update (2021) to determine the extent of natural hazards with potential to affect the TCCWD area.

In addition to reviewing the Sonoma County MJHMP, the TCCWD LHMP Planning Team reviewed previous hazard occurrences, which provide a historical view of hazard risk, and a window into potential hazards that can affect the TCCWD area in the future. Information about Federal and State disaster declarations in Sonoma County was compiled from FEMA and the California Office of Emergency Services' (Cal-OES) databases, as shown in Table 5: **Historical Federal and State Declared Disasters in Sonoma County**. Though not a complete snapshot of hazard incidences in the TCCWD area (since not all hazard events are federally or state declared), this table provides the TCCWD LHMP Planning Team with substantiated accounts of disasters affecting Sonoma County (including areas around Timber Cove) dating back to 1964, which predominately included wildfire, flooding, earthquakes, landslides, and winter storms. A singular

drought event and tsunami event were also declared. This list of events is not exclusive to Timber Cove; it is a compilation of declared disaster events in greater Sonoma County.

Table 5: Historical Federal and State Declared Disasters in Sonoma County

Year	Disaster Type	Disaster Name	Disaster Number
1964	Heavy Rains and Flooding	1964 Late Winter Storms	DR-183
1969	Severe Storms, Flooding	1969 Storms	DR-253
1981-1982	Severe Storms, Flood, Mudslides, High Tide	1982 Winter Storms	DR-651
1983	Coastal Storms, Floods, Slides, Tornadoes	Winter Storms	DR-677
1986	Severe Storms, Flooding	1986 Storms	DR-758
1990-1991	Freeze of '91	California Severe Freeze	DR-894
1992	Late Winter Storms	December Winter Storms	N/A (State Declared)
1993	Flood of '93	California Severe Winter Storms, Flooding and Mudslides	DR-979
1994	Fishing Emergency	California El Nino Effect (Salmon Industry)	DR-1038
1995	Winter Storm and Flood of '95, Parts I and II	1995 Severe Winter Storms	DR-1044
1997	Superbowl Flood	1997 January Floods	DR-1155
1998-2000	Flood of '98/ Rio Nido Debris Flow	California Severe Storms, Tornadoes, High Winds, Flooding	DR-1267
1998	Winter Storm and Flood	1998 El Nino Floods	DR-1203
2004	Geysers Fire	Fire	FM-2554
2005-2006	2005-2006 Winter Storms	Severe Storms, Flooding, Mudslides, and Landslides	DR-1628
2006	2006 April Storms	Severe Rainstorms and Flooding	N/A (State Declared)
2006	2006 June Storms	Severe Storms, Flooding, Landslides, and Mudslides	DR-1646
2007	Freeze Emergency	Extreme Freeze Conditions	N/A (State Declared)
2011	Great Tohoku Tsunami	California Tsunami Waves	DR-1968
2014-2016	Drought	California Drought	EO B-40-17
2014	South Napa Earthquake	California Earthquake	DR-4193
2015	Valley Fire	California Valley Fire and Butte Fire	DR-4240
2017	Severe Winter Storms, Flooding, and Mudslides	California Severe Winter Storms, Flooding and Mudslides	DR-4301
2017	Severe Winter Storms, Flooding, Mudslides	California Severe Winter Storms, Flooding and Mudslides	DR-4308
2017	Wildfires	California Wildfires	DR-4344

2019	Severe Winter Storms,	California Severe Winter Storms, Flooding and Mudslides	DR-4434
2019	Kincade Fire	Fire	DR-5295
2020	COVID-19 Pandemic	California COVID-19 Pandemic	DR-4482
2020	Wildfires	LNU Lightning Fire Complex	FM-5331
2020	Wildfires	Glass Fire	FM-5376
2021	Drought	Russian River Watershed	N/A (State Declared)
2021	Severe Storms	Severe Storms	N/A (State Declared)
2022	Winter Storm and Flooding	California Severe Winter Storms, Flooding and Mudslides	DR-4683
2023	Severe Winter Storms and Flooding	California Severe Winter Storms, Flooding, and Mudslides	EM-3591
2023	Severe Winter Storms, Flooding, Landslides, and Mudslides	California Severe Winter Storms, Flooding, and Mudslides	EM-3592
2023	Severe Winter Storms, Straight-line Winds, Flooding, Landslides, and Mudslides	California Winter Storms, Straight-line Winds, Flooding, Landslides, and Mudslides	DR-4699
2024	Severe Winter Storms	Severe Winter Storms	N/A (State Declared)
2025	Severe Winter Storms	February Storms	N/A (State Declared)
2025	Severe Storms	Late December Storms	N/A (State Declared)
2026	Storms	Early January 2026	N/A (State Declared)

Source: Federal Emergency Management Agency, Disaster Information. N.d. Disaster Information | FEMA.gov Accessed July 21, 2026.
California State Board of Equalization, Disaster List, Chronological List of Governor Proclaimed Disasters for Property Tax Purposes Accessed August 20, 2026
DR- Major Disaster Declaration
EO- Executive Order
FM- Fire Management Assistance Declaration

Based on the review of hazards identified in similar and relevant documents prepared for adjacent areas (including the Sonoma County MJHMP and the Sonoma County Water Agency LHMP), previous incidents, historical knowledge of localized events, and natural hazard trends, the TCCWD LHMP Planning Team developed a preliminary list of hazards with significant potential to occur in the Timber Cove area: earthquakes; wildfires; landslides; flooding; sea level rise; tsunami; drought; and severe storms. Due to limited resources to implement mitigation actions, a streamlined list of identified hazards ensures that appropriate levels of efforts are allocated to the hazards determined to have the largest potential impact on the TCCWD.

The following natural hazards were deemed by the Planning Team as having minimal potential impact on the District's ability to operate: Corrosive Soils, Extreme Heat, Hailstorm, Freezing Temperatures, and Coastal Erosion. The LHMP focuses on natural hazards; the human-caused hazards, such as hazardous materials, have been removed, as these issues are generally covered by other planning initiatives.

To ensure that hazards and vulnerabilities are accurately represented, TCCWD's geographic information system (GIS) team used an overlaying method for geographically defined hazards, using the most current data layers for the primary hazards to create Exhibits 2 through 9. The data used was the most current available. Table 6: **Hazards Summary for Timber Cove County Water District**, provides a summary of the natural hazards evaluated in this LHMP. The rating scale for probability and impact that follows is based on the history, frequency, and magnitude of the hazards listed in Table 6.

- Low = little to no likelihood of hazard event occurring or affecting infrastructure or operations (1% tp 10% chance in the next year)
- Medium = moderate likelihood of hazard occurring or affecting infrastructure or operations (1% to 10% chance in the next 10 years)
- High = very likely that hazard will occur or affect infrastructure or operations (10% to 100% chance in the next 10 years)

The hazard assessment considered natural hazards with a medium to high probability to be the primary hazards capable of impacting TCCWD infrastructure. The following hazards are assessed to be the most likely to affect TCCWD jurisdiction, and the risks and vulnerabilities associated with these are described in subsequent sections:

- Earthquake Hazards
- Wildfire Hazards
- Landslide Hazards
- Flooding Hazards
- Sea Level Rise Hazards
- Tsunami Hazards

- Drought
- Severe Storms

Data analysis of historical and estimated impacts have shown that the impacts to District infrastructure, staff, and clients will be minimal for Flooding, Sea Level Rise, and Tsunami. These hazards are not considered a priority for this LHMP. The analysis is included for informational purposes. The location of each hazard overlaid on TCCWD's infrastructure can be seen in Exhibits 2 to 9 throughout this report and within in Appendix C.

Table 6: Hazards Summary for Timber Cove County Water District

Hazards	History	Probability	Impact	Comments
Earthquake	Yes	High	High	TCCWD is located among multiple faults with an extensive history of regional earthquake activity.
Wildfire	Yes	High	High	The topography and vegetation of the area are contusive to wildfire.
Landslide	No	High	High	Although no recorded specific incidences, landslides in conjunction to other hazards and those occurring in close proximity to TCCWD can impact the District
Flooding	No	Low	Low	Localized flooding is often due to severe storms and creates minimal impacts.
Sea Level Rise	No	Low	Low	Sea Level Rise may impact over an extended time frame and will only affect a small area of TCCWD infrastructure.
Tsunami	Yes	Low	Low	Tsunami hazard is low due to TCCWD infrastructure located outside of inundation zone.
Drought	Yes	Medium	Medium	Drought impact will depend on steps taken by TCCWD to ensure service to the District clients
Severe Storm	Yes	High	Medium	Severe Storm impacts will vary depending on localized flooding and tree fall impacting District infrastructure.

4.2 Earthquake

4.2.1 Background

The term “earthquake” refers to the vibration of the Earth’s surface caused by movement along a fault, by a volcanic eruption, or even by manmade explosions. Vibration can be violent and cause widespread damage and injury or may be barely felt. Most destructive earthquakes are caused by movements along faults. An earthquake is both the sudden slip on an active earth fault and the resulting shaking and radiated seismic energy caused by the slip. Stresses in the earth’s outer layer push the sides of the fault together. Stress builds up, and the rocks slip suddenly, releasing energy in waves that travel through the earth’s crust and cause the shaking that is felt during an earthquake.

The amount of energy released during an earthquake is usually expressed as a magnitude and is measured directly from the earthquake as recorded on seismographs. Another measure of earthquake severity is intensity. Intensity is an expression of the amount of shaking at any given location on the ground surface (see Section 4.2.4 for more information on earthquake magnitude and potential ground shake maps). Seismic shaking is typically the greatest cause of loss to structures during earthquakes.

Fissures are narrow openings or cracks of considerable length and depth usually associated with a nearby fault or earthquake activity. Most fissures occur on unconsolidated ground (as opposed to bedrock) and they can develop from shaking, settling, and lurching of the ground during an earthquake.

The level of risk of an earthquake happening, in contrast to magnitude, is dependent on the proximity to a fault line. Timber Cove is located within an area that is traversed by several fault lines, including the San Andreas Fault. Timber Cove is at a very high risk for experiencing an earthquake, compared to other areas of California that are not as close to active faults. The magnitude of ground shaking from an earthquake, as well as the resulting damage, is dependent on multiple factors including: the type of soil structure and underground composition (sand, bedrock, etc.); construction of the buildings/infrastructure; distance from the epicenter; and other factors. Timber Cove is also located in an area that can experience the strongest ground shaking because it is also located near major active faults that are capable of the most intense ground shaking, which can damage or destroy buildings and other infrastructure.

USGS Earthquake Mapping Programs

ShakeMaps

The U.S. Geological Survey (USGS) Earthquake Hazards Program produces maps called ShakeMaps that map ground motion and shaking intensity following significant earthquakes. ShakeMaps focus on the ground shaking caused by the earthquake, rather than on characteristics of the earthquake source, such as magnitude and epicenter. An earthquake has only one magnitude and one epicenter, but it produces a range of ground shaking at sites throughout the region, depending on the distance from the earthquake, the rock and soil conditions at sites, and variations in the propagation of seismic waves from the earthquake due to complexities in the structure of the earth's crust.

A ShakeMap shows the extent and variation of ground shaking immediately across the surrounding region following significant earthquakes. Such mapping is derived from peak ground motion amplitudes recorded on seismic sensors, with interpolation where data are lacking based on estimated amplitudes. Color-coded instrumental intensity maps are derived from empirical relations between peak ground motions and Modified Mercalli intensity. In addition to the maps of recorded events, the USGS creates the following:

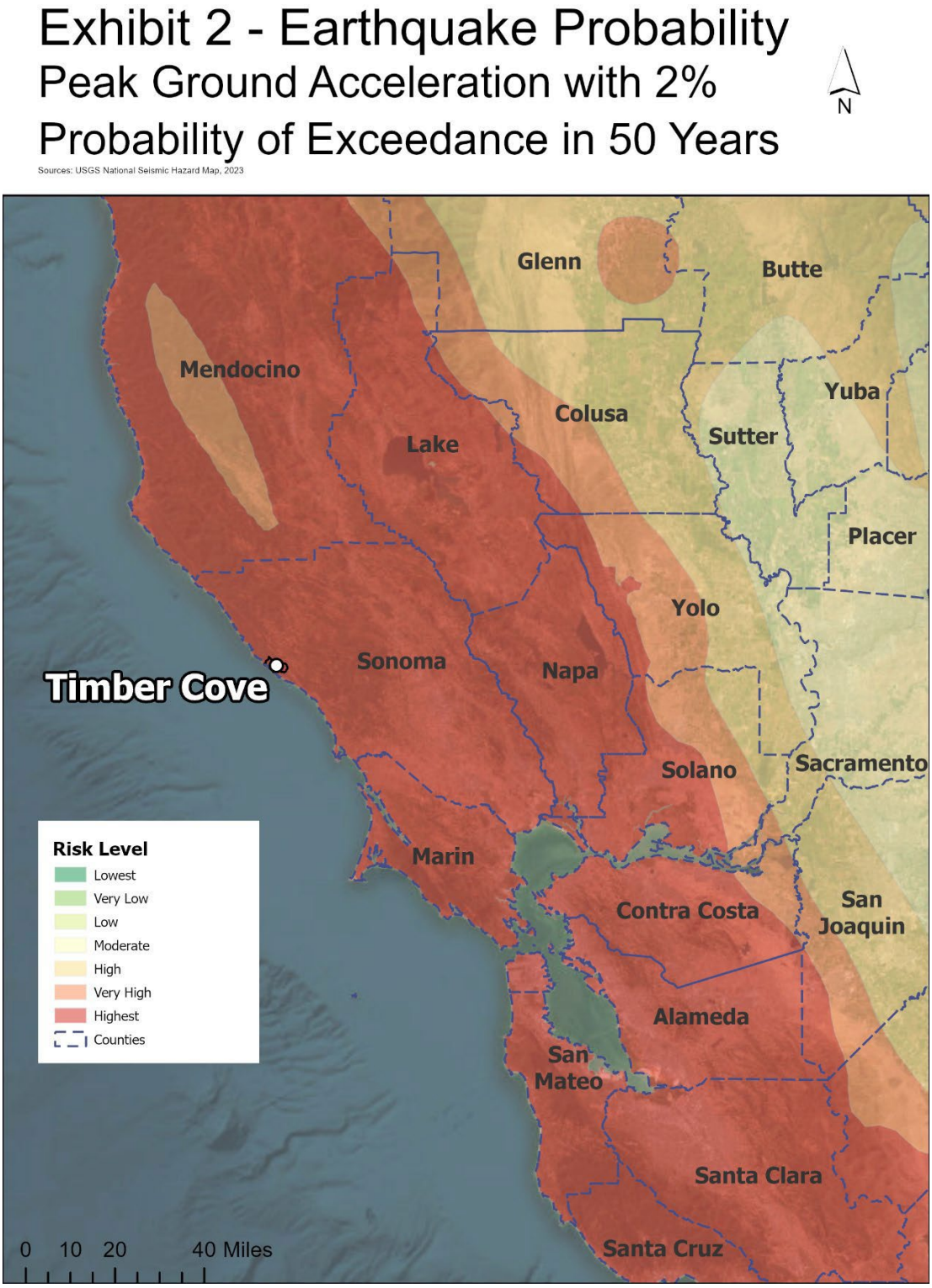
- Scenario ShakeMaps of hypothetical earthquakes of an assumed magnitude on known faults
- Probabilistic ShakeMaps, based on predicted shaking from all possible earthquakes over a 10,000-year period. In a probabilistic map, information from millions of scenario maps are combined to make a forecast for the future. The maps indicate ground motion at any given point that has a given probability of being exceeded in a given timeframe, such as a 100-year (1-percent-annual chance) event.

National Seismic Hazard Maps

National maps of earthquake shaking hazards provide information for creating and updating seismic design requirements for building codes, insurance rate structures, earthquake loss studies, retrofit priorities and land use planning. After thorough review of the studies, professional organizations of engineers update the seismic-risk maps and seismic design requirements contained in building codes. The USGS updated the National Seismic Hazard Maps in 2023. New seismic, geologic, and geodetic information on earthquake rates and associated ground shaking were incorporated into these revised maps. The 2023 map, shown in Exhibit 2, *Earthquake Probability Map (Peak Acceleration (%g) with 2% Probability of Exceedance in 50 Years)*, represents the best available data as determined by the USGS.

FEMA developed an Earthquake Hazard Map to designate seismic design categories (SDCs) which reflect the likelihood of experiencing earthquake ground shaking of various intensities (in contrast to the risk of experiencing an earthquake). SDCs are used to develop building codes to determine the level of seismic resistance required for new building construction. Building codes change over time, in part to new information and research into earthquake dynamics and its effect on construction methods, and the SDCs are modified dependent on such research, with the latest update occurring in 2020. The levels of severity

Exhibit 2: Earthquake Probability Map



are color/alphabetically coded on the FEMA Hazard Map ranging from “A/White” denoting the lowest probability of experiencing damage to “E/Red” being near major active faults capable of producing the most intense ground shaking. Refer to Exhibit 3, *FEMA Earthquake Hazard Map for Western United State*s. The map shows the range of earthquake severity of the Western United States.

Timber Cove is within an area that has the potential to experience severe ground shaking due to an earthquake. Exhibit 4, *Earthquake Zones Adjacent To Timber Cove* identifies multiple areas that can experience some of the most severe earthquake shaking. The California Geological Survey (CGS) began publishing maps of Earthquake Shaking Potential for California in 1999. Multiple revisions of the map were created utilizing data from the National Seismic Hazard Maps (NSHM). The Earthquake Shaking Potential Maps, like the NSHM, denotes areas with the potential to experience a full oscillation (back and forth movement) or one second of movement within the next 50 years by a percentage, with a 2% probability considered the most hazardous. In addition to NSHM data, the CGS incorporates anticipated amplification of ground motions by utilizing local soil conditions. The legend coloration on the map highlights the range of probability / hazard to an area by how close the area is to reaching a 2% probability of shaking, therefore, the area with the highest incident and force of ground movement. These areas are the most likely to be affected by an earthquake and suffer the most damage. The 2016 revision of the CGS Earthquake Shaking Potential For California map is considered the most recent. The area encompassing Amanita Circle, Pine Court, Umland Circle, Pacific View, and Ninive Drive have a probability of experiencing shaking as well as suffering the most damage. The infrastructure in that area is distribution main lines, meters, water valves, and water air relief valves. Leaks and ruptures in these areas will cause major disruptions in the District’s ability to provide water services.

4.2.2 Past Occurrences

According to the Sonoma County MJHMP, the Bay Area has experienced significant, well-documented earthquakes. Since 1855, more than 140 earthquakes have been felt in the Santa Rosa area (located approximately 30 miles southeast of Timber Cove). According to the Northern California Earthquake Data Center, two earthquakes of magnitude 5.0 or greater have been felt in Sonoma County since 2000:

- December 14, 2016—A 5.01 magnitude event near The Geysers
- August 24, 2014—A 6.02 magnitude event near South Napa

The sections below describe major recorded historical earthquakes that have affected Sonoma County.

Pre-1900 Earthquakes

Seven earthquakes are believed to have caused damage to structures in Sonoma County in the 19th century. Reported damage from these earthquakes indicates a Modified Mercalli rating of VI to VIII. Notable events were the 1868 magnitude 7.2 earthquake on the Hayward Fault and the 1898 magnitude 6.7 earthquake on the Rodgers Creek Fault. Although damage from these two events was limited due to the area’s sparse population at the time, a recurrence of either of these events would result in significant damage today.

