



# Marin Municipal Water District Hazard Mitigation Plan

**PUBLIC REVIEW DRAFT**

September 2021



**TETRA TECH**



# Marin Municipal Water District Hazard Mitigation Plan

September 2021

## PREPARED FOR

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### **Marin Municipal Water District**

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## ACRONYMS/ABBREVIATIONS

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%g—Percent acceleration force of gravity	MMWD—Marin Municipal Water District
44 CFR—Code of Federal Regulations, Title 44	NASA—National Aeronautics and Space Administration
ABAG—Association of Bay Area Governments	NEHRP—National Earthquake Hazards Reduction Program
ACCP—American concrete cylinder pipe	NFIP—National Flood Insurance Program
AWIA—America’s Water Infrastructure Act (2018)	NOAA—National Oceanic and Atmospheric Administration
C-SMART—Collaboration: Sea-level Marin Adaptation Response Team	NWS—National Weather Service
CA LCP—California Landscape Conservation Partnership	PFA—polyfluoroalkyl substance
CAL FIRE—California Department of Forestry and Fire Protection	PGA—Peak Ground Acceleration
Cal OES—California Governor’s Office of Emergency Services	ppm—Parts per million
CAP—Climate Action Plan	PSPS—public safety power shutoff
CCR—California Code of Regulations	SCADA—supervisory control and data acquisition
CDBG—Community Development Block Grant	SCWA—Sonoma County Water Agency
CDC—U.S. Centers for Disease Control and Prevention	UCERF3—Uniform California Earthquake Rupture Forecast 3
COVID-19—Coronavirus Disease 2019	USDM—U.S. Drought Monitor
CPUC—California Public Utilities Commission	USGS—United States Geological Survey
CUPA— Certified Unified Program Agency	
DFIRM—Digital Flood Insurance Rate Map	
DMA—Disaster Mitigation Act	
DWR—California Department of Water Resources	
EAP— emergency action plan	
ESA—Endangered Species Act	
FEMA—Federal Emergency Management Administration	
FERC—Federal Energy Regulatory Commission	
HVAC—heating, ventilation, and air conditioning	
GIS—Geographic Information System	
Hazus—Hazards U.S.	



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## EXECUTIVE SUMMARY

The Marin Municipal Water District (the District) provides water services in the southeastern part of Marin County (see Figure ES-1), and its ability to continue to provide these services will be critical to the area's ability to recover from a hazard event. To address this need, the District has completed its first formal plan to prepare for the impacts of hazards that could impact the District. The *Marin Municipal Water District Hazard Mitigation Plan* provides a framework for all hazards that are likely to impact the District.

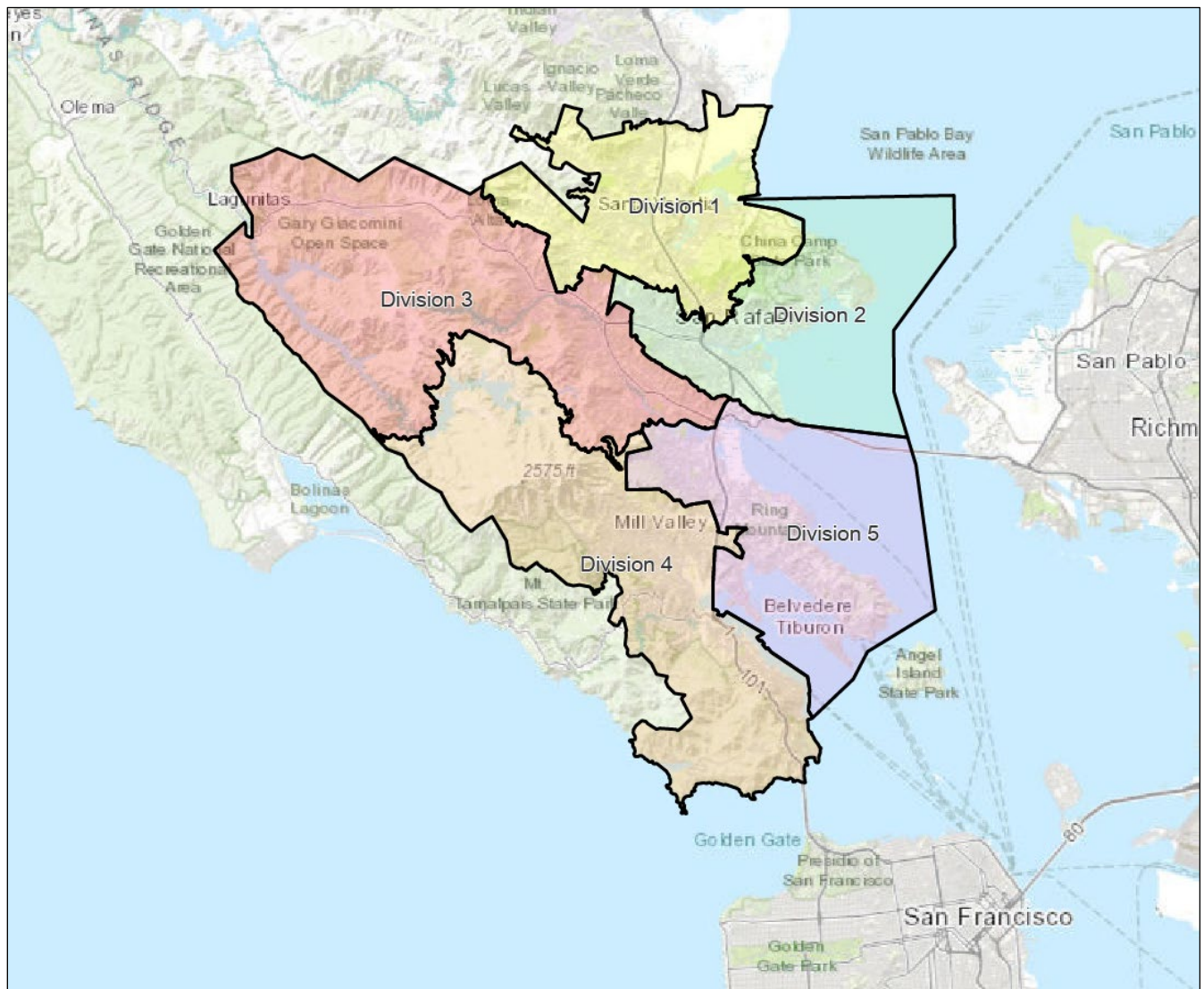


Figure ES-1. Marin Municipal Water District Service Area

The hazard mitigation plan strives to reduce risk for District assets that are vital for its continuity of operations following hazard events. The plan's goals and recommendations lay the groundwork for implementing local mitigation activities. The contents of the plan comply with requirements of the federal Disaster Mitigation Act, under which communities with approved hazard mitigation plans are eligible for various hazard mitigation funding programs provided by the Federal Emergency Management Agency.

The plan was prepared by a planning team of District staff and professional consultants, with oversight by a 12-member Steering Committee of local stakeholders representing interests within the District's service area boundaries. Public input for the plan was solicited through a survey, an internet presence, and media outreach.

## DISTRICT DESCRIPTION

Chartered on April 25, 1912, the Marin Municipal Water District was the first municipal water district in California. Prior to its formation, water in central and southern Marin had been provided by several small, private companies, many of them subsidiaries to local real estate developers. Recognizing the critical importance of reliable water service, the community came together to create a publicly owned and managed water system.

The District serves 191,000 people in central and southern Marin County and provides 100 percent locally sourced drinking water. About 75 percent of the District's water supply comes from reservoirs on Mt. Tamalpais and in west Marin County. The remaining supply comes from neighboring Sonoma County's Russian River water system.

The Hazard Mitigation Plan assesses the potential risk that natural hazards pose to buildings, infrastructure and equipment owned by the District. The District's key assets generally consist of buildings, pumps, tanks, and pipelines, which are defined for this plan as the District's critical facilities. Table ES-1 summarizes the District's critical facilities and their value.

**Table ES-1. Marin Municipal Water District Assets**

Asset	Quantity	Estimated Replacement Cost
<b>Structures/Facilities</b>	# of Facilities	
Administrative Facilities	29	\$71,341,461
Raw Water Facilities	10	\$17,952,474
Potable Water Structures	201,005	\$678,721,148
Recycled Water Structures	1,629	\$7,943,500
<b>Total</b>	<b>202,673</b>	<b>\$775,958,583</b>
<b>Pipelines</b>	Length (feet)	
Potable Water	5,881,326	\$3,396,805,837
Recycled Water	139,155	\$92,051,398
<b>Total</b>	<b>6,020,481</b>	<b>\$3,488,857,235</b>
<b>Total Value for all District Assets</b>		<b>\$4,264,815,818</b>

## HAZARDS OF CONCERN

The Steering Committee considered the full range of natural hazards that could impact the District and then ranked the hazards that present the greatest concern. Figure ES-2 shows the hazard ranking.



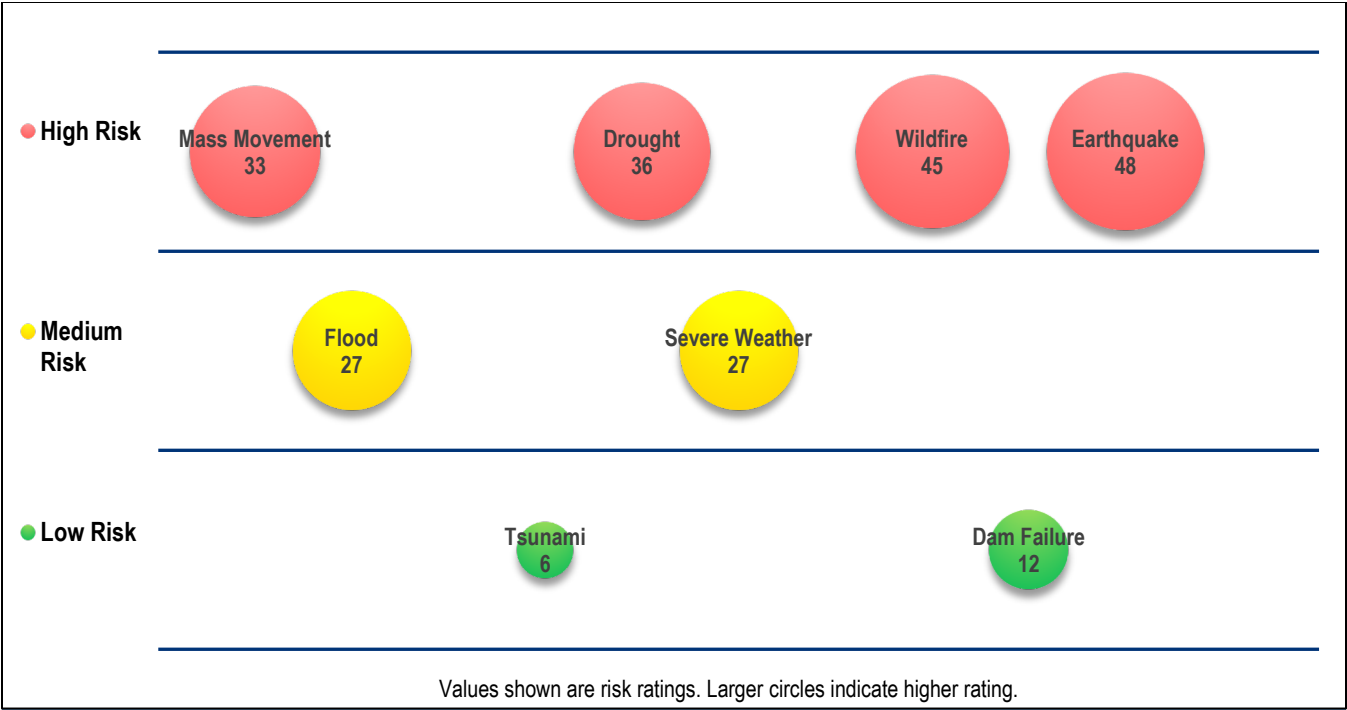


Figure ES-2. Hazard Risk Rating

In addition to the ranked hazards of concern, the Steering Committee recognized other hazards that present risks to the District but are difficult to quantify. These other hazards of interest are cyber-attack, hazardous materials, terrorism, and public health emergencies (including pandemics). The hazard mitigation plan provides general descriptions of the nature of these hazards. It also presents an overview on climate change, and how all hazards have the potential to be affected by it.

RISK ASSESSMENT

Risk assessments in the hazard mitigation plan describe the risks associated with each identified hazard of concern. For each hazard, a general profile of the hazard as it may affect the District was developed, and an assessment was completed to determine the number of District critical facilities that the hazard could affect (this is called “exposure”) and the potential damage that could result (this is called “vulnerability”).

This risk assessment found that, although many District facilities have exposure to most or all of the identified hazards of concern, quantifiable damage to facilities is likely only from the dam failure, earthquake, and flood hazards. Table ES-2 summarizes loss estimates for these hazards.

**Table ES-2. Estimated Overall Damage to Critical Facilities from Dam Failure and Earthquake**

	Loss Value of Damage		
	Structure	Contents	Total
<b>Earthquake</b>			
Hayward/Rodgers Creek Fault, Magnitude 7.58	\$122,006,170	\$3,795,236	<b>\$125,801,407</b>
North San Andreas Fault, Magnitude 7.88	\$182,271,408	\$4,951,975	<b>\$187,223,383</b>
San Gregorio Fault, Magnitude 7.44	\$112,825,239	\$2,663,901	<b>\$115,489,139</b>
West Napa Fault, Magnitude 6.97	\$5,681,055	\$442,276	<b>\$6,123,331</b>
100-Year Probabilistic Earthquake	\$101,028,358	\$1,343,377	<b>\$102,371,735</b>
<b>Dam Failure</b>			
Mapped Inundation Area	\$4,465,207	\$234,891	<b>\$4,700,098</b>
<b>Flood</b>			
1% Annual Chance Flood	\$1,245,306	N/A	<b>\$1,245,306</b>
0.2% Annual Chance Flood	\$1,300,423	N/A	<b>\$1,300,423</b>
<b>Tsunami</b>			
Mapped Inundation Area	\$150,641	N/A	<b>\$150,641</b>

## MITIGATION

Based on the risk assessment and hazard ranking, the Steering Committee identified 20 actions the District should take to mitigate the loss potential associated with the hazards of concern. These actions were chosen from a range of alternatives, using the following goals and objectives for guidance:

- Mission Statement—The mission of the hazard mitigation plan is to reduce risk and increase the resiliency of our water system during natural disasters by establishing a mitigation program that focuses on protecting life, property, infrastructure, and the environment.
- Goals:
  1. Protect life and property during disasters
  2. Minimize damage to critical infrastructure to maintain continuity of essential water services
  3. Protect natural resources, including local water supply sources
  4. Increase public awareness of the risk of loss of water
- Objectives:
  1. Implement projects that assist in protecting lives by making infrastructure, critical facilities, and other property more resistant to natural hazards
  2. Address aging infrastructure issues to reduce/minimize the impacts from future hazards and disasters
  3. Implement projects that reduce/minimize the impacts on our natural resources from future hazards and disasters
  4. Raise awareness and communicate risk to District assets

Table ES-3 lists the recommended hazard mitigation actions that make up the action plan. It also indicates priorities for each action in terms of implementing the action and pursuing grant funding for the action. These priorities are based on estimated benefits and costs of each action, how many objectives the action can accomplish, the availability of existing funding, and the action's eligibility for various grant programs.

**Table ES-3. Recommended Hazard Mitigation Actions**

Action Number and Description	Implementation Priority	Grant Pursuit Priority
<b>Action MMD-1</b> —Construct an emergency intertie across the Richmond San Rafael Bridge for water transfers to provide an alternative imported water supply to the District's capacity.	High	High
<b>Action MMD-2</b> —Pine Mountain Tunnel Project Mitigation. Reconstruction of an existing facility to reduce vulnerability to hazards.	Medium	High
<b>Action MMD-3</b> —Replace existing wood-roofed concrete tank at Ross Reservoir with new steel and/or concrete tanks.	Medium	High
<b>Action MMD-4</b> —Refurbish pump station at Kastania to increase imported water capacity.	Medium	High
<b>Action MMD-5</b> —Replace roofs and vents of treatment plants with non-combustible materials.	Medium	High
<b>Action MMD-6</b> —Replace 4 miles of ACCP transmission line pipe on North Marin Line from Shafter Bridge to San Geronimo Treatment Plant.	Medium	High
<b>Action MMD-7</b> —Create a defensible space around treatment plants.	Medium	High
<b>Action MMD-8</b> —Install a full-scale automated meter infrastructure to allow for real time analysis of water usage.	High	Medium
<b>Action MMD-9</b> —Perform seismic upgrades on 14 steel storage tanks in distribution system, including anchoring and flexible connections.	High	Low
<b>Action MMD-10</b> —Retrofit the exterior of 64 pump stations with non-combustible materials.	High	Medium
<b>Action MMD-11</b> —Replace clarifiers at San Geronimo Treatment Plant to increase seismic resilience.	High	Low
<b>Action MMD-12</b> —Install ozone at the San Geronimo Treatment Plant as a green alternative to chemical treatment	Medium	Medium
<b>Action MMD-13</b> —Expand recycled water infrastructure from Las Gallinas Sanitary District to Peacock Gap golf course.	Medium	High
<b>Action MMD-14</b> —Replace existing redwood tank at Bolsa.	High	Low
<b>Action MMD-15</b> —Replace existing redwood tank at Scenic.	High	Low
<b>Action MMD-16</b> —Replace existing redwood tank at Madera Park.	High	Low
<b>Action MMD-17</b> —Install permanent generators at 29 pump stations.	Medium	High
<b>Action MMD-18</b> —Replace existing redwood tanks at Hind.	Medium	High
<b>Action MMD-19</b> —Improve functionality and seismic reliability of emergency operations center with current technology.	Medium	High
<b>Action MMD-20</b> —Improve seismic reliability and install permanent generators at administration building.	Medium	High
<b>Action MMD-21</b> —Improve seismic reliability and install permanent generators at the corporation yard.	Medium	High
<b>Action MMD-22</b> —Install ozone at the Bon Tempe Treatment Plant to reduce chemical delivery needs, provide sustainability, and improve long-term water quality.	Medium	High
<b>Action MMD-23</b> —Continue to maintain the Hazard Mitigation Planning portion of the District's website for continued risk communication and hazard mitigation plan implementation over the performance period of this plan.	High	N/A



## **Part 1. BACKGROUND AND METHODS**



# 1. INTRODUCTION

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## 1.1 THE BIG PICTURE

Hazard mitigation is defined as any action taken to reduce or alleviate the loss of life, personal injury, and property damage that can result from a disaster. It involves long- and short-term actions implemented before, during and after disasters. Hazard mitigation activities include planning efforts, policy changes, programs, studies, improvement projects, and other steps to reduce the impacts of hazards.

The federal Disaster Mitigation Act (DMA) emphasizes planning for disasters before they occur. The DMA requires state and local governments to develop hazard mitigation plans as a condition for federal disaster grant assistance. Regulations developed to fulfill the DMA's requirements are included in Title 44 of the Code of Federal Regulations (44 CFR). The DMA promotes sustainability in hazard mitigation. To be sustainable, hazard mitigation needs to incorporate sound management of natural resources and address hazards and mitigation in the largest possible social and economic context.

## 1.2 A PLAN FOR THE MARIN MUNICIPAL WATER DISTRICT

The Marin Municipal Water District (MMWD or the District) has completed a planning process to prepare for the impacts of hazards that could impact the District. The District worked with its neighbors and identified stakeholders to prepare a detailed, multi-hazard plan, and to identify what steps it can take in advance to mitigate impacts from those hazards. It was the District's aim to engage its rate payers, through the hazard mitigation planning process, to communicate risk and seek input on ways that the District can reduce that risk and become more resilient.

The *Marin Municipal Water District Hazard Mitigation Plan* is the District's first formal plan pursuant to the Disaster Mitigation Act of 2000 (Public Law 106-109). The plan promotes sound policy to protect the District's critical facilities from the impacts of natural hazards. It identifies resources, information, and strategies for reducing risk from those hazards. Elements and strategies in the plan were selected because they meet a program requirement and because they best meet the needs of the District and its community.

All residents and businesses within the District's service area are the ultimate beneficiaries of this hazard mitigation plan. The plan strives to reduce risk for District assets that are vital for its continuity of operations following hazard events. The District provides water services in a portion of Marin County, and its ability to continue to provide these services will be critical to the area's ability to recover from a hazard event. This plan provides a viable planning framework for all hazards that are likely to impact the District. Participation in development of the plan by key stakeholders helped ensure that outcomes will be mutually beneficial. The plan's goals and recommendations lay the groundwork for implementing local mitigation activities and partnerships.

## 1.3 PLAN ORGANIZATION

The *Marin Municipal Water District Local Hazard Mitigation Plan* consists of three parts:

- Part 1 describes the concept of hazard mitigation, the process and methodologies used to develop this hazard mitigation plan, and significant hazard-related profile characteristics of the District.
- Part 2 provides a detailed risk assessment of the specific hazards of concern to the District. The assessment of each hazard describes the history, location, frequency and severity of the hazard, the District's exposure to the hazard, and the potential losses that could result from occurrences of the hazard.
- Part 3 defines the District's goals and objectives for hazard mitigation, recommended actions to mitigate hazard risks, and a strategy for implementing the recommended actions.

## 2. THE PLANNING PROCESS

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### 2.1 PLANNING TEAM, PLANNING AREA AND STEERING COMMITTEE

To address the federal mandates in the DMA, the Marin Municipal Water District applied for and was awarded a planning grant (Project #4407-713-088P) funded by the Federal Emergency Management Agency (FEMA) to develop a hazard mitigation plan. The first step in developing the hazard mitigation plan was to establish a planning team to carry out the planning process and document preparation and a steering committee of local stakeholders to guide the planning team.

MMWD hired Tetra Tech to assist in the facilitation of the planning process. The Tetra Tech project manager assumed the role of the lead planner, reporting directly to a MMWD-designated project manager. A planning team was formed to lead the planning effort, made up of the following members:

- Kristin Arnold (Marin Municipal Water District)—Project Manager
- Elysha Irish (Marin Municipal Water District)—Supervisor
- Matthew Steiner (Marin Municipal Water District)—Engineer
- Matthew Sagues (Marin Municipal Water District)—Grant Coordinator
- Rob Flaner (Tetra Tech)—Project Manager
- Bart Spencer (Tetra Tech)—Lead Project Planner
- Carol Baumann (Tetra Tech)—Lead Hazard Planner
- Jeana Wiser (Tetra Tech)—Lead Outreach Planner
- Des Alexander (Tetra Tech)—Lead Profiling Planner

At the outset of planning, the planning team defined the specific boundaries of the planning area to be addressed. These boundaries affect both the detailed risk assessment and the selection of mitigation actions. For this hazard mitigation plan, the planning area was defined as MMWD's service area boundaries.

To be successful, hazard mitigation planning requires the collaboration and support of diverse parties whose interests can be affected by hazard losses. The plan was developed with significant public input, and its development was overseen by a steering committee. The planning team assembled a list of candidates representing interests within the planning area that could have recommendations for the plan or be impacted by its recommendations. From these candidates, the Steering Committee was formed to oversee all phases of the plan. Table 2-1 lists the committee members. The Steering Committee was tasked with identifying potential natural hazards and providing input to the hazard mitigation plan. The committee met approximately once per month commencing in January 2020.



**Table 2-1. Steering Committee Members**

<b>Name</b>	<b>Title</b>	<b>Department or Agency</b>
<b>Elysha Irish (Chair)</b>	Supervisor	MMWD
<b>Matthew Sagues (Vice-Chair)</b>	Grant Coordinator	MMWD
<b>Matthew Steiner</b>	Engineer	MMWD
<b>Jeanne Mariani-Belding</b>	Communications	MMWD
<b>Tom Jordan</b>	Coordinator	Office of Emergency Services, Marin County
<b>Chris Martinelli</b>	Fire Captain	Marin County Fire Department
<b>Hannah Lee</b>	Civil Engineer	Marin County Public Works
<b>Shaun Horne</b>	Watershed Resources Manager	MMWD
<b>Kent Gylfe</b>	Project Manager	Sonoma County Water Agency
<b>Eric Goldman</b>	Safety & Emergency Response Manager	MMWD
<b>Gary Andersen</b>	Assistant Superintendent of Operations	MMWD
<b>Emma Detwiler (alternate)</b>	Communications Specialist	MMWD

## 2.2 COORDINATION WITH OTHER AGENCIES

During a nine-month process to prepare the plan, residents and officials from neighboring agencies were invited to contribute by sharing local knowledge of the area's vulnerability to hazards and by suggesting ways MMWD can mitigate disasters. The following agencies were invited to participate and were kept apprised of plan development milestones:

- Marin County Office of Emergency Services
- Marin County Fire Department
- Marin County Public Works
- Sonoma County Water Agency

These agencies received meeting announcements, meeting agendas, and meeting minutes by e-mail throughout the plan development process or were kept apprised through other outreach methods. They supported the effort by attending meetings or providing feedback on issues. They were provided an opportunity to comment on this plan, primarily through the hazard mitigation plan website. Each was sent an e-mail message informing them when draft portions of the plan were available for review. In addition, the complete draft plan was sent to the California Governor's Office of Emergency Services (Cal OES) and FEMA Region IX for a pre-adoption review to ensure program compliance.

## 2.3 REVIEW OF EXISTING PROGRAMS

Hazard mitigation planning must include review and incorporation, if appropriate, of existing plans, studies, reports, and technical information (44 CFR, Section 201.6(b)(3)). Chapter 4 of this plan provides a review of laws and ordinances in effect within the planning area that can affect hazard mitigation actions. In addition, the following programs can affect mitigation within the planning area:

- California State Hazard Mitigation Forum
- County of Marin Hazard Mitigation Plan

## 2.4 PUBLIC INVOLVEMENT

Broad public participation in the planning process helps ensure that diverse points of view about the planning area's needs are considered and addressed. The public must have opportunities to comment on disaster mitigation plans during the drafting stages and prior to plan approval (44 CFR, Section 201.6(b)(1)).

### 2.4.1 Public Involvement Strategy

#### **Stakeholders and the Steering Committee**

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

- Local public safety and emergency services agencies
- Local disaster-preparedness and relief organizations
- Local special-purpose districts and utilities

#### **Survey**

The planning team developed a hazard mitigation plan survey with guidance from the Steering Committee. The survey was used to gauge household preparedness for natural hazards and the level of knowledge of tools and techniques that assist in reducing risk and loss from natural hazards. It was designed to help identify areas vulnerable to one or more natural hazards. In addition to multiple choice questions, respondents were offered the opportunity to provide additional information through several open response sections. The survey is available through a link on the District website, and will remain available even after the close of this effort. A sample page is shown in Figure 2-1.

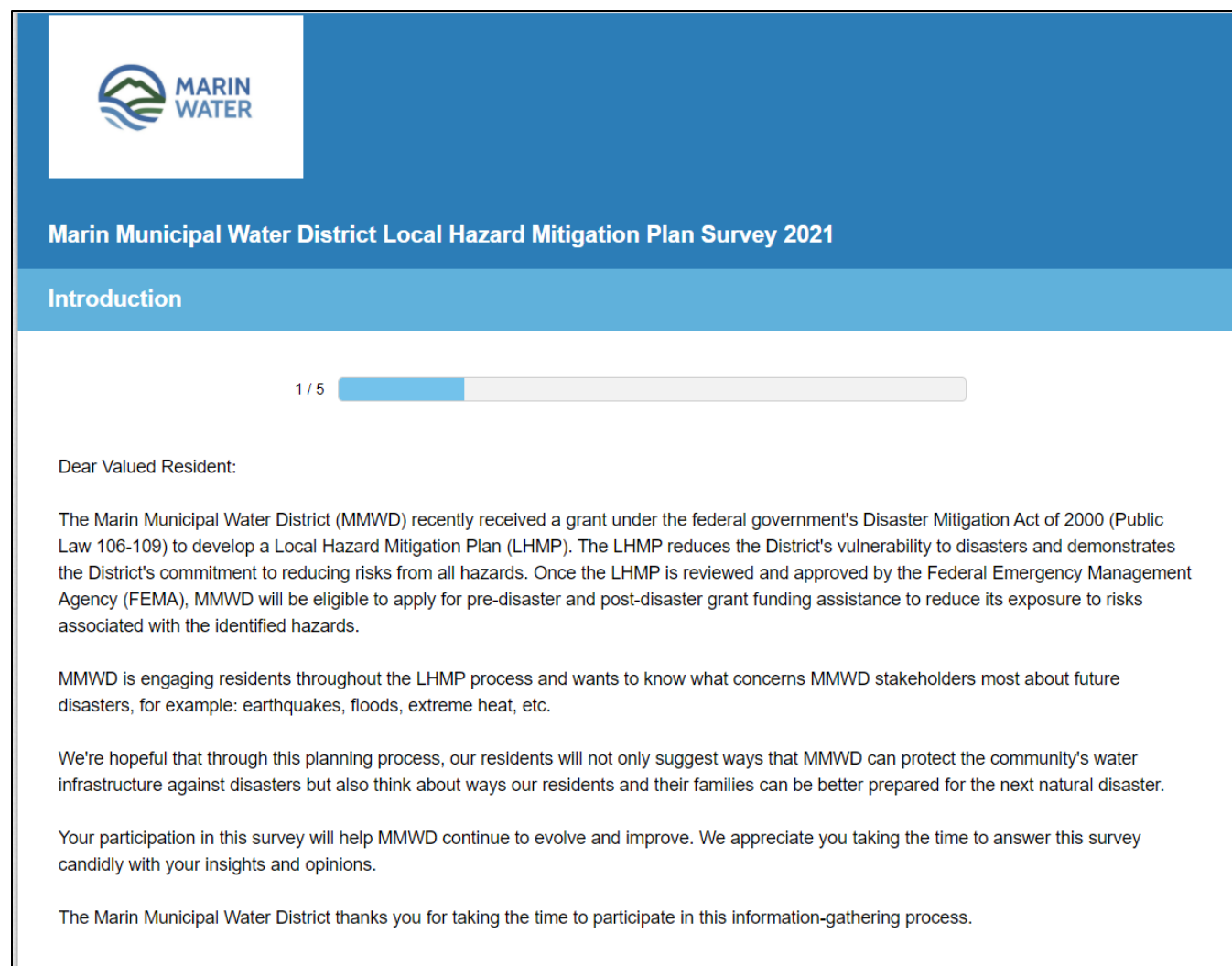
#### **Public Meetings**

With the outbreak of the COVID-19 pandemic in March 2020, public gatherings and public meeting gatherings were suspended to reduce and prevent the spread of the virus. Steering Committee meeting notices were posted on the District's website; opportunity was provided for any public comment during these meetings.

#### **Media Outreach**

An active state drought declaration was in effect for the duration of the planning effort, and the District made the decision to prioritize all press releases to be related to the drought, in order to streamline important drought communications. Therefore, no formal press releases highlighting the hazard mitigation planning process were issued.

One media announcement was released in September 2021 to announce the availability of a draft version of the hazard mitigation plan for a two-week public review period. The public review period also was announced at the September 21, 2021 Board of Directors meeting.



**Figure 2-1. Sample Page from Survey Distributed to the Public**

## **Internet**

At the beginning of the plan development process, a Marin Municipal Water District hazard mitigation webpage was created to include information about the update process (<https://www.marinwater.org/emergency-preparedness>; see Figure 2-2).

Throughout the process, the website was used to keep the public informed on milestones and to solicit relevant input. The site's address was publicized in the survey and steering committee meetings. Information on the plan development process, the Steering Committee, the survey, and drafts of the plan was made available to the public on the site throughout the process. MMWD intends to keep a website active after the plan's completion to keep the public informed about successful mitigation projects and future updates.

**Emergency Preparedness**

< Education and Outreach

- Marin Water News
- Drought Resources
- Volunteer Programs
- Emergency Preparedness**
- Resources

Marin Water continually dedicates time and resources to preparing for emergencies that could impact our water sources and delivery systems. We conduct comprehensive vulnerability assessments to ensure we're prepared, no matter the situation.

Our Operations Center is staffed 24/7 year-round, so we are able to activate our Emergency Operations Center (EOC) at any time to coordinate the actions of Marin Water first responders.

Disasters are rarely confined to a particular set of geographical boundaries. We may require the support of outside agencies to handle an emergency that exceeds our resource capabilities. Likewise, other federal, state, or local agencies may request our assistance. When this happens, Marin Water will partner with other agencies to share resources and information and to coordinate the response and recovery effort as a part of the Standardized Emergency Management System (SEMS).

**Contact Info**

24-Hour Water Emergencies  
Ph: [415.945.1500](tel:415.945.1500)

Coronavirus Response

Draft Wildfire Resilience Plan 2020

**Local Hazard Mitigation Plan**

Marin Water is developing a Local Hazard Mitigation Plan (LHMP) to inventory potential hazards that Marin Water is most vulnerable to, assess risks to the district's infrastructure and critical facilities, and develop a mitigation strategy to reduce the risk of exposure and

**Figure 2-2. Sample Page from Hazard Mitigation Plan Website**

## 2.4.2 Public Involvement Results

### Event Attendance

Opportunity was provided for public comment during Steering Committee meetings. No written or oral public comment was received during these meetings.

A draft version of the hazard mitigation plan was made available for public review for a two-week period beginning in late September 2021. The District received [REDACTED] comments on the draft plan during this review period.

Survey Outreach

Completed surveys were received from 18 respondents. Of these respondents, 50 percent indicated that they have experienced a pandemic, and 87.5 percent indicated that they have been affected by drought. Most respondents (87.5 percent) said they usually receive information about natural hazards and emergency preparedness from a local government source (i.e., local, county, or state government); 75 percent reported experience with climate change impacts and 81.25 percent indicated having experienced impacts from severe weather.

Survey results were shared with the Steering Committee. Detailed survey results are provided in Appendix A. Example results are summarized in Figure 2-3.

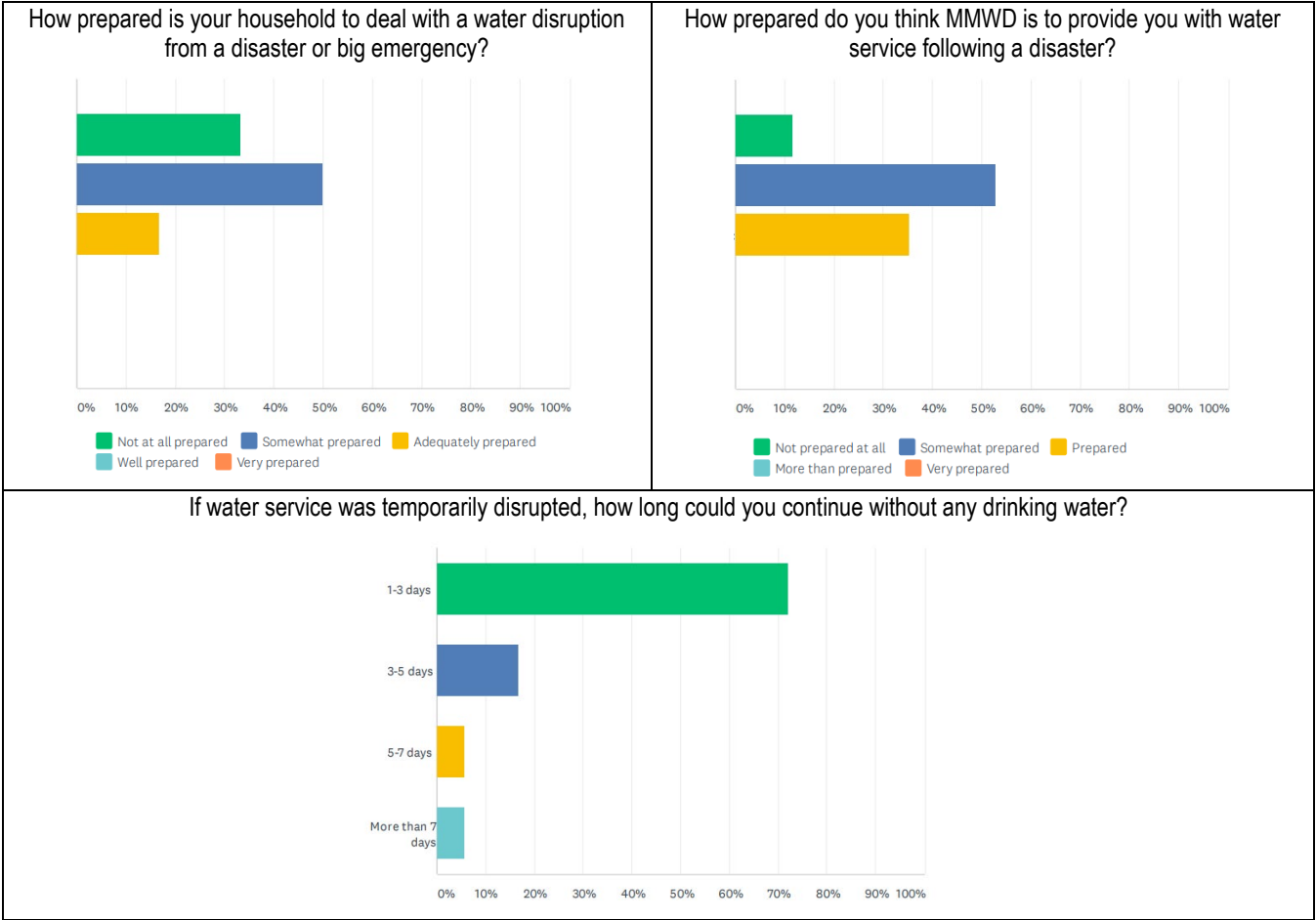


Figure 2-3. Key Survey Results

2.5 PLAN DEVELOPMENT CHRONOLOGY/MILESTONES

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



**Table 2-2. Plan Development Chronology/Milestones**

Date	Event	Description
12/16/2020	Planning Team Kickoff Meeting	<ul style="list-style-type: none"> <li>• Introductions</li> <li>• Data Needs</li> <li>• Public Outreach</li> <li>• Steering Committee</li> </ul>
01/06/2021	Planning Team Meeting #2	<ul style="list-style-type: none"> <li>• General Updates</li> <li>• 1<sup>st</sup> Steering Committee Meeting</li> <li>• Data Needs</li> </ul>
01/20	Planning Team Meeting #3	<ul style="list-style-type: none"> <li>• Planning Process</li> <li>• Hazard Analysis</li> <li>• Public Outreach/Engagement</li> <li>• Steering Committee</li> </ul>
01/21	Steering Committee Meeting #1	<ul style="list-style-type: none"> <li>• Welcome and Introductions</li> <li>• Project Overview</li> <li>• Steering Committee Role</li> <li>• Public Involvement Strategy</li> <li>• Next Steps</li> </ul>
02/03	Planning Team Meeting #4	<ul style="list-style-type: none"> <li>• Planning Process</li> <li>• Hazard Analysis</li> <li>• Public Engagement</li> </ul>
02/17	Planning Team Meeting #5	<ul style="list-style-type: none"> <li>• Planning Process</li> <li>• Hazard Analysis</li> <li>• Public Engagement</li> </ul>
02/25	Steering Committee Meeting #2	<ul style="list-style-type: none"> <li>• Project Overview</li> <li>• Hazard Analysis Update</li> <li>• Public Involvement Strategy</li> </ul>
03/17	Planning Team Meeting #6	<ul style="list-style-type: none"> <li>• Strengths, Weaknesses, Opportunities and Obstacles Session</li> <li>• Steering Committee</li> <li>• Hazard Analysis</li> <li>• Public Outreach</li> </ul>
03/25	Steering Committee Meeting #3	<ul style="list-style-type: none"> <li>• Project Overview</li> <li>• Hazard Analysis Update</li> <li>• Public Involvement Strategy</li> </ul>
04/14	Planning Team Meeting #7	<ul style="list-style-type: none"> <li>• Hazard Update</li> <li>• Strengths, Weaknesses, Opportunities and Obstacles Results to Date</li> <li>• Public Outreach</li> <li>• Steering Committee</li> </ul>
04/28	Planning Team Meeting #8	<ul style="list-style-type: none"> <li>• Strengths, Weaknesses, Opportunities and Obstacles Exercise Update</li> <li>• Action Item Discussion</li> <li>• Hazard Update</li> <li>• Public Outreach</li> </ul>
05/26	Planning Team Meeting #9	<ul style="list-style-type: none"> <li>• Action Item Discussion</li> <li>• Plan Maintenance Strategy</li> <li>• Hazard Update</li> <li>• Public Outreach</li> </ul>
06/09	Planning Team Meeting #10	<ul style="list-style-type: none"> <li>• Action Item Discussion</li> <li>• Plan Maintenance Strategy</li> <li>• Hazard Update</li> <li>• Public Outreach</li> </ul>

Date	Event	Description
08/04	Planning Team Meeting #11	<ul style="list-style-type: none"><li>• Process Update</li><li>• Risk Information Review</li></ul>
TBD	Public Outreach	Initiate 2-week final public comment period for review of the draft plan
TBD	Public Outreach	Closure of 2-week Final Public Comment period
TBD	Plan Review	Plan sent to Cal OES for review and approval pending adoption
TBD	Approval Pending Adoption	Approval pending adoption received from FEMA Region IX
TBD	Plan Adopted by the District	Plan is finalized with the Board's adoption
TBD	Final Approval	FEMA granted final approval of the adopted plan.

## 3. MARIN MUNICIPAL WATER DISTRICT PROFILE

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The Marin Municipal Water District was the first municipal water district in California. Today, MMWD serves more than 191,000 people in central and southern Marin County, providing 100 percent locally sourced drinking water. The District owns and manages about 22,000 acres of watershed land on Mt. Tamalpais and in west Marin County. The primary source of water supply is rainfall captured in seven reservoirs, providing 75 percent of the water consumed. The remaining 25 percent is imported from the Russian River through an agreement with the Sonoma County Water Agency. MMWD also manages its own recycled water system, with recycled water imported from Las Gallinas Valley Sanitary District.

### 3.1 DISTRICT HISTORY

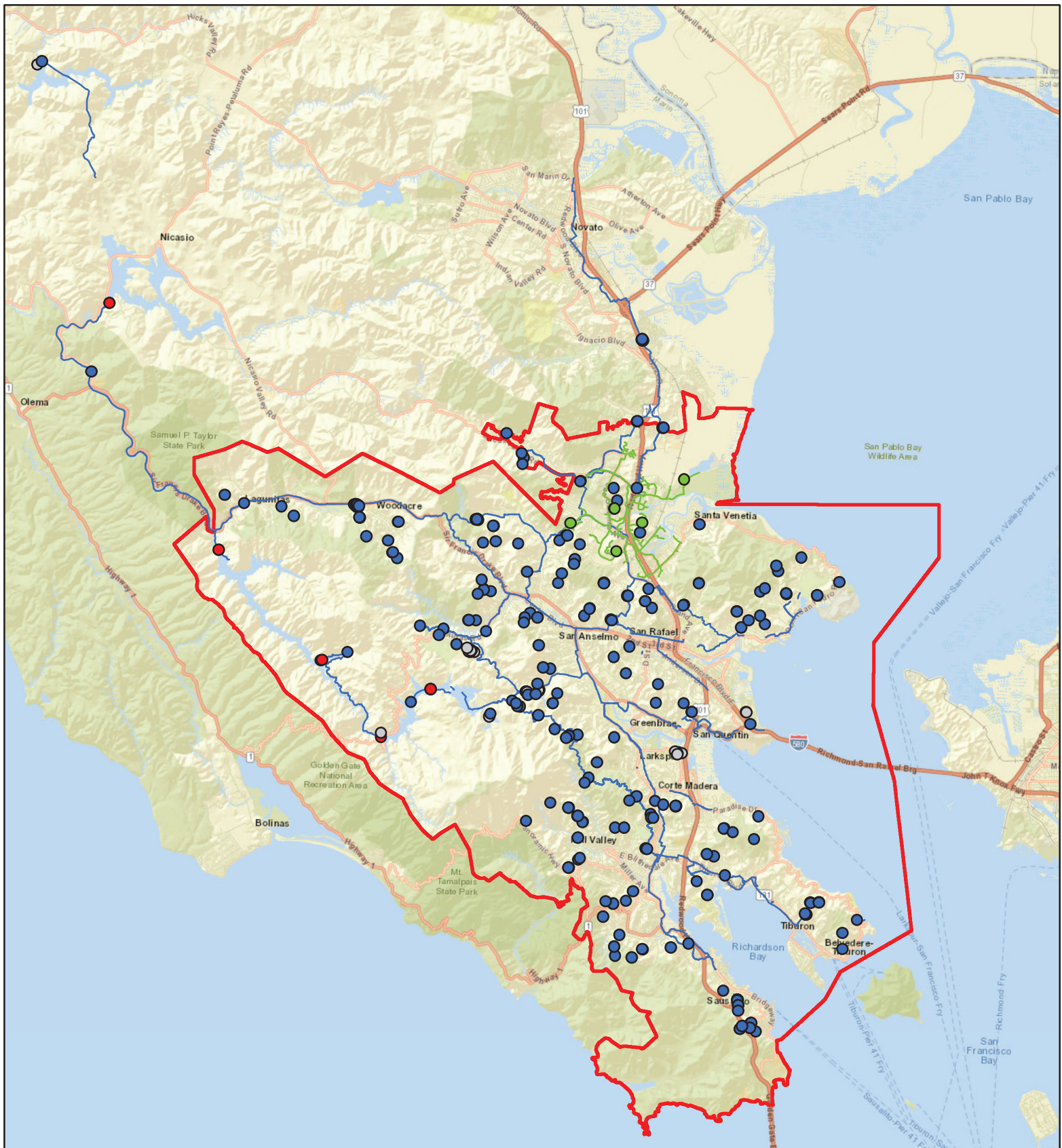
MMWD is an urban water supplier and resource planning agency that was the first municipal water district in California. Prior to this, water in central and southern Marin had been provided by several small, private companies. In 1912, recognizing the importance of reliable water service, the community came together to create a publicly owned and managed water system (MMWD, 2021). When MMWD began operations in November 1916, it immediately became responsible for the protection of 10,300 acres of watershed lands on Mt. Tamalpais: 1,300 acres on the south side of the mountain obtained from the North Coast Water Company; 3,500 acres on the north side obtained from Marin Water and Power Company; and 5,500 acres in the vicinity of what was to be Alpine Dam, obtained by condemnation from the Lagunitas Water Company. The latter two parcels had been private property off-limits to the public; the North Coast Water Company lands had been open to the public for hiking on the mountain.

### 3.2 SERVICE AREA

The District serves 191,000 customers in a service area of 147 square miles along the eastern corridor of Marin County from the Golden Gate Bridge northward. In addition to many unincorporated Marin County communities, MMWD serves 10 incorporated cities and towns: San Rafael, Mill Valley, Fairfax, San Anselmo, Ross, Larkspur, Corte Madera, Tiburon, Belvedere and Sausalito. Figure 3-1 shows the District's water service area.


### 3.3 DISTRICT FACILITIES

This hazard mitigation plan assesses the potential risk that natural hazards pose to buildings, infrastructure and equipment owned by the District. This assessment of risk requires that an inventory of key facilities be developed. The inventory created for this plan includes two parts: an overview count of specific types of assets that the District owns, and a listing of the estimated replacement value of key assets. The key assets generally consist of buildings, pumps, tanks, valves, and pipelines, which are defined for this plan as the District's critical facilities. Table 3-1 and Table 3-2 summarize the District's critical facilities and their value.



**Figure 3-1. Marin Municipal Water District Service Area**

- |                         |                     |
|-------------------------|---------------------|
| ○ Administrative        | — Transmission Main |
| ● Potable Water System  | — Recycled Main     |
| ● RAW Water Facility    | □ Service Area      |
| ● Recycled Water System |                     |

  
 0 1 2 Miles  
 Data Sources: Esri, MMWD



**Table 3-1. Marin Municipal Water District Structures**

Type	Number of Structures	Replacement Cost Value
<b>Administrative Facilities</b>		
Buildings	24	\$70,101,461
Containers	2	\$40,000
Structures	3	\$1,200,000
<b>Total</b>	<b>29</b>	<b>\$71,341,461</b>
<b>Raw Water Facilities</b>		
Buildings	1	\$652,474
Containers	1	\$50,000
Facilities	2	\$3,500,000
Pump Stations	4	\$3,750,000
Ponds	1	\$0
Structures	1	\$10,000,000
<b>Total</b>	<b>10</b>	<b>\$17,952,474</b>
<b>Potable Water Structures</b>		
Buildings	4	\$383,300
Corrosion Stations	6,786	\$13,572,000
Water Treatment Plants	11	\$250,000,000
Fittings	35,173	\$21,103,800
Generators	2	\$2,000,000
Hydrants	7,453	\$55,897,500
Installation Points	63,062	\$25,224,800
Large Meters	97	\$291,000
Pump Stations	94	\$99,000,000
Taps	59,627	\$23,850,800
Valves	28,565	\$22,498,500
Tanks	131	\$164,899,448
<b>Total</b>	<b>201,005</b>	<b>\$678,721,148</b>
<b>Recycled Water Structures</b>		
Corrosion Stations	111	\$222,000
Fittings	400	\$240,000
Hydrants	12	\$90,000
Installation Points	383	\$153,200
Pump Stations	3	\$3,000,000
Taps	372	\$148,800
Valves	345	\$289,500
Water Tanks	3	\$3,800,000
<b>Total</b>	<b>1,629</b>	<b>\$7,943,500</b>



**Table 3-2. Marin Municipal Water District Pipelines**

Type	Pipe Length (feet)	Replacement Cost Value
<b>Potable Water Pipelines</b>		
Transmission Main - Brittle	118,656	\$132,992,326
Transmission Main - Ductile	501,345	\$559,012,445
Distribution Main - Brittle	1,834,535	\$1,124,940,965
Distribution Main - Ductile	2,217,334	\$1,398,441,735
Lateral	1,209,456	\$181,418,365
<b>Total</b>	<b>5,881,326</b>	<b>\$3,396,805,837</b>
<b>Recycled Water Pipelines</b>		
Recycled Main - Brittle	47	\$28,008
Recycled Main - Ductile	129,217	\$90,539,737
Lateral	9,891	\$1,483,654
<b>Total</b>	<b>139,155</b>	<b>\$92,051,398</b>

### 3.4 ADMINISTRATION

MMWD is governed by a five-member Board of Directors, each representing a district division (see Figure 3-2). Directors serve overlapping four-year terms. The Board elects one of its members to serve as board president each year. The Board appoints the general manager, administrative services division manager/treasurer, board secretary, and legal counsel, each of whom serves at the pleasure of the Board. The general manager is the chief executive and is responsible for hiring all division managers and administering programs in accordance with the policies of, and the annual budget adopted by, the Board of Directors.

### 3.5 PHYSICAL CHARACTERISTICS

#### 3.5.1 Topography

MMWD is entirely within Marin County, a southeast facing peninsula across the Golden Gate Strait from San Francisco. The county is bordered by San Francisco Bay and San Pablo Bay on the east, Sonoma County to the northeast and north, and the Pacific Ocean on the west. Elevations range from sea level at the shorelines to 2,572 feet on Mount Tamalpais. Part of the mountain's watershed is included within MMWD's boundaries.

#### 3.5.2 Soils and Geology

The 1985 *Soil Survey of Marin County, California* identifies 17 soil types. They have been grouped into three landscape types, as summarized in Table 3-3.

#### 3.5.3 Climate

The planning area has a Mediterranean climate with year-round pleasant weather. On average, August tends to be the warmest month and December the coolest. Winters are usually mild with no freezing temperatures. As with many areas of California, micro-climates in the District are possible. Table 3-4 summarizes key climate data in as recorded at two National Weather Service climate stations in or near the District.

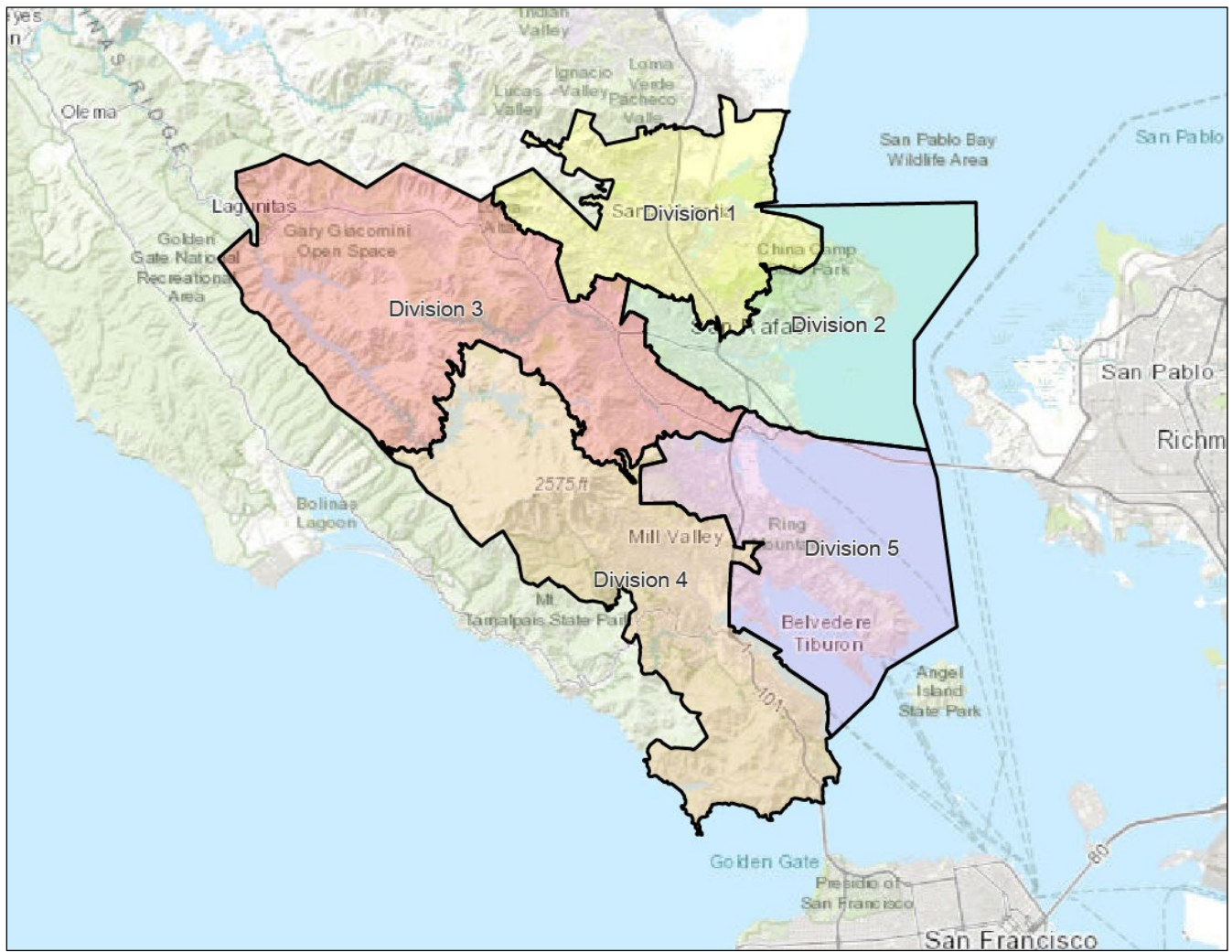


Figure 3-2. District Board Divisions

Table 3-3. Identified Soil Types in the Marin County Area

Soil/Landscape Group	Soil Description
Soils on alluvial fans and plains, in basins, and on tidal flats	The four soil types in this group make up 15 percent of the survey area, dominantly on the lower positions of the landscape in the eastern part of the area. These soils are deep or very deep and somewhat poorly drained or very poorly drained. The surface layer is silt loam to clay.
Coastal soils on dunes, terraces, hills, mountains, and uplands	The eight soil types in this group make up 42 percent of the survey area, dominantly near the coast. These soils are shallow to very deep and are somewhat excessively drained to somewhat poorly drained. The surface layer is sand to clay loam.
Inland soils on uplands	The five soil types are in this group make up 43 percent of the survey area, in the central and eastern part of the area. These soils are shallow or moderately deep and are somewhat excessively drained or well drained. The surface layer is loam or gravelly loam.

Source: U.S. Department of Agriculture, 1985

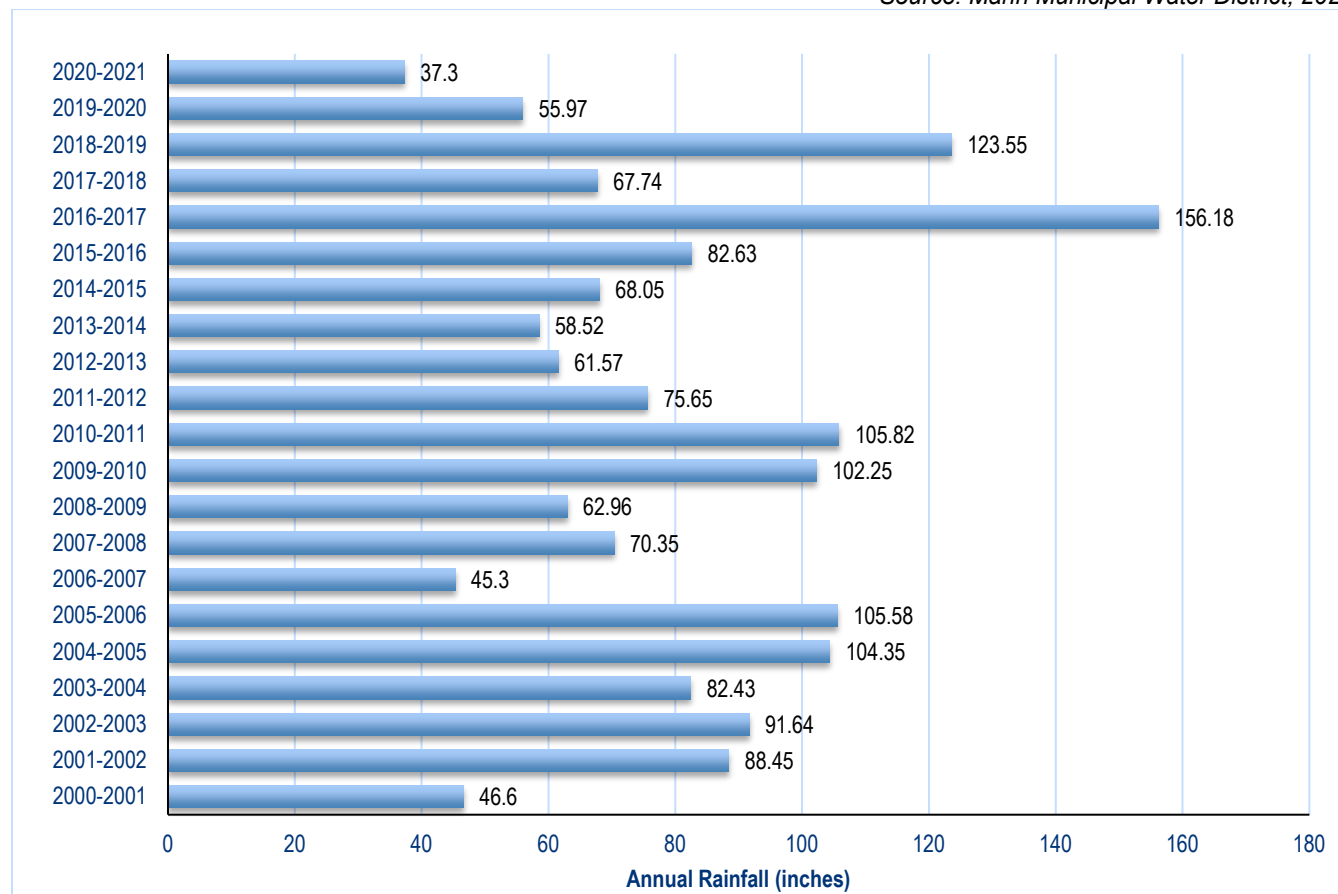
**Table 3-4. Marin County Climate Data**

	San Rafael Civic Center	Kentfield
<b>Normals, 1991 – 2020</b>		
Annual Average Minimum Temperature	49.0° F	47.8° F
Annual Average Maximum Temperature	70.0° F	70.7° F
Average Annual Mean Temperature	59.5° F	59.3° F
Average Annual Precipitation	34.45 inches	44.39 inches
<b>Extremes</b>		
Period of Record	1/1/1894 – 9/16/2021	1/1/1902 – 9/16/2021
Maximum Temperature	110° F (4 occurrences)	112° F, July 11, 1913
Minimum Temperature	20° F, December 22, 1990	17° F, December 31, 1915
One Date Maximum Precipitation	10.84 inches, February 3, 2004	11.56", January 21, 1967

Source: National Weather Service 2021

Most precipitation occurs from December through March. Precipitation in the summer is infrequent, and rainless periods of several months are common. Precipitation usually occurs as localized cloudbursts, mostly in the mountains after summer, and light to moderate winter rains. Six to eight heavy rain events each year result in most of the precipitation. In general, the quantity of precipitation increases with elevation. Annual quantities over the planning area can vary widely year by year. Figure 3-3 shows historical rainfall at Lake Lagunitas since 2000.

Source: Marin Municipal Water District, 2021

**Figure 3-3. Annual Rainfall at Lake Lagunitas (June 1 – May 31)**

## 3.6 DEVELOPMENT PROFILE

### 3.6.1 Current Land Use

As a water provider, MMWD has no land use authority. Such authority lies with the municipal governments that intersect the MMWD's service area. However, a land use analysis can provide a gauge of service demand MMWD can face. Table 3-5 presents existing land uses in Marin County. Much of the county is undeveloped and mountainous. The predominant land use is tax exempt area, which makes up about 51 percent of the total area. Lower density residential uses are concentrated in the eastern portion of the county, often adjacent to commercial areas. Commercial and industrial land uses make up about 2 percent of the total area (MMWD, 2021). Most of the developed area lies along the main transportation corridor, U.S. Highway 101. Some smaller developments are located along the western coast.

**Table 3-5. Land Use in Marin County**

Land Use	Area (acres)	% of total
<b>Residential</b>		
Floating Home	5	0.00
Mobile Homes	2	0.00
Multiple-Family Residential – Improved	2,244	0.60
Multiple-Family Residential – Unimproved	121	0.03
Single Family Attached	346	0.09
Single Residential – Improved	27,243	7.33
Single Residential – Unimproved	5,695	1.53
<b>Commercial/Industrial</b>		
Commercial – Improved	5,078	1.37
Commercial – Unimproved	762	0.20
Industrial – Improved	678	0.18
Industrial – Unimproved	789	0.21
<b>Agriculture/Farmland</b>		
Agricultural – Improved	57,741	14.73
Agricultural – Unimproved	26,921	7.25
Farmland – Improved	14,004	3.77
Farmland – Unimproved	8,061	2.17
<b>Other</b>		
Common Area	1,645	0.44
Exemption – Improved	5,245	1.41
Exemption – Vacant	1,708	0.46
Historically Significant	2	0.00
Open Space – Improved	374	0.10
Open Space – Unimproved	4,443	1.20
Rural – Improved	9,998	2.69
Rural – Unimproved	9,256	2.49
Tax Exempt	192,009	51.67
Valued by S.B.E.	15	0.00
(blank)	195	0.05
<b>Total Area</b>	<b>371,583</b>	<b>100%</b>

### 3.6.2 Development Trends

Future growth within the District's service area will impact the demand for its services. The following is an overview of the expected future development trends for the portions of Marin County that interface with the MMWD service area.

The Association of Bay Area Governments' (ABAG's) regional housing needs allocation identifies the total number of housing units, separated into four affordability levels, that every local government in the Bay Area must plan to accommodate for the period from 2023 to 2031 in order to meet the needs of all residents. ABAG released a draft regional housing needs allocation report in May 2021, and Marin County needs 14,305 new housing units to accommodate the County's expected growth rate (ABAG, 2021). The Cities of Belvedere, Corte Madera, Fairfax, Larkspur, Mill Valley, Ross, San Anselmo, and San Rafael need a combined 7,383 housing units (ABAG, 2021). Given this allocation, MMWD can expect to see an increase in demand within its service area in the next few years.

## 3.7 DEMOGRAPHICS

Knowledge of the composition of the population and how it has changed in the past and how it may change in the future is needed for making informed decisions about the future. Information about population is a critical part of planning because it directly relates to land needs such as housing, industry, stores, public facilities and services, and transportation.

The following demographic profiles represent estimates of MMWD demographics based on data from the U.S. Census American Community Survey data sets. Census data is organized by census tracts and blocks that target municipal boundaries and other census designated places. Population demographics are not typically reported for special purpose districts by state and federal agencies, as district boundaries typically do not align with Census tracts or blocks. Demographics for special purpose districts are often assessed based on the largest municipal population centers within the District's service area. The following demographic profiles are based on census data available for the Town of Corte Madera or the entire County of Marin.

### 3.7.1 Population Counts and Growth Rates

The California Department of Finance population estimate for Marin County as of January 1, 2021 is 257,774. Population changes are useful socio-economic indicators. A growing population generally indicates a growing economy, while a decreasing population may signify economic decline. Table 3-6 shows annual population estimates for Marin County and the state of California from 2000 to 2021. Figure 3-4 shows the annual population change based on these data (California Department of Finance, 2021). Marin County saw negative population growth in nine of 22 years over this period.

### 3.7.2 Population Characteristics

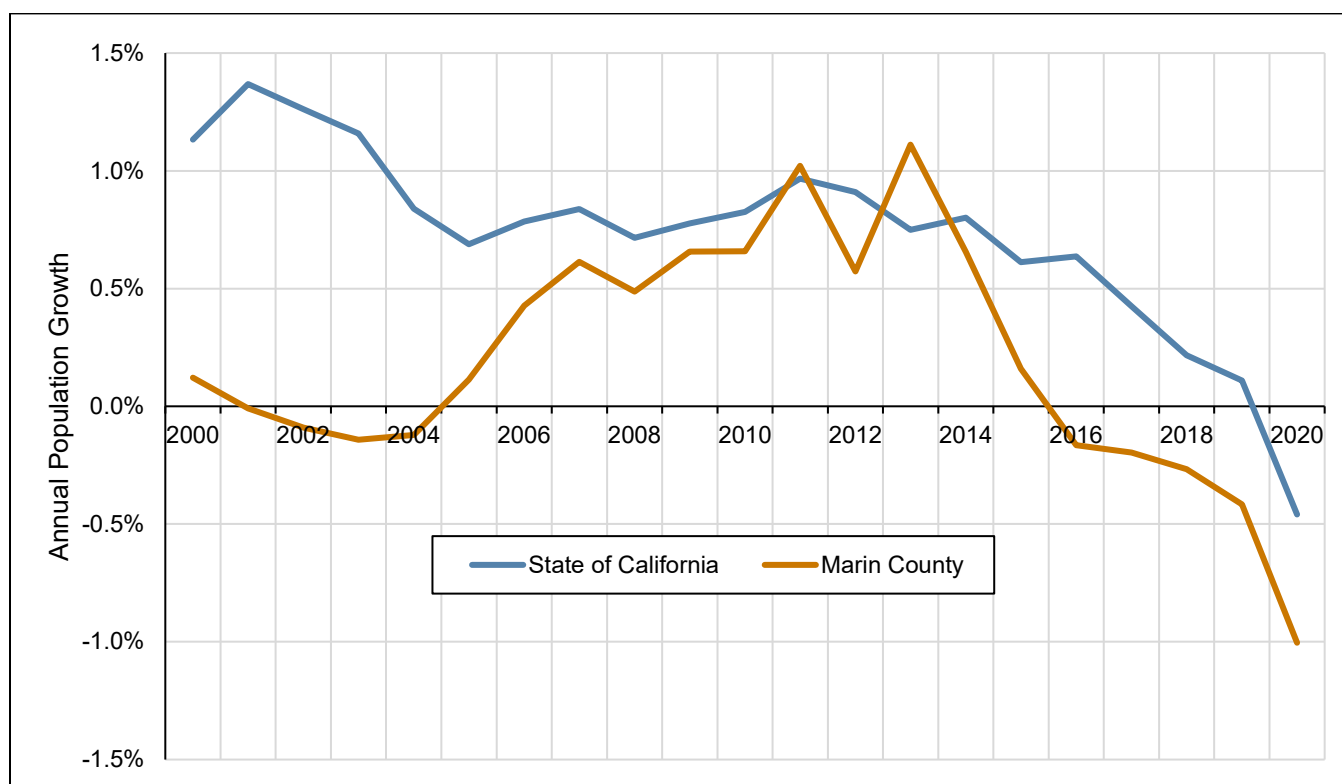
Some populations are at greater risk from hazard events because of decreased resources or physical abilities. Research has shown that people living near or below the poverty line, the elderly, women, children, ethnic minorities, renters, individuals with disabilities, and others with access and functional needs, all experience more severe effects from disasters than the general population.



**Table 3-6. Annual Population Data**

Year	State of California	Marin County	Year	State of California	Marin County
2000	33,873,086	247,289	2011	37,561,624	254,069
2001	34,256,789	247,590	2012	37,924,661	256,662
2002	34,725,516	247,567	2013	38,269,864	258,133
2003	35,163,609	247,342	2014	38,556,731	261,001
2004	35,570,847	246,990	2015	38,865,532	262,711
2005	35,869,173	246,688	2016	39,103,587	263,130
2006	36,116,202	246,969	2017	39,352,398	262,695
2007	36,399,676	248,025	2018	39,519,535	262,179
2008	36,704,375	249,546	2019	39,605,361	261,478
2009	36,966,713	250,760	2020	39,648,938	260,388
2010	37,253,956	252,409	2021	39,466,855	257,774

Source: California Department of Finance, Demographic Research Unit

**Figure 3-4. California and Marin County Population Growth**

These vulnerable populations may vary from the general population in risk perception, living conditions, access to information before, during and after a hazard event, capabilities during an event, and access to resources for post-disaster recovery. Indicators of vulnerability—such as disability, age, poverty, and minority race and ethnicity—often overlap spatially and often in the geographically most vulnerable locations. Detailed spatial analysis to locate areas where there are higher concentrations of vulnerable community members would help to extend focused public outreach and education to these most vulnerable residents.