1906 San Francisco Earthquake

The April 18, 1906, magnitude 8.3 earthquake on the northern segment of the San Andreas Fault caused major damage in Santa Rosa, Sebastopol, Healdsburg, Petaluma and other communities. Santa Rosa is said to have suffered more damage proportionally to its size than any other Bay Area city. The only reported casualties in Sonoma County were in Santa Rosa, where 65 died. The shaking lasted for about 50 seconds. The Santa Rosa Courthouse was totally destroyed by the shaking and ensuing fire, as were approximately

Exhibit 3: FEMA Earthquake Western United States

Exhibit 3 - FEMA Seismic Design Categories for Default Site Conditions

Sources: FEMA Earthquake Hazard Maps

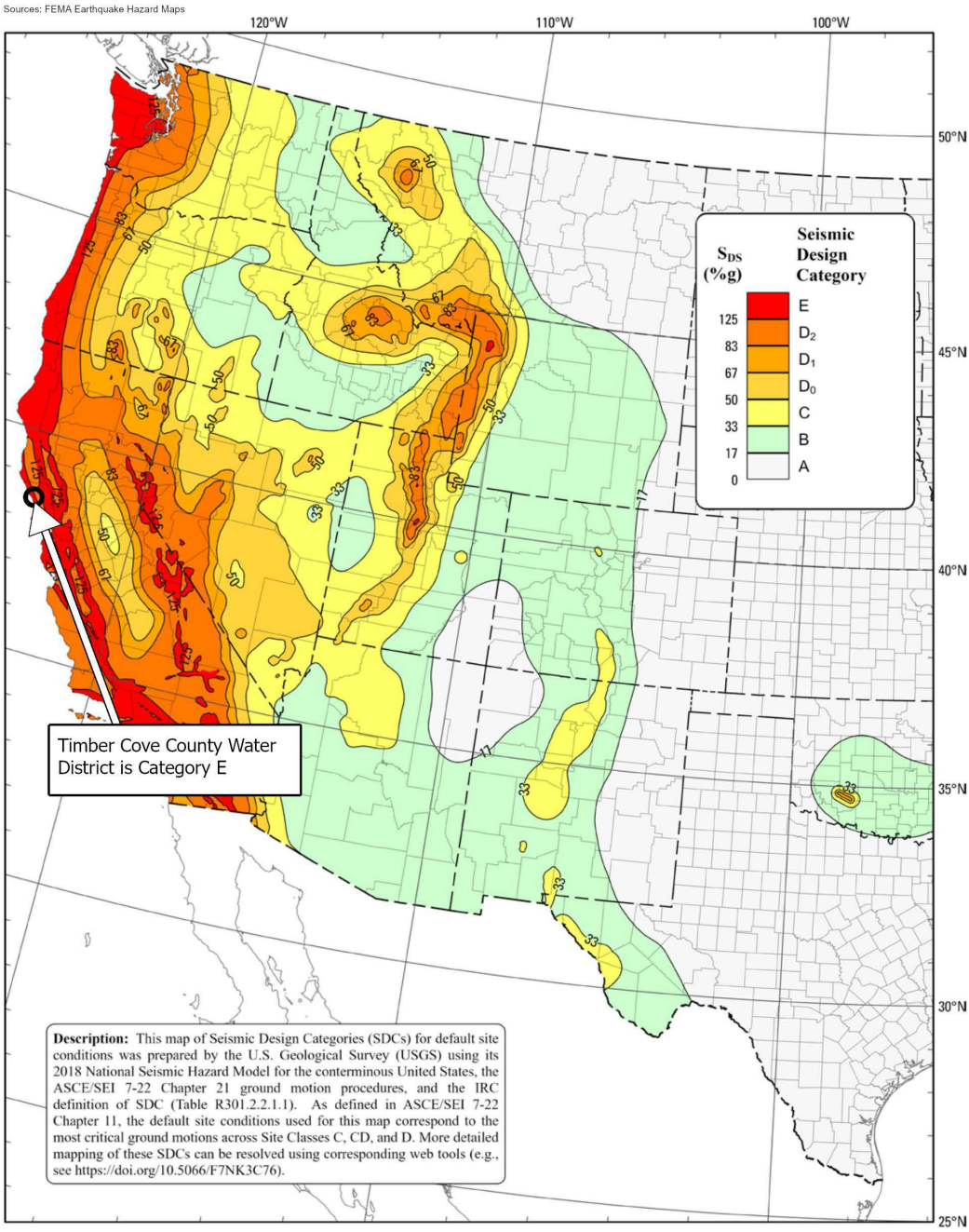
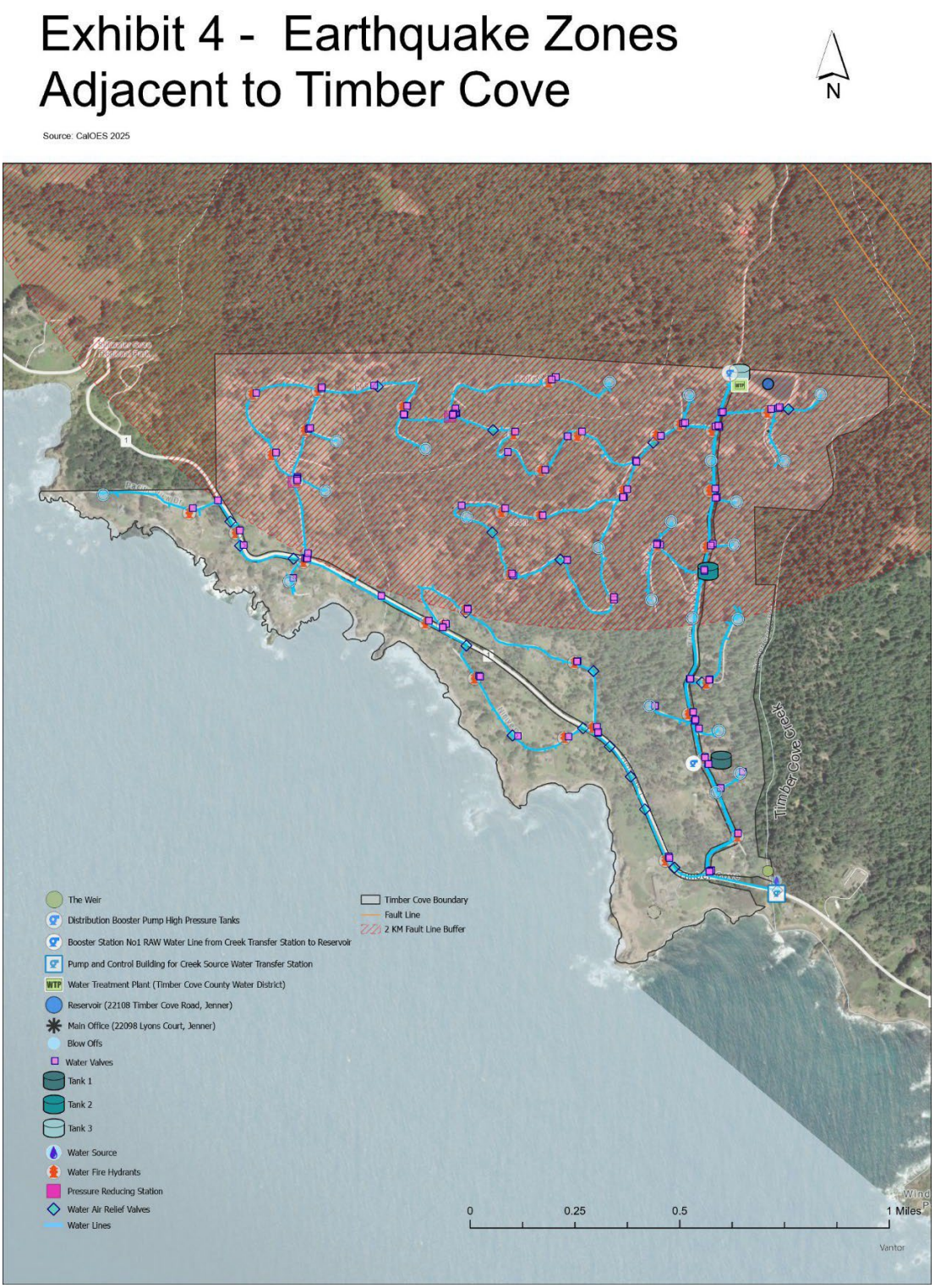


Exhibit 4: Earthquake Zones



eight blocks of commercial buildings. It was reported that almost all non-wood buildings were destroyed by the shaking alone.

1969 Rodgers Creek/Healdsburg Fault Earthquake

The last major earthquake event with an epicenter in Sonoma County occurred on October 1, 1969. Two earthquakes of magnitudes 5.6 and 5.7 originated 2 miles north of Santa Rosa. Damage was concentrated in Santa Rosa and principally confined to the partial collapse of unreinforced masonry buildings and wood frame buildings. In all, 99 structures were significantly damaged, approximately half in the business district and half in residential areas. Total building damage was estimated at $6 million, with dwelling contents losses at $1.25 million. Several County buildings suffered damage, including the library, post office, and veteran's memorial building. There was no loss of life from these earthquakes. The mayor of Santa Rosa sought state and federal disaster assistance, but there was not enough damage to public facilities to warrant a declaration. Small Business Administration loans were made available to commercial and residential property owners.

1989 Loma Prieta Earthquake

This magnitude 6.9 earthquake was caused by slip along the San Andreas Fault. Damage in Sonoma County was minor (only five dwellings were yellow tagged), but the quake killed 63 people and injured 3,757 throughout Northern California and caused an estimated $6 billion in property damage. It was the largest earthquake to occur on the San Andreas Fault since the 1906 San Francisco earthquake.

2014 South Napa Earthquake

On August 24, 2014, a magnitude 6.0 earthquake shook Napa, Solano, and Sonoma County. The epicenter was 9 miles southeast of the City of Sonoma. The earthquake occurred on the West Napa Fault, a fault that was not mapped under the Alquist-Priolo earthquake fault hazard zone. It was the largest event in the Bay Area since the 1989 Loma Prieta earthquake. At least 12 aftershocks followed. The quake injured 257 people and killed one. Several structures in eastern Sonoma County were severely damaged. The governor issued an emergency proclamation for this event, and a federal disaster was declared on September 11, 2014. The total economic loss was estimated at $400 million.

2016 The Geysers Earthquake

A 5.0 magnitude earthquake occurred 4 miles west of The Geysers and 14 miles southwest of Clearlake on

December 14, 2016, following a series of medium size earthquakes in Mammoth Lakes and the Central Coast. This event was primarily felt in the Clearlake and Santa Rosa areas but was also felt throughout the Bay Area.

4.2.3 Location/Geographic Extent

Sonoma County is the northernmost of the nine counties that constitute the seismically active San Francisco Bay Area. Earthquakes in the Bay Area occur due to a sudden slip on one of the several major faults of the San Andreas Fault system. Some of the major faults in the San Andreas Fault system include the Hayward, Rodgers Creek, Calaveras, San Gregorio, and Maacama faults. Several of these faults have been seismically active in historical time and have produced large earthquakes with surface rupture.

Based on the California Department of Conservation-CGS Earthquake Hazards Zone Application ("EQ Zapp"), the San Andreas fault traverses the Timber Cove community in a northwest direction, immediately adjacent to the community's eastern boundary. Refer to Exhibit 4, *Earthquake Zones Adjacent to Timber Cove*.

4.2.4 Magnitude/Severity

The most common method for measuring earthquakes is magnitude, which measures the strengths of earthquake. Although the Richter Scale is known as the measurement for magnitude, the majority of scientists currently use either the Moment Magnitude Scale or Modified Mercalli Intensity (MMI) Scale. The effects of an earthquake in a particular location are measured by intensity. Earthquake intensity decreases with increasing distance from the epicenter of the earthquake.

The magnitude of an earthquake is related to the total area of the fault that ruptured, as well as the amount of offset (displacement) across the fault. As shown below, there are seven earthquake magnitude classes, ranging from great to micro. A great class of magnitude can cause tremendous damage to infrastructure in Timber Cove, compared to a micro class, which results in minor damage to infrastructure.

Moment Magnitude Scale

- Great M > 8 Tremendous damage
- Major 7 <= M < 7.9 Widespread heavy damage
- Strong 6 <= M < 6.9 Severe damage
- Moderate 5 <= M < 5.9 Considerable damage
- Light 4 <= M < 4.9 Moderate damage
- Minor 3 <= M < 3.9 Rarely causes damage
- Micro M < 3 Minor damage

The MMI Scale measures earthquake intensity as shown below. The MMI Scale has 12 intensity levels. Each level is defined by a group of observable earthquake effects, such as ground shaking and/or damage to infrastructure. Levels I through VI describe what people see and feel during a small to moderate earthquake. Levels VII through XII describe damage to infrastructure during a moderate to catastrophic earthquake.

Modified Mercalli Scale

- 1.0 to 3.0 (I)
    - I: Not felt except by very few people under especially favorable conditions.
- 3.0 to 3.9 (II – III)
    - II: Felt by a few people, especially those on upper floors of buildings. Suspended objects may swing.
    - III: Felt quite noticeably indoors. Many do not recognize it as an earthquake. Standing motorcars may rock slightly.
- 4.0 – 4.9 (IV – V)
    - IV: Felt by many who are indoors; felt by a few outdoors. At night, some awakened. Dishes, windows, and doors rattle.
    - V: Felt by nearly everyone; many awakened. Some dishes and windows broken; some cracked plaster; unstable objects overturned.
- 5.0 – 5.9 (VI – VII)

  - VI: Felt by everyone; many frightened and run outdoors. Some heavy furniture moved, some fallen plaster or damaged chimneys.
  - VII: Most people are alarmed and run outside. Damage is negligible in well-constructed buildings; considerable damage in poorly constructed buildings.
- 6.0 – 6.9 (VII – IX)
  - VIII: Damage slight in special designed structures; considerable in ordinary buildings; great in poorly built structures. Heavy furniture overturned. Chimneys, monuments, etc. may topple.
  - IX: Damage considerable in specially designed structures. Buildings shift from foundations and collapse. Ground cracked. Underground pipes broken.
- 7.0 and Higher (VIII and Higher)
  - X: Some well-built wooden structures destroyed. Most masonry structures destroyed. Ground badly cracked. Landslides on steep slopes.
  - XI: Few, if any, masonry structures remain standing. Railroad rails bent; bridges destroyed. Broad fissure in ground.
  - XII: Virtual total destruction. Waves seen on ground. Objects thrown into the air.

4.2.5 Frequency/Probability of Future Occurrences

According to the Sonoma County MLHMP, historic records of earthquake occurrences may give some indication of future probabilities. Seismic activity was more frequent from 1830 to 1930 than it has been since. This leads some scientists to suspect that pressure is building up along the faults in the Bay Area that can result in a large quake. Such a quake could have dramatic and devastating effects throughout the Bay Area. As discussed in the Sonoma County MLHMP, the USGS reports the following earthquake probabilities for the Bay Area over next 30 years:

- 72 percent probability of an earthquake measuring magnitude 6.7.
- 51 percent probability of an earthquake measuring magnitude 7.0
- 20 percent probability of an earthquake measuring magnitude 7.5.

4.2.6 Vulnerability

A number of earthquake faults and fault zones underlay Timber Cove. Underground infrastructure, such as pipelines, have the potential to fracture and leak during ground shaking events. Water mains and secondary distribution lines will leak or fracture during ground shaking events. Water mains servicing Amanita Circle, Pine Court, and Cypress Court are asbestos concrete (transite) pipe. This type of pipe is more prone to breaking, especially in seismic events as it is less flexible than PVC piping. The water mains with transite piping are an existing high priority to be replaced. Additional vulnerabilities include rupture of storage tanks, damage to the water treatment facility, chlorine or other hazardous chemical leakage from storage tanks and facilities, destruction of storage sheds or office buildings, possible leakage or failure of open surface reservoir lining or edges, damage to weir structures, supply, or distribution pump systems. Many of these facilities were constructed to meet earthquake building codes in the past but may need additional earthquake strengthening.

4.3 Wildfire

4.3.1 Background

Wildfire is relevant to TCCWD's water supply and transmission due to the potential impacts to the District's facilities and infrastructure, increased demands on the water supply system to support the firefighting effort, and residual water quality impacts because of erosion/sediment filling the reservoir and/or impacting Timber Cove Creek watershed.

Periodic fires are part of the natural environment and consist of four categories: wildland fires, urban-wildland interface fires, firestorms, and prescribed fires. Wildfires are fueled by naturally occurring trees, brush, and grasses; the urban-wildland interference fires are fueled by vegetation and the built environment. Firestorms occur during extreme weather or fire behavior conditions and generally burn until conditions change or the available fuel is exhausted. Prescribed fires are controlled burns conducted by fire department staff in very specific environmental conditions intentionally set for fire and fuels management.

The behavior of wildfires is impacted by three principal factors including topography, fuel, and weather. Topography is important because the movement of air over the terrain tends to direct a fire's course. Gulches and canyons can funnel air and function as a chimney, concentrating heat and smoke and increasing fire spread. Saddles and ridgetops tend to offer lower resistance to the passage of air and will draw fires through the saddle or up the ridge. Uphill slopes will increase the rate of fire spread due to preheating vegetation or other fuels; downhill slopes tend to slow down the rate of fire spread. South-facing slopes tend to be more susceptible to fire because they receive higher solar radiation, which speeds the drying of the vegetation compared to other areas.

Fuel for wildland fires is provided by the amount and type of vegetation available in the area. Different fuels have different burn qualities. For example, grasses release little energy but can sustain very high rates of spread. Chaparral type vegetation contains natural oils, is fire dependent, and can grow in large, deep clumps, increasing the energy and burn time when ignited. Large trees create extreme heat and energy, extreme ember casting, which increases spread of fire over large areas, and a high density of trees can create conditions of extreme fire behavior such as rapidly spreading crown fires, "fire tornados", and fire storms that generate localized weather conditions consisting of high velocity and variable winds.

Several TCCWD facilities are threatened by direct flame impingement. These include existing maintenance and administration buildings, externally exposed and structurally enclosed water and other storage tanks, treatment facilities, pumping and other facilities dedicated to the removal of water from Timber Cove Creek and the distribution of water throughout the system.

TCCWD is responsible for providing water toward firefighting activities through a series of fire hydrants located within the distribution system and a hydrant at the open storage reservoir. Extended fire flow can impact the amount of potable water available to clients and overall water storage. The most recent water distribution system evaluation (Timber Cove County Water Distribution System Evaluation, 2024) noted several concerns regarding fire flow capacity within the district. These areas can limit the availability of water for firefighting.

Loose soil, ash, and other debris generated after a fire can create impacts on TCCWD infrastructure. TCCWD maintains an open reservoir as additional storage. Post fire erosion can impact the reservoir as well as the wind/ smoke introduction of foreign particulate matter into the water. Fire damage can impact the Timber Cove Creek watershed, introducing soil, ash, and other debris into the creek by means of secondary erosion and landslides. Timber Cove Creek is the sole source of fresh water to TCCWD, and such impacts may severely limit TCCWD's ability to provide safe water to District clients.

4.3.2 Past Occurrences

The Timber Cove Fire Protection District (TCFPD) is the initial fire response agency for the Timber Cove community and the TCCWD service area. Prior wildfires fought within the TCFPD response area are listed in Table 7: **Wildfire History in the Timber Cove Fire Protection District**. Timber Cove was also threatened and indirectly impacted by fires in surrounding areas of Sonoma County, most significantly the 2020 (Sonoma – Lake – Napa Unit) LNU Lighting Complex Fire and Glass Fires.

Table 7: Wildfire History in the Timber Cove Fire Protection District

Date	Name	Size	Cause	Impact
8/2020	Lightning Complex	363,000 acres	Lightning	
8/2000	Meyers Fire	2,360 acres	Lightning	
10/2017	Fort	18 acres	Unknown	
9/2016	Salt Point State Park	Under 5 acres	Unknown	Campground Evacuation
9/2013	Bohan	Over 5 acres	Unknown	
5/2013	Frisk Mill	Over 5 acres	Power Lines	
11/2007	Rossen	Under 5 acres	Unknown	
10/2007	Veg	Under 5 acres	Unknown	
9/2006	Hirsh	Under 5 acres	Escaped Burn	
6/2006	Meyers Grade	Over 5 acres	Unknown	
10/2005	Prairie	Under 5 acres	Unknown	State Park impacted
09/2004	Stump Fire	Over 5 acres	Unknown	State Park impacted
9/2001	Burn Pile	Over 5 acres	Escaped Burn	
7/2001	Ocean Cove	Over 5 acres	Power Lines	
9/1993	Gerstle	700 acres	Unknown	Prairie to Ocean
Source: Timber Cove Fire Protection District. 2024. Fire District Master Plan. Figure 45.				

4.3.3 Location/Geographic Extent

Sonoma County has many areas with highly flammable fuel that, together with long, dry summer and steep slopes, create a significant natural hazard of wildfires. Wildfires can result in death, injury, economic losses, and environmental damage. Timber Cove is located near the ocean and experiences a general coastal-influenced climate with cooler temperatures and higher humidity than the inland areas of Sonoma County.

However, high winds, heat, and low humidity on the ridge tops and inland areas can elevate the risk of wildfires reaching the community.

Homes within Timber Cove and the surrounding area are at higher risk of wildfire impact than the incorporated cities within Sonoma County due to the lower density and semi-rural nature of the area. Unlike higher density development communities adjacent to undeveloped wildland vegetation, Timber Cove's homes and other development is intermixed within undeveloped wildland vegetation. Timber Cove is surrounded and intermixed with large timber (pine, redwoods, Douglas firs, madrone, and oak trees), and many of the structures are located in small clearings with trees surrounding the property and directly adjacent to the structure. In addition, the terrain is more challenging and limits firefighter access to areas within the community. Therefore, protection of homes and public service infrastructure such as District facilities will be difficult.