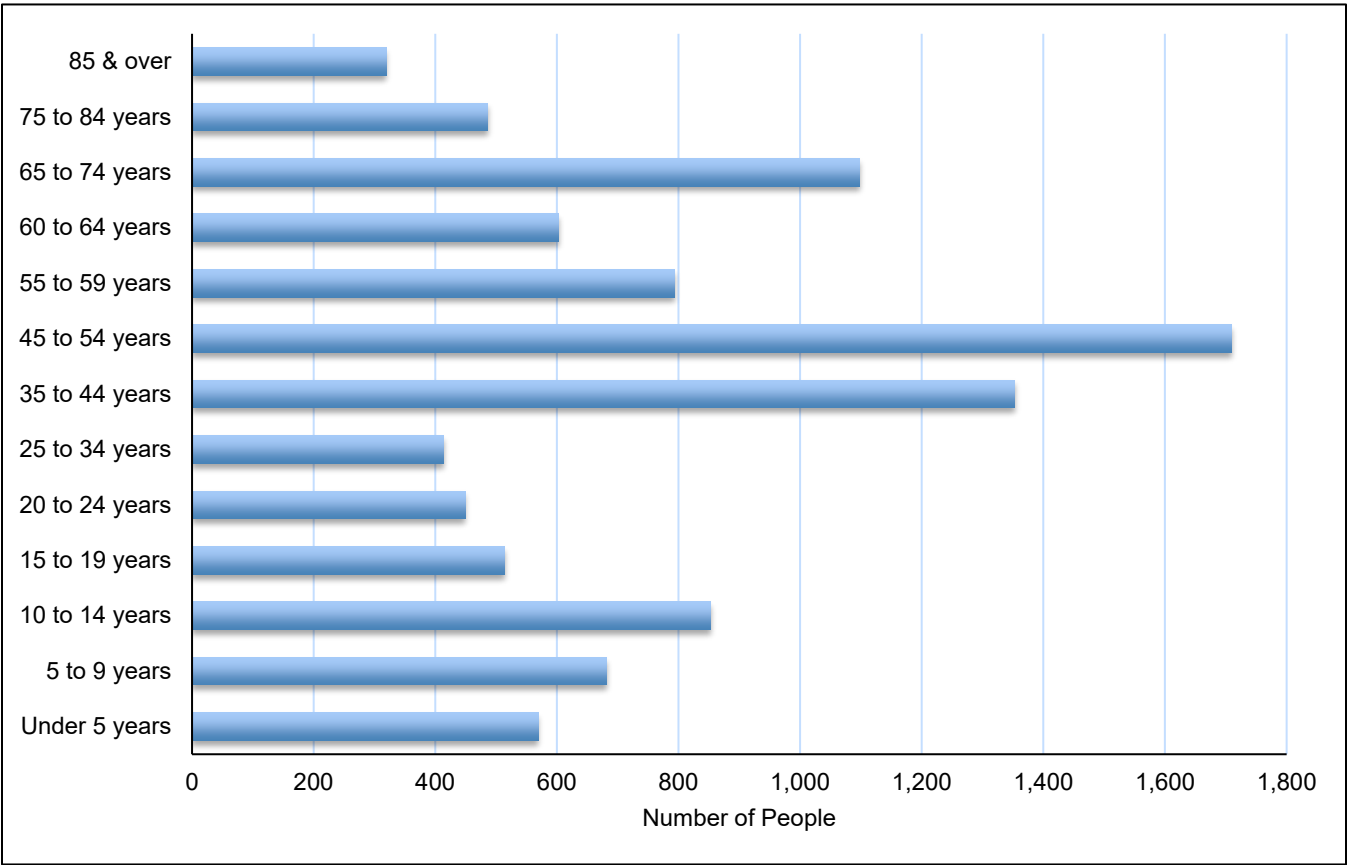
**Age Distribution**

As a group, the elderly are more likely to lack the physical and economic resources necessary for response to hazard events and are more likely to suffer health-related consequences making recovery slower. They are more likely to be vision, hearing, and/or mobility impaired, and more likely to experience mental impairment or dementia. Additionally, the elderly are more likely to live in assisted-living facilities where emergency preparedness occurs at the discretion of facility operators. These facilities are typically identified as “critical facilities” by emergency managers because they require extra notice to implement evacuation.

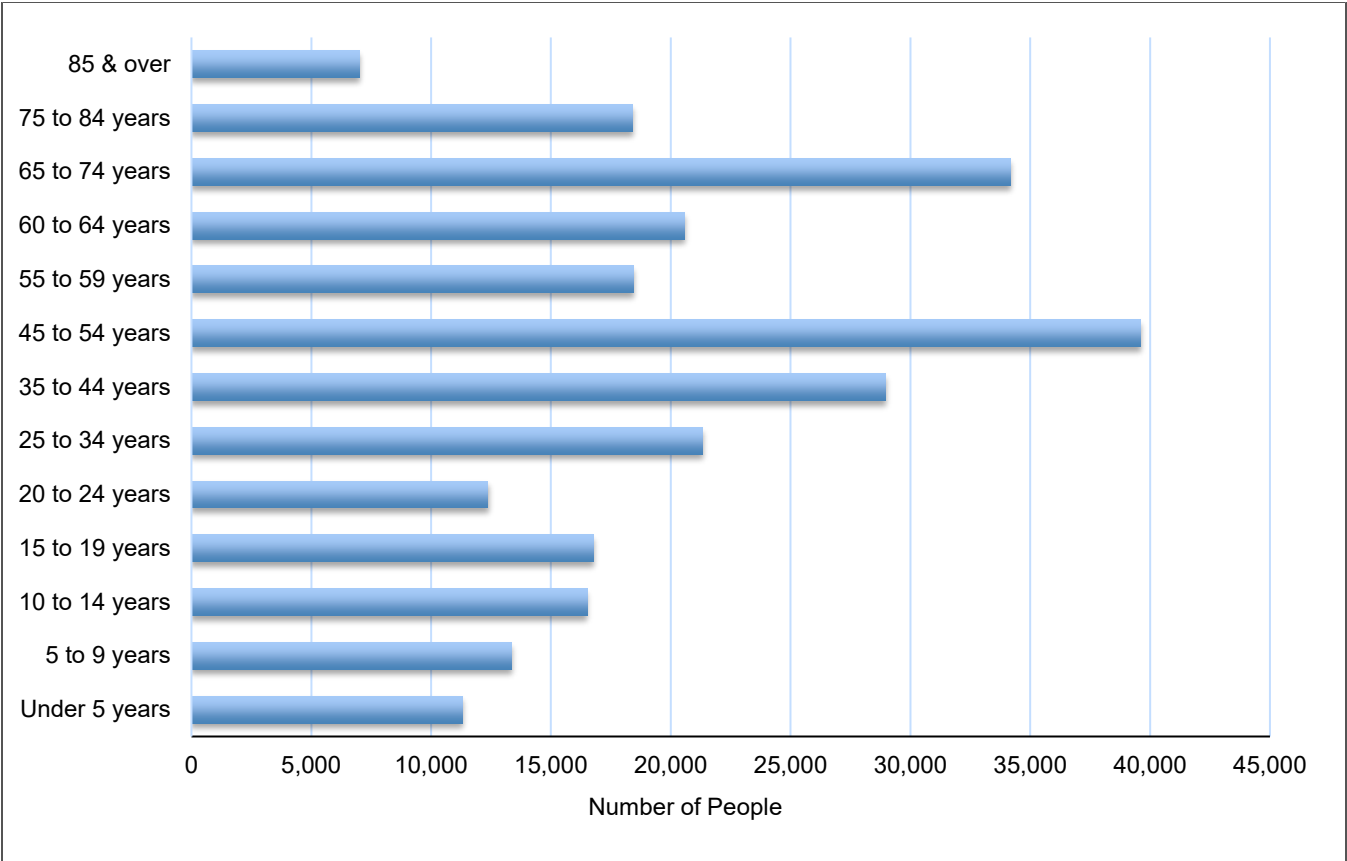
Elderly residents living in their own homes may have more difficulty evacuating their homes and could be stranded in dangerous situations. This population group is more likely to need special medical attention, which may not be readily available during natural disasters due to isolation caused by the event. Specific planning attention for the elderly is an important consideration given the current aging of the American population.

Children under 14 are particularly vulnerable to disaster events because of their young age and dependence on others for necessities. Very young children may additionally be vulnerable to injury or sickness; this vulnerability can be worsened during a natural disaster because they may not understand the measures that need to be taken to protect themselves from hazards.

The overall age distribution is shown in Figure 3-5 and Figure 3-6 for the Town of Corte Madera and Marin County.



**Figure 3-5. Age Distribution in the Town of Corte Madera**



**Figure 3-6. Age Distribution in County of Marin**

Based on the most recent 5-year estimates from the U.S. Census Bureau’s American Community Survey (2015-2019), 19.3 percent of Corte Madera and 23 percent of Marin County’s areas’ populations are 65 or older. The Census data show that 52.78 percent of Corte Madera’s and 30.63 percent of Marin County’s over-65 population have disabilities of some kind and 4.6 percent (Corte Madera) and 6.0 percent (Marin County) have incomes below the poverty line. Corte Madera’s population includes 21.37 percent who are 14 or younger. Among children under 18, 3.4 percent are below the poverty line. Marin County’s population includes 15.91 percent who are 14 or younger. Among children under 18 in the area, 7.5 percent are below the poverty line.

**Individuals with Disabilities or Access and Functional Needs**

Individuals with disabilities are more likely to have difficulty responding to a hazard event than the general population. Local government is the first level of response to assist these individuals, and coordination of efforts to meet their access and functional needs is paramount to life safety efforts. It is important for emergency managers to distinguish between functional and medical needs to plan for incidents that require evacuation and sheltering. Knowing the percentage of population with a disability gives emergency management personnel and first responders an opportunity to ensure that emergency plans and procedures include considerations for addressing the needs of those residents. According to the 5-year American Community Survey (2015-2019), 8.7 percent of individuals in Corte Madera and 9.8 percent of those in Marin County live with some form of disability.

## **Race, Ethnicity and Language**

Research shows that racial and ethnic minorities are less likely to be involved in pre-disaster planning and experience higher mortality rates during a disaster event. Post-disaster recovery can be ineffective and is often characterized by cultural insensitivity. Since higher proportions of ethnic minorities live below the poverty line than the majority white population, poverty can compound vulnerability (Office of Minority Health, 2008).

Figure 3-7 and Figure 3-8 show the 2019 American Community Survey racial distributions in the Town of Corte Madera and the County of Marin, based on race categories defined by U.S. Office of Management and Budget standards. The ACS reports that 16.3 percent of the County's population is of Hispanic origin, which indicates the heritage, nationality, lineage, or country of birth of the person or the person's parents or ancestors before arriving in the United States and may be any race.

According to the ACS, 86.8 percent of families in Town of Corte Madera speak only English at home, and 13.2 percent of families speak a language other than English at home; the largest contingent of those families speak other Indo-European languages (8.0 percent).

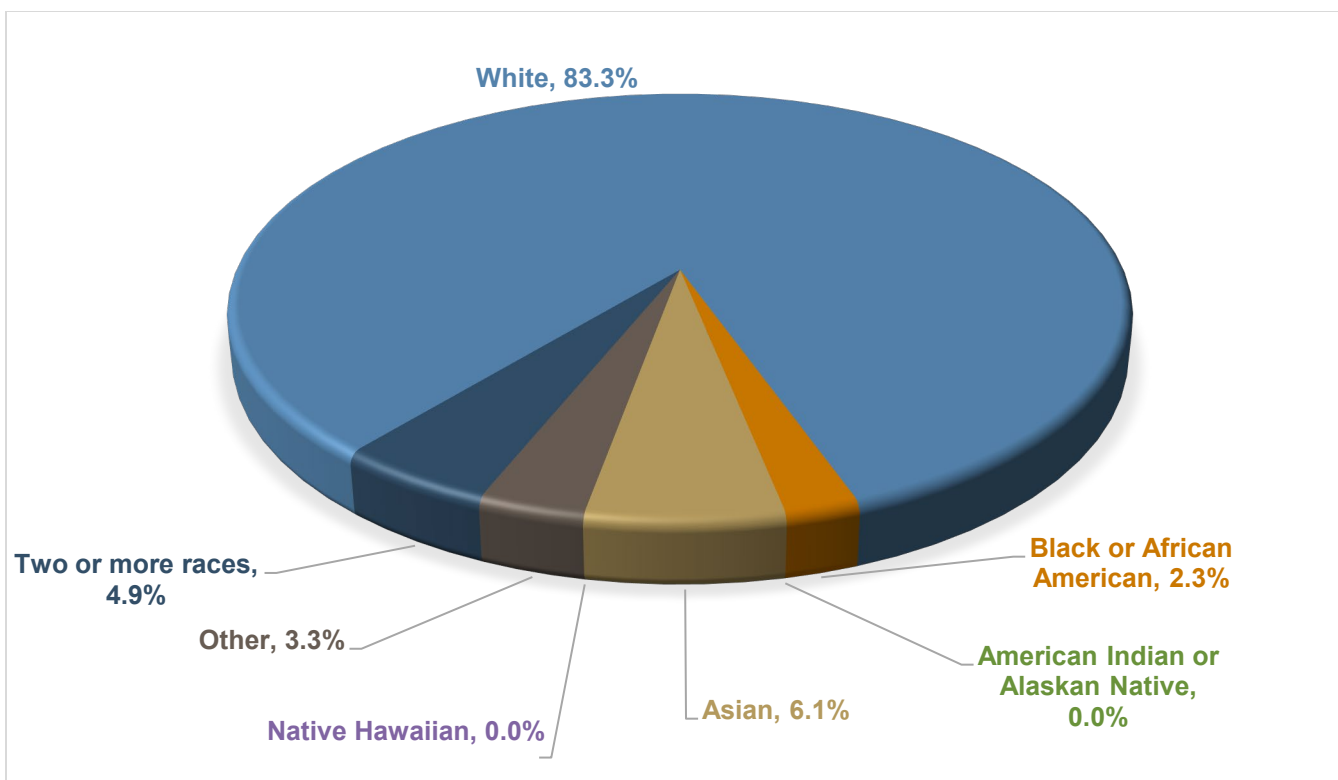
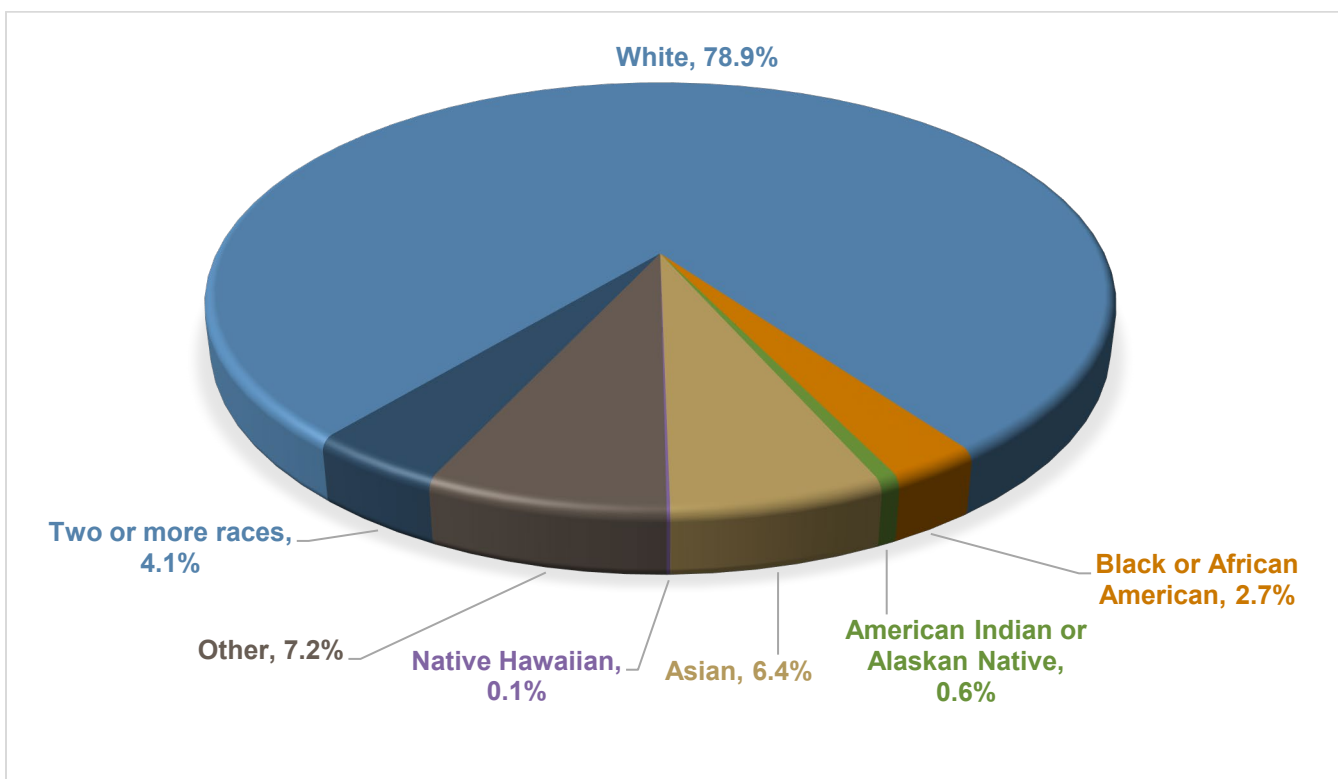
According to the ACS, 80.4 percent of families in Marin County speak only English at home, and 19.6 percent of families speak a language other than English at home; the largest contingent of those families speaks Spanish (10.6 percent).

## **3.8 FINANCIAL SUMMARY**

The Marin Municipal Water District has two budgets that are planned and administered annually (the MMWD "Fiscal Year" runs from July 1 - June 30); each budget provides a detailed spending plan for each of the major functions performed by MMWD. A brief explanation of the background behind each budget is discussed below:

- **Operating Budget**—These funds are budgeted for day-to-day MMWD operations.
- **Capital Improvement Program Budget**—These funds are used to pay for the building, replacement, or rehabilitation of large capital facilities.

Each of these identified funding sources could be the source of local contributions for federal grants that require a local match. It is MMWD's intention with the completion of this Hazard Mitigation Plan to leverage state and federal grant funding as much as possible to increase the resilience of MMWD.

**Figure 3-7. Corte Madera Race Distribution****Figure 3-8. Marin County Race Distribution**



## 4. HAZARDS OF CONCERN

The Steering Committee considered the full range of natural hazards that could impact the planning area and then ranked the hazards that present the greatest concern. The process incorporated review of state and local hazard planning documents, as well as local, state, and federal information on the frequency, magnitude and costs associated with hazards that have impacted or could impact the planning area. Anecdotal information regarding natural hazards and the perceived vulnerability of the planning area's assets to them was also used.

### 4.1 HISTORY OF HAZARD EVENTS IN THE PLANNING AREA

Presidential disaster declarations are typically issued for hazard events that cause more damage than state and local governments can handle without federal assistance. A presidential disaster declaration puts federal recovery programs into motion to help disaster victims, businesses, and public entities. Table 4-1 lists declared hazard events whose effective area included the MMWD service area (declared events within Marin County). Such a declaration does not necessarily indicate that any MMWD assets were damaged by the event.

**Table 4-1. Presidential Disaster Declarations with Affected Area Including the MMWD Service Area**

Type of Event	Date	Disaster Declaration	Counties Impacted <sup>a</sup>
COVID-19 Pandemic	03/22/2020	DR-4482	All California Counties
Severe Winter Storms, Flooding, Landslides, and Mudslides	05/18/2019	DR-4434	Amador, Butte, Colusa, Del Norte, El Dorado, Glenn, Humboldt, Lake, <b>Marin</b> , Mariposa, Mendocino, Monterey, Napa, Sonoma, Tehama, Trinity, Tuolumne, Yolo
Severe Winter Storms, Flooding, Landslides, and Mudslides	05/01/2019	DR-4431	Calaveras, Colusa, <b>Marin</b> , Mariposa, Mendocino, Modoc, Napa, Riverside, Santa Barbara, Shasta, Trinity
Severe Winter Storms, Flooding, Landslides, and Mudslides	04/01/2017	DR-4308	Alameda, Alpine, Amador, Butte, Calaveras, Colusa, Contra Costa, Del Norte, El Dorado, Glenn, Humboldt, Kings, Lake, Lassen, <b>Marin</b> , Mariposa, Merced, Modoc, Mono, Monterey, Napa, Nevada, Plumas, Sacramento, San Benito, San Joaquin, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Shasta, Sierra, Siskiyou, Solano, Sonoma, Stanislaus, Sutter, Tehama, Trinity, Tule River Indian Reservation, Tuolumne, Yolo
Severe Winter Storms, Flooding, and Mudslides	02/14/2017	DR-4301	Alameda, Amador, Butte, Calaveras, Contra Costa, El Dorado, Humboldt, Inyo, Lake, Lassen, <b>Marin</b> , Mendocino, Merced, Mono, Monterey, Napa, Nevada, Placer, Plumas, Sacramento, San Benito, San Luis Obispo, Santa Clara, Santa Cruz, Shasta, Sierra, Siskiyou, Solano, Sonoma, Sutter, Trinity, Tuolumne, Yolo, Yuba



Type of Event	Date	Disaster Declaration	Counties Impacted <sup>a</sup>
Severe Storms, Flooding, Landslides, and Mudslides	06/05/2006	DR-1646	Alameda, Amador, Calaveras, El Dorado, Lake, Madera, <b>Marin</b> , Merced, Napa, Nevada, Placer, San Joaquin, San Mateo, Santa Cruz, Sonoma, Stanislaus, Tuolumne
Severe Storms, Flooding, Mudslides, and Landslides	02/03/2006	DR-1628	Contra Costa, Del Norte, El Dorado, Lake, <b>Marin</b> , Mendocino, Napa, Nevada, Sacramento, Shasta, Siskiyou, Solano, Sonoma
Severe Winter Storms and Flooding	02/09/1998	DR-1203	Alameda, Amador, Butte, Calaveras, Colusa, Contra Costa, Del Norte, Fresno, Glenn, Humboldt, Kern, Lake, Los Angeles, <b>Marin</b> , Mendocino, Merced, Monterey, Napa, Orange, Riverside, Sacramento, San Benito, San Bernardino, San Diego, San Francisco, San Joaquin, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Solano, Sonoma, Stanislaus, Sutter, Tehama, Trinity, Tulare, Ventura, Yolo, Yuba
Severe Storms/Flooding	01/04/1997	DR-1155	Alameda, Alpine, Amador, Butte, Calaveras, Colusa, Contra Costa, Del Norte, El Dorado, Fresno, Glenn, Humboldt, Kings, Lake, Lassen, Madera, <b>Marin</b> , Mariposa, Mendocino, Merced, Modoc, Mono, Monterey, Napa, Nevada, Placer, Plumas, Sacramento, San Benito, San Francisco, San Joaquin, San Luis Obispo, San Mateo, Santa Clara, Santa Cruz, Shasta, Sierra, Siskiyou, Solano, Sonoma, Stanislaus, Sutter, Tehama, Trinity, Tulare, Tuolumne, Yolo, Yuba
Severe Winter Storms, Flooding, Landslides, Mud Flows	03/12/1995	DR-1046	Alameda, Alpine, Amador, Butte, Calaveras, Colusa, Contra Costa, El Dorado, Fresno, Glenn, Humboldt, Imperial, Inyo, Kern, Kings, Lake, Lassen, Los Angeles, Madera, <b>Marin</b> , Mariposa, Mendocino, Merced, Modoc, Mono, Monterey, Napa, Nevada, Orange, Placer, Plumas, Riverside, Sacramento, San Benito, San Bernardino, San Diego, San Francisco, San Joaquin, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Shasta, Sierra, Siskiyou, Solano, Sonoma, Stanislaus, Sutter, Tehama, Trinity, Tulare, Tuolumne, Ventura, Yolo, Yuba
Severe Winter Storms, Flooding, Landslides, Mud Flows	01/10/1995	DR-1044	Alameda, Amador, Butte, Colusa, Contra Costa, Del Norte, El Dorado, Glenn, Humboldt, Kern, Kings, Lake, Lassen, Los Angeles, Madera, <b>Marin</b> , Mendocino, Modoc, Monterey, Napa, Nevada, Orange, Placer, Plumas, Riverside, Sacramento, San Bernardino, San Diego, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Shasta, Solano, Sonoma, Sutter, Tehama, Trinity, Ventura, Yolo, Yuba
Severe Freeze	02/11/1991	DR-894	Alameda, Butte, Colusa, Fresno, Glenn, Imperial, Kern, Los Angeles, Madera, <b>Marin</b> , Mendocino, Merced, Monterey, Napa, Riverside, San Benito, San Bernardino, San Diego, San Joaquin, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Solano, Sonoma, Stanislaus, Sutter, Tehama, Tulare, Ventura, Yolo, Yuba
Loma Prieta Earthquake	10/18/1989	DR-845	Alameda, Contra Costa, <b>Marin</b> , Monterey, Sacramento, San Benito, San Francisco, San Joaquin, San Mateo, Santa Clara, Santa Cruz, Solano
Severe Storms, Flooding	02/21/1986	DR-758	Alameda, Alpine, Amador, Butte, Calaveras, Colusa, Contra Costa, Del Norte, El Dorado, Glenn, Humboldt, Lake, Lassen, Madera, <b>Marin</b> , Mendocino, Modoc, Mono, Napa, Nevada, Placer, Plumas, Sacramento, San Benito, San Joaquin, San Mateo, Santa Clara, Santa Cruz, Shasta, Sierra, Solano, Sonoma, Sutter, Tehama, Trinity, Tuolumne, Yolo, Yuba
Coastal Storms, Floods, Slides, Tornadoes	02/09/1983	DR-677	Alameda, Butte, Colusa, Contra Costa, Del Norte, Glenn, Humboldt, Kern, Kings, Lake, Los Angeles, <b>Marin</b> , Mariposa, Mendocino, Merced, Monterey, Napa, Orange, Placer, Riverside, Sacramento, San Benito, San Bernardino, San Diego, San Joaquin, San Luis Obispo, San Mateo, Santa Barbara, Santa Clara, Santa Cruz, Shasta, Solano, Sonoma, Stanislaus, Sutter, Tehama, Trinity, Ventura, Yolo, Yuba
Severe Storms, Flood, Mudslides, High Tides	01/07/1982	DR-651	Alameda, Contra Costa, Humboldt, <b>Marin</b> , San Joaquin, San Mateo, Santa Cruz, Solano, Sonoma

Type of Event	Date	Disaster Declaration	Counties Impacted <sup>a</sup>
Severe Storms, High Tides, Flooding	02/08/1973	DR-364	<b>Marin</b> , San Diego, San Luis Obispo, Santa Barbara, Solano, Ventura
Severe Storms, Flooding	02/16/1970	DR-283	Alameda, Butte, Colusa, Del Norte, Glenn, Lake, Lassen, <b>Marin</b> , Mendocino, Modoc, Plumas, Shasta, Siskiyou, Sutter, Tehama, Trinity, Yuba
Severe Storms, Flooding	01/26/1969	DR-253	Amador, Contra Costa, El Dorado, Fresno, Humboldt, Inyo, Kern, Kings, Los Angeles, Madera, <b>Marin</b> , Mariposa, Mendocino, Merced, Modoc, Mono, Monterey, Orange, Placer, Plumas, Riverside, Sacramento, San Benito, San Bernardino, San Joaquin, San Luis Obispo, Santa Barbara, Shasta, Sierra, Solano, Sonoma, Stanislaus, Tehama, Tulare, Tuolumne, Ventura, Yuba
Heavy Rains & Flooding	12/24/1964	DR-183	Alpine, Amador, Butte, Colusa, Del Norte, El Dorado, Glenn, Humboldt, Lake, Lassen, <b>Marin</b> , Mendocino, Modoc, Napa, Nevada, Placer, Plumas, Sacramento, San Joaquin, Shasta, Sierra, Siskiyou, Solano, Sonoma, Stanislaus, Sutter, Tehama, Trinity, Tuolumne, Yolo, Yuba

a. All declarations include Marin County

## 4.2 IDENTIFIED HAZARDS OF CONCERN FOR THIS PLAN

Based on the review, this plan addresses the following hazards of concern; hazards not listed were determined to not have impacts on the District's service area.:

- Dam failure
- Drought
- Earthquake
- Flood
- Mass movements
- Severe weather
- Tsunami
- Wildfire
- Climate change



## 5. RELEVANT LAWS, ORDINANCES, PROGRAMS AND CAPABILITIES

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Existing laws, ordinances, plans and capabilities at the federal, state and local level can support or impact hazard mitigation initiatives identified in this plan. Hazard mitigation plans are required to include a review and incorporation, if appropriate, of existing plans, studies, reports, and technical information as part of the planning process, as stated in 44 CFR, Section 201.6(b)(3). Pertinent federal, state, and local laws are described below.

### 5.1 RELEVANT FEDERAL AND STATE AGENCIES, PROGRAMS AND REGULATIONS

State and federal regulations and programs that need to be considered in hazard mitigation are constantly evolving. For this plan, a review was performed to determine which regulations and programs are currently most relevant to hazard mitigation planning. The findings are summarized in Table 5-1 and Table 5-2. Short descriptions of each program are provided in Appendix B.

### 5.2 COUNTY, CITY OR OTHER DISTRICT

The following local jurisdictions provide information and guidance relevant to hazard mitigation planning for the Marin Municipal Water District:

- **Marin County Emergency Operations Plan**—Informs emergency management protocol for the county including the MMWD service area.
- **Marin County Multi-Jurisdictional Hazard Mitigation Plan**—Includes risk and vulnerability assessments and targeted mitigation strategies for the County and Cities within the MMWD service area.
- **Marin Countywide Plan**—Informs land use within the County which can impact demands on MMWD services.
- **General Plans for the Cities of Belvedere, Corte Madera, Fairfax, Larkspur, Mill Valley, Ross, San Anselmo, San Rafael, Sausalito, and Tiburon**—Informs land use within the Cities which can impact demands on MMWD services.
- **Marin Community Wildfire Protection Plan**—Provides a science-based assessment of wildfire hazards and threats to homes in the wildland urban interface within the MMWD service area.
- **Sonoma County Water Agency's Local Hazard Mitigation Plan**—The FEMA approved local hazard mitigation plan for a principal water supply partner for MMWD.

**Table 5-1. Summary of Relevant Federal Agencies, Programs and Regulations**

Agency, Program or Regulation	Hazard Mitigation Area Affected	Relevance
<b>A Collaborative Approach for Reducing Wildfire Risks to Communities and the Environment</b>	Wildfire Hazard	This strategy implementation plan prepared by federal and western state agencies outlines measures to restore fire-adapted ecosystems and reduce hazardous fuels.
<b>America's Water Infrastructure Act (2018)</b>	Infrastructure Improvements	This act provides for water infrastructure improvements throughout the country.
<b>Americans with Disabilities Act</b>	Action Plan Implementation	FEMA hazard mitigation project grant applications require full compliance with applicable federal acts.
<b>Civil Rights Act of 1964</b>	Action Plan Implementation	FEMA hazard mitigation project grant applications require full compliance with applicable federal acts.
<b>Clean Water Act</b>	Action Plan Implementation	FEMA hazard mitigation project grant applications require full compliance with applicable federal acts.
<b>Community Development Block Grant Disaster Resilience Program</b>	Action Plan Funding	This is a potential alternative source of funding for actions identified in this plan.
<b>Disaster Mitigation Act</b>	Hazard Mitigation Planning	This is the current federal legislation addressing hazard mitigation planning.
<b>Endangered Species Act</b>	Action Plan Implementation	FEMA hazard mitigation project grant applications require full compliance with applicable federal acts.
<b>Federal Energy Regulatory Commission Dam Safety Program</b>	Dam Failure Hazard	This program cooperates with a large number of federal and state agencies to ensure and promote dam safety.
<b>Federal Wildfire Management Policy and Healthy Forests Restoration Act</b>	Wildfire Hazard	These documents mandate community-based collaboration to reduce risks from wildfire.
<b>National Dam Safety Act</b>	Dam Failure Hazard	This act requires a periodic engineering analysis of most dams in the country
<b>National Environmental Policy Act</b>	Action Plan Implementation	FEMA hazard mitigation project grant applications require full compliance with applicable federal acts.
<b>National Fire Plan (2001)</b>	Wildfire Hazard	This plan calls for joint risk reduction planning and implementation by federal, state and local agencies.
<b>National Incident Management System</b>	Action Plan Development	Adoption of this system for government, nongovernmental organizations, and the private sector to work together to manage incidents involving hazards is a prerequisite for federal preparedness grants and awards.
<b>Presidential Executive Order 11988 (Floodplain Management)</b>	Flood Hazard	This order requires federal agencies to avoid long and short-term adverse impacts associated with modification of floodplains.
<b>Presidential Executive Order 11990 (Protection of Wetlands)</b>	Action Plan Implementation	FEMA hazard mitigation project grant applications require full compliance with applicable presidential executive orders.
<b>U.S. Army Corps of Engineers Dam Safety Program</b>	Dam Failure Hazard	This program is responsible for safety inspections of dams that meet size and storage limitations specified in the National Dam Safety Act.
<b>U.S. Army Corps of Engineers Flood Hazard Management</b>	Flood Hazard, Action Plan Implementation, Action Plan Funding	The Corps of Engineers offers multiple funding and technical assistance programs available for flood hazard mitigation actions.
<b>U.S. Fire Administration</b>	Wildfire Hazard	This agency provides leadership, advocacy, coordination, and support for fire agencies and organizations.
<b>U.S. Fish and Wildlife Service</b>	Wildfire Hazard	This service's fire management strategy employs prescribed fire throughout the National Wildlife Refuge System to maintain ecological communities.

**Table 5-2. Summary of Relevant State Agencies, Programs and Regulations**

Agency, Program or Regulation	Hazard Mitigation Area Affected	Relevance
<b>AB 32: The California Global Warming Solutions Act</b>	Action Plan Development	This act establishes a state goal of reducing greenhouse gas emissions to 1990 levels by 2020.
<b>AB 756: Public Water System PFAs</b>	Public Water System polyfluoroalkyl substances (PFAs)	This act requires the State Water Resources Control Board to administer provisions relating to the regulation of drinking water to protect public health, including conducting research, studies, and demonstration programs, enforcing the federal Safe Drinking Water Act, adopting regulations, and assessing the quality of water in private domestic water supplies
<b>AB 2242: Urban Water Management Planning Act</b>	Drought Hazard	Requires an urban water management plan, among other things, to describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable, and provide data for average, single-dry, and multiple-dry water years.
<b>AB 2800: Climate Change—Infrastructure Planning</b>	Action Plan Development	This act requires state agencies to take into account the impacts of climate change when developing state infrastructure.
<b>Alquist-Priolo Earthquake Fault Zoning Act</b>	Earthquake Hazard	This act restricts construction of buildings used for human occupancy on the surface trace of active faults.
<b>California Department of Forestry and Fire Protection (CAL FIRE)</b>	Wildfire Hazard	CAL FIRE has responsibility for wildfires in areas that are not under the jurisdiction of the Forest Service or a local fire organization.
<b>California Department of Parks and Recreation</b>	Wildfire Hazard	State Parks Resources Management Division has wildfire protection resources available to suppress fires on State Park lands.
<b>California Department of Water Resources</b>	Flood Hazard	This state department is the state coordinating agency for floodplain management.
<b>California Division of Safety of Dams</b>	Dam Failure Hazard	This division monitors the dam safety program at the state level and maintains a working list of dams in the state.
<b>California Environmental Quality Act</b>	Action Plan Implementation	This act establishes a protocol of analysis and public disclosure of the potential environmental impacts of development projects. Any project action identified in this plan will seek full California Environmental Quality Act compliance upon implementation.
<b>California Fire Alliance</b>	Wildfire Hazard	The alliance works with communities at risk from wildfires to facilitate the development of community fire loss mitigation plans.
<b>California Fire Plan</b>	Wildfire Hazard	This plan's goal is to reduce costs and losses from wildfire through pre-fire management and through successful initial response.
<b>California Fire Safe Council</b>	Wildfire Hazard	This council facilitates the distribution of National Fire Plan grants for wildfire risk reduction and education.
<b>California Fire Service and Rescue Emergency Mutual Aid Plan</b>	Wildfire Hazard	This plan provides guidance and procedures for agencies developing emergency operations plans
<b>California Multi-Hazard Mitigation Plan</b>	Hazard Mitigation Planning	Local hazard mitigation plans must be consistent with their state's hazard mitigation plan.
<b>California Water-Use Efficiency Legislation</b>	Hazard Mitigation Planning	Could be a program promoted by MMWD outreach efforts.
<b>Disadvantaged and Low-Income Communities Investments</b>	Action Plan Funding	This is a potential source of funding for actions located in disadvantaged or low-income communities.

Agency, Program or Regulation	Hazard Mitigation Area Affected	Relevance
<b>Governor's Executive Order B-37-16</b>	Drought Hazard	Water districts must conduct a "stress test," that is, examine the projected reliability of all their water supply resources over the next three years, and assume that water demand is high, and that precipitation levels are low. Results of this analysis could support the identification of projects for this hazard mitigation plan.
<b>Governor's Executive Order S-13-08 (Climate Impacts)</b>	Action Plan Implementation	This order includes guidance on planning for sea level rise in designated coastal and floodplain areas for new projects.
<b>Office of the State Fire Marshal</b>	Wildfire Hazard	This office has a wide variety of fire safety and training responsibilities.
<b>Senate Bill 97: Guidelines for Greenhouse Gas Emissions</b>	Action Plan Implementation	This bill establishes that greenhouse gas emissions and the effects of greenhouse gas emissions are appropriate subjects for California Environmental Quality Act analysis.
<b>Standardized Emergency Management System</b>	Emergency Management including Hazard Mitigation	Cal OES oversees emergency management compliance including the use of Standardized Emergency Management System and approval of submitted hazard mitigation plans. Local governments must use this system to be eligible for state funding of response-related personnel costs.
<b>Western Governors Association Ten-Year Comprehensive Strategy</b>	Wildfire Hazard	This strategy implementation plan prepared by federal and Western state agencies outlines measures to restore fire-adapted ecosystems and reduce hazardous fuels.

## 5.3 DISTRICT CORE CAPABILITIES

The planning team performed an inventory and analysis of existing authorities and capabilities called a "capability assessment." A capability assessment creates an inventory of an agency's mission, programs, and policies, and evaluates its capacity to carry them out. It presents a toolkit for implementation of the hazard mitigation plan.

The assessment identifies potential gaps in core capabilities and filling those gaps may eventually become actions in the plan. Assessment findings were shared with the Steering Committee as it developed the action plan shown in Chapter 20. If the review identified an opportunity to add or expand a capability, then doing so has been identified as a mitigation action. The District views each core capability to be fully adaptable as needed to meet the best interests of the District. This adaptability is considered to be an overarching District capability that is acknowledged by this reference.

### 5.3.1 Ordinances and Plans

#### **Ordinance No. 449**

This ordinance establishes mandatory water conservation measures to enhance the District's water conservation program pursuant to Water Code section 375. The conservation measures are aimed at reducing the quantity of water used indoors and outdoors by all District customers to preserve the District's limited water supply during drought.

#### **Ordinance No. 450**

The District adopted Ordinance No. 450, amending Ordinance No. 449 to add additional water conservation measures to help reach a goal of 40 percent water use reduction while providing customers flexibility in achieving individual water use reductions (MMWD, 2021).



## **Water Resources Plan 2040**

The District prepared *Water Resources Plan 2040* to evaluate resiliency in the face of threats to water resources in its service area and to identify options to enhance resiliency. The Water Resources Plan provides information for making informed water supply planning decisions in the face of reliability threats. The District used WaterSim to simulate reliability events and the resulting futures that could impact supply conditions. Events considered in the Water Resources Plan included earthquakes, drought, climate change, wildfire, landslides, and water quality issues. Forty resiliency options were developed to improve the District's resiliency and ability to meet demand in times of potential supply shortages (MMWD, 2017).

## **2020 Urban Water Management Plan (Draft)**

The *Urban Water Management Plan* is a foundational document and source of information about the District's historical and projected water demand, water supplies, supply reliability and potential vulnerabilities, water shortage contingency planning, and demand management programs (MMWD, 2021).

## **Water Shortage Contingency Plan**

The Water Shortage Contingency Plan is a stand-alone component of the *Urban Water Management Plan* that details stages of drought and actions that the District should take in response to each stage. Key components of the Water Shortage Contingency Plan, as required by the State Water Code, include the following:

- Create six standard water shortage levels corresponding to: 10-, 20-, 30-, 40-, 50- and >50-percent
- Define locally appropriate "shortage response actions" for each shortage level, with a corresponding estimate of the extent to which the action will address the gap between supply and demand.
- By July 1 each year beginning in 2022, submit an annual water shortage assessment report to the California Department of Water Resources (DWR).

## **Wildfire Resilience Plan 2020 (Draft)**

MMWD's *Wildfire Resilience Plan* summarizes existing District programs and operations related to wildfire preparedness, identifies data gaps, and recommends actions that will lead to a more wildfire resilient water system. It captures the perspectives, observations, and input of the District personnel who operate the system, and identifies strengths, weaknesses, and potential vulnerabilities related to wildfire. The plan will be updated periodically to address changing conditions and new wildfire resiliency best practices (MMWD, 2020).

## **America's Water Infrastructure Act Plan**

At the time of the preparation of this hazard mitigation plan, MMWD is in the process of completing the requirements of the 2019 America's Water Infrastructure Act.

### **5.3.2 Financial Capabilities**

Assessing a jurisdiction's fiscal capability provides an understanding of the ability to fulfill the financial needs associated with hazard mitigation projects. This assessment identifies both outside resources, such as grant-funding eligibility, and local jurisdictional authority to generate internal financial capability, such as through fees. An assessment of fiscal capabilities is presented in Table 5-3.

**Table 5-3. Fiscal Capability**

<b>Financial Resources</b>	<b>Accessible or Eligible to Use?</b>
Capital Improvements Project Funding	Yes
Authority to Levy Taxes for Specific Purposes	Yes
User Fees for Utility Service	Yes
Incur Debt through General Obligation Bonds	Yes
Incur Debt through Special Tax Bonds	Yes
State-Sponsored Grant Programs	Yes
Federal-Sponsored Grant Programs	Yes
Other	N/A

### 5.3.3 Administrative and Technical Capabilities

Administrative and technical capabilities focus on the availability of personnel resources responsible for implementing all the facets of hazard mitigation. An assessment of administrative and technical capabilities is presented in Table 5-4.

**Table 5-4. Administrative and Technical Capability**

<b>Staff/Personnel Resources</b>	<b>Available?</b>	<b>Department/Agency/Position</b>
Planners or engineers with knowledge of water supply infrastructure	Yes	Engineering Manager can perform or can contract for this service
Planners or engineers with an understanding of natural hazards	Yes	Contract for service
Staff with training in benefit/cost analysis	Yes	Contract for service
Personnel skilled or trained in GIS applications	Yes	Engineering Manager can perform or contract for service
Scientist familiar with natural hazards in local area	Yes	Contract for service
Emergency manager	Yes	General Manager
Grant writers	Yes	General Manager can perform or contract for service
Other	N/A	N/A

### 5.3.4 Public Outreach Capabilities

Regular engagement with the public on issues regarding hazard mitigation provides an opportunity to directly interface with community members. Assessing this outreach and education capability illustrates the connection between the government and community members, which opens a two-way dialogue that can result in a more resilient community based on education and public engagement. An assessment of education and outreach capabilities is presented in Table 5-5.

**Table 5-5. Education and Outreach Capability**

Criterion	Response
Do you have a public information officer or communications office?	Yes
Do you have personnel skilled or trained in website development?	Yes
Do you have hazard mitigation information available on your website? • If yes, briefly describe.	Yes <a href="https://www.marinwater.org/emergency-preparedness">https://www.marinwater.org/emergency-preparedness</a>
Do you use social media for hazard mitigation education and outreach? • If yes, briefly describe.	Yes MMWD uses Facebook, Twitter and Instagram
Do you have any citizen boards or commissions that address issues related to hazard mitigation? • If yes, briefly describe.	N/A
Do you have any other programs already in place that could be used to communicate hazard-related information? • If yes, briefly describe.	Yes - Alert Marin  MMWD is part of County-wide Emergency Notification System; County provides related advertising of the system and provides hazard-related information
Do you have any established warning systems for hazard events? • If yes, briefly describe.	Yes SCADA System, County Emergency Operations Center, Alert Marin

## 5.4 OPPORTUNITIES FOR INTEGRATION

The District has a high degree of core capability for funding, administrative and technical functions, and public outreach with its existing plans and programs. These capabilities represent opportunities for future integration with this hazard mitigation plan. The District has begun this integration process with the concurrent planning efforts for this hazard mitigation plan and the planning requirements of the America's Water Infrastructure Act. This hazard mitigation plan includes information that can be used for future updates such as the following:

- Updates to the District's Strategic Plan.
- Updates to the District's Water System Master Plan.
- Updates to the District's Urban Water Management Plan
- Updates to the District's Capital Facilities Plan
- Updates to the Wildfire Resilience Plan

The District is fully committed to plan integration where feasible and valuable, as evidenced by the identification of plan integration in the action plan provided in Chapter 20.



## 6. RISK ASSESSMENT METHODOLOGY

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The risk assessments in this hazard mitigation plan describe the risks associated with each identified hazard of concern. Each chapter describes the hazard, the planning area's vulnerabilities, and probable event scenarios. The following steps were used to define the risk of each hazard:

- Identify and profile each hazard—The following information is given for each hazard:
  - Past occurrences of the hazard affecting the planning area
  - Geographic areas most affected by the hazard
  - Event frequency estimates
  - Severity estimates
  - Warning time likely to be available for response.
- Determine exposure to each hazard—Exposure was determined by overlaying hazard maps with an inventory of structures, facilities, and systems to determine which of them would be exposed to each hazard. For each identified hazard of concern, the best available existing data delineating a hazard area was selected. Data sets were evaluated based on scale, age, and source. Data available in a GIS-compatible format with coverage of the full extent of the planning area were preferred for the analysis.
- Assess the vulnerability of exposed facilities—Vulnerability of exposed structures and infrastructure was determined by interpreting the probability of occurrence of each event and assessing structures, facilities, and systems that are exposed to each hazard. FEMA's hazard-modeling program called Hazus was used to perform this assessment for the flood, dam failure and earthquake hazards. Outputs similar to those from Hazus were generated for other hazards using GIS and maps generated by the Hazus program.

### 6.1 MAPPING

A review of national, state and county databases was performed to locate available spatially based data relevant to this planning effort. Maps were produced using GIS software to show the spatial extent and location of identified hazards when such data was available. These maps are included in the hazard profile chapters of this document.

### 6.2 HAZARD RISK MODELING

#### 6.2.1 Overview

In 1997, FEMA developed the standardized Hazards U.S., or Hazus, model to estimate losses caused by earthquakes and identify areas that face the highest risk and potential for loss. Hazus was later expanded into a multi-hazard methodology with new models for estimating potential losses from hurricanes and floods.

Hazus is a GIS-based software program used to support risk assessments, mitigation planning, and emergency planning and response. It provides a wide range of inventory data—such as demographics, building stock, critical

facilities, transportation infrastructure, and utility lifelines—and uses multiple models to estimate potential losses from natural disasters. The program maps and displays hazard data and the results of damage and economic loss estimates for buildings and infrastructure. Its advantages include the following:

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

### 6.2.2 Levels of Detail for Evaluation

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

- **Level 1**—All of the information needed to produce an estimate of losses is included in the software's default data. This data is derived from national databases and describes in general terms the characteristic parameters of the planning area.
- **Level 2**—More accurate estimates of losses require more detailed information about the planning area. To produce Level 2 estimates of losses, detailed information is required about local geology, hydrology, hydraulics and building inventory, as well as data about utilities and critical facilities. This information is needed in a GIS format.
- **Level 3**—This level of analysis generates the most accurate estimate of losses. It requires detailed engineering and geotechnical information to customize it for the planning area.

### 6.2.3 Application for This Plan

The following hazards were evaluated using Hazus:

- **Flood**—A Level 2 user-defined analysis was performed for the District's facilities and infrastructure in flood zones. Current flood mapping for the planning area was used to delineate flood hazard areas and estimate potential losses from the 1-percent-annual-chance and 0.2-percent-annual-chance flood event (commonly known as the 100-year and 500-year floods). To estimate damage that would result from a flood, Hazus uses pre-defined relationships between flood depth at a structure and resulting damage, with damage given as a percent of total replacement value. Curves defining these relationships have been developed for damage to structures and for damage to typical contents within a structure. By inputting flood depth data and known structure replacement cost values, dollar-value estimates of damage were generated.
- **Dam Failure**—A Level 2 analysis was run using the flood methodology described above. The analysis assessed the combined mapped inundation areas for failure of seven dams: Alpine, Bon Tempe, Lagunitas, Peters Dam Kent, Phoenix, Seeger Dam Nicasio, Soulajule.



- **Earthquake**—A Level 2 analysis was performed to assess earthquake exposure and vulnerability for four scenario events and one probabilistic event:
  - A Magnitude-7.58 event on the Hayward fault with an epicenter 10.5 miles east-northeast of Corte Madera.
  - A Magnitude-7.88 event on the North San Andreas fault with an epicenter 10 miles west of Corte Madera.
  - A Magnitude-7.44 event on the San Gregorio North fault with an epicenter 36 miles south of Corte Madera.
  - A Magnitude-6.97 event on the West Napa fault with an epicenter 29 miles north-northeast of Corte Madera.
  - The standard Hazus 100-year probabilistic event.
- **Tsunami**— A Level 2 analysis was run using the flood methodology described above. The analysis assessed the mapped tsunami inundation area.

## 6.3 RISK ASSESSMENT WITHOUT MODELING

For most of the hazards evaluated in this risk assessment, historical data was not adequate to model future losses. However, GIS is able to map hazard areas and calculate exposures if geographic information is available on the locations of the hazards and inventory data. A qualitative analysis was conducted for some hazards using the best available data and professional judgment. The risk assessment for drought was more limited and qualitative than the assessment for the other hazards of concern because drought generally does not affect structures.

## 6.4 SOURCES OF DATA USED IN HAZUS MODELING

### 6.4.1 Facilities and Infrastructure Cost Data

Replacement cost values and detailed structure information were derived from data provided by the District on its potable and recycled water system facilities and infrastructure. The exposure of the facilities and infrastructure to the hazards was analyzed using GIS overlays. Hazus was used to determine damage to pipelines and to the following facilities: pump stations, water treatment plants, tanks, and buildings.

The Hazus earthquake module calculates the economic loss to pipelines using the number of leaks and the number of breaks multiplied by cost to repair each leak or break. Default cost-to-repair values included in Hazus were updated with the following information provided by the District:

- Cost to repair a pipeline leak: \$5,000
- Cost to repair a pipeline break: \$5,000

Hazus default values for pipeline restoration time also were updated with information provided by the District. MMWD normally operates with four crews of three to six workers per crew, with a surge capacity of six to seven crews at a time. A capacity of seven crews was used for the Hazus analyses. A crew can repair one leak, or break, per day.

### 6.4.2 Hazus Data Inputs

The following hazard datasets were used for the Hazus Level 2 analysis conducted for the risk assessment:

- **Flood**—The effective Digital Flood Insurance Rate Map (DFIRM) for the planning area was used to delineate flood hazard areas and estimate potential losses from the 1-percent-annual-chance and 0.2-percent-annual-chance flood events. Using the DFIRM floodplain boundaries and U.S. Geological Survey (USGS) 3-meter digital elevation model data, a flood depth grid was generated and integrated into the Hazus model.
- **Dam Failure**—Dam-failure inundation depth grids for the Alpine Dam, Bon Tempe Dam, Lagunitas Dam, Peters Dam Kent, Phoenix Dam, Seeger Dam Nicasio, and SoulaJule Dam were provided by the California Department of Water Resources. The individual dam depth grids were combined using the maximum depth where the dam inundation areas overlapped, and the combined depth grid was integrated into the Hazus model.
- **Earthquake**—ShakeMaps and probabilistic data prepared by the USGS were used for the analysis of the earthquake hazard (see Section 9.1.5 for a discussion of ShakeMaps). National Earthquake Hazard Reduction Program (NEHRP) soils from the California Department of Conservation, liquefaction zone information from Marin County, and landslide susceptibility data from the California Geological Survey (CGS) were also integrated into the Hazus model.
- **Tsunami**—Tsunami inundation area data provided by CGS and the USGS 3-meter digital elevation model data were used to develop tsunami inundation depth grids that were integrated into the Hazus model.

### 6.4.3 Other Local Hazard Data

Locally relevant information on hazards was gathered from a variety of sources. Frequency and severity indicators include past events and the expert opinions of geologists, emergency management specialists, and others. Data sources for specific hazards were as follows:

- **Landslide**—Two landslide datasets were used in the analysis:
  - CGS data on susceptibility to deep-seated landslides—Areas categorized as very high and high susceptibility (categories X, XI, VIII, and VII) were used in the exposure analysis.
  - Marin County data showing the distribution of landslides evident in the landscape—Areas categorized as “mostly landslide” were used in the exposure analysis.
- **Sea Level Rise**—Sea level rise data were provided by the San Francisco Bay Conservation and Development Commission’s Adapting to Rising Tides (ART) program. Sea level rise intervals of 24 inches and 48 inches were used in the exposure analysis. Twenty-four inches of sea level rise approximates the King Tide in 30 years. Forty-eight inches of sea level rise is the closest interval, available in the ART data, to the 3.5 feet recommended in the State of California guidance.
- **Wildfire**—Fire threat data originated from the California Public Utilities Commission (CPUC) and was provided by MMWD. Areas categorized as fire threat Tiers 2 and 3 were used in the exposure analysis.

### 6.4.4 Data Source Summary

Table 6-1 summarizes the data sources used for the risk assessment for this project:

**Table 6-1. Hazus Model Data Documentation**

<b>Data</b>	<b>Source</b>	<b>Date</b>	<b>Format</b>
Facilities and infrastructure data including buildings, wells, pump stations, tanks, valves, hydrants, connections, and pipelines	MMWD	2021	Digital (GIS)
Dam breach inundation maps (inundation boundaries and depth grids)	California Department of Water Resources	2018-20	Digital (GIS)
ShakeMap – Hayward M7.58	USGS	2017	Digital (GIS)
ShakeMap –North San Andreas M7.88	USGS	2017	Digital (GIS)
ShakeMap – San Gregorio North M7.44	USGS	2017	Digital (GIS)
ShakeMap – West Napa M6.97	USGS	2017	Digital (GIS)
Liquefaction susceptibility	Marin County (originally USGS)	2006	Digital (GIS)
NEHRP soils (VsMapV3_Geology)	California Department of Conservation	2015	Digital (GIS)
DFIRM for Marin County (effective date of 6/25/2019)	FEMA	2019	Digital (GIS)
Susceptibility to deep-seated landslides	California Geological Survey	2011	Digital (GIS)
Distribution of landslides evident in the landscape	Marin County (originally USGS)	Unknown	Digital (GIS)
Adapting To Rising Tides Bay Area Sea Level Rise & Mapping Project: Marin County/SF Bay	San Francisco Bay Conservation and Development Commission	2017	Digital (GIS)
Tsunami Inundation Map for Emergency Planning	California Emergency Management Agency, California Geological Survey, and University of Southern California – Tsunami Research Center	2009	Digital (GIS)
CPUC Fire Threat Map	MMWD (originally CA Public Utilities Commission)	Unknown	Digital (GIS)
National Elevation Data 3 meter or better	USDA/NRCS - National Geospatial Center of Excellence	Unknown	Digital (GIS)

## 6.5 LIMITATIONS

Loss estimates, exposure assessments and hazard-specific vulnerability evaluations rely on the best available data and methodologies. Uncertainties are inherent in any loss estimation methodology and arise in part from incomplete scientific knowledge concerning natural hazards and their effects on the built environment. Uncertainties also result from the following:

- Approximations and simplifications necessary to conduct a study
- Incomplete or outdated inventory, demographic, or economic parameter data
- The unique nature, geographic extent and severity of each hazard
- Mitigation measures already employed
- The amount of advance notice residents have to prepare for a specific hazard event.

These factors can affect loss estimates by a factor of two or more. Therefore, potential exposure and loss estimates are approximate and should be used only to understand relative risk. Over the long term, the District will collect additional data to assist in estimating potential losses associated with other hazards.

## **Part 2. Risk ASSESSMENT**





## 7. DAM FAILURE

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### 7.1 GENERAL BACKGROUND

A dam is an artificial barrier that can store water, wastewater, or liquid-borne materials for many reasons—flood control, human water supply, irrigation, livestock water supply, energy generation, containment of mine tailings, recreation, or pollution control. Many dams fulfill a combination of these functions. They are an important resource in the United States.

Dams can be classified according to their purpose, construction material, slope, cross-section, or means of controlling seepage. Materials used to construct dams include earth, rock, tailings from mining or milling, concrete, masonry, steel, timber, plastic, rubber, and combinations of these.

#### 7.1.1 Causes of Dam Failures

Partial or full failure of dams has the potential to cause massive destruction to the ecosystems and communities located downstream. Partial or full failure can occur as a result of one or a combination of the following reasons (FEMA, 2015):

- Overtopping caused by floods that exceed the dam capacity (inadequate spillway capacity)
- Prolonged periods of rainfall and flooding
- Deliberate acts of sabotage (terrorism)
- Structural failure of materials used in dam construction
- Movement and/or failure of the foundation supporting the dam
- Settlement and cracking of concrete or embankment dams
- Piping and internal erosion of soil in embankment dams
- Inadequate or negligent operation, maintenance, and upkeep
- Failure of upstream dams on the same waterway
- Earthquake (liquefaction/landslides).

Many dam failures in the United States have been secondary results of other disasters. The most common causes are earthquakes, landslides, extreme storms, equipment malfunction, structural damage, foundation failures, and sabotage. Poor construction, lack of maintenance and repair, and deficient operational procedures are preventable or correctable by a program of regular inspections. Terrorism and vandalism are serious concerns that all operators of public facilities must plan for; these threats are under continuous review by public safety agencies.

7.1.2 Residual Risk

All dams face a “residual risk” of failure, which represents the risk that conditions may exceed those for which the dam was designed. For example, dams may be designed to withstand a probable maximum precipitation, defined as the greatest depth of precipitation for a given duration that is theoretically possible over a given storm area at a particular geographical location at a given time of the year. The chance of occurrence of a precipitation event of a greater magnitude than that represents residual risk for such dams.

7.1.3 Dam Regulation and Hazard Ratings

Regulatory oversight of dams is assigned to various agencies (see Appendix B):

- FEMA monitors dams under the National Dam Safety Act
- The Federal Energy Regulatory commission promotes safety of power-producing dams through its Dam Safety Program
- The U.S. Army Corps of Engineers operates and maintains hundreds of dams nationwide and is responsible for safety inspections of dams that meet size and storage limitations specified in the National Dam Safety Act.
- California’s Division of Safety of Dams, Department of Water Resources monitors the Dam Safety Program at the state level and maintains a working list of dams in the state.

FEMA uses the following classification system for the hazard potential of dam failures (FEMA, 2004)

- **Low Hazard Potential**—Dams where failure or mis-operation results in no probable loss of human life and low economic and/or environmental losses. Losses are principally limited to the owner’s property.  
**Significant Hazard Potential**—Dams where failure or mis-operation results in no probable loss of human life but can cause economic loss, environmental damage, or disruption of lifeline facilities or can impact other concerns. Significant hazard potential classification dams are often located in predominantly rural or agricultural areas but could be located in areas with population and significant infrastructure.
- **High Hazard Potential**—Dams where failure or mis-operation will probably cause loss of human life.

California’s Division of Safety of Dams developed a hazard potential classification system for state-jurisdiction dams, as shown on Table 7-1. The state system is modified from the three-tier federal guidelines, adding a fourth hazard classification of “extremely high.” Dams classified as extremely high hazard may impact highly populated areas or critical infrastructure or have short evacuation warning times. The federal and state rating systems are both based on the potential consequences of a dam failure; they do not address the probability of such failures.

Table 7-1. State of California Downstream Hazard Potential Classification		
Hazard Category	Direct Loss of Life	Economic, Environmental, and Lifeline Losses
Low	None expected	Low and principally limited to dam owner's property
Significant	None expected	Yes
High	Probable (one or more expected)	Yes, but not necessary for this classification
Extremely High	Considerable	Yes, major impacts to critical infrastructure or property

Source: California Division of Safety of Dams, 2017

## 7.1.4 Planning Requirements

### State of California

All dams whose inundation areas may impact the planning area have emergency action plans (EAPs) on file. The EAPs must include the following (Cal OES, 2018):

- Emergency notification flow charts
- Information on a four-step response process
- Description of agencies' roles and actions in response to an emergency incident
- Description of actions to be taken in advance of an emergency
- Inundation maps
- Additional information such as revision records and distribution lists.

After the EAPs are approved by the state, the law requires dam owners to send the approved EAPs to relevant stakeholders. Local public agencies can then adopt emergency procedures that incorporate the information in the EAP in a manner that conforms to local needs and includes methods and procedures for alerting and warning the public and other response and preparedness related items (State of California, 2018).

### Federal Energy Regulatory Commission

Dams that fall under the jurisdiction of the Federal Energy Regulatory Commission (FERC) also have specified planning requirements. FERC has the largest dam safety program in the United States. It cooperates with a large number of federal and state agencies to ensure and promote dam safety and, more recently, homeland security. FERC requires licensees to prepare EAPs and conducts training sessions on how to develop and test these plans. The plans are designed to serve as an early warning system if there is a potential for, or a sudden release of water from, a dam failure or accident to the dam. The plans include operational procedures that may be used, such as reducing reservoir levels and reducing downstream flows and procedures for notifying affected residents and agencies responsible for emergency management. These plans are frequently updated and tested to ensure that in emergency situations everyone knows what to do, thus saving lives and minimizing property damage.

## 7.1.5 Secondary Hazards

Dam failure can cause severe downstream flooding. Overland flows from dam breach are likely to transport large amounts of debris, which can impact District assets such as buildings, wells, pumps, and pipe casings. Other potential secondary hazards of dam failure are landslides around the reservoir perimeter, bank erosion on streams, and destruction of downstream habitat. Dam failure may worsen the severity of a drought by releasing water that might have been used as a potable water source.

## 7.2 HAZARD PROFILE

### 7.2.1 Past Events

According to the 2018 California State Hazard Mitigation Plan, there have been nine dam failures in the state since 1950, none of which occurred in Marin County. Overtopping caused two of the failures, and the others were caused by seepage or leaks. California has had about 45 failures of non-federal dams. The most common cause of failure was overtopping.

## 7.2.2 Location

According to the California Division of Safety of Dams, there are 17 dams in Marin County. Seven are rated as significant, high, or extremely high hazard. Table 7-2 lists key information about the seven dams that have the potential to impact MMWD should they fail. Figure 7-1 shows dam locations and aggregate dam-failure inundation areas.

**Table 7-2. Dams with Potential to Impact the Marin Municipal Water District**

Name	Alpine	Bon Tempe	Peters	Lagunitas	Seeger	Phoenix Lake	Soulajule
Hazard Potential	High	High	High	Significant	High	Extremely High	High
Condition Assessment	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory	Satisfactory
Owner	MMWD	MMWD	MMWD	MMWD	MMWD	MMWD	MMWD
Year Built	1917	1949	1954	1872	1961	1907	1979
Dam Type	Gravity	Earthen	Earthen	Earthen	Earthen	Earthen	Earthen
Crest Length (feet)	524	1,150	700	433	400	320	700
Height (feet)	143	98	230	48	115	90	122
Storage Capacity (acre-feet)	8,892	4,300	32,900	4,430	22,400	612	10,700

## 7.2.3 Frequency

A major dam failure is a rare event for which there is no defined recurrence interval. For the risk ranking in this plan, the District chose to assign a probability value of medium (an event to likely occur within 100 years) to account for increased frequency due to the impacts from climate change.

While the probability of dam failure is very low, the probability of flooding associated with changes to dam operational parameters in response to climate change is higher. Dam designs and operations are developed based on hydrographs from historical records. If these hydrographs experience significant changes over time due to the impacts of climate change, dam design and operations may no longer be valid for the changed condition. This could have significant impacts on dams that provide flood control. Specified release rates and impound thresholds may have to be changed. This would result in increased discharges downstream of these facilities, increasing the probability and severity of flooding.

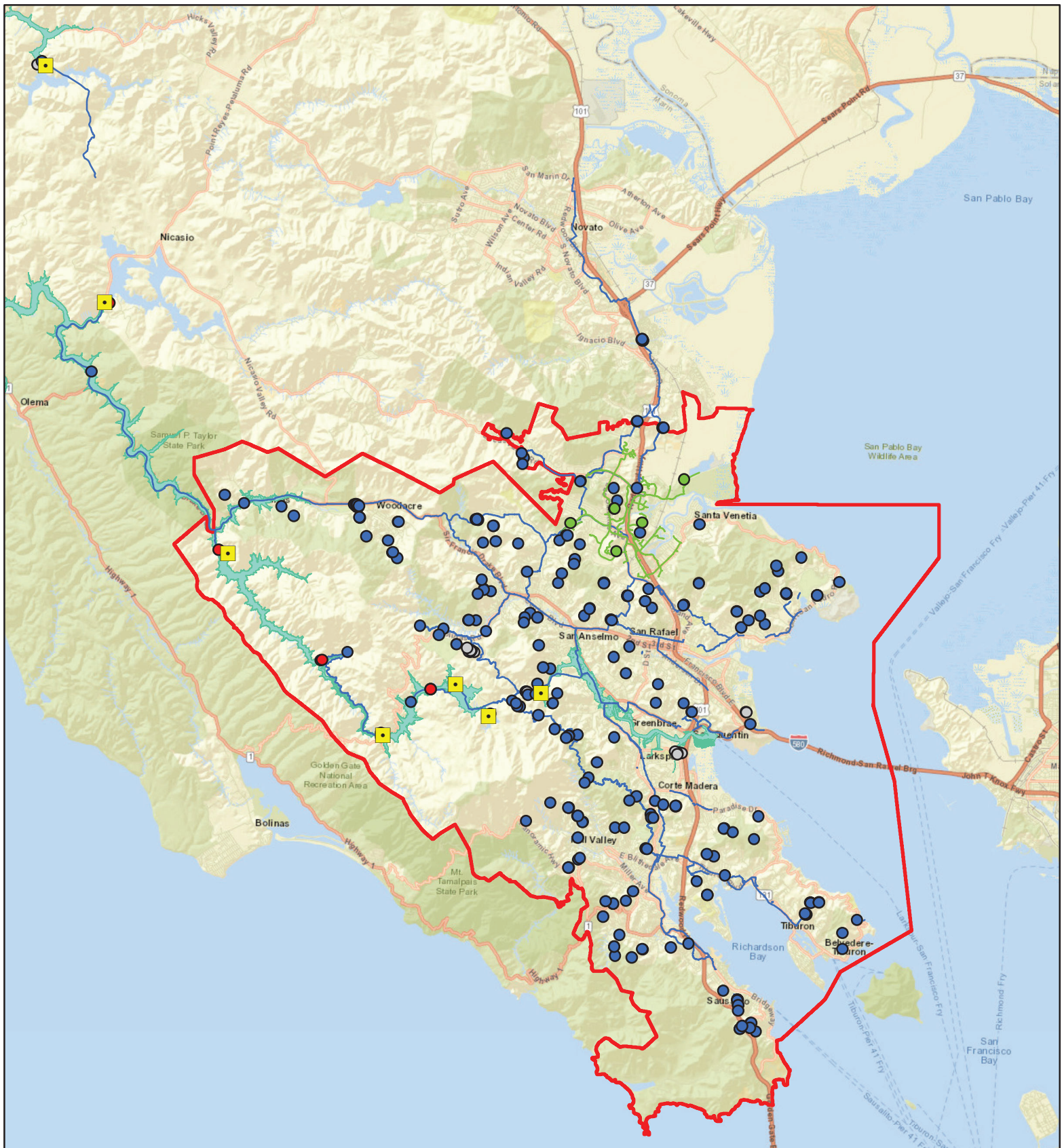
## 7.2.4 Severity

Table 7-2 lists the hazard potential of dams that could impact the District, using the State of California rating system described in Section 7.1.3. These ratings indicate the potential severity of dam failure impacts in the District.

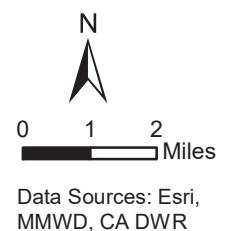
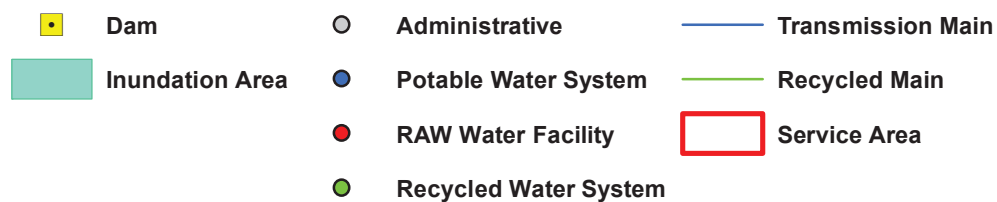
## 7.2.5 Warning Time

Warning time for dam failure depends on the cause of the failure. In case of extreme precipitation, evacuations can be planned with sufficient time. In the event of a structural failure due to earthquake, there may be no warning time. A dam's structural type also affects warning time. Earthen dams do not tend to fail completely or instantaneously. Once a breach is initiated, discharging water erodes the breach until the reservoir is empty or the breach resists further erosion. Concrete dams also tend to begin with a partial breach. The time of breach formation ranges from a few minutes to a few hours.





**Figure 7-1. Dam Locations and Combined Dam Inundation Area**



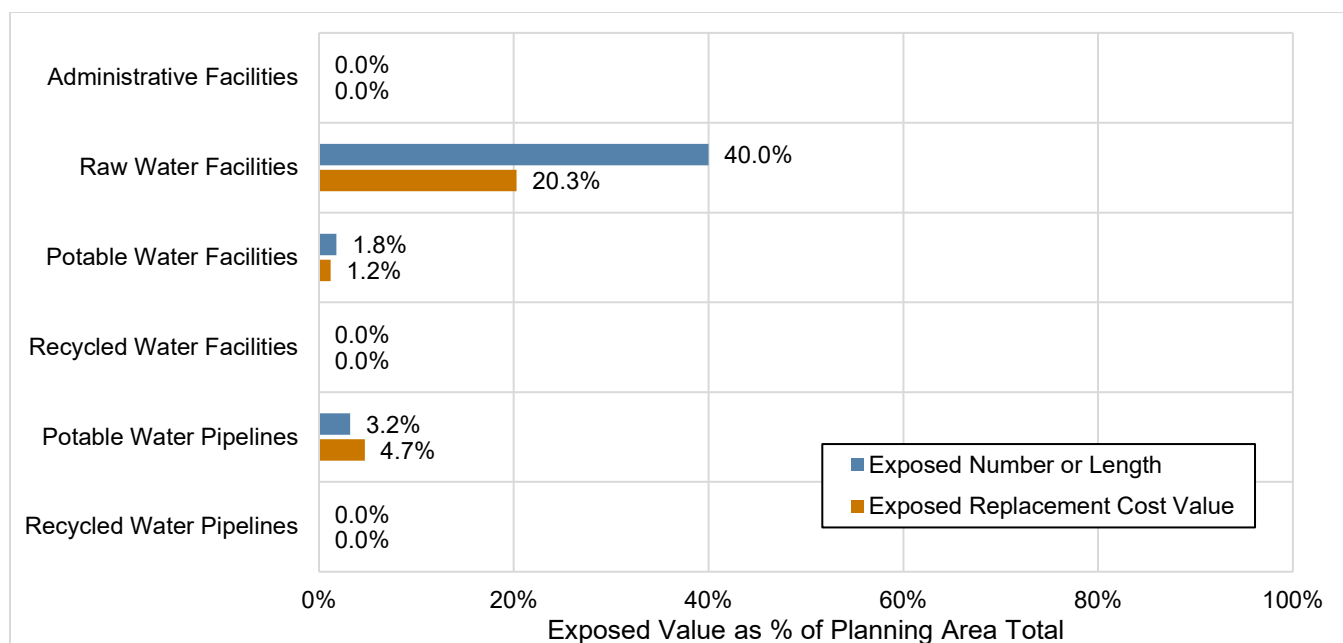
The County of Marin has a system for warning citizens in the event of an emergency, including dam failure. Alert Marin is a mass notification system designed to keep Marin County residents, employees, students, and businesses informed of emergencies and community events. Interested parties can register their cell phone or VoIP (voice over internet protocol) phone to receive emergency alerts sent by call, text, email, or smartphone application from the County of Marin. Listed, unlisted, and blocked Marin County landline phone numbers are already included in the emergency notification system.