4.3.4 Magnitude/Severity

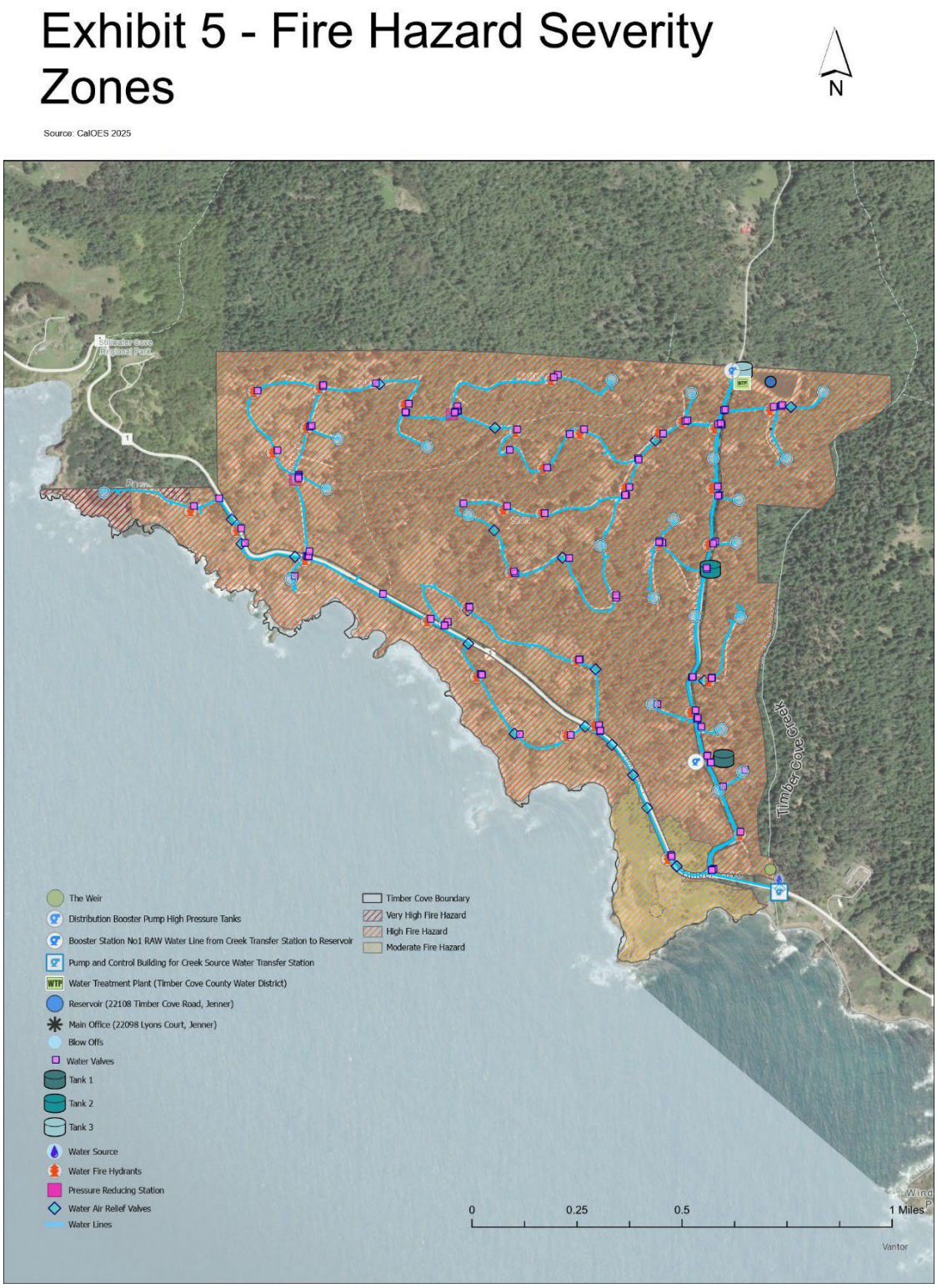
Wildfires throughout the state have increased in severity due to increased temperatures, extended fire season, development within wildland areas, and climate change driven alterations in local weather patterns. The devastating impacts upon rural and urban areas are evidenced by the complete destruction of the community of Paradise in northern California, due to the Camp Fire in 2018, and the Eaton and Palisade Fires in southern California in 2025. Paradise is comparable to Timber Cove because it is located within a heavily forested area with limited access for both civilian evacuation and fire department equipment access. The communities affected by the Eaton and Palisade fires also had a limited water supply. Paradise is a much larger community, but the challenges and concerns are similar.

Timber Cove is in a high Fire Hazard Severity Zone (FHSZ) and has an increased possibility of being impacted by wildfire. The California Department of Forestry and Fire Protection (CalFire) has developed FHSZ's to classify lands within CalFire's State Responsibility Area. These are forested and other lands where the state of California is financially responsible for wildland fire protection. Refer to Exhibit 5, *Fire Hazard Severity Zones*. The maps include wildland areas where local governments have wildland fire protection responsibility. This science-based and field-tested model assigns a hazard score based on multiple factors that influence fire likelihood and fire behavior. A key factor of this map is that it evaluates hazard, not risk. Hazard is based on the physical condition that creates a likelihood of a fire occurring in that specific area over a 30- to 50-year period without taking into account short-term modifications such as fuel reduction efforts, whereas risk is the potential damage a fire can do to the area under existing conditions, including any modifications such as fuel reduction projects, defensible space, and/or an ignition resistant building construction. The fire hazard score takes into consideration the following factors: fire history, existing and potential natural vegetation that fuels fires, predicted flame length, blowing embers, terrain, and typical weather for the area that contributes to fire growth. The maps place each area in zones considered to be Moderate, High, and Very High. The zones are not to be used as a structure loss model since key information regarding the construction of each building is not considered. These maps are tools to be used by local agencies in implementing wildland urban interface building standards on new construction. FHSZ information is placed as a natural hazard disclosure on real estate documents at the time of sale to inform structure owners of defensible space clearance requirements around buildings. Finally, this resource can assist local agencies in decisions regarding building codes alterations, road width requirements, and other such codes and regulations.

4.3.5 Frequency/Probability of Future Occurrences

The entirety of Timber Cove is considered at High Risk for wildfire. Lighting is the most common natural ignition source for wildfires. The vast majority of wildland fires have human causes such as unattended campfires, power line failures, vehicle ignition sources, sparks from equipment used for brush removal, etc.

Exhibit 5: Fire Hazard Severity Zones



Increased periods of hot, dry weather, drought, and extreme weather events due to climate change will increase the probability of wildland fires in the future. Drastic weather and climate extremes will increase the vulnerability of pine and other trees to insect infestation and diseases, creating areas of dead and dying trees that ignite quickly, generating rapid fire spread. The population of Timber Cove is slowly increasing, and new tourism opportunities are being created. This will increase the likelihood of human-ignited wildland fires within Timber Cove and the TCCWD service area.

4.3.6 Vulnerability

The aboveground infrastructure, such as storage sheds, maintenance buildings, and the water treatment plant may be damaged or destroyed by fire. Power may be shut off due to damage to electrical infrastructure. Other above ground structures such as tanks and distribution pumps may suffer damage due to flame impingement. Damage or destruction of private homes and businesses create possible water leaks, impacting water availability. Water supplies may be diminished due to firefighting activities, including damage to fire hydrants or pumping equipment. Access to facilities can be limited due to damage and debris. Damage to the water treatment plan could release chlorine into the environment. Fire within the watershed of Timber Creek has the potential to introduce ash, soil and other vegetative debris into the creek. This will increase turbidity and contaminants in the water supply for TCCWD, increasing treatment costs before it can be utilized. Large debris will block or damage pump and filter capabilities and may reduce the capacity of the weir structure. Ashfall and other contaminants may be introduced into the open water supply reservoir, requiring additional filtration before use. Damage to TCCWD facilities and production capabilities may require TCCWD to acquire outside sources of water to service the community.

4.4 Landslide

4.4.1 Background

Mass movement is the movement of rock and soil down slope under the influence of gravity. Landslides are the most commonly recognized type of mass movement. Other common mass movement types include the following:

- **Block slides**—Blocks of rock that slide along a slip plane as a unit down a slope.
- **Coastal bluff erosion**—The collapse of coastal bluffs due to undercutting erosive forces of wave action.
- **Creep**—A slow-moving landslide often only noticed through crooked trees and disturbed structures.
- **Debris avalanche**—A debris flow that travels faster than about 10 miles per hour (mph). Speeds in excess of 20 mph are not uncommon, and speeds in excess of 100 mph, although rare, can occur. The slurry can travel miles from its source, growing as it descends, picking up trees, boulders, cars, and anything else in its path.
- **Earth flows**—Fine-grained sediments that flow downhill and typically form a fan structure.
- **Mudslides or Debris Flows**—Rivers of rock, earth, organic matter and other soil materials saturated with water. They develop in the soil overlying bedrock on sloping surfaces when water rapidly accumulates in the ground, such as during heavy rainfall or rapid snowmelt.
- **Rock falls**—Blocks of rock that fall away from a bedrock unit without a rotational component.
- **Rock topples**—Blocks of rock that fall away from a bedrock unit with a rotational component.
- **Rotational slumps**—Blocks of fine-grained sediment that rotate and move down slope.

- **Transitional slides**—Sediments that move along a flat surface without a rotational component.

Mass movements are caused by a combination of geological and climate conditions, as well as encroaching urbanization. Vulnerable areas are affected by residential, agricultural, commercial, and industrial development and the infrastructure that supports it.

Factors causing mass movements fall into two categories:

- Factors that increase driving forces:
  - Steepening the slope
  - Adding weight to (loading) the slope, especially the upper parts
  - Increasing the height of a slope (either by human or natural downcutting)
- Factors that reduce resisting forces:
  - Adding water to the slope, which causes increased pore pressure, which reduces frictional strength.
  - Steepening the slope, which reduces normal stress, and thus reduces internal friction.
  - Bedding, jointing, or foliation parallel to slope or dipping out of slope—these discontinuities are low-strength zones along which the rock can fail and slide out of the slope.
  - Intrinsically weak materials (e.g., deeply weathered, sheared, unconsolidated, or clay-rich materials)
  - Undercutting the slope, which reduces support.
  - Removing vegetation, especially trees, which reduces root strength and leads to increased water in soil due to reduced evaporation losses.
  - Seismic shaking
  - Coastal bluff erosion caused by wave action.

4.4.2 Past Occurrences

While the community of Timber Cove has not experienced past occurrences of landslides specifically, as shown in Table 2, *Historical Federal and State Declared Disasters in Sonoma County,* several disasters were federally declared that included landslide/mass movement events in Sonoma County. According to the Sonoma County MJHMP, one of the most recent and most destructive mass movements in Sonoma County occurred in April 2006. Persistent heavy rainfall caused a massive number of landslides across the Sonoma and Marin County valleys area during the first half of April. Another landslide occurred during the El Niño winter storms of January 6 – 7, 1998, in the community of Rio Nido (approximately 15.5 miles east of Timber Cove). The upper portion of the slide consisted of a large rotational block failure that occurred near the top of the ridge, approximately 600 feet above the elevation of the canyon floor. Two debris flow failures, which are characterized by fluid and high-speed downhill flows, were initiated from the face of the block. Residents were evacuated until the stability of the slides could be determined.

Geologic studies were performed and movement of the slides monitored for years. Evacuation zones maps were periodically revised and residents gradually permitted them to return to some areas. Other damaging slides occurred in the communities of Monte Rio, Gold Ridge, Hidden Acres, Blucher Valley, Fitch Mountain, and the coastal community of Gleason Beach.

The widespread damage caused across the state by these storms prompted FEMA and Cal-OES to initiate the first federally funded landslide acquisition program. The program was designed to permanently remove the properties destroyed, damaged, or still at risk from the landslides. Sonoma County received funds for the acquisition of 45 properties in the four communities that suffered the greatest damage.

Timber Cove has been impacted by smaller landslides. These landslides damaged infrastructure, such as roads and other access points. A small landslide during winter of 2022/2023 along Lee Drive began to undermine the roadbed. Although repaired that area of the road continues to suffer erosion that can impact TCCWD operations. December 18, 2024, a small landslide along SR 1 affected approximately 30 feet of the shoulder and began impacting the road surface. Further erosion of the area exposed the trench line of a 6-inch water main that supplies the area between SR-1 and the coastline. (Personal communication with TCCWD, 2026).

4.4.3 Location/Geographic Extent

Dormant Sites of Previous Mass Movements

One of the best predictors of where mass movements might occur is the location of past landslides, which can be recognized by distinctive topographic shapes that can remain in place for thousands of years. Such sites range from a few acres to several square miles. Many show no evidence of recent movement and are not currently active. A few may become active in any given year. The recognition of ancient dormant landslide sites is important in the identification of areas susceptible to landslides because they can be reactivated by earthquakes or by exceptionally wet weather. These dormant sites are also vulnerable to construction-triggered sliding. The shoreline contains many large, deep-seated dormant landslides.

Landslide Susceptibility Mapping

The USGS developed a Landslide Inventory and Susceptibility Map which was created in 2019 then updated in 2022 using a combination of existing data, new high resolution topographic data, and improved computation availability for data management to develop an improved, highly detailed, and uniform data compilation national landslide map. Exhibit 6, *Landslide Susceptibility* shows landslide susceptibility within the TCCWD service area according to the latest USGS map.

4.4.4 Magnitude/Severity

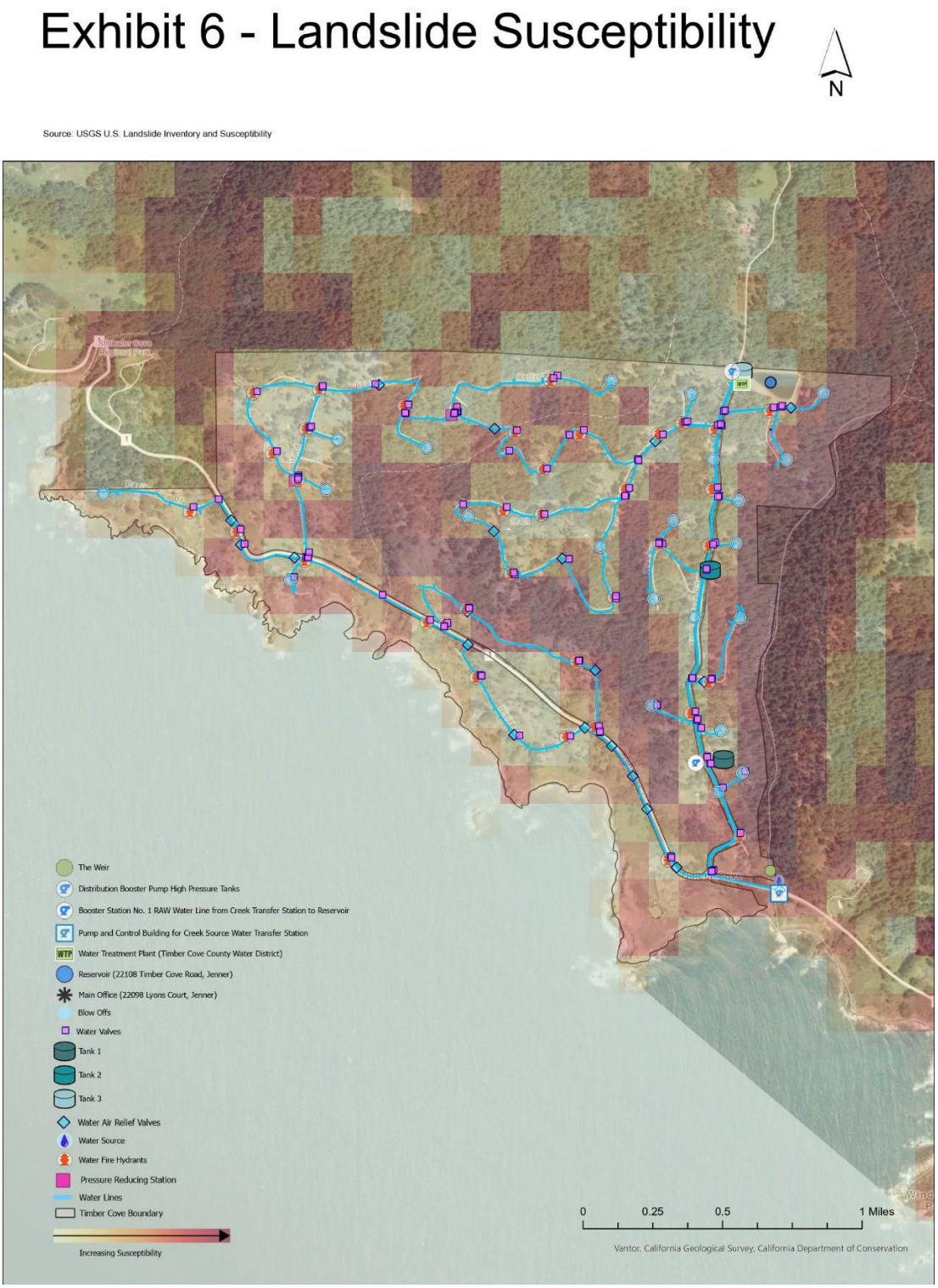
Mass movements destroy property and infrastructure and can claim human lives. They have the potential of destabilizing the foundation of structures, which may result in monetary loss for residents. Slope failures in the United States result in an average of 25 to 50 lives lost per year. Movements can pose a serious hazard to properties on or below hillsides. They can cause block access to roads, which can isolate residents and businesses and delay commercial, public and private transportation. This can result in economic losses for businesses. Vegetation or poles on slopes can be knocked over, resulting in possible losses to power and communication lines. Mass movements also can damage rivers or streams, potentially harming water quality, fisheries, and spawning habitat.

Landslides along Sonoma County's coastline, in conjunction with wave action, have resulted in seawall failure, severe erosion, cliff failure, and loss of bluff top area that threatens development. Lots have been significantly reduced in size in the last 25 years, and several houses have been damaged to the extent that they are no longer habitable. Poor road design and construction can contribute to landslide hazards through side-casting on sloping lands, over steepened cut slopes and inadequate drainage facilities.

4.4.5 Frequency/Probability of Future Occurrences

Mass movements are often triggered by other natural hazards such as earthquakes, heavy rain, floods or wildfires, so their frequency is often related to the frequency of the precipitating hazards. In Sonoma County,

Exhibit 6: Landslide Susceptibility



landslides typically occur during and after severe storms, so the potential for landslides largely coincides with the potential for sequential severe storms that saturate steep, vulnerable soils. Most weather-induced landslides in Sonoma County occur in the winter after the water table has risen. Landslides that result from earthquakes can occur at any time. Approximately 50 landslides occur each winter that block county roads.

4.4.6 Vulnerability

Underground distribution pipelines, fire hydrants, and other distribution structures can be severely damaged due to landslides. Areas that have the highest susceptibility to landslides are Amanita Circle, Ruoff Drive, Bufano Court, Umland Circle, Ninive Drive, the steep banks of Timber Creek, and where the distribution mains pass along and under SR-1. TCCWD facilities such as the treatment facility are located in areas of low landslide risk.

4.5 Flooding

4.5.1 Background

Flooding occurs when an area, known as a floodplain, adjacent to a river, creek, lake, or ocean becomes inundated with water due to a rapid increase in water flow or increased wave size most often caused by severe weather. There are incidents of flooding due to man-made reasons, such as a dam or pipeline failure, but these are rare.

A riverine floodplain can be a broad, flat landscape that a river flows through, or a narrow channel like a canyon or gulch that the river is confined in due to the surrounding topography. Coastal floodplains are adjacent to the ocean and other tidally influenced areas. Like riverine floodplains, coastal floodplains may be broad or narrow, depending on local topography and natural flood defenses such as dune systems or tidal wetlands. Coastal floods are usually caused by coastal storm generated storm surges when the wave energy from the storm combines with normal tides to push water further inland than the normal shoreline. These increased waves cause damage to areas that are not normally affected by wave action.

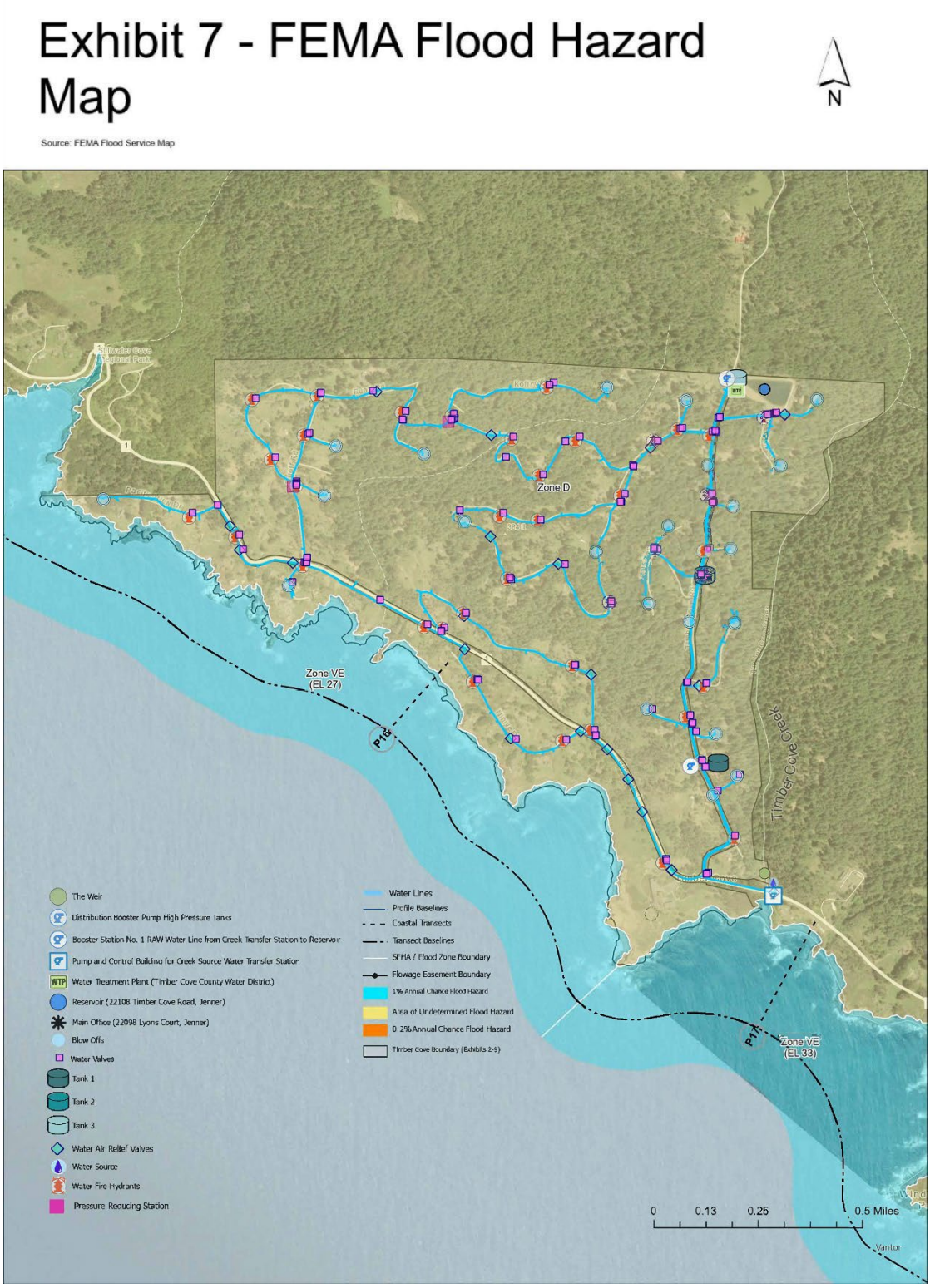
4.5.2 Past Occurrences

There is no record of historic flooding within Timber Cove. The community has suffered impacts due to localized washouts and water accumulations in low lying areas during periods of heavy rainfall.

4.5.3 Location/Geographic Extent

The community of Timber Cove is located in the wooded hills along the northern coast of California. There is one established creek system to the south of the community, Timber Cove Creek. FEMA designates the Timber Cove community as an area of low flood risk, as the Timber Cove Creek is in a steep channel to the south of the community and there are no major rivers nearby, as shown in Exhibit 7, *FEMA Flood Hazard Map*. The District's treatment plant and other infrastructure are placed along the ridge over 100 feet above the creek bed and extends to the northwest hills away from the creek bed. TCCWD maintains a weir, pump, and other structures that remove water from the creek to supply District operations. The District's main water supply is from Timber Cove Creek. Damage to these structures in a multi-hazard scenario could affect TCCWD's ability to service District clients. The remainder of the District's infrastructure may be less affected due to localized areas of soil washout along pipelines, creating possible temporary breaks and reduction of service. Impacts to District pipelines due to washouts or excessive water collection created by blocked culverts can occur due to periods of extended heavy rainfall that may lead to local flooding in low lying areas within the District service area.

Exhibit 7: FEMA Flood Hazard Map



The coastline in this area is a series of high (approximately 150 feet) bluffs with rocky outcroppings. Storm surges assaulting these bluffs create impacts over time due to accelerated erosion. Section 4.6 below further discusses flooding due to storm surge and sea level rise. Currently, the high bluffs reduce the possibility of a storm surge from impacting District infrastructure.

4.5.4 Magnitude/Severity

Flooding within Timber Cove and TCCWD facilities may occur during periods of sustained, heavy rainfall. The severity of these local impacts will vary depending on which parts of the infrastructure will be affected. Damage to pipelines and smaller pumping facilities may occur where these are located in low lying areas or areas susceptible to soil washout. Damage to these facilities will cause limited-service disruptions of the areas affected.

The weir and other facilities located within Timber Cove Creek are susceptible to damage in periods of increased flow within the creek. Increased flows will occur during periods of intense heavy rainfall within Timber Cove and within the hills to the east of Timber Cove that form the Timber Cove Creek watershed. Damage to these facilities may severely impact TCCWD's ability to provide water to Timber Cove in a multi-hazard scenario where multiple points of failure are experienced at once.

4.5.5 Frequency/Probability of Future Occurrences

Flooding typically results from large-scale weather systems generating prolonged rainfall. Atmospheric rivers are narrow bands of extremely moisture laden air that typically form over the northern Pacific Ocean. When they make landfall in California, they produce heavy, localized precipitation that can last for many hours or days. Excessive rainfall can cause the saturation of soils and runoff from upland and upstream areas accumulating in downstream and low-lying areas. The frequency and intensity of atmospheric river events impacting the Timber Cove area is likely to increase due to climate change.

4.5.6 Vulnerability

Timber Cove is in a low flood risk area due to its geographic location. The analysis supports flooding can be considered a low hazard to the district, The weir and associated structures within Timber Creek are at risk due to increased flows within the creek. Flood damage to other infrastructure, such as distribution lines, would be minimal. Flood damage to roads within Timber Cove may hamper access to District facilities.

4.6 Sea Level Rise

4.6.1 Background

Based on the Cal EOS 2023 California State Hazard Mitigation Plan, sea level rise is an increase in the average level of the ocean that progressively worsens the impact of high tides and wind-driven waves associated with severe storms. Increases in global sea level result from three primary causes: ocean expansion caused by warming water; the melting of land-based ice, including mountain glaciers, ice caps, and the polar ice sheets of Greenland and Antarctica; and land-water storage changes. Since 2006, the melting of land ice from glaciers and ice sheets has become the most important contributor to sea level rise, with mountain glaciers contributing 20 percent and ice sheets 33 percent. If the current rate of loss for these ice sheets continues, their contribution will become the dominant source of sea level rise.

California has more than 1,100 miles of outer coast featuring bluffs, beaches, and wetlands, in addition to bay shorelines and the Sacramento-San Joaquin River Delta. Timber Cove's location along the coastline makes it vulnerable to the risks associated with sea level rise. The sea level along California's coast has risen nearly 8 inches in the past century and is projected to rise by as much as 20 to 55 inches by the end of the century.

4.6.2 Past Occurrences/Previous Assessments

Sonoma County Local Coastal Plan

First mandated in 1979 by the California Coastal Act, the Sonoma County Local Coastal Plan (LCP) is an important planning document in managing the conservation and development of the county's coastal regions. The current Sonoma County LCP was written in 1981 and amended in 2001. The County is currently in the process of updating the plan. General findings of the plan are as follows:

- Rising seas increase the risk of coastal flooding, storm surge inundation, bluff and coastal erosion, shoreline retreat, saltwater intrusion, and wetland loss or migration.
- The net result of coastal storms and sea level rise is coastline retreat, ranging from a few centimeters per year for bluffs made of resistant bedrock to several meters for beaches and dunes. These rates of coastline retreat will increase with rising sea levels and are likely to further increase if waves become higher.
- The impacts of sea level rise will vary according to local factors such as shoreline characteristics and topography, the location and extent of development, and local drainage and wind patterns.
- Sea level rise will result in more frequent flooding and gradual inundation, as well as increased bluff, dune, and shoreline erosion. This flooding and erosion will affect transportation facilities, utility systems, storm water systems, ports and harbors, large wetland areas, and coastal development (i.e., homes and businesses).

4.6.3 Location/Geographic Extent

Sea level rise is likely to affect all coastal areas of Sonoma County. Sea level data from the USGS's Coastal Storm Modeling System were used in the risk assessment for this hazard mitigation plan. The data indicate sea level rise inundation areas for a sea level rise of 200 centimeters with a 100-year storm event. The mapped inundation areas for this scenario is shown on Exhibit 8, *Estimated Inundation Area for 200-Centimeter Sea Level Rise with the 100-Year Storm*.

4.6.4 Magnitude/Severity

Models projecting sea level rise provide a range of severity scenarios based on assumptions about the rate of climate change. One medium-rate sea level rise scenario for Sonoma County predicts increases from the 1992 baseline sea level. While Sonoma County's ocean coast regularly experiences erosion, flooding, and significant storm events, sea level rise would exacerbate these natural processes and lead to significant social, environmental, and economic impacts. The third National Climate Assessment cites compelling evidence showing that the cost of doing nothing exceeds the costs associated with adapting to sea level rise by 10 times.

Exhibit 8: Estimated Inundations Area for 200-cm Sea Level Rise

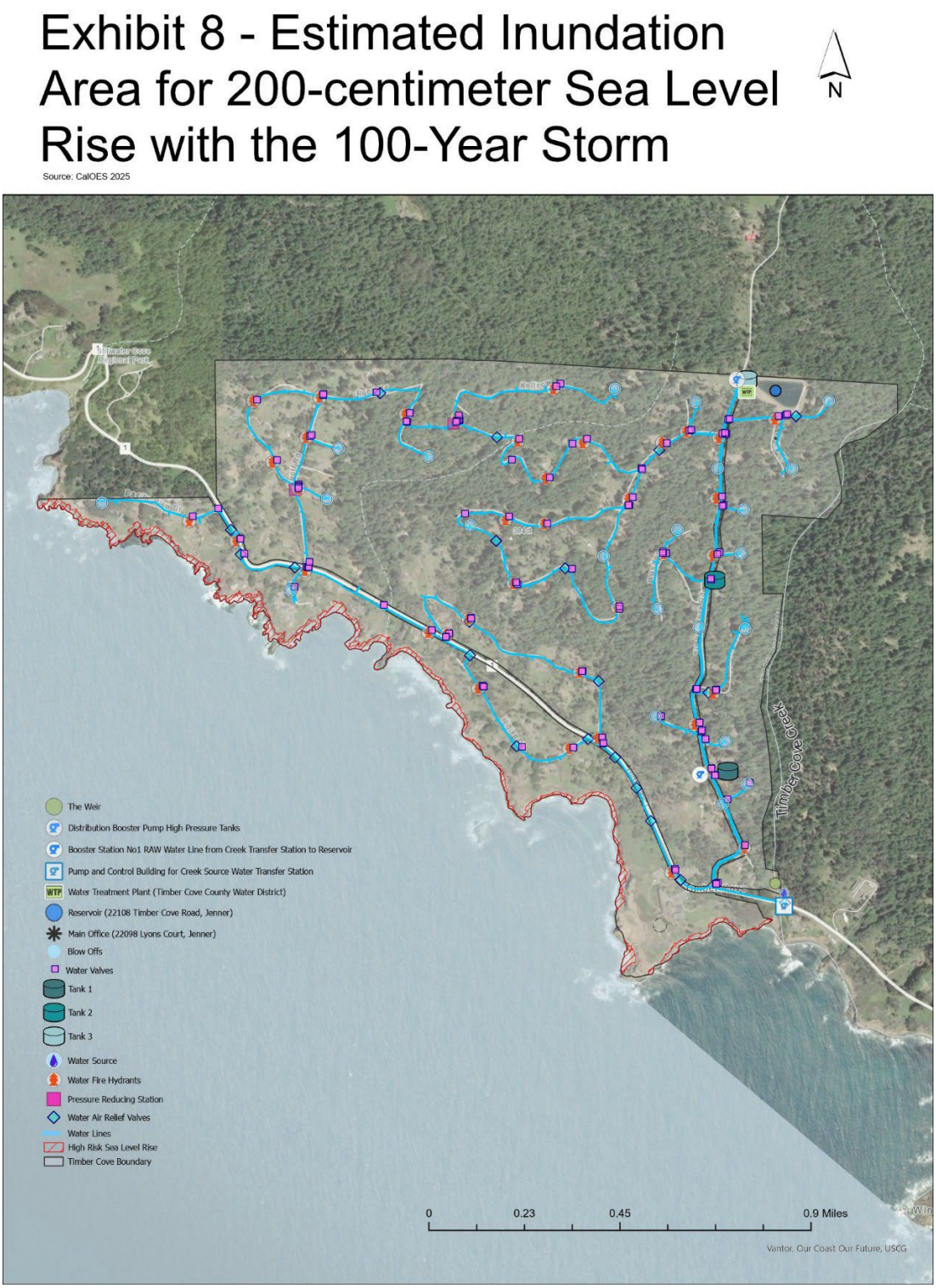
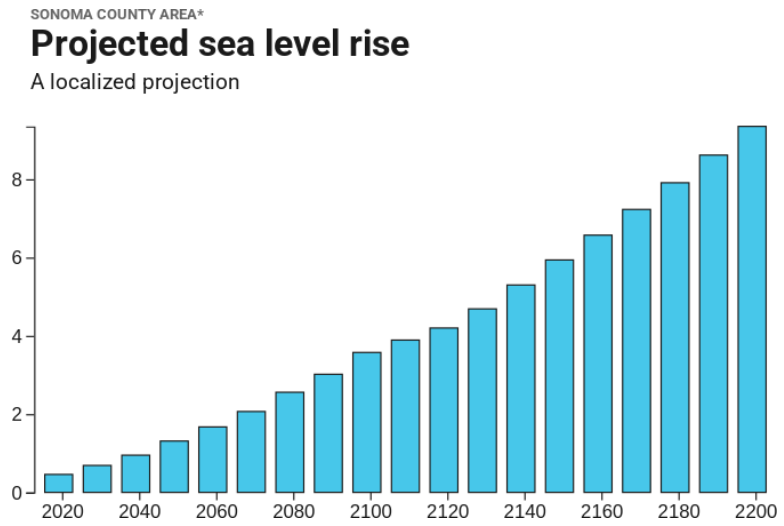


Figure 1: Sonoma County Area Projected Sea Level Rise



Source: Climate Central, https://riskfinder.climatecentral.org/

4.6.5 Frequency/Probability of Future Occurrences

Sea level rise is an ongoing phenomenon that will likely impact the frequency and severity of coastal storms. Storms and flooding in California typically occur during the winter from November to April and are influenced by several climate patterns, most prominently the El Niño Southern Oscillation. Every two to seven years, the Southern Oscillation alternates between two phases—La Niña and El Niño. El Niño years generally result in persistently low air pressure, greater rainfall, and high winds. The water levels reached during these large, short-term events have exceeded mean sea levels projected for year 2100, so understanding their additive effects is crucial for coastal planning.

4.6.6 Vulnerability.

Sea level rise poses a minimal threat to the District's distribution system, water storage, and other facilities due to Timber Cove's location on bluffs approximately 150 feet above the Pacific Coast shoreline. Sea level rise is considered a low priority due to this data analysis.

4.7 Tsunami

4.7.1 Background

A tsunami is a massive wave, or series of waves, generated by an earthquake, landslide, or volcanic eruption (The Japanese word "tsu" means "harbor;" "nami" means "wave"). What typically happens is a large submarine earthquake (magnitude 8 or higher), landslide, or volcanic eruption creates an upward movement of the sea floor, displacing and lifting the overlying seawater up. This uplifted/displaced water then flows downward and radiates away from the uplifted seafloor in all directions as a tsunami. A tsunami can travel across the open ocean at about 500 miles per hour. As the wave approaches land, the ocean shallows, the wave slows down to about 30 miles per hour and grows significantly in height (amplitude). This wave or series of waves will radiate away at a semi-predicable rate of speed so that it will hit various parts of the coastline at different times. The speed and severity of the tsunami will vary depending on how close the affected coastline is to the incident that created the tsunami. The National Tsunami Warning Center will

provide warnings for areas along the coastline, if possible, due to the location of the earthquake that triggered the tsunami.

4.7.2 Past Occurrences/Previous Assessments

According to the California Department of Conservation, over 80 recorded tsunamis have impacted California's coastline in the past. Most have done minor damage to specific areas along the coast. A tsunami's impact will vary on how close the source of the tsunami is to the coastline. Local sources include the tectonic plate subduction zones alone the California coast, such as the Cascadia Subduction Zone that runs from Cape Mendocino in northern California, to Vancouver Island, Canada. Distant sources for tsunamis striking the California coastline are any large earthquake epicenter, uplift, volcanic eruption, or landslide that happens along the Pacific Rim of the Pacific Ocean, including the Alaska-Aleutian subduction zone, and similar areas along the coast of Japan. Notable tsunamis in Californian history include:

- December 21, 1812 – A tsunami impacted the Santa Barbara and Ventura coastline shortly after an earthquake was felt in the area. Low lying areas were inundated, and damage was reported in the harbor.
- April 1, 1946 – A magnitude 8.6 earthquake in the Aleutian Islands created a tsunami that cause damage along the coast of California, including flooding more than 1,000 feet inland at Half Moon Bay.
- March 28, 1964 – A 9.2 magnitude earthquake in Alaska generated a tsunami that did extensive damage to Crescent City, California.
- March 11, 2011 – A 9.1 magnitude earthquake off the coast of Japan produced a tsunami that impacted California. The tsunami did not create significant flooding, but the strong currents damaged harbors all along the coast, with the most significant damage occurring in Crescent City and Santa Cruz harbors.

4.7.3 Location/Geographic Extent

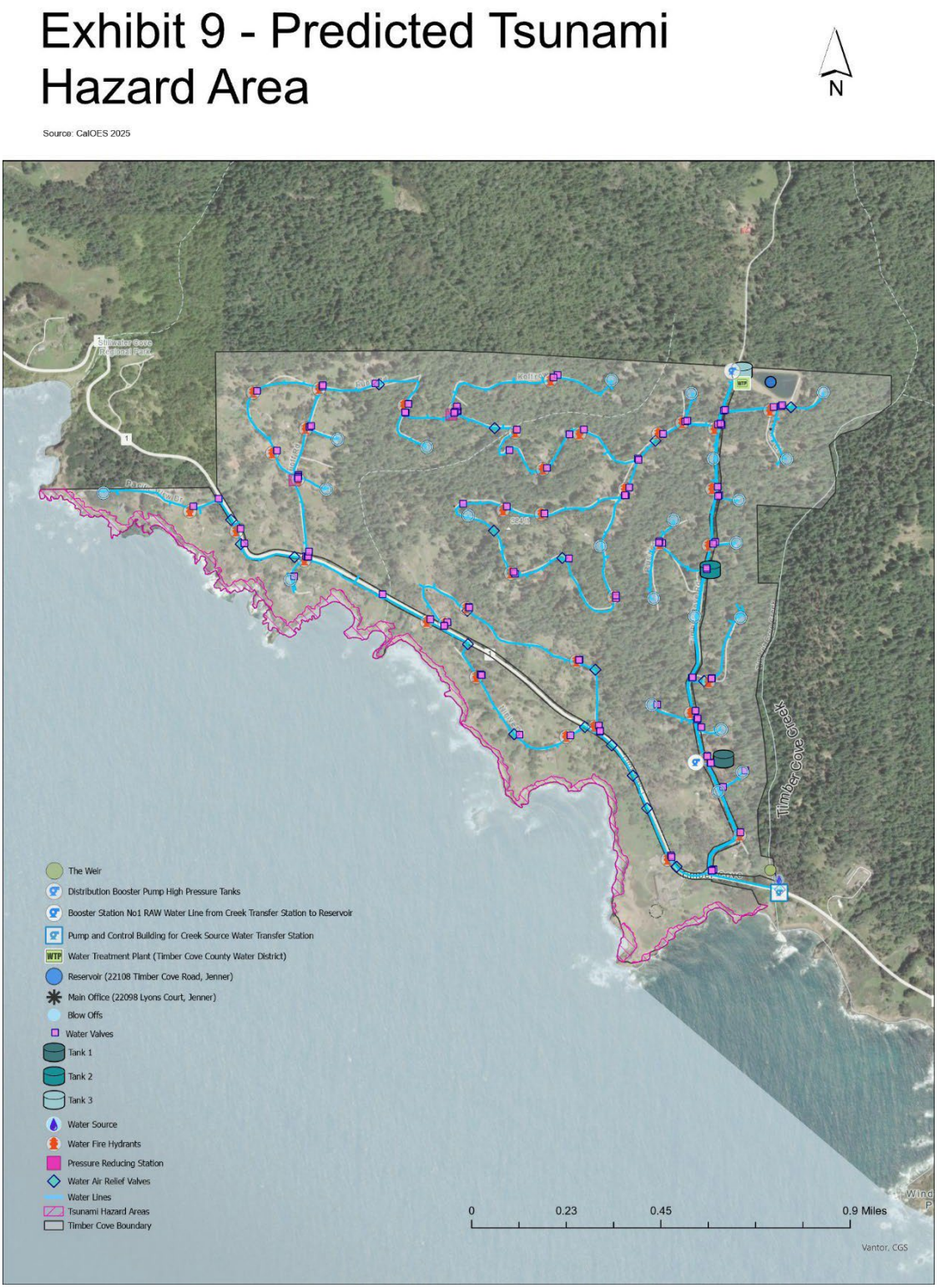
Timber Cove is located along the coast of northern California, north of San Francisco. The coastline consists of large bluffs and cliffs at the shoreline with small, narrow coves where streams and other water courses meet the ocean. Going inland from the coastline, the community is located within bluffs and hills that range from 200 to 600 feet above sea level. The 2022 updated California Department of Conservation Tsunami Hazard Area Map has placed most of Timber Cove above the projected tsunami inundation area. The only areas potentially affected by a tsunami are the areas between SR-1 and the coastline and all low-lying areas located in the mouth of Timber Cove Creek and areas within and either side of the creek bed itself. Refer to Exhibit 9, *Predicted Timber Cove Tsunami Hazard Area*.

4.7.4 Magnitude/Severity

A tsunami would impact the full length of the Timber Cove community. As it pertains to TCCWD's infrastructure, the extent of potential damage to TCCWD infrastructure due to a tsunami may be limited to:

- all pipelines, pump systems, hydrants, and other water delivery systems along the developed area between SR-1 and the coastline,
- the weir, pumping systems, pipeline, and other infrastructure located within the Timber Cove Creek streambed from the streambed to the top of the ridge along Timber Cove Creek for the length of the inundation.

Exhibit 9: Tsunami Hazard



This damage would severely impact operations for TCCWD because the primary source of water for the community would be inaccessible and inoperable for an extended period of time. Damage to SR-1 would have an additional impact on TCCWD operations because emergency water supplies may be delayed due to limited access to the community and unimpacted water distribution infrastructure.

4.7.5 Frequency/Probability of Future Occurrences

According to the National Oceanic and Atmospheric Administration, about 80 percent of all known tsunamis are triggered by earthquakes, however, landslides, volcanic activity, and certain types of weather and meteorites can also cause tsunamis. The Pacific Ocean coastline has the highest probability of a tsunami due to the prevalence of submarine earthquake faults in the Pacific Ring of Fire, the area of tectonic plates and volcanic activity that encompasses the Pacific Ocean. Timber Cove and the TCCWD service area may be impacted if a tsunami were to impact the California coastline in the future.

4.7.6 Vulnerability

Tsunamis poses a minimal threat to the District's distribution system, water storage, and other facilities due to Timber Cove's location above the Pacific Coast. The location of the weir within Timber Creek is over 400 feet inland and approximately 150 feet above sea level, placing it above the predicted tsunami hazard area. Tsunamis are considered a low priority due to the data analysis within this LHMP, the information is included to provide a rationale for a coastal location being minimally affected by a tsunami.

4.8 Drought

4.8.1 Background

Drought is a prolonged period of low precipitation over several years. It is marked by a significant decrease in the water supply relative to what is needed to sufficiently meet typical demand in a location. California has gone through significant multi-year statewide droughts in 2008-2011, 2012-2017, and 2020-2022. The State of California placed Sonoma and Mendocino counties under a drought-induced State of Emergency on April 21, 2021 (Sonoma County Water Agency LHMP). Droughts start gradually and the impacts are dependent on water users and how the user acquires water. Typically, drought conditions will be felt first by those most reliant on rainfall, low yielding individual wells, and small water systems lacking a reliable source of water or a sole source of water. Drought impacts increase with the length of drought conditions as water supplies in reservoirs and groundwater basins decline, creating a greater impact over a wider region and population.