## 7.3 EXPOSURE

The risk assessment for dam failure evaluated District assets that lie within the aggregate mapped dam-failure inundation areas shown in Figure 7-1. Table 7-3 summarizes the number of each type of facility found to be within the aggregate mapped inundation area and the total replacement cost value of those exposed facilities. Figure 7-2 shows these results as the percent of planning area totals for each asset type.

**Table 7-3. Number and Value of District Facilities Exposed to the Dam Failure Hazard**

Asset Type	Exposed Number or Length	Exposed Replacement Cost Value
<b>Structures/Facilities</b>		
<b>Number</b>		
Administrative	0	\$0
Raw Water Facilities	4	\$3,652,474
Potable Water Structures	3,519	\$7,956,950
Recycled Water Facilities	0	\$0
<b>Total</b>	<b>3,523</b>	<b>\$11,609,424</b>
<b>Pipelines</b>		
<b>Length in Feet</b>		
Potable Water	186,049	\$160,442,926
Recycled Water	0	\$0
<b>Total</b>	<b>186,049</b>	<b>\$160,442,926</b>
<b>Total</b>		<b>\$172,052,350</b>



**Figure 7-2. District Facilities Exposed to the Dam Failure Hazard as % of Planning Area Total**

The exposure analysis included the District’s pipeline assets. While most of these assets are underground, and not susceptible to impacts from overland flows associated with dam failures, there are sections of pipelines that are exposed as they cross drainageways and channels. The exact location of these exposed pipelines was not available in a geospatial dataset to support this exposure analysis.

## 7.4 VULNERABILITY

The flood module of Hazus was used for a Level 2 assessment of vulnerability to dam failure. Hazus estimated damage to the nine District structures in the dam failure inundation area. Detailed results for each facility are provided in Appendix C; overall results for the entire district are summarized in Table 7-4.

**Table 7-4. Estimated Overall Damage to District Facilities from Dam Failure**

	Damage as % of Total Value	Loss Value of Damage
<b>Structure</b>	53.6%	\$4,465,207
<b>Contents</b>	72.0%	\$234,891
<b>Total</b>		<b>\$4,700,098</b>

## 7.5 DEVELOPMENT TRENDS

The demand for critical MMWD services may increase with growth in the surrounding area. Repair or replacement of MMWD assets will be governed by codes and standards applied by the County of Marin and service provided cities, depending on the location of the asset. The State of California’s adoption of bills expanding property owners’ rights to build accessory dwelling units will increase densities in most the MMWD’s service area; areas that, as recently as 2019, were thought to be built out.

Marin County and the municipalities of Corte Madera, Tiburon, Sausalito, Mill Valley, Larkspur, Fairfax, Belvedere, Ross, San Rafael, and San Anselmo participate in the National Flood Insurance Program (NFIP) and have adopted floodplain management standards pursuant to that program’s requirements. Applications of these codes and standards to any new or redeveloped District assets will reduce the risk of potential impacts from dam failure inundation.

## 7.6 ISSUES

Flooding as a result of a dam failure would significantly impact properties and populations in the inundation areas. There is often limited warning time for such failures. These events are frequently associated with other natural hazard events such as earthquakes, landslides or severe weather, which limits their predictability and compounds the hazard. Important issues associated with dam failure hazards include the following:

- While the percentage is small, the District does have critical assets exposed to the aggregate dam failure inundation area.
- All of the dams for which the District has exposure are owned and maintained by the District. Failure of any of these dams would have a significant impact on the District’s ability to provide services, as each dam is critical to the District’s stored water supply.
- Emergency action plans for federally regulated dams include an adequate level of public notification in the event of failure. However, the protocol for notification of downstream citizens of imminent failure needs to be tied to local emergency response planning.



- Most dam failure mapping at federal levels requires determination of the probable maximum flood. While the probable maximum flood represents a worst-case scenario, it is generally the event with the lowest probability of occurrence. For non-federally regulated dams, mapping of dam failure scenarios that are less extreme than the probable maximum flood but have a higher probability of occurrence can be valuable to emergency managers and community officials downstream. Such mapping can indicate areas potentially impacted by more frequent events to support emergency response and preparedness.
- The concept of residual risk associated with structural flood control projects should be considered in the design of capital projects and the application of land use regulations.

## 8. DROUGHT

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### 8.1 GENERAL BACKGROUND

Drought is a significant decrease in water supply relative to what is typical in a given location. It is a normal phase in the climate cycle of most regions, originating from a deficiency of precipitation over an extended period of time, usually a season or more. This leads to a water shortage for some activity, group or environmental sector. Drought can be characterized based on various impacts or measurements:

- Meteorological measurements such as rainfall deficit compared to normal or expected rainfall
- Agricultural impacts due to reduced rainfall and water supply (e.g., crop loss, herd culling, etc.)
- Hydrological measurements of stream flows, groundwater, and reservoir levels relative to normal conditions
- Direct and indirect socio-economic impacts on society and the economy (e.g., increased unemployment due to failure of an industry because of drought).

Drought is a normal phase in the climactic cycle of most geographical regions. If the weather pattern that causes a drought lasts a short time (a few weeks or a couple of months), the drought is considered short-term. If the weather pattern becomes entrenched and the precipitation deficits last for several months or years, the drought is considered to be long-term. It is possible for a region to experience a long-term circulation pattern that produces drought, and to have short-term changes in this long-term pattern that result in short-term wet spells. Likewise, it is possible for a long-term wet circulation pattern to be interrupted by short-term weather spells that result in short-term drought.

#### 8.1.1 Monitoring Drought

##### **National Oceanic and Atmospheric Administration Drought Indices**

The National Oceanic and Atmospheric Administration has developed several indices to measure drought impacts and severity and to map their extent and locations:

- The ***Crop Moisture Index*** measures weekly short-term drought to quantify drought impacts on agriculture during the growing season.
- The ***Palmer Z Index*** measures monthly short-term drought.
- The ***Palmer Drought Severity Index*** measures the duration and intensity of long-term drought-inducing circulation patterns. Long-term drought is cumulative, so the intensity of drought during a given month is dependent on the current weather patterns plus the cumulative patterns of previous months. Weather

patterns can change quickly from a long-term drought pattern to a long-term wet pattern, and the Palmer Drought Index can respond fairly rapidly.

- The hydrological impacts of drought (e.g., reservoir levels, groundwater levels, etc.) take longer to develop and it takes longer to recover from them. The *Palmer Hydrological Drought Index* quantifies long-term hydrological effects. It responds more slowly to changing conditions than the Palmer Drought Index.
- While the Palmer indices consider precipitation, evapotranspiration and runoff, the *Standardized Precipitation Index* considers only precipitation. In the Standardized Precipitation Index, an index of zero indicates the median precipitation amount; the index is negative for drought and positive for wet conditions. The Standardized Precipitation Index is computed for time scales ranging from one month to 24 months.

Figure 8-1 shows examples of these indices as of mid-2021.

### **U.S. Drought Monitor**

The U.S. Drought Monitor (USDM) is a map that is updated weekly to show the location and intensity of drought across the country. The USDM uses a five-category system (National Integrated Drought Information System, 2020):

- D0—Abnormally Dry
  - Short-term dryness slowing planting, growth of crops
  - Some lingering water deficits
  - Pastures or crops not fully recovered
- D1—Moderate Drought
  - Some damage to crops, pastures
  - Some water shortages developing
  - Voluntary water-use restrictions requested
- D2—Severe Drought
  - Crop or pasture loss likely
  - Water shortages common
  - Water restrictions imposed
- D3—Extreme Drought
  - Major crop/pasture losses
  - Widespread water shortages or restrictions
- D4—Exceptional Drought
  - Exceptional and widespread crop/pasture losses
  - Shortages of water creating water emergencies

The USDM categories show experts' assessments of conditions related to drought. These experts check variables including temperature, soil moisture, water levels in streams and lakes, snow cover, and meltwater runoff. They also check whether areas are showing drought impacts such as water shortages and business interruptions. Associated statistics show what proportion of various geographic areas are in each category of dryness or drought, and how many people are affected. U.S. Drought Monitor data go back to 2000.

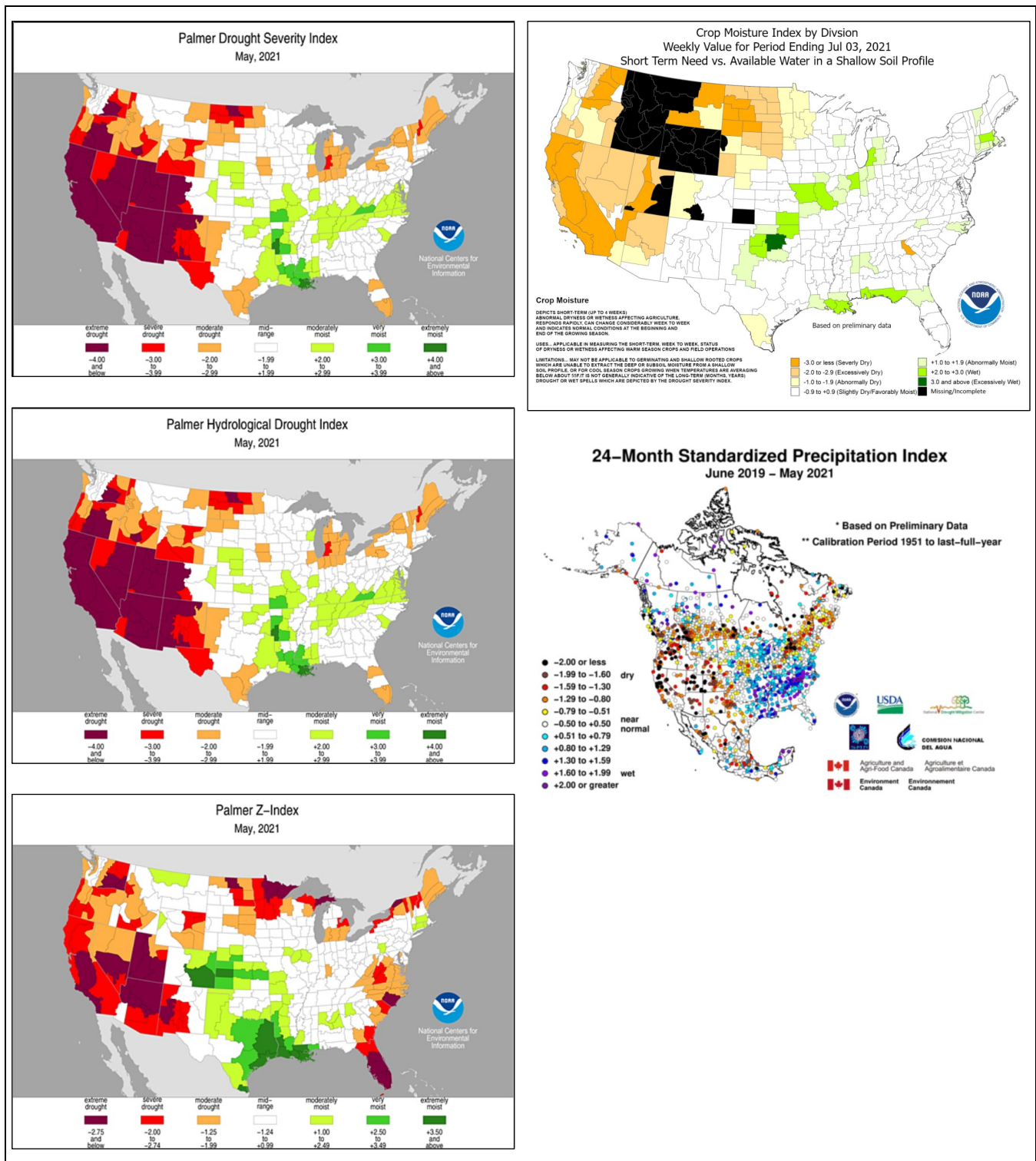


Figure 8-1. Example Drought Index Maps, Current as of Mid-2021

### 8.1.2 Drought Impacts

Drought can have a widespread impact on the environment and the economy, although it typically does not result in loss of life or damage to structures, as do other natural disasters. The National Drought Mitigation Center uses three categories to describe likely drought impacts:

- **Economic Impacts**—These impacts of drought cost people (or businesses) money. Farmers' crops are destroyed; low water supply necessitates spending on irrigation or drilling of new wells; water-related businesses (such as sales of boats and fishing equipment) may experience reduced revenue.
- **Environmental Impacts**—Plants and animals depend on water. When a drought occurs, their food supply can shrink, and their habitat can be damaged.
- **Social Impacts**—Social impacts include public safety, health, conflicts between people when there is not enough water to go around, and changes in lifestyle.

The demand that society places on water systems and supplies—such as expanding populations, irrigation, and environmental needs—contributes to drought impacts. Drought can lead to difficult decisions regarding the allocation of water, as well as stringent water use restrictions, water quality problems, and inadequate water supplies for fire suppression. There are also issues such as growing conflicts between agricultural uses of surface water and in-stream uses, surface water and groundwater interrelationships, and the effects of growing water demand on uses of water.

Vulnerability of an activity to drought depends on its water demand and the water supplies available to meet the demand. The impacts of drought vary between sectors of the community in both timing and severity:

- **Water supply**—The water supply sector encompasses urban and rural drinking water systems that are affected when a drought depletes water supplies due to sub-average rainfall.
- **Agriculture and commerce**—The agriculture and commerce sector includes the reduction of crop yield and livestock sizes due to insufficient water supply for crop irrigation and maintenance of ground cover for grazing.
- **Environment, public health, and safety**—The environmental, public health, and safety sector focuses on wildfires that are both detrimental to the forest ecosystem and hazardous to the public. It also includes the impact of desiccating streams, such as the reduction of in-stream habitats for native species.

Drought generally does not affect groundwater sources as quickly as surface water supplies, but groundwater supplies generally take longer to recover. Reduced precipitation during a drought means that groundwater supplies are not replenished at a normal rate. This can lead to a reduction in groundwater levels and problems such as reduced pumping capacity or wells going dry. Droughts can affect groundwater storage as reserves are drawn down in anticipation of drought impacts. Such conjunctive use assists in drought resilience, but it can take years to replenish the water that was stored. Shallow wells are more susceptible than deep wells. Reduced replenishment of groundwater affects streams. Much of the flow in streams comes from groundwater, especially during the summer when there is less precipitation and after snowmelt ends. Reduced groundwater levels mean that even less water will enter streams when stream flows are lowest.

### 8.1.3 Defined Drought Stages in California

During critically dry years, the California State Water Resources Control Board can mandate water entitlements on water right holders to address statewide water shortages. Table 8-1 shows the state drought management program stages mandated to water right holders.

Table 8-1. State Drought Management Program		
Drought Stage	State Mandated Customer Demand Reduction	Rate Impacts
Stage 0 or 1	<10%	Normal rates
Stage 2	10 to 15%	Normal rates; Drought surcharge
Stage 3	15 to 20%	Normal rates; Drought surcharge
Stage 4	>20%	Normal rates, Drought surcharge

### 8.1.4 Secondary Hazards

The secondary impact most associated with drought is wildfire. A prolonged lack of precipitation dries out vegetation, which becomes increasingly susceptible to ignition as the duration of the drought extends. In addition, lack of sufficient water resources can stress trees and other vegetation, making them more vulnerable to infestation from pests, which in turn, can make them more vulnerable to ignition.

## 8.2 HAZARD PROFILE

### 8.2.1 Local Water Supply

Until 1976, MMWD obtained water solely from rainfall collected from a watershed of 28 square miles of District-owned lands, and 36 square miles not owned by the District. Six reservoirs in the watershed had a storage capacity of 17.3 billion gallons. Through a bond issue authorized during the drought of the 1970s, a seventh reservoir was completed in 1980—the Soulajule Reservoir, which added 3.4 billion gallons to the total storage. The District’s Kent Lake facility was expanded in 1982 by raising Peters Dam 45 feet, increasing the storage capacity from 5.4 billion gallons to 10.6 billion gallons. Presently, the total reservoir storage operated by the District is 25.9 billion gallons. Figure 8-2 shows reservoir locations.

The District now receives supplemental water from the Sonoma County Water Agency’s (SCWA’s) transmission system, which provides treated water purchased from SCWA’s Russian River Project. The Russian River flows are augmented by Pacific Gas and Electric’s Potter Valley Project, which diverts a portion of the Eel River flows to the East Fork of the Russian River.

Water is diverted and extracted from the stretch of the Russian River just upstream of Wohler Bridge via six radial wells. The diverted river water percolates through sand and gravel and only needs the addition of chlorine to meet drinking water quality standards. Although the water extracted via the six radial wells does percolate through the ground, due to the connection to the surface water source, this diversion is permitted as a surface water supply under existing surface water rights to the Russian River and Dry Creek water. The SCWA supply also includes a relatively small amount of groundwater from wells in the central Santa Rosa Plain subbasin.

Source: Marin Municipal Water District, 2020



**Figure 8-2. District Water Supply Sources**

All three groundwater basins are categorized by the California Statewide Groundwater Elevation Monitoring program as low or very low priority basins (DWR, 2019). Studies conducted by the District over the last 40 years have determined that groundwater within the District's service area is very limited as it is either found in fractures in the Franciscan Formation (bedrock) or in shallow alluvial deposits in valleys. Therefore, groundwater is not currently or planned to be used as a water supply source by the District.



## 8.2.2 Past Events

### **Statewide Droughts**

The California Department of Water Resources has state hydrologic data back to the early 1900s (CA DWR, 2017). The hydrologic data show multi-year droughts from 1912 to 1913, 1918 to 1920, 1922 to 1924 and 1928 to 1934. The following sections describe additional prolonged periods of drought in California since then, all of which impacted Marin County to some degree.

#### ***1976 to 1977 Drought***

California had one of its most severe droughts due to lack of rainfall during the winters of 1976 and 1977. 1977 was the driest period on record in California to that time, with the previous winter recorded as the fourth driest. The cumulative impact led to widespread water shortages and severe water conservation measures throughout the state. Only 37 percent of the average Sacramento Valley runoff was received, with just 6.6 million acre-feet recorded. A federal disaster declaration was declared that included Marin County.

#### ***1987 to 1992 Drought***

California received precipitation well below average levels for four consecutive years. During this drought, only 56 percent of average runoff for the Sacramento Valley was received, totaling just 10 million acre-feet. By February 1991, all 58 counties in California were suffering from drought conditions. Urban areas as well as rural and agricultural areas were impacted.

#### ***2007 to 2009 Drought***

The governor issued an Executive Order that proclaimed a statewide drought emergency on June 4, 2008 after spring 2008 was the driest spring on record and snowmelt runoff was low. On February 27, 2009, the governor proclaimed a state of emergency for the entire state as the severe drought conditions continued widespread impacts and the largest court-ordered water restriction in state history (at the time).

#### ***2012 to 2017 Drought***

California's latest drought set several records:

- The period from 2012 to 2014 ranked as the driest three consecutive years for statewide precipitation.
- 2014 set new climate records for statewide average temperatures and for record-low water allocations in the State Water Project and federal Central Valley Project.
- 2013 set minimum annual precipitation records for many communities.

On January 17, 2014 the governor declared a state of emergency for drought throughout California. This declaration followed release of a report that stated that California had had the least amount of rainfall in its 163-year history. Californians were asked to voluntarily reduce their water consumption by 20 percent. Drought conditions worsened into 2015.

On April 1, 2015, following the lowest snowpack ever recorded, the governor announced actions to save water, increase enforcement to prevent wasteful water use, streamline the state's drought response, and invest in new technologies to make California more drought resilient. The governor directed the State Water Resources Control

Board to implement mandatory water reductions in cities and towns across California to reduce water usage by 25 percent on average.

The drought ended with a wet water year of 2017—the second-wettest year on record in terms of statewide runoff, and wettest year of record in the Sacramento River Basin. Responding to the wet conditions, Executive Order B-40-17 in April 2017 terminated the statewide drought proclamation (California DWR, 2020).

### ***Current (2021) Drought***

The Marin County Board of Supervisors voted unanimously May 18, 2021, to declare a local drought emergency and acknowledge the imminent threat of disaster (Marin County, 2021). In July 2021, the state expanded its drought emergency declaration to include Marin County (McMillan, 2021). With reservoirs at historical lows, MMWD’s board of directors declared a water shortage emergency and adopted the following mandatory water use restrictions, with a goal of reducing water use districtwide by 40 percent (MMWD, 2021):

- Spray irrigation is limited to one day per week. Each community has a designated watering day. Spray irrigation on Saturday and Sunday is not allowed.
- Drip irrigation is limited to any two days per week.
- We recommend turning off your irrigation system and spot watering by hand, only when necessary. Spot watering can be done on any day of the week.
- Outdoor watering is prohibited between 9 a.m. and 7 p.m. to prevent evaporation.
- Covers are required for all pools and spas. Liquid pool covers are acceptable.
- Do not wash vehicles at home. Use a carwash that recycles water instead.
- Do not power wash homes or businesses.
- Do not wash driveways or sidewalks.
- Do not waste water. Flooding gutters is prohibited.
- Leaks must be fixed within 48 hours of being discovered.
- Garden hoses must have a shutoff nozzle.
- Golf course irrigation is restricted to greens and tees.
- Do not water grass on public medians.
- Do not use potable water for dust control, compaction, sewer flushing or street cleaning.
- Do not refill or top off decorative fountains.

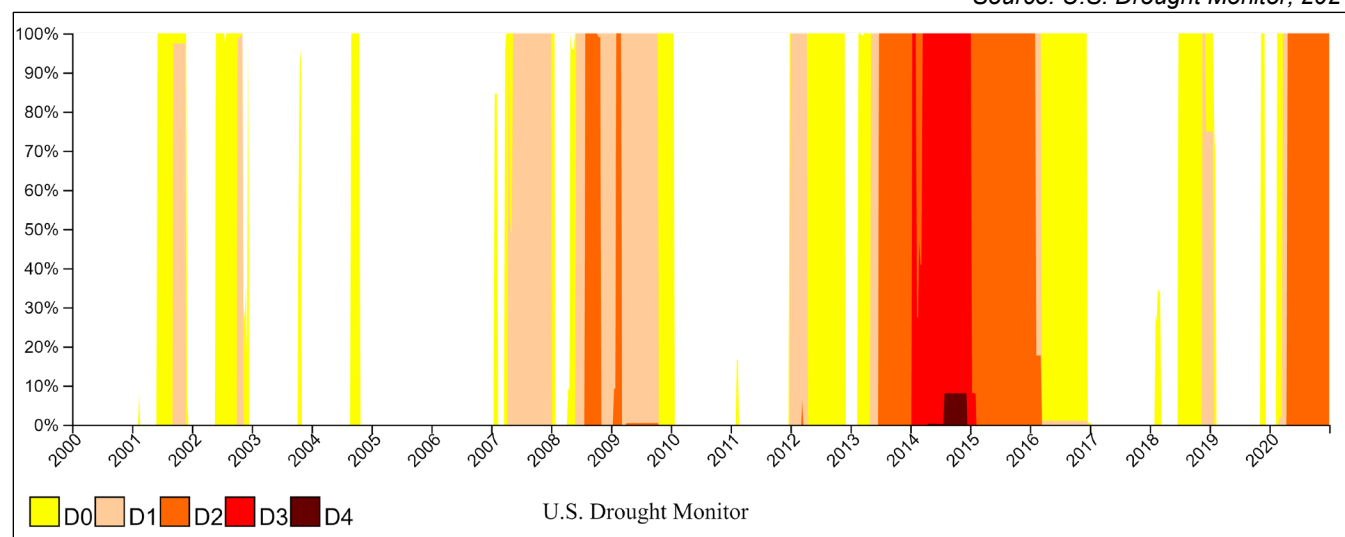
### **8.2.3 Location**

Drought is a regional phenomenon that has the potential to impact the entire planning area. A drought affects all aspects of the environment and the community simultaneously and has the potential to impact every person, directly or indirectly, in the planning area as well as adversely affect the local economy.

## 8.2.4 Frequency

Drought has a high probability of occurrence in the planning area. From January 2000 to December 2020, some part of Marin County experienced a USDM rating of D1 or higher in 411 out of 1,123 weeks—slightly more than 3 out of every 10 weeks (see Figure 8-3). Historical drought data for the planning area indicate there have been six significant multi-year droughts in the last 40 years (1980 to 2020), amounting to a severe drought every 6 to 7 years on average. As temperatures increase, the probability of future droughts will likely increase as well.

Source: U.S. Drought Monitor, 2021



**Figure 8-3. Percent of Marin County Affected by Each USDM Rating, 2000 – 2020**

## 8.2.5 Severity

### U.S. Drought Monitor Ratings

Marin County has a history of severe droughts. As shown in Figure 8-3, at least part of the county has experienced extreme (D3) or exceptional (D4) droughts more than once since 2000.

### Drought Impact Reporter

The National Drought Mitigation Center developed the Drought Impact Reporter in response to the need for a national drought impact database for the United States. Information comes from a variety of sources: on-line, drought-related news stories and scientific publications, members of the public who visit the website and submit a drought-related impact for their region, members of the media, and members of relevant government agencies. The Drought Impact Reporter contains information on 1,795 impacts from droughts that specifically affected Marin County from January 1970 through December 2020. The following are the categories and reported number of impacts (note that some impacts have been assigned to more than one category):

- Agriculture—419
- Business and Industry—104
- Energy—13

- Fire—265
- Plants and Wildlife—369
- Relief, Response, and Restrictions—642
- Society and Public Health—419
- Tourism and Recreation—127
- Water Supply and Quality—929

## 8.2.6 Warning Time

Predicting drought depends on the ability to forecast precipitation and temperature. Scientists at this time do not know how to predict drought more than a month in advance for most locations. Only generalized warning can take place due to the numerous variables that scientists have not pieced together well enough to make accurate and precise predictions.

Determination of when drought begins is based on impacts on water users and assessments of available water supply, including water stored in reservoirs or groundwater basins. Different water agencies have different criteria for defining drought. Some issue drought watch or drought warning announcements.

## 8.3 EXPOSURE AND VULNERABILITY

Drought produces a complex web of impacts that spans many sectors of the economy and reaches well beyond the area experiencing physical drought. This complexity exists because water is integral to the ability to produce goods and provide services. Drought can affect a wide range of economic, environmental, and social activities. The vulnerability of an activity to the effects of drought usually depends on its water demand, how the demand is met, and what water supplies are available to meet the demand.

All district assets would be exposed to some degree to the impacts of moderate to extreme drought conditions. No structures will be directly affected by drought conditions, though droughts can have significant impacts on landscapes. However, landscape impacts are not considered critical in planning for impacts from the drought hazard. Critical facilities as defined for this plan will continue to be operational during a drought.

## 8.4 DEVELOPMENT TRENDS

While droughts typically do not impact physical structures and assets, they could impact the supply of water. The demand for critical District services may increase with growth in the surrounding area. The State of California's adoption of bills expanding property owners' rights to build accessory dwelling units will increase densities in most the District's service area; areas that, as recently as 2020, were thought to be built out.

## 8.5 ISSUES

The planning team has identified the following drought-related issues:

- The vulnerability of the District to drought lies in the 75 percent of District supplies relying primarily on rainfall and consumption. The District should consider identifying the creation of regional interties, which is a state priority, as an effective mitigation of this issue

- 
- Identification and development of alternative water supplies such as the capture and storage of stormwater runoff, and expansion of the District's recycled water program
  - Create regional partnerships to utilize groundwater recharge techniques to stabilize the groundwater supply
  - The probability of increased drought frequencies and durations due to climate change
  - The promotion of active water conservation even during non-drought periods
  - Public education on water conservation



## 9. EARTHQUAKE

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### 9.1 GENERAL BACKGROUND

An earthquake is the vibration of the earth's surface following a release of energy in the earth's crust. This energy can be generated by a sudden dislocation of the crust or by a volcanic eruption. Most destructive quakes are caused by dislocations of the crust. The crust may first bend and then, when the stress exceeds the strength of the rocks, break and snap to a new position. In the process of breaking, vibrations called "seismic waves" are generated. These waves travel outward from the source of the earthquake at varying speeds.

#### 9.1.1 Earthquake Location

The location of an earthquake is commonly described by its focal depth and the geographic position of its epicenter. The focal depth of an earthquake is the depth from the Earth's surface to the region where an earthquake's energy originates (the focus or hypocenter). The epicenter of an earthquake is the point on the Earth's surface directly above the hypocenter.

#### 9.1.2 Earthquake Geology

##### Tectonic Plates

The Earth's crust, which is the rigid outermost shell of the planet, is broken into seven or eight major tectonic plates (depending on how they are defined) and many minor plates. Where the plates meet, they move in one of three ways along their mutual boundary: convergent (two plates moving together), divergent (two plates moving apart), or transform (two plates moving parallel to one another). Earthquakes, volcanic activity, mountain-building, and oceanic trench formation occur along these plate boundaries. Subduction is a geological process that takes place at convergent boundaries of tectonic plate, in which one plate moves under another. Regions where this process occurs are known as subduction zones, and they have the potential to generate highly damaging earthquakes.

California is seismically active because of movement of the North American Plate, east of the San Andreas Fault, and the Pacific Plate to the west, which includes the state's coastal communities. The transform (parallel) movement of these tectonic plates against one another creates stresses that build as the rocks are gradually deformed. The rock deformation, or strain, is stored in the rocks as elastic strain energy. When the strength of the rock is exceeded, rupture occurs along a fault. The rocks on opposite sides of the fault slide past each other as they spring back into a relaxed position. The strain energy is released partly as heat and partly as elastic waves called seismic waves. The passage of these seismic waves produces the ground shaking in earthquakes.



## **Faults**

Geologists have found that earthquakes reoccur along faults, which are zones of weakness in the earth's crust. When a fault experiences an earthquake, there is no guarantee that all the stress has been relieved. Another earthquake can still occur. In fact, relieving stress along one part of a fault may increase it in another part.

Faults are more likely to have future earthquakes on them if they have more rapid rates of movement, have had recent earthquakes along them, experience greater total displacements, and are aligned so that movement can relieve the accumulating tectonic stresses. Geologists classify faults by their relative hazards. "Active" faults, which represent the highest hazard, are those that have ruptured to the ground surface during the Holocene period (about the last 11,000 years). "Potentially active" faults are those that displaced layers of rock from the Quaternary period (the last 1,800,000 years) (California Department of Conservation, 2003).

Determining if a fault is "active" or "potentially active" depends on geologic evidence, which may not be available for every fault. The majority of the seismic hazards are on well-known active faults. However, inactive faults, where no displacements have been recorded, also have the potential to reactivate or experience displacement along a branch sometime in the future. An example of a fault zone that has been reactivated is the Foothills Fault Zone. The zone was considered inactive until evidence of an earthquake (approximately 1.6 million years ago) was found near Spenceville, California. Then, in 1975, an earthquake occurred on another branch of the zone near Oroville, California (now known as the Cleveland Hills Fault). The State Division of Mines and Geology indicates that increased earthquake activity throughout California may cause tectonic movement along currently inactive fault systems.

### **9.1.3 Earthquake Classifications**

Earthquakes are typically classified in one of two ways: By the amount of energy released, measured as magnitude; or by the impact on people and structures, measured as intensity.

#### **Magnitude**

An earthquake's magnitude is a measure of the energy released at the source of the earthquake. Magnitude is commonly expressed by ratings on the moment magnitude scale ( $M_w$ ), the most common scale used today (USGS, 2017a). This scale is based on the total moment release of the earthquake (the product of the distance a fault moved and the force required to move it). The scale is as follows:

- Great— $M_w > 8$
- Major— $M_w = 7.0 - 7.9$
- Strong— $M_w = 6.0 - 6.9$
- Moderate— $M_w = 5.0 - 5.9$
- Light— $M_w = 4.0 - 4.9$
- Minor— $M_w = 3.0 - 3.9$
- Micro— $M_w < 3$

#### **Intensity**

The most commonly used intensity scale is the modified Mercalli intensity scale. Ratings of the scale as well as the perceived shaking and damage potential for structures are shown in Table 9-1. The modified Mercalli intensity scale is generally represented visually using shake maps, which show the expected ground shaking at any given location produced by an earthquake with a specified magnitude and epicenter.

**Table 9-1. Mercalli Scale and Peak Ground Acceleration Comparison**

Modified Mercalli Scale	Perceived Shaking	Potential Structure Damage		Estimated PGA <sup>a</sup> (%g)
		Resistant Buildings	Vulnerable Buildings	
I	Not Felt	None	None	<0.17%
II-III	Weak	None	None	0.17% – 1.4%
IV	Light	None	None	1.4% – 3.9%
V	Moderate	Very Light	Light	3.9% – 9.2%
VI	Strong	Light	Moderate	9.2% – 18%
VII	Very Strong	Moderate	Moderate/Heavy	18% – 34%
VIII	Severe	Moderate/Heavy	Heavy	34% – 65%
IX	Violent	Heavy	Very Heavy	65% – 124%
X – XII	Extreme	Very Heavy	Very Heavy	>124%

a. PGA measured in percent of g, where g is the acceleration of gravity

Sources: USGS, 2008; USGS, 2010

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 shake map shows the variation of ground shaking in a region immediately following significant earthquakes (for technical information about shake maps see USGS, 2018).

### 9.1.4 Ground Motion

Earthquake hazard assessment is also based on expected ground motion. During an earthquake when the ground is shaking, it also experiences acceleration. The peak acceleration is the largest increase in velocity recorded by a particular station during an earthquake. Estimates are developed of the annual probability that certain ground motion accelerations will be exceeded; the annual probabilities can then be summed over a time period of interest.

The most commonly mapped ground motion parameters are horizontal and vertical peak ground accelerations (PGA) for a given soil type. PGA is a measure of how hard the earth shakes, or accelerates, in a given geographic area. Instruments called accelerographs record levels of ground motion due to earthquakes at stations throughout a region. PGA is measured in multiples of “g” (the acceleration due to gravity) or expressed as a percent acceleration force of gravity (%g). These readings are recorded by state and federal agencies that monitor and predict seismic activity.

Maps of PGA values form the basis of seismic zone maps that are included in building codes such as the International Building Code. Building codes that include seismic provisions specify the horizontal force due to lateral acceleration that a building should be able to withstand during an earthquake. PGA values are directly related to these lateral forces that could damage “short period structures” (e.g. single-family dwellings). Longer period response components determine the lateral forces that damage larger structures with longer natural periods (apartment buildings, factories, high-rises, bridges).

## 9.1.5 U.S. Geological Survey 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 the 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 Map**

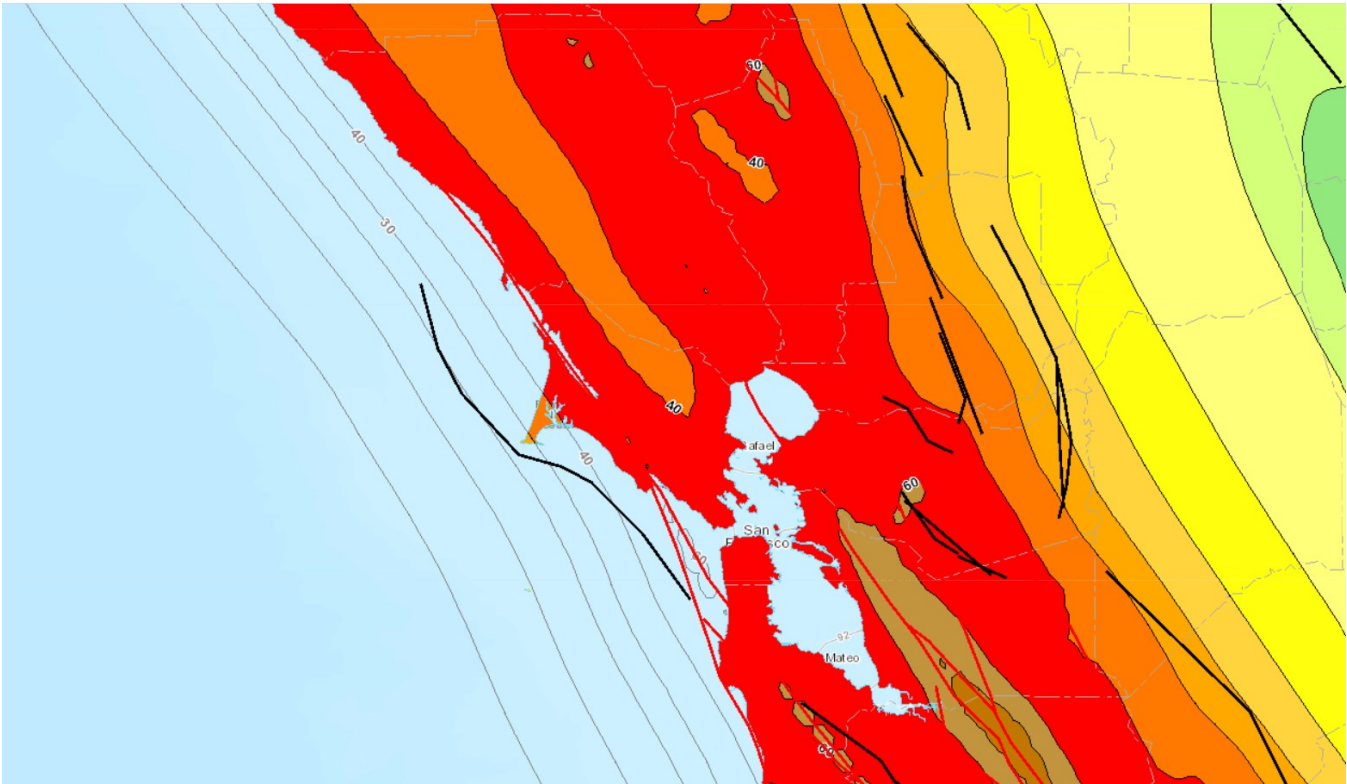
National probabilistic maps of earthquake shaking hazards have been produced since 1948. The USGS last updated its National Seismic Hazard Maps in 2018, incorporating the best available seismic, geologic, and geodetic information on earthquake rates and associated ground shaking. The map produced for this update included maps of the PGA expected at various probability levels of different soil types. Figure 9-1 shows the peak ground acceleration with 10 percent probability of exceedance in 50 years. This level of ground shaking has been used for designing buildings in high seismic areas.

The National Seismic Hazard Maps provide information essential to creating and updating seismic design requirements for building codes, insurance rate structures, earthquake loss studies, retrofit priorities and land use planning used in the U.S. Scientists frequently revise these maps to reflect new information and knowledge. Buildings, bridges, highways and utilities built to meet modern seismic design requirements are typically able to withstand earthquakes better, with less damage and disruption. After thorough review of the studies, professional organizations of engineers update the seismic-risk maps and seismic design requirements contained in building codes (USGS, 2001).

## 9.1.6 Liquefaction and Soil Types

Soil liquefaction occurs when water-saturated sands, silts or gravelly soils are shaken so violently that the individual grains lose contact with one another and float freely in the water, turning the ground into a pudding-like liquid. Building and road foundations lose load-bearing strength and may sink into what was previously solid ground.

Source: USGS, 2021



**Figure 9-1. Peak Acceleration (%g) with 10% Probability of Exceedance in 50 Years in Central California**

A program called the National Earthquake Hazard Reduction Program (NEHRP) creates maps based on soil characteristics to help identify locations subject to liquefaction. Table 9-2 summarizes NEHRP soil classifications. NEHRP Soils B and C typically can sustain ground shaking without much effect, dependent on the earthquake magnitude. The areas that are commonly most affected by ground shaking have NEHRP Soils D, E and F. In general, these areas are also most susceptible to liquefaction.

**Table 9-2. NEHRP Soil Classification System**

NEHRP Soil Type	Description	Mean Shear Velocity to 30 meters (m/s)
A	Hard Rock	1,500
B	Firm to Hard Rock	760-1,500
C	Dense Soil/Soft Rock	360-760
D	Stiff Soil	180-360
E	Soft Clays	< 180
F	Special Study Soils (liquefiable soils, sensitive clays, organic soils, soft clays >36 meters thick)	

Soil liquefaction maps are useful tools to assess potential damage from earthquakes. In general, areas with NEHRP Soils D, E and F are also susceptible to liquefaction. If there is a dry soil crust, excess water will sometimes come to the surface through cracks in the confining layer, bringing liquefied sand with it, creating sand boils. This is a vital need for assessing seismic risk within the planning area. Liquefaction data tracks with where NEHRP soil data is available.

### 9.1.7 Potential Damage

Earthquakes can last from a few seconds to over five minutes; they may also occur as a series of tremors over several days. The actual movement of the ground in an earthquake is seldom the direct cause of injury or death. Casualties generally result from falling objects and debris as the shocks shake buildings and other structures. Soil liquefaction can undermine building and road foundations.

Disruption of communications, electrical power supplies and gas, sewer and water lines should be expected. Earthquakes may trigger fires, dam failures, landslides, or releases of hazardous material, compounding their disastrous effects.

The severity of a seismic event is correlated to the stability of the ground close to the epicenter. A poorly built structure on a stable site is more likely to survive a large earthquake than a well-built structure on an unstable site.

### 9.1.8 Secondary Hazards

Earthquakes can cause large and sometimes disastrous landslides and mudslides. River valleys are vulnerable to slope failure, often as a result of loss of cohesion in clay-rich soils. Soil liquefaction occurs when water-saturated sands, silts or gravelly soils are shaken so violently that the individual grains lose contact with one another and float freely in the water, turning the ground into a pudding-like liquid. Building and road foundations lose load-bearing strength and may sink into what was previously solid ground. Unless properly secured, hazardous materials can be released, causing significant damage to the environment and people. Earthen dams and levees are highly susceptible to seismic events and the impacts of their eventual failures can be considered secondary risks for earthquakes.

Earthquakes can also trigger tsunamis. Tsunamis significantly damage many locations beyond where the earthquake struck. Coastal communities near the earthquake epicenter that are also vulnerable to tsunamis could experience devastating impacts. Additionally, fires can result from gas lines or power lines that are broken or downed during the earthquake. It may be difficult to control a fire, particularly if the water lines feeding fire hydrants are also broken.

According to the USGS Earthquake Hazards Program, an earthquake hazard is anything associated with an earthquake that may affect resident's normal activities. This includes the following:

- **Surface Faulting**—Displacement that reaches the earth's surface during slip along a fault. Commonly occurs with shallow earthquakes, those with an epicenter less than 20 kilometers.
- **Ground Motion (shaking)**—The movement of the earth's surface from earthquakes or explosions. Ground motion or shaking is produced by waves that are generated by sudden slip on a fault or sudden pressure at the explosive source and travel through the earth and along its surface.
- **Landslide**—A movement of surface material down a slope.
- **Liquefaction**—A process by which water-saturated sediment temporarily loses strength and acts as a fluid. Earthquake shaking can cause this effect.
- **Tectonic Deformation**—A change in the original shape of a material due to stress and strain.
- **Tsunami**—A sea wave of local or distant origin that results from large-scale seafloor displacements associated with large earthquakes, major submarine slides, or violent underwater volcanic eruptions.

## 9.2 HAZARD PROFILE

### 9.2.1 Past Events

Marin County has been included in one FEMA declaration for earthquakes: the October 17, 1989, Loma Prieta Earthquake (DR-845). Table 9-3 lists earthquakes of magnitude 5.0 or greater within a 100-mile radius of the planning area.

**Table 9-3. Earthquakes Magnitude 5.0 or Larger Within 100-Mile Radius of the Planning Area**

Date	Magnitude	Epicenter Location
August 1, 1975	5.7	SSE of Oroville, California
August 2, 1975	5.1, 5.2	NW of the Salton Sea, California
January 24, 1980	5.8, 5.1	N of Livermore, California
January 27, 1980	5.4	Livermore, California
October 17, 1989	6.9	Loma Prieta, California
August 24, 2014	6.02	NNW of South Napa, California
August 10, 2016	5.09	Salton Sea, California
December 14, 2016	5.01	NW of The Geysers, California

Source: Northern California Earthquake Data Center, 2021

The 1989 Loma Prieta Earthquake was the most recent damaging earthquake event affecting Northern California. The epicenter was on the San Andreas fault 56 miles south of San Francisco and 10 miles northeast of Santa Cruz, near Mt. Loma Prieta in the Santa Cruz Mountains. The focal depth was 11 miles (typical California earthquake focal depths are 4 to 6 miles). The earthquake ruptured the southernmost 30 miles of the break that caused the 1906 San Francisco Earthquake. Its magnitude was established at 6.9 after consultation with monitoring stations around the world (CA DOC, 2021).

The Loma Prieta quake was felt as far away as San Diego and western Nevada. Thousands of aftershocks were recorded. A magnitude 5.2 aftershock occurred 2.5 minutes after the main shock. In the following week, 20 aftershocks of magnitude 4.0 or greater were recorded, as well as more than 300 of magnitude 2.5 or greater. The aftershock zone stretched 25 miles, from north of Los Gatos near Highway 17 to south of Watsonville near Highway 101 (CA DOC, 2021). The quake caused damage to water system facilities around the Bay Area, including the Rinconada Water Treatment Plant and storage tanks that were damaged by sloshing.

In total, 63 people were killed, 3,757 were reported injured and 12,053 were displaced. Damage and business interruption estimates reached as high as \$10 billion, with direct damage estimated at \$6.8 billion. The earthquake caused damage to 18,306 houses and 2,575 businesses and destroyed 963 houses and 147 businesses. The most notable damage included the collapse of the elevated Cypress Structure section of Interstate 880 in Oakland, the collapse of a section of roadbed on the Bay Bridge, and extensive damage to downtown Santa Cruz and San Francisco's Marina District. The Bay Bridge was unusable for a month. The World Series between the San Francisco Giants and Oakland A's was postponed (CA DOC, 2021).



## 9.2.2 Location

### **Faults**

Earthquakes are considered a major threat to Marin County due to the proximity of several fault zones, notably including the Hayward Fault and the San Andreas Fault Zone. Figure 9-2 shows large faults that could affect Marin County. A significant earthquake along one of the major faults could cause substantial casualties, extensive damage to buildings, roads and bridges, fires, and other threats to life and property. The effects could be aggravated by aftershocks and by secondary effects such as fire, landslide, and dam failure. A major earthquake could be catastrophic in its effect on the population and could exceed the response capability of the local communities and even the State. The following section describe major faults near the planning area.

#### ***Hayward Fault***

The Hayward Fault runs along the foot of the East Bay hills. Its last major earthquake occurred on October 21, 1868, destroying downtown Hayward, killing 5 people, and injuring an additional 30. With an estimated magnitude of 6.8, it caused damage throughout the area. San Francisco suffered about \$350,000 in property damage and it was considered the “Great Earthquake” until the San Francisco Earthquake in 1906.

Scientists studying past earthquakes on the Hayward fault have found that the most recent five major earthquakes on the fault happened on average every 140 years. Since it has been more than 144 years since the last major earthquake, it is statistically likely that the Hayward fault will rupture and produce a significant earthquake within the next 30 years (UC Berkeley, 2018).

#### ***North San Andreas Fault***

The San Andreas fault system is more than 800 miles long, at depths of at least 10 miles below ground. The San Andreas fault forms a continuous narrow break in the Earth’s crust that extends from northern California southward to Cajon Pass near San Bernardino. Southeastward from Cajon Pass, several branching faults, including the San Jacinto and Banning faults, share the movement of the crustal plates. In this stretch of the fault zone, the name “San Andreas” generally is applied to the northeastern most branch (Schulz and Wallace, 2021).

Mapping along the San Andreas fault between San Francisco and Cape Mendocino has revealed that many strands of the fault are active. Uplifts within the fault interrupt sediment movement in several locations and help control the shape of the coast. Sediment-filled basins can amplify ground motion and shaking in an earthquake, Fault strands can indicate possible fault movement along other branches, making it challenging to calculate slip rates.

Near Bodega Bay, the main San Andreas fault is currently about 2,600 feet west of its previously mapped location. Adjacent to the fault, strong ground motions have generated significant seafloor failures on the gently sloping shelf. Such areas are important to avoid when placing offshore structures. Farther north, USGS mapped the offshore section of the San Andreas for the first time in detail from where it goes offshore at Cape Arena to its termination at the junction of three tectonic plates off Cape Mendocino, California (USGS, 2021).

#### ***San Gregorio North Fault***

The San Gregorio fault zone is the principal tectonic structure west of the San Andreas fault in the coastal region between Monterey Bay and Bolinas Lagoon. The fault is primarily offshore, with strands intersecting the coastline at only two locations: between Pt. Año Nuevo and San Gregorio, and between Pillar Point and Moss Beach.



Source: California Earthquake Authority, 2020



Figure 9-2. Earthquake Fault Zones in the Bay Area

The San Gregorio fault zone is the northern part of a system of coast-parallel strike-slip faults extending from Monterey Bay to a northern terminus about 12 miles northwest of San Francisco, near Bolinas Bay, where the San Gregorio intersects the San Andreas Fault. The southern part of the system includes the Sur, San Simeon, and Hosgri faults. Because the fault zone is complex and lies primarily offshore, its rate of deformation and relative components of strike, slip, oblique slip, and/or reverse slip remain poorly understood (Simpson et al., 1997).

### **West Napa Fault Zone**

The West Napa fault zone is a 20-mile-long fault parallel to the western margin of the Napa Valley that extends to the southeast along the eastern margin of marshlands bordering northeastern San Pablo Bay. The fault has been mapped as a late Pleistocene-Holocene active fault, with the southern part zoned as an Alquist-Priolo Earthquake Fault Zone. The fault is inferred to be predominantly a right-slip fault based on its geomorphic expression and its north-northwest trend, which is roughly parallel to major right-slip faults of the San Andreas fault system (Wesling & Hanson, 2006).

### **Susceptible Areas**

Although the intensity of an earthquake is not likely to vary significantly across the planning area, impacts can vary based on local soil characteristics. The areas that are commonly most affected by ground shaking have NEHRP Soils D, E and F. NEHRP soil classifications in the planning area are shown on Figure 9-3. Risk is similarly increased in areas of mapped liquefaction susceptibility. These areas are shown on Figure 9-4.

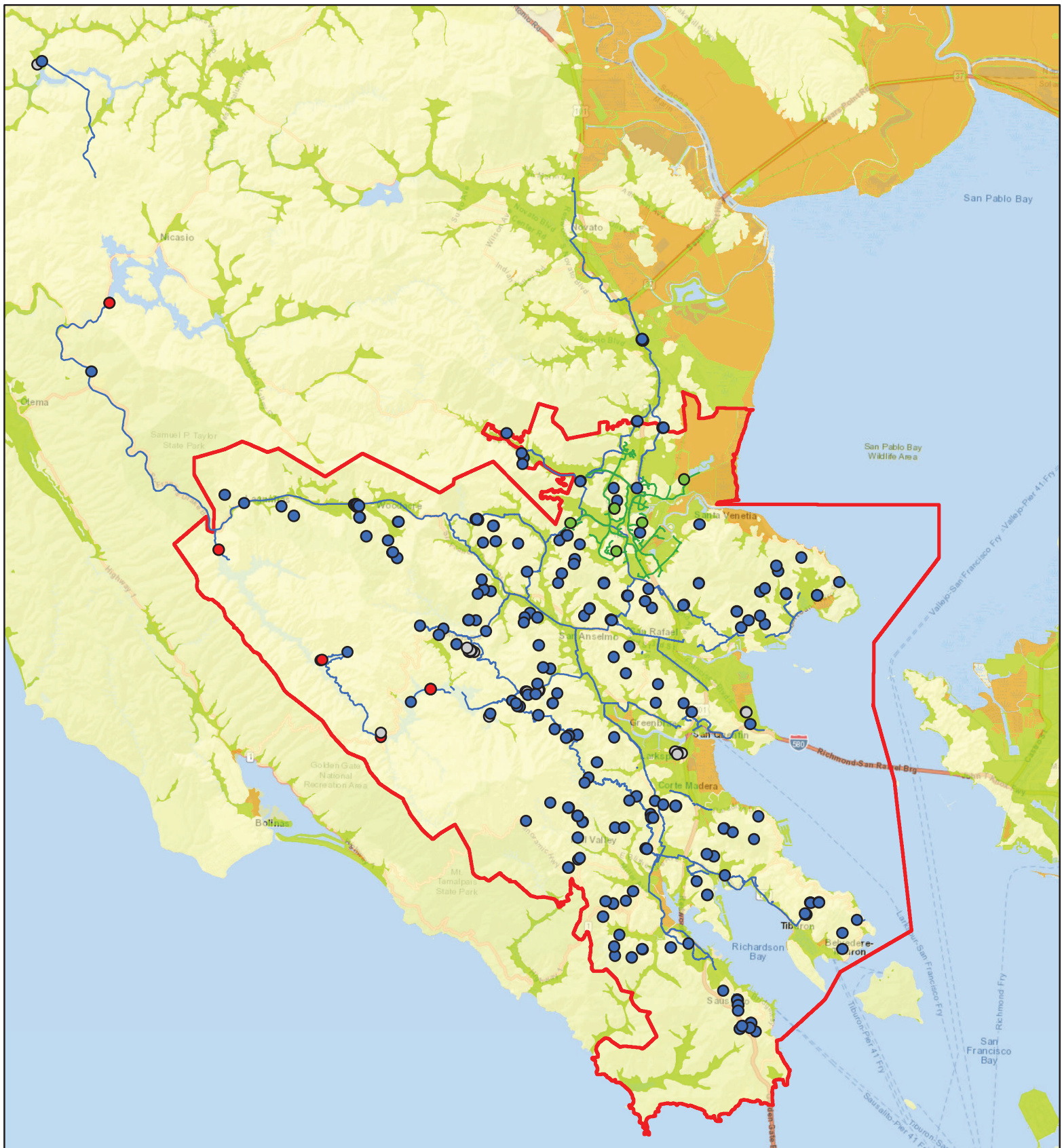
### **9.2.3 Severity**

USGS probabilistic mapping is an indication of potential earthquake intensity in an area. Figure 9-1 shows the intensity with a 10-percent exceedance chance in 50 years in Northern California. For the District service area, this PGA is in the approximate range of 0.3g (see Section 9.1.4 for an explanation of PGA).

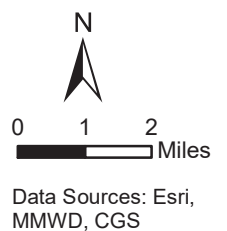
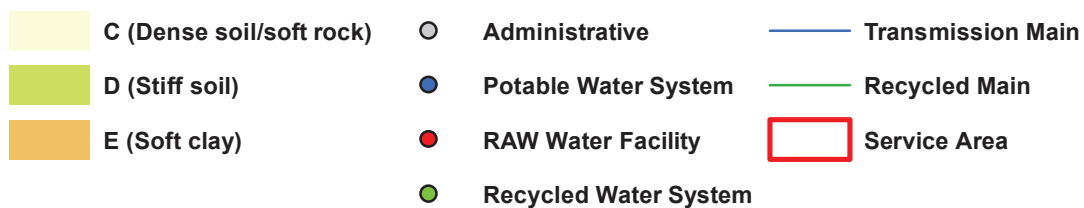
Intensity also is shown in locally specific ShakeMaps. Intensity for four ShakeMap scenarios, as described in Table 9-4, is shown on Figure 9-5 through Figure 9-8. Figure 9-9 shows the fault rupture plains for these ShakeMap scenario earthquakes.

**Table 9-4. ShakeMap Scenarios Used for This Risk Assessment**

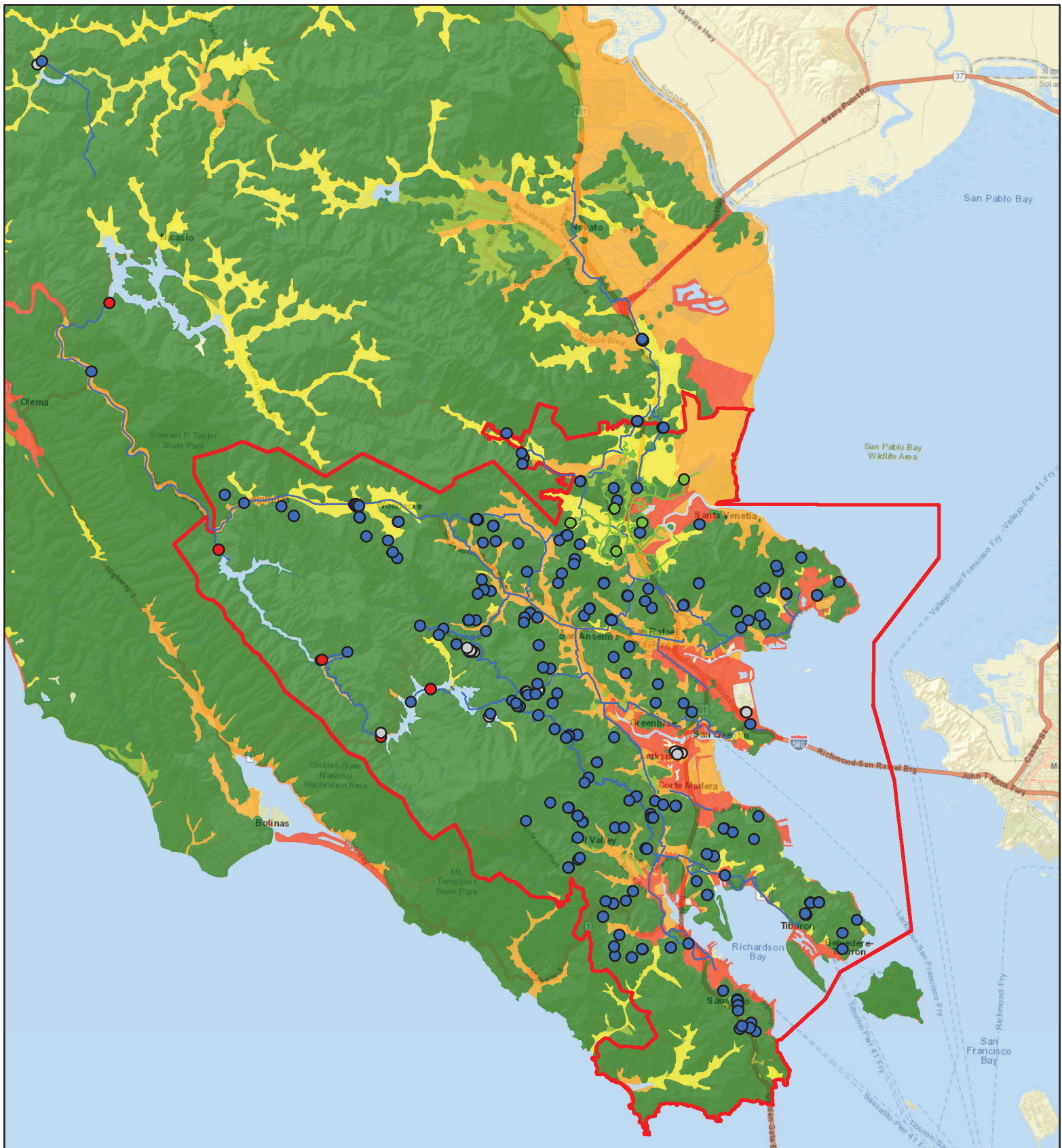
<b>Affected Fault</b>	<b>Magnitude</b>	<b>Focal Depth (miles)</b>	<b>Epicenter Location</b>	<b>Map Figure</b>
<b>Hayward/Rodgers Creek</b>	7.58	7.5 km	North Richmond (N37.99, W122.34)	Figure 9-5
<b>North San Andreas</b>	7.88	6.6 km	4 miles west of Alpine Lake (N37.93, W122.70)	Figure 9-6
<b>San Gregorio North</b>	7.44	7.0 km	4 miles south of Half Moon Bay (N37.41, W122.43)	Figure 9-7
<b>West Napa</b>	6.97	8.1 km	5 miles northwest of Central Napa (N38.33, W122.37)	Figure 9-8



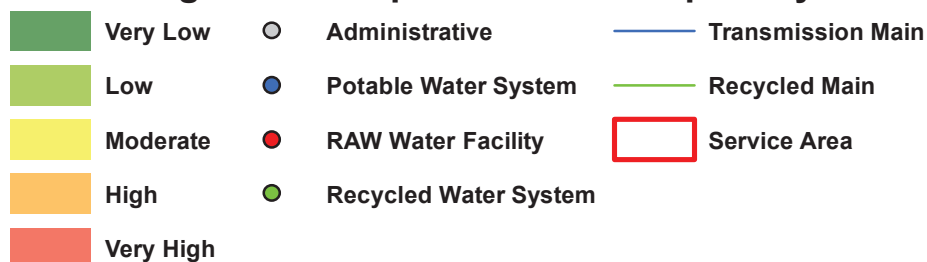
**Figure 9-3. NEHRP Soil Class**





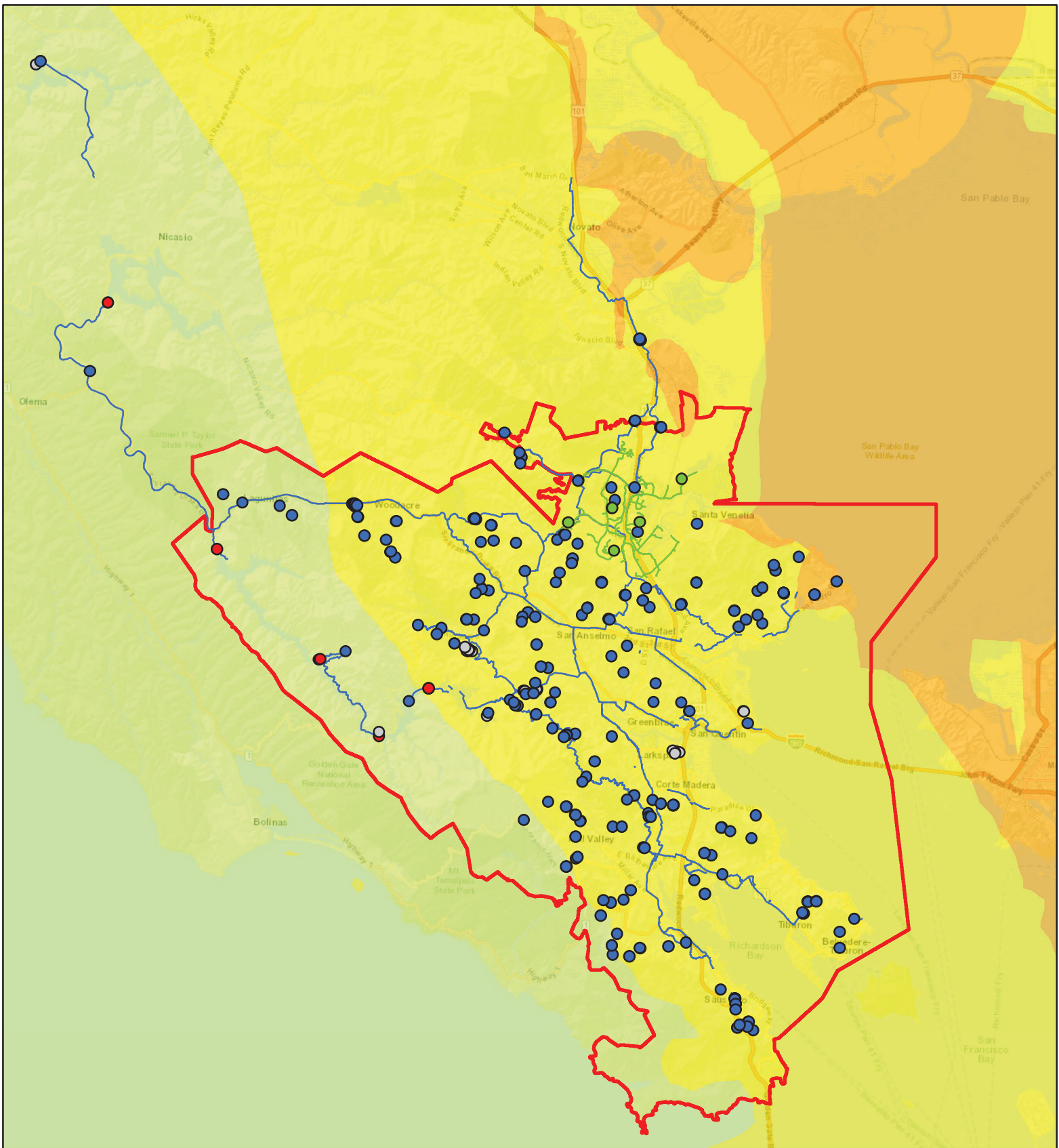


**Figure 9-4. Liquefaction Susceptibility**



Data Sources: Esri,  
MMWD





**Figure 9-5. Hayward M7.58 Earthquake Scenario**

**Mercalli Intensity Scale**

VI (Strong/Light)

VII (Very Strong/Moderate)

VIII (Severe/Moderate-Heavy)

Intensity scale described as: (perceived shaking / potential damage)

○ Administrative

● Potable Water System

● RAW Water Facility

● Recycled Water System

— Transmission Main

— Recycled Main

□ Service Area

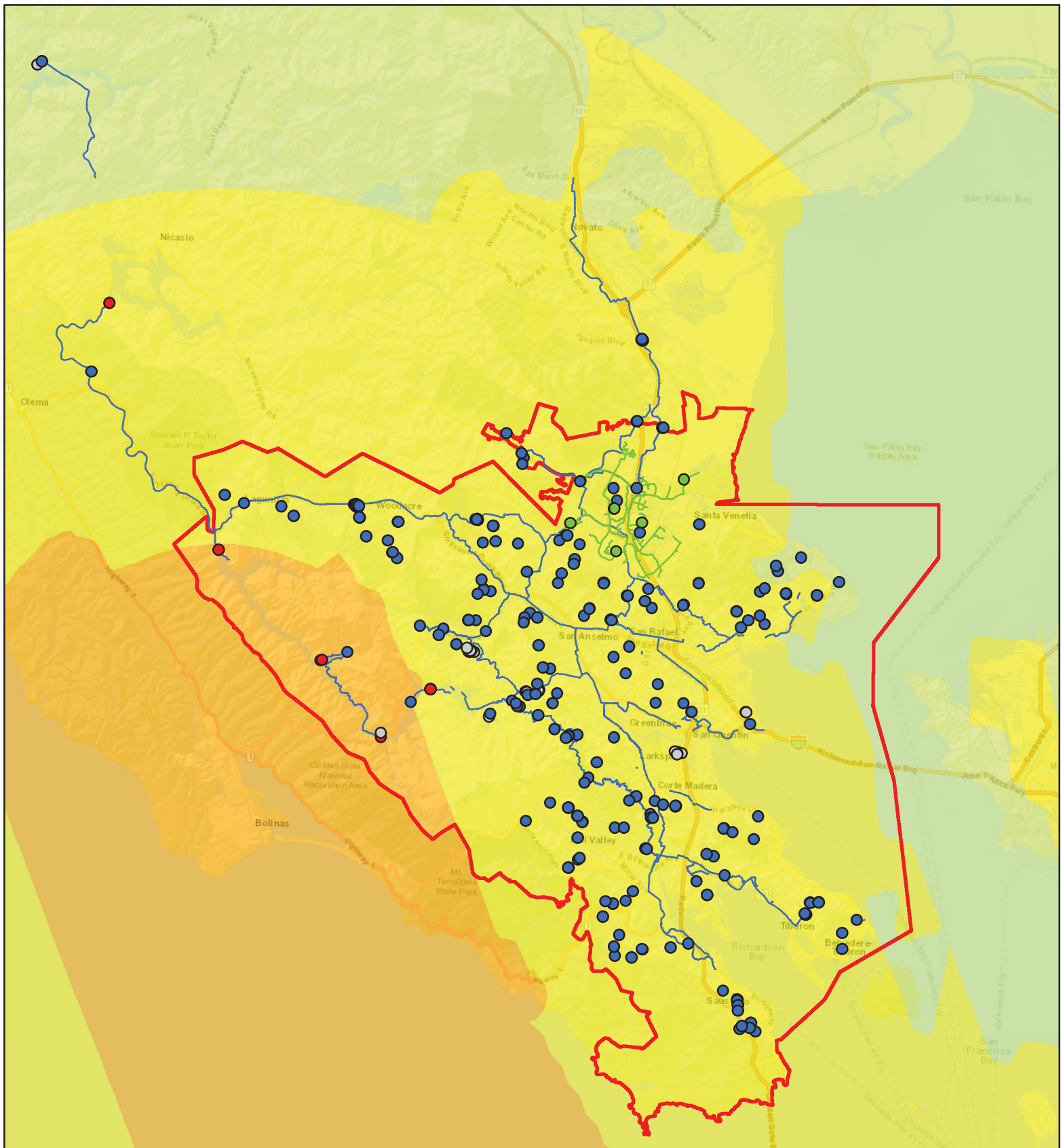


0 1 2  
Miles

Data Sources: Esri,  
MMWD, USGS

Intensity scale described as: (perceived shaking / potential damage)





**Figure 9-7. San Gregorio North M7.44 Earthquake Scenario**

**Mercalli Intensity Scale**

VI (Strong/Light)

VII (Very Strong/Moderate)

VIII (Severe/Moderate-Heavy)

Intensity scale described as: (perceived shaking / potential damage)

○ Administrative

● Potable Water System

● RAW Water Facility

● Recycled Water System

— Transmission Main

— Recycled Main

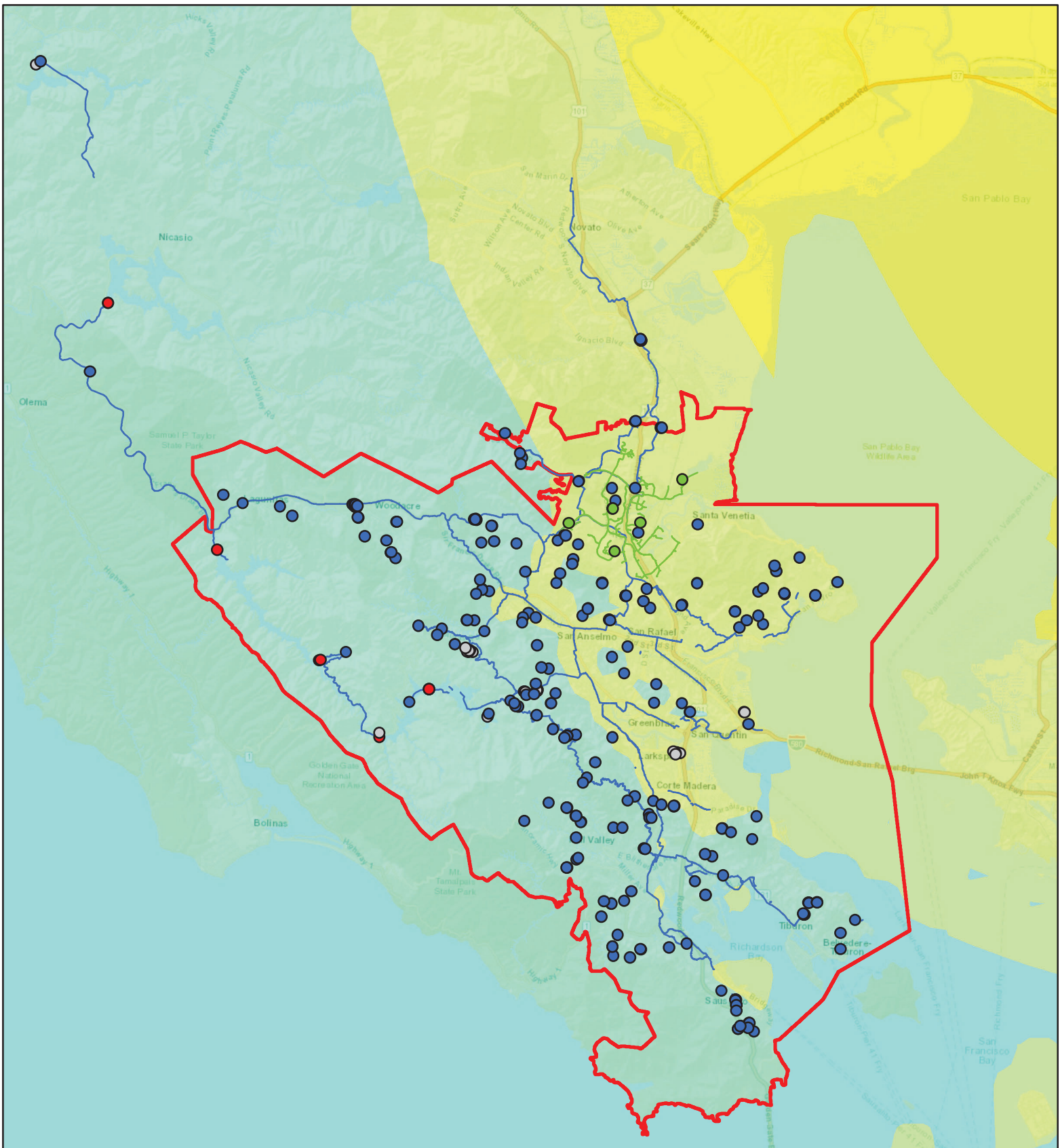
□ Service Area



0 1 2  
Miles

Data Sources: Esri,  
MMWD, USGS





**Figure 9-8. West Napa M6.97 Earthquake Scenario**

**Mercalli Intensity Scale**

V (Moderate/Very Light)

VI (Strong/Light)

VII (Very Strong/Moderate)

Intensity scale described as: (perceived shaking / potential damage)



Administrative



Potable Water System



RAW Water Facility



Recycled Water System

Transmission Main

Recycled Main

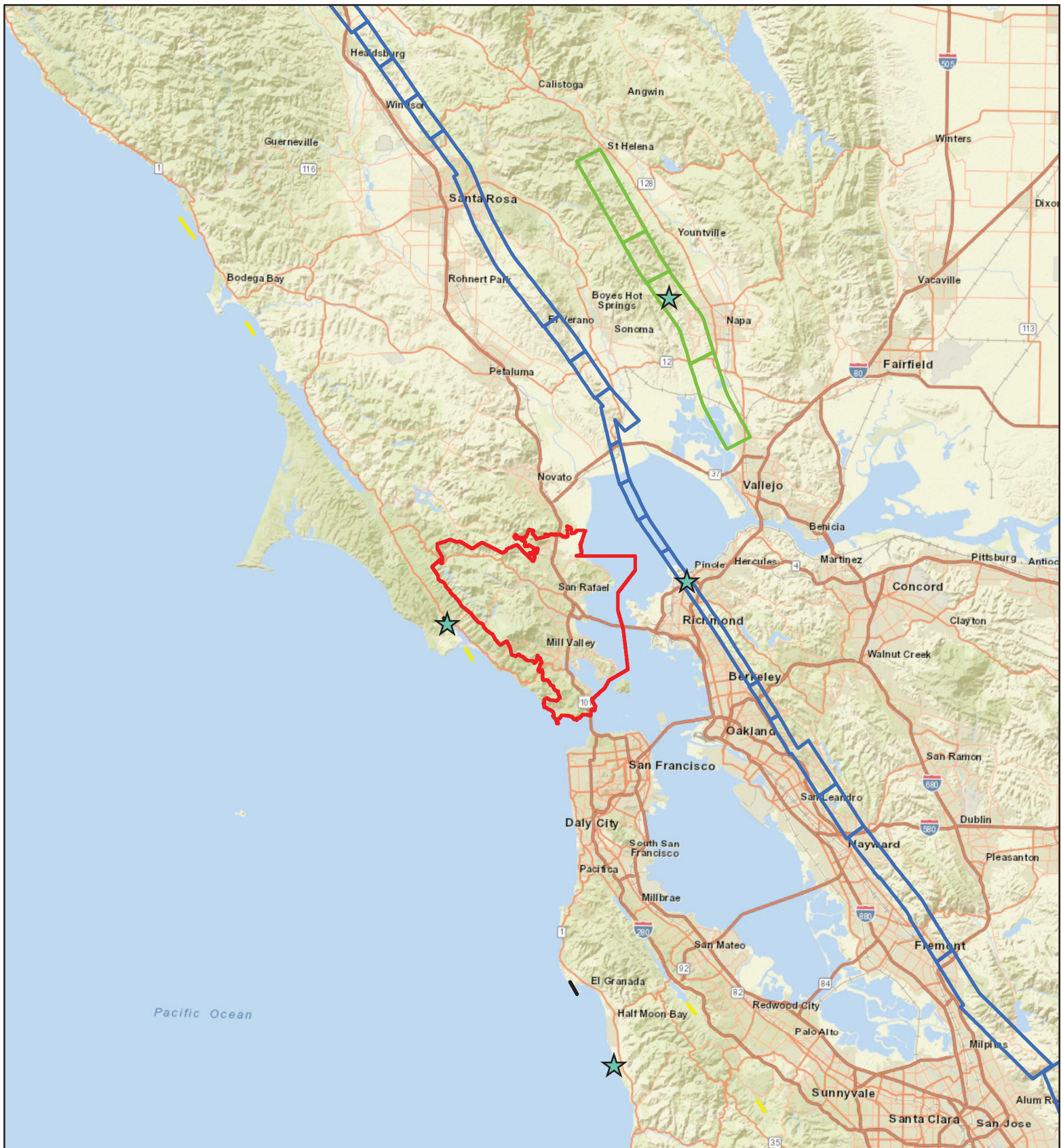
Service Area



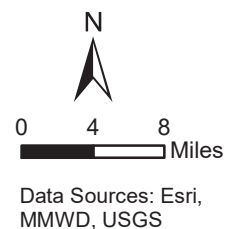
0 1 2 Miles

Data Sources: Esri, MMWD, USGS





**Figure 9-9. Fault Rupture Planes for ShakeMap Scenario Events**



## 9.2.4 Frequency

Seismic activity in the Bay Area was more frequent from 1830 to 1930 than it has been since. This leads some scientists to suspect that pressure is building 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. In 2008, the USGS concluded that there is a 63 percent probability of at least one M6.7 or greater earthquake striking in the San Francisco Bay region before 2032, a 31 percent chance along the Hayward/Rodgers Creek fault, and a 21 percent chance of occurrence along the Northern San Andreas Fault. Figure 9-10 illustrates this analysis. An earthquake of this magnitude on either of these fault systems could result in serious damage to buildings, facilities, and infrastructure in densely populated areas of the Bay Area.