Drought does not typically impact structures as do other hazards. Drought impacts are more widespread, including economic (loss of income in farming and other such industries, increased costs for water supply agencies such as digging new wells or improving existing wells or acquiring water from outside suppliers), environmental (plant and tree death leading to secondary impacts), and social (impacts to public safety and health due to water use restrictions).

4.8.2 Past Occurrences/Previous Assessments

TCCWD drilled two exploration wells during the drought of 2014. The wells were abandoned because they were too shallow, failed to produce enough water for District use, and had a high iron content that would require additional infrastructure for a prefiltering system (TCCWD personal communication, June 2025).

TCCWD conducted a Source Capacity Study that evaluated water diversion from Timber Cove Creek and reservoir storage data from 2016 to 2020. This plan formed the basis for the submittal of a Conservation Action Plan to ensure the District's Source Capacity of water remains sufficient during key periods of the year when unusual weather and/or demand conditions are present and potentially persistent (TCCWD

Conservation Action Plan for Source Capacity Study, 2021). The plan considered typical rainfall and creek diversion potential as well as recent drought related patterns to delineate three periods during an annual cycle of creek diversions for direct use or storage reservoir refill. The plan's objective was to provide TCCWD staff with a tool to optimize surface water diversions and to raise awareness regarding the critical nature of following a diversion strategy to ensure a sufficient and reliable supply of water to their customers. The Conservation Action Plan includes minimum water storage thresholds that if not met or exceeded each month, require the District to send Water Conservation Notices to all customers. The customers are notified that voluntary water conservation goals (individual reductions in use by 10 than 20 percent) are in effect. The TCCWD Board of Directors adopted the Conservation Action Plan in 2021.

TCCWD Infrastructure Committee Phased Strategic Plan (2022) outlined District concerns regarding water source availability due to climate change and potential drought conditions. In October 2021, TCCWD came close to meeting the criteria for entering Stage 1 of the TCCWD Conservation Plan, which would have prompted the need for the community to voluntarily reduce water consumption by 10%. The Infrastructure Committee recommended various options to improve the weir and surrounding area to increase the capacity and efficiency of the weir and associated channels to improve pumping capacity. Discussions with the District operations staff concluded that dredging the weir will be the best option at the time. The District Board of Directors approved funding for a Biological Wildlife Assessment Report in 2022. The Phased Strategic Plan stated that TCCWD has previously invested in assorted studies and surveys assessing possible locations for additional water sources, such as new wells, to augment the District water supply. TCCWD also has rights to a well located within the Timber Cove Inn property. The Infrastructure Committee and TCCWD Board of Directors recognizes the need for additional water sources and will continue to assess viable water sources after the weir improvements have been completed.

4.8.3 Location/Geographical Extent

Periods of low precipitation impact entire states and regions of the country. How local regions are impacted by drought is varied by the type of water system used and the geographical location of the water system. Although TCCWD was unable to provide specific incidences of impact due to the extended statewide and Sonoma County specific droughts, a drought would affect the entirety of the TCCWD service area. TCCWD actions, including drilling two exploratory wells during the 2014 declared drought and the development of the Conservation Action Plan for Source Capacity Study, allude to impacts of drought. Timber Cove is located along coastal bluffs, and the watershed consists of low hills along the northern coastline of California. Proximity to the ocean moderates the overall temperature, reducing evaporative water loss as well as creating conditions that encourage precipitation and coastal fog. The geographical location and conditions may reduce some of the drought impacts that inland locations experience.

4.8.4 Magnitude/Severity

The scale and severity of drought impacts on local resources is unique to that area's water supply and storage capacity, as well as the ability to acquire water from outside agencies. TCCWD is reliant on the surface water available and seasonal rainfall within Timber Cove Creek for its water supply. The District is not considering drilling any new wells (TCCWD communication, 2025). The District is extremely vulnerable to an extended drought period lasting multiple years.

Exhibit 10: Drought Severity

4.8.5 Frequency/Probability of Future Occurrence

Weather patterns are altering, creating periods of extended and excessive heat during summer. The frequency and intensity of excessive heat events impacting the Timber Cove area is likely to increase. TCCWD's location along the coast and within low hills may reduce drought impacts due to natural conditions. TCCWD has a large raw and treated water storage capacity and a water conservation action plan that will improve the District's ability to operate during a short-term drought condition. Therefore, there is a low probability that the District will be greatly impacted in a short-term drought. The lack of a secondary water source could create a severe impact if the natural flow of Timber Creek is greatly reduced due to an extended drought or if an unrelated incident impacts creek flow during a drought. Climate change over time will create increasing variability in precipitation amounts and warming trends, both in increasing temperature and longer periods of warm temperatures. These combined changes will increase the likelihood of multi-year droughts. (California's Fourth Climate Change Assessment, 2019)

4.8.6 Vulnerability

The District is reliant on a single source of water, Timber Creek, which is fed by rainfall and underground water within the Timber Creek watershed. The District utilizes water storage facilities to store water during abundant rainfall. Current storage facilities are 3 water tanks with a combined storage of 187,600 gallons and a reservoir of approximately 9.9 million gallons. The District implemented the TCCWD Conservation Action Plan in March 2021. The plan requires diversions of raw water from Timber Creek to be stored within the reservoir during specific months of the year when stream flows are historically high and requires withdrawals from the reservoir during low flow periods of the year. The plan establishes thresholds reliant on surface water storage within the reservoir for implementing additional conservation measures, including notices to customers requesting voluntary conservation goals. Adherence to the plan would reduce TCCWD drought vulnerability to extended drought periods.

4.9 Severe Storm

4.9.1 Background

Severe weather is any dangerous meteorological phenomenon that has the potential to cause damage, serious social disruption, or loss of human life. These events include high winds, (sustained winds of approximately 30 miles per hour with gusts over 60 miles per hour are possible within the Timber Cove area), and intense periods of precipitation that can lead to flooding and rock/debris slides. Severe storms usually strike Timber Cove in the winter months. The impacts most associated with severe storms are fallen trees due to the high winds. Trees are vulnerable to falling in a high wind event when they have suffered damage or death due to insect infestation, drought, or age. Once these trees fall, they can block roads and access to infrastructure, damage structures, and sever powerlines. This can make it difficult for District staff to access facilities for operations, maintenance, and emergency repair. Power outages due to trees damaging powerlines or falling on electrical facilities can prevent other utilities, such as water systems and land-based phone service, from functioning. Loss of power can be extremely challenging for the District to maintain reliable water service. In past storm events where loss of power occurred in Timber Cove, the District was without power for 10-12 days and relied upon generators for backup power.

4.9.2 Past Occurrences/Previous Assessments

Timber Cove is located in a heavily forested area with limited access routes and exposed overhead powerlines strung on power poles throughout the tree canopy. The TCFPD has recorded 65 incidents of severe weather events (thunderstorms, wind events, and extreme heat) since 2000 that have caused death, injury, or property damage within its response area that includes Timber Cove and the surrounding region.

Table 8: **Storm History in the Timber Cove Fire Protection District**, shows data associated with past storm events from 2008 through 2023 in the TCFPD service area. A severe storm in January 2023 caused 43 trees to fall within Timber Cove blocking roads throughout the community. Some of these trees blocked culverts, causing localized flooding that damaged the road surface.

Table 8: Storm History in the Timber Cove Fire Protection District

Date	Trees Down	Power Outage	Debris Flow	Flooding	Road Closure
1/2008	X	X	X		
11/2008	X	X	X		
2/2009	X	X	X		
1/2010	X	X	X	X	X
10/2010	X	X		X	
12/2010	X	X	X	X	X
2/2011	X		X	X	
3/2011	X		X	X	
6/2011	X				
1/2012	X		X	X	X
3/2012	X		X	X	X
11/2012	X	X	X	X	X
12/2012	X		X	X	
4/2013	X				
10/2013	X				
11/2013	X				
2/2014	X		X		X
2/2014	Drought Declaration/Dry Wells				
12/2014	x		x	x	X
2/2015	x		x		X
12/2016	x		x		X
2/2017	x				
10/2017	x		x		X
1/2018	x	x			X
2/2018	x	x	x		X
2/2019	x	x	x		X
3/2019	x	x	x		X
9/2019		X			
10/2019		X			
11/2019		x			
12/2022	x	x			X
1/2023	x	x	x		x

Source: Timber Cove Fire Protection District. 2024. Fire District Master Plan

The TCCWD reported over $4,000.00 in damage and clean-up costs due to a severe storm in January 2024 that caused trees to fall within the weir and at Tank 2, crushing a storage shed. The District reported that three homes reported damage to their water lines from falling trees. (TCCWD, personal communication, June 2025). Additional severe storm /high wind events were February 4, 2024, with wind speeds reaching speeds of 83 miles per hour and December 23rd and 24th, 2025 with wind speeds reaching 77 and 70 miles per hour respectively. (National Centers for Environmental Information, 2026).

4.9.3 Location/Geographical Extent

Severe storms can affect all of Timber Cove and the greater region. The forested hills and coastal bluffs of Timber Cove can concentrate local wind events and can concentrate precipitation. Timber Cove is located off SR-1 with only two access roads into the majority of the community and the main water treatment plant for the TCCWD. Fallen trees and localized debris flows, rock falls, downed power lines, and flood damage has isolated individual homes, various access roads within Timber Cove, and the community of Timber Cove from outside assistance in recent storms. Direct and indirect damage to TCCWD facilities and staff will occur due to future severe storm events.

4.9.4 Magnitude/Severity

Recent damage to TCCWD facilities due to severe storms has been limited to the costs of tree removal from access roads and falling trees within their compounds. Other damage to facilities and infrastructure has been due to secondary hazards such as localized flooding. Increased costs due to increasing storm activity are likely due to the unpredictability of individual storm severity over time.

4.9.5 Frequency/Probability of Future Occurrence

Alterations in weather patterns due to climate change are expected to create more variable precipitation with unusual amounts of rainfall at unusual times. Intensity of storms can increase during the normal annual weather cycle. Weather phenomena such as atmospheric rivers (large, narrow sections of the Earth's atmosphere that carry moisture from the tropics or other regions causing heavy rain or snow) and bomb cyclones (a rapidly intensifying midlatitude storm system due to strong temperature contrasts between meeting air masses) will become more frequent. Severe storms have the potential to become yearly events. According to California's Fourth Climate Change Assessment, what has been considered a 1-in-20-year one day severe storm becomes 3 times more frequent, approximately a 1-in-7-year event. Atomspheric river driven events could occur every 40 to 50 years by 2100. Single day precipitation events that can be considered as "the wettest day of the year" will show an increase of 6% to 21% and up to 37% by 2100. Impacts to Timber Cove and TCCWD's facilities and infrastructure can be expected to increase due to secondary storm hazards, such as downed trees, power outages, flooding, landslides, and rock falls.

4.9.6 Vulnerability

TCCWD infrastructure has relatively low vulnerability to severe storm damage. Trees falling on structures and/or access roads will impact the District's ability to maintain services. Prolonged rainfall can result in flooding within Timber Creek and localized areas such as culverts that may damage distribution lines. Power outages due to trees falling onto power transmission lines, or other such damage to the power grid would temporarily hamper water supply to parts of the TCCWD system. TCCWD does have an emergency power generator that can operate the water treatment facility and some distribution pumps.

4.10 Vulnerability Summary

4.10.1 Vulnerability Summary

Vulnerability of an agency, institution, city, or infrastructure is dependent on a combination of hazard risk to it and the impact, sensitivity, or consequence of the hazard on it. Potential hazards vary according to local

conditions, including location, geography, climate, population, and multiple variables. Timber Cove County Water District has identified the following hazards as potentially affecting the District.

Earthquake

Multiple earthquake faults underlie the Timber Cove County Water District service area. The District's infrastructure would be susceptible to impacts such as damage to pipelines, tank and other vessels rupturing, structural damage of offices and storage areas, damage to the open reservoir lining or walls, and damage or failure of the weir.

Wildfire

Wildfire presents multiple hazards to the District. Direct involvement of structures (offices, tanks, treatment plant, etc.) would severely inhibit the District's ability to provide potable water to the community. Damage to private homes and businesses can damage water meters and other smaller facilities, creating numerous leaks and repair costs. Destruction of the surrounding vegetation, especially within the watershed of Timber Creek, can introduce foreign material (ash, soil, tree and brush refuse) into the creek, creating damage to the physical structures (weir, pump system) as well as additional water treatment procedures to ensure the water is safe for use. Potential contamination from ashfall and debris entering the open water reservoir leading to additional filtration.

Landslide

Specific sections of the supply mains and associated structures are potentially impacted by landslides.

Flooding

The Timber Cove community is prone to localized flooding of areas such as low culverts and low areas between hills. The weir and associated structures within the streambed of Timber Creek is susceptible to damage from flooding.

Sea Level Rise

There is minimal risk of impacts due to sea level rise because the coastline consists of high bluffs.

Tsunamis

There is minimal risk of impacts due to tsunamis because the coastline consists of high bluffs.

Drought

The impact of drought is low. Water supply to the District is limited to one source, Timber Creek. The geographic location of Timber Creek's watershed, along the Northern Coast of California, can mitigate the effects of a drought cycle relative to a more inland watershed due to the proximity of the Pacific Ocean's temperature moderation effects. Drought can result in soil settlement that may impact infrastructure such as pipelines and water tanks.

Severe Storms

Impacts due to severe storms is dependent on factors such as the amount of treefall along access roads, power outages due to power grid failure, and localized flooding preventing access to District facilities and repair locations.

The relatively small size of TCCWD creates a situation where a relatively small impact would generate a larger consequence to the operations of the District. The District currently has very limited options to mitigate impacts on its operations from one of the above hazards.

4.10.2 Hazard and Vulnerability Matrix Methodology

TCCWD's unique size, location, and infrastructure required the development of a 2-part matrix to estimate vulnerability in a quantifiable point or ranking system, based on exposure risk and sensitivity or consequence of a specific hazard occurring.

Exposure to Risk or Potential to Experience a Hazard ranks the potential for the specific infrastructure item to be impacted by a hazard. Location of the specific part of the infrastructure, if the structure is above or below ground level, type of structure, etc. are considered when ranking the individual item for being impacted by a specific hazard. For example, Water Storage Tank #2 (Howland Property) is located on a ridge line, it has a moderate potential to be impacted by a landslide, but it is inland from the coast so there is little potential to be impacted by a tsunami or sea level rise.

Sensitivity of Impact/ Consequence of a Hazard ranks the level of impact that damage or destruction of a specific infrastructure item would have on the ability of TCCWD to provide water service to the clients of the District. The matrix ranking was based on the item's value to how the District's water delivery system physically operates, how vital that item is to the operation of the District in general, and repair considerations for the infrastructure item. For example, during a Drought, there is little impact on the Management Office's ability to operate the water district, whereas a wildfire damaging or destroying the Management Office has a major impact on the operation of the water district.

Certain infrastructure components were given additional consideration due to the nature of the component. The distribution pipelines, fences, and items such as various valves and fire hydrants were given a ranking based on the highest hazard ranking that the item is located or, in the case of pipelines, passes through. The distribution pipelines are constructed of varied materials depending on the age and size of the pipe's use. The three main pipeline materials used for TCCWD distribution lines are various types of PVC, asbestos concrete, and steel. These materials vary in quantity and durability; therefore, these components of the infrastructure are given an overall ranking accordingly.

Table 9: **Hazard and Vulnerability Matrix for TCCWD** ranks the District's vulnerability to the above noted hazards. The Hazard and Vulnerability analysis is based on a 3-point scale of 1 being the lowest assessment risk and consequence, and 3 being the highest assessment of risk and consequence. A final 3-point weighting is also applied to emphasize the influence of one hazard versus another. Exposure to a specific risk/hazard and Sensitivity of impact /consequence of a specific risk or hazard risk are considered separately. The risk is evaluated for all the infrastructure identified across the property, considering Earthquake, Wildfire, Landslide, Flooding, Sea Level Rise, Tsunami, Drought, and Severe Storm hazards. The final vulnerability is calculated as the product of the exposure ranking, sensitivity ranking, and weighting factor, all divided by the maximum possible points for each item of infrastructure. For items which are distributed across the entire site, such as water lines, the worst hazard ranking from all site instances is reflected.

Earthquake, Wildfire, Drought (subsidence), and Severe Storms are weighted at a value of 3 relative to other hazards, with Flooding weighted at a value of 2, followed by Landslide, Sea Level Rise, and Tsunami hazard at no weight or a value of 1.

Seismic Hazards

Perhaps the most relevant quantitative indicator of seismic risk is Peak Ground Acceleration, Velocity, and/or Displacement. The Peak Ground Acceleration (PGA) across the site was estimated based on USGS Static Hazard Curves. PGA was estimated for 2% exceedance in 50 years, which equates to an approximate

2,475-year return period consistent with upper-level events in ASCE 7, and assuming a site class D. The PGA across the site from 1.03 g to 1.06g, with an average of 1.04 g. This is relatively high considering PGA in this framework across California varies from approximately 0.4 to 0.9 on average. Therefore, on a 3-point hazard scale, a hazard risk of 3 was assigned to all infrastructure. Pipelines installed within the ground will tend to move as part of the ground mass during a seismic event. Pipelines that are installed above the ground are more susceptible to breakage as they flex separately from the ground below which they are installed above. Thus, it is less likely that an underground pipeline will break from ground movement during an earthquake.

For sensitivity or impact assessed on a 3-point impact scale, a consequence value of 1 was assigned to distributed systems and improvements on or below ground such as the weir piping, fire hydrants, and fencing. Water Storage tanks were assigned a value of 2, and buildings and other taller structures or with human occupancy assigned a value of 3.

Wildfire Hazards

Fire hazards were estimated through reference to the CalFire Fire Hazard FHSZ GIS databased. Fire hazards are assigned as “None”, “Moderate”, “High”, and “Very High”. Therefore, considering the Hazard and Vulnerability analysis is performed on a three-point scale of 1 being the lowest risk and 3 being the highest, a point system was applied to the range of FHSZ as 1 – none, 1.67 – moderate, 2.33 – high, and 3 – very high, for an event distribution of ranking. The majority of the Timber Cove study area is in a “high” FHSZ, with the exception of the southern tip which is a Moderate FHSZ. However, the improvements in the lower zone only include water air relief valves, hydrant gate valves, water line, fire hydrants, roadway, and fencing – all of which are also present also in the High FHSZ.

For vulnerability (sensitivity or impact) assessed on a 3-point impact scale, a consequence value of 1 was assigned to distributed systems and improvement on or below ground such as the weir, piping, fire hydrants, and fencing. Water Storage tanks were assigned a value of 2, and buildings and other taller structures or with human occupancy assigned a value of 3.

Landslide Hazards

Landside Hazards were estimated through reference to the California Department of Conservation, CGS Landslide Inventory. There are no mapped landslide hazards within the study footprint. However, there are improvements adjacent to Timber Cove Creek which have not been evaluated on a site-specific basis and may be a likely hazard for landslide. Therefore, these improvements were assigned a value of 2 on the 3-point hazard and vulnerability analysis scale for this study. This includes the Booster Pump System, Natural Water Storage Reservoir, Water Treatment Plant, Plant and Management offices, Emergency Generator (Water Treatment Plant), and the three Water Tanks.

For vulnerability (sensitivity or impact) assessed on a 3-point impact scale, a consequence value of 3 was assigned to all improvements considering ground movement related to landslide would require complete replacement.

Flood Hazards

Flood Hazards were estimated through reference to the FEMA National Flood Hazard Layer. There are no mapped flood hazards within the study footprint; therefore, all improvements are assigned a value of 1 on the 3-point hazard and vulnerability analysis scale for this study.

For vulnerability (sensitivity or impact) assessed on a 3-point impact scale, a consequence value of 3 was assigned to the weir and the natural water storage reservoir which would receive high volume of flow during an extreme event. A consequence value of 1 was assigned to distributed systems and improvement on or

below ground such as the weir, piping, fire hydrants, and fencing. The distribution lines at Pacific View and all other infrastructure was assigned a value of 2.

Sea Level Rise

Sea level rise was estimated through reference to the USGS Multi Hazard Viewer for Sea Level Rise and Storm Scenarios. There are no mapped sea level rise hazards within the study footprint; therefore, all improvements are assigned a value of 1 on the 3-point hazard and vulnerability analysis scale for this study.

The site is well protected from the influence of sea level rise. For vulnerability (sensitivity or impact) assessed on a 3-point impact scale, a consequence value of 1 was assigned to all infrastructure considering both the low risk and low consequence of such events for this project site.

Tsunami

Tsunami Hazards were estimated through reference to the California Department of Conservation California Tsunami Areas. Project improvements are not found within the tsunami hazard zones; therefore, all improvements are assigned a value of 1 on the 3-point hazard and vulnerability analysis scale for this study.

The site is well protected from the influence of Tsunami. For vulnerability (sensitivity or impact) assessed on a 3-point impact scale, a consequence value of 1 was assigned to all infrastructure considering both the low risk and low consequence of such events for this project site.

Drought

Risk of damage to infrastructure due to drought is estimated to be low in general, except as a variable cause or precursor to wildfire hazards, which are evaluated separately. All improvements are assigned a value of 1 on the 3-point hazard and vulnerability analysis scale for this study.

With regard to vulnerability (sensitivity or impact), drought can also induce subsidence or vertical ground movement due to soil settlement. Therefore, on a 3-point impact scale, a consequence value of 2 was assigned to distributed systems and improvement on or below ground such as the weir, piping, fire hydrants, and fencing, as well as the water tanks which have a large footprint and would be affected by differential settlement. A value of 3 was assigned to the roadway pavement which would also be affected by drought-induced subsidence. A value of 1 was assigned to all other infrastructure.

Severe Storms

Similar to Flood Hazards, Severe Storm Hazards were estimated through reference to the FEMA National Flood Hazard Layer. There are no mapped flood hazards within the study footprint; therefore, all improvements are assigned a value of 1 on the 3-point hazard and vulnerability analysis scale for this study. However, the Weir and the Natural Water Storage Reservoir were assigned a value of 2 for hazard risk based on the increased flows these would receive during a storm.

For vulnerability (sensitivity or impact) assessed on a 3-point impact scale, a consequence value of 3 was assigned to the either critical infrastructure or exposed and easily damaged elements, including the Weir, Water Storage Reservoir, Emergency Generator, Tool Shed, Distribution Piping, Values, and Meters Throughout TCCWD1, Fire Hydrants, Roadways, Fencing. A value of 2 was assigned to all other infrastructure.

Table 9: Hazard and Vulnerability Matrix for TCCWD

Facility	Exposure Risk or Potential to Experience a Hazard								Sensitivity of Impact/Consequence of a Hazard								Vulnerability
	3	Max Ranking (1 to 3)							3	Max Ranking (1 to 3)							
Facility	Earthquake Hazards	Wildfire Hazards	Landslide Hazards	Flooding Hazards	Sea Level Rise Hazards	Tsunami Hazards	Drought	Severe Storms	Earthquake Hazards	Wildfire Hazards	Landslide Hazards	Flooding Hazards	Sea Level Rise Hazards	Tsunami Hazards	Drought	Severe Storms	Vulnerability (1 to 3)
Weight (1 to 3) -->	3	3	1	2	1	1	3	3	3	3	1	2	1	1	3	3	
Weir	3	2.33	3	1	1	1	1	2	1	1	3	3	1	1	1	3	1.06
Booster Pump System	3	2.33	1	1	1	1	1	1	3	3	3	2	1	1	2	2	1.35
Water Storage (natural reservoir and associated systems)	3	2.33	2	1	1	1	1	2	1	1	3	3	1	1	2	2	0.94
Water Treatment Plant (including tanks, pumps, chemicals and associated systems)	3	2.33	1	1	1	1	1	1	3	3	3	2	1	1	1	2	1.29
Plant Office -22108 Timber Cover Rd2	3	2.33	1	1	1	1	1	1	3	3	3	2	1	1	1	2	1.29
Management Office-22098 Lyons Court	3	2.33	2	1	1	1	1	1	3	3	3	2	1	1	1	2	1.35
Emergency Generator (Water Treatment Plant)	3	2.33	1	1	1	1	1	1	2	3	3	2	1	1	1	3	1.18
Water Storage Tank #1 ***(Southmost)*** (across from Rae's)	3	2.33	2	1	1	1	1	1	2	3	3	2	1	1	2	2	1.23
Water Storage Tank #2 (Howland Property)	3	2.33	2	1	1	1	1	1	2	3	3	2	1	1	2	2	1.23
Water Storage Tank #3 ***(Northmost)*** (Plant)	3	2.33	1	1	1	1	1	1	2	3	3	2	1	1	2	2	1.18
Koftinaw Pump Station (abandoned)	3	2.33	1	1	1	1	1	1	3	3	3	2	1	1	2	2	1.35
15,Amanita Circle, Pacific View Distribution Lines (replacement costs)	3	2.33	1	1	1	1	1	1	1	2	3	2	1	1	1	2	0.80
Tool Shed Reservoir	3	2.33	1	1	1	1	1	1	1	1	3	1	1	1	1	3	0.69
Distribution Piping, Values, and Meters Throughout TCCWD1 (PVC)	3	2.33	3	1	1	1	1	1	3	3	3	1	1	1	2	3	1.49
Distribution Piping, Values, and Meters Throughout TCCWD1 (Asbestos)	3	2.33	3	1	1	1	1	1	2	2	3	1	1	1	2	3	1.18
Distribution Piping, Values, and Meters Throughout TCCWD1 (Steel)	3	2.33	3	1	1	1	1	1	1	1	3	1	1	1	2	3	0.86
Fire Hydrants	3	2.33	3	1	1	1	1	1	1	2	3	1	1	1	2	3	1.00
Tools and other maintenance equipment	3	2.33	1	1	1	1	1	1	1	1	3	1	1	1	1	3	0.69
Pump and Control Building	3	2.33	1	1	1	1	1	1	3	3	3	2	1	1	2	2	1.35
Roadways at the Water Treatment Plant	3	2.33	2	1	1	1	1	1	1	2	3	3	1	1	3	3	1.08
Storage Building and Management Office	3	2.33	2	1	1	1	1	3	3	3	3	2	1	1	1	3	1.76
Steel Container Storage Shed	3	2.33	1	1	1	1	1	1	1	1	3	1	1	1	1	2	0.63
Fencing	3	2.33	1	1	1	1	1	1	1	1	3	2	1	1	1	3	0.73

Section 5.0 Mitigation Strategy

5.1 Mitigation Goals

The goal of the TCCWD LHMP presented in Section 1.1, Purpose of the Plan, is to conduct a thorough evaluation of the natural hazard risks and vulnerabilities of the District's infrastructure, and to outline an action plan to address these vulnerabilities. Section 4 of this Plan has highlighted the natural hazards with the potential to impact the District. The TCCWD LHMP Planning Team has identified a number of long-term goals, prioritized specific concerns, and identified mitigation measures to be taken to better equip the District to meet its responsibilities to its clients and the greater community in case of a natural disaster.

The goals will also serve to guide the District in decision making during implementation of current mitigation actions and future mitigation actions.

A) Avoid or reduce the potential loss of life, injury, and economic damage to the District's employees or assets due to natural hazards.

B) Provide a level of reliable water supply to the District clients.

C) Increase the District's ability to serve the community during and after hazard events.

D) Develop and encourage coordination and mutual assistance with agencies in the local and regional area to improve the disaster readiness of the area.

The hazard mitigation actions identified below list activities which TCCWD will use to reduce their risk to potential hazards. These mitigation actions were identified through the planning process with the LHMP Planning Team, a review of existing plans and documents, and public input. Some of these actions may be eligible for funding through Federal and State grant programs and other funding sources as made available to the District. The mitigation actions are intended to address the comprehensive range of identified hazards. Some actions may address risk reduction from multiple hazards.

5.2 Mitigation Cost Benefit Review, Prioritization, Funding Strategy, and Action Plan

5.2.1 Hazard Mitigation Benefit Cost Review and Prioritization

FEMA requires a planning level, quantitative and / or qualitative benefit-cost review to aid in prioritizing mitigation projects within the Local Hazard Mitigation Plan (LMHP):

- 44 CFR Section 201.6 (c)(3) "An action plan describing how the actions identified in paragraph (c)(3)(ii) of this section will be prioritization, implemented, and administered by the local jurisdiction. Prioritization will include a special emphasis on the extent to which benefits are maximized according to a cost-benefit review of the proposed projects and their associated costs.
- FEMA Local Planning Policy Guide (2025) Mitigation Strategy: Element C5-a. "The plan must describe the criteria used for prioritizing the implementation of the actions. The criteria must include an emphasis on the extent to which benefits are maximized, in relation to the associated costs of the action. *Although a full benefit-cost analysis is not necessary, the plan must demonstrate that proposed mitigation actions will be prioritized by weighing the cost of the action versus the benefits the action will produce, in addition to other prioritization factors. Another example of a prioritization method may be that jurisdictions establish a minimum threshold for the dollar amount, types or*

number of benefits an action must have to be considered for implementation. Or they could simply prioritize actions with more benefits than other alternatives.

Other methodologies are acceptable if the plan demonstrates that the action's monetary and non-monetary benefits were specifically emphasized and considered in the community's decision-making process. Qualitative benefits (quality of life, natural and beneficial values, etc.) may be used, especially in considering mitigation actions that alleviate long-term risk."

- FEMA Local Mitigation Planning Handbook: Section 6.4.1 "The one criterion that must be part of the evaluation and prioritization process is a cost benefit-cost review. The planning team must weigh the benefits of a mitigation action against the cost. A full benefit-cost analysis, such as the FEMA BCA Module, is not required. A planning-level assessment of whether the costs are reasonable compared to the probable benefits will suffice. Cost estimates can be based on experience and judgement. They do not have to be exact.

Benefits include losses avoided, such as the number and value of structures and infrastructure protected by the action. Protecting people from injury and loss of life is another benefit. Qualitative benefits, such as quality of life and saving ecosystem function, can also be included in the review. The benefit-cost review that was performed is inspired by the qualitative method outlined in FEMA How-To Guide.

FEMA guidance considers this analysis as a generalization of the relative value of and between the various mitigation actions proposed by the LMHP. The LHMP is not intended to specifically request a grant or loan from a federal agency, it is a statement of what the jurisdiction(s) that created the plan deem necessary to protect its population, structures, and infrastructure before a natural or manmade hazard strikes. A LHMP must be in place before a jurisdiction / agency can pursue a more specific grant or loan from FEMA or other Federal Agency to fund a mitigation action. The required application or sub application for a specific grant must be completed (including all documentation of potential costs) in order to receive funding. Cal-OES provides guidance and assistance for communities and other agencies in preparing the LHMP.

Analysis:

The first step in prioritizing mitigation actions is to review the measurable and non-measurable benefits and costs for each mitigation action. This is a three-part process based on experience, professional estimates, and judgment:

1) Measuring Vulnerability before and after mitigation. An overall review of vulnerability of the area affected by the mitigation before and after (estimated) the mitigation and the potential difference between the two states. Vulnerability considerations can include number of people affected by the hazard, area affected (acreage) by the hazard, number and type of properties affected by the hazard, estimated property damage, loss of use considerations, loss of life, etc. These considerations can be valued in cost estimates or by non-monetary benefits.
2) Develop a simple list of potential benefits that may not be addressed in step 1.
3) Develop a simple list of potential costs that may not be addressed in step 1.

Costs of the mitigation actions can include (note: extreme detail is not needed for LHMP):

- Construction costs (This can be a relative or rough estimate of overall costs including materials, crew, permitting, and management costs)
- Programming costs (staff to administer/ maintenance cost (quarterly, yearly, etc.) and other programing needs.)

- Time needed to implement
- Funding available
- Type of funding (grants/loans)

Benefits can include qualitative considerations focusing on risk reductions.

- Risk reductions to critical facilities and infrastructure.
- Reduction in service disruption
- Public health and safety benefits
- Ease of implementation
- Regulatory, compliance, or redundancy benefits
- Contribution to community resilience.
- Public/political interest and approval
- Mitigation of hazard of most concern to the community/agency

Once the information has been collected, the priority can be assigned to the action(s).

High priority actions should be actions that provide the most benefit to the community, and / or the benefits are perceived to exceed costs without further study or evaluation This can be a combination of positive benefits to a large number of residents, low overall costs or minimal costs over a length of time, positive environmental benefits, the action can reduce vulnerabilities over a number of hazards, can be completed over a short time frame, etc.

Medium priority action should be actions that may not remove vulnerabilities but only minimizes the impact and/or the benefits are perceived to exceed costs but may require further study or evaluation before implementation. Such actions can have higher costs, may require low additional staffing requirements, may have a longer time frame for implementation, may only address one or two hazards, etc.

Low priority actions should be actions that does not directly address the vulnerability and/or the benefits and the associated costs require an additional evaluation prior to implementation. Actions in this category can be indirect actions like general education or outreach, actions that require significant new staff or higher construction costs, etc.

It should be noted that a low or medium priority action can be implemented before a higher priority action if the action may begin addressing a vulnerability that a higher priority action will eventually be implemented (for example, a low priority action by be increasing drought resistance educational activities while simultaneously starting a high priority action such as locating and developing a second water source.)

Limitations of the Benefit Cost Analysis

This Benefit Cost Review was developed for TCCWD's LHMP and aids in prioritizing mitigation actions for the District. All scores are comparative and not predictive as to costs and benefits. If the District is to pursue specific grant funding from FEMA, or grants administered by Cal-OES, other sources, the District will be required to complete a separate Benefit Cost Analysis fully detailing all costs and benefits, as well as other required documentation. This Benefit Cost Review shall only be used for the purposes of assisting prioritizing mitigation actions within the current version of the Timber Cove County Water District LHMP. An updated Benefit Cost Review must be completed for the 5-year update of the LHMP.

5.2.2 Mitigation Funding Strategy

The District intends to fund mitigation activities considered feasible to accomplish with a combination of TCCWD budget funds and Federal and/or state grant funds or loans when available. These funds could be from a variety of sources, including FEMA Pre-Disaster Mitigation Grant Funding, FEMA Hazard Mitigation Grant Program funding, FEMA Hazard Mitigation Assistance, FEMA Disaster Management Act, Emergency Management Performance Grant program funds, United States Department of Agriculture (USDA), and U.S. Bureau of Reclamation (USBR) funding. The TCCWD Infrastructure Committee identified the following agencies as a starting point for TCCWD's research into potential funding opportunities.

- The California Water Board's Division of Financial Assistance
- California Special District Association Finance Corporation
- California Governor's Office of Land Use and Climate Innovation
- The California Infrastructure and Economic Development Bank's Infrastructure State Revolving Fund Program.

The District will apply for funding once a project has been identified as viable or, during the investigative phase, if funding is available to assist with those associated costs. In addition, the TCCWD will facilitate and monitor grant funding opportunities as they arise and report on grant applications' outcomes as part of the annual reporting required under the LHMP.

The TCCWD Phased Strategic Plan (2022) identifies long term capital improvements to the District within a 3-year time frame. The District Capital Improvement and Infrastructure Planning Committee considered 5- or 10-year time frames as not in the best interest of the District due to funding constraints incurred by the limited size of the District, the results of implementation of near-term improvements to the system, available technologies, and cost information for equipment will change over time. The Planning Committee recommended that longer term projects that are discussed in the current Phased Strategic Plan be further evaluated and prioritized in the preparation phase of the next Phased Strategic Plan update, which is recommended to be released every three years. The mitigation measures recommended in this LHMP will be included in the next Phased Strategic Plan.

A Water Distribution System Evaluation was conducted in 2024 and prioritized six distribution system improvements that would improve the District's ability to provide reliable and safe water service to the community. The evaluation assessed the current condition of the infrastructure, identified areas of concern, recommended improvements, and estimated probable costs. The District combined the three highest priority projects into one project for development. A Preliminary Engineering Report, Water Distribution Facilities Study (2025) was prepared by the District to evaluate alternatives for construction of this project.

Table 10: **Current Capital Improvement Projects** lists the projects evaluated in the reference documents above.

Table 10: Current Capital Improvement Projects

Project	Description	Cost
Consolidated Pacific View Drive, Amanita Circle, and Koftinow Drive Project	Replace aging pipes, asbestos cement pipes, and upgrade infrastructure to improve system reliability, eliminate leaks, and improve low-pressure flow, flow issues, and water quality	Approximately 1.2 to 1.3 million dollars dependent on construction methods.
Umland Circle	Replace main with thicker pipe to maintain consistent pressure	$484,400
Lee Drive	Replace existing main pipe to reduce leaks and improve fire flow	$290,650
Residential Courts	Replace existing distribution main to ensure consistent pressure, reliability, and water quality.	$1.8 million
Installation of Koftinow Pump Station	Installation of a new booster pump station near Tank 3.	$262,000 – $393,000
Filter Vessel Train Improvements	Replace corroded ductile iron pipe from the vessels to the clear well and reinstating granular activated carbon for chemical removal.	$187,550
Tank Piping Replacement	Evaluate Installation of a chemical free ultraviolet system in the plant for water purification.	TBD*
Evaluation of Weir Improvements[1]	Proposed weir dredging project.	TBD (min: $5,600)
Grant Funding Evaluation and Monitoring	Utilize an outside professional to research available grants for implementation of projects and authoring grant applications	Estimated $4,000 a year

*TBD-to be determined: represents costs that could not be determined at time of Plan development.

5.2.3 Mitigation Action Plan

The process used by the TCCWD LHMP Planning Team to identify hazard mitigation actions for this Plan included the review of the District's hazard assessment presented in Section Four and a discussion of concerns and issues to reduce hazards to critical facilities and infrastructure. The TCCWD LHMP Planning Team considers the District is most vulnerable to impacts from Earthquakes, Wildfire, Severe Storms, Landslides, and Drought conditions.

Multi-hazard action items are those activities that pertain to two or more of the five hazards in the mitigation plan: Earthquake, Wildfire, Severe Storm, Landslides, and Drought.

Table 11: **TCCWD Hazard Mitigation Actions** presents TCCWD Hazard Mitigation Actions that are aligned with the above mitigation goals, including potential, although not exclusive, funding solutions for each action.

Table 11: TCCWD Hazard Mitigation Actions

Goal	Mitigation	Potential Funding Source***	Timeframe	Responsible Party	Priority
Multi-Hazard Related Actions					
B) Provide a level of reliable water supply to District clients	Conduct a District resilience assessment to identify specific deficits and develop strategies to rectify.	FEMA-HMA, CA DWR (Watershed Resilience Program), SWRCB (SAFER), SADWF	2-3 years	General Manager	High
B) Provide a level of reliable water supply to District clients	Evaluate at least one reliable secondary source of water supply for the District (feasibility study/hydrogeologic well siting study)	USDA ECWAG, CA DWR(Small Community Drought Relief Program), SWRCB (Technical Assistance Funding), SADWF, USBR WaterSMART grant	2-3 years	Operations Chief	High
B) Provide a level of reliable water supply to District clients	Develop at least one reliable secondary source of water supply for the District	EPA WIFIA,USDA Water & Waste Disposal Program, CA DWR(Small Community Drought Relief Program), SWRCB (General Drought Funding), SADWF, USBR, WaterSMART grant	5-10 years	Operations Chief	Medium
B) Provide a level of reliable water supply to District clients	Develop agreements with surrounding water agencies and/or private contractors for supplemental water supply	General Fund	4-5 years	General Manager	Low
B) Provide for a level of reliable water service to District clients	Ongoing worksite and off-site training and inspection of Hazardous Materials Storage facilities	General Fund, SWRCB (Clean Water State Revolving Fund/Small Community Funding Program), SADWF	Annually at minimum	Operations Chief	Low
C) Increase the District's ability to serve the community during and after hazard events	Coordination with WiConduit to develop broadband technologies to improve District communications	CPUC Grant, Broadband Infrastructure Grant; CA State & Local Cybersecurity Grant Program	1-2 years	General Manager	High

Goal	Mitigation	Potential Funding Source***	Timeframe	Responsible Party	Priority
D) Develop and encourage coordination with local and regional agencies to improve disaster readiness of area	Develop and conduct training programs with local emergency agencies for District facilities	General Fund, CAL FIRE (Wildfire Resilience Block Grants, Urban and Community Forestry) Cal OES(Hazard Mitigation Grant Program), FEMA EMPG	Quarterly	Operations Chief	Medium
D) Develop and encourage coordination with local and regional agencies to improve disaster readiness of the area	Coordinate with Sonoma County Department of Emergency Management regarding upcoming drills and exercises	General Fund, CAL FIRE (Wildfire Resilience Block Grants, Urban and Community Forestry) , Cal OES(Hazard Mitigation Grant Program), FEMA EMPG	Annually at minimum	General Manager	Medium
	Earthquake Related Actions				
B) Provide for a level of reliable water supply to District clients	Conduct a seismic analysis for potential risks to District infrastructure and develop mitigation actions.	FEMA BRIC, Cal OES(Hazard Mitigation Grant Program), CA DWR, SWRCB (Technical Assistance Funding), SADWF	4-5 years	General Manager	High
B) Provide a level of reliable water supply to District clients	Installation District approved technologies and systems for improved earthquake resilience.	USDA Loan, FEMA-HMGP (Primary); USDA Water & Waste Disposal Loan/Grant (Secondary); SWRCB (DWSRF Supplemental)	5-10 years	Operations Chief	High

Goal	Mitigation	Potential Funding Source***	Timeframe	Responsible Party	Priority
B) Provide a level or reliable water supply to District Clients	Purchase and storage of emergency equipment, materials, and supplies (pipes, fittings, etc.) that would be needed following a major earthquake	General Fund	Monthly as needed	Operations Chief	Medium
C) Increase the ability of the district to serve the community during and after hazard events	Participate in the Great California Shakeout exercise conducted annually by Cal-OES	General Fund	Recurrent, annually	General Manager	Medium
	Wildfire Related Actions				
A) Avoid potential loss of life, injury, and economic damage to the District's assets or its employees	Assess potential risk to water quality and District infrastructure to wildfire damage	FEMA-HMA, CALFIRE (Wildfire Resilience Block Grants, Urban and Community Forestry), CA Fire Safe Council, CA DWR (Watershed Resilience Program)	4-5 years	Operation Chief	High
B) Provide a level of reliable water supply to District clients	Conduct a water system hydraulic model to identify and address any deficiency found.	CA SWRCB (Technical Assistance Funding) SADWF, CA DWR, USBR WaterSmart	1-5 year	General Manager	High
C) Increase the ability of the District to serve the community during and after hazard events	Brush removal operations in the property surrounding District facilities	FEMA-HMA, CAL FIRE(California Forest Improvement Program), California Fire Safe Council	Recurrent, as needed	General Manager	High

Goal	Mitigation	Potential Funding Source***	Timeframe	Responsible Party	Priority
	Severe Storm Related Actions				
C) Increase ability of the District to serve the community during and after hazard events	Conduct a Scour Vulnerability and Evaluation Study of culverts, roadway, piping, and other areas of potential concern.	General Fund, FEMA HMA, DWR Flood Grants, FHWA PROTECT, Caltrans	4-5 years	General Manager	High
C) Increase ability of the District to serve the community during and after hazard events	Implement soil scour prevention measures to existing culverts and other areas with potential washout concerns	General Fund, FEMA HMA, FHWA PROTECT, Caltrans	4-5 years	Operations Chief	High
C) Increase ability of the District to serve the community during and after hazard events	Maintain and periodically assess emergency power needs and equipment	General Fund, FEMA-HMA, SWRCB (Backup Generator Funding) DWSRF	Quarterly	Operations Chief	Low
C) Increase ability of the District to serve the community during and after hazard events	Contract with third party for on call tree removal services	General Fund, FEMA-HMA	Annual	General Manager	Low
	Landslide Related Actions				
B) Provide a level of reliable water supply to District clients	Conduct a Geotechnical Study and Hazard Assessment of the diversion weir, pump intake structure, Timber Creek streambed, and other District infrastructure	FEMA-HMA, Cal-OES(Hazard Mitigation Grant Program), SWRCB (Technical Assistance Funding), SADWF	1-2 years	General Manager	High

Goal	Mitigation	Potential Funding Source* **	Timeframe	Responsible Party	Priority
B) Provide a level of reliable water supply to District clients	Prepare a soil stabilization action plan for landslide response	FEMA-HMA, Cal-OES (Hazard Mitigation Grant Program), SWRCB (Technical Assistance Funding Program), SADWF	4-5 years	General Manager	High
	Drought Related Actions				
B) Provide a level of reliable water supply to District clients	Review and update the TCCWD Conservation Action Plan in regard to seasonal / annual inflow /outflow data to ensure efficiency and accuracy	General Fund, SWRCB (Drought Funding)	5-10 years	General Manager	Medium
B) Provide a level of reliable water supply to District clients	Distribute educational materials to encourage low water use	General Fund, SWRCB (Drought Funding), SADWF, Sonoma Water, WaterSMART grant	4-5 years	General Manager	Low

Note:

*The District will investigate eligibility for funding by the agencies and programs listed. General Fund designates existing District budgeting.