In March 2015, the USGS released updated earthquake probabilities using the Uniform California Earthquake Rupture Forecast 3 (UCERF3) model. In the updated analysis, the USGS estimates there is a 72 percent chance of at least one earthquake of M 6.7 or larger in the next 30 years on one of the Bay Area's faults. This new analysis changed the probability along the San Andreas Fault to 33 percent and lowered the Rodgers Creek Fault to 15 percent. Smaller magnitude earthquakes are more likely to occur, potentially producing significant local damage. The results of the USGS 2015 earthquake probability assessment are summarized in Table 9-5.

Change in probabilities is attributed to the impacts of the 2014 South Napa earthquake, which is thought to have relieved pressure in some areas; and the segment lengths considered between 2008 and 2015. For instance, the 2008 study assessed probabilities along the Northern San Andreas Fault while the 2015 study looked at the entire length of the San Andreas Fault. The 2008 report considered Hayward and Rodgers Creek faults together, while the 2015 report addressed them separately.

**Table 9-5. Likelihood of an Earthquake of M6.7 or Greater Over the Next 30 Years**

Earthquake Fault	Probability of M6.7 or Greater Earthquake Over the Next 30 Years
San Andreas (Mendocino Coast to San Benito County)	33%
Hayward	28%
Calaveras	24%
Hunting Creek, Berryessa, Green Valley, Concord	24%
Maacama	23%
Rodgers Creek	15%
San Gregorio	5%
Greenville	6%
Mt. Diablo	3%
West Napa	2%

Source: Uniform Earthquake Rupture Forecast, Version 3, 2014

The UCERF3 also defined the following recurrence intervals for the earthquake scenarios used for the risk assessment in this hazard mitigation plan:

- Hayward/Rodgers Creek M7.58 recurrence interval = 168 years
- North San Andreas M7.88 recurrence interval = 160 years
- San Gregorio North M7.44 recurrence interval = 481 years
- West Napa, M6.97 recurrence interval = 1,508 years





## 9.2.5 Warning Time

There is no current reliable way to predict the day or month that an earthquake will occur at any given location. Research is being done with warning systems that use the low energy waves that precede major earthquakes. These potential warning systems would give approximately 40 seconds notice that a major earthquake is about to occur. The warning time is very short, but it could allow for someone to get under a desk, step away from a hazardous material, or shut down a computer system.

## 9.3 EXPOSURE

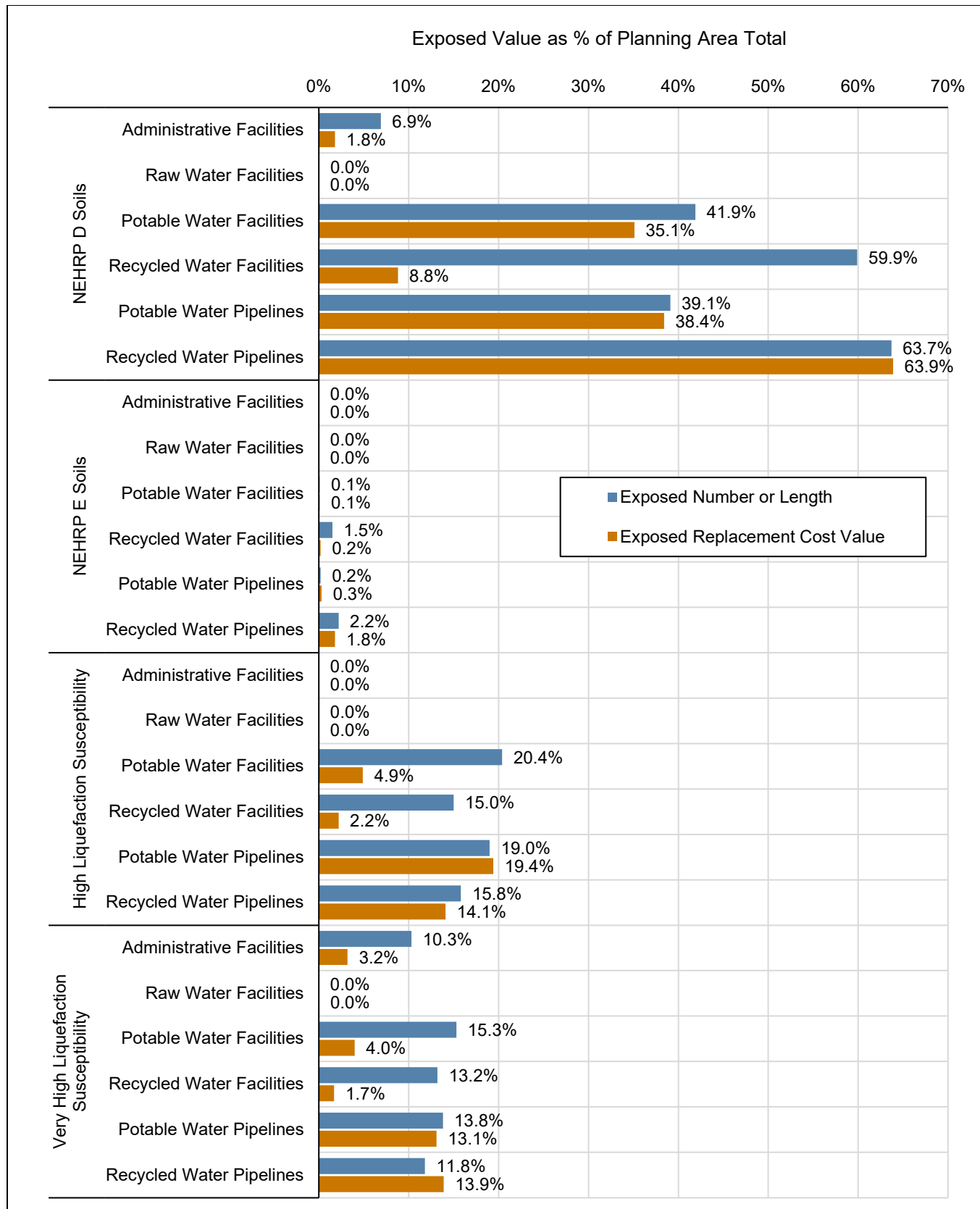
The risk assessment for earthquake determined District assets that lie within mapped liquefaction areas or areas of high-risk NEHRP soils (soil classes D and E). Table 9-6 and Table 9-7 summarize the numbers of facilities identified within these hazard areas and the total replacement cost value of those exposed facilities. Figure 9-11 shows these results as the percent of planning area totals for each type.

**Table 9-6. Number and Value of District Facilities on Soil Types Susceptible to the Earthquake Hazard**

Asset Type	NEHRP Class D Soils		NEHRP Class E Soils	
	Exposed Number or Length	Exposed Replacement Cost Value	Exposed Number or Length	Exposed Replacement Cost Value
<b>Structures/Facilities</b>	<b>Number</b>		<b>Number</b>	
Administrative	2	\$1,250,000	0	\$0
Raw Water Facilities	0	\$0	0	\$0
Potable Water Structures	84,106	\$238,144,750	298	\$390,650
Recycled Water Facilities	975	\$701,500	25	\$14,000
<b>Total</b>	<b>85,083</b>	<b>\$240,096,250</b>	<b>323</b>	<b>\$404,650</b>
<b>Pipelines</b>	<b>Length in Feet</b>		<b>Length in Feet</b>	
Potable Water	2,297,708	\$1,304,178,832	13,948	\$8,846,716
Recycled Water	88,658	\$58,829,716	2,995	\$1,685,328
<b>Total</b>	<b>2,386,366</b>	<b>\$1,363,008,548</b>	<b>16,943</b>	<b>\$10,532,044</b>
<b>Total</b>		<b>\$1,603,104,798</b>		<b>\$10,936,694</b>

**Table 9-7. Number and Value of District Facilities in Areas Susceptible to Liquefaction**

Asset Type	Liquefaction Susceptibility - High		Liquefaction Susceptibility - Very High	
	Exposed Number or Length	Exposed Replacement Cost Value	Exposed Number or Length	Exposed Replacement Cost Value
<b>Structures/Facilities</b>	<b>Number</b>		<b>Number</b>	
Administrative	0	\$0	3	\$2,250,000
Raw Water Facilities	0	\$0	0	\$0
Potable Water Structures	41,097	\$33,371,450	30,810	\$27,313,400
Recycled Water Facilities	244	\$178,250	215	\$134,050
<b>Total</b>	<b>41,341</b>	<b>\$33,549,700</b>	<b>31,028</b>	<b>\$29,697,450</b>
<b>Pipelines</b>	<b>Length in Feet</b>		<b>Length in Feet</b>	
Potable Water	1,119,740	\$659,388,608	814,066	\$443,849,579
Recycled Water	22,014	\$12,976,535	16,387	\$12,833,094
<b>Total</b>	<b>1,141,754</b>	<b>\$672,365,143</b>	<b>830,453</b>	<b>\$456,682,673</b>
<b>Total</b>		<b>\$705,914,843</b>		<b>\$486,380,123</b>



**Figure 9-11. District Facilities in Earthquake Susceptible Areas as % of Planning Area Total**

## 9.4 VULNERABILITY

Earthquake vulnerability results for the risk assessment were generated using a Hazus Level 2 (user-defined) analysis for the four ShakeMap scenarios shown in Figure 9-5 through Figure 9-8 as well as the Hazus-defined 100-year probabilistic earthquake.

### 9.4.1 Level of Damage to Structures

Hazus classifies the vulnerability of structures to earthquake damage in five categories: no damage, slight damage, moderate damage, extensive damage, or complete damage. The model was used to assign a vulnerability category to each District asset. The estimates of damage level were then used to estimate the dollar cost of damage to the structures. Detailed results for each facility are provided in Appendix C. Table 9-8 summarizes the results by category of asset type (see Table 3-1 for facilities included in each asset type).

### 9.4.2 Level of Damage to Pipelines

For pipelines, Hazus estimates earthquake damage in several categories: number of repairs needed (leaks and breaks), days required to implement repairs, and economic loss. Table 9-9 summarizes the results for the District's potable water and recycled water pipelines.

**Table 9-8. Earthquake Scenario Loss Estimates for District Structures**

	Average Probability of Damage to Structure					Total Damage
	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage	
Administrative Facilities						
Hayward/Rodgers Creek, M7.58	50.77%	22.39%	14.02%	10.73%	2.06%	\$4,966,337
North San Andreas, M7.88	23.97%	31.21%	22.90%	18.21%	3.69%	\$6,431,029
San Gregorio, M7.44	39.40%	28.70%	17.45%	11.93%	2.51%	\$3,403,699
West Napa. M6.97	89.19%	7.45%	0.75%	2.08%	0.52%	\$554,969
100-Year Probabilistic	60.70%	25.37%	5.82%	6.51%	1.59%	\$1,640,855
Raw Water Facilities						
Hayward/Rodgers Creek, M7.58	67.66%	22.41%	9.10%	0.81%	0.00%	\$72,240
North San Andreas, M7.88	3.00%	18.20%	43.91%	31.12%	3.74%	\$1,248,579
San Gregorio, M7.44	14.10%	31.81%	35.43%	16.42%	2.22%	\$820,109
West Napa. M6.97	99.69%	0.27%	0.03%	0.00%	0.00%	\$696
100-Year Probabilistic	57.96%	23.36%	14.02%	4.48%	0.15%	\$236,419
Potable Water Structures						
Hayward/Rodgers Creek, M7.58	35.74%	21.34%	21.10%	18.31%	3.48%	\$118,201,641
North San Andreas, M7.88	16.26%	22.39%	27.49%	27.87%	5.96%	\$176,449,990
San Gregorio, M7.44	34.52%	26.04%	19.95%	16.18%	3.28%	\$109,296,982
West Napa. M6.97	93.42%	5.13%	1.26%	0.15%	0.03%	\$5,223,667
100-Year Probabilistic	45.34%	17.80%	16.27%	16.81%	3.76%	\$99,302,112
Recycled Water Facilities						
Hayward/Rodgers Creek, M7.58	19.20%	21.35%	25.43%	28.44%	5.56%	\$1,827,833
North San Andreas, M7.88	20.23%	21.03%	24.69%	28.48%	5.54%	\$1,809,559
San Gregorio, M7.44	32.75%	26.29%	20.32%	17.16%	3.47%	\$1,245,327
West Napa. M6.97	80.36%	13.79%	3.45%	1.93%	0.46%	\$264,212
100-Year Probabilistic	48.58%	16.55%	13.92%	17.32%	3.60%	\$1,160,766



**Table 9-9. Earthquake Scenario Loss Estimates for District Pipelines**

	Total Number of Leaks	Total Number of Breaks	Total Number of Repairs	Days to Repair Leaks	Days to Repair Breaks	Total Days of Repairs	Economic Loss
<b>Potable Water Pipelines</b>							
Hayward/Rodgers Creek, M7.58	114.2	28.5	142.7	16.3	4.1	20.4	\$713,606
North San Andreas, M7.88	202.9	50.7	253.6	29.0	7.2	36.2	\$1,268,055
San Gregorio, M7.44	113.9	28.5	142.4	16.3	4.1	20.3	\$712,085
West Napa, M6.97	12.4	3.1	15.5	1.8	0.4	2.2	\$77,677
100-Year Probabilistic	4.5	1.1	5.6	0.6	0.2	0.8	\$28,207
<b>Recycled Water Pipelines</b>							
Hayward/Rodgers Creek, M7.58	3.2	0.8	3.9	0.5	0.1	0.6	\$19,749
North San Andreas, M7.88	2.6	0.6	3.2	0.4	0.1	0.5	\$16,171
San Gregorio, M7.44	1.8	0.4	2.2	0.3	0.1	0.3	\$10,938
West Napa, M6.97	0.3	0.1	0.4	0.0	0.0	0.1	\$2,110
100-Year Probabilistic	0.5	0.1	0.7	0.1	0.0	0.1	\$3,376

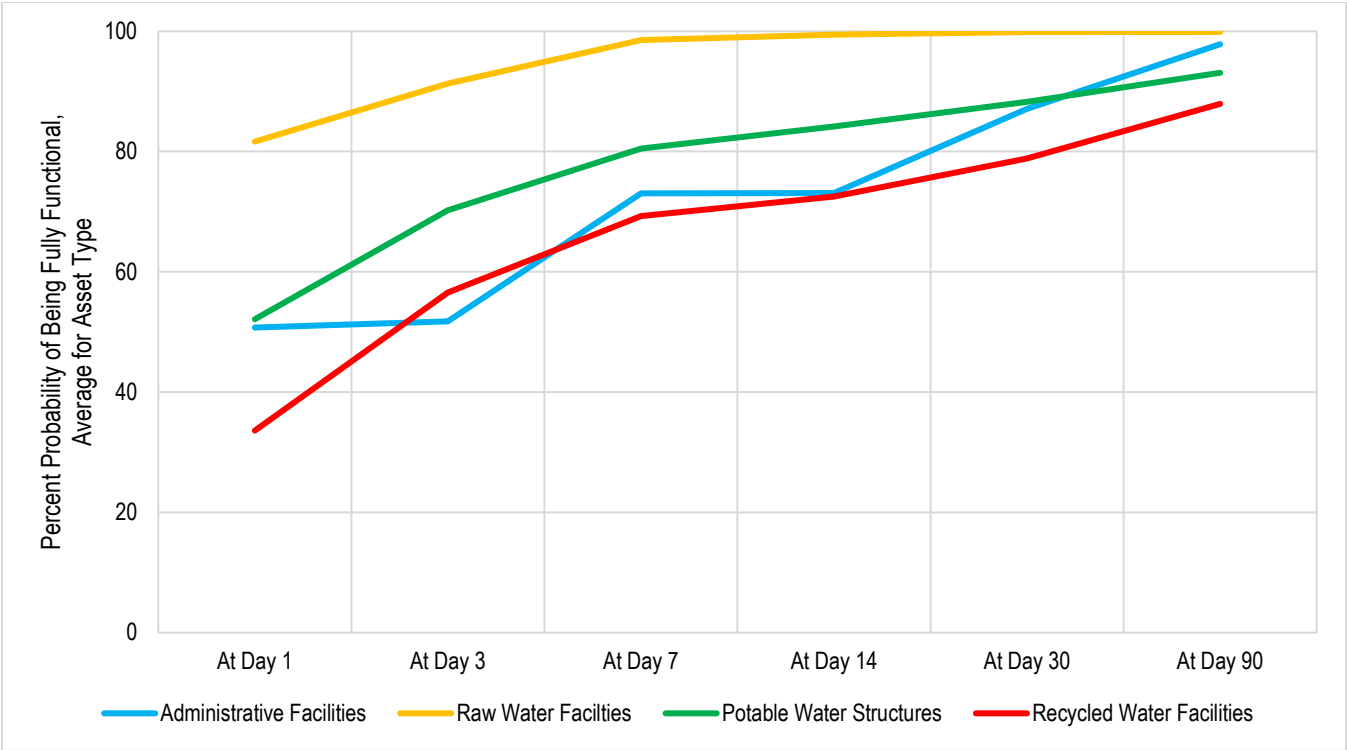
### 9.4.3 Time to Return Structures to Functionality

Hazus estimates the time to restore critical facilities to fully functional use. Results are presented as probability of being functional at specified time increments: 1, 3, 7, 14, 30 and 90 days after the event. For example, Hazus may estimate that a facility has 5 percent chance of being fully functional at Day 3, and a 95-percent chance of being fully functional at Day 90. The analysis of District structures was performed for all earthquake scenarios for each facility found to be damaged. Results are summarized by asset type category in Figure 9-12 through Figure 9-16 (see Table 3-1 for facilities included in each asset type).

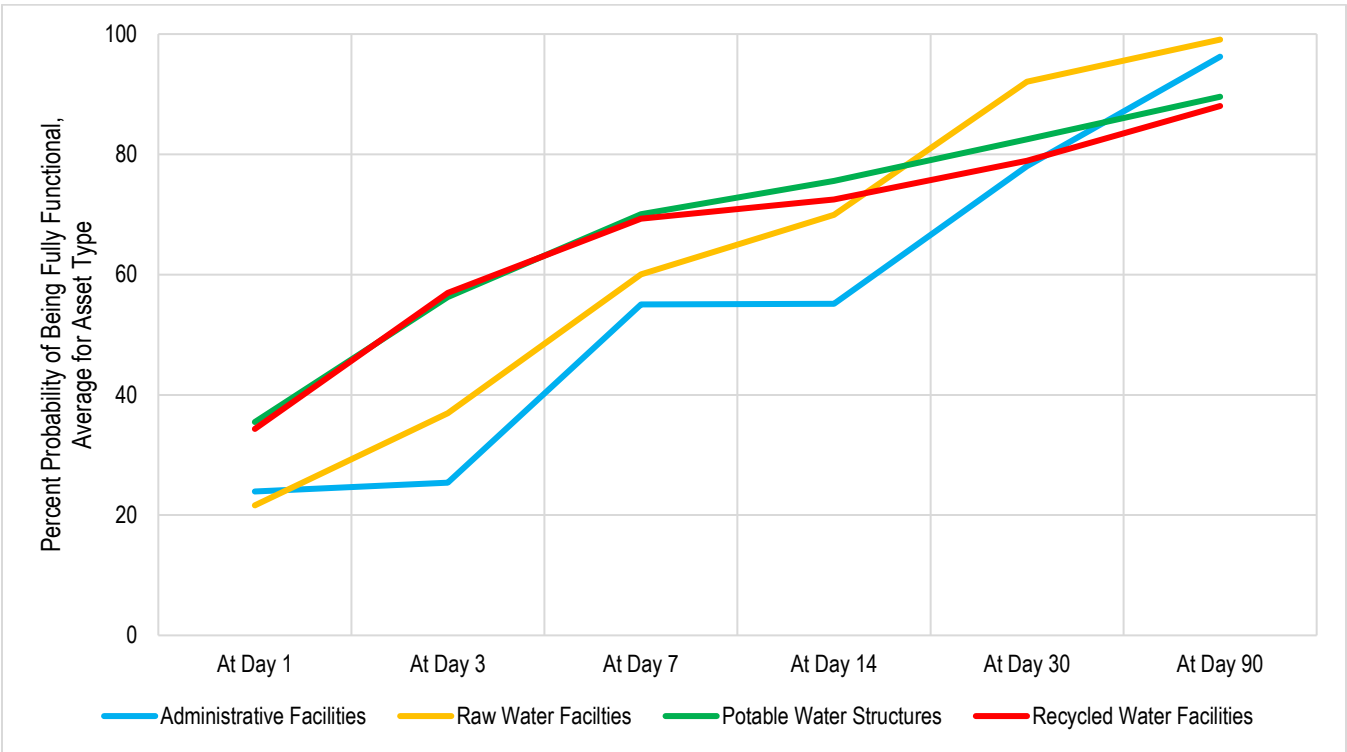
## 9.5 DEVELOPMENT TRENDS

The demand for critical MMWD services may increase with growth in the surrounding area. The State of California's adoption of bills expanding property owners' rights to build accessory dwelling units will increase densities in most the MMWD's service area; areas that, as recently as 2019, were thought to be built out.

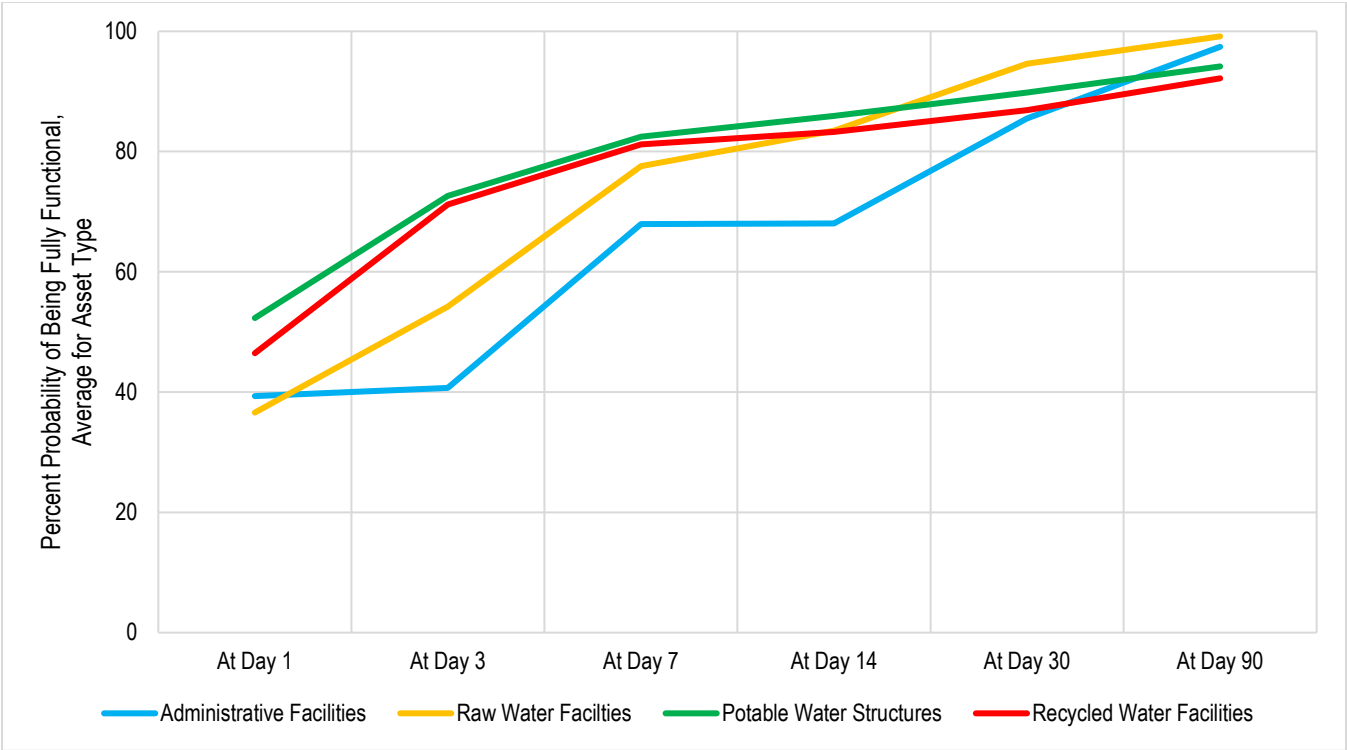
Repair or replacement of MMWD assets, if necessary, will be governed by codes and standards applied by the various municipalities, depending upon the location of the asset. These jurisdictions have adopted codes and standards that include adoption of the 2019 California State Building Code, which is based on the 2018 International Building Code. Applications of these codes and standards to any new or redeveloped MMWD assets will reduce the risk of potential impacts from earthquakes.



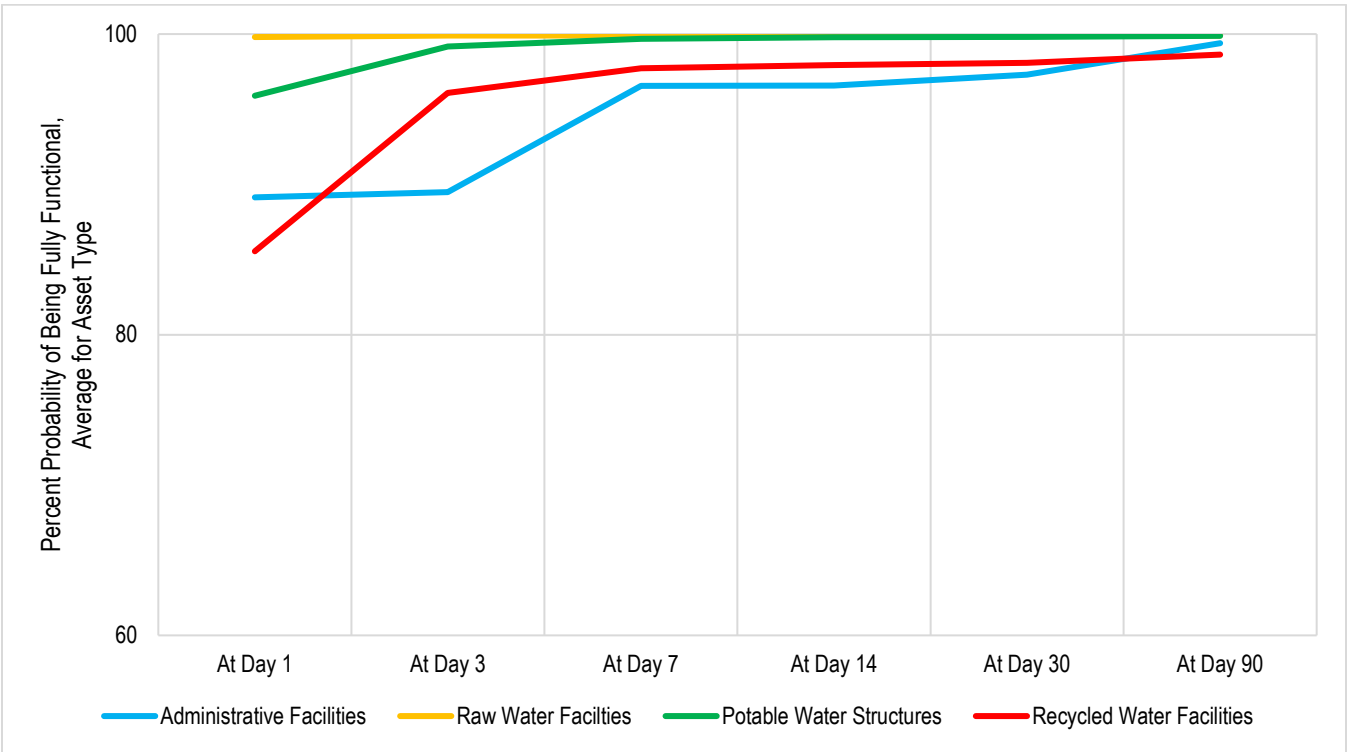
**Figure 9-12.** Average Probability of Full Functionality After Hayward/Rodgers Creek M7.58 Event



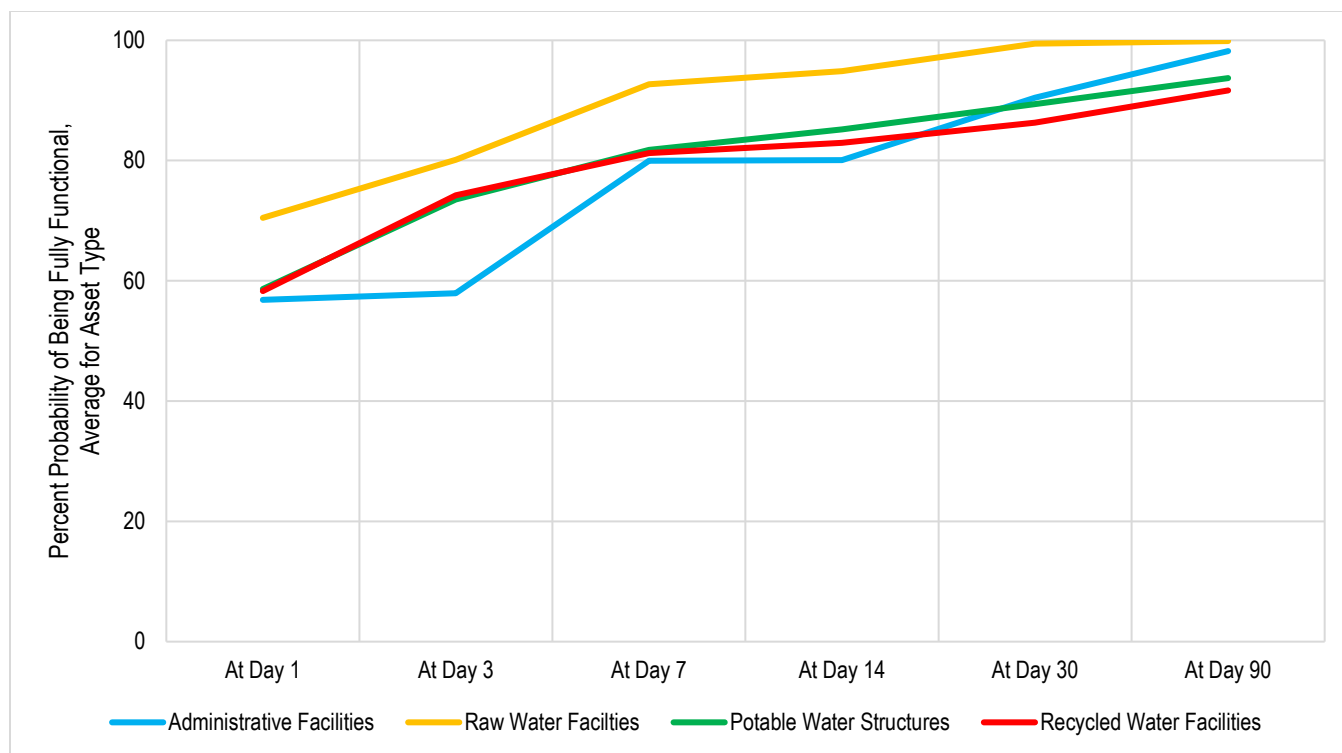
**Figure 9-13.** Average Probability of Full Functionality After N. San Andreas M 7.88 Event



**Figure 9-14.** Average Probability of Full Functionality After San Gregorio M7.44 Event



**Figure 9-15.** Average Probability of Full Functionality After West Napa M6 Event



**Figure 9-16. Average Probability of Full Functionality After 100-Year Probabilistic Event**

## 9.6 ISSUES

Important issues associated with an earthquake include the following:

- The District has numerous critical facilities with a high degree of vulnerability to earthquake.
- The estimated total damage from the most severe earthquake scenario evaluated (the North San Andreas Fault scenario) represents 4.4 percent of the replacement cost of all identified critical facilities for the District.
- Based on the modeling of critical facility performance performed for this plan, a high number of facilities in the planning area are expected to have complete or extensive damage from scenario events. These facilities are prime targets for structural retrofits.
- The District should consider the enhancement continuity of operations plans using the information on risk and vulnerability contained in this plan.
- Geotechnical standards should be established that take into account the probable impacts from earthquakes in the design and construction of new or enhanced facilities.
- There are a large number of earthen dams within the planning area. Dam failure warning and evacuation plans and procedures should be reviewed and updated to reflect the dams' risk potential associated with earthquake activity in the region.
- Earthquakes could trigger other natural hazard events such as dam failures and landslides, which could severely impact the planning area.

# 10. FLOOD

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## 10.1 GENERAL BACKGROUND

### 10.1.1 River Flooding

River flooding occurs when a river rises to overflow its natural banks due to causes such as prolonged, general rainfall, locally intense thunderstorms, snowmelt, or ice jams.

#### **Measuring Floods on Rivers**

River flooding is measured using a discharge probability, which is the probability that a certain river discharge (flow) will be equaled or exceeded in a given year. Flood studies use historical records to determine the probability of occurrence for different discharge levels. The flow that historical data show to have a 1 percent chance of being equaled or exceeded in any given year is called the 1-percent-annual-chance flood (commonly called the 100-year flood). Also called the “base flood,” this flood event is a regulatory standard used in assessing flood risk, regulating new development, and setting requirements for purchasing flood insurance.

Discharge probabilities have an inverse relationship to river flows—that is, a lower probability indicates a higher flow. The 0.2-percent-annual chance flood represents (commonly called the 500-year flood) a higher river flow than a 1-percent-annual-chance flood. These probabilities reflect statistical averages only; it is possible for two or more low-probability floods to occur in a short time period. The probabilities also can vary along a single river: the same storm event can cause a 1-percent-annual-chance flood at one location on a river and only a 10-percent-annual-chance flood at a point further upstream or downstream.

#### **River Floodplains**

A floodplain is the area adjacent to a river, creek or lake that becomes inundated during a flood. Floodplains may be broad, as when a river crosses an extensive flat landscape, or narrow, as when a river is confined in a canyon. When floodwaters recede after a flood event, they leave behind layers of rock and mud. These gradually build up to create a new floor of the floodplain. Floodplains generally contain unconsolidated sediments (accumulations of sand, gravel, loam, silt, and/or clay), often extending below the bed of the stream. These sediments provide a natural filtering system, with water percolating back into the ground and replenishing groundwater. These are often important aquifers, the water drawn from them being filtered compared to the water in the stream. Fertile, flat reclaimed floodplain lands are commonly used for agriculture, commerce and residential development.

Connections between a river and its floodplain are most apparent during and after major flood events. These areas form a complex physical and biological system that not only supports a variety of natural resources but also

provides natural flood and erosion control. When a river is separated from its floodplain with levees and other flood control facilities, natural, built-in benefits can be lost, altered, or significantly reduced.

Floodplains can support ecosystems that are rich in plant and animal species. A floodplain can contain 100 or even 1,000 times as many species as a river. Wetting of the floodplain soil releases an immediate surge of nutrients: those left over from the last flood, and those that result from the rapid decomposition of organic matter that has accumulated since then. Microscopic organisms thrive, and larger species enter a rapid breeding cycle. Opportunistic feeders (particularly birds) move in to take advantage. The production of nutrients peaks and falls away quickly, but the surge of new growth endures for some time. This makes floodplains valuable for agriculture. Species growing in floodplains are markedly different from those that grow outside floodplains. For instance, riparian trees (trees that grow in floodplains) tend to be very tolerant of root disturbance and very quick-growing compared to non-riparian trees.

### **Floodplain Mapping**

The extent of the floodplain during a 1-percent-annual-chance flood is called the special flood hazard area and often is used as a regulatory boundary. Many communities have maps that show the extent and likely depth of flooding for the base flood. Corresponding water-surface elevations describe the elevation of water that will result from a given discharge level, which is used in estimating flood damage.

## **10.1.2 Coastal Flooding**

Coastal floods are usually caused by coastal storms that, when combined with normal tides, push water toward the shore. This is commonly referred to as storm surge. The result can be waves that extend further inland, causing damage to development that would not normally be subject to wave action. 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.

## **10.1.3 Urban Flooding**

Drainage facilities in urbanized areas consists of series of pipes, roadside ditches, and channels. Urban flooding occurs when these conveyance systems lack the capacity to convey rainfall runoff to nearby creeks, streams, and rivers. As drainage facilities are overwhelmed, roads and transportation corridors become conveyance facilities. The key factors that contribute to urban flooding are rainfall intensity and rainfall duration. Topography, soil conditions, urbanization, and groundcover also play an important role.

Urban floods can be a great disturbance of daily life in urban areas. Roads can be blocked, and people may be unable to go to work or school. Economic damage can be high, but the number of casualties is usually limited, depending on the nature of the flood. On flat terrain, the flow speed can be low, and people may still be able drive through the flood. The water may rise relatively slowly and usually does not reach life endangering depths.

Urban floods can occur suddenly as flash floods after a brief but intense downpour. In these cases, they can move rapidly, end suddenly, and occur in areas not generally associated with flooding (such as subdivisions not adjacent to a water body). Although the duration of these events is usually brief, the damage they cause can be severe.



### 10.1.4 Secondary Hazards

The most problematic secondary hazard for riverine flooding is bank erosion, which can be more harmful than actual flooding. Floodwaters may scour stream banks, edging properties closer to the floodplain or causing them to fall in. Flooding is also responsible for hazards such as landslides when high flows over-saturate soils on steep slopes, causing them to fail. Hazardous materials spills are also a secondary hazard of flooding if storage tanks rupture and spill into streams, rivers, or storm sewers.

## 10.2 HAZARD PROFILE

There are six types of flood events that can impact the planning area: riverine flooding, urban flooding, coastal flooding, tsunami flooding, flooding from sea level rise, and flooding from a dam failure. This hazard profile focuses on the coastal, riverine, and urban flood hazards. Floods resulting from a dam failure are discussed in Chapter 7. Tsunami flooding is discussed in Chapter 13. Sea level rise is discussed in Chapter 15.

The major flooding causes in the District are short-duration, high-intensity storms. Water courses in the service area can flood in response to a succession of intense winter rainstorms, usually between early November and late March. A series of such weather events can cause severe flooding in the District due to the large percentage of impervious area and the age and capacity of the drainage system.

A series of storms that floods numerous drainage basins in a short time could overwhelm response and floodplain management capabilities within the District. Major roads could be blocked, preventing critical access to District assets, resulting in interruption of critical functions. High in-channel flows could cause water courses to scour, possibly washing out roads and creating more isolation problems. Floodplain management resources would not be able to make repairs quickly enough to restore critical facilities and infrastructure. Additionally, as ground becomes saturated, groundwater flooding issues typical for the District would be significantly enhanced.

### 10.2.1 Local Flooding Characteristics

#### **Flood Timing and Causes**

In areas such as Marin County that do not have extended periods of below-freezing temperatures or significant snowfall, floods usually occur during the season of highest precipitation or during heavy rainfalls after prolonged dry periods. Marin County is dry during late spring, summer, and early fall and receives most of its rain during winter. Most rainfall occurs from November through April. Due to varying microclimates, inland-area rainfall during 2016-2017 ranged 47 inches in Novato to over 82 inches in Kentfield. Along the coast, rainfall ranged from 36 inches at Oceana Marin to 45 inches at Point Reyes Station (County of Marin, 2018). All of Marin County's watersheds are small and largely prone to flash flooding.

In the Bay Area, winter storms represent significant flood risks. Flooding associated with severe storms has been among the most common hazards in the Bay Area, occurring nearly annually from 1950 to the present. Heavy rainfall brings many areas of localized flooding, especially in low-lying areas (ABAG, 2021).

Other types of flooding in Marin include isolated ponding and stormwater overflow. Isolated ponding is when pools form on the ground and can occur in any area that does not drain effectively—for example, in a natural depression in the landscape. Stormwater overflow is when storm drains back up. Stormwater drainage systems quickly convey rainwater through underground pipes to creeks and the Bay. When the storm drains are obstructed

or broken or when the water bodies to which they lead are already full, water backs up onto the streets. Although stormwater overflow and isolated ponding occur throughout the County, the effects are typically not widespread or significantly damaging (County of Marin, 2018).

## **Flood Protection**

Several Marin communities, such as Tamalpais Valley, Santa Venetia, Corte Madera, Belvedere, and parts of Strawberry, Novato, and Ross Valley, are protected by levees. Levees are typically earthen embankments designed to contain, control, or divert the flow of water to provide some level of protection from flooding. No levee system provides full protection from all flooding events to the people and structures located behind it. Some level of flood risk exists in the levee-protected areas. Except for one levee system in Novato-Hamilton, none of Marin County's levees are FEMA-accredited. Many were built decades ago without an engineered design by farmers or developers, and material may have been added over the years (County of Marin, 2018).

The Marin County Flood Control and Water Conservation District maintains 3.6 miles of channels (17 percent of the total channel length) and related flood control infrastructure in the Southern Marin Watershed. The flood control district is divided into zones that perform functions such as the construction, operation, and maintenance of levees, pumping stations, culverts and drainage ways, and the cleaning and maintenance of creeks. All major actions by the zones require authorization by the Board of Supervisors of the flood control district. MMWD boundaries fall within five of the flood control district's zones (Marin Watershed Program, 2021):

- **Zone 3, Richardson Bay**—Zone 3 covers over 13 square miles, including the City of Mill Valley and numerous unincorporated communities including Marin City, Alto, Sutton Manor, Almonte, Tamalpais Valley, Homestead Valley, and portions of Strawberry Point. There are 12,560 parcels and the boundaries of the zone include the sub-watersheds of Arroyo Corte Madera del Presidio, Warner Creek, and Coyote Creek, all of which drain to Richardson Bay.
- **Zone 4, Bel Aire**—Zone 4 is small, covering only 0.85 square miles and includes parts of the Town of Tiburon and Bel Aire and Strawberry Circle. There are 850 parcels in the zone and its boundaries include the sub-watersheds of East and West Creeks and Salt Works Canal, all of which drain to Richardson Bay.
- **Zone 6, San Rafael Meadows**—Zone 6 is the County's smallest flood control zone, covering only 0.16 square miles, entirely within the City of San Rafael. It was created in the 1960s to address frequent flooding in the low-lying neighborhood just west of Highway 101 across from the County Civic Center and occupies a very small part of the Gallinas Creek Watershed. The neighborhood was unincorporated when the zone was established but was later annexed by the City of San Rafael, which now owns and maintains the zone's drainage easements. There are 440 parcels in the zone.
- **Zone 7, Santa Venetia**—Zone 7 is the second-smallest flood control zone in the county and covers 0.42 square miles in entirely unincorporated lands in the community of Santa Venetia. There are 890 parcels in the zone. Santa Venetia was one of the first developments in Marin County to be constructed on fill over bay mud, which occurred in an era before the County had the authority to regulate or control development. Due to the low initial elevation of the fill and the compressible nature of the underlying bay mud, the area has subsided and is now below the high tide level.
- **Zone 9, Ross Valley**—Zone 9 covers 29 square miles, including the towns of Fairfax, San Anselmo, Ross, and Larkspur as well as the unincorporated communities of San Anselmo, Fairfax, Kentfield, and Greenbrae. There are 21,095 parcels in the zone. The zone boundary was amended In January 2007 to include all territories within the incorporated areas of the towns of San Anselmo and Fairfax. This change was undertaken in response to the flood of December 31, 2005, and the subsequent creation of the Ross Valley Flood Control and Watershed program.

## 10.2.2 Past Events

Marin County has experienced 16 flooding events since 1969 for which federal disaster declarations were issued, as summarized in Table 10-1. Many flood events do not trigger federal disaster declaration protocol but have significant impacts on their communities. These events are also important to consider in establishing recurrence intervals for flooding. The sections below describe significant recent flood events in Marin County.

**Table 10-1. History of Flood Events**

Date	Declaration #	Type of event
02/24 – 03/01/2019	DR-4434	Severe Winter Storms, Flooding, Landslides, and Mudslides
02/13 – 02/15/2019	DR-4431	Severe Winter Storms, Flooding, Landslides, and Mudslides
02/01 – 02/23/2017	DR-4308	Severe Winter Storms, Flooding, Mudslides
01/03 – 01/12/2017	DR-4301	Severe Winter Storms, Flooding, and Mudslides
03/29 – 04/16/2006	DR-1646	Severe Storms, Flooding, Landslides, and Mudslides
12/17/2005 – 01/03/2006	DR-1628	Severe Storms, Flooding, Mudslides, and Landslides
02/02 – 04/30/1998	DR-1203	Severe Winter Storms and Flooding
12/28/1996 – 04/01/1997	DR-1155	Severe Storms and Flooding
02/13 – 04/19/1995	DR-1046	Severe Winter Storms, Flooding, Landslides, Mud Flows
01/03 – 02/10/1995	DR-1044	Severe Winter Storms, Flooding, Landslides, Mud Flows
02/12 – 03/10/1986	DR-758	Severe Storms, Flooding
01/21 – 03/30/1983	DR-677	Coastal Storms, Floods, Slides, Tornadoes
12/19/1982 – 01/08/1983	DR-651	Severe Storms, Flood, Mudslides, High Tide
02/08/1973	DR-364	Severe Storms, High Tides, Flooding
02/16/1970	DR-283	Severe Storms, Flooding
01/26/1969	DR-253	Severe Storms, Flooding

Source: FEMA, 2021

### **February 24 – March 1, 2019**

On April 13, 2019, the state requested a major federal disaster declaration for Public Assistance due to severe winter storms, flooding, landslides, and mudslides from February 24 to March 1, 2019. The request covered 19 counties, including Marin County (FEMA, 2020).

### **February 13 – 15, 2019**

The County of Marin proclaimed a local state of emergency on February 15, 2019, because of the severe impacts of storm damage. Beginning February 13, heavy rains combined with saturated ground and high tides to topple trees, as well as wash out County-maintained roads and creek banks. The impacts from the storm included mudslides and levee breaches. On February 14, stormwater exceeded the capacity of Novato Creek where it passes under Highway 37. Stormwater broke through the embankment on land owned by SMART along the south side of Highway 37. Flooding in the area stemmed from damage at that intersection (County of Marin, 2019).

### **February 1 – 23, 2017**

On March 19, 2017, the state requested a major federal disaster declaration for Public Assistance due to severe winter storms, flooding, and mudslides during the period of February 1 to 23, 2017. The request covered 42 counties, including Marin County (FEMA, 2020a).

### **January 3 – 12, 2017**

On February 10, 2017, the state requested a major federal disaster declaration for Public Assistance due to severe winter storms, flooding, and mudslides during the period of January 3 to 12, 2017. The request covered 34 counties, including Marin County (FEMA, 2020b).

### **December 2005/January 2006, April 2006**

The storms of December 2005, January 2006, and April 2006 generated damage at 151 locations, including an estimated \$15 million in damage to County-maintained property. Of that, \$10 million eventually was reimbursed by the state or federal government (County of Marin, 2017).

## **10.2.3 Location**

The March 21, 2019, Marin County Digital Flood Insurance Rate Maps (DFIRMs) are FEMA's official delineation of special flood hazard areas for all of Marin County (see Figure 10-1). Identified special flood hazard areas include shallow flooding areas, floodways, alluvial fans, and coastal areas. These maps are the basis for the exposure and vulnerability analyses presented in this chapter. They represent the best data available at the time of this analysis, but they may not represent all identified sources of flood risk in Marin County. Extent and location mapping for flood hazards that fall outside of FEMA's *Guidelines and Specifications for Flood Insurance Studies* is not currently available for all flood hazard areas identified.

## **10.2.4 Frequency**

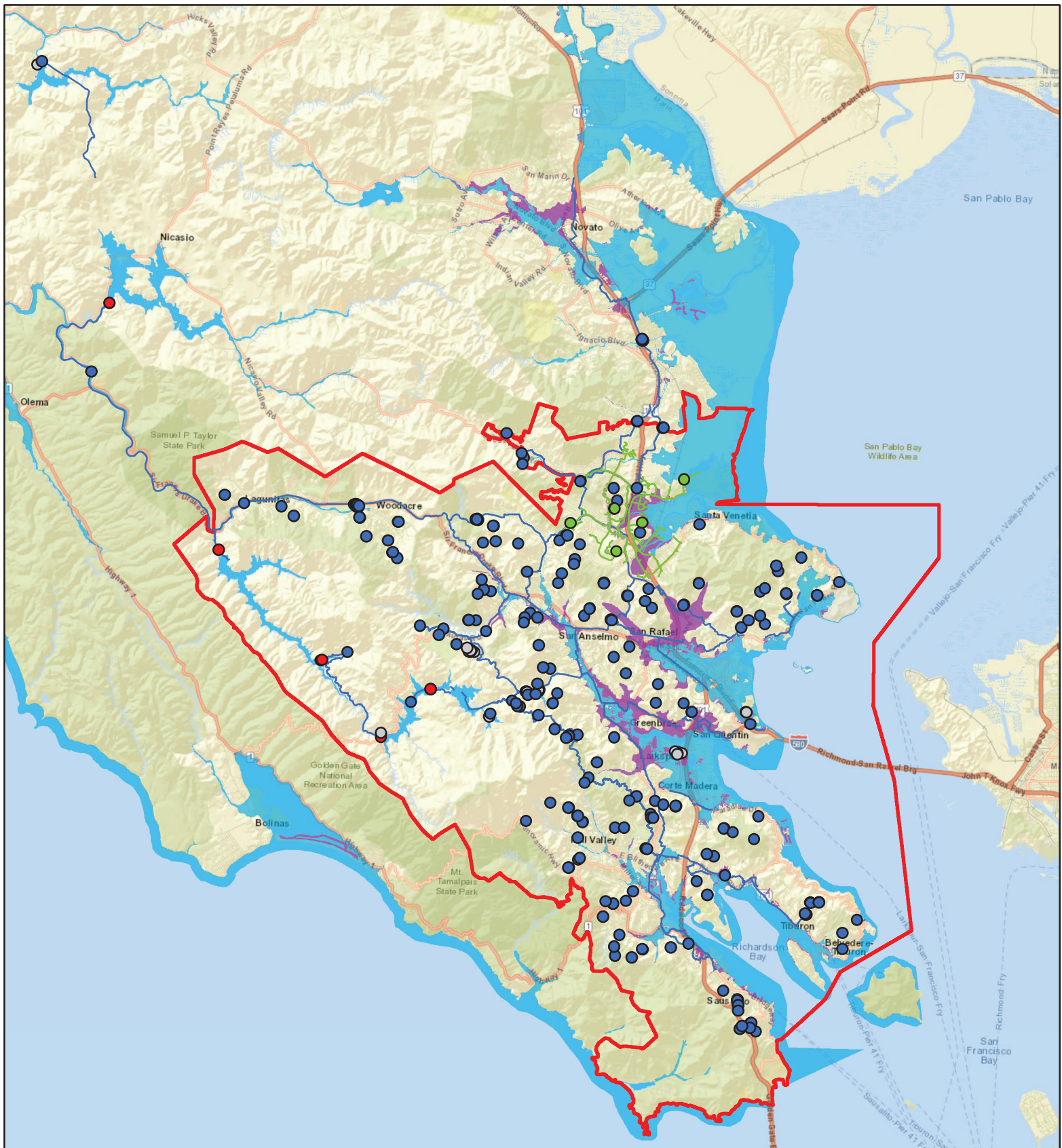
Marin County has experienced 16 flood events that triggered a federal disaster declaration since 1969, and average of one such flood event every 3.25 years. Records show that the County can expect to experience some degree of localized flooding annually. For the risk ranking scenario in this plan, the District chose to assign a probability value of "high" (an event to likely occur within 25 years) as the appropriate frequency probability for the flood hazard.

## **10.2.5 Severity**

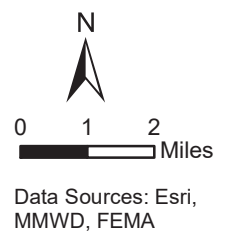
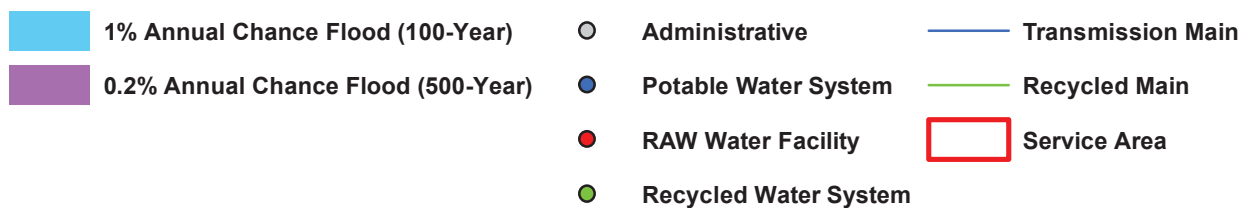
The principal factors affecting flood damage are flood depth and velocity. The deeper and faster flood flows become, the more damage they can cause. Shallow flooding with high velocities can cause as much damage as deep flooding with slow velocity. This is especially true when a channel migrates over a broad floodplain, redirecting high velocity flows and transporting debris and sediment.

FEMA calculates peak flows, in cubic feet per second, on local rivers and streams to develop its flood maps. Those flow rates indicate how much water is conveyed down each stream's channel at one or more locations for various flood levels. These flow values do not directly indicate flood severity, since the flooding associated with them depends on how much flow can be contained within the stream channel. However, they do allow an assessment of the relative flood flows between different streams and between different flood recurrence levels (from the 10-year flood to the 500-year flood). Peak stream flows used in the FEMA flood study for Marin County are listed in Table 10-2.





**Figure 10-1. FEMA Flood Hazard Areas**



**Table 10-2. Summary of Peak Discharges in the Planning Area**

Source/Location	Drainage Area (square miles)	Discharge (cubic feet/second)			
		10-Year	50-Year	100-Year	500-Year
ARROYO AVICHI					
At Novato Creek	1.78	550	770	890	1,140
ARROYO CORTE MADERA DEL PRESIDIO CREEK					
At Northwestern Pacific Railroad	6.01	1,440	2,330	2,710	3,550
At Stream Gaging Station	4.69	1,120	1,810	2,110	2,760
Downstream of La Goma Street	4.69	594	840	930	1,094
Just upstream of confluence with Warner Canyon Creek	3.62	900	1,460	1,700	2,220
Just upstream of confluence with Old Mill Creek	1.54	380	610	710	2,200
ARROYO SAN JOSE					
Approximately 1,800 feet downstream of Bel Marin Keys bridge	5.4	1,200	1,900	2,300	2,900
At U.S. Highway 101	5.4	1,200	1,900	2,300	2,900
CORTE MADERA CREEK					
At U.S. Highway 101	24.7	5,500	8,000	9,000	2,900
At Bon Air Road	21.6	5,000	7,400	8,300	9,000
At Tamalpais Creek	20.2	8,800	7,100	8,000	8,700
Above confluence of Tamalpaid Creek	18.1	4,300	6,400	7,300	8,000
At the City of San Anselmo/Town of Ross corporate limits	14.4	3,200	4,700	5,300	6,800
COYOTE CREEK					
At State Highway 1 bridge	3.48	1,240	1,860	2,100	2,630
Downstream of confluence with Tennessee Creek	3.37	1,200	1,800	2,040	2,550
At Ash Street	1.32	540	800	910	1,130
CREST MARIN CREEK					
Upstream of confluence with Tennessee Creek	0.30	110	160	180	240
ESKOOT CREEK					
At Bolinas Lagoon	1.59	666	970	1,090	1,350
At State Highway 1	1.32	540	810	910	1,130
FAIRFAX CREEK					
Confluence with San Anselmo Creek	4.10	810	1,450	1,720	2,400
White Hill School (near Town of Fairfax corporate limits)	1.8	450	770	960	1,600
IGNACIO CREEK					
At confluence with Arroyo San Jose	1.3	400	650	800	1000
KITTLE CREEK					
At Sir Francis Drake Boulevard	0.28	70	135	150	290
At Walters Road	0.25	60	115	150	260
LAGUNITAS CREEK					
At Point Reyes Station Bridge	107.3	14,700	25,000	28,050	34,840
MURPHY CREEK					
At Brookwood Lane	0.15	50	90	115	190



Source/Location	Drainage Area (square miles)	Discharge (cubic feet/second)			
		10-Year	50-Year	100-Year	500-Year
NOVATO CREEK					
Downstream of confluence of Arroyo Avichi	25.40	3,420	5,140	6,230	8,150
Downstream of confluence of Warner Creek	23.62	3,110	4,690	5,690	7,460
At upstream corporate limits of City of Novato	13.80	1,300	2,100	2,500	3,800
At Stafford Dam	8.4	1,330	1,980	2,340	3,360
OLD MILL CREEK					
At confluence with Arroyo Corte Madera del Presidio Creek	1.85	470	750	870	1,140
OLEMA CREEK					
At Bear Valley Road Bridge	14.6	3,590	5,150	5,720	6,810
PACHECO CREEK					
At Northwestern Pacific Railroad	1.69	470	670	770	980
REED CREEK					
At Evergreen Avenue	0.84	250	380	430	540
ROSS CREEK					
At confluence with Corte Madera	3.00	720	1,220	1,400	2,000
At corporate limits of Town of Ross	2.15	500	850	990	1,500
SAN ANSELMO CREEK					
Mouth of Fairfax Creek	9.00	1,970	3,100	3,500	4,500
Mouth of Deer Park Creek	4.96	1,080	1,780	2,100	3,000
Mouth of Wood Lane Drainage	4.19	930	1,620	1,900	2,780
At corporate limits of Town of Fairfax	3.10	725	1,300	1,480	2,100
SAN RAFAEL CREEK					
At Grand Avenue	4.3	1,430	1,865	1,995	2,500
At Lindero Street	1.8	640	670	690	600
Upstream end of 2ndStreet culvert	1.3	400	705	830	1,100
SUTTON-MANOR CREEK					
At the Mouth	1.00	300	535	625	765
TENNESSEE CREEK					
Upstream of confluence with Coyote Creek	1.81	550	840	960	1,220
Upstream of confluence with Crest Marin Creek	1.51	440	680	780	980
VINEYARD CREEK					
At mouth	2.60	580	830	960	1,230
WARNER CANYON CREEK					
At confluence with Arroyo Corte Madera del Presidio	0.98	210	330	390	500
WARNER CREEK					
Upstream of confluence of Novato Creek	5.18	1,260	1,800	2,080	2,680
Downstream of confluence of Wilson Creek	4.47	1,80	1,540	1,770	2,280
WILSON CREEK					
At the mouth	1.88	520	750	860	1,100
At Mill Road	1.42	470	680	780	1,000

## 10.2.6 Warning Time

The warning time that a community has to take action to protect lives and property from a flooding threat is a function of the time between the first predictions of heavy rainfall, the first rainfall, and the first occurrence of flooding. Each watershed has unique qualities that affect its response to rainfall. A hydrograph, which is a graph or chart of stream flow in relation to time (see Figure 10-2), is a useful tool for examining a stream's response to rainfall. Once rainfall starts falling over a watershed, runoff begins, and the stream begins to rise. Water depth in the stream channel (stage of flow) will continue to rise in response to runoff even after rainfall ends. Eventually, the runoff will reach a peak and the stage of flow will crest. At this peak, the stream stage remains at a constant level until it begins to fall and eventually subside to a level below flooding stage. The length of time that floodwaters remain above flood stage is an important characteristic of the flood hazard.

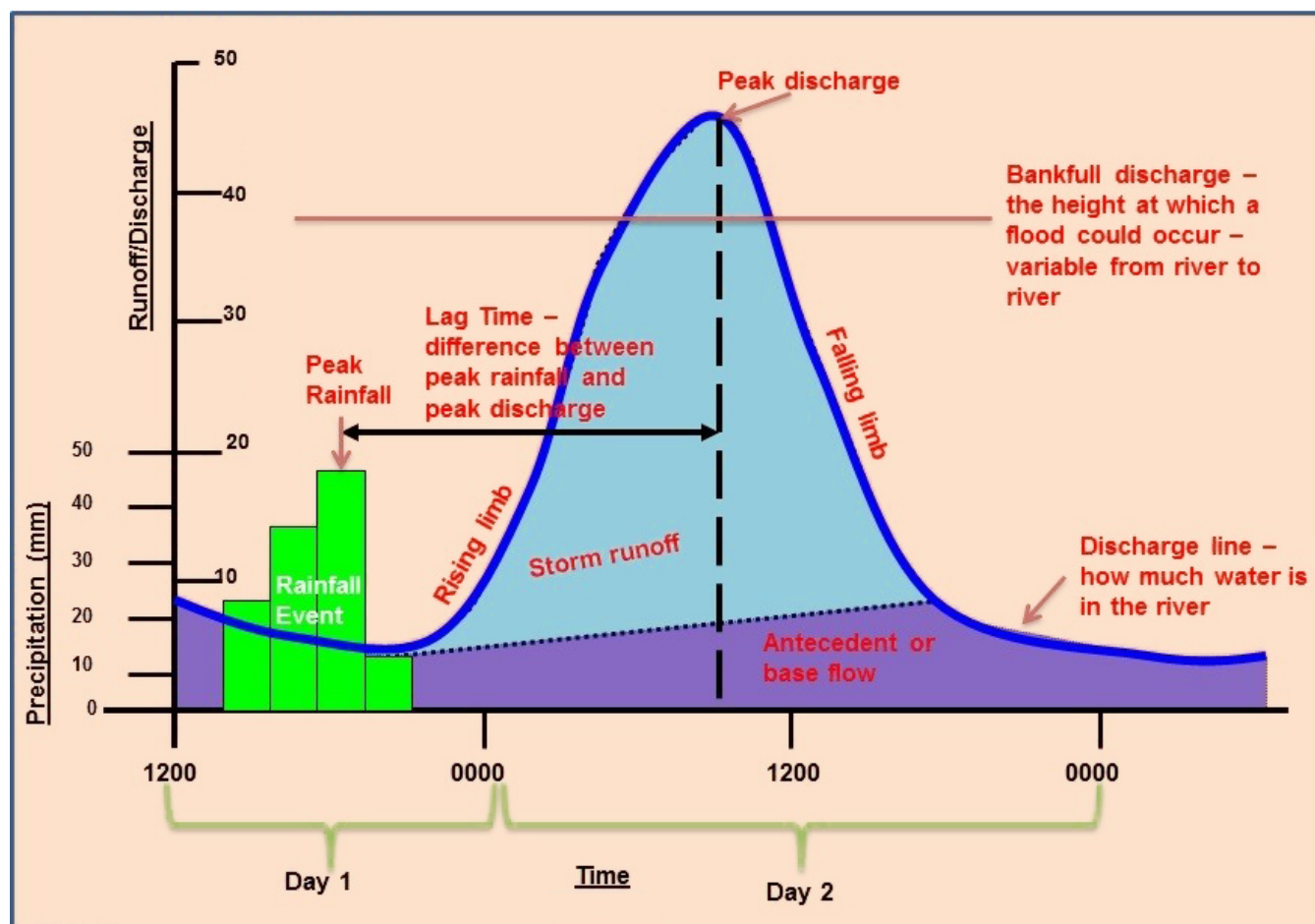


Figure 10-2. Example Hydrograph

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

To provide quantitative information for flood warning and detection, Marin County uses several systems to alert residents. The Marin County Sheriff's Office of Emergency Services (OES) is an approved "alerting authority" for the Emergency Alert System and for Wireless Emergency Alerts. The OES also uses the Alert

Marin Emergency Notification System to deliver incident-specific information or potentially life-saving instruction to the precise geographic areas affected. Anyone 18 and over who lives, works, or attends school in Marin County can register their cell phone for Alert Marin. The County also uses the Nixle alert system to disseminate zip code specific information, as well as post-disaster information about logistics and any issues affecting larger areas (road closures, updates, etc.) (Marin County Sheriff's Office, 2021).