**CA- California;

CA DWR- California Department of Water Resources

Cal-OES- California Office of Emergency Services

FEMA- Federal Emergency Management Agency

SADWF- Safe and Affordable Drinking Water Fund

SWRCB- State Water Resources Control Board

USBR- United States Bureau of Reclamation

USDA- United States Department of Agriculture

5.2.4 Mitigation removed from consideration

LHMP meetings with the TCCWD Board of Directors regarding vulnerabilities and mitigation actions highlighted Board of Directors' concerns of physical contamination of the open surface water reservoir from wildfire debris (ash, embers, etc.) and/ chemical contamination due to an unintentional drop of retardant into the reservoir. A potential mitigation is to place a temporary or permanent physical cover over the reservoir. The LMHP Planning team's review removed this mitigation from consideration for the following reasons:

- Physical contamination, such as ash and embers, can be filtered out during TCCWD normal water treatment operations. CAL FIRE, and the United States Forest Service, the two agencies that provide aerial firefighting resources during wildland fires, only use Phos-Chek® for aerial retardant applications (Perimeter Solutions "CAL FIRE Wildland Firefighting").
- Phos-Chek®'s active component is either ammonium phosphate or ammonium polyphosphate. In addition to the main components is small quantities of performance additives including a gum thickener, a flow conditioner, corrosion inhibitors, and color pigment. Aerial application of Phos-Chek® is a mixture of 10 to 15% Phos-chek® to 85 to 90% water. (ICL Performance Products LP) The compounds within the retardant can be removed with the usual water treatment processes at TCCWD.
- Federal policy requires "buffers extending no less than 300 feet on either side of a waterway", in which a waterway is defined as "including but not limited to perennial streams, … (and) reservoir" Such waterways "in which water is present at the time of retardant application….is considered an avoidance area".(USFS, Record of Decision, 2024) Map analysis of the area of and surrounding the reservoir and the nearby Timber Cove Creek riverbed has shown that the buffers are very close together, if not overlapping at the closest point between the reservoir's southeastern corner and the riverbed. It is a reasonable conclusion that, in the case of a wildfire, aerial application of retardant will be prohibited during firefighting operations near the location of the reservoir and the Timber Creek riverbed.
- Installation and covering of the reservoir is not a cost-effective mitigation for the wildfire hazard, or other hazards to TCCWD infrastructure due to costs related to development, installation, and long-term maintenance.
-

5.3 Capabilities Assessment for Implementation of Action Plan.

The Timber Cove County Water District consists of a Board of Directors, a General Manager, Chief Operator, Shift Operator, and an Administrative Assistant. Mitigation actions recommended by the TCCWD LMHP Planning Team must be reviewed and approved by the Board of Directors. Once approved, mitigation actions will be coordinated between the General Manager and Operations Chief for further implementation. TCCWD is a small water district with limited staff and funding due to the small number of clients, therefore, implementation of some mitigation actions will be dependent upon contracted companies (i.e. grant sourcing, geotechnical surveys, etc.). TCCWD is a Special District within California and has sole authority regarding infrastructure development and policy creation. The California Division of Drinking Water provides a plan review for all water treatment and distribution infrastructure projects. Sonoma County provides permits for non-water treatment and distribution construction projects.

5.4 Existing Authorities, Policies, Programs, and Resources, and Ability to Expand and Improve

Currently the TCCWD supplies water to 270 properties, the majority of these connections are residential. Funding for operations and capital improvements primarily comes from rate payers, state and federal grants, and state and federal loans. District operation policies include an Emergency Disaster Plan, an Infrastructure Phased Strategic Plan, Conservation Action Plan, and other policies that are not relevant to this LHMP. The Emergency Disaster Plan provides policies and procedures for mitigation operations during emergency incidents and contains sample notifications for the customers regarding boil water notification and other instructions depending on the specific mitigation for the specific hazard (i.e. possible bacteria contamination versus hazardous chemical contamination). It does not specify earthquake or other drills, this will be addressed as part of the mitigation actions outlined in this LHMP. Elements of this LHMP will be included within future updates to the Infrastructure Phased Strategic Plan as future projects. Some of the mitigation

actions mirror existing projects in the current plan. Scheduled data collection regarding the effectiveness and potential changes to the Conservation Action Plan due to changing conditions are included as a mitigation action in this LHMP.

Updates to existing plans and policies are reviewed by District staff and approved/ adopted by the District Board of Directors during scheduled District Board meetings.

5.4.1 Timber Cove's Ability to Expand on and Improve Existing Policies and Programs

The effectiveness of the District's non-regulatory LHMP depends on the implementation of the Plan and incorporation of the outlined mitigation action items into existing District's plans, policies, and programs. The Plan includes a range of action items that, if implemented, would reduce loss from hazard events. Together, the mitigation action items in the Plan provide the framework for activities that the District can choose to implement over the next five years. Accordingly, TCCWD has prioritized the Plan's goals and identified actions that will be implemented (resources permitting) through existing plans, policies, and programs.

The General Manager has taken on the responsibility for overseeing the Plan's implementation and coordination within the District's existing programs, coordinating with consultants for technical studies, and similar duties. The Operations Chief will assume lead responsibility for facilitating LHMP implementation and maintenance of the District infrastructure.

5.4.2 Incorporation Into Existing Planning Mechanisms As stated in 5.1, Mitigation Priorities and goals, information on hazards, risk, vulnerability, and mitigation in this Plan is based on information from similar planning documents used by the District. The District will continue to coordinate the Plan's mitigation actions with other planning processes and programs, which include the TCCWD Capital Improvement Plan, TCCWD Infrastructure Committee Phased Strategic Plan, and the TCCWD Emergency Response Plan. Elements of the LHMP that can be integrated into existing plans include but are not limited to: elements of the LHMP Hazard Mitigation Table, mitigation actions, hazard identification, and hazard vulnerability summaries. The District General Manager and Board of Directors will include the LHMP coordination/integration with other existing plans and policies as the existing plans are updated. Inclusion of LHMP mitigation actions will be addressed and added to the existing plan noted above, and other policy documents, during the normal revision timelines for the specific plan or policy.

5.5 Participation in the NFIP and Compliance with NFIP Requirements

TCCWD is not a participant in the National Flood Insurance Program (NIFP). This program is designed for communities that have high flood risk, floodplains, or areas/facilities that experience repetitive flood damage. The geographical location of the TCCWD service area within coastal hills is not considered to have a high flood risk, floodplains, or have suffered repetitive flood damage. TCCWD's infrastructure do not have any Repetitive Loss or Severe Repetitive Loss structures which would be eligible for the NFIP. The NFIP is not available for private agencies.

Section 6.0 Plan Maintenance

This Section identifies the formal process to ensure that the TCCWD LHMP remains an active and relevant document. The Plan maintenance process includes a schedule for monitoring and evaluating the plan annually and producing an update every five years. This section describes how TCCWD will integrate public participation throughout the Plan maintenance and implementation process. In addition, the Plan's format allows the District to readily update sections when new data becomes available. Resulting in a Plan that will remain current and relevant to the District.

6.1 Monitoring, Evaluating, and Updating the Plan

Section 201.6.(d)(3) of Title 44 of the Code of Federal Regulations requires that local hazard mitigation plans be reviewed, revised if appropriate, and resubmitted for approval to remain eligible for benefits awarded under the DMA. The District intends to update the Plan on a five-year cycle from the date of plan adoption. It is anticipated that this update process will occur one year before the expiration of the existing plan. This cycle may be accelerated to less than five years based on the following triggers:

- A Presidential Disaster Declaration that impacts the Agency.
- A hazard event that causes a significant amount of damage.

6.1.1 Monitoring

The TCCWD General Manager and the Operations Chief will be responsible for maintenance of this LHMP. The Operations Chief and Operations department will lead in maintenance issues by coordinating the maintenance of this plan. The General Manager will undertake the formal review process and revising the LHMP. The General Manager will facilitate periodic meetings with the Operations Chief, Board of Directors, public outreach, and other stakeholders to update and revise the Plan. Plan implementation and evaluation will be a shared responsibility among the General Manager, Operation Chief, Board of Directors, and other staff of TCCWD.

The Operations Chief will be responsible for tracking the implementation of the LHMP and report such findings to the General Manager and other TCCWD stakeholders periodically. Mitigation action items' costs and progress will be evaluated as part of the yearly budget process for TCCWD. Public input will be obtained periodically to advise TCCWD clients of the mitigation progress and new concerns.

6.1.2 Evaluation

The minimum task of the annual hazard mitigation review meeting will be to evaluate the Plan's progress and incorporate the actions into other planning documents and be conducted by the District General Manager and the Operations Chief. This review will be to evaluate the Plan's progress and incorporate the actions into other planning documents. This review will include the following:

- Summary of any hazard events that occurred during the prior year and their impact on the District.
- Review of successful mitigation initiatives identified in the Plan.
- A brief discussion about why targeted mitigation strategies were not completed.
- Re-evaluation of the Mitigation Actions to determine if the timeline for identified projects needs to be amended (such as changing a long-term project to a short-term project due to funding availability)
- Recommendations for new mitigation actions.
- Changes in, or potential for, new funding options/grant opportunities.
- Integration of new GIS data and maps that can be utilized to update the Plan.
- Evaluation of any other planning programs or initiatives within the District that involved hazard mitigation. Evaluation will include review of documents such as Capital Improvement Plan, Emergency Operations, Budgeting, etc., to include and enhance reduction of vulnerabilities, mitigation of hazards, and improve District resilience.

- The mitigation actions will be reviewed and revised to account for any actions, completed, deferred, or changed to account for changes in the risk assessment or new District policies identified under other planning mechanisms, as appropriate.

6.1.3 Annual Progress Form

As part of the Plan Maintenance Process for the LHMP, the annual hazard mitigation planning team will convene to conduct an annual review to monitor the progress in implementing the LHMP. The LHMP Progress Report Form has been developed for this purpose and will be completed annually.

The LHMP Progress Report Form (Section 6.1.7) will provide the basis for possible changes to the overall LHMP. The Agency will have an opportunity to refocus on any new or more threatening hazards. In addition, this will allow the District to make any necessary adjustments to or changes in resource allocations and engage additional support for the LHMP implementation if warranted. The findings will be reviewed by the General Manager and used for the next plan update.

6.1.4 Five-Year LHMP Update Procedure and Timeline

The LHMP will be updated every 5 years, with the updating process beginning 1 year before the expiration of the existing plan. This update will be supervised by the District General Manager and include additional District staff and other personnel as deemed necessary. The General Manager will initiate the creation of an LHMP update planning team and supervise the development of an updated plan including, but not limited to, the following:

- Summary of any hazard events that occurred during the prior year and their impact on the District.
- Review of successful mitigation initiatives identified in the Plan.
- A brief discussion about why targeted mitigation strategies were not completed.
- Re-evaluation of the Mitigation Actions to determine if the timeline for identified projects needs to be amended (such as changing a long-term project to a short-term project due to funding availability)
- Review by General Manager, Operations Chief, Board of Directors, and other such stakeholders.
- Recommendations for new mitigation actions.
- Changes in, or potential for, new funding options/grant opportunities.
- Integration of new GIS data and maps that can be utilized to update the Plan.
- Evaluation of any other planning programs or initiatives within the District that involved hazard mitigation. Evaluation will include review of documents such as Capital Improvement Plan, Emergency Operations, Budgeting, etc., to include and enhance reduction of vulnerabilities, mitigation of hazards, and improve District resilience.
- The mitigation actions will be reviewed and revised to account for any actions, completed, deferred, or changed to account for changes in the risk assessment or new District policies identified under other planning mechanisms, as appropriate.
- The draft update will be sent to appropriate agencies for comment.

- The public will be allowed to comment before adoption.
- The TCCWD Board of Directors will adopt the updated Plan.

Based on a midyear 2026 Cal-OES and FEMA approval date.

• March 2027 - LHMP Progress Report and October 2027 Mitigation Action review

• March 2028 - LHMP Progress Report and October 2028 Mitigation Action review

• March 2029 - LHMP Progress Report and October 2029 Mitigation Action review

• March 2030 - LHMP Progress Report and Plan Update implementation

• October 2030 - Mitigation Action Review

• January 2031 - Submit Update LHMP to Cal-OES and FEMA

• March 2031 - LHMP Progress Report

• Summer 2031 - Implementation of approved LHMP

6.1.5 Adoption

The Timber Cove County Water District's Board of Directors is responsible for adopting the Plan. Once the Plan has been adopted, the District will be responsible for final submission to Cal-OES. Cal-OES will then submit the Plan to FEMA for final review and approval.

6.1.6 Future Public Participation After the Plan has been Approved.

The public will continue to be apprised of the LHMP actions through the District's website and by providing copies of the progress report to the public. Upon initiating the LHMP update process, a new public involvement strategy will be developed based on guidance from the planning team. This strategy will be based on the needs and capabilities of the District at the time of the update. At a minimum, this strategy will include the use of local media outlets within the District service area, notification by mail to District customers, social media outreach, public meetings, and the District's website.

6.1.7 Progress Report Form

LHMP Annual Progress Report Form

Date:

Name of Person Completing the Report:
Summary of Progress:

Have any new hazard/disaster events occurred during the reporting period? If so, list the event(s).

To your knowledge, did anyone from the public comment on the plan during the reporting period? If so, list the comments.

Do the goals, objectives, and mitigation actions of the plan address current and expected conditions? If not, please explain further:

Were any mitigation projects identified in the LHMP implemented during the reporting period? If so, list the projects.

What obstacles, problems, or delays did any current or ongoing mitigation projects encounter, if any?

How were the problems solved?

Are current resources appropriate for implementing the Plan? Y N

Have the outcomes occurred as expected? Y N

Have outside agencies participated as proposed? Y N

Were shortcomings identified, what can the Agency do to get things back on track?

Have there been changes in development trends that could create additional risks? If so, please explain.

Section 7.0 Plan Adoption

Upon FEMA's conditional approval of the updated LHMP, Timber Cove County Water District Board of Directors formally approved and adopted the LHMP on [date TBD insert date after FEMA conditional approval]. Formal FEMA approval of the District's LHMP was received [date TBD insert date of FEMA formal approval].

References

AnyplaceAmerica.com. 2025. www. Anyplace America.com., Timber Cove Topo Map in Sonoma County, California, (map copyright OpenStreetMap) Accessed February 28, 2025

Best Places, 2025. www.bestplaces.net., 2025. Timber Cove, CA. Accessed February 28, 2025

Brelje and Race Consulting Engineers. February 22, 2021, Timber Cove County Water District (TCCWD) Conservation Action Plan for Source Capacity Study B&R File No. 3535.10. (Memorandum)

California Department of Conservation. 2025. Tsunami Educational Materials and FAQs. Accessed May 5, 2025.

California Department of Conservation. 2025. Tsunami Hazard Area. Accessed May 5, 2025.

California Department of Conservation. California Geological Survey. N.d. Earthquake Zones of Required Investigation Accessed March 3, 2025.

California Department of Conservation. California Geological Survey, Landslide Inventory. N.d. Landslide Inventory (Beta) Accessed March 3, 2025.

California Department of Forestry and Fire Protection. Fire and Resource Assessment Program. N.d. Fire and Resource Assessment Program. Accessed March 3, 2025.

California Department of Forestry and Fire Protection website. 2025. osfm.fire.ca.gov/what-we-do/community-wildfire-prepardness-and-mitigation/fire-hazard-severity-zones Accessed March 28, 2025.

California Natural Resources Agency. 2019. California's Fourth Climate Change Assessment

California Office of Emergency Services. 2023. State Hazard Mitigation Plan.

Census Reporter .org. 2026. Timber Cove, CA, https://censusreporter.org/ Accessed May 15, 2026

Federal Emergency Management Agency. Disaster Information. N.d. Disaster Information | FEMA.gov Accessed July 26, 2026.

Federal Emergency Management Agency. National Flood Hazard Layer. N.d. FEMA's National Flood Hazard Layer (NFHL) Viewer Accessed April 15, 2025.

Federal Emergency Management Agency. Earthquake Hazard Maps. N.d. Earthquake Hazard Maps FEMA.gov Accessed April 14, 2025.

Glatfelter Claims Management, Inc. 2024. Claim Acknowledgement of Timber Cove County Water District storm damage recovery, February 9, 2024.

ICL Performance Products LP. 2022. Phos-Chek® Fire Retardants For Use in Preventing & Controlling Fires in Wildland Fuels, Frequently Asked Questions

National Drought Mitigation Center. University of Nebraska-Lincoln. U.S. Drought Monitor. N.d. Current Map | U.S. Drought Monitor Accessed February 27, 2025.

National Oceanic and Atmospheric Administration. https://www.noaa.gov/explainers/science-behind-tsunamis Accessed June 5, 2025.

National Oceanic and Atmospheric Administration. https://www.ncei.noaa.gov/stormevents/ Accessed July 20, 2026.

Perimeter Solutions. 2024. CAL FIRE Wildland Firefighting

Sonoma County. 2020. Tsunami Ready - Sonoma County Emergency and Preparedness Information Accessed May 6, 2025.

Sonoma County. 2021. Sonoma County Multi-jurisdictional Hazard Mitigation Plan Update 2021, Volume 1, Area- Wide Elements

Sonoma County, 2021. Sonoma County Multi-jurisdictional Hazard Mitigation Plan Update 2021, Volume 2, Planning Partner Annexes

Somona County GIS. Sonoma County GIS Accessed March 2025.

Sonoma Water, 2024. Sonoma County Water Agency Local Hazard Mitigation Plan

The Press Democrat. 2024. www.pressdemocrat.com. Accessed March 7, 2025.

The Weather.com. 2025. What is a bomb cyclone? Impacts over the years in the US. Accessed May 21, 2025.

Timber Cove Excavating Inc. 2024. Proposal for tree removal and shed demolition and removal, February 18, 2024.

Timber Cove County Water District. 2021. Board of Director's General Meeting Minutes, March 27, 2021

Timber Cove County Water District. 2022. Timber Cove County Water District Phased Strategic Plan

Timber Cove County Water District. 2023. 2023 Financial Planning, Revenue Requirements, and Rate Setting Analysis.

Timber Cove County Water District. 2024. Water Distribution System Evaluation.

Timber Cove County Water District. 2025. Personal email communication with Melany Collett, General Manager.

Timber Cove County Water District. 2025. Preliminary Engineering Report Water Distribution Facilities.

Timber Cove County Water District. 2026. Personal email communication with Alfonzo Portugal III, Operator T2/D2.

Timber Cove Fire Protection District. 2024. Fire District Master Plan

Timber Cove Homeowners Association. 2023. HOA Communication to HOA members regarding storm damage within the area. 2023.

World Media Group. 2025. www.usa.com ,2025. Timber Cove, CA Weather - USA.com™. Accessed February 28, 2025

U.S. Department of Energy. 2025 www.energy.gov, DOE Explains ... Atmospheric Rivers. Accessed May 21, 2025

U.S. Forest Service. 2024 Record of Decision Nationwide Aerial Application of Fire Retardant on National Forest System Lands, January 2024

U.S. Geological Survey. Hazard Exposure Reporting and Analytics, Multi Hazard Viewer for Sea Level Rise and Storm Scenarios. HERA Multi-Hazards Viewer Accessed March 3, 2025.

U.S. Geological Survey. National Seismic Hazards Model. N.d. National Seismic Hazard Model | U.S. Geological Survey Accessed March 3, 2025.