### 10.3 EXPOSURE

The risk assessment for flood evaluated District assets that lie within the 1-percent-annual-chance and 0.2-percent-annual-chance flood zones. Table 10-3 summarizes the number of each type of critical facility found to be within the mapped flood zones and the total replacement cost value of those exposed facilities. Figure 10-3 shows these results as the percent of total planning area structures of each type. The exposure analysis included the District's pipeline assets. While most of these assets are underground, and not susceptible to impacts from overland flows associated with flooding, there are sections of pipelines that are exposed as they cross drainageways and channels. The exact location of these exposed pipelines was not available in a geospatial dataset to support this exposure analysis.

**Table 10-3. Number and Value of District Facilities Exposed to the Flood Hazard**

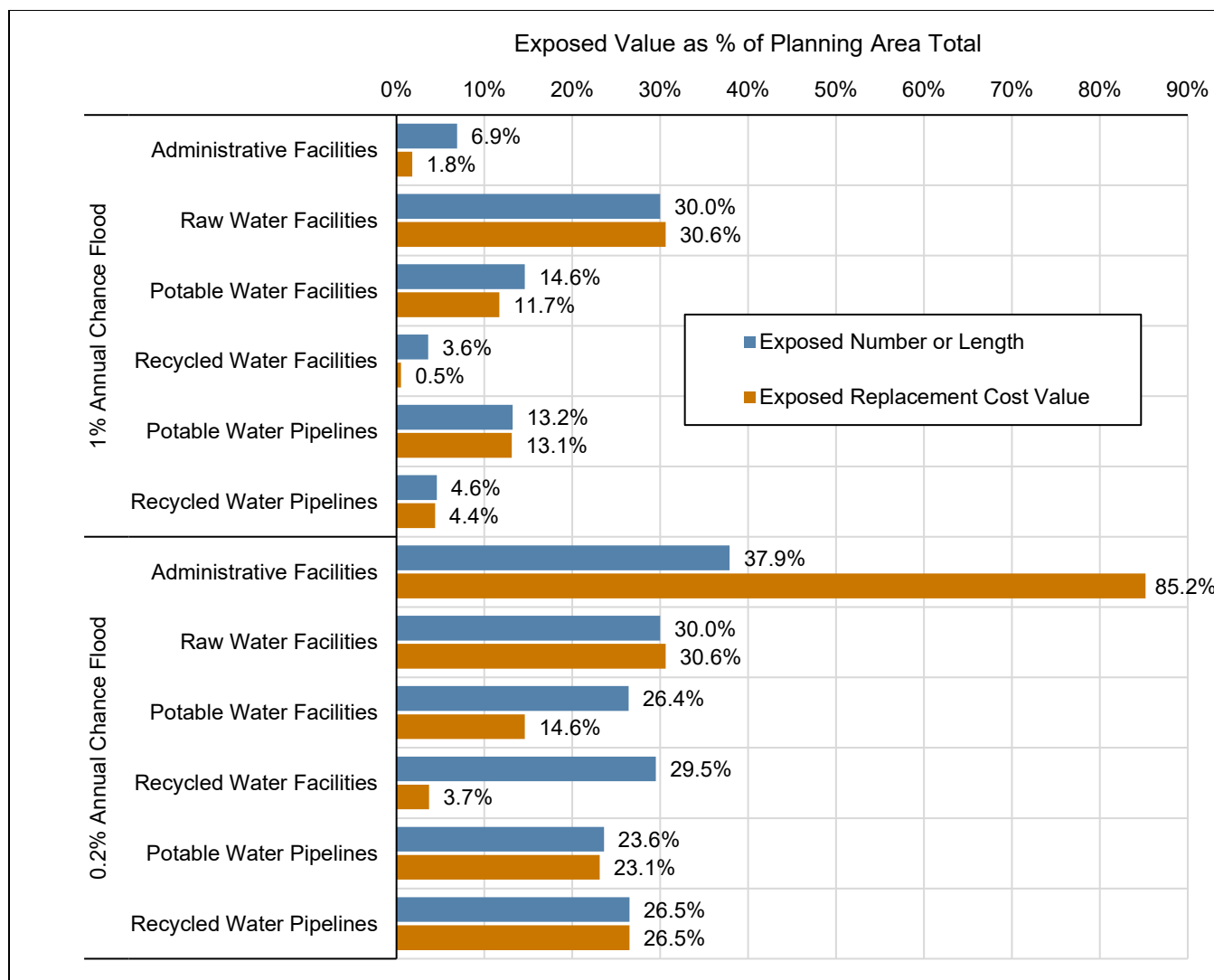
Assets	1% Annual Chance Flood		0.2% Annual Chance Flood	
	Exposed Number or Length	Exposed Replacement Cost Value	Exposed Number or Length	Exposed Replacement Cost Value
<b>Structures/Facilities</b>	<b>Number</b>		<b>Number</b>	
Administrative	2	\$1,250,000	11	\$60,774,586
Raw Water Facilities	3	\$5,500,000	3	\$5,500,000
Potable Water Structures	29,410	\$79,332,300	53,034	\$98,913,150
Recycled Water Facilities	59	\$39,650	481	\$296,800
<b>Total</b>	<b>29,474</b>	<b>\$86,121,950</b>	<b>53,529</b>	<b>\$165,484,536</b>
<b>Pipelines</b>	<b>Length in Feet</b>		<b>Length in Feet</b>	
Potable Water	776,672	\$443,887,435	1,389,336	\$783,618,613
Recycled Water	6,433	\$4,007,249	36,853	\$24,414,083
<b>Total</b>	<b>783,104</b>	<b>\$447,894,683</b>	<b>1,426,189</b>	<b>\$808,032,696</b>
<b>Total</b>		<b>\$534,016,633</b>		<b>\$973,517,231</b>

### 10.4 VULNERABILITY

The flood module of Hazus was used for a Level 2 assessment of vulnerability to the flood hazard. Hazus estimated damage to critical District assets from the 1-percent-annual-chance or 0.2-percent-annual-chance flood. Detailed results for each facility are provided in Appendix C; overall results for the entire district are summarized in Table 10-4.

**Table 10-4. Estimated Overall Damage to Critical Facilities from Flood**

	Number of Facilities Affected	Loss Value of Damage	Damage as % of Total Value
<b>1% Annual Chance Flood</b>	7	\$1,245,306	19.9%
<b>0.2% Annual Chance Flood</b>	8	\$1,300,423	17.9%



**Figure 10-3. District Facilities Exposed to the Flood Hazard as % of Planning Area Total**

## 10.5 DEVELOPMENT TRENDS

The demand for critical MMWD services may increase with growth in the surrounding area. The State of California's adoption of bills expanding property owners' rights to build accessory dwelling units will increase densities in most the District's service area; areas that, as recently as 2019, were thought to be built out.

Repair or replacement of MMWD assets, if necessary, will be governed by codes and standards applied by the various municipalities, depending upon the location of the asset. These jurisdictions have adopted codes and standards that include adoption of the 2019 California State Building Code, which is based on the 2018 International Building Code. The County and all its incorporated cities also participate in the National Flood Insurance Program (NFIP) and have adopted floodplain management standards pursuant to that program's requirements. Applications of these codes and standards to any new or redeveloped MMWD assets will reduce the risk of potential impacts from flood.

## 10.6 ISSUES

The planning team has identified the following flood-related issues relevant to the planning area:

- The currently effective flood hazard mapping does not accurately reflect the true flood risk in the MMWD service area. FEMA mapping does not recognize flooding associated with urban drainage issues.
- Planning tools whose use depends on flood hazard mapping are less effective due to the deficiencies in the currently available mapping.
- There needs to be a sustained effort to gather historical damage data, such as high water marks on structures and damage reports, to measure the cost-effectiveness of future mitigation projects.
- Ongoing flood hazard mitigation will require funding from multiple sources.
- There needs to be a coordinated hazard mitigation effort between jurisdictions affected by flood hazards across Marin County.
- Floodplain residents need to continue to be educated about flood preparedness and the resources available during and after floods.
- A lack of concern regarding flood risk by property owners can translate to the lack of political will to make changes.
- The potential impact of climate change on flood conditions needs to be better understood.
- Floodplain restoration/reconnection opportunities should be identified as a means to reduce flood risk.
- Post-flood disaster response and recovery actions need to be solidified.
- Floodplain management actions require interagency coordination.
- Open spaces (infiltration) have decreased substantially, with no plans to reverse this trend. More impervious surface leads to more runoff.





# 11. MASS MOVEMENTS

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## 11.1 GENERAL BACKGROUND

Ground saturation by water, steepening of slopes by erosion or construction, alternate freezing and thawing, and earthquake shaking are all factors that contribute to mass movements such as landslides. Mass movements are typically associated with periods of heavy rainfall or rapid snow melt. Rain-saturated hill slopes and increased groundwater pressure on porous hillsides are triggering agents of slope failure. In areas burned by forest and brushfires, a lower threshold of precipitation may initiate mass movements. The following are common types of mass movements (see Figure 11-1):

- Rotational Slides—Blocks of fine-grained sediment that rotate and move down slope
- Translational Slides—Sediments that move along a flat surface without a rotational component
- Block Slides—Blocks of rock that slide along a slip plane as a unit down a slope.
- 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
- Debris Flows (Mudslides)—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.
- 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
- Creep—A slow-moving landslide often only noticed through crooked trees and disturbed structures
- Lateral spread—Landslides that commonly form on gentle slopes and that have rapid fluid-like flow movement, like water

### 11.1.1 Mass Movement Causes

Landslides 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.

Source: USGS, 2004

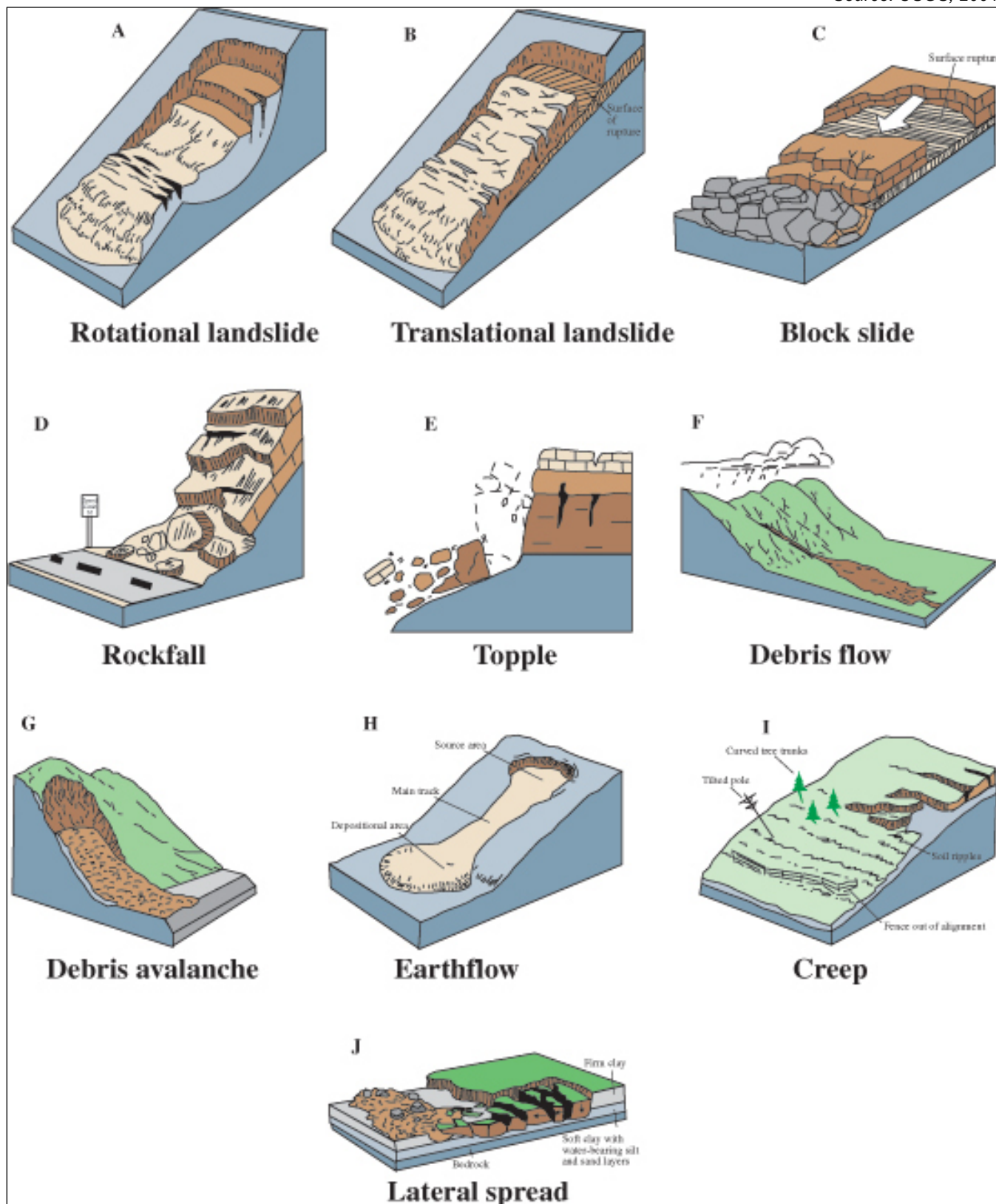


Figure 11-1. Common Mass Movement Types

Factors causing landslides 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)
  - Seismic shaking
- 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

### 11.1.2 Secondary Hazards

Mass movements have the potential to block rivers or streams, which can result in flooding.

## 11.2 HAZARD PROFILE

### 11.2.1 Past Events

Table 11-1 lists known mass movement events in the vicinity of the planning area from 1980 through 2020.

### 11.2.2 Location

Factors that influence the mass movement hazard include steep slopes, weak rocks, and heavy rains. In 2011, the California Geological Survey conducted an analysis using rock strength and slope data to create classes of susceptibility to deep-seated landslides. Figure 11-2 shows landslide hazard mapping for the planning area.

The locations of past mass movements are often likely sites of future mass movements. These locations range from a few acres to several square miles. Although most show no evidence of recent movement, a small portion may become active in any given year. Ancient dormant mass movements sites can be reactivated by earthquakes or by exceptionally wet weather. These dormant sites also are vulnerable to construction-triggered sliding. As development spreads into hillsides, unstable soil and erosion often contribute to mass movements.

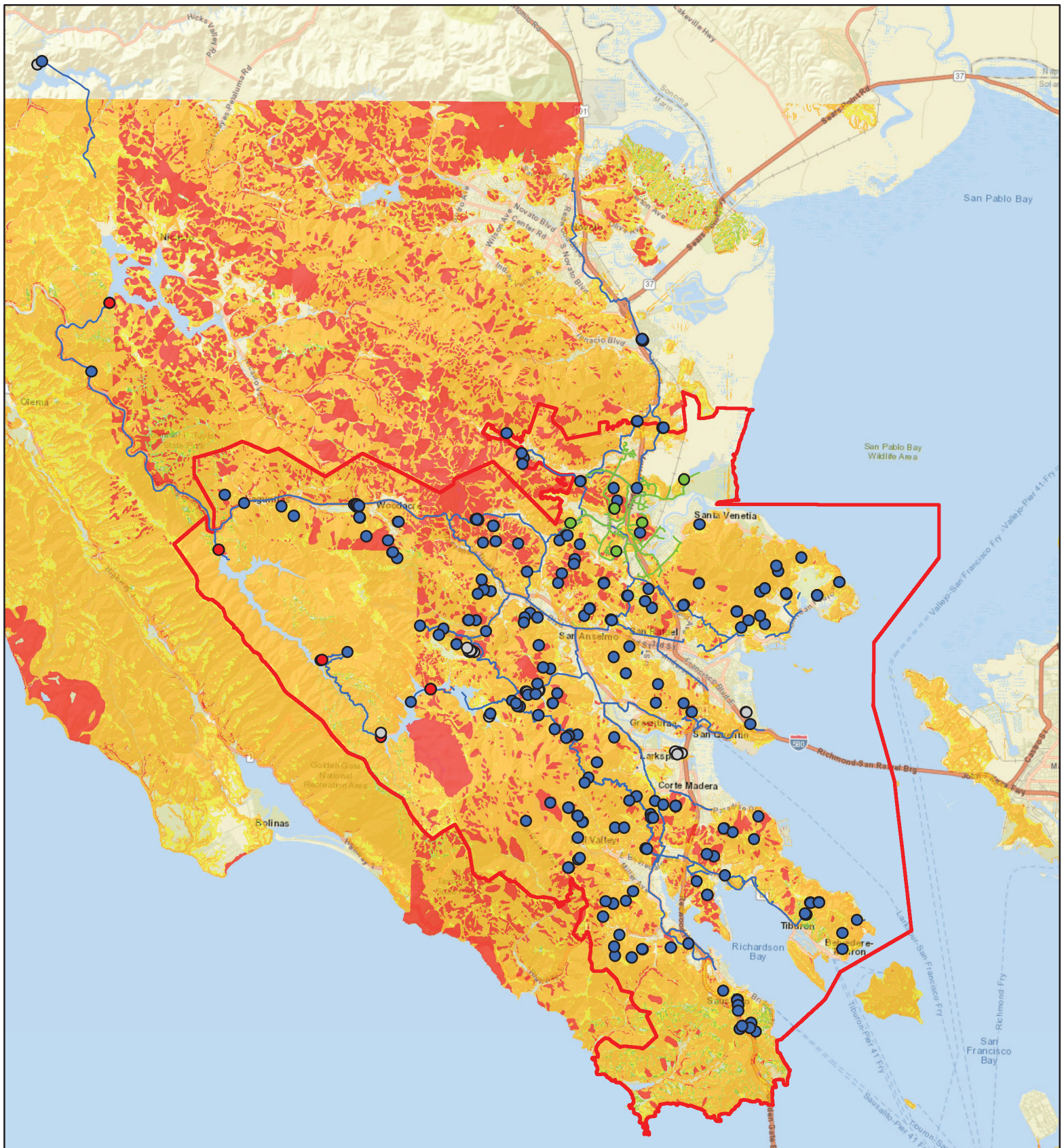
The USGS has developed mass movement mapping for the Bay Area that designates historical landslide occurrence throughout the area in four ratings: flat land (little or no potential for slides), few landslides (few, if any, large historical landslides), mostly landslide (mapped historical slides and some areas surrounding them), and many landslides (mapped historical slides and more extensive surrounding areas than in the mostly landslide category). Figure 11-3 shows the areas mapped as “mostly landslide” within the District.

**Table 11-1. Mass Movement Events in and near the District Planning Area**

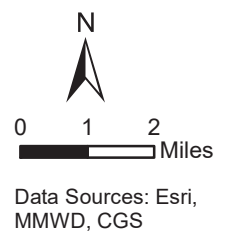
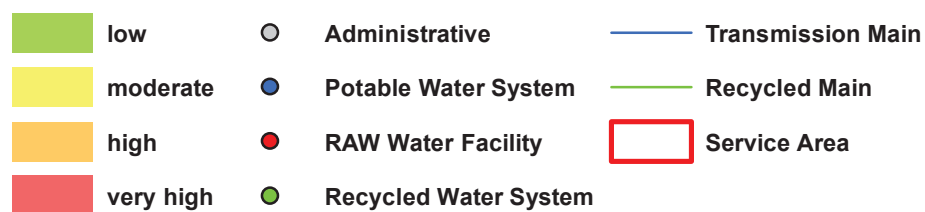
Event Date	Event Type	FEMA Number	Description
01/16/2020	Debris Flow	N/A	Mud/dirt/rocks reported on US-101 S and Marin City on ramp. Mud and dirt falling from right hand side.
02/24/2019 – 03/01/2019	Severe Winter Storms, Flooding, Landslides, and Mudslides	DR-4434	An atmospheric river moved through the region near the end of the month with the bulk of the debris flows experienced in the North Bay.
02/13 – 02/15/2019	Severe Winter Storms, Flooding, Landslides, and Mudslides	DR-4431	An atmospheric river with an associated cold front moved through the region from February 12th to the 15th bringing widespread flooding and debris flows.
01/16/2019	Debris Flow	N/A	Mud slide shutdown SB 101 Waldo Grade.
01/06/2019	Debris Flow	N/A	Mud slide covering lanes on Sir Francis Drake Blvd at Lagunitas Rd.
02/01 – 02/23/2017	Severe Winter Storms, Flooding, Mudslides	DR-4308	Potent atmospheric river brought copious amounts of rain to the region causing widespread flooding, debris flow, accidents, and over topping of reservoir spillways.
01/03 – 01/12/2017	Severe Winter Storms, Flooding, and Mudslides	DR-4301	State Highway 1 in Marin County was closed between Bolinas and Stinson Beach on due to mudslides. The District sustained over \$2 million in damage.
01/16/2016	Debris Flow	N/A	Minor Mud slide on SR1 at Steep Ravine Trail, blocked one lane.
12/11/2014	Debris Flow	N/A	A significant mudslide occurred along Tennessee Valley Road, causing \$1 million in property damage.
12/11/2014	Debris Flow	N/A	A slide under sixty feet of Highway 1 near Muir Beach resulted in a full closure of the road, causing \$1 million in damages.
02/28/2014	Debris Flow	N/A	Rock and mudslide blocking portions of Highway 1 at Panoramic.
03/29/2006 – 04/16/2006	Severe Storms, Flooding, Landslides, and Mudslides	DR-1646	Persistent heavy rainfall caused a massive number of landslides across the Sonoma and Marin County valleys area during the first half of April. About \$20 million of damage was done to agriculture. In Marin county the hardest hit areas were Mill Valley, Fairfax, and San Rafael. In Mill Valley, a man was killed after he was buried in a mudslide in his backyard.
12/17/2005 – 01/03/2006	Severe Storms, Flooding, Mudslides, and Landslides	DR-1628	Declaration of Emergency for Marin County declared due to severe winter storms. These caused flashfloods, mudslides, and damage to roads and other infrastructure.
01/03 – 02/10/1995	Severe Winter Storms, Flooding, Landslides, Mud Flows	DR-1044	A series of winter storms caused several mudslides in Marin County, blocking roads and damaging residential and public property.
01/21 – 03/30/1983	Coastal Storms, Floods, Slides, Tornadoes	DR-677	A series of winter storms along the California coast caused widespread property damage. As of January 29, 11 deaths were reported, along with damages to over 2,600 homes and 30 public roads.
12/19/1981 – 01/08/1983	Severe Storms, Flood, Mudslides, High Tide	DR-651	Heavy rainfall in the San Francisco Bay region on January 3–5 triggered thousands of debris flows from Santa Cruz County to Contra Costa and Sonoma Counties, as well as flooding along the San Lorenzo River, Soquel Creek, and Aptos Creek in Santa Cruz County. Floods along creeks in Marin County plus added significant amounts of sediment to Tomales Bay. The landslides caused at least \$66 million in damage. Landslides caused 25 of the 33 storm-caused deaths. Total estimated storm-related losses were \$280 million.

Sources: NOAA 2021, FEMA 2021; CBS SF BayArea, 2017; Marin County, 2006; The New York Times, 1995, 1983; USGS, 1988

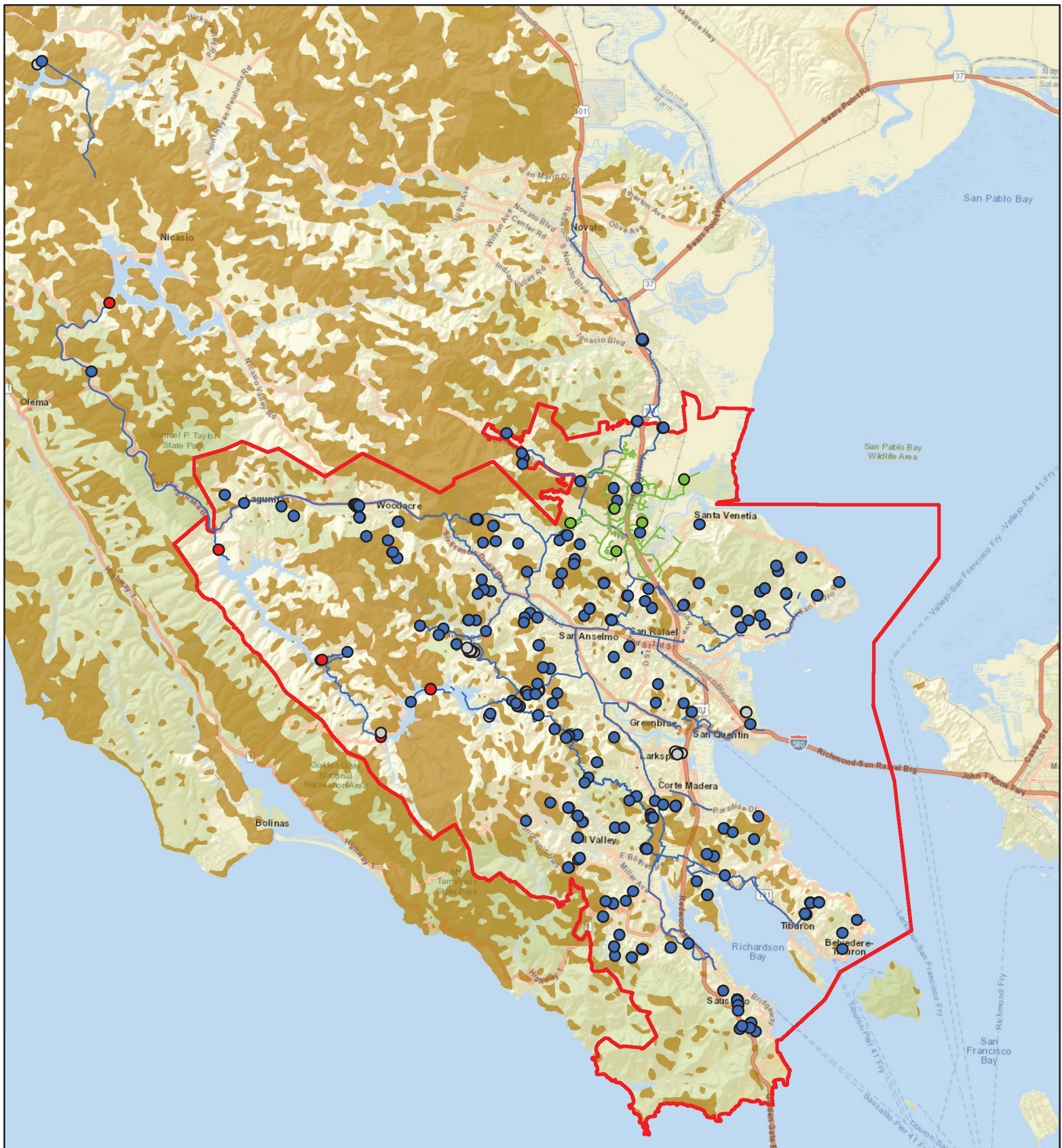




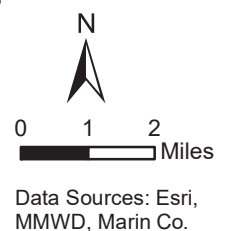
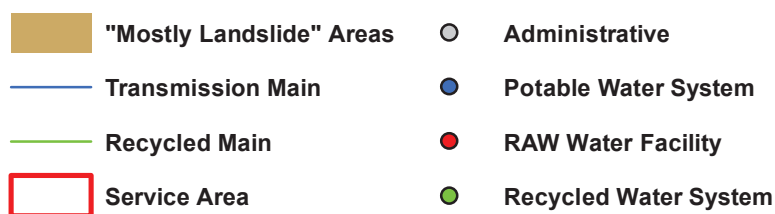
**Figure 11-2. Susceptibility to Deep-Seated Landslides**







**Figure 11-3. Distribution of Landslides Evident in the Landscape**





### 11.2.3 Frequency

Mass movements are often triggered by other natural hazards such as earthquakes, heavy rain, floods, or wildfires, so mass movement frequency is often related to the frequency of these other hazards. According to the National Centers for Environmental Information storm events database, the planning area has been impacted by flash flood, wildfires, and severe storms at least once every other year since 1960, representing an annual probability of 50 percent. Given the preponderance of steep slopes and the frequency of contributory sources to landslides in the planning area, the probability of future occurrence can be considered equal to this 50-percent annual probability. Until better data is generated specifically for mass movement hazards, this frequency is appropriate for the purpose of ranking risk.

### 11.2.4 Severity

Mass Movements destroy property and infrastructure and can take the lives of people. They pose a serious hazard to properties on or below hillsides. Landslides directly damage structures in two ways:

- Disruption of structural foundations caused by differential movement of the ground upon which the structure sits—As a landslide breaks away from a slope, it deforms the ground into an undulating surface broken up by fissures and scarps. This deformation distresses foundations and structures situated on top of a landslide by settlement, cracking, and tilting. This can occur slowly, over years, or rapidly within days or hours.
- The physical impact of debris moving down-slope against structures located in the debris flow's path—A water-saturated, fast-moving debris flow can destroy all in its path, collapsing walls and shifting structures off their foundations.

Slope failures in the United States result in an average of 25-50 lives lost per year and an annual cost to society of about \$1.5 billion. Landslides and debris flows cause millions of dollars in cumulative damage to Northern California's homes, businesses, and infrastructure every year.

### 11.2.5 Warning Time

The velocity of mass movements range from a slow creep of inches per year to many feet per second, depending on slope angle, material and water content. Some methods used to monitor mass movements can provide an idea of the type of movement and the amount of time prior to failure. It is also possible to determine what areas are at risk during general time periods. Assessing the geology, vegetation, and amount of predicted precipitation for an area can help in these predictions.

There is no practical warning system for individual mass movements. The current standard operating procedure is to monitor situations on a case-by-case basis and respond after the event has occurred. Generally accepted warning signs for mass movement activity include the following:

- Springs, seeps, or saturated ground in areas that have not typically been wet before
- New cracks or unusual bulges in the ground, street pavements or sidewalks
- Soil moving away from foundations
- Ancillary structures such as decks and patios tilting and/or moving relative to the main house
- Tilting or cracking of concrete floors and foundations

- Broken water lines and other underground utilities
- Leaning telephone poles, trees, retaining walls or fences
- Offset fence lines
- Sunken or down-dropped road beds
- Rapid increase in creek water levels, possibly accompanied by increased turbidity (soil content)
- Sudden decrease in creek water levels though rain is still falling or just recently stopped
- Sticking doors and windows, and visible open spaces indicating jambs and frames out of plumb
- A faint rumbling sound that increases in volume as the landslide nears
- Unusual sounds, such as trees cracking or boulders knocking together.

### 11.3 EXPOSURE

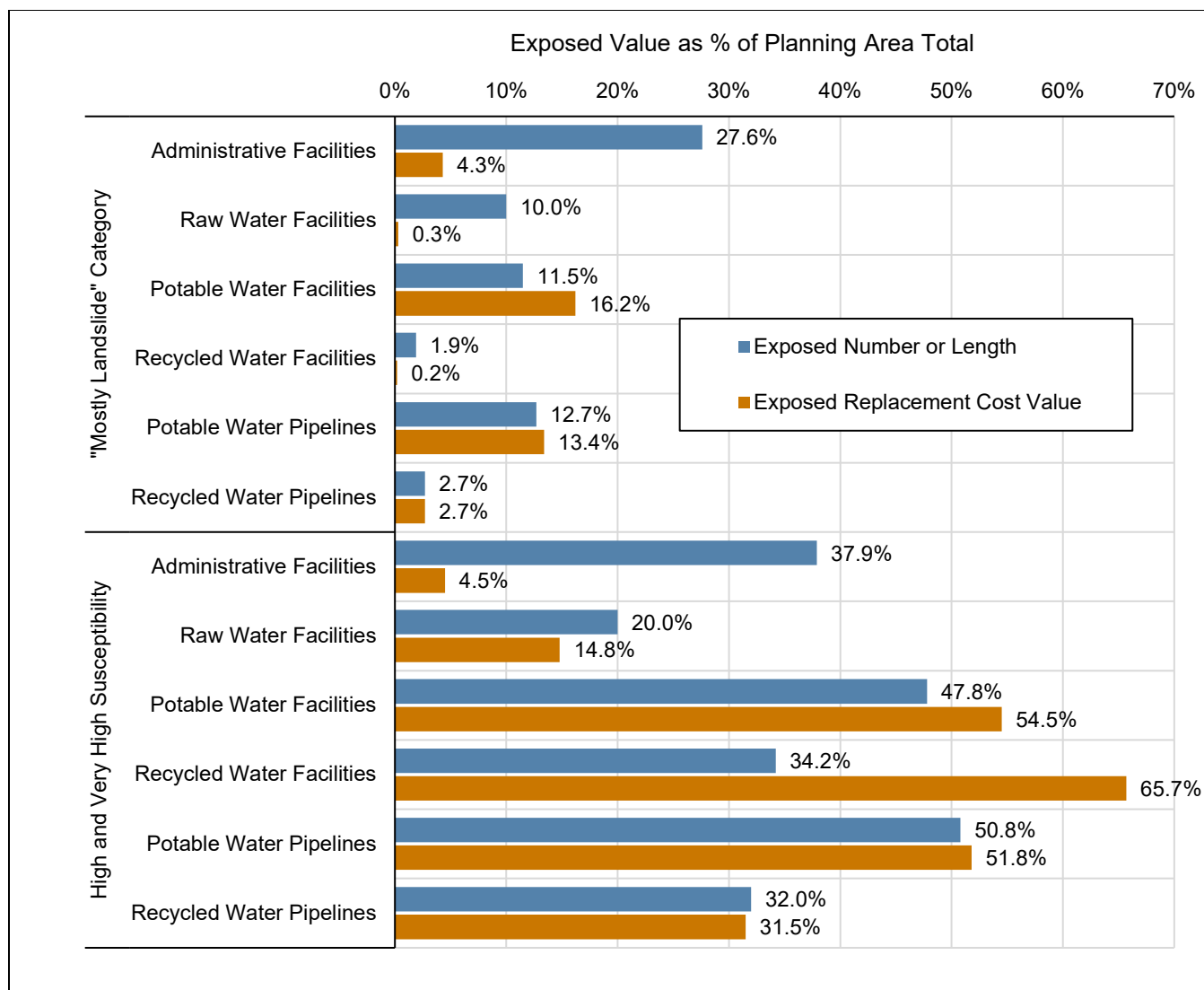
The risk assessment for landslide evaluated District assets that lie within landslide susceptibility zones. Table 11-2 summarizes the number of each type of facility in each mapped landslide susceptibility zone and the total replacement cost value of those exposed facilities. Figure 11-4 shows the results as the percent of total planning area assets.

**Table 11-2. Number and Value of District Facilities Exposed to the Landslide Hazard**

Assets	"Mostly Landslide" Category		High and Very High Susceptibility	
	Exposed Number or Length	Exposed Replacement Cost Value	Exposed Number or Length	Exposed Replacement Cost Value
<b>Structures/Facilities</b>	<b>Number</b>		<b>Number</b>	
Administrative	8	\$3,091,699	11	\$3,175,798
Raw Water Facilities	1	\$50,000	2	\$2,652,474
Potable Water Structures	23,054	\$109,829,900	95,993	\$369,858,398
Recycled Water Facilities	31	\$18,150	557	\$5,220,650
<b>Total</b>	<b>23,094</b>	<b>\$112,989,749</b>	<b>96,563</b>	<b>\$380,907,320</b>
<b>Pipelines</b>	<b>Length in Feet</b>		<b>Length in Feet</b>	
Potable Water	748,099	\$455,699,813	2,988,327	\$1,758,102,626
Recycled Water	3,740	\$2,507,679	44,476	\$28,989,679
<b>Total</b>	<b>751,839</b>	<b>\$458,207,492</b>	<b>3,032,803</b>	<b>\$1,787,092,305</b>
<b>Total</b>		<b>\$571,197,241</b>		<b>\$2,167,999,625</b>

### 11.4 VULNERABILITY

Loss estimation modeling is not available for the landslide hazard. Although complete historical documentation of the landslide threat in the planning area is lacking, the available history of landslides in the region suggests a significant vulnerability to such hazards.



**Figure 11-4. District Facilities Exposed to the Landslide Hazard as % of Planning Area Total**

Damage attributable to landslides has the potential to affect any exposed MMWD assets. At this time all assets exposed to the landslide hazard are considered vulnerable until more information becomes available. A more in-depth analysis of mitigation measures taken to protect these facilities in the event of landslides should be done to determine if they could withstand the potential impacts. In the MMWD pipeline system, pipes made of more brittle materials, such as clay or concrete, are more likely to be damaged by landslide movements than pipes of more ductile materials such as ductile iron or polyvinyl chloride.

## 11.5 DEVELOPMENT TRENDS

The demand for critical MMWD services may increase with growth in the surrounding area. The State of California's adoption of bills expanding property owners' rights to build accessory dwelling units will increase densities in most the MMWD service area; areas that, as recently as 2019, were thought to be built out.

Repair or replacement of MMWD assets, if necessary, will be governed by codes and standards applied by the County of Marin, depending upon the location of the asset. These jurisdictions have adopted codes and standards that include adoption of the 2019 California State Building Code, which is based on the 2018 International Building Code. The building code includes provisions for geotechnical analyses in steep slope areas that have soil types that are susceptible to landslide hazards. These provisions ensure that new construction is built to standards that reduce the vulnerability to landslide risk. Applications of these codes and standards to any new or redeveloped MMWD assets will reduce the risk of potential impacts from landslides.

## 11.6 ISSUES

Important issues associated with landslides in the planning area include the following:

- The MMWD has critical facilities exposed to landslide hazards.
- Mapping and assessment of landslide hazards are constantly evolving. As new data and science become available, assessments of landslide risk should be reevaluated.
- The impact of climate change on landslides is uncertain. If climate change impacts atmospheric conditions, then exposure to landslide risks is likely to increase.
- Landslides may cause negative environmental consequences, including water quality degradation.
- The risk associated with the landslide hazard overlaps the risk associated with other hazards such as earthquake, flood and wildfire. This provides an opportunity to seek mitigation alternatives with multiple objectives that can reduce risk for multiple hazards.

## 12. SEVERE WEATHER

### 12.1 GENERAL BACKGROUND

Severe weather refers to any dangerous meteorological phenomena with the potential to cause damage, serious social disruption, or loss of human life. The most common severe weather events affecting the District are extreme heat and high wind, which are described in the following sections.

#### 12.1.1 Extreme Temperature

Extreme heat can be defined as temperatures that hover 10 °F or more above the average high temperature for the region, last for prolonged periods of time, and are often accompanied by high humidity. The National Weather Service (NWS) monitors a heat index that takes both temperature and humidity into account (see Figure 12-1).

Source: National Weather Service

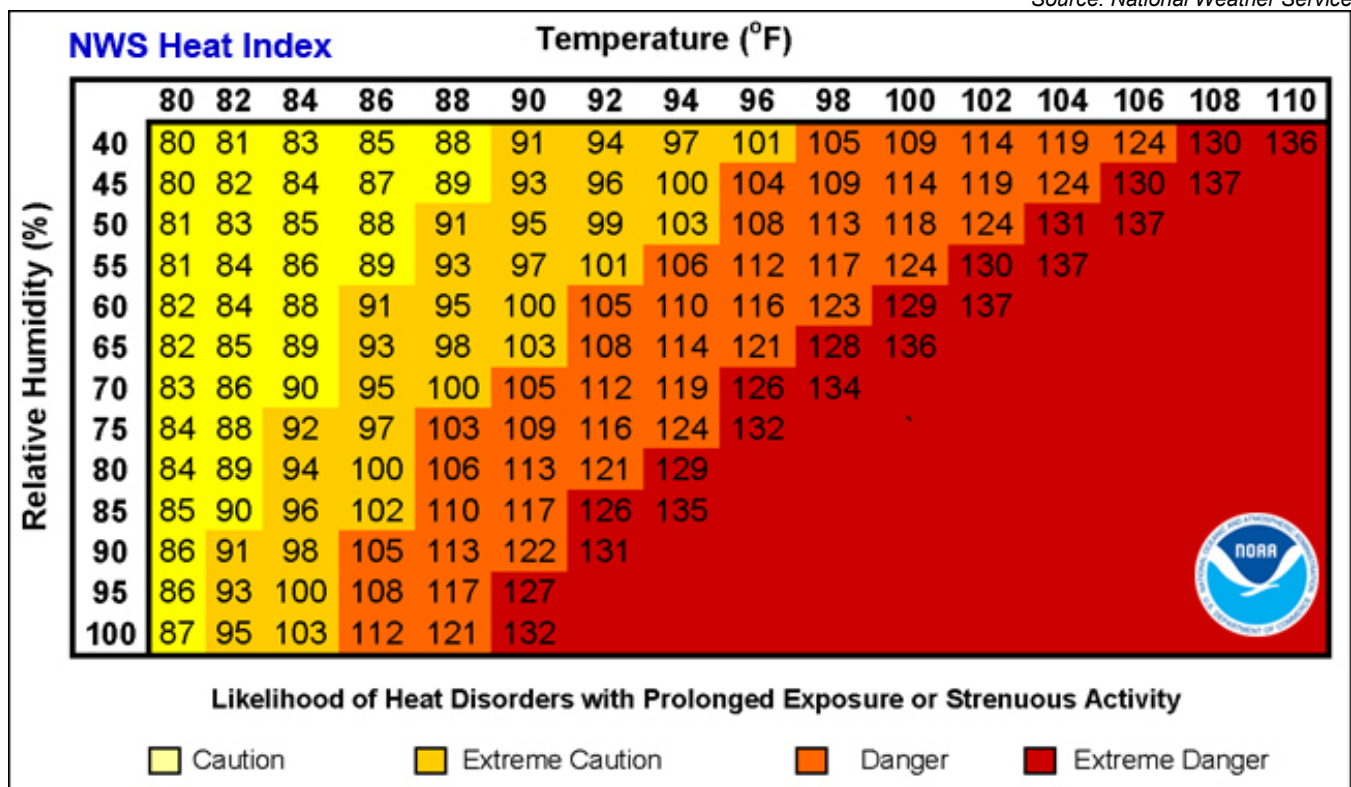


Figure 12-1. Extreme Heat Index

According to the *California Climate Adaptation Strategy*, heat waves have claimed more lives in California than all other declared disaster events combined. Despite this history, few heat emergencies have been proclaimed at the state or federal level. Heat emergencies are often slow to develop and usually hurt vulnerable populations. It can take a number of days of oppressive heat for a heat wave to have a significant or quantifiable impact. Heat waves do not strike victims immediately, but rather their cumulative effects slowly take the lives of vulnerable populations.

The “urban heat island effect” can produce significantly higher nighttime temperatures where asphalt and concrete (which store heat longer) gradually release heat at night. Urban heat islands develop in urban areas where natural surfaces are paved with asphalt or covered by buildings. Radiation from the sun is absorbed by these surfaces during the day and re-radiated at night, raising ambient temperatures. Urban heat islands have high nighttime minimum temperatures compared to neighboring areas. Waste heat from air conditioners, vehicles, and other equipment contributes to the urban heat island effect.

### 12.1.2 High Winds

High winds are generally short-duration events involving straight-line winds or gusts of over 50 mph, strong enough to cause property damage. Straight-line wind is any wind that is not associated with rotation; this term is used mainly to differentiate from tornado winds. Most thunderstorms produce some straight-line winds because of outflow generated by the thunderstorm downdraft.

High winds are especially dangerous in areas with significant tree stands and areas with exposed property, poorly constructed buildings, manufactured housing units, major infrastructure, and above-ground utility lines. A windstorm can topple trees and power lines, cause damage to residential, commercial, and critical facilities, and leave tons of debris in its wake.

#### **Types of Damaging Winds**

Damaging winds are classified as those exceeding 60 mph. Damage from such winds is more common than damage from tornadoes. Wind speeds can reach up to 100 mph and can produce a damage path extending for hundreds of miles. Damaging straight-line winds include the following:

- **Downdraft**—A small-scale column of air that rapidly sinks toward the ground.
- **Downburst**—A strong downdraft with horizontal dimensions larger than 2.5 miles resulting in an outward burst or damaging winds on or near the ground. Downburst winds may begin as a microburst and spread out over a wider area, sometimes producing damage similar to a strong tornado. Although usually associated with thunderstorms, downbursts can occur with showers too weak to produce thunder.
- **Microburst**—A small, concentrated downburst that produces an outward burst of damaging winds at the surface. Microbursts are generally less than 2.5 miles across and short-lived, lasting only 5 to 10 minutes, with maximum wind speeds up to 168 mph.
- **Gust front**—The leading edge of rain-cooled air that clashes with warmer thunderstorm inflow. Gust fronts are characterized by a wind shift, temperature drop, and gusty winds out ahead of a thunderstorm. Sometimes the winds push up air above them, forming a shelf cloud or detached roll cloud.
- **Derecho**—A widespread thunderstorm wind caused when new thunderstorms form along the leading edge of an outflow boundary (the boundary formed by horizontal spreading of thunderstorm-cooled air). The word “derecho” is of Spanish origin and means “straight ahead.” Thunderstorms feed on the boundary and continue to reproduce. Derechos typically occur in summer when complexes of



thunderstorms form over plains, producing heavy rain and severe wind. The damaging winds can last a long time and cover a large area.

- **Bow Echo**—A linear wind front bent outward in a bow shape. Damaging straight-line winds often occur near the center of a bow echo. Bow echoes can be 200 miles long, last for several hours, and produce extensive wind damage at the ground.

### **Rating Wind Strength**

As shown in Table 12-1 the Beaufort Wind Scale is an empirical measure that relates wind speed to observed conditions at sea or on land.

**Table 12-1. Beaufort Wind Scale**

Beaufort Number	Speed (mph)	Terminology	Description
0	0	Calm	Calm. Smoke rises vertically.
1	1-3	Light air	Wind motion visible in smoke.
2	4-7	Light breeze	Wind felt on exposed skin. Leaves rustle.
3	8-12	Gentle breeze	Leaves and smaller twigs in constant motion.
4	13-18	Moderate breeze	Dust and loose paper is raised. Small branches begin to move.
5	19-24	Fresh breeze	Smaller trees sway
6	25-31	Strong breeze	Large branches in motion. Whistling heard in overhead wires. Umbrella use is difficult.
7	32-38	Near gale	Whole trees in motion. Some difficulty when walking into the wind.
8	39-46	Gale	Twigs broken from trees. Cars veer on road.
9	47-54	Severe gale	Light structure damage.
10	55-63	Storm	Trees uprooted. Considerable structural damage.
11	64-73	Violent storm	Widespread structural damage.
12	74-95	Hurricane	Considerable and widespread damage to structures.

Source: Lewis, 2018





### **12.1.3 Secondary Hazards**

Extreme heat can contribute to drought conditions. Extreme temperatures also can dry vegetation, contributing to the possibility of wildfire. Wind can accelerate the flames of a wildfire, helping the fire grow in area or intensity. High temperatures, extreme dryness, and high winds can create conditions in which any spark at the wrong time and place can lead to a major wildfire.

### **Public Safety Power Shutoffs**

Public safety power shutoff (PSPS) events are secondary hazards associated with severe weather. Under certain severe weather conditions, utility service providers shut off power to help prevent wildfire and keep communities safe. A combination of dry vegetation and high winds can uproot trees, blow branches onto power lines or create sparks if power lines contact one another. These conditions call for a PSPS. These outages occur across the state to prevent wildfires and keep communities safe. Table 12-2 shows the weather conditions that are monitored by utility service providers that trigger PSPS events. These events can impact areas beyond where severe weather conditions are being observed due to the grid nature of electrical power distribution systems. Sustained periods of downtime could lead to significant economic impacts.

**Table 12-2. Triggers for Public Safety Power Shutoff Events**

Monitor Factor	Metrics
Red Flag Warning 	A warning declared by the National Weather Service that weather conditions could lead to fire and rapid spread.
Low Humidity 	20% or lower humidity. Low humidity creates dry vegetation, which fuel fire.
High Winds 	Sustained wind speeds above 25 miles per hour and wind gusts above 45 miles per hour can cause fire to spread.
Utility Observations 	On-the-ground findings from Utility crews.

Most Marin County residents live in elevated (Tier 2) or extreme (Tier 3) fire threat areas. Pacific Gas and Electric Company is expanding its Community Wildfire Safety Program that includes PSFS events when extreme fire danger conditions are forecasted (Marin HHS, 2021).

## 12.2 HAZARD PROFILE

### 12.2.1 Past Events

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

#### Extreme Heat

According to the Western Regional Climate Center, the planning area averages 20-25 days a year with temperatures exceeding 90°F, and those days may be included in a heat wave event. A storm event database maintained by NOAA's National Centers for Environmental Information lists the following excessive heat events in the planning area:

- **September 6 – 7, 2020** – A large area of high pressure over the west brought excessive heat and dry conditions to the region. Numerous record high temperatures were broken with 13 broken records on Sunday the 6th alone, including records set that weekend for the month of September. Temperatures over the long weekend breached 110 degrees across the interior with 90s along the coast to start the weekend and even reaching 100 degrees in San Francisco on Sunday. Once the ridge began to break down towards the end of the weekend, offshore winds increased flaring up some of the wildfires that were ignited during August's lightning storm. These winds also enabled smoke from various wildfires across the state to blanket much of the Bay Area. The skies were tinted orange and red with ash accumulating for many locations. Two locations in the North Bay Valleys tied previous record high temperatures for the month of September. Kentfield with 108 degrees and Napa with 110 degrees.

#### High Winds

Marin County has experienced high wind events. The National Centers for Environmental Information storm events database lists the following wind events from 2000 to 2020:

- 87 high wind events, with 9 categorized as damaging wind events.
- 8 thunderstorm events, with none categorized as damaging wind events.

## 12.2.2 Location

Severe weather events have the potential to happen anywhere in the planning area. Extreme heat events may be exacerbated in the District where reduced air flow, reduced vegetation, and increased generation of waste heat can contribute to temperatures that are several degrees higher than in surrounding less urbanized areas. High wind events affect an entire region.

## 12.2.3 Frequency

### **Extreme Heat**

The National Climatic Data Center storm events database lists 1 excessive heat event in Marin County since 2000. This correlates to a 0.05 percent annual probability. Climate change is likely to bring hotter temperatures, more hot days, and more frequent heat waves, leading to higher rates of heat-related impairments and deaths.

### **High Winds**

The severe weather events for the planning area are often related to high winds. Based on a record of 87 high wind events (over 60 mph) in 21 years, the planning area will continue to experience these on an annual basis.

## 12.2.4 Severity

### **Extreme Heat**

Extreme heat is the primary weather-related cause of death in the U.S. In a 10-year record of weather fatalities across the nation from (2006-2015), excessive heat claimed more lives each year than floods, lightning, tornadoes, and hurricanes. In 2015, heat claimed 25 lives, though none of them were in California (NWS 2016b).

Extreme heat can cause heat exhaustion, in which the body becomes dehydrated, resulting in an imbalance of electrolytes. Without intervention, heat exhaustion can lead to collapse and heatstroke. Heatstroke occurs when perspiration cannot occur and the body overheats. It can lead to confusion, coma, and death. Hot weather also can increase levels of ozone, a major component of smog that is created in the presence of sunlight. High ozone levels often cause or worsen respiratory problems. The longer a heat wave lasts and the hotter the temperature is, the greater the risk of adverse impacts on human health or infrastructure.

Extreme heat events do not typically impact buildings; however, losses may be associated with the urban heat island effect and overheating of HVAC systems. Extreme heat events can lead to drought, which can impact water supplies, or contribute to wildfires (see Chapter 14).

### **High Winds**

The most common problems associated with severe winds are immobility and loss of function for utilities caused by power outage. Fatalities are uncommon but can occur. Power lines may be downed due to high winds, and services such as water or phone may not be able to operate without power. Physical damage to homes and facilities can be caused by wind induced falling objects such as trees. High winds are a frequent problem in the planning area and have been known to damage utilities. The wind speed given in wind warnings issued by the NWS is for a one-minute average; gusts may be 25 to 30 percent higher.

### 12.2.5 Warning Time

Meteorologists can often predict the likelihood of severe weather. This can give several days of warning time. However, meteorologists cannot predict the exact time of onset or severity of any given weather condition. Some events may come on more quickly and have only a few hours of warning time. The NWS issues advisories, watches and warnings associated with wind and temperature as listed in Table 12-3.

**Table 12-3. NWS Weather Warnings, Watches and Advisories**

	Warning	Watch	Advisory
<b>Wind<sup>a</sup></b>	Strong sustained winds for one hour or longer, or wind gusts for any duration that are not associated with thunderstorms are occurring or will occur within six to 12 hours	Strong sustained winds for one hour or longer, or wind gusts for any duration that are not associated with thunderstorms are occurring or will occur within 12 to 48 hours	Strong winds are occurring or will occur within 12 to 24 hours but are not so strong as to warrant a high wind warning
<b>Excessive heat<sup>b</sup></b>	Heat index values are forecast to meet or exceed locally defined warning criteria for more than three hours over at least two consecutive days; issued within 12 hours of the onset of the high heat index	Conditions are favorable in the next 24 to 72 hours for extreme heat index values during the day, combined with nighttime low temperatures of 80 °F or higher that limit perspiration recovery,	Heat index values are forecast to meet or exceed locally defined warning criteria for one or two days; usually issued within 12 hours of the onset of the high heat index

- a. NWS offices issue wind-related products based on local criteria for strong sustained winds or gusts
- b. Specific criteria varies among local weather forecast offices due to climate variability and the effect of excessive heat on the local population. Typical criteria are maximum daytime temperatures above 105 °F to 110 °F for up to three hours per day, with minimum nighttime temperatures above 75 °F for two consecutive days. Criteria may be lowered if the heat event occurs early in the season or during a multi-day heat wave or a widespread power outage

Sources: Wikipedia, 2020; NWS, 2020

## 12.3 EXPOSURE

It can be assumed that all MMWD assets are exposed to some extent to severe weather events profiled in this chapter. Power outages or roaming blackouts may occur as a result of extreme heat events that strain and overheat circuits. During a blackout, all critical facilities that rely on electricity for power will be severely impacted unless they are connected to a backup power source. Facilities on higher ground may also be exposed to wind damage or damage from falling trees.

## 12.4 VULNERABILITY

Currently, there are no available models that can estimate loss and loss of function from severe weather events. Therefore, no formal loss estimations have been developed.

Weather-related vulnerability is tied predominantly to the loss of power, as most of the MMWD critical facilities are power dependent. Weather-induced loss of power for the planning area is prevalent, especially considering the impact of Public Safety Power Shutoff protocols being deployed by electric utility service providers in California. The Public Safety Power Shutoff is a procedure in which a utility service provider may turn off electricity in the interest of public safety if severe weather threatens a portion of the electric system. The MMWD has backup power for most but not all of its critical facilities, so there is some degree of vulnerability associated with this core capability. There are portable sources for emergency power supply, but these sources are not as efficient as fixed-place backup power for each facility.

## 12.5 DEVELOPMENT TRENDS

The demand for critical MMWD services may increase with growth in the surrounding area. The State of California's adoption of bills expanding property owners' rights to build accessory dwelling units will increase densities in most the MMWD service area; areas that, as recently as 2019, were thought to be built out.

Repair or replacement of MMWD assets, if necessary, will be governed by codes and standards applied by the various municipalities, depending upon the location of the asset. These jurisdictions have adopted codes and standards that include adoption of the 2019 California State Building Code, which is based on the 2018 International Building Code. The building code includes provisions for mitigating the impacts from high winds and structure insulation requirements that can mitigate the impacts from extreme heat. These codes and standards would have no direct impact on future MMWD assets, with the exception of any new structures the District may construct.

## 12.6 ISSUES

Important issues associated with a severe weather in the planning area include the following:

- The MMWD backup power capability should be enhanced
- Dead or dying trees as a result of drought conditions are more susceptible to falling during severe storm events.
- Severe weather events are likely to increase as a result of climate change impacts, including the potential for extreme heat.



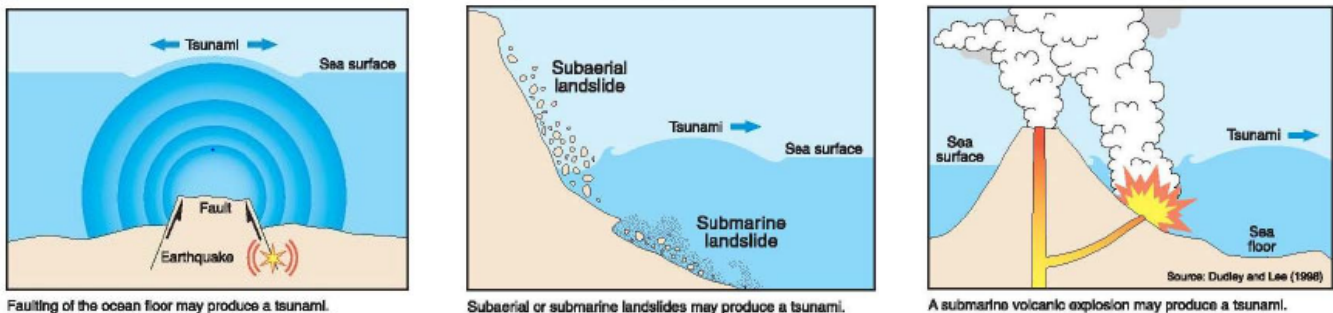


# 13. TSUNAMI

## 13.1 GENERAL BACKGROUND

A tsunami is a series of high-energy waves that radiate outward like pond ripples from an area where a generating event occurs, arriving at shorelines over an extended period. Tsunamis can be induced by earthquakes, landslides and submarine volcanic explosions (see Figure 13-1). Tsunamis are typically classified as local or distant, depending on the location of their source in comparison to where waves occur:

- The waves nearest to the generating source represent a local tsunami. Such events have minimal warning time, leaving few options except to run to high ground after a strong, prolonged local earthquake. Damage from the tsunami adds to damage from the triggering earthquake due to ground shaking, surface faulting, liquefaction, and landslides.
- The waves far from the generating source represent a distant tsunami. Distant tsunamis may travel for hours before striking a coastline, giving a community a chance to implement evacuation plans if a warning is received.



**Figure 13-1. Common Sources of Tsunamis**

Historical records suggest that tsunami wave heights on the order of 15 to 60 feet on the West Coast could be generated by a powerful earthquake near the coast. Significant damage would result from the ground shaking, tsunami wave forces, and impacts associated with debris.

### 13.1.1 Tsunami Characteristics

In the open ocean, a tsunami may be only a few inches or feet high, but it can travel with speeds approaching 600 miles per hour. As a tsunami enters the shoaling waters near a coastline, its speed diminishes, its wavelength decreases, and its height increases greatly. At the shoreline, tsunamis may take the form of a fast-rising tide, a cresting wave, or a bore (a large, turbulent wall-like wave). The bore phenomenon resembles a step-like change in

the water level that advances rapidly (from 10 to 60 miles per hour). The first wave is usually followed by several larger and more destructive waves.

The configuration of the coastline, the shape of the ocean floor, and the characteristics of advancing waves play important roles in the destructiveness of the waves. Bays, sounds, inlets, rivers, streams, offshore canyons, islands, and flood control channels may cause various effects that alter the level of damage. Offshore canyons can focus tsunami wave energy, and islands can filter the energy. It has been estimated that a tsunami wave entering a flood control channel could reach a mile or more inland, especially if it enters at high tide. The orientation of the coastline determines whether the waves strike head-on or are refracted from other parts of the coastline. A wave may be small at one point on a coast and much larger at other points. The inundation area for a tsunami event is often described as runup as illustrated in Figure 13-2.

Source: UNESCO, Retrieved from *Different Directions: Tsunami*, n.d.

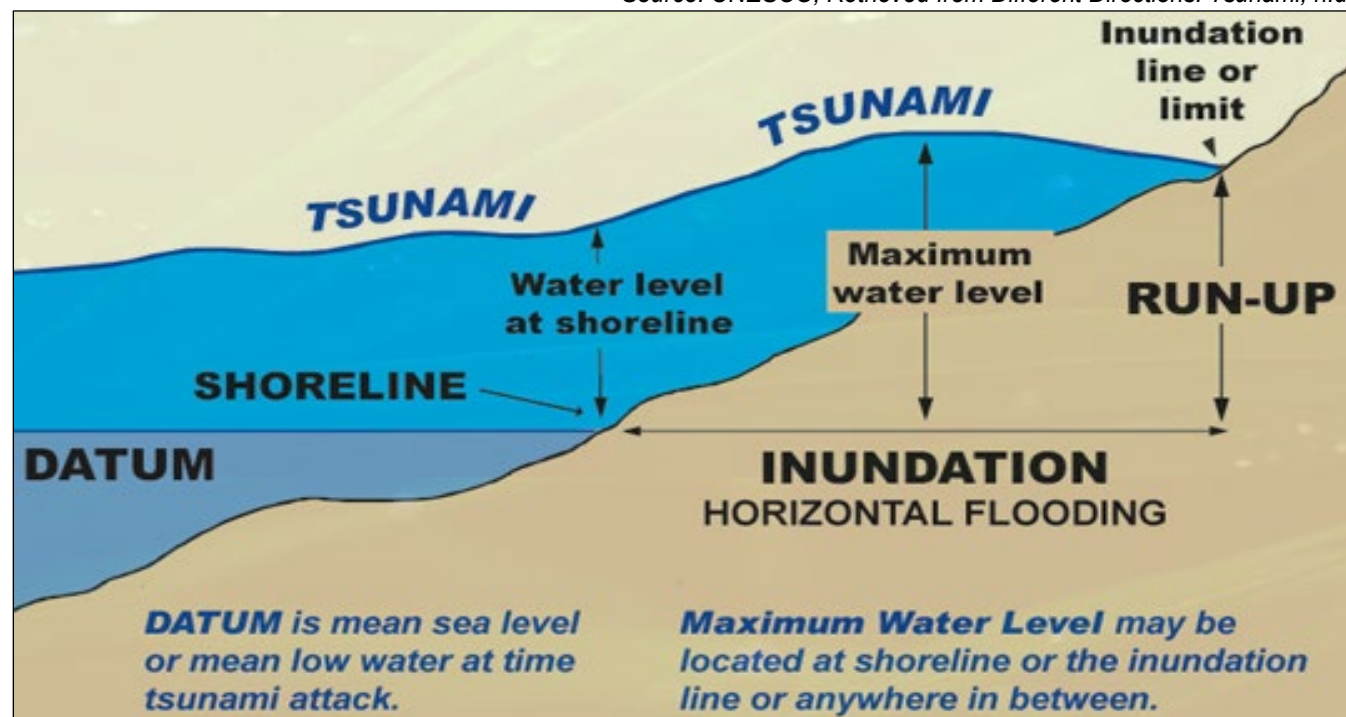


Figure 13-2. Runup Distance and Height in Relation to the Datum and Shoreline

### 13.1.2 Secondary Hazards

A major tsunami in the planning area would result in flooding near the coastline.

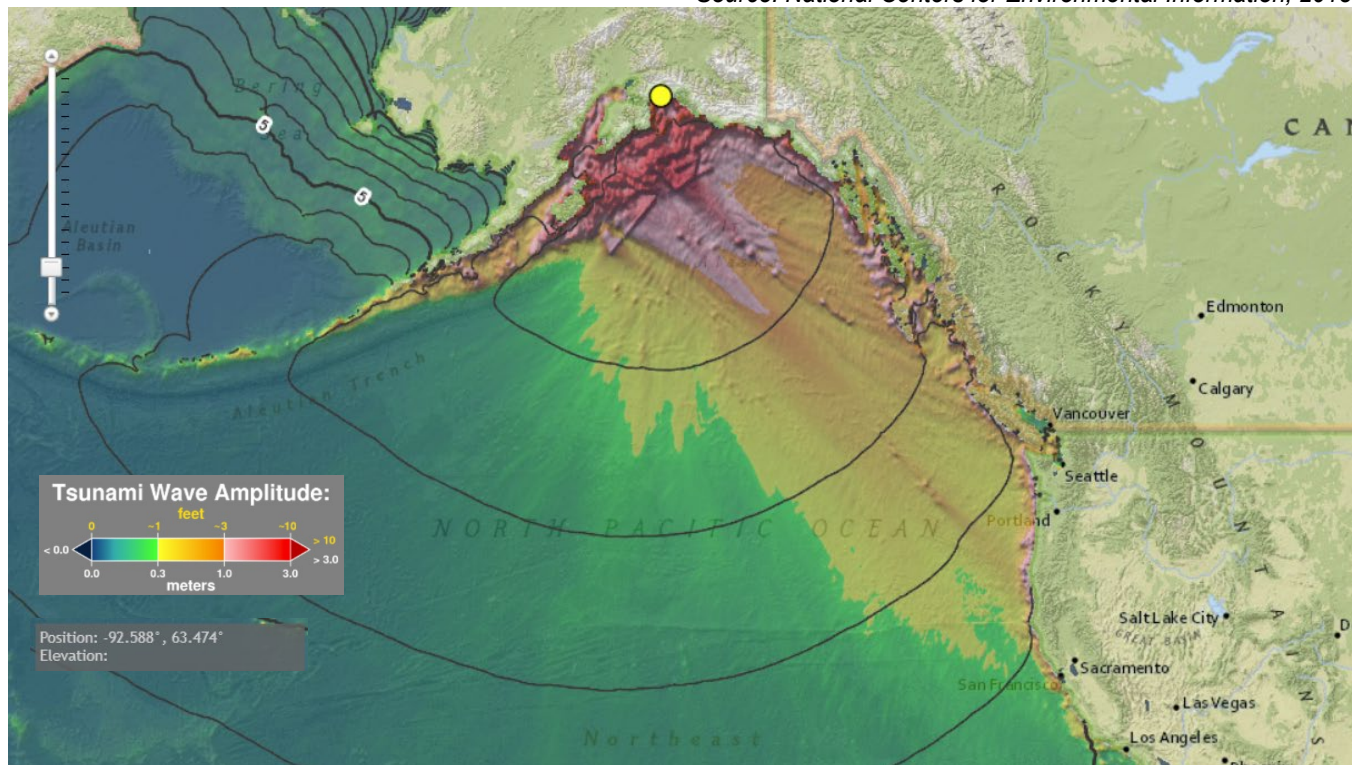
## 13.2 HAZARD PROFILE

### 13.2.1 Past Events

California is at risk from both local and distant tsunamis. About 80 possible or confirmed tsunamis in California have been observed or recorded, including the following:

- The most recent recorded tsunamis affecting California were the March 11, 2011 tsunami caused by an earthquake near Japan, which resulted in nearly \$100 million in damage to the California maritime community, and the February 27, 2010 minor recorded tsunami inundation in California caused by an earthquake near Chile.
- A 1960 Chilean earthquake produced a tsunami that impacted the entire Pacific basin. Damage was reported in California ports and harbors from San Diego to Crescent City and losses exceeded \$1 million.
- A 1964 tsunami generated by a Magnitude-9.2 Alaska earthquake (see Figure 13-3) killed 12 in Northern California and caused over \$15 million in damage. Wave oscillations in San Francisco Bay lasted more than 12 hours, causing nearly \$200,000 in damage to boats and harbor structures. Sonoma County experienced slight tsunami impacts from this event.

Source: National Centers for Environmental Information, 2018



**Figure 13-3. 1964 Alaska Earthquake Tsunami Event**

### 13.2.2 Location

The areas in Marin County that have the greatest exposure to potential damages by a tsunami are those coastal communities along the Pacific Coast areas. The County of Marin has produced Tsunami Coastal Inundation Maps for their Pacific Coast areas at Dillon Beach, Tomales Bay Eastshore, Inverness Area, Stinson Beach, Bolinas, and Muir Beach. The County also produced Inner Bay Inundation Maps for the following communities:

- **San Rafael/San Quentin**—San Rafael, San Quentin, Strawberry Point, Tiburon, Corte Madera, and Larkspur
- **San Francisco North**—Sausalito, Marin City, Mill Valley, Strawberry Point, Tiburon
- **Novato/Petaluma Point**—Novato, Petaluma Point, Santa Venetia (Marin County Sheriff's Office, 2021)

Figure 13-4 shows the extent and the location of the tsunami inundation areas for the Marin County planning area. This map does not represent risk from a single event but shows a composite area of risk that combines the inundation areas from a number of local and distant potential sources, including the Cascadia subduction zone, the Central Aleutians Island subduction zone, historical earthquake events, and other sources (California Department of Conservation, 2017a). The inundation areas represent the maximum considered tsunami runup from a number of extreme, yet realistic, tsunami sources. The tsunami hazard zone is mostly influenced by a local source Cascadia event; however, distant sources can result in notable wave run ups. Additional tsunami mapping information is available from the California Department of Conservation (California Department of Conservation, 2017a and 2017b).

### 13.2.3 Frequency

There have been no tsunami events known to impact the planning area in 80 years. Most tsunami events that occur are minor. Typically, four or five tsunamis occur every year in the Pacific Basin, and those that are most damaging have historically been generated in the Pacific waters off South America rather than in the northern Pacific (County of Marin, 2018). The National Tsunami Hazard Mitigation Program rates the risk to the U.S. west coast from the tsunami hazard as high to very high (Dunbar and Weaver, 2015).

### 13.2.4 Severity

A tsunami's size and speed, as well as the coastal area's form and depth, affect the impact of the tsunami. At some locations, the advancing turbulent wave front will be the most destructive part of the tsunami wave. In other situations, the greatest damage will be caused by the outflow of water back to the sea between crests, sweeping away items on the surface and undermining roads, buildings, bulkheads, and other structures. This outflow action can carry enormous amounts of highly damaging debris, resulting in further destruction. Ships and boats, unless moved away from shore, may be forced against breakwaters, wharves, and other craft, or be washed ashore and left grounded after the withdrawal of the seawater (National Tsunami Hazard Mitigation Program, 2001).

In 2009 Cal OES, the California Geologic Survey, and the University of Southern California mapped the tsunami run-up zone for the maximum credible earthquake along the Marin County coast, using NOAA's National Tsunami Hazard Mitigation Program. The modeling projected that a tsunami of 25 feet could occur in the coastal areas of Marin County. According to the National Tsunami Hazard Mitigation Program, tsunami events with runups of more than 3 feet are the most likely to be dangerous to people and property.

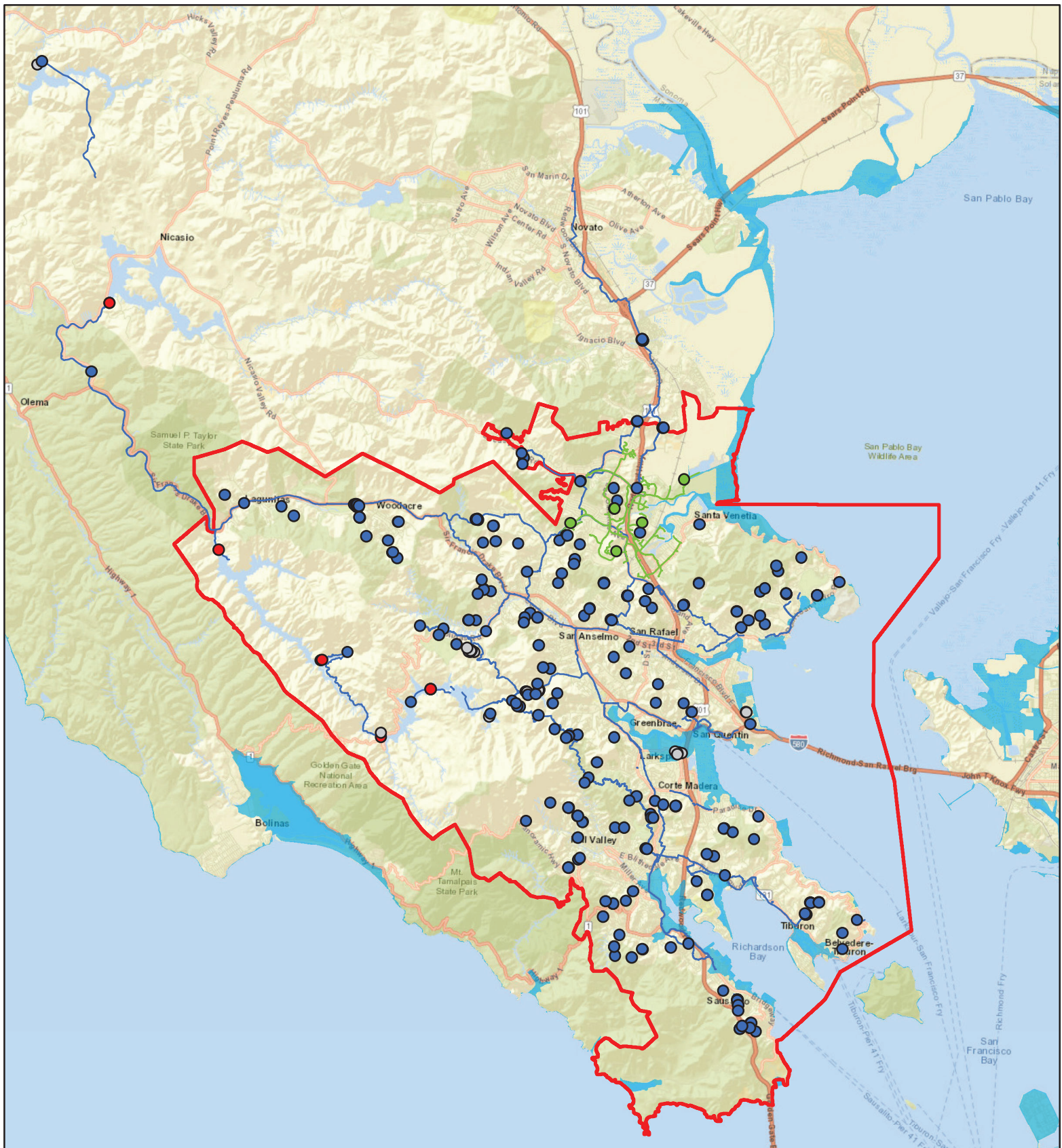
### 13.2.5 Warning Time

#### Visible Indications

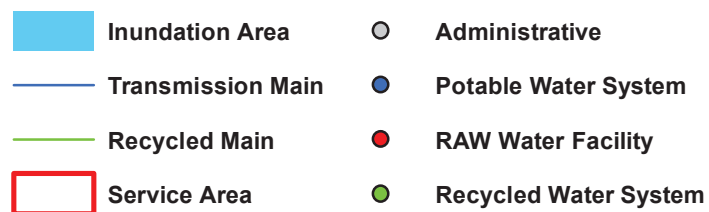
Tsunamis are difficult to detect in the open ocean; with waves generally less than 3 feet high. The first visible indication of an approaching tsunami may be either a rise or drop in water surface levels (National Tsunami Hazard Mitigation Program, 2001):

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





**Figure 13-4 Tsunami Inundation Area**



0 1 2  
Miles

Data Sources: Esri,  
MMWD, CGS

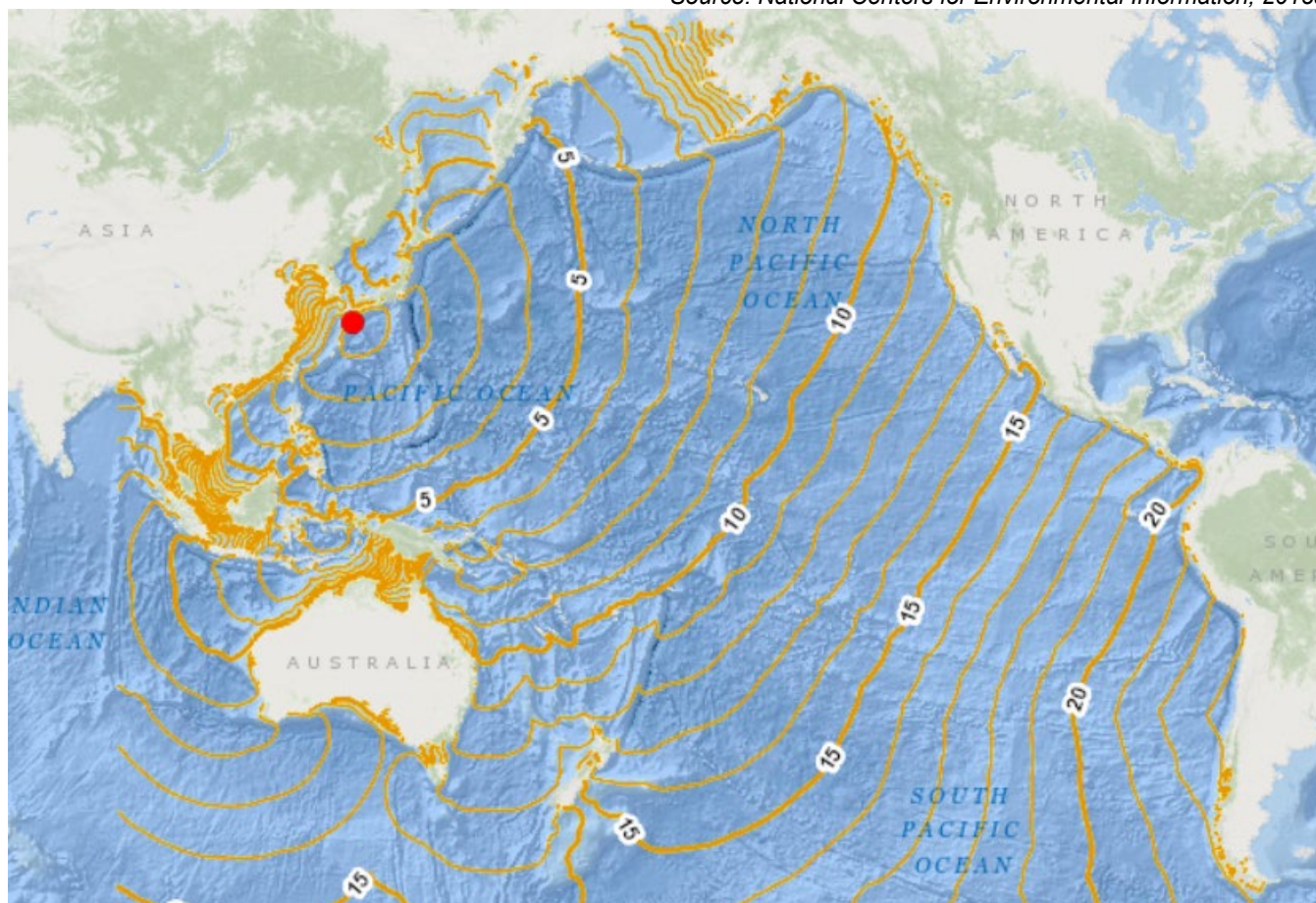


- The advancing tsunami may initially arrive as a strong surge increasing the sea level. This can be similar to the rising tide, but the tsunami surge rises faster and does not stop at the shoreline. Even if the wave height appears to be small, 3 to 6 feet for example, the strength of the accompanying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

### **Estimated Travel Times**

The NOAA National Center for Environmental Information website provides maps that show estimated travel times to coastal locations for various tsunami-generating events. Figure 13-5 shows one example of the travel time for a tsunami generated in Aburatsu, Japan to reach the planning area—approximately 11 hours.

*Source: National Centers for Environmental Information, 2018a*



**Figure 13-5.** Potential Tsunami Travel Times in the Pacific Ocean, in Hours

### **Warning System**

#### **Tsunami Warning System for the Pacific Ocean**

The tsunami warning system for the Pacific Ocean is a cooperative effort involving 26 nations. The National Weather Service operates two regional information distribution centers for this system: The Pacific Tsunami Warning Center in Ewa Beach, Hawaii; and the National Tsunami Warning Center covering the California coast



in Palmer, Alaska. The warning centers issue tsunami watches, warnings, and advisories. The system is activated when a Pacific basin earthquake of magnitude 6.5 occurs or an earthquake is widely felt along the North American coast. When this occurs, the following sequence of actions occurs:

- Data is interpolated to determine epicenter and magnitude of the event.
- If the earthquake is of the right type, depth, magnitude, and is far away from California coast, a TSUNAMI WATCH is typically issued for the California coastline.
- A TSUNAMI WATCH is upgraded to a TSUNAMI WARNING if tsunami wave heights are forecast to be 1 meter or larger. A TSUNAMI ADVISORY is issued if tsunami wave heights are forecast to be 0.3 meters to less than 1 meter.
- Tsunami travel times are calculated, and the warning is transmitted to disseminating agencies who relay it to the public.
- The National Tsunami Warning Center will cancel/expire watches, warnings, or advisories if tide gauges and buoys indicate no significant tsunami was generated or if tsunami waves no longer meet the criteria for at least 3 hours.

This system is not considered to be effective for communities close to the tsunami source, because the first wave would arrive before the data could be processed and analyzed, and communications systems may be impacted by the precipitating event. In this case, strong ground shaking would provide the first warning of a potential tsunami and evacuations should begin immediately.

### ***2018 Marin Operational Area Emergency Operations Plan – Tsunami Annex***

In its Tsunami Annex, the Marin County Emergency Operations Plan states that in the event of a tsunami warning, population in designated tsunami inundation hazard areas will be warned and advised to evacuate to higher ground or safe refuge areas. The public will be instructed to move by the quickest method available to a point no less than 30 feet above sea level. The expected arrival time of the tsunami will also be provided if available. After warning the public, alerting and moving populations at campgrounds, beaches, schools, or convalescent care facilities has the highest priority. Members of the public may receive warnings directly via the Alert Marin notification system, Emergency Alert System or the NOAA Weather Radio network. West Marin's Radio Station KWMR will provide follow-up messaging with verified updates to the public via airwaves and internet streaming in their area. Public alerting for watches and advisories will follow standard NOAA guidance (Marin County Sheriff Department, 2018).

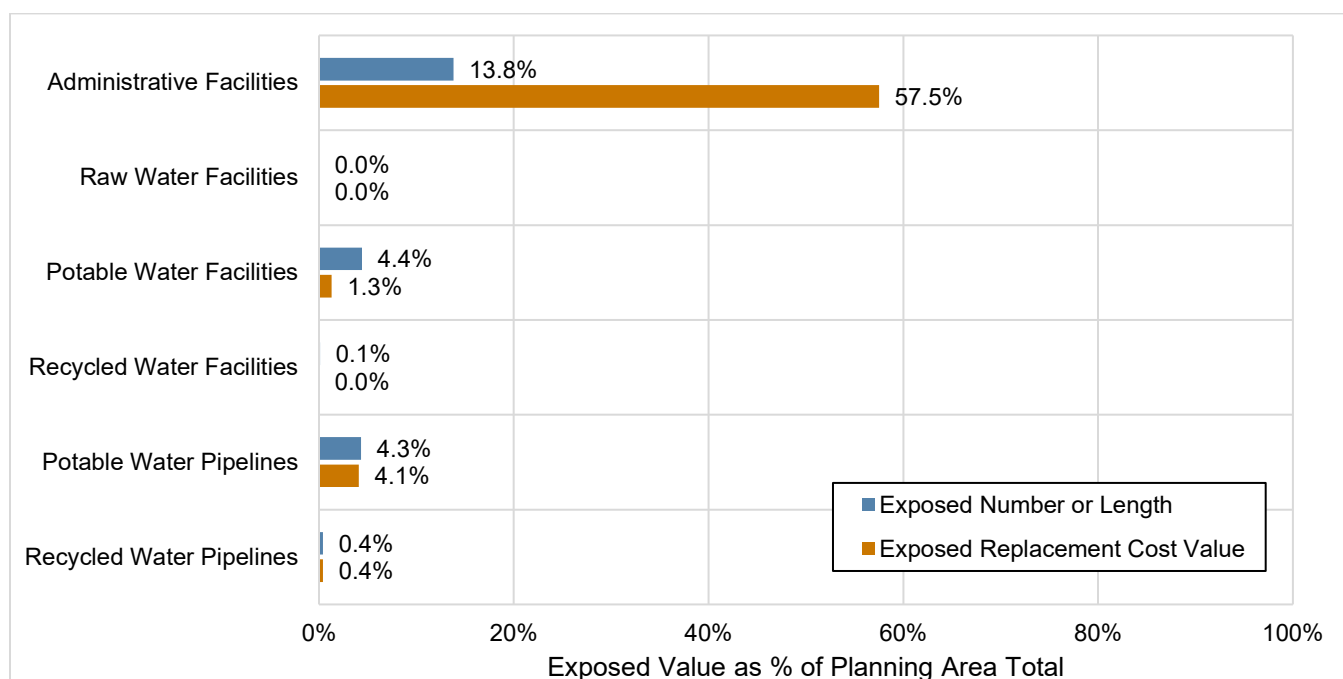
NOAA, Cal OES, and local emergency managers coordinate tsunami warning communications for the planning area. This emergency notification system is routinely tested and includes broadcasts on NOAA Weather Radio All Hazards, social media, local television and radio stations, sirens, and aircraft public address system. Alert Marin and the Wireless Emergency Alert System will also be activated during a real event.

## **13.3 EXPOSURE**

The risk assessment for tsunami evaluated District assets that lie within the mapped tsunami inundation area. Table 13-1 summarizes the number of each type of facility found to be within the mapped inundation area and the total replacement cost value of those exposed facilities. Figure 13-6 shows these results as the percent of planning area totals for each type.

**Table 13-1. Number and Value of District Facilities Exposed to the Tsunami Hazard**

Assets	Exposed Number or Length	Exposed Replacement Cost Value
<b>Structures/Facilities</b>		
	<b>Number</b>	
Administrative	4	\$41,025,000
Raw Water Facilities	0	\$0
Potable Water Structures	8,846	\$8,606,550
Recycled Water Facilities	2	\$1,350
<b>Total</b>	<b>8,852</b>	<b>\$49,632,900</b>
<b>Pipelines</b>		
	<b>Length in Feet</b>	
Potable Water	253,387	\$140,039,666
Recycled Water	596	\$412,437
<b>Total</b>	<b>253,983</b>	<b>\$140,452,103</b>
<b>Total</b>		<b>\$190,085,003</b>

**Figure 13-6. District Facilities Exposed to the Tsunami Hazard as % of Planning Area Total**

The exposure analysis included the District's pipeline assets. While most of these assets are underground, and not susceptible to impacts from overland flows associated with tsunamis, there are sections of pipelines that are exposed as they cross drainageways and channels. The exact location of these exposed pipelines was not available in a geospatial dataset to support this exposure analysis.

## 13.4 VULNERABILITY

The flood module of Hazus was used for a Level 2 assessment of vulnerability to the tsunami hazard. Hazus estimated damage to only one District facility in the mapped tsunami inundation area. The estimated damage to that facility, a pump station, was \$150,641—15 percent of the facilities estimated replacement cost.

The following general potential impacts from tsunami in the District were identified:

- The populations most vulnerable to the tsunami hazard are the elderly, disabled and very young who reside near beaches, low-lying coastal areas, tidal flats, and river deltas that empty into ocean going waters.
- In the event of a local tsunami generated in or near the planning area, there would be little warning time, so more of the population would be vulnerable.
- The impact of tsunami waves and the scouring associated with debris that may be carried in the water could be damaging to all structures along beaches, low-lying coastal areas, tidal flats, and river deltas. The most vulnerable structures are those in the front line of tsunami impact and those that are structurally unsound. Structures that were built to current floodplain regulations in the tsunami inundation area may have some level of protection, particularly if they were built to withstand wave action.
- In addition to structure damage, ships moored at piers and in harbors often are swamped and sunk or are left battered and stranded high on the shore.
- The following infrastructure is vulnerable to damage:
  - **Water Proximate Infrastructure**—Breakwaters and piers collapse, sometimes because of scouring actions that sweep away their foundation material and sometimes because of the sheer impact of the tsunami waves.
  - **Flood Control Systems**—Floodwaters can back up drainage systems, causing localized flooding. Culverts can be blocked by debris from tsunami events, also causing localized urban flooding.
  - **Utility Systems**—Floodwaters can get into drinking water supplies, causing contamination. Sewer systems can be backed up, causing waste to spill into homes, neighborhoods, rivers, and streams. Tsunami waves can knock down power lines and radio/cellular communication towers. Power generation facilities can be severely impacted by wave action and by inundation from floodwater.
- Tsunami waves can carry destructive debris and pollutants that can have devastating impacts on all facets of the environment. Environmental impacts on local waterways and wildlife would be most significant in areas closest to the point of impact. The vulnerability of aquatic habit and associated ecosystems in low-lying areas close to the coastline is high.

## 13.5 DEVELOPMENT TRENDS

The demand for critical MMWD services may increase with growth in the surrounding area. Repair or replacement of MMWD assets will be governed by codes and standards applied by the County of Marin, depending on the location of the asset. The State of California's adoption of bills expanding property owners' rights to build accessory dwelling units will increase densities in most the MMWD service area; areas that, as recently as 2019, were thought to be built out. The County of Marin, the cities of Belvedere, Corte Madera, Larkspur, Mill Valley, San Anselmo, and the Town of Ross also participate in the National Flood Insurance Program and have adopted floodplain management standards pursuant to that program's requirements. Applications of these codes and standards to any new or redeveloped MMWD assets will reduce the risk of potential impacts from tsunami inundation.

## 13.6 ISSUES

Important issues associated with a tsunami in the planning area include the following:

- A local source tsunami presents the highest risk to the planning area, as there will not be time to initiate evacuation with the first surge arriving in as few as 10 minutes. Strong ground shaking preceding the tsunami would damage buildings, communications and electric utility infrastructure, roads, and bridges.
- Risk from tsunami inundation is not subject to the State of California real estate disclosure law at this time.
- There are estimated to be 1,549 residential structures in the planning area located in tsunami inundation areas. Some of these structures have flood protection measures in place that may offer a degree of protection from tsunami risk; however, a large number of structures in the planning area were built before the cities and County entered the NFIP. Structures not designed to resist tsunami forces and built to have habitable areas above runup levels should not be assumed to provide protection.
- It is estimated that more than 1,441 people would be displaced as a result of the modeled tsunami event, which does not include populations likely to be displaced by the earthquake that caused the tsunami.
- Significant debris would be produced as a result of a major tsunami impacting the planning area and could be exacerbated by damage caused by the earthquake that preceded it.
- More than 1 percent of the total replacement value of the planning area could be lost as a result of a tsunami event. This would have significant implications for the local economy and local taxes.
- There are 115 critical facilities in the planning area that are located in tsunami risk areas.
- The loss of harbor and dock facilities and impacts on fisheries after a tsunami would have significant impacts on the local economy and the ability to receive recovery resources by sea if roads are severely damaged.
- To effectively measure and evaluate the probable impacts of tsunamis on planning, new hazard mapping based on probabilistic scenarios likely to occur for Marin County is in process. The science and technology in this field are emerging. For tsunami hazard mitigation programs to be effective, probabilistic tsunami mapping will be a key component. It is anticipated that this level of detail will be available to support the next update to this plan.
- Present building codes and guidelines do not adequately address the impacts of tsunamis on structures, and current tsunami hazard mapping is not appropriate for code enforcement. It is anticipated that future updates to the California Building Code will include amendments that address these issues.
- The Redwood Coast Tsunami Work Group and its geologists have done extensive work in implementing and supporting public information and awareness programs. These programs need to be continued, supported and enhanced to promote the concepts of mitigation and preparedness for the impacts of tsunamis and all hazards addressed by this plan.
- As tsunami warning technologies evolve, the tsunami warning capability within the planning area will need to be enhanced to provide the highest degree of warning to planning partners with tsunami risk exposure.
- With the future impacts from climate change, the issue of sea level rise may become an important consideration as probable tsunami inundation areas are identified through future studies.
- Special attention will be focused on the vulnerable communities and tourists in the tsunami zone and on hazard mitigation through public education and outreach.

## 14. WILDFIRE

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### 14.1 GENERAL BACKGROUND

A wildfire is any uncontrolled fire occurring on undeveloped land that requires fire suppression. Wildfires can occur naturally, such as those ignited by lightning, and are important to many ecosystem processes; however, most are started by human activity such as smoking, campfires, equipment use, and arson.

#### 14.1.1 Factors Influencing Wildfire Behavior

Fire behavior is based on factors such as the following (CAL FIRE, 2012):

- **Fuel**—Fuel may include living and dead vegetation on the ground, along the surface as brush and small trees, and above the ground in tree canopies. Lighter fuels such as grasses, leaves and needles quickly expel moisture and burn rapidly, while heavier fuels such as tree branches, logs and trunks take longer to warm and ignite. Trees killed or defoliated by forest insects and diseases are more susceptible to wildfire.
- **Weather**—Relevant weather conditions include temperature, relative humidity, wind speed and direction, cloud cover, precipitation amount and duration, and the stability of the atmosphere. When the temperature is high, relative humidity is low, wind speed is increasing and coming from the east (offshore flow), and there has been little or no precipitation, so vegetation is dry, conditions are very favorable for extensive and severe wildfires. These conditions occur more frequently inland where temperatures are higher, and fog is less prevalent.
- **Terrain**—Topography includes slope and elevation. The topography of a region influences the amount and moisture of fuel; the impact of weather conditions such as temperature and wind; potential barriers to fire spread, such as highways and lakes; and elevation and slope of landforms (fire spreads more easily uphill than downhill).

#### 14.1.2 Marin Municipal Water District Wildfire Resilience Plan

Marin Municipal Water District staff developed a *Wildfire Resilience Plan* to summarize existing district programs and operations related to wildfire preparedness, identify data gaps, and develop recommended actions that will lead to a more wildfire resilient and reliable water system that protects communities throughout the service area. The District will use this plan to:

- Inform the board, community, internal organization, and agency partners of preparedness status and needs
- Develop, implement, and track recommended actions
- Provide a basis for future investments related to wildfire resilience.



### 14.1.3 Marin County Community Wildfire Protect Plan

The Marin County Community Wildfire Protection Plan provides a science-based assessment of wildfire hazards and threats to homes in the wildland urban interface of Marin County, California. The Marin Community Wildfire Protection Plan was published in 2016 and updated in 2020. It was developed through a collaborative process involving Fire Safe Marin, Marin County fire agencies, county officials, county, state, and federal land management agencies, community members, and MMWD.

The purpose of the Community Wildfire Protection Plan is to provide fire agencies, land managers, and other stakeholders in Marin County with guidance and strategies to reduce fire hazard and the risk of catastrophic wildfires in the wildland urban interface, while promoting the protection and enhancement of the county's economic assets and ecological resources.

### 14.1.4 Secondary Hazards

Wildfire can lead to secondary hazards such as landslides and flooding (due to the impacts of silt in local watersheds). It can strip slopes of vegetation, exposing them to greater amounts of runoff, which can weaken soils and lead to landslides. Major landslides can occur several years after a wildfire. Most wildfires can bake soils, thus increasing the imperviousness of the ground, which increases the runoff generated by storm events and therefore the chance of flooding. Vulnerability to flooding also increases due to the destruction of watersheds.

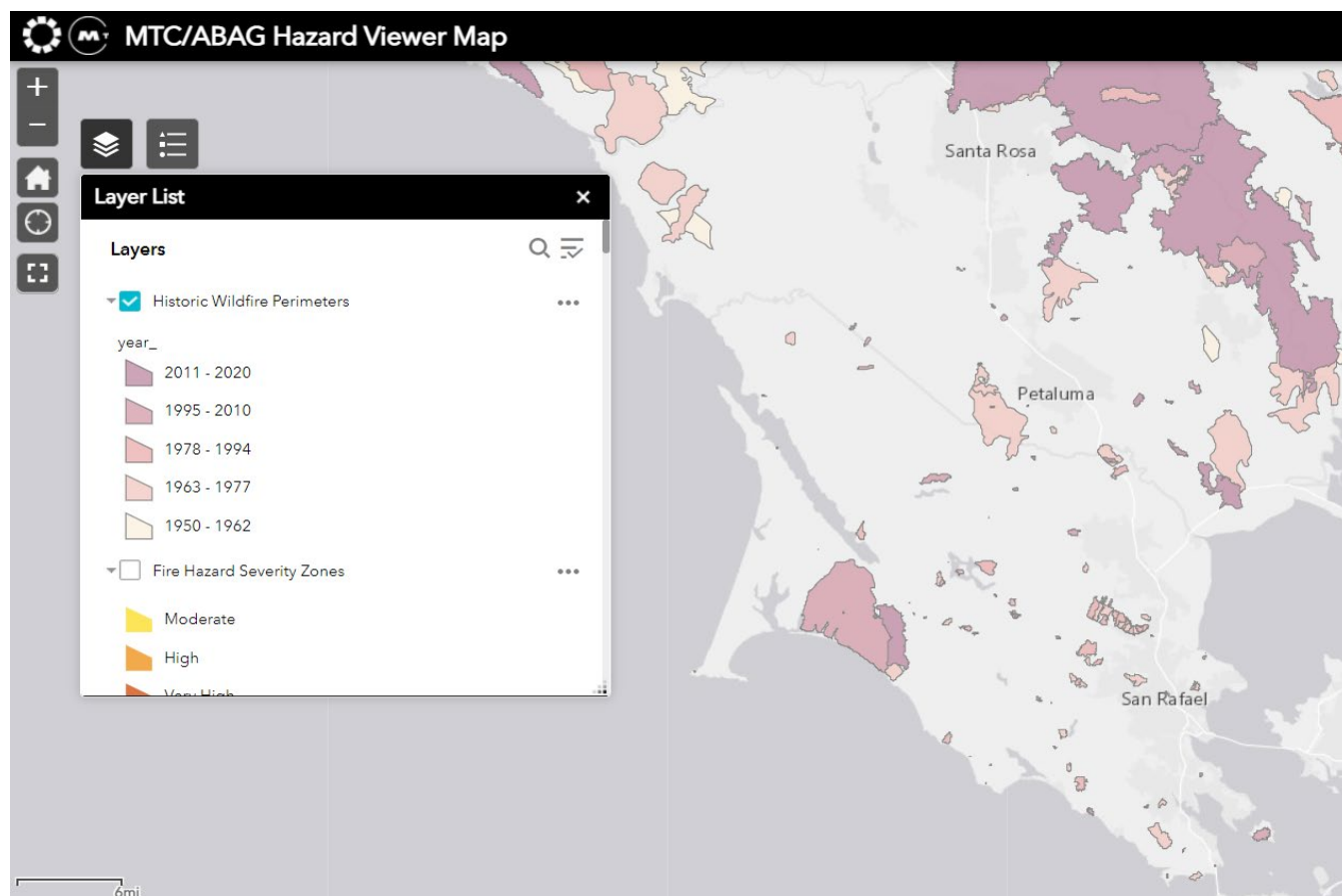
## 14.2 HAZARD PROFILE

### 14.2.1 Past Events

Figure 14-1 shows the historical fire perimeters impacting the Marin County vicinity since 1950. Fire records for the county are incomplete, but historical newspaper articles and old fire planning studies document an active fire history going back to the early 20th century.

The most recent fire in Marin County was the Woodward Fire, which was started on August 17, 2020, by lightning from a rare dry lightning weather event. The Woodward Fire was contained by October 9, 2020, at 4,929 acres. The last fire in Marin that resulted in significant structure loss was the Vision Fire in 1995, which destroyed 48 structures in the community of Inverness. In 1929, the base of Mt. Tamalpais—specifically the community of Mill Valley—experienced a significant fire known as the Great Mill Valley Fire. That fire's footprint is now developed with more than 1,100 homes (valued at over \$1 billion) which have significantly altered the natural vegetation through urban and suburban development (*Marin Community Wildfire Protection Plan*, December 2020).

CAL FIRE incident information identifies eight wildfires in Marin County since 2008. Marin County has been included in no federal wildfire disaster declarations and no federal fire management declaration events, for a total of zero federal declarations since 1980.



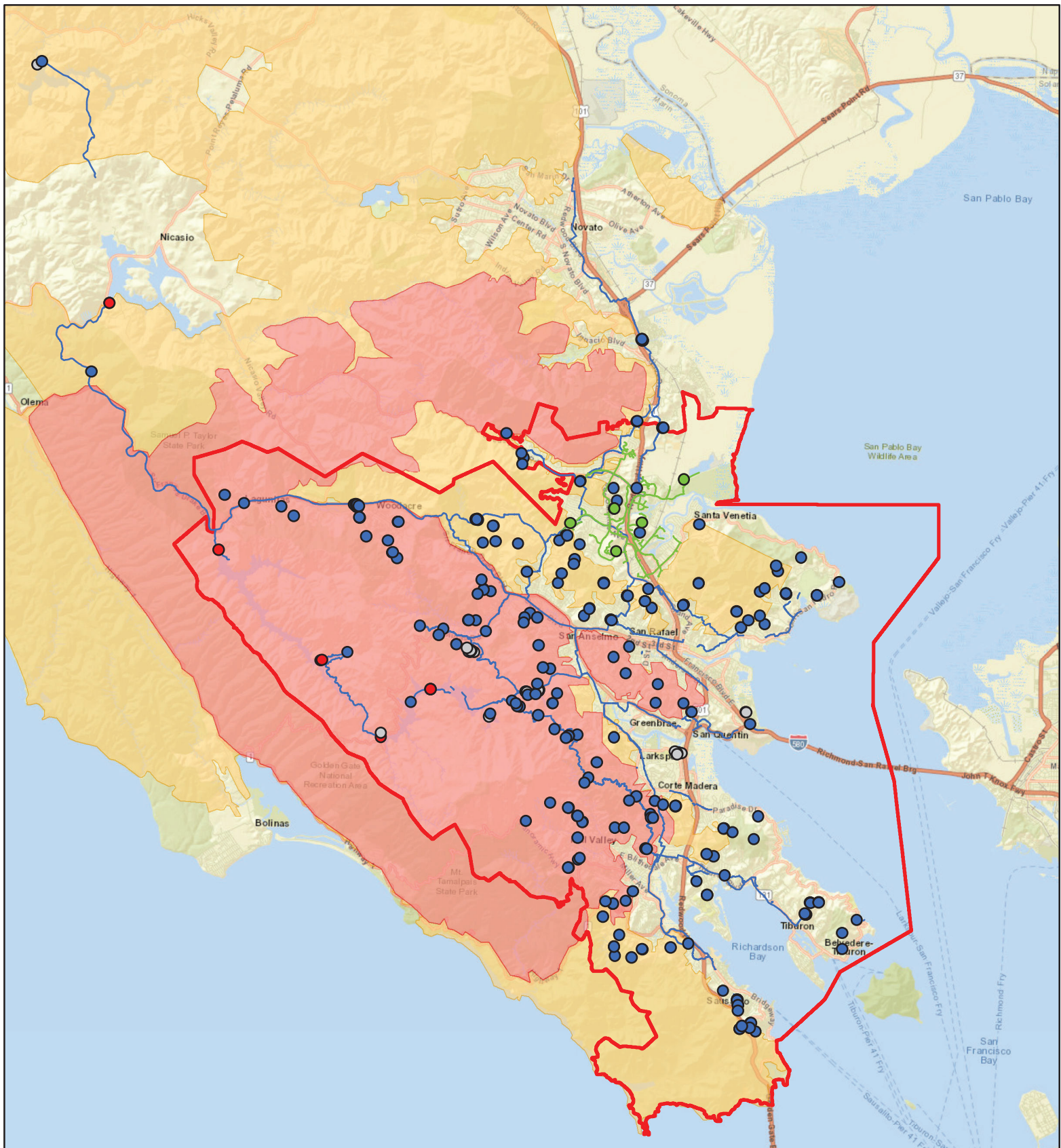
**Figure 14-1. Historical Fire Perimeters Impacting Marin County Vicinity**

## 14.2.2 Location

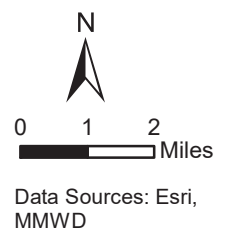
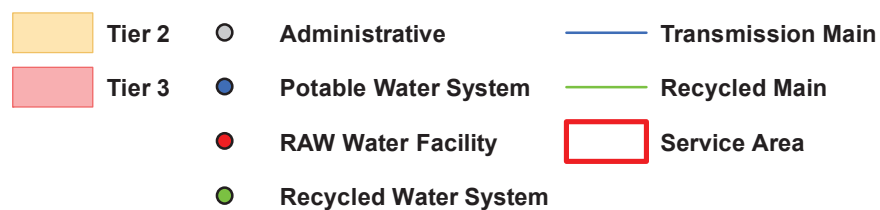
In response to California State legislation, The California Public Utilities Commission (CPUC) fire threat mapping for the entire State. These maps were developed in tiers, with Tier 1 focusing on tree mortality and Tiers 2 and 3 focusing on the likelihood and potential impacts on people and property from utility related wildfires. A key driver for this mapping was to inform the development of fire-safety regulations in “high-fire-threat areas.” Figure 14-2 shows the CPUC fire threat mapping for the planning area.

## 14.2.3 Frequency

Wildfires will continue to present a risk to Marin County and the planning area. It is difficult to estimate the number of wildfires that will occur in the planning area because of the number of factors that impact the potential for a fire and because some conditions exert increasing pressure on the wildland urban interface zone (e.g., ongoing development). An analysis of the frequency of past occurrences can give a rough guide as to how many events may occur each year if current trends continue.



**Figure 14-2. CPUC Wildfire Threat**





CAL FIRE incident information identifies eight wildfires in Marin County since 2008. Marin County has been included in no federal wildfire disaster declarations and no federal fire management declaration events, for a total of zero federal declarations since 1980. planning area can expect to experience adverse impacts from some type of severe weather event at least annually. Using these historical statistics, recurrence probability for the wildfire events are as shown in Table 14-1.

**Table 14-1. Recurrence Probability for Wildfire**

Event	Time Frame (Years)	# of Events over Timeframe	Recurrence Interval	% Annual Chance
Wildfire	12	8	11 Year	9

### 14.2.4 Severity

Potential losses from wildfire include human life, structures and other improvements, and natural resources. The potential for significant damage to life and property exists in areas designated as “wildland-urban interface areas,” where development is adjacent to densely vegetated areas. There are no recorded incidents of loss of life from wildfires in the planning area.

Fire hazards present a considerable risk to vegetation and wildlife habitats. Short-term loss caused by a wildfire can include the destruction of timber, wildlife habitat, scenic vistas, and watersheds. Long-term effects include smaller timber harvests, reduced access to affected recreational areas, and destruction of cultural and economic resources and community infrastructure. Wildfires can have a significant impact on air quality, especially with prolonged periods of burning, and can cause the contamination of reservoirs.

### 14.2.5 Warning Time

Wildfires are often caused by humans, intentionally or accidentally. There is no way to predict when one might break out. Since fireworks often cause brush fires, extra diligence is warranted around the Fourth of July when the use of fireworks is highest.

Dry seasons and droughts are factors that greatly increase fire likelihood. Dry lightning may trigger wildfires. Adverse weather can be predicted, so special attention can be paid during weather events that may include lightning. Reliable National Weather Service lightning warnings are available on average 24 to 48 hours prior to a significant electrical storm.

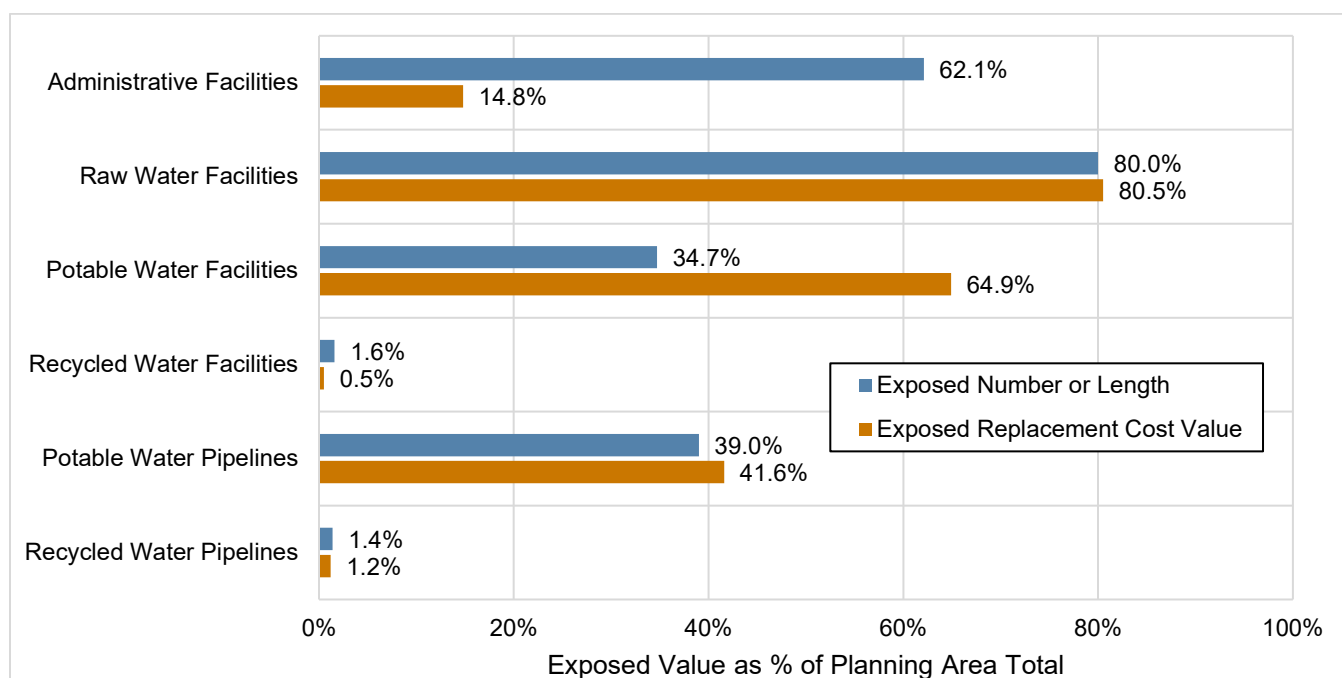
If a fire does break out and spread rapidly, residents may need to evacuate within days or hours. A fire’s peak burning period generally is between 1 p.m. and 6 p.m. Once a fire has started, fire alerting is reasonably rapid in most cases. The rapid spread of cellular and two-way radio communications in recent years has further contributed to a significant improvement in warning time.

## 14.3 EXPOSURE

The risk assessment for wildfire evaluated District assets that lie within the CPUC Tiers 2 and 3 Fire Threat Zones. Table 14-2 summarizes the number of structures in these zones and the total replacement cost value of those exposed facilities. Figure 14-3 shows the results as the percent of planning area totals for each type. The exposure analysis included the District’s pipeline assets. While most of these assets are underground, and not susceptible to impacts from wildfire, there are sections of pipelines that are exposed. The exact location of these exposed pipelines was not available in a geospatial dataset to support this exposure analysis.

**Table 14-2. Number and Value of District Facilities Exposed to the Wildfire Hazard**

Assets	Exposed Number or Length	Exposed Replacement Cost Value
<b>Structures/Facilities</b>		
	<b>Number</b>	
Administrative	18	\$10,566,876
Raw Water Facilities	8	\$14,452,474
Potable Water Structures	69,812	\$440,705,398
Recycled Water Facilities	26	\$36,300
<b>Total</b>	<b>69,864</b>	<b>\$465,761,048</b>
<b>Pipelines</b>		
	<b>Length in Feet</b>	
Potable Water	2,293,623	\$1,414,540,847
Recycled Water	1,905	\$1,103,684
<b>Total</b>	<b>2,295,528</b>	<b>\$1,415,644,531</b>
<b>Total</b>		<b>\$1,881,405,579</b>

**Figure 14-3. District Facilities Exposed to the Wildfire Hazard as % of Planning Area Total**

## 14.4 VULNERABILITY

Structures, above-ground infrastructure, and critical facilities are all vulnerable to the wildfire hazard. There is currently no validated damage function available to support wildfire mitigation planning. Vulnerable assets are assumed to include all those identified as exposed to the wildfire hazard. Critical facilities of wood frame construction or with wood roofs are especially vulnerable during wildfire events.



## 14.5 DEVELOPMENT TRENDS

Urbanization alters the natural fire regime, and can create the potential for expansion of urbanized areas into wildland areas. The demand for critical District services may increase with growth in the surrounding area. The State of California's adoption of bills expanding property owners' rights to build accessory dwelling units will increase densities in most the District's service area; areas that, as recently as 2019, were thought to be built out.

Repair or replacement of District assets, if necessary, will be governed by codes and standards applied by the County of Marin, depending upon the location of the asset. These jurisdictions have adopted codes and standards that include adoption of the 2019 California State Building Code, which is based on the 2018 International Building Code.

## 14.6 ISSUES

The major issues for wildfire are the following:

- The wildfire hazard presents a significant threat to the District's infrastructure. The District has two treatment plants and dozens of tanks and pump stations that are directly threatened by wildfire.
- Public education and outreach to people living in or near the fire hazard zones should include information about and assistance with mitigation activities such as defensible space, and advance identification of evacuation routes and safe zones.
- Wildfires could cause landslides as a secondary natural hazard.
- Climate change could affect the wildfire hazard.
- Vegetation management activities. This would include enhancement through expansion of the target areas as well as additional resources.

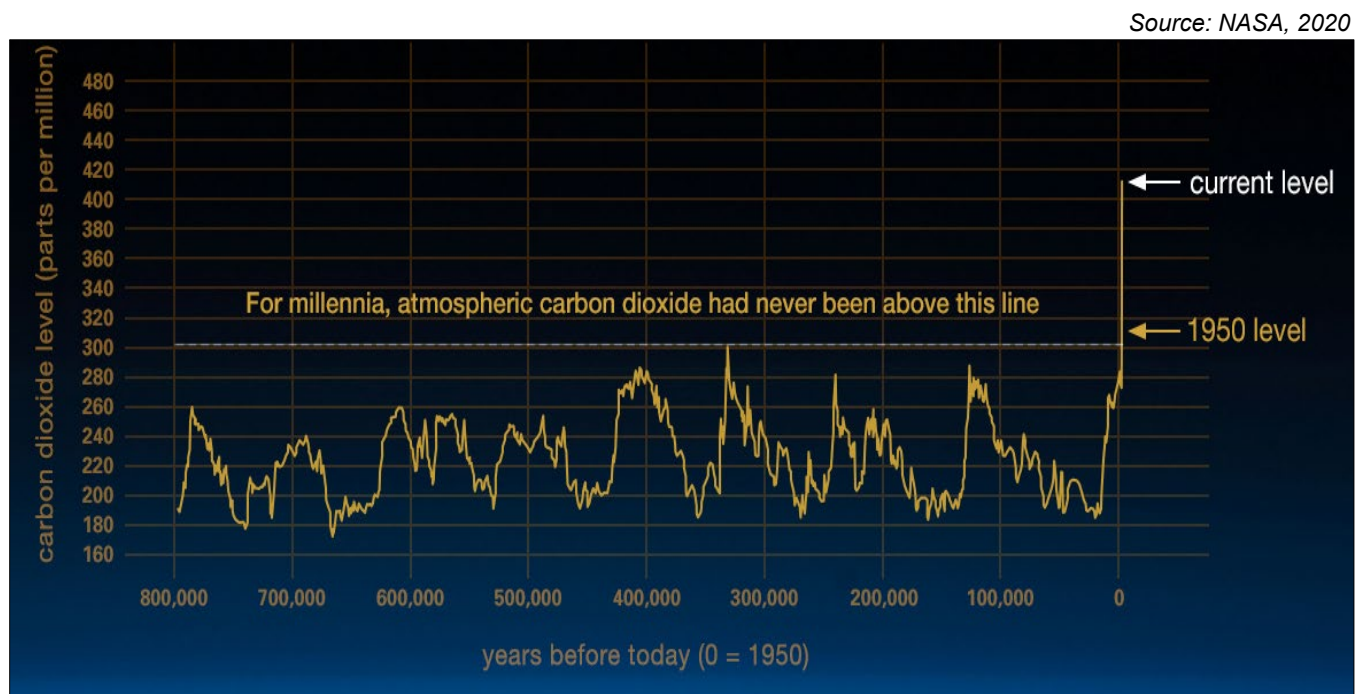


# 15. CLIMATE CHANGE CONSIDERATIONS

## 15.1 GENERAL BACKGROUND

Climate, consisting of patterns of temperature, precipitation, humidity, wind and seasons, plays a fundamental role in shaping natural ecosystems and the human economies and cultures that depend on them. “Climate change” refers to changes in climatic conditions over a long period of time.

The well-established worldwide warming trend of recent decades and its related impacts are caused by increasing concentrations of carbon dioxide and other greenhouse gases in the earth’s atmosphere. Greenhouse gases are gases that trap heat in the atmosphere, resulting in a warming effect. Carbon dioxide is the most known greenhouse gas; however, methane, nitrous oxide and fluorinated gases also contribute to warming. Emissions of these gases come from a variety of sources, such as the combustion of fossil fuels, agricultural production, and changes in land use. According to the National Aeronautics and Space Administration (NASA), carbon dioxide concentrations measured about 280 parts per million (ppm) before the industrial era began in the late 1700s and have risen dramatically since then, surpassing 400 ppm in 2013 for the first time in recorded history (see Figure 15-1).



**Figure 15-1.** Global Carbon Dioxide Concentrations Over Time

### 15.1.1 Current Global Indications of Climate Change

The major scientific agencies of the United States—including NASA and the National Oceanic and Atmospheric Administration (NOAA)—have presented evidence that climate change is occurring. NASA summarizes key evidence as follows (NASA, 2020a):

- **Global Temperature Rise**—The planet’s average surface temperature has risen about 1.62 °F since the late 19th century, a change driven largely by increased carbon dioxide and other human-made emissions into the atmosphere. Most of the warming occurred in the past 35 years, with the five warmest years on record taking place since 2010.
- **Warming Oceans**—The oceans have absorbed much of this increased heat, with the top 2,300 feet of ocean showing warming of more than 0.4 °F since 1969.
- **Shrinking Ice Sheets**—The Greenland and Antarctic ice sheets have decreased in mass. Greenland lost an average of 286 billion tons of ice per year between 1993 and 2016, and Antarctica lost about 127 billion tons of ice per year during the same time period. The rate of Antarctica ice mass loss has tripled in the last decade.
- **Glacial Retreat**—Glaciers are retreating almost everywhere around the world—including in the Alps, Himalayas, Andes, Rockies, Alaska and Africa.
- **Decreased Snow Cover**—Satellite observations reveal that the amount of spring snow cover in the Northern Hemisphere has decreased over the past five decades and that the snow is melting earlier
- **Sea Level Rise**—Global sea level rose about 8 inches in the last century. The rate in the last two decades is nearly double that of the last century and is accelerating slightly every year.
- **Declining Arctic Sea Ice**—Both the extent and thickness of Arctic sea ice has declined rapidly over the last several decades
- **Extreme Events**—The number of record high temperature events in the United States has been increasing since 1950, while the number of record low temperature events has been decreasing. The U.S. has also witnessed increasing numbers of intense rainfall events.
- **Ocean Acidification**—Since the beginning of the Industrial Revolution, the acidity of surface ocean waters has increased by about 30 percent. The amount of carbon dioxide absorbed by the upper layer of the oceans is increasing by about 2 billion tons per year.

### 15.1.2 Projected Future Impacts

The Third National Climate Assessment Report for the United States indicates that impacts resulting from climate change will continue through the 21st century and beyond. Although not all changes are understood at this time, the following impacts are expected in the United States (NASA, 2017):

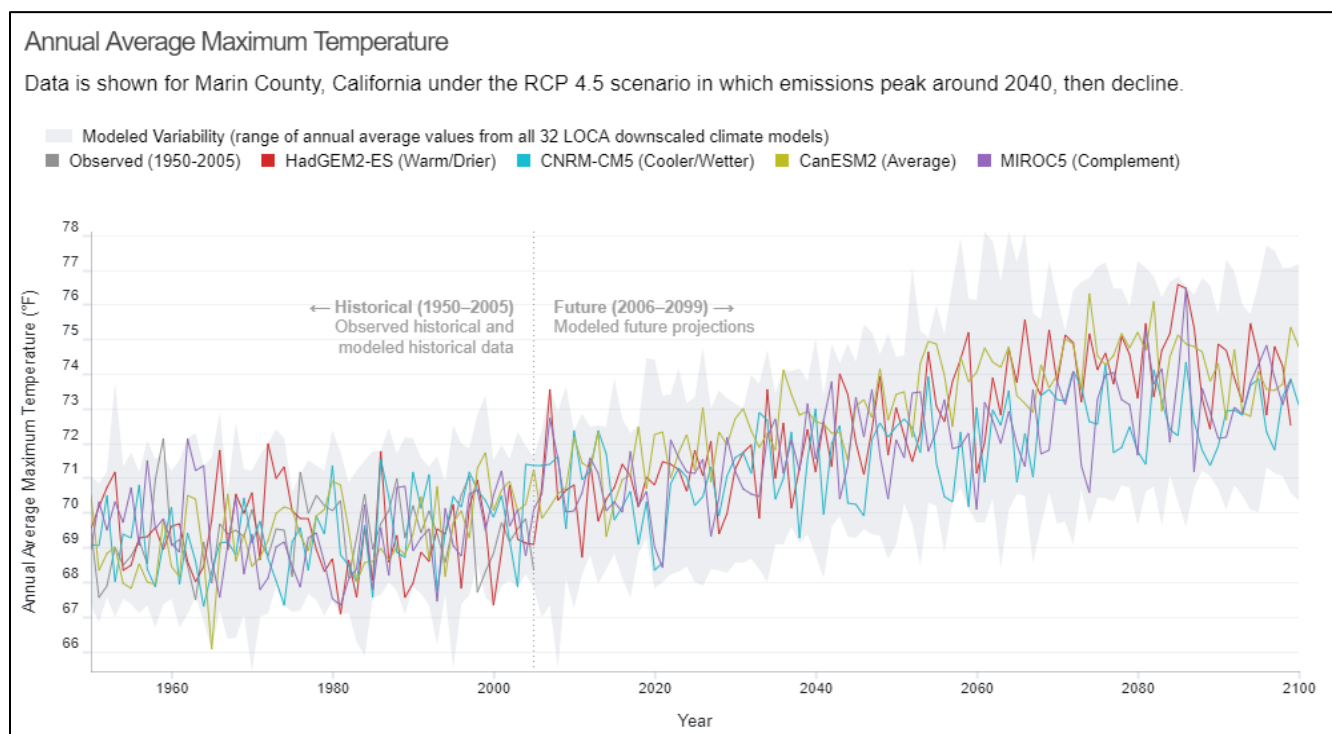
- Temperatures will continue to rise.
- Growing seasons will lengthen.
- Precipitation patterns will change.
- Droughts and heat waves will increase.
- Hurricanes will become stronger and more intense.
- Sea level will rise 1 to 8.2 feet by 2100 (NOAA, 2020a and 2020b).

Climate change projections contain inherent uncertainty, largely because they depend on future greenhouse gas emission scenarios. Generally, the uncertainty in greenhouse gas emissions is addressed by the assessment of differing scenarios: low-emissions scenarios and high-emissions scenarios. In low-emissions scenarios, greenhouse gas emissions are reduced substantially from current levels. In high-emissions scenarios, greenhouse gas emissions generally increase or continue at current levels. Uncertainty in outcomes is generally addressed by averaging a variety of model outcomes.

Despite this uncertainty, climate change projections present valuable information to help guide decision-making for possible future conditions. The following sections summarize information developed by Cal-Adapt, a resource for public information on how climate change might impact local communities, for Marin County, which includes Marin Municipal Water District.

## Temperature

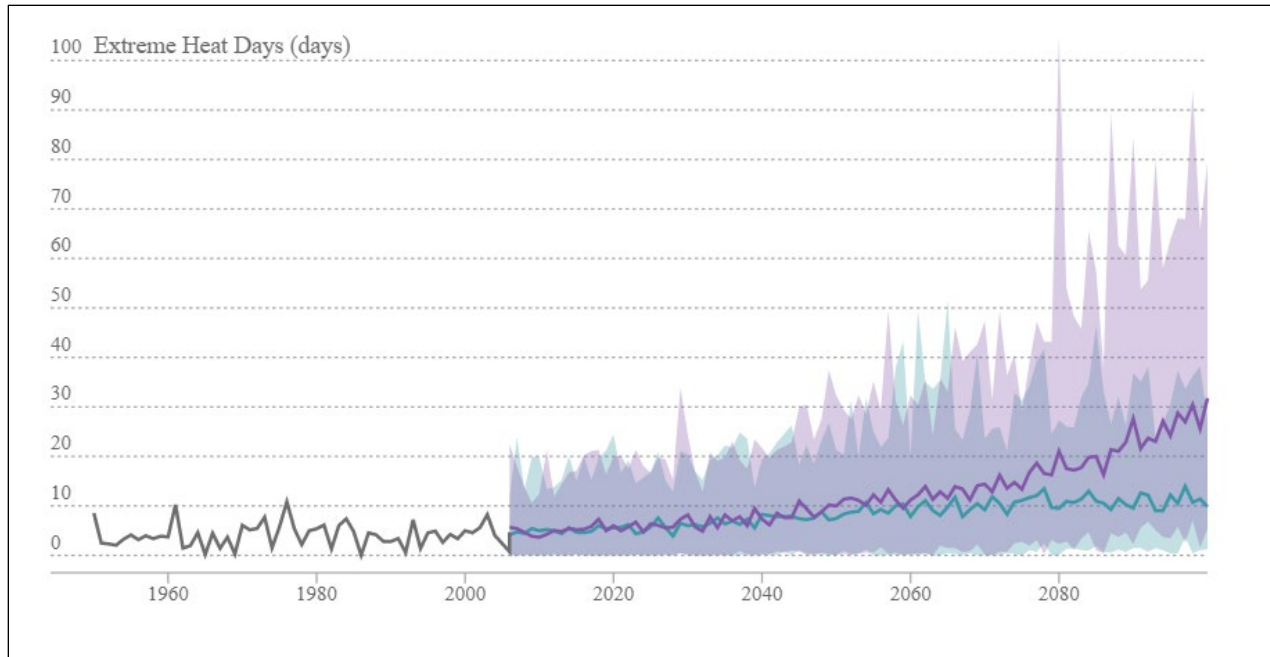
The historical (1961-1990) average temperature for the region was 74.2°F. By 2090, the average temperature is expected to increase above this baseline by 5.6°F and 8.5°F in the low- and high-emissions scenarios, respectively (see Figure 15-2).



**Figure 15-2. Observed and Projected Average Temperatures for Marin County**

The extreme heat day temperature threshold for the planning area is 93.9°F. The historical average number of extreme heat days is four. The number of extreme heat days, the number of warm nights (57.3°F threshold), the number of heat waves and the duration of heat waves are all expected to increase over the next century (see Figure 15-3).





**Figure 15-3. Projected Number of Extreme Heat Days by Year for Marin County**

### **Precipitation**

Precipitation projections for California remain uncertain. Models show differing impacts from slightly wetter winters to slightly drier winters, with the potential for a 10- to 20-percent decrease in total annual precipitation. Changes in precipitation patterns, coupled with warmer temperatures, may lead to significant changes in hydrology. In high-emissions scenarios, more precipitation may fall as rain rather than snow and this snow may melt earlier in the season, thus impacting the timing of changes in stream flow and flooding (Cal-Adapt, 2021).

### **Snowpack**

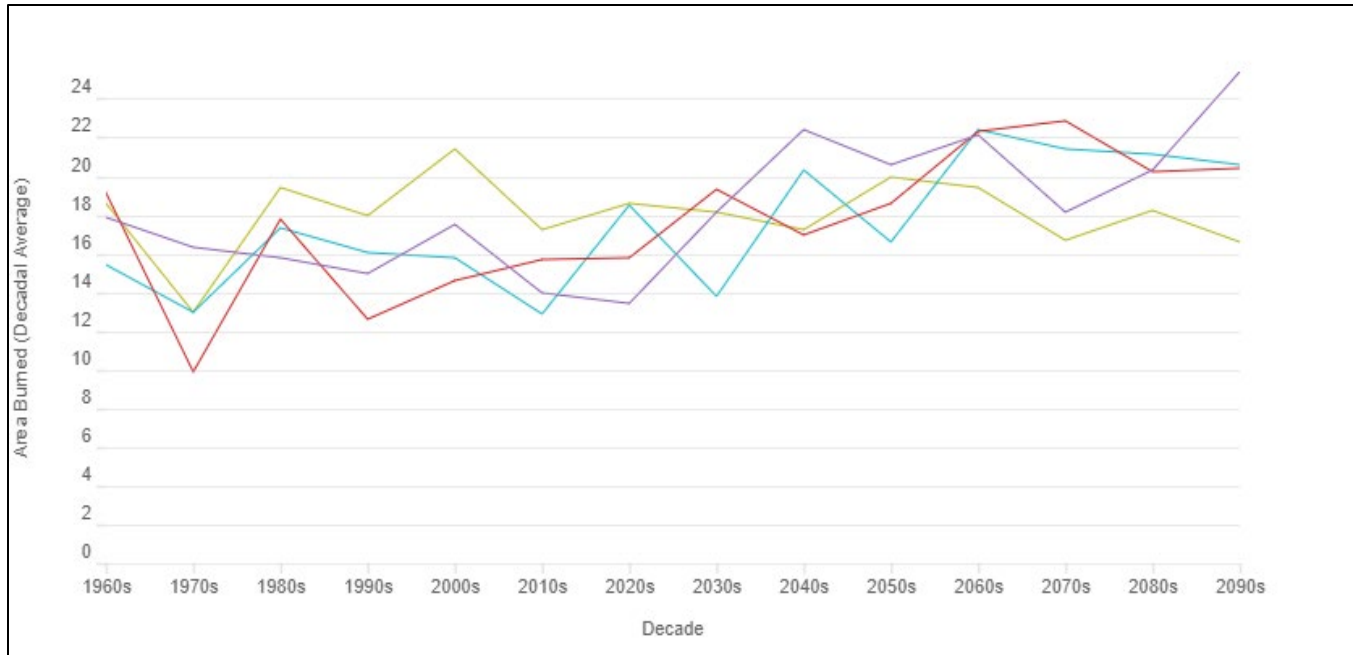
While there are no snow-water equivalency measurements for the planning area, Cal-Adapt indicates that parts of California may see snowpack levels reduced by up to 25 inches from the baseline (1961-1990) by 2090.

### **Wildfire**

Wildfire risk is expected to change in coming decades (see Figure 15-4). Under both high- and medium-emissions scenarios, the change in area burned may increase slightly and then decrease by 10 to 20 percent by 2085.

## **15.2 RESPONSES TO CLIMATE CHANGE**

Communities and governments worldwide are working to address, evaluate and prepare for climate changes that are likely to impact communities in coming decades. Adaptation is defined by the Intergovernmental Panel on Climate Change as the process of adjustment to actual or expected climate and its effects. In human systems, adaptation seeks to moderate or avoid harm or exploit beneficial opportunities. In some natural systems, human intervention may facilitate adjustment to expected climate and its effects (IPCC, 2014).



**Figure 15-4. Modeled Annual Area Burned in Marin County Under High Emissions Scenario**

Societies across the world are facing the need to adapt to changing conditions associated with natural disasters and climate change such as those indicated above. Farmers are altering crops and agricultural methods to deal with changing rainfall and rising temperature; architects and engineers are redesigning buildings; planners are looking at managing water supplies to deal with droughts or flooding.

Most ecosystems can adapt to change and buffer surrounding areas from the impacts of change. Forests can bind soils and hold water during times of plenty, releasing it through the year; floodplains can absorb water during peak flows; coastal ecosystems can hold out against storms—attenuating waves and reducing erosion. Ecosystem-based adaptation is the use of biodiversity and ecosystem services as part of an overall strategy to help people adapt to the adverse effects of climate change. This includes the sustainable management, conservation and restoration of specific ecosystems that provide key services.

### 15.2.1 Climate Ready: Marin Municipal Water District

The California Landscape Conservation Partnership (CA LCP) engages in integrated landscape and seascape conservation and adaptation throughout California. Through the CA LCP, the Climate Ready North Bay Project created a climate adaptation knowledge base for planning for the future of North San Francisco Bay Area watersheds, including those covered by Marin Municipal Water District (CA LCP, 2021).

MMWD's priority concerns are potential climate change impacts on lake operations and water demand, availability of surface water supply, drought risks, and stewardship of the Mt. Tamalpais watershed in terms of vegetation management and fire risk. MMWD staff is considering using Climate Ready North Bay products as communication tools to inform the MMWD Board of Directors. An objective for communications would be to foster understanding of why each climate scenario is different and what the implications of each may be. MMWD's goal is to clearly illustrate the challenge of climate change adaptation in the context of historical data.

MMWD's management concerns are grouped into three resource areas: 1) Regional Rainfall Annual Variability; 2) Marin County Surface Water Supply (including drought risks, demand, and fisheries habitat); and 3) Land Cover and Fire Risks (CA LCP, 2021a).

### 15.2.2 Collaboration: Sea-level Marin Adaptation Response Team (C-SMART)

C-SMART is an effort led by the County of Marin's Community Development Agency to understand the potential impacts of sea level rise and work together with communities to prepare for a resilient future. Through a series of community workshops and other forums, members of the public have provided valuable input to the study process. Findings from the C-SMART project inform the Local Coastal Program.

Grant funding from the Ocean Protection Council and California Coastal Commission, matched by Marin County staff time supported two major phase I deliverables: *Marin Ocean Coast Sea Level Rise Vulnerability Assessment* and *Marin Ocean Coast Sea Level Rise Adaptation Report*. The Vulnerability Assessment was presented to the Board of Supervisors and identified vulnerabilities of different asset types (parcels and buildings, transportation, utilities, working lands, natural resources, recreation, emergency services, and historic and archaeological resources) and community-scale vulnerabilities for Muir Beach, Stinson Beach, Bolinas, Inverness, East Shore, Point Reyes Station, and Dillon Beach.

In summary, the document concluded that around 1,300 parcels, 1,100 buildings, 20 miles of roads, 1,800 acres of wetlands, and numerous other assets could be exposed to sea level rise and storms by 2100 (County of Marin, 2018).

### 15.2.3 Marin County Unincorporated Area Climate Action Plan 2030

The Marin County Unincorporated Area Climate Action Plan (CAP) is a public document which helps explain how the community contributes to climate change; sets targets for how much those contributions can be reduced by a certain year; and outlines a path to meet that goal. The CAP is grounded in the County of Marin's understanding that climate change is already impacting California and the world and will continue to affect Marin's residents and businesses for the foreseeable future, as well as other communities around the world.

In 2017, the County Board of Supervisors launched Drawdown: Marin and in 2018, the County Community Development Agency began a two-year planning process that engaged residents, businesses, and subject matter experts in a comprehensive, science-based, county-wide campaign to identify actions that will dramatically reduce greenhouse gas emissions, address equity, and increase community resilience. Drawdown: Marin is currently working to engage the entire community, including traditionally marginalized communities, in the initiative to ensure local actions are designed and implemented in a way that makes sense for all Marin residents.

The plan recommends the following actions to adapt to climate change and make unincorporated Marin County communities more resilient:

- Ensure fair and robust inclusion of lower-income households and diverse communities in the planning and response to climate change impacts, including sea level rise, wildfire, public health, and emergency preparedness.
- Support and integrate Climate Action Planning and implementation with the ongoing adaptation efforts of C-SMART and BayWAVE.

- Coordinate and integrate Climate Adaptation Planning consistently throughout related County plans, including but not limited to the Countywide Plan and its Safety Element, Hazard Mitigation Plan, sea level rise adaptation plans, Community Wildfire Protection Plan, Local Coastal Plan and emergency and capital improvement plans.
- Collaborate with cities within the County, as well as special districts, and subregional bodies such as Transportation Authority of Marin to coordinate and integrate planning.
- Adopt a comprehensive climate change adaptation plan that prepares for and responds to the expected impacts of climate change (County of Marin, 2020).

### 15.3 SEA LEVEL RISE

Sea levels have been rising over the past several decades and are expected to continue to rise. Sea level rise is mostly attributed to two factors: the expansion of water as it warms (thermal expansion) and the melting of ice sheets and glaciers. As average ocean temperatures continue to increase, thermal expansion will continue and can be projected with some degree of certainty. Less certain is how quickly ice sheets will melt, accounting for most of the uncertainty in projections.

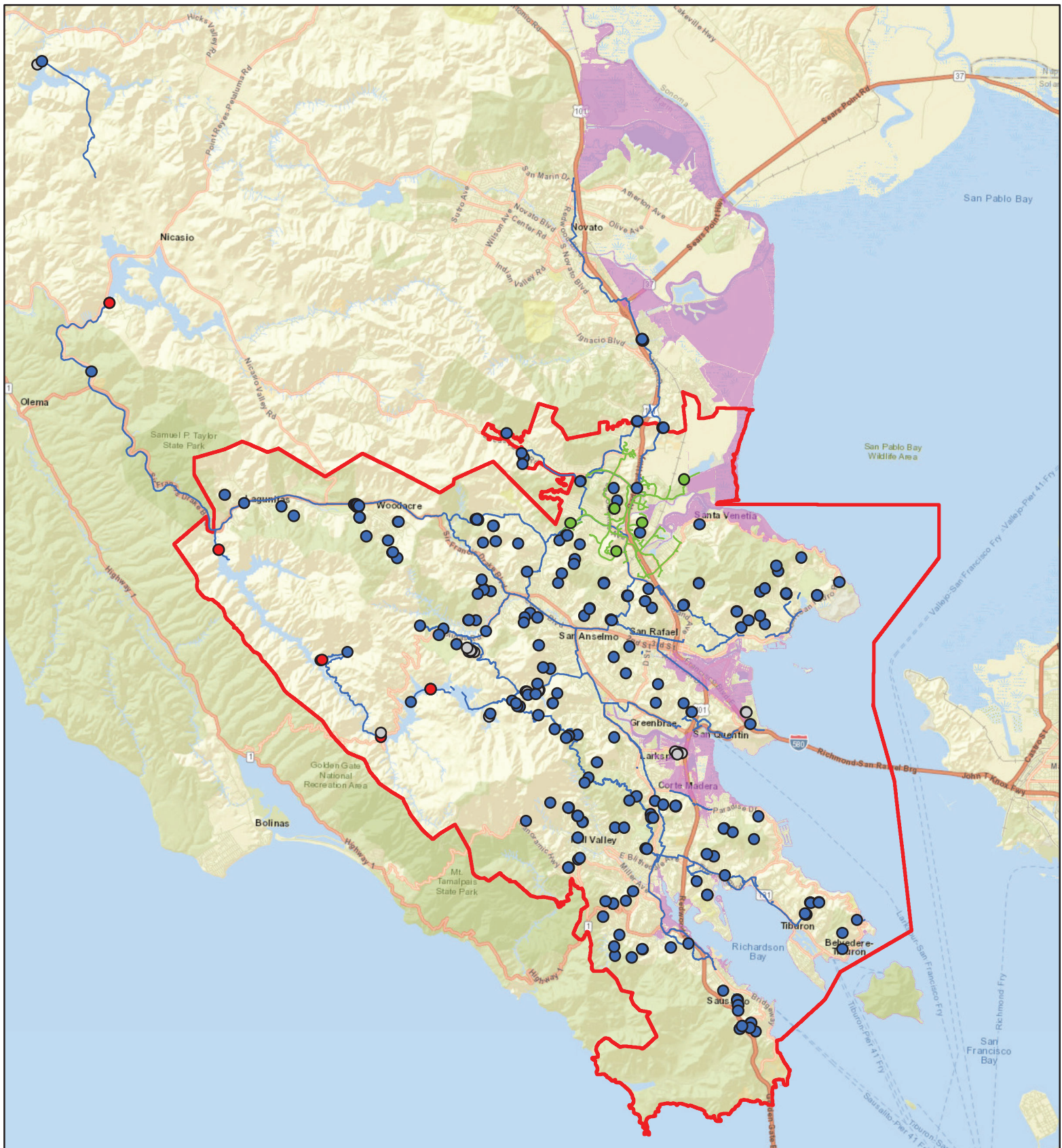
Sea level rise will cause currently dry areas to be permanently or chronically inundated. Temporary inundation from extreme tide events and storm surge also will change. Unlike many other impacts resulting from climate change, sea level rise will have a defined extent and location. This allows for a more-detailed risk assessment to be conducted for this climate change impact. Although the extent and timing of sea level rise is still uncertain, assessing potential areas at risk provides information appropriate for planning purposes.

The risk assessment for sea level rise determined District assets that lie within the mapped inundation zone for two sea level rise scenarios: a 24-inch sea level rise and a 48-inch sea level rise, as shown on Figure 15-5 and Figure 15-6, respectively. Table 15-1 summarizes the number of each type of facility found to be within each mapped inundation area and the total replacement cost value of those exposed facilities. Figure 15-7 shows the results as the percent of planning area totals for each type.