U.S. Geological Survey. USGS Static Hazard Curves. Unified Hazard Tool. Accessed October 1, 2025

Appendix A: Stakeholder and Public Outreach

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Appendix B: Internal Meeting Minutes

Timber Cove County Water District Local Hazard Mitigation Plan Kickoff Meeting Agenda

February 14, 2025 / 2:00pm / Microsoft Teams

Timber Cove County Water District Local Hazard Mitigation Plan

Kickoff Meeting

Attendee Introductions

MNS personnel

District personnel

Scope and Clarification of Tasks and Duties

Review of overall scope

Schedule of project deliverables

Communication protocols:

Specific contacts for District staff

Outside Agency staff, key stakeholders, and community representatives

Identification of:

Existing and planned infrastructure

Relevant documentation/maps/figures/ and other reference information

GIS data availability

Preliminary Identification of Specific Hazards

Specific hazards the District has identified – asbestos pipes, earthquakes, fire, creek/watershed contamination, pressure for firefighting, landslides.

Hazards identified by agency partners (Fire Department/Police/Community/etc.)

Specific existing mitigation actions being implemented or considered

Identification of risks that local agencies have identified

Identification of local populations/groups that warrant unique consideration.

Concluding comments

Timber Cove LHMP Planning Meeting May 15, 2025

TCCWD LHMP
Community Meeting #1
10:30am – 11:30am
5/17/2025

The major concerns voiced by the community/TCCWD staff are:

- Severe storms
- Drought
- Access for evacuation and recovery efforts.

Severe Storms: Community members voiced concerns as to why severe storms are not listed as a hazard. The past 2 years have had severe storm events (atmospheric rivers and "bomb" cyclones") that have generated high winds and localized flooding. The high winds have created extensive tree fall throughout the HOA, TCCWD service area, and surrounding communities. The heavy rainfall also caused localized flooding that has limited access to roads within the Timber Cove community and the community itself from outside the area. The flooding has also created service problems due to damaged lines, although not to extreme precautions such as boil water before use. A staff member noted that a drought weakened tree or otherwise dead tree will become "waterlogged" and then fall.

Drought: A TCCWD board member asked why drought was not a hazard because the water district gets water from one main source, the Timber Cove Creek watershed. The concern is that during a period of extended drought, the lack of rain fall will cause the creek to "dry up" and the TCCWD will not be able to provide water or refill the reservoirs and water tanks. A staff member noted that droughts weakened the trees so that they are more likely to fall due to insect infestation and or tree death due to lack of water.

Access for evacuation and recovery efforts: An underlying theme of much of the conversation was about access to and from Timber Cove from the outside area as well as access within the service area/HOA. The community and staff noted several reasons for access issues, including tree fall, flooding, and damage to roads that either access Timber Cove or are roads that pass through Timber Cove to other areas. The main concern was tree fall blocking access via roads. A TCCWD member stated that approximately 34 trees fell in the TCCWD area/HOA that blocked roads or driveways. A community member stated that there were trees falling into power lines and cutting power to the area.

Other meeting attendees stated that damaged or blocked roads that are in areas surrounding Timber Cove are a major concern due to limiting access for recovery efforts and/or evacuation routes.

Other notes:

A community member suggested creating alternate access routes to certain areas within the TCCWD as a mitigation.

A staff member noted that TCCWD has placed at least one new propane tank as part of the TCCWD facilities for additional fuel for emergency generators to power their facilities, because the district was down to 1 day's worth of fuel to power their facilities a year or so ago during a storm series.

Timber Cove County Water District has added a tab onto their website for updates and other information regarding the LHMP. It includes recorded meetings.

The current timeline for completion of the document and FEMA submittal will be December.

TCCWD Hazard Assessment Meeting December 19, 2025

Timber Cove Hazard Assessment Meeting

Project: Local Hazard Mitigation Plan

Date: December 19, 2025, 12:00-1:00pm

Location: Teams Collaborative Call

Attendees:

John Gray – President (Timber Cove County Water District)
Spencer Lipp – Director (Timber Cove County Water District)
Melany Collett– General Manager (Timber Cove County Water District
Emily Elliott, AICP – Project Manager (MNS Engineers)
Chad Harden – Bridge and Structures Technical Director (MNS Engineers)
Josh Reece – Natural Resources Practice Lead Planning (MNS Engineers)
Joe Loveland – Associate Planner (MNS Engineers)
Alexandria Miramontes – Assistant Planner (MNS Engineers

Discussion and Concurrence on Mitigation Planning

MNS presented the draft Local Hazard Mitigation Plan to the Timber Cove County Water District to identify mitigation strategies informed by the Hazard Mitigation Actions and Vulnerability Assessment. The discussion focused on reviewing proposed mitigation goals and actions applicable to district operations, clarifying FEMA requirements, and confirming which actions are already underway and which of those will be requiring further evaluation or planning.

The District provided input on priority mitigation actions related to emergency supply preparedness, earthquake resilience, status of wildfire resilience of key tanks, landslide and storm history, and current communication protocol during hazard events. Additional discussion addressed funding considerations, coordination with emergency responders and regional partners, and the need to update plan language to accurately reflect existing mitigation effort and where further evaluation is needed.

Immediate Actions
MNS to update the Local Hazard Mitigation Plan to reflect documented landslide events.
MNS to revise the Hazard Mitigation Action section to reflect the County's ongoing mitigation efforts and to clarify language to reflect where the County needs to evaluate existing conditions.
MNS to revise the Mitigation Goal's language in Hazard Mitigation Action section.
MNS to condense repeating Multi-Hazard Actions throughout the Hazard Mitigation Action section.
Timber Cove County Water District to coordinate with the following,
Sonoma County Emergency Management
WiConduit

TCCWD LHMP Meeting January 9,2026

Timber Cove Hazard Assessment Meeting

Project: Local Hazard Mitigation Plan
Date: January 9, 2026, 12:00-1:00pm
Location: Teams Collaborative Call
Attendees:

John Gray – President (Timber Cove County Water District)
Spencer Lipp – Director (Timber Cove County Water District)
Melany Collett– General Manager (Timber Cove County Water District
Emily Elliott, AICP – Project Manager (MNS Engineers)
Chad Harden – Bridge and Structures Technical Director (MNS Engineers)
Josh Reece – Natural Resources Practice Lead Planning (MNS Engineers)
Joe Loveland – Associate Planner (MNS Engineers)
Alexandria Miramontes – Assistant Planner (MNS Engineers)

Agenda
1. Discussion and Concurrence on Hazard Identification
Review the following identified hazards Timber Cove from the draft Local Hazard Mitigation Plan affecting,
4.3.3-4.3.5 Wildfire
Exhibit 5
4.8.3-4.8.5 Drought
4.9.3-4.9.5 Severe Storm
2. Discussion and Concurrence on Vulnerability Assessment
Confirm concurrence with documented vulnerabilities,
4.10 Vulnerability Assessment
3. Discussion and Concurrence on Mitigation Planning
Discuss mitigation strategies applicable to Timber Cove
5.3 Goals to Reduce or Avoid Long-Term Vulnerabilities to Identified Hazards
5.4 Mitigation Actions and Projects to Reduce Impacts from Hazards Posing a Threat to Jurisdiction

TCCWD LHMP Meeting January 9,2026 (Minutes)

Timber Cove Mitigation Planning Meeting

Project: Local Hazard Mitigation Plan
Date: January 9, 2026, 12:00-1:00pm
Location: Teams Collaborative Call
Attendees:

John Gray – President (Timber Cove County Water District)
Spencer Lipp – Director (Timber Cove County Water District)
Alfonso Portugal – Shift Operator (Timber Cove County Water District)
Melany Collett – General Manager (Timber Cove County Water District)
Emily Elliott, AICP – Project Manager (MNS Engineers)
Chad Harden – Bridge and Structures Technical Director (MNS Engineers)
Josh Reece – Natural Resources Practice Lead Planning (MNS Engineers)
Joe Loveland – Associate Planner (MNS Engineers)
Alexandria Miramontes – Assistant Planner (MNS Engineers)

1. Discussion and Concurrence on Mitigation Planning
MNS continued presenting the draft mitigation actions of the Local Hazard Mitigation Plan to the Timber Cove County Water District as previously introduced in a meeting held in December of 2025. The purpose of this discussion was to continue reviewing the proposed mitigation strategies and goals informed by the Hazard Identification and Vulnerability Assessment section of the draft document. The review focused on Wildfire, Severe Storm, and Drought hazards to confirm feasibility, status, and prioritization of the proposed actions.
Decision Points and Discussions Items During the Meeting

- Update the Wildfire mitigation actions section to reflect that Goal B is currently in progress and revise the associated implementation timeframe from 0-5 year to 1-2 years.
- Revise Severe Storm Mitigation Goal C to clarify responsibility for maintenance of county-maintained culverts along Timber Cove Road and incorporate language addressing landslide mitigation related to line exposure.
- MNS staff to review and potentially revise Severe Storm Goal C language to account for County permitting constraints and the County's position that maintenance is not currently required.
- Update Drought Mitigation Goal B to reflect that the annual inflow/outflow update is an ongoing action.
- Revise Drought Mitigation Goal B as the action has previously been evaluated and deemed unfeasible by the District.
- Revise Drought mitigation language to change "develop" to "distribute."

Next Steps

- MNS to prepare a memo with the Hazard Matrix for review by the board for written comments
- After written comments, coordinate and host a noticed public workshop to follow to present mitigation actions for feedback
- MNS to proceed with a cost-benefit analysis following confirmation of the revised mitigation actions.

TCCWD LHMP Meeting March 20, 2026 (Minutes)

Timber Cove Mitigation Planning Meeting

Project: Local Hazard Mitigation Plan
Date: March 20th, 2026, 3:00-5:00pm
Location: Zoom Collaborative Call
Attendees:

John Gray – President (Timber Cove County Water District)
Jay Kvapil– Vice President (Timber Cove County Water District)
Jessica Weber – Director (Timber Cove County Water District)
John Rea Director – (Timber Cove County Water District)
Spencer Lipp – Director (Timber Cove County Water District)
Alfonso Portugal – Shift Operator (Timber Cove County Water District)
Melany Collett – General Manager (Timber Cove County Water District)
Emily Elliott, AICP – Project Manager (MNS Engineers)
Chad Harden – Bridge and Structures Technical Director (MNS Engineers)
Josh Reece – Natural Resources Practice Lead Planning (MNS Engineers)
Joe Loveland – Associate Planner (MNS Engineers)
Alexandria Miramontes – Assistant Planner (MNS Engineers)
Members of the Public

Agenda

Discussion and Concurrence on Mitigation Planning
MNS facilitated a meeting to discuss the Timber Cove Water District's draft Local Hazard Mitigation Plan (LHMP) with District staff and the public. This meeting covered the natural hazards that the Water District is vulnerable to, key mitigation goals, and the associated mitigation measures proposed in the LHMP. Following this discussion, a question and comment period was held to receive feedback from District staff and from the community.

The majority of comments focused on wildfire-related vulnerabilities, concerns, and mitigation measures. Additional topics included landslide risks near the weir, funding sources for mitigation actions, and additional mitigation measures to potentially incorporate into the LHMP.

Discussions Items During the Meeting

Wildfire
PVC Piping Concerns
Concerns regarding wildfire impacts to pressurized PVC piping and related contamination risks. Discussion began with the concern that aboveground PVC piping may melt during wildfire events, reducing available water for firefighting purposes. District Operations staff clarified that most aboveground pressurized PVC piping is located between water meters and customer-owned infrastructure and therefore is not directly maintained by the District.

Board members further raised concerns about excessive belowground heat during wildfire events, citing past incidents in which underground PVC piping melted with concerns regarding groundwater contamination being voiced. Participants also discussed possible mitigation measures including installing check valves or backflow prevention devices between meters and customer piping to reduce

contamination risks. Additionally, the ideas of the District doing community outreach to inform residents of the risks associated with above-ground PVC piping during wildfire was discussed.

Community Outreach

MNS staff suggested that a feasibility study and potential installation of check valves could be a cost-effective mitigation measure, with a proposed implementation timeframe of one to two years based on operational input.

Water Quality and Reservoir Protection

Protecting the open reservoir that provides water storage to the District was emphasized as a high priority. Participants raised concern that wildfire ash, debris, or unintended fire-retardant could contaminate the reservoir. Reference was made to a past incident when the reservoir could not be used, requiring the District to truck in water from external sources.

Possible mitigation measures discussed included:

- Identifying treatment methods or other mechanisms to remove or mitigate ash or chemical contamination
- Investigating physical or operational barriers
- Coordinating with CAL FIRE or other agencies to request designation of the reservoir area as a “no drop zone” for aerial firefighting operations

Participants emphasized that reservoir contamination could result in a complete loss of local water supply.

Wildfire Coordination and Planning

A participant requested that MNS staff review and consider relevant wildfire related documents from the local fire protection district, including their hazard mitigation and master planning documents, for awareness and consistency where appropriate. Said community members noted participation in a regional Firewise organization, which could provide opportunities for coordination with first responders and emergency preparedness groups.

MNS staff clarified that while coordination is encouraged, the LHMP is limited in scope to District infrastructure and operational continuity and does not include evacuation planning or broader city or county responsibilities.

Landslide / Geological Hazards

Concerns were raised regarding degradation and stability of the hillside located south of the Weir. Participants noted previous slope movement involving soil and boulders falling near the Weir. A large boulder currently positioned upslope was identified as a potential future hazard.

Although the issue was not identified as immediately critical, participants expressed concern that future slope failure could damage the electrical system and pumps associated with the weir. Monitoring and possible future mitigation were identified as important considerations.

Drought / Water Supply Management

Participants asked how the District can determine whether the existing Conservation Action Plan requires updating. MNS staff explained that the first step would be reviewing the age and relevance of source data, including inflow, outflow, and creek flow measurements. Comparison with more recent data would help determine whether current conditions remain aligned with the plan’s assumptions or whether updates are warranted.

Funding and Administrative Clarifications
Participants asked how mitigation actions identified in the LHMP would be funded. MNS staff explained that an approved LHMP is required to be eligible for FEMA and Cal OES hazard mitigation funding. Once mitigation actions are finalized, MNS will assist in identifying potential funding sources including from the Timber Cove County Water District Capital Improvement Program (CIP) and state and federal grants or loans.

Next Steps
MNS staff outlined the remaining steps in the LHMP process including finalizing mitigation actions and conducting cost-benefit analyses. Following this, a public draft of the LHMP will be distributed to the community.

Appendix C: Exhibits

Exhibit 1: *Timber Cove County Water District LHMP Study Area*
Exhibit 2: *Earthquake Probability Map (Peak Acceleration (%g) with 2% Probability of Exceedance in 50 Years)*
Exhibit 3: *FEMA Earthquake Hazard Map for Western United State*
Exhibit 4: *Earthquake Zones Adjacent to Timber Cove*
Exhibit 5: *Fire Hazard Severity Zones*
Exhibit 6: *Landslide Susceptibility*
Exhibit 7: *FEMA Flood Hazard Map*
Exhibit 8: *Estimated Inundation Area for 200-Centimeter Sea Level Rise with the 100-Year Storm*
Exhibit 9: *Predicted Timber Cove Tsunami Hazard Area*

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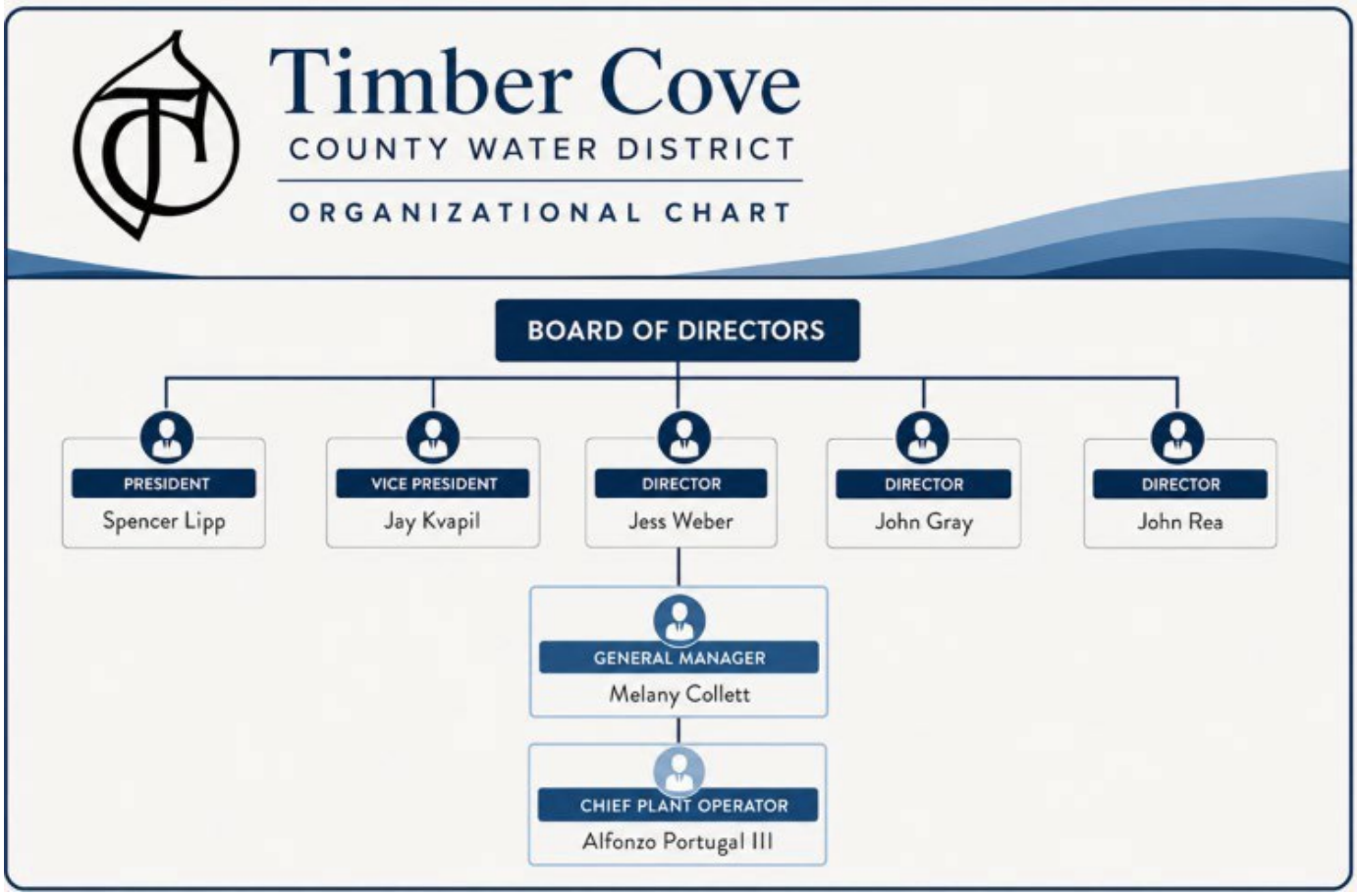
Appendix D: Organizational Chart



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Appendix E: Board Resolution Adopting the LHMP

Upon FEMA's conditional approval of the updated LHMP, Timber Cove County Water District's Board of Directors formally approved and adopted the LHMP on September 26th, 2026. Formal FEMA approval of the District's LHMP was received October 14, 2026.

The formal resolution of adoption follows:

TIMBER COVE COUNTY WATER DISTRICT, CALIFORNIA
RESOLUTION NO. LHMP-01

A RESOLUTION OF TIMBER COVE COUNTY WATER DISTRICT BOARD OF DIRECTORS ADOPTING THE TIMBER COVE COUNTY WATER DISTRICT LOCAL HAZARD MITIGATION PLAN, DATED AUGUST 2026.

WHEREAS the Board of Directors of the Timber Cove County Water District (the "District") is committed to providing reliable water service, and protecting District infrastructure and personnel from natural and human-caused disasters; and

WHEREAS, the Federal Emergency Management Agency (FEMA) and the California Office of Emergency Services (Cal OES) require that all government entities within the state have a Local Hazard Mitigation Plan that meets each entity's guidelines; and

WHEREAS the District has prepared a multi-hazard mitigation plan, hereby known as the Timber Cove County Water District Local Hazard Mitigation Plan, dated August 2026 (the Plan), in accordance with FEMA and Cal OES guidelines; and

WHEREAS the Plan identifies mitigation goals and actions to reduce or eliminate impacts of future hazards and disasters; and

WHEREAS, the District submitted the Plan for Cal OES and FEMA review; and

WHEREAS, on August 24, 2026 Cal OES determined the Plan approvable pending review by FEMA; and

WHEREAS, on September 14, 2026 FEMA determined the Plan approvable pending adoption by the District; and

WHEREAS, the District is required to conduct an update of such Plan every five (5) years; and

WHEREAS, upon formally adopting the Plan and FEMA's approval, the District is eligible for FEMA grant assistance and funding for pre-disaster and post-disaster and hazard mitigation; and

WHEREAS adoption by the Board of Directors demonstrates its commitment to hazard mitigation and achieving the goals outlined in the Plan.

NOW THEREFORE, BE IT RESOLVED that the Board of Directors of the Timber Cove County Water District adopts the Plan and urges District staff to collectively incorporate mitigation actions into all District planning and facilities and funding opportunities.

Section 1. In accordance with applicable law and District procedures for adopting resolutions, the Board of Directors adopts the Plan. While content related to Timber Cove County Water District may require revisions to meet the plan approval requirements, changes occurring after adoption will not require Timber Cove County Water District to re-adopt any further iterations of the plan. Subsequent plan updates following the approval period for this plan will require separate adoption resolutions.

APPROVED AND ADOPTED by a vote of four (4) in favor and zero (0) against, and zero (0) abstaining, this _26th_ day of September, 2026.

By: _____ Spencer Lipp, President

ATTEST: By: _____ Melany Collett, Secretary

APPROVED AS TO FORM: By: _____ (print name) Jesse W. Barton

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