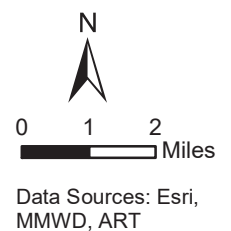
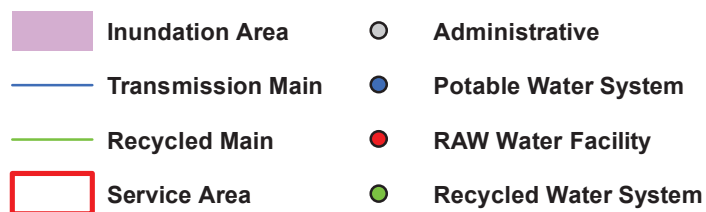
**Table 15-1. Number and Value of District Facilities Exposed to the Sea Level Rise Hazard**

Assets	24" Scenario		48" Scenario	
	Exposed Number or Length	Exposed Replacement Cost Value	Exposed Number or Length	Exposed Replacement Cost Value
<b>Structures/Facilities</b>	<b>Number</b>		<b>Number</b>	
Administrative	0	\$0	2	\$1,250,000
Raw Water Facilities	0	\$0	0	\$0
Potable Water Structures	11,774	\$10,502,500	22,857	\$19,407,700
Recycled Water Facilities	4	\$2,700	34	\$17,250
<b>Total</b>	<b>11,778</b>	<b>\$10,505,200</b>	<b>22,893</b>	<b>\$20,674,950</b>
<b>Pipelines</b>	<b>Length in Feet</b>		<b>Length in Feet</b>	
Potable Water	307,311	\$167,894,371	590,766	\$320,431,876
Recycled Water	254	\$184,237	3,168	\$1,908,529
<b>Total</b>	<b>307,565</b>	<b>\$168,078,608</b>	<b>593,934</b>	<b>\$322,340,405</b>
<b>Total</b>		<b>\$178,583,808</b>		<b>\$343,015,355</b>

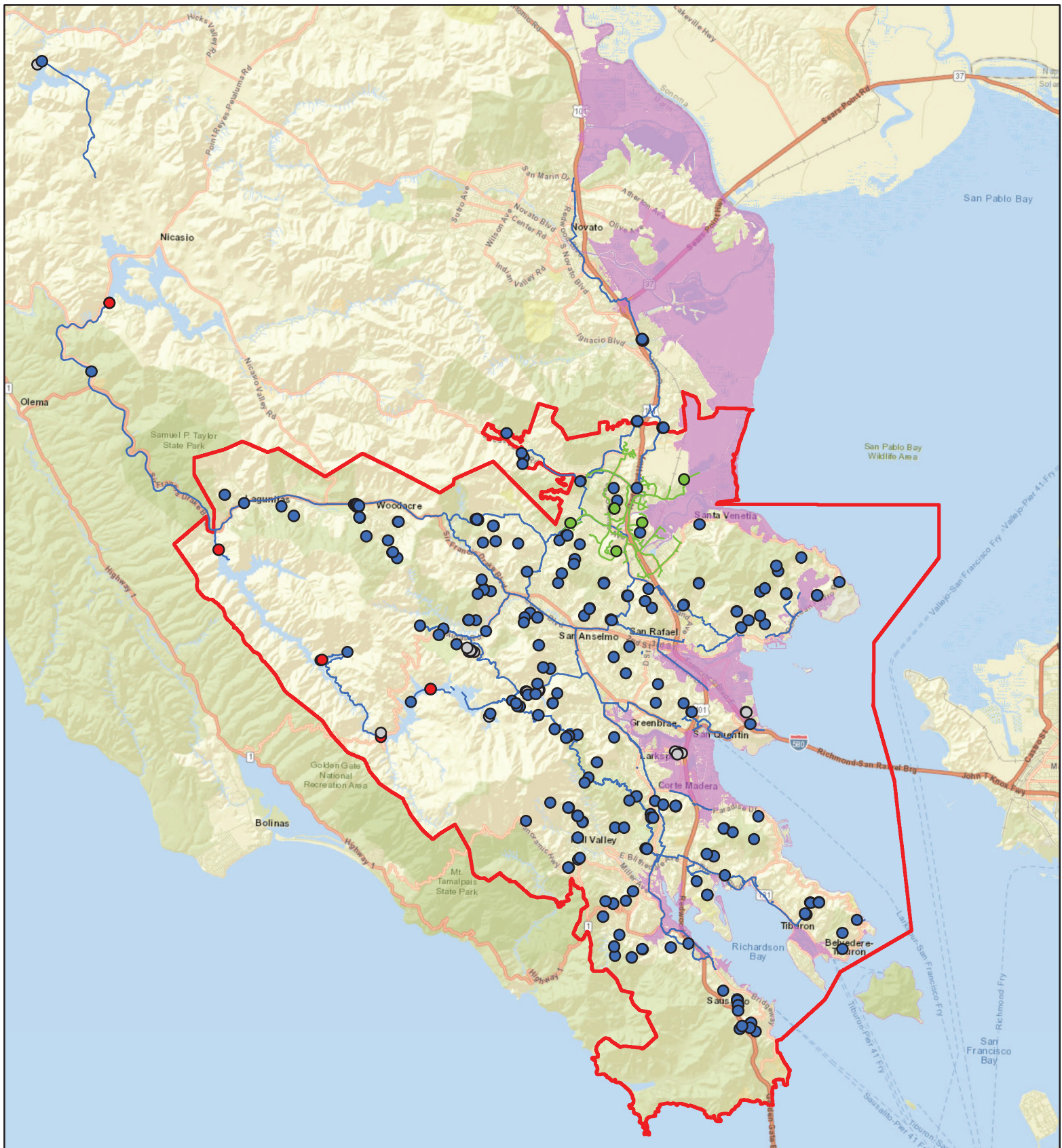




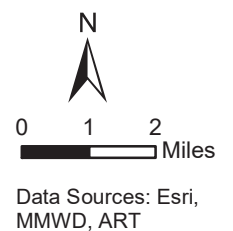
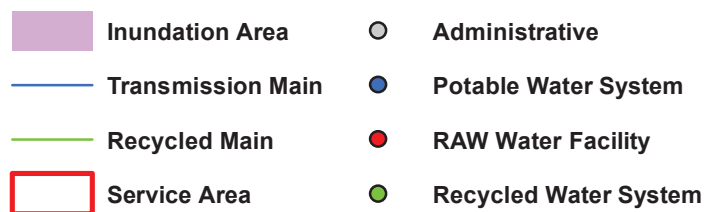
**Figure 15-5. Area Inundated by a Sea Level Rise of 24 inches**

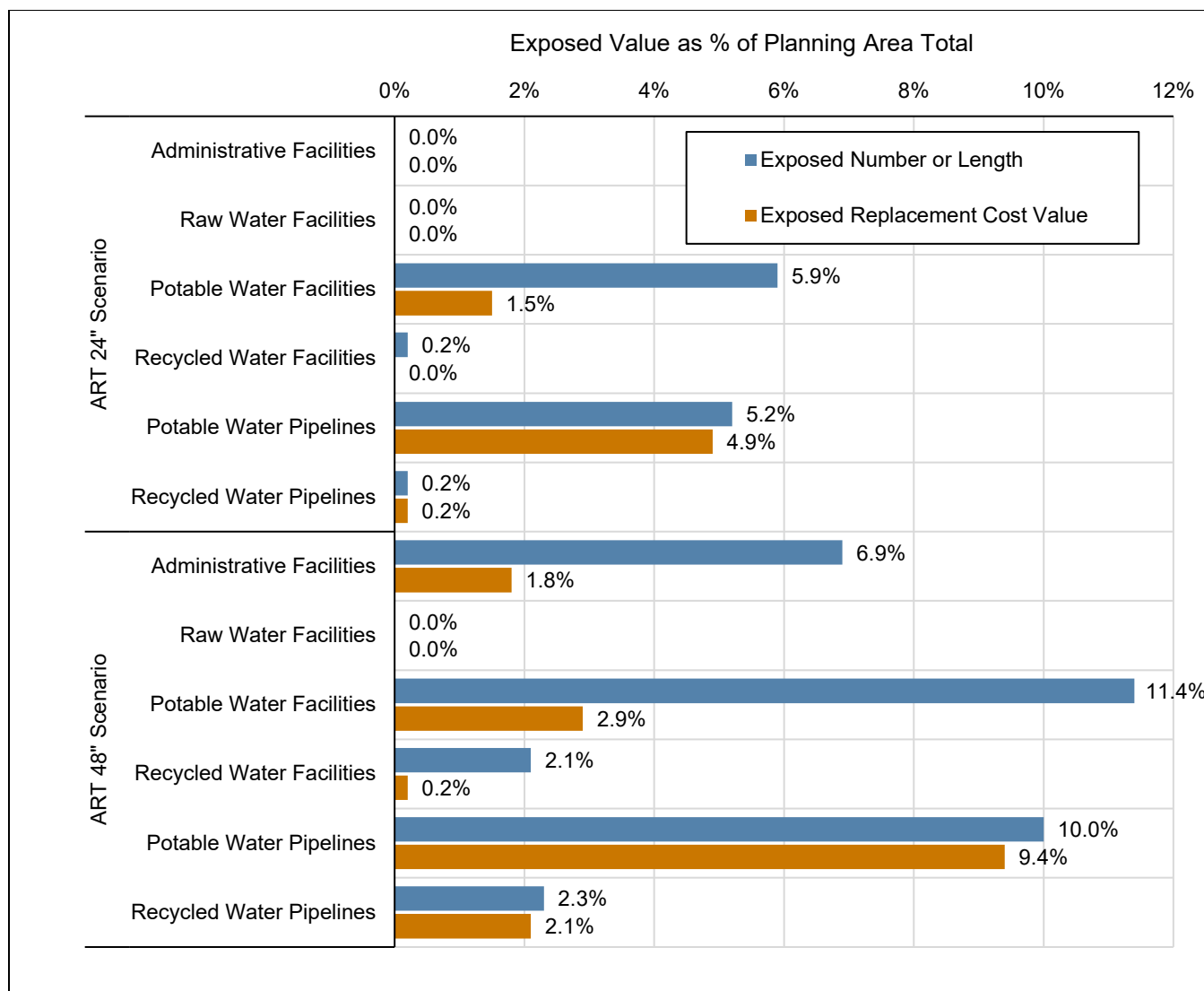






**Figure 15-6. Area Inundated by a Sea Level Rise of 48 inches**





**Figure 15-7. District Facilities Exposed to the Sea Level Rise Hazard as % of Planning Area Total**

The exposure analysis included the District's pipeline assets. While most of these assets are underground, and not susceptible to impacts from inundation associated with sea level rise, there are sections of pipelines that are exposed as they cross drainageways and channels. The exact location of these exposed pipelines was not available in a geospatial dataset to support this exposure analysis.

## 15.4 CLIMATE CHANGE IMPACTS ON HAZARDS

Climate change will have a measurable impact on the occurrence and severity of natural hazards. An essential aspect of hazard mitigation is predicting the likelihood of hazard events in a planning area. Typically, predictions are based on statistical projections from records of past events. This approach assumes that the likelihood of hazard events remains essentially unchanged over time. Thus, averages based on the past frequencies of, for example, floods are used to estimate future frequencies: if a river has flooded an average of once every 5 years for the past 100 years, then it can be expected to continue to flood an average of once every 5 years.

For hazards that are affected by climate conditions, the assumption that future behavior will be equivalent to past behavior is not valid if climate conditions are changing. As flooding is generally associated with precipitation frequency and quantity, for example, the frequency of flooding will not remain constant if broad precipitation patterns change over time. Specifically, as hydrology changes, storms currently considered to be the 100-year flood might strike more often, leaving many communities at greater risk. The risks of landslide, severe storms, and wildfire are all affected by climate patterns as well. For this reason, an understanding of climate change is pertinent to efforts to mitigate natural hazards. Information about how climate patterns are changing provides insight on the reliability of future hazard projections used in mitigation analysis.

The following sections provide qualitative information on how each identified hazard of concern for this planning process may be impacted by climate change and how these impacts may alter current exposure and vulnerability for the people, property, critical facilities, and the environment in the planning area to these hazards.

### 15.4.1 Dam Failure

Property exposure and vulnerability to the dam failure hazard are unlikely to change because of climate change. Dam owners and operators may need to alter maintenance and operations to account for changes in the hydrograph and increased sedimentation. Small changes in rainfall, runoff, and snowpack conditions may have significant impacts for dam operations. Dams are designed partly based on assumptions about a river's flow behavior, expressed as hydrographs. Changes in weather patterns can have significant effects on the hydrograph used for the design of a dam. If the hydrograph changes, it is conceivable that the dam can lose some or all of its designed margin of safety, also known as freeboard. If freeboard is reduced, dam operators may be forced to release increased volumes earlier in a storm cycle to maintain the required margins of safety. Such early releases of increased volumes can increase flood potential downstream.

Dams are constructed with safety features known as "spillways." Spillways are put in place on dams as a safety measure in the event of the reservoir filling too quickly. Spillway overflow events, often referred to as "design failures," result in increased discharges downstream and increased flooding potential. Although climate change will not increase the probability of catastrophic dam failure, it may increase the probability of design failures.

### 15.4.2 Drought

The long-term effects of climate change on regional water resources are unknown, but global water resources are already experiencing the following stresses without climate change:

- Growing populations
- Increased competition for available water
- Poor water quality
- Environmental claims
- Uncertain reserved water rights
- Groundwater overdraft
- Aging urban water infrastructure.

With a warmer climate, droughts could become more frequent, more severe, and longer lasting. According to the National Climate Assessment, "higher surface temperatures brought about by global warming increase the



potential for drought. Evaporation and the higher rate at which plants lose moisture through their leaves both increase with temperature. Unless higher evapotranspiration rates are matched by increases in precipitation, environments will tend to dry, promoting drought conditions” (Globalchange.gov, 2014). Because expected changes in precipitation patterns are still uncertain, the potential impacts and likelihood of drought are uncertain.

Property exposure and vulnerability may increase because of increased drought resulting from climate change, although this would most likely occur in non-structural property such as crops and landscaping. It is unlikely that structure exposure and vulnerability would increase as a direct result of drought, although secondary impacts of drought, such as wildfire, may increase and threaten structures. Critical facility operators may need to alter standard management practices and actively manage resources, particularly in water-related service sectors. By addressing stresses on water supplies and by building a flexible, robust program, MMWD will be able to respond more adeptly to changing conditions and to survive dry years.

### 15.4.3 Earthquake

The impacts of global climate change on earthquake probability are unknown. Some scientists say that melting glaciers could induce tectonic activity, though not likely in areas that would affect the planning area. NASA and USGS scientists found that retreating glaciers in southern Alaska may be opening the way for future earthquakes there (NASA, 2004).

Secondary impacts of earthquakes could be magnified by climate change. Soils saturated by repetitive storms or heavy precipitation could experience liquefaction or an increased propensity for slides during seismic activity due to the increased saturation. Dams storing increased volumes of water due to changes in the hydrograph could have increased probability of failure during seismic events.

Because impacts on the earthquake hazard are not well understood, increases in exposure and vulnerability of local resources are not able to be determined.

### 15.4.4 Flood

Use of historical hydrologic data has long been the standard of practice for designing and operating water supply and flood protection projects. For example, historical data are used for flood forecasting models and to forecast runoff for water supply. This method of forecasting assumes that the climate of the future will be similar to that of the period of historical record. However, the hydrologic record cannot be used to predict changes in frequency and severity of extreme climate events such as floods. Going forward, model calibration or statistical relation development must happen more frequently, new forecast-based tools must be developed, and a standard of practice that explicitly considers climate change must be adopted. Climate change is already impacting water resources, and resource managers have observed the following:

- Historical hydrologic patterns can no longer be solely relied upon to forecast the water future.
- Precipitation and runoff patterns are changing, increasing the uncertainty for water supply and quality, flood management and ecosystem functions.
- Extreme climatic events will become more frequent, necessitating improvement in flood protection, drought preparedness and emergency response.

High frequency flood events (e.g., 10-year floods) will likely increase with a changing climate. Scientists are projecting greater storm intensity, resulting in more direct runoff and flooding. Changes in watershed vegetation

and soil moisture conditions will also change runoff and recharge patterns. As stream flows and velocities change, erosion patterns will change, altering channel shapes and depths, possibly increasing sedimentation behind dams. With potential increases in the frequency and intensity of wildfires due to climate change, there is potential for more floods following fire, which increase sediment loads and water quality impacts.

Property exposure and vulnerability to the flood hazard may increase as a result of climate change impacts. As hydrology changes, what is currently considered a 1-percent-annual-chance (100-year flood) may strike more often, leaving many communities at greater risk. Runoff patterns may change, resulting in risk to facilities that have not historically been at risk from flooding. Additionally, changes in the management and design of flood protection critical facilities may be needed as additional stress is placed on these systems.

### **15.4.5 Mass Movements**

Climate change may impact storm patterns, increasing the probability of more frequent, intense storms with varying duration. Warming temperatures could increase the occurrence and duration of droughts, which would increase the probability of wildfire, reducing the vegetation that helps to support steep slopes. All these factors would increase the probability for mass movement occurrences.

Property exposure and vulnerability would be unlikely to increase because of climate change impacts on the mass movement hazard. Mass movement events may occur more frequently, but the extent and location should be contained within mapped hazard areas or recently burned areas. Disruption of water service may become more frequent because of mass movement hazards. For example, transportation systems may experience more frequent delays if slides blocking these systems occur more frequently.

### **15.4.6 Severe Weather**

Climate change presents a challenge for risk management associated with severe weather. Historical data shows that the probability for severe weather events increases in a warmer climate, and the frequency of severe weather events has increased steadily in recent decades (see Figure 15-8). Rising temperatures can lead to more intense heat waves that can be exacerbated in urbanized areas by the urban heat island effect. Evidence suggests that heat waves are already increasing, especially in western states.

Critical facility exposure and vulnerability would be unlikely to increase as a result of climate change impacts on the severe weather hazard; however, the District may experience more frequent disruptions in service. For example, more frequent and intense storms may cause more frequent disruptions in power service.

### **15.4.7 Tsunami**

The impacts of global climate change on tsunami probability are unknown. Even if climate change does not increase the frequency with which tsunamis occur, it may result in more destructive waves. As sea levels continue to rise, tsunami inundation areas would likely reach further into communities than current mapping indicates.

As land area likely to be inundated by tsunami waves increases, exposure and vulnerability to the tsunami hazard may increase for population, property, critical facilities, and the environment. Changes to the tsunami hazard from climate change may result in more direct economic impacts on a greater number of businesses and economic centers, as well as the infrastructure systems that support those businesses.



Source: Munich RE, 2020

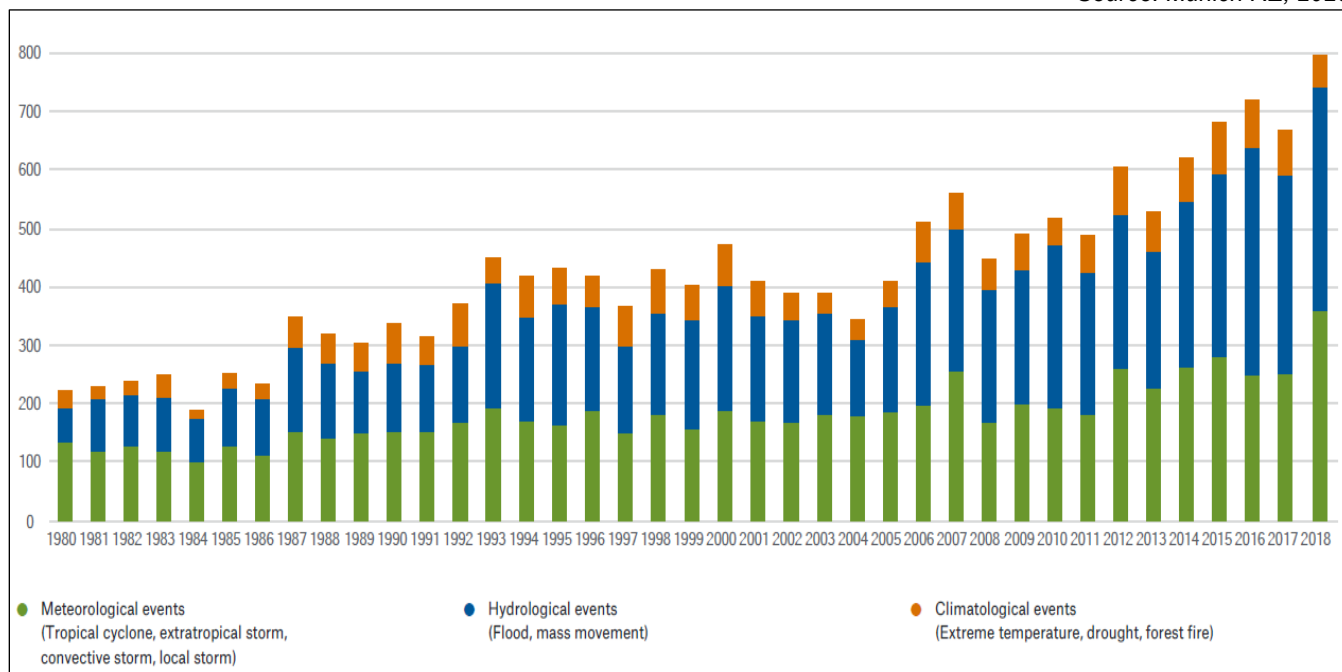


Figure 15-8. Worldwide Natural Catastrophe Events, 1980 – 2018

### 15.4.8 Wildfire

Wildfire is determined by climate variability, local topography, and human intervention. Climate change has the potential to affect multiple elements of the wildfire system: fire behavior, ignitions, fire management, and vegetation fuels. Hot dry spells create the highest fire risk. Increased temperatures may intensify wildfire danger by warming and drying out vegetation. Additionally, changes in climate patterns may impact the distribution and perseverance of insect outbreaks that create dead trees (increase fuel). When climate alters fuel loads and fuel moisture, forest susceptibility to wildfires changes. Climate change also may increase winds that spread fires. Faster fires are harder to contain, and thus are more likely to expand into residential neighborhoods. Larger, more severe, and more frequent fires may impact critical facilities by increasing the risk of ignition from nearby fire sources.

## 16. RISK RANKING

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A risk ranking was performed for the hazards of concern described in this plan. This risk ranking assessed the probability of each hazard's occurrence as well as its likely impact on the planning area. The risk ranking methodology and results were reviewed, discussed, and approved by the Steering Committee.

Numerical ratings of probability and impact were based on the hazard profiles and exposure and vulnerability evaluations presented in Chapters 7 through 15. Using that data, the planning team ranked the risk of all the natural hazards of concern described in this plan. When available, estimates of risk were generated with data from Hazus or GIS. For hazards of concern with less specific data available, qualitative assessments were used. As appropriate, results were adjusted based on local knowledge and other information not captured in the quantitative assessments.

Risk ranking results are used to help establish mitigation priorities. Marin Municipal Water District used these rankings to inform the development of its action plan, identifying mitigation actions, at a minimum, to address each hazard with a “high” or “medium” risk ranking. Actions that address hazards with a low or no hazard ranking are optional.

### 16.1 PROBABILITY OF OCCURRENCE

The probability of occurrence of a hazard is indicated by a probability factor based on likelihood of annual occurrence:

- High—Hazard event is likely to occur within 25 years (Probability Factor = 3)
- Medium—Hazard event is likely to occur within 100 years (Probability Factor = 2)
- Low—Hazard event is not likely to occur within 100 years (Probability Factor = 1)
- None—If there is no exposure to a hazard, there is no probability of occurrence (Probability Factor = 0)

The assessment of hazard frequency is generally based on past hazard events in the area. Table 16-1 summarizes the probability assessment for each hazard of concern for this plan.

**Table 16-1. Probability of Hazards**

Hazard Event	Probability (high, medium, low)	Probability Factor
Dam Failure	Medium	2
Drought	High	3
Earthquake	High	3
Flood	High	3
Mass Movements	High	3
Sea Level Rise	High	3
Severe Weather	High	3
Tsunami	Low	1
Wildfire	High	3

## 16.2 IMPACT

Hazard impacts will be assessed in three categories: impacts on people, impacts on property and impacts on the local economy. Numerical impact factors are assigned as follows:

- **People**—Values are assigned based on the percentage of the total population exposed in your service area to the hazard event. The degree of impact on individuals will vary and is not measurable, so the calculation assumes for simplicity and consistency that all people exposed to a hazard because they live in a hazard zone will be equally impacted when a hazard event occurs. Impact factors were assigned as follows:
  - High—25 percent or more of the population is exposed to a hazard (Impact Factor = 3)
  - Medium—10 percent to 24 percent of the population is exposed to a hazard (Impact Factor = 2)
  - Low—9 percent or less of the population is exposed to the hazard (Impact Factor = 1)
  - No impact—None of the population is exposed to a hazard (Impact Factor = 0)
- **Property**—Values are assigned based on the percentage of the total district assets exposed to the hazard event:
  - High—25 percent or more of the total replacement value of assets is exposed to a hazard (Impact Factor = 3)
  - Medium—10 percent to 24 percent of the total replacement value of assets is exposed to a hazard (Impact Factor = 2)
  - Low—9 percent or less of the total replacement value of assets is exposed to the hazard (Impact Factor = 1)
  - No impact—None of the total replacement value is exposed to a hazard (Impact Factor = 0)
- **Continuity of Operations**—Impact on operations is assessed based on estimates of how long it will take your jurisdiction to become 100-percent operable after a hazard event. The estimated functional downtime for critical facilities has been subjectively assigned an impact as follows:
  - High—Functional downtime of 365 days or more (Impact Factor = 3)
  - Medium—Functional downtime of 180 to 364 days (Impact Factor = 2)
  - Low—Functional downtime of 180 days or less (Impact Factor = 1)
  - No impact—No functional downtime is estimated from the hazard (Impact Factor = 0).

Table 16-2 summarizes the impacts for each hazard.

**Table 16-2. Hazard Impact on People, Property and Operations**

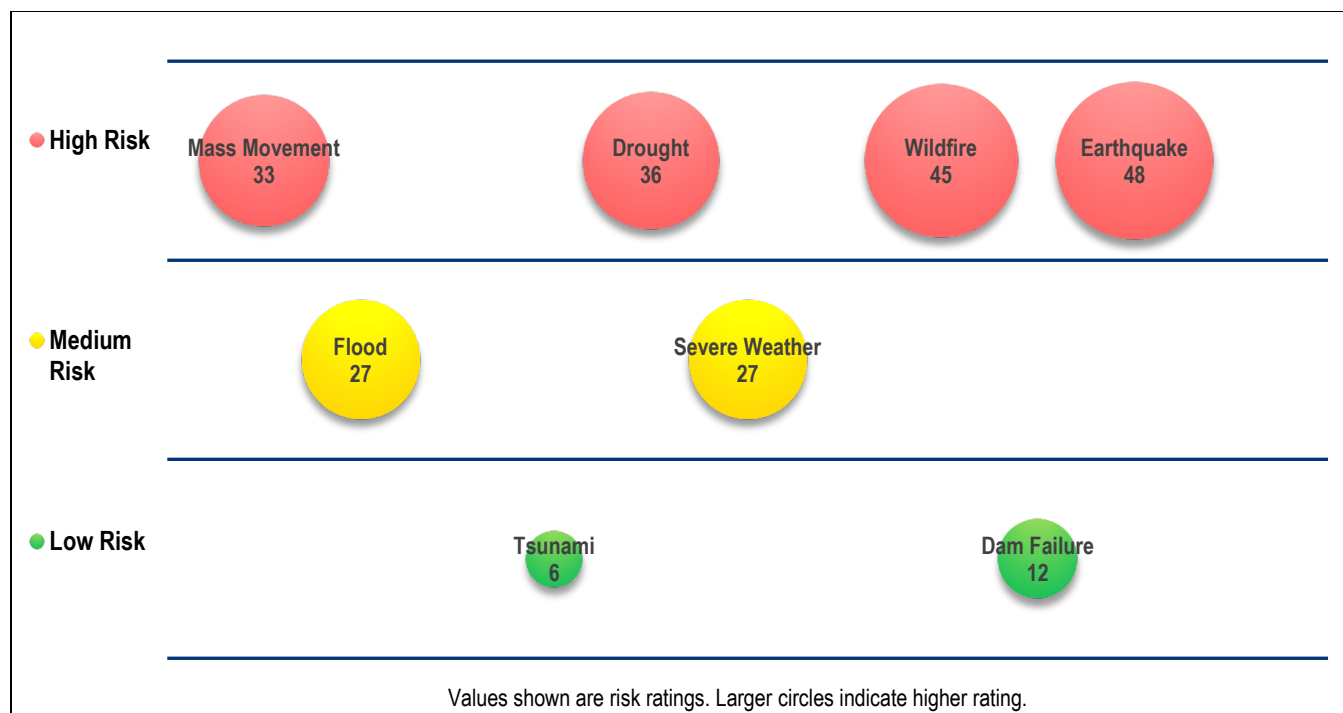
Hazard Event	People (Weighting Factor = 3)		Property (Weighting Factor = 2)		Operations (Weighting Factor = 1)	
	Impact / Score	Weighted Score	Impact / Score	Weighted Score	Impact / Score	Weighted Score
Dam Failure	Low/1	3	Low/1	2	Low/1	1
Drought	Low / 1	3	High / 3	6	High / 3	3
Earthquake	High / 3	9	High / 3	6	Low/1	1
Flood	Medium/2	6	Low / 1	2	Low / 1	1
Mass Movement	Medium / 2	6	Medium/2	4	Low/1	1
Sea Level Rise	Low/1	3	Low/1	2	Low/1	1
Severe Weather	High/3	6	Medium/2	4	Low / 1	1
Tsunami	Low/1	3	Low/1	2	Low/1	1
Wildfire	High/3	9	Medium / 2	4	Medium / 2	2

## 16.3 RISK RATING AND RANKING

The risk rating for each hazard was determined by multiplying the probability factor by the sum of the weighted impact factors for people, property, and continuity of operations, as summarized in Table 16-3. Based on these ratings, a priority of high, medium or low was assigned to each hazard. Generally, score of 30 or greater receive a “high” rating, score between 15 and 29 receive a “medium” rating, and score of less than 15 receives a “low” rating. Figure 16-1 shows the hazard risk ranking.

**Table 16-3. Hazard Risk Rating**

Hazard Event	Probability Factor	Sum of Weighted Impact Factors	Total (Probability x Impact)
Dam Failure	2	3+2+1=6	2x6=12
Drought	3	3+6+3=12	3x12=36
Earthquake	3	9+6+1=16	3x16=48
Flood	3	6+2+1=9	3x9=27
Mass Movement	3	6+4+1=11	3x11=33
Severe Weather	3	6+2+1=9	3x9=27
Tsunami	1	3+2+1=6	1x6=6
Wildfire	3	9+4+2=15	3x15=45

**Figure 16-1. Hazard Risk Rating**



## 17. OTHER HAZARDS OF INTEREST

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The hazards of concern assessed in this plan are those that present significant risks in the Marin Municipal Water District service area. Additional hazards, both natural and human-caused, were identified by the Steering Committee as having some potential to impact the planning area, but at a much lower risk level than the hazards of concern. These other hazards are identified as hazards of interest.

The sections below provide short profiles of each hazard of interest, including qualitative discussion of their potential to impact MMWD. No formal risk assessment of these hazards was performed, and no mitigation initiatives have been developed to address them. However, MMWD should be aware of these hazards and should take steps to reduce the risks they present whenever it is practical to do so.

### 17.1 PUBLIC HEALTH EMERGENCY

An outbreak is defined by the U.S. Centers for Disease Control and Prevention (CDC) as the occurrence of more cases of disease than normally expected within a specific place or group of people over a given period of time. State and local regulations require immediate reporting of any known or suspected outbreaks by health care providers, health care facilities, laboratories, veterinarians, schools, child day care facilities, and food service establishments. An epidemic is a localized outbreak that spreads rapidly and affects a large number of people or animals in a community. A pandemic is an epidemic that occurs worldwide or over a very large area and affects a large number of people or animals.

#### NOTE REGARDING COVID-19

While this planning process was underway, the world was still at the peak of the COVID-19 global pandemic. The impacts from this event will be long term and change the way society views, prepares for, and responds to pandemics.

Information and data on the impacts from this event and the development of policies to respond were not fully vetted enough to inform this plan. It is anticipated that future updates to this plan will have well informed, expanded dialogue on this subject matter.

#### 17.1.1 Identified Hazards

The California Department of Public Health has identified the conditions described in Table 17-1 as human diseases that could contribute to a serious epidemic in the state.

#### 17.1.2 Planning Capability for Pandemic

The California Department of Public Health works to protect the public's health in the Golden State and helps shape positive health outcomes for individuals, families and communities. The Department's programs and services, implemented in collaboration with local health departments and state, federal and private partners, touch the lives of every Californian and visitor to the state 24 hours a day, 7 days a week.

**Table 17-1. Naturally Spread Diseases Seen in California**

Description	Examples
<b>Animal Transmitted</b>	
These are diseases that are transmitted to humans by domestic or non-domestic animals.	<ul style="list-style-type: none"> <li>• Brucellosis (undulant fever)</li> <li>• Campylobacteriosis</li> <li>• Cat scratch disease</li> <li>• Cryptosporidiosis</li> <li>• Escherichia coli (E. coli)</li> <li>• Giardiasis</li> <li>• Middle Eastern Respiratory Syndrome</li> <li>• Plague</li> <li>• Psittacosis (ornithosis, parrot fever)</li> <li>• Q Fever</li> <li>• Rabies</li> <li>• Ringworm</li> <li>• Salmonellosis</li> <li>• Toxoplasmosis</li> <li>• Tularemia</li> </ul>
<b>Bloodborne</b>	
Viruses, bacteria and parasites that can be carried in blood and cause disease are known as bloodborne pathogens. Transmission of these diseases may be from direct blood contact, needle sticks, intravenous drug use, sexual behavior, insects or other vectors.	<ul style="list-style-type: none"> <li>• Ebola</li> <li>• Hepatitis C</li> <li>• Malaria</li> </ul>
<b>Community-Acquired Infections</b>	
Community-acquired infections are infections that are contracted outside of a hospital (or are diagnosed within 48 hours of admission) without any previous health care encounter.	<ul style="list-style-type: none"> <li>• Adenovirus</li> <li>• Bed Bugs</li> <li>• Body Lice</li> <li>• Campylobacteriosis</li> <li>• Conjunctivitis (pink eye)</li> <li>• Common cold viruses</li> <li>• Enterovirus, non-polio</li> <li>• Hand, foot, and mouth disease</li> <li>• Head Lice ('ukus)</li> <li>• Impetigo</li> <li>• Influenza (flu)</li> <li>• Invasive Group A Streptococcus (necrotizing fasciitis)</li> <li>• Legionnaires' Disease/Pontiac Fever</li> <li>• Methicillin-Resistant Staphylococcus Aureus</li> <li>• Norovirus</li> <li>• Pinworm disease</li> <li>• Respiratory syncytial virus</li> <li>• Ringworm</li> <li>• Scabies</li> <li>• Smallpox</li> <li>• Staphylococcus aureus</li> <li>• Strep throat/scarlet fever</li> <li>• Streptococcus, Group B</li> <li>• Tularemia</li> <li>• Viral meningitis</li> </ul>
<b>Foodborne</b>	
Foodborne diseases can be spread when food becomes contaminated with fecal matter containing bacteria, viruses, or parasites. This contamination can happen at a farm, manufacturing plant, restaurant, or home. Foodborne diseases usually result in gastrointestinal illness, which can include symptoms such as diarrhea, vomiting, nausea, stomachache, and fever. People who are ill with a foodborne disease can give the infection to others, so proper hygiene and hand washing practices are essential to limit the spread of disease. People experiencing gastrointestinal symptoms should not prepare or handle food for others.	<ul style="list-style-type: none"> <li>• Amebiasis</li> <li>• Angiostrongyliasis (rat lungworm)</li> <li>• Anisakiasis</li> <li>• Botulism</li> <li>• Brucellosis (undulant fever)</li> <li>• Campylobacteriosis</li> <li>• Cholera</li> <li>• Ciguatera fish poisoning</li> <li>• Cryptosporidiosis</li> <li>• Cyclosporiasis</li> <li>• Escherichia coli (E. coli)</li> <li>• Giardiasis</li> <li>• Listeriosis</li> <li>• Norovirus</li> <li>• Salmonellosis</li> <li>• Scombroid</li> <li>• Shigellosis</li> <li>• Tularemia</li> <li>• Typhoid Fever</li> <li>• Vibriosis</li> <li>• Yersinia enterocolitica</li> </ul>

Description	Examples
<b>Influenza</b>	
Influenza is an infectious viral disease of birds and mammals commonly transmitted through airborne aerosols such as coughing or sneezing. Symptoms are chills, headache, fever, nausea, muscle pain and occasionally pneumonia.	<p>Flu pandemics in the late 19th and 20th centuries:</p> <ul style="list-style-type: none"> <li>• Russian flu</li> <li>• 1918 Spanish flu</li> <li>• Asian flu</li> <li>• Hong Kong flu</li> <li>• A/H1N1 or the swine flu.</li> </ul> <p>Avian flu strains H5N1 and H7N9 caused human deaths but did not escalate to pandemic proportions.</p>
<b>Mosquito-Transmitted</b>	
Mosquito-borne diseases are not an immediate threat in Hawai'i because travelers are usually vaccinated (yellow fever) or disease spread requires an infected animal to travel all the way from the mainland (West Nile virus). Some mosquito-transmitted diseases (e.g., malaria or Japanese encephalitis) are not likely to ever be a threat because the mosquito species that spread them are not found in Hawai'i. However, travelers should be aware of these diseases and where they occur in the world so they may protect themselves.	
<b>Respiratory Viruses</b>	
Respiratory viruses are responsible for influenza-like illness. They can also cause the common cold. The virus that caused the Covid-19 pandemic is a respiratory virus. People at high risk (those with certain underlying conditions, the elderly, the very young, and pregnant women) can develop severe illness that results in hospitalization or death. The best way protection is proper hygiene and avoiding contact with sick individuals. The best way for those who are infected to protect others is to cover their nose and mouth when sneezing and coughing, use good hand hygiene, and stay home from work or school.	<ul style="list-style-type: none"> <li>• Adenovirus</li> <li>• Coronaviruses (including SARS and MERS CoV)</li> <li>• Influenza</li> <li>• Parainfluenza</li> <li>• Parvovirus B19</li> <li>• Respiratory Syncytial Virus</li> <li>• Rhinovirus (Common Cold)</li> <li>• Measles</li> <li>• Pertussis (whooping cough)</li> </ul>
<b>Waterborne Diseases</b>	
Diseases caused by micro-organisms transmitted in water can be spread while bathing, washing, drinking water, or eating food exposed to contaminated water.	<ul style="list-style-type: none"> <li>• Cholera</li> <li>• Giardiasis</li> <li>• Legionnaires' Disease /Pontiac Fever</li> <li>• Leptospirosis</li> <li>• Typhoid Fever</li> <li>• Vibriosis</li> </ul>
<b>Sexually Transmitted Disease</b>	
HIV/AIDS, chlamydia, gonorrhea, and syphilis are the predominant sexually transmitted infections handled by the Hawai'i State Department of Health Harm Reduction Services Branch, whose responsibilities include awareness, prevention, and control of these infections.	<ul style="list-style-type: none"> <li>• Chlamydia</li> <li>• Genital warts</li> <li>• Gonorrhea</li> <li>• Hepatitis A, B, and C</li> <li>• Herpes</li> <li>• Human Immunodeficiency Virus/Acquired Immunodeficiency Syndrome (HIV/AIDS)</li> <li>• Human papillomavirus</li> <li>• Syphilis</li> <li>• Zika</li> </ul>

Marin Health & Human Services is the largest department in the County of Marin and is charged with promoting and protecting the health, well-being, self-sufficiency, and safety of all people in Marin County.

Marin County Public Health is currently tracking demographic, geographic, and clinical information about confirmed COVID-19 cases to inform the COVID-19 response and understand factors associated with COVID-19 transmission and clinical outcomes in our community. COVID-19 testing and case data are reported as timely, accurately, and completely as available. As of July 8, 2021, Marin County had 12,058 total cases of COVID-19, with 158 deaths; 507,084 COVID-19 tests have been completed and 204,485 Marin County residents have been vaccinated (Marin HHS, 2021).

## 17.2 CYBER-ATTACK

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

### 17.2.1 Types of Cyber-Attack

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

This risk assessment includes cyber-attacks and cyber-terrorism under the inclusive hazard of cyber-threats. The terms often are used interchangeably, though they are not the same. While all cyber-terrorism is a form of cyber-attack, not all cyber-attacks are cyber-terrorism.

Public and private computer systems are likely to experience a variety of cyber-attacks, from blanket malware infection to targeted attacks on system capabilities. Cyber-attacks specifically seek to breach information technology security measures designed to protect an individual or organization. The initial attack is followed by more severe attacks for the purpose of causing harm, stealing data, or financial gain. Organizations are prone to different types of attacks that can be either automated or targeted in nature. Table 17-2 describes the most common cyber-attack mechanisms faced by organizations today.

### 17.2.2 Cyber-Terrorism

Cyber-terrorism is the use of computers and information, particularly over the internet, to recruit others to an organization's cause, cause physical or financial harm, or cause a severe disruption of infrastructure service. Such disruptions can be driven by religious, political, or other motives. Like traditional terrorism tactics, cyber-terrorism seeks to evoke very strong emotional reactions, but it does so through information technology rather than a physically violent or disruptive action. Cyber-terrorism has three main types of objectives (Kostadinov 2012):

- **Organizational**—Cyber-terrorism with an organizational objective includes specific functions outside of or in addition to a typical cyber-attack. Terrorist groups today use the internet on a daily basis. This daily use may include recruitment, training, fundraising, communication, or planning. Organizational cyber-terrorism can use platforms such as social media as a tool to spread a message beyond country borders and instigate physical forms of terrorism. Additionally, organizational goals may use systematic attacks as a tool for training new members of a faction in cyber-warfare.

**Table 17-2. Common Mechanisms for Cyber-Attacks**

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

- Undermining**—Cyber-terrorism with undermining as an objective seeks to hinder the normal functioning of computer systems, services, or websites. Such methods include defacing, denying, and exposing information. While undermining tactics are typically used due to high dependence on online structures to support vital operational functions, they typically do not result in grave consequences unless undertaken as part of a larger attack. Undermining attacks on computers include the following:
  - Directing conventional kinetic weapons against computer equipment, a computer facility, or transmission lines to create a physical attack that disrupts the reliability of equipment.
  - Using electromagnetic energy, most commonly in the form of an electromagnetic pulse, to create an electronic attack against computer equipment or data transmissions. By overheating circuitry or jamming communications, an electronic attack disrupts the reliability of equipment and the integrity of data.
  - Using malicious code directed against computer processing code, instruction logic, or data. The code can generate a stream of malicious network packets that disrupt data or logic by exploiting vulnerability in computer software, or a weakness in computer security practices. This type of cyber-attack can disrupt the reliability of equipment, the integrity of data, and the confidentiality of communications
- Destructive**—The destructive objective for cyber-terrorism is what organizations fear most. Through the use of computer technology and the internet, the terrorists seek to inflict destruction or damage on



tangible property or assets, and even death or injury to individuals. There are no cases of pure cyber-terrorism as of the date of this plan.

### 17.2.3 Impacts of Cyber-Attack

According to the Ponemon Institute's *2015 Cost of Cyber Crime*, the cost of cyber-crime in the U.S. is at an annual average of \$15.4 million per company. An international study released by Malwarebytes in 2016 found that cyber-ransom threats caused 34 percent of business victims to lose revenue and 20 percent had to stop business immediately. The study also reported that nearly 60 percent of all cyber-ransom attacks demanded over \$1,000, over 20 percent asked for more than \$10,000, and 1 percent asked for over \$150,000.

Cyber-attacks are experienced on a daily basis, often without being noticed. They can originate from any computer to affect any other computer in the world. If a system is connected to the internet or operating on a wireless frequency, it is susceptible to exploitation. Targets of cyber-attacks can be individual computers, networks, organizations, business sectors, or governments. Financial institutions and retailers are often targeted to extract personal and financial data that can be used to steal money from individuals and banks. The most affected sectors are finance, energy and utilities, and defense and aerospace, as well as communications and health care. Both public and private operations are threatened on a near-daily basis by the millions of currently engineered cyberattacks developed to automatically seek technological vulnerabilities.

A catastrophic cyber-attack can have far-ranging effects on District assets. All critical facilities operated by electricity and/or a computer system are vulnerable to cyber-attacks. Cyber-attacks may affect structures if any critical electronic systems suffer service disruption. For instance, a cyber-attack may cripple the electronic system that controls a cooling system or pressure system within critical infrastructure. This may result in physical damage to the structure from components overheating, or an explosion if pressure relief systems are rendered inoperable. Such failures may not be immediately recognizable as cyber-attacks, appearing at first to be attributable to mechanical malfunctions.

Economic impacts can be far-reaching if a cyber-attack is prolonged for a week or longer. Cyber-attacks can have extensive fiscal impacts. Companies and government services can lose large sums of unrecoverable revenue from site downtime and possible compromise of sensitive confidential data. Cyber-incidents could result in the theft or modification of important data—including personal, agency, or corporate information—and the sabotage of critical processes, including the provision of basic services by government or private-sector entities.

### 17.2.4 Responding to Cyber-Attack

The District and all of Marin County will continue to be impacted by cyber-attacks in the future. The nature of these attacks is projected to evolve in sophistication over time. The County has taken a proactive position in its cyber-security efforts with the establishment of the Cyber Crimes Detail unit and is expected to remain vigilant in its efforts to prevent attacks from occurring or disrupting business operations. This vigilance applies to the District as well, which has a vested interest in securing its cyber based systems. The America's Water Infrastructure Act (AWIA) assessment that the District is currently performing includes a significant cyber security assessment and recommendations element. The District will integrate elements of this Hazard Mitigation Plan with the AWIA assessment as appropriate.

Up-to-date virus protection software used in public and private sectors prevents many cyberattacks from becoming successful. Programs that promote public education on virus protection are an effective way to mitigate cyber-threats.

## 17.3 HAZARDOUS MATERIALS

A hazardous material is a substance or combination of substances that, because of quantity, concentration, or physical, chemical, or infectious characteristics, may cause or contribute to an increase in mortality or an increase in serious illness, or otherwise pose a hazard to human life, property, or the environment. Hazardous material releases can pose a risk to life, public health, air quality, water quality and the environment. They may result in the evacuation of a facility or an entire neighborhood. In addition to the immediate risk, long-term public health and environmental impacts may result from sustained exposure to certain substances.

Title 49 of the Code of Federal Regulations lists thousands of hazardous materials, including gasoline, insecticides, household cleaning products, and radioactive materials. Even the natural gas used in homes and businesses is a dangerous substance when a leak occurs. According to the California State Hazard Mitigation Plan, hazardous materials are substances that are flammable, combustible, explosive, toxic, noxious, corrosive, an oxidizer, an irritant or radioactive. State-regulated substances that have the greatest probability of adversely impacting communities are listed in the CCR, Title 19.

Hazardous materials are present in facilities that produce, store, or use them:

- Water treatment plants use chlorine to eliminate bacterial contaminants.
- Hazardous materials are transported along interstate highways and railways daily.
- The natural gas used in homes and businesses is a dangerous substance when a leak occurs.
- Many businesses, through intentional action, lack of awareness or accidental occurrences, have contamination in and around their property.

### 17.3.1 Types of Incidents

The following are the most common types of hazardous material incidents:

- **Fixed-Facility Hazardous Materials Incident**—This is the uncontrolled release from a fixed site of materials that pose a risk to health, safety and property. It is possible to identify and prepare for fixed-site incidents because federal and state laws require those facilities to notify state and local authorities about materials being used or produced at the site.
- **Hazardous Materials Transportation Incident**—A hazardous materials transportation incident is any event during transport resulting in uncontrolled release of materials that can pose a risk to health, safety and property. Transportation incidents are difficult to prepare for because there is little if any notice about what materials could be involved should an accident happen. Transported hazardous wastes include thousands of shipments of radiological materials moved across the United States by ground transportation, mostly medical materials and low-level radioactive waste. Hazardous materials transportation incidents can occur on any transportation corridor, although most occur on interstate highways, other major federal or state highways, or major rail lines. Many incidents occur in sparsely populated areas and affect very few people. Others are in areas with much higher population densities, such as the January 6, 2005 train accident in Graniteville, South Carolina that released chlorine gas killing nine, injuring 500, and causing the evacuation of 5,400 residents.

- **Interstate Pipeline Hazardous Materials Incident**—There are a significant number of interstate natural gas, heating oil, and petroleum pipelines running through the State of California. These are used to provide natural gas to utilities and to transport these materials from production facilities to end-users.

Hazardous materials are likely accidentally released or spilled numerous times each day. Eliminating these widespread substances would be nearly impossible, but the threat of accidental releases or spills may be reduced by mitigation.

### 17.3.2 Responding to the Hazardous Materials Risk

The following mitigation efforts for hazardous substances are implemented through state and federal regulation:

- Fixed Facilities:
  - Process hazard analysis through the California Division of Occupational Safety and Health
  - Policies and procedures, hazard communication, and training
  - Placarding and labeling of containers
  - Hazard assessment
  - Security
  - Process and equipment maintenance
  - Mitigating techniques (flares, showers, mists, containment vessels, failsafe devices)
  - Use of inherently safer alternative products
  - Emergency plans and coordination
  - Response procedures
- Transported:
  - Placards and labeling of containers
  - Proper container for material type
  - Random inspections of transporters
  - Safe handling policies and procedures
  - Hazard communications
  - Training for handlers
  - Permitting
  - Transportation flow studies, e.g., restricting HAZMAT transportation over certain routes.

### 17.3.3 Oversight

The County's Public Works Department was designated as the Certified Unified Program Agency (CUPA) for the County of Marin. The CUPA is the local administrative agency that coordinates the regulation of hazardous materials and hazardous wastes in Marin County. The Marin County Certified Unified Programs Agency (CUPA) regulates and inspects approximately 850 Marin businesses.

The CUPA provides its regulated businesses several convenient benefits such as a single point of contact for permitting, billing and inspections; uniformity and consistency in enforcement of regulations; and a single fee system incorporating all of the applicable fees from the six CUPA programs.

## 17.4 TERRORISM

### 17.4.1 Types of Terrorism

Acts of terrorism are intentional, criminal, malicious acts that involve the use of illegal force, are intended to intimidate or coerce, and are committed in support of political or social objectives. Table 17-3 provides a hazard profile summary for terrorism-related events.

**Table 17-3. Event Profiles for Terrorism**

Hazard	Application Mode <sup>a</sup>	Hazard Duration <sup>b</sup>	Static/Dynamic Characteristics <sup>c</sup>	Mitigating and Exacerbating Conditions <sup>d</sup>
<b>Conventional Bomb</b>	Detonation of explosive device on or near target; delivery via person, vehicle, or projectile.	Instantaneous; additional secondary devices, or diversionary activities may be used, lengthening the duration of the hazard until the attack site is determined to be clear.	Extent of damage is determined by type and quantity of explosive. Effects generally static other than cascading consequences, incremental structural failure, etc.	Blast force is inversely proportional to the cube of the distance from the blast; thus, each additional increment of distance provides progressively more protection. Terrain, forestation, structures, etc. can provide shielding by absorbing and/or deflecting energy and debris. Exacerbating conditions include ease of access to target; lack of barriers and shielding; poor construction; and ease of concealment of device.
<b>Chemical Agent</b>	Liquid/aerosol contaminants can be dispersed using sprayers or other aerosol generators; liquids vaporizing from puddles/containers; or munitions.	Chemical agents may pose viable threats for hours to weeks depending on the agent and the conditions in which it exists.	Contamination can be carried out of the initial target area by persons, vehicles, water, and wind. Chemicals may be corrosive or otherwise damaging over time if not remediated.	Air temperature can affect evaporation of aerosols. Ground temperature affects evaporation of liquids. Humidity can enlarge aerosol particles, reducing inhalation hazard. Precipitation can dilute and disperse agents but can spread contamination. Wind can disperse vapors but also cause target area to be dynamic. The micro-meteorological effects of buildings and terrain can alter travel and duration of agents. Shielding in the form of sheltering in place can protect people and property from harmful effects.
<b>Arson/Incendiary Attack</b>	Initiation of fire or explosion on or near target via direct contact or remotely via projectile.	Generally, minutes to hours.	Extent of damage is determined by type and quantity of device, accelerant, and materials present at or near target. Effects generally static other than cascading consequences, incremental structural failure, etc.	Mitigation factors include built-in fire detection and protection systems and fire-resistive construction techniques. Inadequate security can allow easy access to target, easy concealment of an incendiary device, and undetected initiation of a fire. Non-compliance with fire and building codes, as well as failure to maintain existing fire protection systems, can substantially increase the effectiveness of a fire weapon.
<b>Armed Attack</b>	Tactical assault or sniping from remote location, or random attack based on fear, emotion, or mental instability.	Generally, minutes to days.	Varies based on the perpetrators' intent and capabilities.	Inadequate security can allow easy access to target, easy concealment of weapons, and undetected initiation of an attack.

Hazard	Application Mode <sup>a</sup>	Hazard Duration <sup>b</sup>	Static/Dynamic Characteristics <sup>c</sup>	Mitigating and Exacerbating Conditions <sup>d</sup>
<b>Biological Agent</b>	Liquid or solid contaminants can be dispersed using sprayers/aerosol generators or by point or line sources such as munitions, covert deposits, and moving sprayers.	Biological agents may pose viable threats for hours to years depending on the agent and the conditions in which it exists.	Depending on the agent used and the effectiveness with which it is deployed, contamination can be spread via wind and water. Infection can spread via human or animal vectors.	Altitude of release above ground can affect dispersion; sunlight is destructive to many bacteria and viruses; light to moderate wind will disperse agents but higher winds can break up aerosol clouds; the micro-meteorological effects of buildings and terrain can influence aerosolization and travel of agents.
<b>Cyber-terrorism</b>	Electronic attack using one computer system against another.	Minutes to days.	Generally no direct effects on built environment.	Inadequate security can facilitate access to critical computer systems, allowing them to be used to conduct attacks.
<b>Agro-terrorism</b>	Direct, generally covert contamination of food supplies or introduction of pests and/or disease agents to crops and livestock.	Days to months.	Varies by type of incident. Food contamination events may be limited to specific distribution sites, whereas pests and diseases may spread widely. Generally, no effects on built environment.	Inadequate security can facilitate adulteration of food and introduction of pests and disease agents to crops and livestock.
<b>Radiological Agent</b>	Radioactive contaminants can be dispersed using sprayers/ aerosol generators, or by point or line sources such as munitions.	Contaminants may remain hazardous for seconds to years depending on material used.	Initial effects will be localized to site of attack; depending on meteorological conditions, subsequent behavior of radioactive contaminants may be dynamic.	Duration of exposure, distance from source of radiation, and the amount of shielding between source and target determine exposure to radiation.
<b>Nuclear Bomb</b>	Detonation of nuclear device underground, at the surface, in the air, or at high altitude.	Light/heat flash and blast/shock wave last for seconds; nuclear radiation and fallout hazards can persist for years. Electromagnetic pulse from a high-altitude detonation lasts for seconds and affects only unprotected electronic systems.	Initial light, heat, and blast effects of a subsurface, ground, or air burst are static and determined by the device's characteristics and employment; fallout of radioactive contaminants may be dynamic, depending on meteorological conditions.	Harmful effects of radiation can be reduced by minimizing the time of exposure. Light, heat, and blast energy decrease logarithmically as a function of distance from seat of blast. Terrain, forestation, structures, etc. can provide shielding by absorbing and/or deflecting radiation and radioactive contaminants.



Hazard	Application Mode <sup>a</sup>	Hazard Duration <sup>b</sup>	Static/Dynamic Characteristics <sup>c</sup>	Mitigating and Exacerbating Conditions <sup>d</sup>
<b>Intentional Hazardous Material Release (fixed facility or transportation)</b>	Solid, liquid, and/or gaseous contaminants may be released from fixed or mobile containers	Hours to days.	Chemicals may be corrosive or otherwise damaging over time. Explosion and/or fire may be subsequent. Contamination may be carried out of the incident area by persons, vehicles, water, and wind.	As with chemical weapons, weather conditions directly affect how the hazard develops. The micro-meteorological effects of buildings and terrain can alter travel and duration of agents. Shielding in the form of sheltering in place can protect people and property from harmful effects. Non-compliance with fire and building codes, as well as failure to maintain existing fire protection and containment features, can substantially increase the damage from a hazardous materials release.

Source: FEMA 386-7

- a. **Application Mode**—The human acts necessary to cause the event to occur.
- b. **Hazard Duration**—The length of time the hazard is present. For example, a chemical warfare agent such as mustard gas, if unremediated, can persist for hours or weeks under the right conditions.
- c. **Dynamic or Static Characteristics**—An event's tendency to expand, contract, or remain confined in time, magnitude, and space. For example, a cloud of chlorine gas leaking from a storage tank can change location by drifting with the wind and can diminish in danger by dissipating over time.
- d. **Mitigation and Exacerbating Conditions:**  
 Mitigation Conditions—Characteristics of the target and its physical environment that can reduce the effects of a hazard. For example, earthen berms can provide protection from bombs; exposure to sunlight can render some biological agents ineffective; and effective perimeter lighting and surveillance can minimize the likelihood of someone approaching a target unseen.  
 Exacerbating conditions—Characteristics that can enhance or magnify the effects of a hazard. For example, depressions or low areas in terrain can trap heavy vapors, and a proliferation of street furniture (trash receptacles, newspaper vending machines, mail boxes, etc.) can provide hiding places for explosive devices.

The Federal Bureau of Investigation (FBI) categorizes two types of terrorism in the United States:

- Domestic terrorism involves groups or individuals whose terrorist activities are directed at elements of our government or population without foreign direction. The FBI is the primary response agency for domestic terrorism. The FBI coordinates domestic preparedness programs and activities of the United States to limit acts posed by terrorists, including the use of weapons of mass destruction.
- International terrorism involves groups or individuals whose terrorist activities are foreign-based or directed by countries or groups outside the United States, or whose activities transcend national boundaries. Examples include the 1993 bombing of the World Trade Center and the attacks of September 11, 2001 at the World Trade Center and the Pentagon.

Bioterrorism agents are divided into three categories based on their ease of spread and the severity of illness they cause. Category A agents are most dangerous, and Category C agents are current emerging threats:

- Category A pathogens—Organisms or biological agents that pose the highest risk to national security and public health because they:
  - Can be easily spread or transmitted from person to person
  - Result in high death rates and have the potential for major public health impact
  - Might cause public panic and social disruption
  - Require special action for public health preparedness.
- Category B pathogens—The second highest priority organisms/biological agents. They:
  - Are moderately easy to disseminate
  - Result in moderate morbidity rates and low mortality rates
  - Require specific enhancements for diagnostic capacity and enhanced disease surveillance.

- Category C pathogens—The third highest priority, including emerging pathogens that could be engineered for mass dissemination in the future because of:
  - Availability
  - Ease of production and dissemination
  - Potential for high morbidity and mortality rates and major health impact.

## 17.4.2 Impacts of Terrorism

Most terrorist events in the United States have been bombing attacks, involving detonated or undetonated explosive devices, tear gas, pipe bombs, or firebombs. The effects of terrorism can vary from loss of life and injuries to property damage and disruptions in services such as electricity, water supplies, transportation, or communications. The event may have an immediate effect or a delayed effect. Terrorists often choose targets that offer limited danger to themselves and areas with relatively easy public access. Foreign terrorists look for visible targets where they can avoid detection before and after an attack such as international airports, large cities, major special events, and high-profile landmarks.

Three factors distinguish terrorism hazards from other types of hazards:

- In the case of chemical, biological, and radioactive agents, their presence may not be immediately obvious, making it difficult to determine when and where they may have been released, who has been exposed, and what danger is present for first responders and emergency medical technicians.
- There is limited scientific understanding of how these agents affect the population at large.
- Terrorism evokes strong emotional reactions, ranging from anxiety to fear to anger to despair to depression.

## 17.4.3 Responding to Terrorism

While education, heightened awareness, and early warning of unusual circumstances may deter crime and terrorism, intentional acts that harm people and property are possible at any time. Public safety entities react to the threat, locating, isolating, and neutralizing further damage, and investigating potential scenes and suspects to bring criminals to justice. Those involved with terrorism response, including public health and public information staff, are trained to deal swiftly with the public's emotional reaction. The area of the event must be clearly identified in all emergency alert messages to prevent those not affected by the incident from overwhelming local emergency rooms and response resources, which would reduce service to those actually affected. The public must be informed clearly and frequently about what government agencies are doing to mitigate the impacts of the event. The public will also be given clear directions on how to protect the health of individuals and families.

In dealing with terrorism, the unpredictability of human beings must be considered. People with a desire to perform criminal acts may seek out targets of opportunity that may not fall into established lists of critical areas or facilities. First responders train not only to respond to organized terrorism events, but also to respond to random acts by individuals who, for a variety of reasons ranging from fear to emotional trauma to mental instability, may choose to harm others and destroy property.

The AWIA assessment that the District is currently performing includes a significant terrorism assessment and recommendations element. The District will integrate elements of this Hazard Mitigation Plan with the AWIA assessment as appropriate.

## Part 3. MITIGATION PLAN



## 18. MISSION STATEMENT, GOALS, AND OBJECTIVES

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Hazard mitigation plans must identify goals for reducing long-term vulnerabilities to identified hazards (44 CFR Section 201.6(c)(3)(i)). The Steering Committee established a set of goals and measurable objectives for this plan, based on data from the preliminary risk assessment and the results of the public involvement strategy. The mission statement, goals, objectives, and actions in this plan all support each other. Objectives were selected that meet multiple goals. Actions were prioritized based on ability to accomplish multiple objectives.

### 18.1 MISSION STATEMENT

A mission statement focuses the range of objectives and actions to be considered. This is not a goal because it does not describe a hazard mitigation outcome, and it is broader than a hazard-specific objective. The mission statement for this hazard mitigation plan is as follows:

*The mission of the hazard mitigation plan is to reduce risk and increase the resiliency of our water system during natural disasters by establishing a mitigation program that focuses on protecting life, property, infrastructure, and the environment.*

### 18.2 GOALS

Four goals were set for MMWD's first hazard mitigation plan which are listed below:

1. Protect life and property during disasters
2. Minimize damage to critical infrastructure to maintain continuity of essential water services
3. Protect natural resources, including local water supply sources
4. Increase public awareness of the risk of loss of water

### 18.3 OBJECTIVES

The Steering Committee members identified the following plan objectives:

1. Implement projects that assist in protecting lives by making infrastructure, critical facilities, and other property more resistant to natural hazards
2. Address aging infrastructure issues to reduce/minimize the impacts from future hazards and disasters
3. Implement projects that reduce/minimize the impacts on our natural resources from future hazards and disasters
4. Raise awareness and communicate risk to District assets





## 19. MITIGATION BEST PRACTICES

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Catalogs of hazard mitigation actions were developed that present a range of alternatives to be considered for the action plan, in compliance with 44 CFR (Section 201.6(c)(3)(ii)). One catalog was developed for each natural hazard of concern evaluated in this plan. The catalogs present alternatives that are categorized in two ways:

- Who would have responsibility for implementation:
  - Individuals (personal scale)
  - Businesses (corporate scale)
  - Government (government scale).
- What the alternative would do:
  - Manipulate the flooding hazard
  - Reduce exposure to the flooding hazard
  - Reduce vulnerability to the flooding hazard
  - Increase the ability to respond to or be prepared for the flooding hazard.

The catalogs list mitigation actions that might be able to reduce the risk of hazards in the planning area. They show a baseline set of alternatives that are backed by a planning process and are consistent with plan goals and objectives. Mitigation actions recommended in this plan were selected from among the alternatives. The following actions in the catalog would generally not be selected as recommended mitigations for this plan:

- Any action that is not feasible
- Any action that is already being implemented
- Any action for which there is an apparently more cost-effective alternative
- Any government action that is beyond the capabilities of the District to implement (government actions in the catalogs are generic to all forms of government and may not fall within the responsibilities of a water district)
- Any government action that does not have public or political support

The catalogs for each hazard of concern are presented in Table 19-1 through Table 19-8.

**Table 19-1. Alternatives to Mitigate the Dam Failure Hazard**

Personal-Scale	Corporate-Scale	Government-Scale <sup>a</sup>
<ul style="list-style-type: none"> <li>• <b>Manipulate the hazard:</b> <ul style="list-style-type: none"> <li>❖ None</li> </ul> </li> <li>• <b>Reduce exposure to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Relocate out of dam failure inundation areas.</li> </ul> </li> <li>• <b>Reduce vulnerability to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Elevate home to appropriate levels.</li> </ul> </li> <li>• <b>Increase the ability to respond to or be prepared for the hazard:</b> <ul style="list-style-type: none"> <li>❖ Learn about risk reduction for the dam failure hazard.</li> <li>❖ Learn the evacuation routes for a dam failure event.</li> <li>❖ Educate yourself on early warning systems and the dissemination of warnings.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <b>Manipulate the hazard:</b> <ul style="list-style-type: none"> <li>❖ Remove dams.</li> <li>❖ Remove levees.</li> <li>❖ Harden dams.</li> </ul> </li> <li>• <b>Reduce exposure to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Replace earthen dams with hardened structures.</li> </ul> </li> <li>• <b>Reduce vulnerability to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Flood-proof facilities within dam failure inundation areas.</li> </ul> </li> <li>• <b>Increase the ability to respond to or be prepared for the hazard:</b> <ul style="list-style-type: none"> <li>❖ Educate employees on the probable impacts of a dam failure.</li> <li>❖ Develop a continuity of operations plan.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <b>Manipulate the hazard:</b> <ul style="list-style-type: none"> <li>❖ Remove dams.</li> <li>❖ Remove levees.</li> <li>❖ Harden dams.</li> </ul> </li> <li>• <b>Reduce exposure to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Replace earthen dams with hardened structures</li> <li>❖ Relocate critical facilities out of dam failure inundation areas.</li> <li>❖ Consider open space land use in designated dam failure inundation areas.</li> </ul> </li> <li>• <b>Reduce vulnerability to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Adopt higher floodplain standards in mapped dam failure inundation areas.</li> <li>❖ Retrofit critical facilities within dam failure inundation areas.</li> </ul> </li> <li>• <b>Increase the ability to respond to or be prepared for the hazard:</b> <ul style="list-style-type: none"> <li>❖ Map dam failure inundation areas.</li> <li>❖ Enhance emergency operations plan to include a dam failure component.</li> <li>❖ Institute monthly communications checks with dam operators.</li> <li>❖ Inform the public on risk reduction techniques</li> <li>❖ Adopt real-estate disclosure requirements for the re-sale of property located within dam failure inundation areas.</li> <li>❖ Consider the probable impacts of climate in assessing the risk associated with the dam failure hazard.</li> <li>❖ Establish early warning capability downstream of listed high hazard dams.</li> <li>❖ Consider the residual risk associated with protection provided by dams in future land use decisions.</li> </ul> </li> </ul>

a. These catalogs are generic and are not specific to the District. Many of the government-scale alternatives listed are beyond the range of responsibilities of a water district.

**Table 19-2. Alternatives to Mitigate the Drought Hazard**

Personal-Scale	Corporate-Scale	Government-Scale <sup>a</sup>
<ul style="list-style-type: none"> <li>• <b>Manipulate the hazard:</b> <ul style="list-style-type: none"> <li>❖ None</li> </ul> </li> <li>• <b>Reduce exposure to the hazard:</b> <ul style="list-style-type: none"> <li>❖ None</li> </ul> </li> <li>• <b>Reduce vulnerability to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Drought-resistant landscapes</li> <li>❖ Reduce water system losses</li> <li>❖ Modify plumbing systems (through water saving kits)</li> </ul> </li> <li>• <b>Increase the ability to respond to or be prepared for the hazard:</b> <ul style="list-style-type: none"> <li>❖ Practice active water conservation</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <b>Manipulate the hazard:</b> <ul style="list-style-type: none"> <li>❖ None</li> </ul> </li> <li>• <b>Reduce exposure to the hazard:</b> <ul style="list-style-type: none"> <li>❖ None</li> </ul> </li> <li>• <b>Reduce vulnerability to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Drought-resistant landscapes</li> <li>❖ Reduce private water system losses</li> </ul> </li> <li>• <b>Increase the ability to respond to or be prepared for the hazard:</b> <ul style="list-style-type: none"> <li>❖ Practice active water conservation</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <b>Manipulate the hazard:</b> <ul style="list-style-type: none"> <li>❖ Stormwater management</li> <li>❖ Identify alternative water sources</li> </ul> </li> <li>• <b>Reduce exposure to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Identify and create backup sources of supply</li> </ul> </li> <li>• <b>Reduce vulnerability to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Water use conflict regulations</li> <li>❖ Reduce water system losses</li> <li>❖ Distribute water saving kits</li> <li>❖ Implement/expand water reuse projects</li> </ul> </li> <li>• <b>Increase the ability to respond to or be prepared for the hazard:</b> <ul style="list-style-type: none"> <li>❖ Public education on drought resistance</li> <li>❖ Expand recycled water network</li> <li>❖ Identify alternative water supplies for times of drought; mutual aid agreements with alternative suppliers</li> <li>❖ Develop drought contingency plan</li> <li>❖ Develop criteria “triggers” for drought-related actions</li> <li>❖ Improve accuracy of water supply forecasts</li> <li>❖ Modify rate structure to influence active water conservation techniques</li> <li>❖ Increase emergency storage capacity</li> </ul> </li> </ul>

a. These catalogs are generic and are not specific to the District. Many of the government-scale alternatives listed are beyond the range of responsibilities of a water district.

**Table 19-3. Alternatives to Mitigate the Earthquake Hazard**

Personal-Scale	Corporate-Scale	Government-Scale <sup>a</sup>
<ul style="list-style-type: none"> <li>• <b>Manipulate the hazard:</b> <ul style="list-style-type: none"> <li>❖ None</li> </ul> </li> <li>• <b>Reduce exposure to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Locate outside of hazard area (off soft soils)</li> </ul> </li> <li>• <b>Reduce vulnerability to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Retrofit structure (anchor house structure to foundation)</li> <li>❖ Secure household items that can cause injury or damage (such as water heaters, bookcases, and other appliances)</li> <li>❖ Build to higher design</li> </ul> </li> <li>• <b>Increase the ability to respond to or be prepared for the hazard:</b> <ul style="list-style-type: none"> <li>❖ Practice “drop, cover, and hold”</li> <li>❖ Develop household mitigation plan, such as creating a retrofit savings account, communication capability with outside, 72-hour self-sufficiency during an event</li> <li>❖ Keep cash reserves for reconstruction</li> <li>❖ Become informed on the hazard and risk reduction alternatives available.</li> <li>❖ Develop a post-disaster action plan for your household</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <b>Manipulate the hazard:</b> <ul style="list-style-type: none"> <li>❖ None</li> </ul> </li> <li>• <b>Reduce exposure to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Locate or relocate mission-critical functions outside hazard area where possible</li> </ul> </li> <li>• <b>Reduce vulnerability to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Build redundancy for critical functions and facilities</li> <li>❖ Retrofit critical buildings and areas housing mission-critical functions</li> </ul> </li> <li>• <b>Increase the ability to respond to or be prepared for the hazard:</b> <ul style="list-style-type: none"> <li>❖ Adopt higher standard for new construction; consider “performance-based design” when building new structures</li> <li>❖ Keep cash reserves for reconstruction</li> <li>❖ Inform your employees on the possible impacts of earthquake and how to deal with them at your work facility.</li> <li>❖ Develop a continuity of operations plan</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <b>Manipulate the hazard:</b> <ul style="list-style-type: none"> <li>❖ None</li> </ul> </li> <li>• <b>Reduce exposure to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Locate critical facilities or functions outside hazard area where possible</li> </ul> </li> <li>• <b>Reduce vulnerability to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Harden infrastructure</li> <li>❖ Provide redundancy for critical functions</li> <li>❖ Adopt higher regulatory standards</li> <li>❖ Perform seismic retrofits for vulnerable critical buildings and areas</li> </ul> </li> <li>• <b>Increase the ability to respond to or be prepared for the hazard:</b> <ul style="list-style-type: none"> <li>❖ Provide better hazard maps</li> <li>❖ Provide technical information and guidance</li> <li>❖ Enact tools to help manage development in hazard areas (e.g., tax incentives, information)</li> <li>❖ Include retrofitting and replacement of critical system elements in capital improvement plan</li> <li>❖ Develop strategy to take advantage of post-disaster opportunities</li> <li>❖ Warehouse critical infrastructure components such as pipe fittings, valves, pumps, power line, and road repair materials</li> <li>❖ Solidify supplemental power supply to tanks and pump stations (generator program)</li> <li>❖ Develop and adopt a continuity of operations plan</li> <li>❖ Initiate triggers guiding improvements (such as &lt;50% substantial damage or improvements)</li> <li>❖ Further enhance seismic risk assessment to target high hazard buildings for mitigation opportunities.</li> <li>❖ Develop a post-disaster action plan that includes grant funding and debris removal components.</li> </ul> </li> </ul>

a. These catalogs are generic and are not specific to the District. Many of the government-scale alternatives listed are beyond the range of responsibilities of a water district.



**Table 19-4. Alternatives to Mitigate the Flood Hazard**

Personal-Scale	Corporate-Scale	Government-Scale <sup>a</sup>
<ul style="list-style-type: none"> <li>• <b>Manipulate the hazard:</b> <ul style="list-style-type: none"> <li>❖ Clear storm drains and culverts</li> <li>❖ Use low-impact development techniques</li> </ul> </li> <li>• <b>Reduce exposure to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Locate outside of hazard area</li> <li>❖ Elevate utilities above base flood elevation</li> <li>❖ Use low-impact development techniques</li> </ul> </li> <li>• <b>Reduce vulnerability to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Raise structures above base flood elevation</li> <li>❖ Elevate items within house above base flood elevation</li> <li>❖ Build new homes above base flood elevation</li> <li>❖ Flood-proof structures</li> </ul> </li> <li>• <b>Increase the ability to respond to or be prepared for the hazard:</b> <ul style="list-style-type: none"> <li>❖ Buy flood insurance</li> <li>❖ Develop household plan, such as retrofit savings, communication with outside, 72-hour self-sufficiency during and after an event</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <b>Manipulate the hazard:</b> <ul style="list-style-type: none"> <li>❖ Clear storm drains and culverts</li> <li>❖ Use low-impact development techniques</li> </ul> </li> <li>• <b>Reduce exposure to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Locate critical facilities outside hazard area</li> <li>❖ Use low-impact development techniques</li> </ul> </li> <li>• <b>Reduce vulnerability to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Build critical function redundancy or retrofit critical buildings</li> <li>❖ Provide flood-proofing when new critical infrastructure must be located in floodplains</li> </ul> </li> <li>• <b>Increase the ability to respond to or be prepared for the hazard:</b> <ul style="list-style-type: none"> <li>❖ Keep cash reserves for reconstruction</li> <li>❖ Support and implement hazard disclosure for sale of property in risk zones.</li> <li>❖ Solicit cost-sharing through partnerships on projects with multiple benefits.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <b>Manipulate the hazard:</b> <ul style="list-style-type: none"> <li>❖ Maintain drainage system</li> <li>❖ Institute low-impact development techniques on property</li> <li>❖ Structural flood control, levees, channelization, or revetments.</li> <li>❖ Stormwater management regulations and master planning</li> <li>❖ Acquire vacant land or promote open space uses in developing watersheds to control increases in runoff</li> </ul> </li> <li>• <b>Reduce exposure to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Locate or relocate critical facilities outside of hazard area</li> <li>❖ Acquire or relocate identified repetitive loss properties</li> <li>❖ Promote open space uses in identified high hazard areas via techniques such as: planned unit developments, easements, setbacks, greenways, sensitive area tracks.</li> <li>❖ Adopt land development criteria such as planned unit developments, density transfers, clustering</li> <li>❖ Institute low impact development techniques on property</li> <li>❖ Acquire vacant land or promote open space uses in developing watersheds to control increases in runoff</li> </ul> </li> <li>• <b>Reduce vulnerability to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Harden infrastructure, bridge replacement program</li> <li>❖ Provide redundancy for critical functions and infrastructure</li> <li>❖ Adopt regulatory standards such as freeboard standards, cumulative substantial improvement or damage, lower substantial damage threshold; compensatory storage, non-conversion deed restrictions.</li> <li>❖ Stormwater management regulations and master planning.</li> <li>❖ Adopt “no-adverse impact” floodplain management policies that strive to not increase the flood risk on downstream communities.</li> <li>❖ Improve unpaved roads to reduce their likelihood to fail due to flooding</li> </ul> </li> <li>• <b>Increase the ability to respond to or be prepared for the hazard:</b> <ul style="list-style-type: none"> <li>❖ Produce better hazard maps</li> <li>❖ Provide technical information and guidance</li> <li>❖ Enact tools to help manage development in hazard areas (stronger controls, tax incentives, and information)</li> <li>❖ Incorporate retrofitting or replacement of critical system elements in capital improvement plan</li> <li>❖ Develop strategy to take advantage of post-disaster opportunities</li> <li>❖ Warehouse critical infrastructure components</li> <li>❖ Develop and adopt a continuity of operations plan</li> <li>❖ Consider participation in the Community Rating System</li> <li>❖ Maintain and collect data to define risks and vulnerability</li> <li>❖ Train emergency responders</li> <li>❖ Create an elevation inventory of structures in the floodplain</li> <li>❖ Develop and implement a public information strategy</li> <li>❖ Charge a hazard mitigation fee</li> <li>❖ Integrate floodplain management policies into other planning mechanisms within the planning area.</li> <li>❖ Consider impacts of climate change on the risk associated with the flood hazard</li> <li>❖ Consider the residual risk associated with structural flood control in future land use decisions</li> <li>❖ Enforce National Flood Insurance Program</li> <li>❖ Adopt a Stormwater Management Master Plan</li> </ul> </li> </ul>

a. These catalogs are generic and are not specific to the District. Many of the government-scale alternatives listed are beyond the range of responsibilities of a water district.

**Table 19-5. Alternatives to Mitigate the Mass Movement Hazard**

Personal-Scale	Corporate-Scale	Government-Scale <sup>a</sup>
<ul style="list-style-type: none"> <li>• <b>Manipulate the hazard:</b> <ul style="list-style-type: none"> <li>❖ Stabilize slope (dewater, armor toe)</li> <li>❖ Reduce weight on top of slope</li> <li>❖ Minimize vegetation removal and the addition of impervious surfaces.</li> </ul> </li> <li>• <b>Reduce exposure to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Locate structures outside of hazard area (off unstable land and away from slide-run out area)</li> </ul> </li> <li>• <b>Reduce vulnerability to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Retrofit home</li> </ul> </li> <li>• <b>Increase the ability to respond to or be prepared for the hazard:</b> <ul style="list-style-type: none"> <li>❖ Institute warning system, and develop evacuation plan</li> <li>❖ Keep cash reserves for reconstruction</li> <li>❖ Educate yourself on risk reduction techniques for landslide hazards</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <b>Manipulate the hazard:</b> <ul style="list-style-type: none"> <li>❖ Stabilize slope (dewater, armor toe)</li> <li>❖ Reduce weight on top of slope</li> </ul> </li> <li>• <b>Reduce exposure to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Locate structures outside of hazard area (off unstable land and away from slide-run out area)</li> </ul> </li> <li>• <b>Reduce vulnerability to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Retrofit at-risk facilities</li> </ul> </li> <li>• <b>Increase the ability to respond to or be prepared for the hazard:</b> <ul style="list-style-type: none"> <li>❖ Institute warning system, and develop evacuation plan</li> <li>❖ Keep cash reserves for reconstruction</li> <li>❖ Develop a continuity of operations plan</li> <li>❖ Educate employees on the potential exposure to landslide hazards and emergency response protocol.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <b>Manipulate the hazard:</b> <ul style="list-style-type: none"> <li>❖ Stabilize slope (dewater, armor toe)</li> <li>❖ Reduce weight on top of slope</li> </ul> </li> <li>• <b>Reduce exposure to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Acquire properties in high-risk landslide areas</li> <li>❖ Adopt land use policies that prohibit the placement of habitable structures in high-risk landslide areas</li> </ul> </li> <li>• <b>Reduce vulnerability to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Adopt higher regulatory standards for new development within unstable slope areas</li> <li>❖ Armor/retrofit critical infrastructure against the impact of landslides</li> </ul> </li> <li>• <b>Increase the ability to respond to or be prepared for the hazard:</b> <ul style="list-style-type: none"> <li>❖ Produce better hazard maps</li> <li>❖ Provide technical information and guidance</li> <li>❖ Enact tools to help manage development in hazard areas: better land controls, tax incentives, information</li> <li>❖ Develop strategy to take advantage of post-disaster opportunities</li> <li>❖ Warehouse critical infrastructure components</li> <li>❖ Develop and adopt a continuity of operations plan</li> <li>❖ Educate the public on the landslide hazard and appropriate risk reduction alternatives</li> </ul> </li> </ul>

a. These catalogs are generic and are not specific to the District. Many of the government-scale alternatives listed are beyond the range of responsibilities of a water district.

**Table 19-6. Alternatives to Mitigate the Severe Weather Hazard**

Personal-Scale	Corporate-Scale	Government-Scale <sup>a</sup>
<ul style="list-style-type: none"> <li>• <b>Manipulate the hazard:</b> <ul style="list-style-type: none"> <li>❖ None</li> </ul> </li> <li>• <b>Reduce exposure to the hazard:</b> <ul style="list-style-type: none"> <li>❖ None</li> </ul> </li> <li>• <b>Reduce vulnerability to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Insulate house</li> <li>❖ Provide redundant heat and power</li> <li>❖ Insulate structure</li> <li>❖ Plant appropriate trees near home and power lines (“Right tree, right place” National Arbor Day Foundation Program)</li> </ul> </li> <li>• <b>Increase the ability to respond to or be prepared for the hazard:</b> <ul style="list-style-type: none"> <li>❖ Trim or remove trees that could affect power lines</li> <li>❖ Promote 72-hour self-sufficiency</li> <li>❖ Obtain a NOAA weather radio.</li> <li>❖ Obtain an emergency generator.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <b>Manipulate the hazard:</b> <ul style="list-style-type: none"> <li>❖ None</li> </ul> </li> <li>• <b>Reduce exposure to the hazard:</b> <ul style="list-style-type: none"> <li>❖ None</li> </ul> </li> <li>• <b>Reduce vulnerability to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Relocate critical infrastructure (such as power lines) underground</li> <li>❖ Reinforce or relocate critical infrastructure such as power lines to meet performance expectations</li> <li>❖ Install tree wire</li> </ul> </li> <li>• <b>Increase the ability to respond to or be prepared for the hazard:</b> <ul style="list-style-type: none"> <li>❖ Trim or remove trees that could affect power lines</li> <li>❖ Create redundancy</li> <li>❖ Equip facilities with a NOAA weather radio</li> <li>❖ Equip vital facilities with emergency power sources.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <b>Manipulate the hazard:</b> <ul style="list-style-type: none"> <li>❖ None</li> </ul> </li> <li>• <b>Reduce exposure to the hazard:</b> <ul style="list-style-type: none"> <li>❖ None</li> </ul> </li> <li>• <b>Reduce vulnerability to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Harden infrastructure such as locating utilities underground</li> <li>❖ Trim trees back from power lines</li> <li>❖ Consider “cool roofs” and “green roofs”</li> </ul> </li> <li>• <b>Increase the ability to respond to or be prepared for the hazard:</b> <ul style="list-style-type: none"> <li>❖ Support programs such as “Tree Watch” that proactively manage problem areas through use of selective removal of hazardous trees, tree replacement, etc.</li> <li>❖ Establish and enforce building codes that require all roofs to withstand snow loads</li> <li>❖ Increase communication alternatives</li> <li>❖ Modify land use and environmental regulations to support vegetation management activities that improve reliability in utility corridors.</li> <li>❖ Modify landscape and other ordinances to encourage appropriate planting near overhead power, cable, and phone lines</li> <li>❖ Provide NOAA weather radios to the public</li> </ul> </li> </ul>

a. These catalogs are generic and are not specific to the District. Many of the government-scale alternatives listed are beyond the range of responsibilities of a water district.

**Table 19-7. Alternatives to Mitigate the Tsunami Hazard**

Personal-Scale	Corporate-Scale	Government-Scale
<ul style="list-style-type: none"> <li>• <b>Manipulate the hazard:</b> <ul style="list-style-type: none"> <li>❖ None</li> </ul> </li> <li>• <b>Reduce exposure to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Locate outside of hazard area</li> </ul> </li> <li>• <b>Reduce vulnerability to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Apply personal property mitigation techniques to your home such as anchoring your foundation and foundation openings to allow flow through.</li> </ul> </li> <li>• <b>Build local capacity to respond to or prepare for the hazard:</b> <ul style="list-style-type: none"> <li>❖ Develop and practice a household evacuation plan</li> <li>❖ Educate yourself on the risk exposure from the tsunami hazard and ways to minimize that risk</li> <li>❖ Understand tsunami warning signs and signals</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <b>Manipulate the hazard:</b> <ul style="list-style-type: none"> <li>❖ None</li> </ul> </li> <li>• <b>Reduce exposure to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Locate structure or mission critical functions outside of hazard area whenever possible</li> </ul> </li> <li>• <b>Reduce vulnerability to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Mitigate personal property for the impacts of tsunami</li> </ul> </li> <li>• <b>Build local capacity to respond to or prepare for the hazard:</b> <ul style="list-style-type: none"> <li>❖ Develop and practice a corporate evacuation plan</li> <li>❖ Educate employees on the risk exposure from the tsunami hazard and ways to minimize that risk</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <b>Manipulate the hazard:</b> <ul style="list-style-type: none"> <li>❖ Install wave abatement structures</li> </ul> </li> <li>• <b>Reduce exposure to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Locate structure or functions outside of hazard area whenever possible</li> <li>❖ Harden infrastructure for tsunami impacts</li> <li>❖ Relocate identified critical facilities located in tsunami high hazard areas</li> </ul> </li> <li>• <b>Reduce vulnerability to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Adopt higher regulatory standards that will provide higher levels of protection to structures built in a tsunami inundation area</li> <li>❖ Utilize tsunami mapping to guide development away from high risk areas through land use planning</li> </ul> </li> <li>• <b>Build local capacity to respond to or prepare for the hazard:</b> <ul style="list-style-type: none"> <li>❖ Use probabilistic tsunami mapping and land use guidance from the state when published</li> <li>❖ Provide incentives to guide development away from hazard areas</li> <li>❖ Improve the tsunami warning and response system</li> <li>❖ Provide residents with tsunami inundation maps</li> <li>❖ Join NOAA's Tsunami Ready program</li> <li>❖ Develop and communicate evacuation routes</li> <li>❖ Enhance the public information program to include risk reduction options for the tsunami hazard</li> </ul> </li> </ul>

- a. These catalogs are generic and are not specific to the District. Many of the government-scale alternatives listed are beyond the range of responsibilities of a water district.

**Table 19-8. Alternatives to Mitigate the Wildfire Hazard**

Personal-Scale	Corporate-Scale	Government-Scale <sup>a</sup>
<ul style="list-style-type: none"> <li>• <b>Manipulate the hazard:</b> <ul style="list-style-type: none"> <li>❖ Clear potential fuels on property such as dry overgrown underbrush and diseased trees</li> </ul> </li> <li>• <b>Reduce exposure to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Create and maintain defensible space around structures</li> <li>❖ Locate outside of hazard area</li> <li>❖ Mow regularly</li> </ul> </li> <li>• <b>Reduce vulnerability to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Create and maintain defensible space around structures and provide water on site</li> <li>❖ Use fire-retardant building materials</li> <li>❖ Create defensible spaces around home</li> </ul> </li> <li>• <b>Increase the ability to respond to or be prepared for the hazard:</b> <ul style="list-style-type: none"> <li>❖ Employ techniques from the National Fire Protection Association's Firewise Communities program to safeguard home</li> <li>❖ Identify alternative water supplies for fire fighting</li> <li>❖ Install/replace roofing material with non-combustible roofing materials.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <b>Manipulate the hazard:</b> <ul style="list-style-type: none"> <li>❖ Clear potential fuels on property such as dry underbrush and diseased trees</li> </ul> </li> <li>• <b>Reduce exposure to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Create and maintain defensible space around structures and infrastructure</li> <li>❖ Locate outside of hazard area</li> </ul> </li> <li>• <b>Reduce vulnerability to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Create and maintain defensible space around structures and infrastructure and provide water on site</li> <li>❖ Use fire-retardant building materials</li> <li>❖ Use fire-resistant plantings in buffer areas of high wildfire threat.</li> </ul> </li> <li>• <b>Increase the ability to respond to or be prepared for the hazard:</b> <ul style="list-style-type: none"> <li>❖ Support Firewise community initiatives.</li> <li>❖ Create /establish stored water supplies to be utilized for fire fighting.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>• <b>Manipulate the hazard:</b> <ul style="list-style-type: none"> <li>❖ Clear potential fuels on property such as dry underbrush and diseased trees</li> <li>❖ Implement best management practices on public lands.</li> </ul> </li> <li>• <b>Reduce exposure to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Create and maintain defensible space around structures and infrastructure</li> <li>❖ Locate outside of hazard area</li> <li>❖ Enhance building code to include use of fire resistant materials in high hazard area.</li> </ul> </li> <li>• <b>Reduce vulnerability to the hazard:</b> <ul style="list-style-type: none"> <li>❖ Create and maintain defensible space around structures and infrastructure</li> <li>❖ Use fire-retardant building materials</li> <li>❖ Use fire-resistant plantings in buffer areas of high wildfire threat.</li> <li>❖ Consider higher regulatory standards (such as Class A roofing)</li> <li>❖ Establish biomass reclamation activities</li> <li>❖ In high risk areas, use heat-resistant materials like welded steel, and avoid heat-susceptible materials like polyvinyl chloride and high-density polyethylene.</li> </ul> </li> <li>• <b>Increase the ability to respond to or be prepared for the hazard:</b> <ul style="list-style-type: none"> <li>❖ More public outreach and education efforts, including an active Firewise program</li> <li>❖ Possible weapons of mass destruction funds available to enhance fire capability in high-risk areas</li> <li>❖ Identify fire response and alternative evacuation routes</li> <li>❖ Seek alternative water supplies</li> <li>❖ Become a Firewise community</li> <li>❖ Use academia to study impacts/solutions to wildfire risk</li> <li>❖ Establish/maintain mutual aid agreements between fire service agencies.</li> <li>❖ Create/implement fire plans</li> <li>❖ Consider the probable impacts of climate change on the risk associated with the wildfire hazard in future land use decisions</li> </ul> </li> </ul>

a. These catalogs are generic and are not specific to the District. Many of the government-scale alternatives listed are beyond the range of responsibilities of a water district.





## 20. MITIGATION ACTIONS

### 20.1 RECOMMENDED MITIGATION ACTIONS

The Steering Committee selected area-wide actions to be included in a hazard mitigation action plan based on the risk assessment of identified hazards of concern and the defined hazard mitigation goals and objectives.

Table 20-1 lists the recommended hazard mitigation actions that make up the action plan (actions are not listed by priority in this table; prioritization is described below). The timeframe indicated in the table is defined as follows:

- Short-term = Completion within 5 years
- Long-term = Completion within 10 years
- Ongoing= Continuing new or existing program with no completion date

**Table 20-1. Hazard Mitigation Action Plan Matrix**

Benefits New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline <sup>a</sup>
<b>Action MMD-1</b> —Construct an emergency intertie across the Richmond San Rafael Bridge for water transfers to provide an alternative imported water supply to the District's capacity.						
<u>Hazards Mitigated:</u>	Drought					
Existing	1, 2, 3	MMWD	TBD	High	General Funds, Bond Funding	short-term
<b>Action MMD-2</b> —Pine Mountain Tunnel Project Mitigation. Reconstruction of an existing facility to reduce vulnerability to hazards.						
<u>Hazards Mitigated:</u>	Earthquake, Wildfire, Landslide, Drought, Public Health					
New & Existing	1, 2, 3	MMWD	TBD	High	General Funds, Bond Funding, Grant Funding	Short-term
<b>Action MMD-3</b> —Replace existing wood-roofed concrete tank at Ross Reservoir with new steel and/or concrete tanks.						
Hazards Mitigated: Earthquake, Wildfire, Landslide, Drought						
Existing	1, 2, 3	MMWD	TBD	High	General Funds	Long-term
<b>Action MMD-4</b> —Refurbish pump station at Kastania to increase imported water capacity.						
<u>Hazards Mitigated:</u>	Drought					
New & Existing	1, 2, 3	MMWD	TBD	High	General Funds	Long-term
<b>Action MMD-5</b> —Replace roofs and vents of treatment plants with non-combustible materials.						
<u>Hazards Mitigated:</u>	Wildfire					
Existing	1, 2, 3	MMWD	TBD	High	General Funds, Grant Funding	Ongoing
<b>Action MMD-6</b> —Replace 4 miles of ACCP transmission line pipe on North Marin Line from Shafter Bridge to San Geronimo Treatment Plant.						
<u>Hazards Mitigated:</u>	Earthquake					
Existing	1, 2, 3	MMWD	TBD	High	General Funds, Grant Funding	Long-term

Benefits New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline <sup>a</sup>
<b>Action MMD-7</b> —Create a defensible space around treatment plants.						
<u>Hazards Mitigated:</u> Wildfire						
Existing	1, 2, 3	MMWD	TBD	High	General Funds	Short-term
<b>Action MMD-8</b> —Install a full-scale automated meter infrastructure to allow for real time analysis of water usage.						
<u>Hazards Mitigated:</u> Drought, Earthquake, Mass Movement						
New & Existing	1, 2, 3, 4	MMWD	TBD	Medium	General Funds, Grant Funding	Short-term
<b>Action MMD-9</b> —Perform seismic upgrades on 14 steel storage tanks in distribution system, including anchoring and flexible connections.						
<u>Hazards Mitigated:</u> Earthquake						
Existing	1, 2, 3	MMWD	TBD	Low	General Funds	Short-term
<b>Action MMD-10</b> —Retrofit the exterior of 64 pump stations with non-combustible materials.						
<u>Hazards Mitigated:</u> Wildfire						
New & Existing	1, 2, 3	MMWD	TBD	Medium	General Funds, Grant Funding	Short-term
<b>Action MMD-11</b> —Replace clarifiers at San Geronimo Treatment Plant to increase seismic resilience.						
<u>Hazards Mitigated:</u> Earthquake						
New & Existing	1, 2, 3	MMWD	TBD	Low	General Funds	Long-term
<b>Action MMD-12</b> —Install ozone at the San Geronimo Treatment Plant as a green alternative to chemical treatment						
<u>Hazards Mitigated:</u> Climate Change						
New & Existing	1, 2, 3	MMWD	TBD	Medium	General Funds	Long-term
<b>Action MMD-13</b> —Expand recycled water infrastructure from Las Gallinas Sanitary District to Peacock Gap golf course.						
<u>Hazards Mitigated:</u> Drought						
New & Existing	1, 2, 3	MMWD	TBD	High	General Funds, Grant Funding	Long-term
<b>Action MMD-14</b> —Replace existing redwood tank at Bolsa.						
<u>Hazards Mitigated:</u> Drought, Earthquake, Wildfire						
Existing	1, 2, 3	MMWD	TBD	Low	General Funds	Short-term
<b>Action MMD-15</b> —Replace existing redwood tank at Scenic.						
<u>Hazards Mitigated:</u> Drought, Earthquake, Wildfire						
Existing	1, 2, 3	MMWD	TBD	Low	General Funds	Short-term
<b>Action MMD-16</b> —Replace existing redwood tank at Madera Park.						
<u>Hazards Mitigated:</u> Drought, Earthquake, Wildfire						
Existing	1, 2, 3	MMWD	TBD	Low	General Funds	Short-term
<b>Action MMD-17</b> —Install permanent generators at 29 pump stations.						
<u>Hazards Mitigated:</u> Dam Failure, Drought, Earthquake, Flood, Mass Movement, Severe Weather, Tsunami, Wildfire						
New & Existing	1, 2, 3	MMWD	TBD	High	General Funds, Grant Funding	Short-term
<b>Action MMD-18</b> —Replace existing redwood tanks at Hind.						
<u>Hazards Mitigated:</u> Drought, Earthquake, Wildfire						
Existing	1, 2, 3	MMWD	TBD	Medium	General Funds, Grant Funding	Short-term
<b>Action MMD-19</b> —Improve functionality and seismic reliability of emergency operations center with current technology.						
<u>Hazards Mitigated:</u> Dam Failure, Drought, Earthquake, Flood, Mass Movement, Severe Weather, Tsunami, Wildfire						
New & Existing	1, 2, 3, 4	MMWD	TBD	High	General Funds, Grant Funding	Long-term
<b>Action MMD-20</b> —Improve seismic reliability and install permanent generators at administration building.						
<u>Hazards Mitigated:</u> Dam Failure, Earthquake, Flood, Mass Movement, Severe Weather, Tsunami, Wildfire						
New & Existing	1, 2, 3	MMWD	TBD	Medium	General Funds, Grant Funding	Short-term
<b>Action MMD-21</b> —Improve seismic reliability and install permanent generators at the corporation yard.						
<u>Hazards Mitigated:</u> Dam Failure, Earthquake, Flood, Mass Movement, Severe Weather, Tsunami, Wildfire						
New & Existing	1, 2, 3	MMWD	TBD	Medium	General Funds, Grant Funding	Short-term

Benefits New or Existing Assets	Objectives Met	Lead Agency	Support Agency	Estimated Cost	Sources of Funding	Timeline <sup>a</sup>
<b>Action MMD-22</b> —Install ozone at the Bon Tempe Treatment Plant to reduce chemical delivery needs, provide sustainability, and improve long-term water quality.						
<i>Hazards Mitigated:</i> Severe Weather, Drought, Climate Change						
New & Existing	1, 2, 3	MMWD	TBD	High	General Funds, Grant Funding	Long-term
<b>Action MMD23</b> —Continue to maintain the Hazard Mitigation Planning portion of the District's website for continued risk communication and hazard mitigation plan implementation over the performance period of this plan.						
<i>Hazards Mitigated:</i> Dam Failure, Earthquake, Flood, Mass Movement, Severe Weather, Tsunami, Wildfire						
New and Existing	1, 4	MMWD	TBD	Low	General Funds	On-going

## 20.2 ACTION PLAN PRIORITIZATION

The actions recommended in the action plan were prioritized based on the following factors:

- Cost and availability of funding
- Benefit, based on likely risk reduction to be achieved
- Number of plan objectives achieved
- Timeframe for project implementation
- Eligibility for grant funding programs

Two priorities were assigned for each action:

- A high, medium, or low priority for implementing the action
- A high, medium, or low priority for pursuing grant funding for the action.

The sections below describe the analysis of benefits and costs and the assignment of the two priority ratings.

### 20.2.1 Benefit and Cost

The action plan must be prioritized according to a benefit/cost analysis of the proposed actions (44 CFR, Section 201.6(c)(3)(iii)). For this hazard mitigation plan, a qualitative benefit-cost review was performed for each action by assigning ratings for benefit and cost as follows:

- Cost:
  - **High**—Existing funding will not cover the cost of the action; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases).
  - **Medium**—The action could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the action would have to be spread over multiple years.
  - **Low**—The action could be funded under the existing budget. The action is part of or can be part of an ongoing existing program.
- Benefit:
  - **High**—Action will provide an immediate reduction of risk exposure for life and property.
  - **Medium**—Action will have a long-term impact on the reduction of risk exposure for life and property, or action will provide an immediate reduction in the risk exposure for property.

- **Low**—Long-term benefits of the action are difficult to quantify in the short term.

To assign priorities, each action with a benefit rating equal to or higher than its cost rating (such as high benefit/medium cost, medium benefit/medium cost, medium benefit/low cost, etc.) was considered to be cost-beneficial. This is not the detailed level of benefit/cost analysis required for some FEMA hazard-related grant programs. Such analysis would be performed at the time a given action is being submitted for grant funding.

### 20.2.2 Implementation Priority

Implementation priority ratings were assigned as follows:

- **High Priority**—An action that meets multiple objectives, has benefits that exceed costs, and has a secured source of funding. Action can be completed in the short term (1 to 5 years).
- **Medium Priority**—An action that meets multiple objectives, has benefits that exceed costs, and is eligible for funding though no funding has yet been secured for it. Action can be completed in the short term (1 to 5 years), once funding is secured. Medium-priority actions become high-priority actions once funding is secured.
- **Low Priority**—An action that will mitigate the risk of a hazard, has benefits that do not exceed the costs or are difficult to quantify, has no secured source of funding, and is not eligible for any known grant funding. Action can be completed in the long term (1 to 10 years). Low-priority actions may be eligible for grant funding from programs that have not yet been identified.

### 20.2.3 Grant Pursuit Priority

Grant pursuit priority ratings were assigned as follows:

- **High Priority**—An action that meets identified grant eligibility requirements, has high benefits, and is listed as high or medium implementation priority; local funding options are unavailable or available local funds could be used instead for actions that are not eligible for grant funding.
- **Medium Priority**—An action that meets identified grant eligibility requirements, has medium or low benefits, and is listed as medium or low implementation priority; local funding options are unavailable.
- **Low Priority**—An action that has not been identified as meeting any grant eligibility requirements.

### 20.2.4 Prioritization Summary for Mitigation Actions

Table 20-2 lists the priority of each action.



**Table 20-2. Mitigation Action Priority**

Action #	# of Objectives Met	Benefits	Costs	Do Benefits Equal or Exceed Costs?	Is Project Grant-Eligible?	Can Project Be Funded Under Existing Programs/Budgets?	Implementation Priority	Grant Priority
1	3	High	High	Yes	Yes	No	High	High
2	3	High	High	Yes	Yes	No	Medium	High
3	3	High	High	Yes	Yes	No	Medium	High
4	3	High	High	Yes	Yes	No	Medium	High
5	3	High	High	Yes	Yes	No	Medium	High
6	3	High	High	Yes	Yes	No	Medium	High
7	3	High	High	Yes	Yes	No	Medium	High
8	4	High	Medium	Yes	Yes	Yes	High	Medium
9	3	High	Low	Yes	Yes	Yes	High	Low
10	3	High	Medium	Yes	Yes	No	High	Medium
11	3	High	Low	Yes	Yes	Yes	High	Low
12	3	High	Medium	Yes	Yes	Yes	Medium	Medium
13	3	High	High	Yes	Yes	No	Medium	High
14	3	High	Low	Yes	Yes	Yes	High	Low
15	3	High	Low	Yes	Yes	Yes	High	Low
16	3	High	Low	Yes	Yes	Yes	High	Low
17	3	High	High	Yes	Yes	No	Medium	High
18	3	High	Medium	Yes	Yes	No	Medium	High
198	4	High	High	Yes	Yes	No	Medium	High
20	3	High	Medium	Yes	Yes	No	Medium	High
21	3	High	Medium	Yes	Yes	No	Medium	High
22	3	High	High	Yes	Yes	No	Medium	High
23	2	High	High	Yes	No	Yes	High	N/A

## 20.3 CLASSIFICATION OF MITIGATION ACTIONS

The identified mitigation actions were reviewed to classify them by type of action, according to the following classifications:

- **Prevention**—Government, administrative or regulatory actions that influence the way land and buildings are developed to reduce hazard losses. Includes planning and zoning, floodplain laws, capital improvement programs, open space preservation, and stormwater management regulations.
- **Property Protection**—Modification of buildings or structures to protect them from a hazard or removal of structures from a hazard area. Includes acquisition, elevation, relocation, structural retrofit, storm shutters, and shatter-resistant glass.
- **Public Education and Awareness**—Actions to inform residents and elected officials about hazards and ways to mitigate them. Includes outreach projects, real estate disclosure, hazard information centers, and school-age and adult education.
- **Natural Resource Protection**—Actions that minimize hazard loss and preserve or restore the functions of natural systems. Includes sediment and erosion control, stream corridor restoration, watershed

management, forest and vegetation management, wetland restoration and preservation, and green infrastructure.

- **Emergency Services**—Actions that protect people and property during and immediately after a hazard event. Includes warning systems, emergency response services, and the protection of essential facilities.
- **Structural Projects**—Actions that involve the construction of structures to reduce the impact of a hazard. Includes dams, setback levees, floodwalls, retaining walls, and safe rooms.
- **Climate Resiliency**—Actions that incorporate methods to mitigate and/or adapt to the impacts of climate change. Includes aquifer storage and recovery activities, incorporating future conditions projections in project design or planning, or actions that specifically address jurisdiction-specific climate change risks, such as sea level rise or urban heat island effect.
- **Community Capacity Building**—Actions that increase or enhance local capabilities to adjust to potential damage, to take advantage of opportunities, or to respond to consequences. Includes staff training, memorandums of understanding, development of plans and studies, and monitoring programs.

Each recommended action was classified based on the hazard it addresses and the type of mitigation it involves. Table 20-3 shows these classifications.

**Table 20-3. Analysis of Mitigation Actions**

Hazard Type	Action Addressing Hazard, by Mitigation Type							
	Prevention	Property Protection	Public Education & Awareness	Natural Resource Protection	Emergency Services	Structural Projects	Climate Resilient	Community Capacity Building
<b>High-Risk Hazards</b>								
Earthquake	8, 11	3, 11, 14, 15, 16, 18	23	12, 22	8, 17, 19, 20, 21	2, 6	2, 12, 22	8, 11, 12, 17, 19
Wildfire		3, 5, 7, 10, 14, 15, 16, 18	23	12, 22	17, 19, 20, 21	2	2, 12, 22	13, 17, 19
Drought	8	3, 14, 15, 16, 18	23	12, 13, 22	8, 17, 19, 21	1, 2, 4	1, 2, 4, 12, 13, 14, 15, 16, 18, 22	4, 8, 12, 13, 17, 18, 19
<b>Medium-Risk Hazards</b>								
Flood			23	12, 22	17, 20, 21		12, 22	12, 17, 19
Severe Weather			23	12, 22	17, 19, 20, 21		12, 22	12, 17, 19
Mass Movement	8	3	23	12, 22	8, 17, 19, 20, 21	2	2, 12, 22	8, 12, 17, 19
<b>Low-Risk Hazards</b>								
Dam Failure			23	12, 22	17, 19, 20, 21		12, 22	12, 17, 19
Tsunami			23	12, 22	17, 19, 20, 21		12, 22	12, 17, 19

# 21. PLAN ADOPTION AND IMPLEMENTATION

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## 21.1 PLAN ADOPTION

A hazard mitigation plan must document that it has been formally adopted by the governing body of the jurisdiction requesting federal approval of the plan (44 CFR Section 201.6(c)(5)). This plan was submitted for a pre-adoption review to Cal OES and FEMA Region IX prior to adoption. Once pre-adoption approval is provided, the District will formally adopted the plan. DMA compliance and its benefits are achieved with the Plan’s adoption. Once approved and adopted, Appendix D will include FEMA’s approval notice and minutes of the District Board of Directors meeting at which this plan was formally adopted.

## 21.2 PLAN MAINTENANCE STRATEGY

Plan maintenance is the formal process for achieving the following:

- Ensuring that the hazard mitigation plan remains an active and relevant document and that the adopting jurisdiction maintains its eligibility for applicable funding sources
- Monitoring and evaluating the plan annually and producing an updated plan every five years
- Integrating public participation throughout the plan maintenance and implementation process
- Incorporating the mitigation actions outlined in the plan into existing planning mechanisms and programs.

To achieve these ends, a hazard mitigation plan must present a plan maintenance process that includes the following (44 CFR Section 201.6(c)(4)):

- A method and schedule for monitoring, evaluating, and updating the mitigation plan within a 5-year cycle
- An approach for how the community will continue public participation in the plan maintenance process.
- A process by which local governments will incorporate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate

Table 21-1 summarizes the plan maintenance strategy. The sections below further describe each element.

### 21.2.1 Plan Implementation and Monitoring

The mitigation action plan presents a range of action items for reducing loss from hazard events. The District has prioritized actions and can begin to implement the highest-priority actions over the next five years. Some action items can be implemented through the creation of new educational programs, continued interagency coordination, or improved public participation.

**Table 21-1. Plan Maintenance Matrix**

Task	Approach	Timeline	Lead Responsibility	Support Responsibility
<b>Monitoring</b>	Preparation of status updates and action implementation tracking as part of submission for Annual Progress Report.	Annually. Actual reporting period TBD	Associate Engineer	Hazard Mitigation Plan Review Committee
<b>Evaluation</b>	Review the status of previous actions as submitted by the monitoring task lead and support the assessment of the effectiveness of the plan; compile the Annual Progress Report; assess appropriate action for preparing next hazard mitigation plan update.	Annually, or upon comprehensive update to General Plan or major disaster	Associate Engineer	Hazard Mitigation Plan Review Committee
<b>Update</b>	The District will complete a comprehensive update to this plan every 5 years. Plan update to be facilitated through oversight of a stakeholder Steering Committee	Every 5 years or following a major disaster event that significantly impacts the District	Associate Engineer	Hazard Mitigation Plan Review Committee
<b>Continuing Public Involvement</b>	The principle means for providing the public access to the implementation of this plan will be the MMWD Hazard Mitigation Plan website. <a href="https://www.marinwater.org/emergency-preparedness#button-3">https://www.marinwater.org/emergency-preparedness#button-3</a>	Annually	Associate Engineer	Contractor support for Public Outreach
<b>Plan Integration</b>	Integrate relevant information from hazard mitigation plan into other plans and programs where viable and opportunities arise	Ongoing	Associate Engineer	N/A

The effectiveness of the hazard mitigation plan depends on monitoring and incorporation of its actions into existing MMWD plans, policies and programs. The MMWD will have lead responsibility for overseeing the implementation. The Associate Engineer will have responsibility for overseeing the plan monitoring and implementation strategy as summarized in Table 21-1.

## 21.2.2 Plan Evaluation

The plan will be evaluated by how successfully the implementation of identified actions has helped to achieve the goals and objectives identified in this plan. This will be assessed by a review of the changes in risk that occur over the performance period and by the degree to which mitigation goals and objectives are incorporated into existing plans, policies and programs. The minimum task of the MMWD will be the evaluation of the progress of its action plan during a 12-month performance period. This review will include the following:

- Summary of any hazard events that occurred during the performance period and the impact these events had on the planning area
- Review of mitigation success stories
- Review of continuing public involvement
- Brief discussion about why targeted strategies were not completed
- Re-evaluation of the action plan to determine if the timeline for identified projects needs to be amended (such as changing a long-term project to a short-term one because of new funding)
- Recommendations for new projects

- Changes in or potential for new funding options (grant opportunities)
- Impact of any other planning programs or initiatives that involve hazard mitigation.

The evaluation will be summarized in an annual progress report. This report should be used as follows:

- Posted on the MMWD website page dedicated to the hazard mitigation plan
- Presented to the MMWD board to inform them of the progress of actions implemented during the reporting period

Uses of the progress report will be at the discretion of the General Manager. Annual progress reporting is not a requirement specified under 44 CFR. However, it may enhance the MMWD opportunities for funding. While failure to implement this component of the plan maintenance strategy will not jeopardize the MMWD compliance under the DMA, it may jeopardize its opportunity to partner and leverage funding opportunities with the other stakeholders in the planning area.

An oversight committee with representation similar to the Steering Committee that oversaw the development of this plan should have an active role in the plan evaluation. The new steering committee will review the annual progress report and provide input to the MMWD on possible enhancements to be considered at the next update.

### **21.2.3 Plan Update**

Federal regulations require that local hazard mitigation plans be reviewed, revised if appropriate, and resubmitted for approval in order to remain eligible for benefits awarded under the Disaster Mitigation Act (44 CFR Section 201.6.d(3)). This plan's format allows the MMWD to review and update sections when new data become available. New data can be easily incorporated, resulting in a plan that will remain current and relevant. The MMWD intends to update the plan on a five-year cycle from the date of plan approval. This cycle may be accelerated to less than 5 years based on the following triggers:

- A presidential disaster declaration that impacts the planning area
- A hazard event that causes loss of life

It will not be the intent of the update process to develop a completely new hazard mitigation plan. Based on needs identified by the planning team, the update will, at a minimum, include the following elements:

- The update process will be convened through a new steering committee.
- The hazard risk assessment will be reviewed and, if necessary, updated using best available information and technologies.
- The action plan will be reviewed and revised to account for any actions completed, dropped, or changed and to account for changes in the risk assessment or MMWD policies identified under other planning mechanisms.
- The draft update will be sent to appropriate agencies and organizations for comment.
- The public will be given an opportunity to comment on the update prior to adoption.
- The Board of Directors will adopt the updated plan.

Future plan updates will be overseen by a steering committee similar to the one that participated in this update process, so keeping an interim steering committee intact will provide a head start on future updates. The steering

committee's role will be to review the progress report in an effort to identify issues needing to be addressed by future plan updates.

### **21.2.4 Continuing Public Involvement**

The public will continue to be apprised of the plan's progress through the MMWD website, including providing copies of annual progress reports on the website. This site will not only house the final plan, but it will also become the one-stop shop for information regarding the plan and plan implementation. Upon initiation of future update processes, a new public involvement strategy will be initiated based on guidance from a new steering committee. This strategy will be based on the needs and capabilities of the MMWD at the time of the update. At a minimum, this strategy will include the use of local media outlets within the planning area.

### **21.2.5 Incorporation into Other Planning Mechanisms**

The information on hazard, risk, vulnerability and mitigation contained in this plan is based on the best science and technology available at the time this update was prepared. This planning process provided the MMWD with the opportunity to identify, review and expand on core capabilities of the MMWD that could support or enhance the outcomes of this plan. Opportunities for integration identified by this planning process include:

- MMWD Strategic Plan
- MMWD Master Plans
- MMWD emergency response plans
- AWIA plan
- Capital improvement programs
- MMWD vulnerability assessment

Some action items do not need to be implemented through regulation. Instead, they can be implemented through the creation of new educational programs, continued interagency coordination, or improved public participation. As information becomes available from other planning mechanisms that can enhance this plan, that information will be incorporated via the update process.



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To Be Updated for Next Draft [Get Reference Info From Comments Here](#)

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**Marin Municipal Water District Hazard Mitigation Plan**

## **Appendix A. Survey Results**

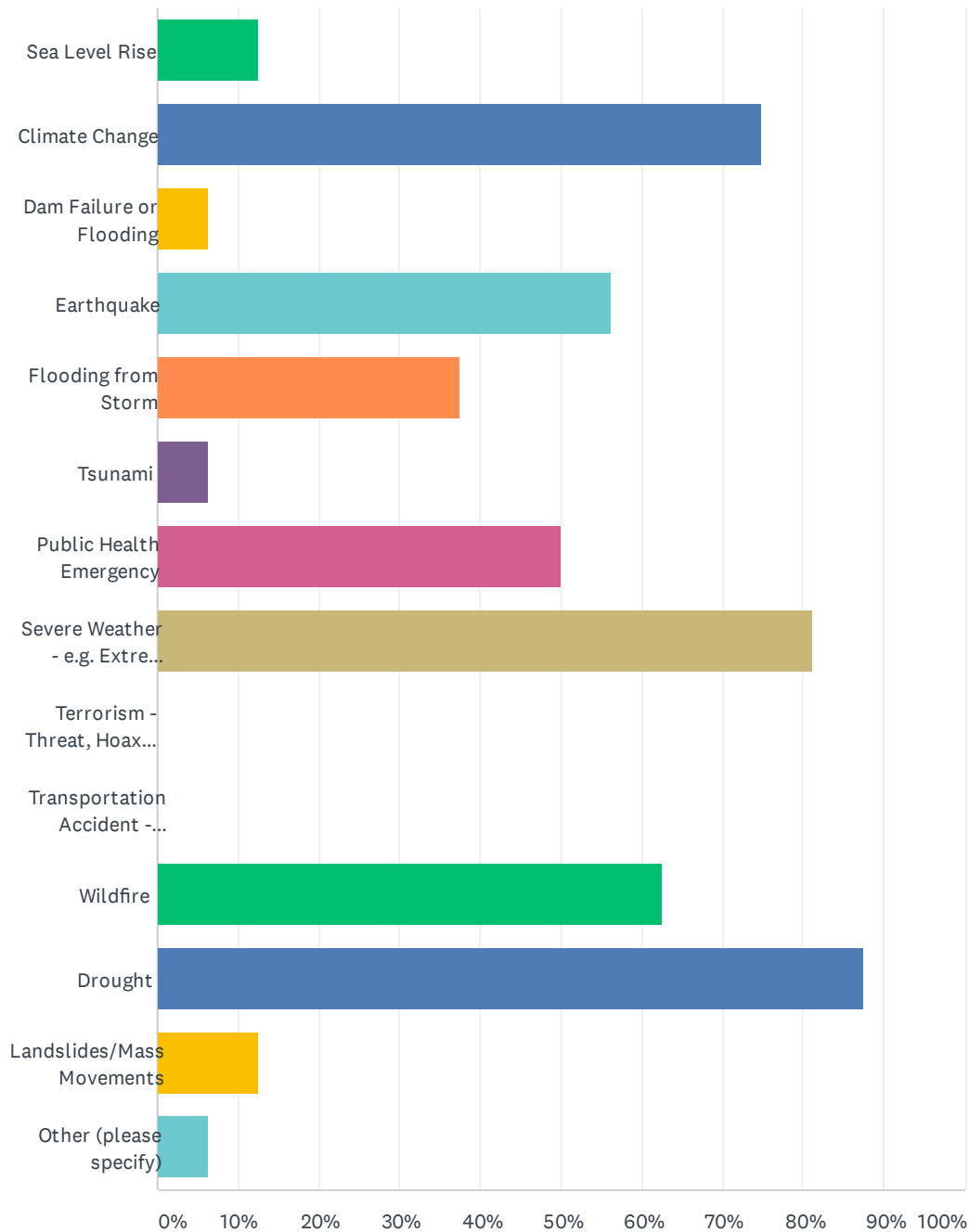
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**Q1 Which of the following natural and man-made hazard events have you or anyone in your household experienced or been affected by in the past within the MMWD service area? The hazards are listed in alphabetical order. (Check all that apply)**

Answered: 16 Skipped: 2



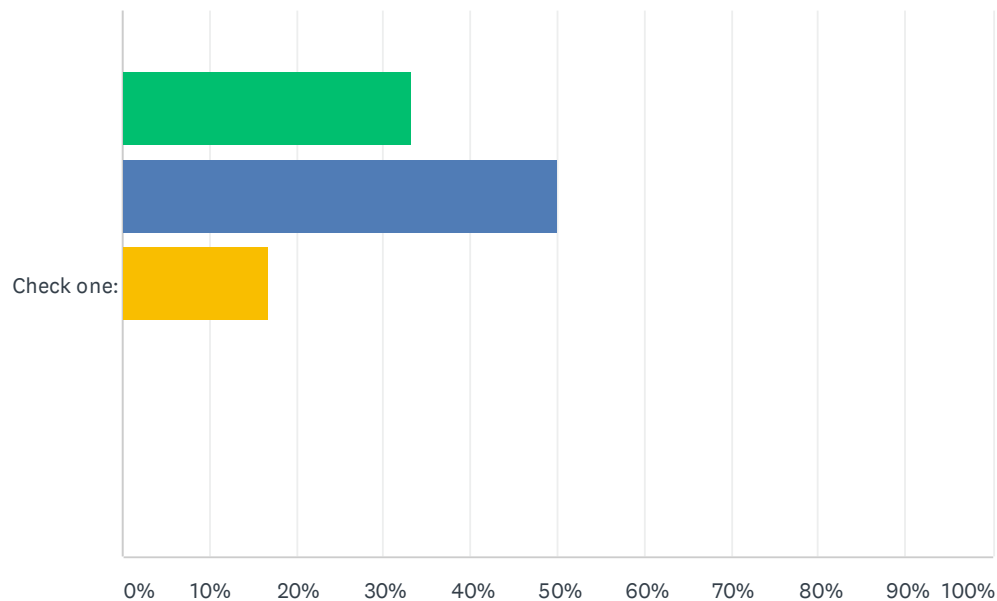
# Marin Municipal Water District Local Hazard Mitigation Plan Survey 2021

ANSWER CHOICES		RESPONSES	
Sea Level Rise		12.50%	2
Climate Change		75.00%	12
Dam Failure or Flooding		6.25%	1
Earthquake		56.25%	9
Flooding from Storm		37.50%	6
Tsunami		6.25%	1
Public Health Emergency		50.00%	8
Severe Weather - e.g. Extreme Heat, Power Outages, Wind		81.25%	13
Terrorism - Threat, Hoax, Cyber Attack		0.00%	0
Transportation Accident - Aircraft or Railroad		0.00%	0
Wildfire		62.50%	10
Drought		87.50%	14
Landslides/Mass Movements		12.50%	2
Other (please specify)		6.25%	1
Total Respondents: 16			

#	OTHER (PLEASE SPECIFY)	DATE
1	Forest tree introduced disease epidemic	4/28/2021 5:53 PM

## Q2 How prepared is your household to deal with a water disruption from a disaster or big emergency?

Answered: 18 Skipped: 0

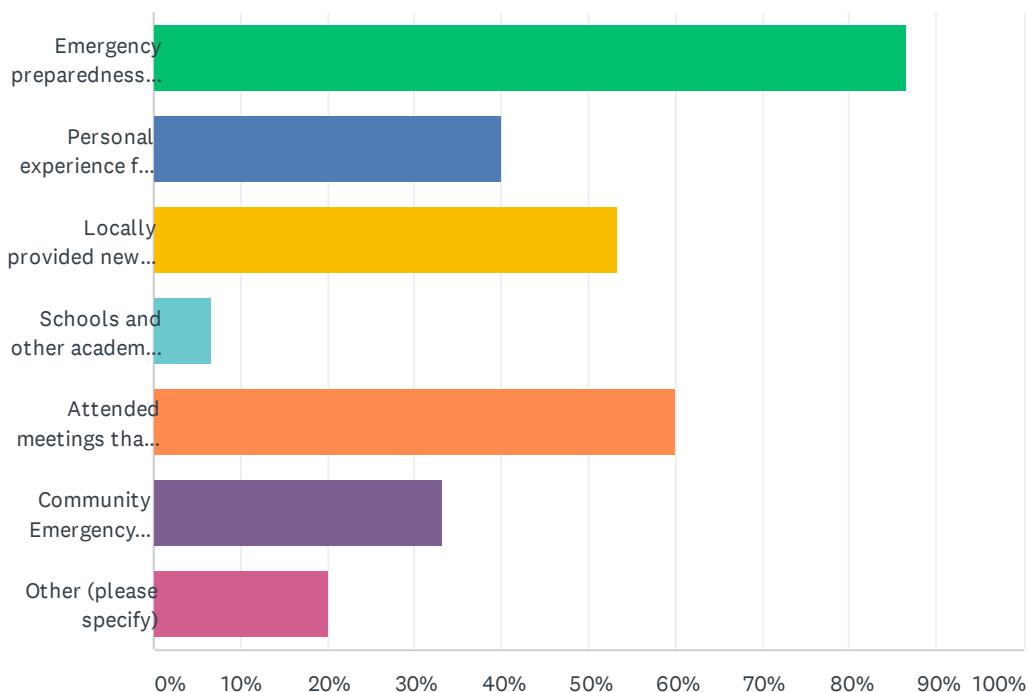


■ Not at all prepared 
 ■ Somewhat prepared 
 ■ Adequately prepared  
■ Well prepared 
 ■ Very prepared

	NOT AT ALL PREPARED	SOMEWHAT PREPARED	ADEQUATELY PREPARED	WELL PREPARED	VERY PREPARED	TOTAL	WEIGHTED AVERAGE
Check one:	33.33% 6	50.00% 9	16.67% 3	0.00% 0	0.00% 0	18	1.83

### Q3 What resources have helped your household become more prepared for emergencies and disasters. (Check all that apply)

Answered: 15    Skipped: 3

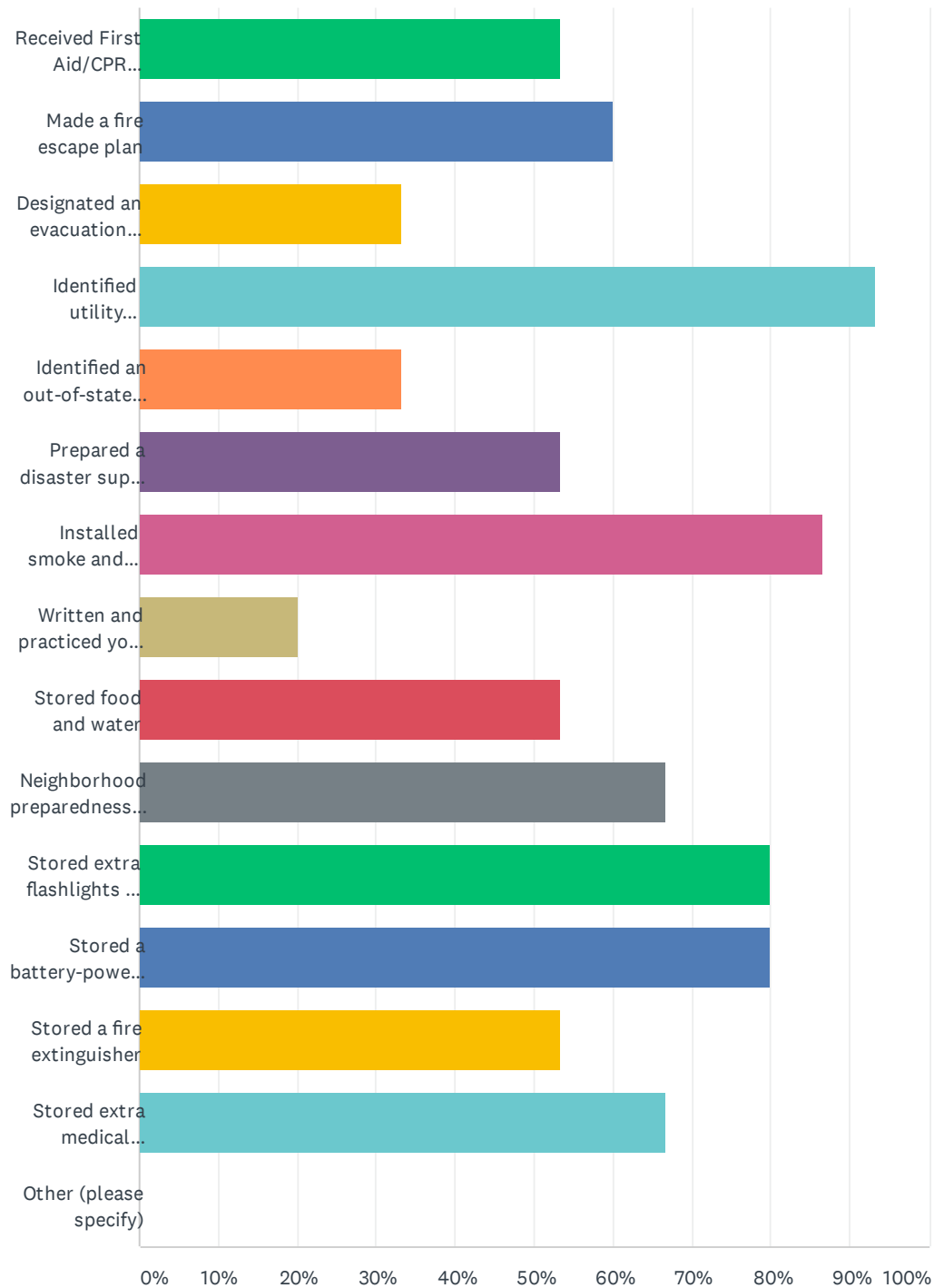


ANSWER CHOICES		RESPONSES	
Emergency preparedness information from a government source (e.g., federal, state, or local emergency management)		86.67%	13
Personal experience from involvement in one or more hazards or disasters		40.00%	6
Locally provided news or other media information		53.33%	8
Schools and other academic institutions		6.67%	1
Attended meetings that have provided information on disaster preparedness		60.00%	9
Community Emergency Response Training (CERT) or other disaster training program		33.33%	5
Other (please specify)		20.00%	3
Total Respondents: 15			

#	OTHER (PLEASE SPECIFY)	DATE
1	Past experiences	5/4/2021 9:31 AM
2	Firesafe MARIN	4/28/2021 5:53 PM
3	Local FireWise Community	4/28/2021 3:08 PM

## Q4 Which of the following steps has your household taken to prepare for a disaster? (Check all that apply)

Answered: 15 Skipped: 3



# Marin Municipal Water District Local Hazard Mitigation Plan Survey 2021

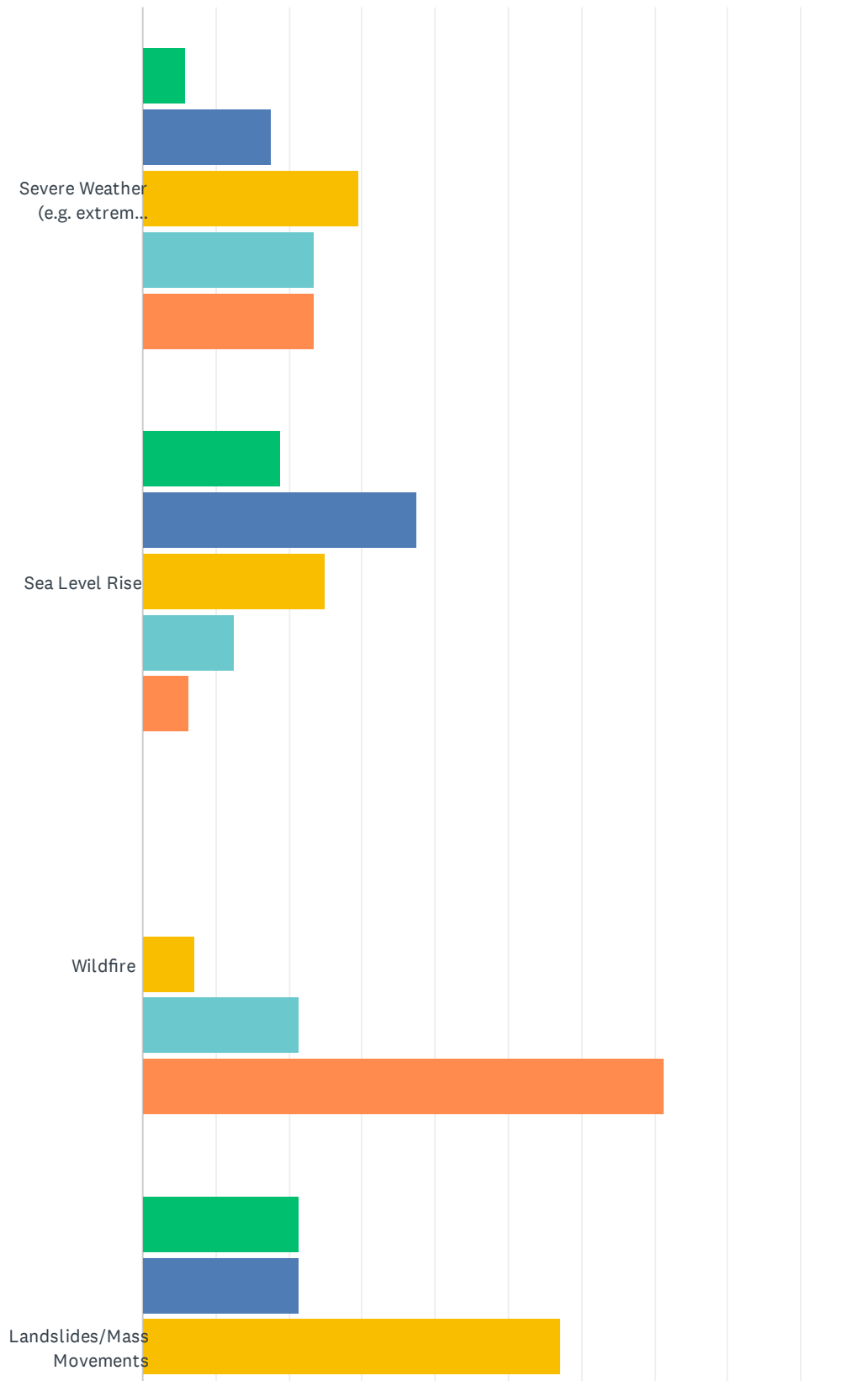
ANSWER CHOICES	RESPONSES	
Received First Aid/CPR training	53.33%	8
Made a fire escape plan	60.00%	9
Designated an evacuation meeting place	33.33%	5
Identified utility shutoffs	93.33%	14
Identified an out-of-state contact	33.33%	5
Prepared a disaster supply kit	53.33%	8
Installed smoke and carbon monoxide detectors on each level of the house	86.67%	13
Written and practiced your family disaster plan	20.00%	3
Stored food and water	53.33%	8
Neighborhood preparedness/planning	66.67%	10
Stored extra flashlights and batteries	80.00%	12
Stored a battery-powered radio	80.00%	12
Stored a fire extinguisher	53.33%	8
Stored extra medical supplies (first aid kit, medications)	66.67%	10
Other (please specify)	0.00%	0
Total Respondents: 15		

#	OTHER (PLEASE SPECIFY)	DATE
	There are no responses.	

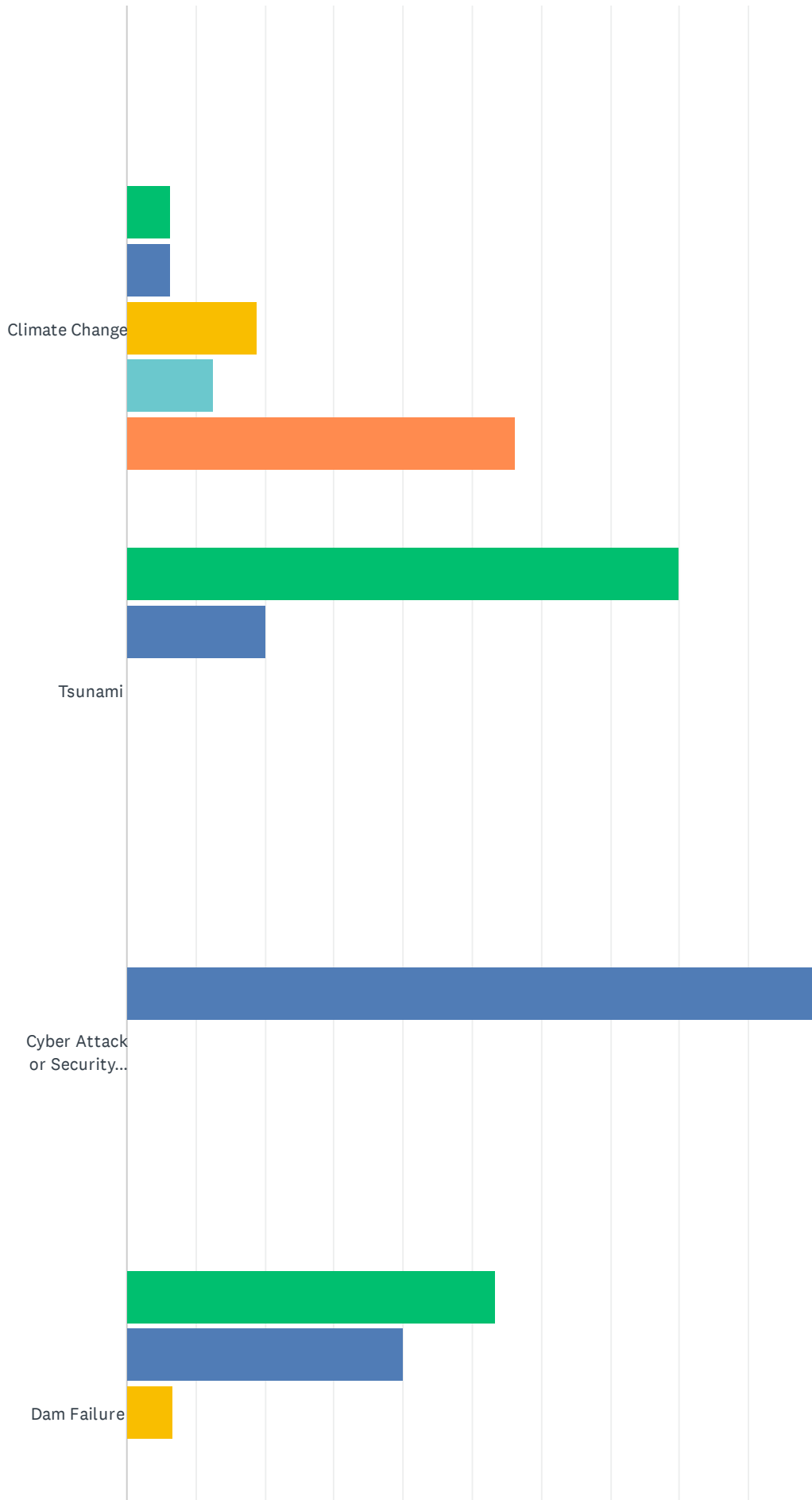


## Q5 How concerned are you about the following hazards in your community? (Select one response for each hazard)

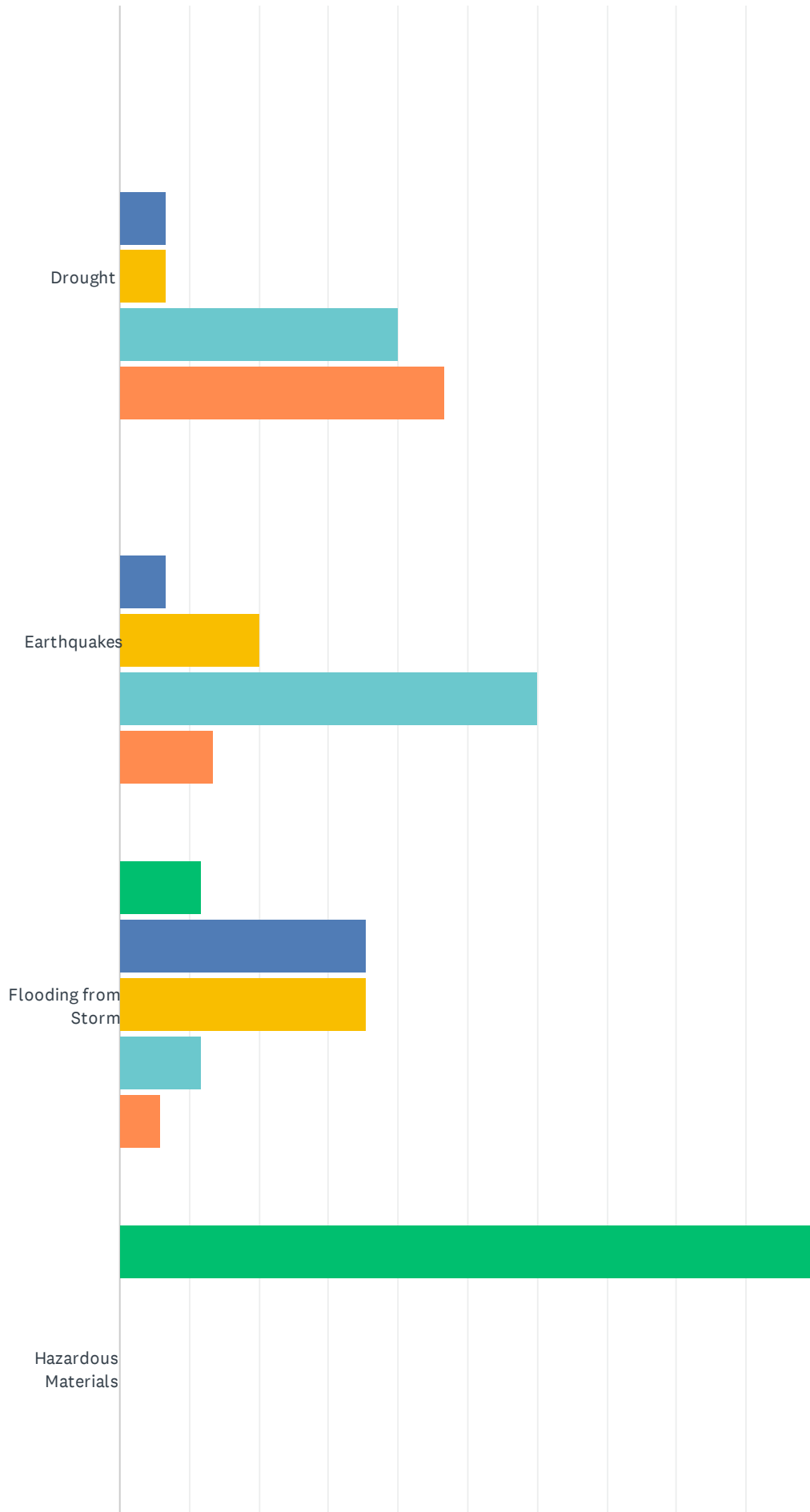
Answered: 18 Skipped: 0



# Marin Municipal Water District Local Hazard Mitigation Plan Survey 2021



# Marin Municipal Water District Local Hazard Mitigation Plan Survey 2021



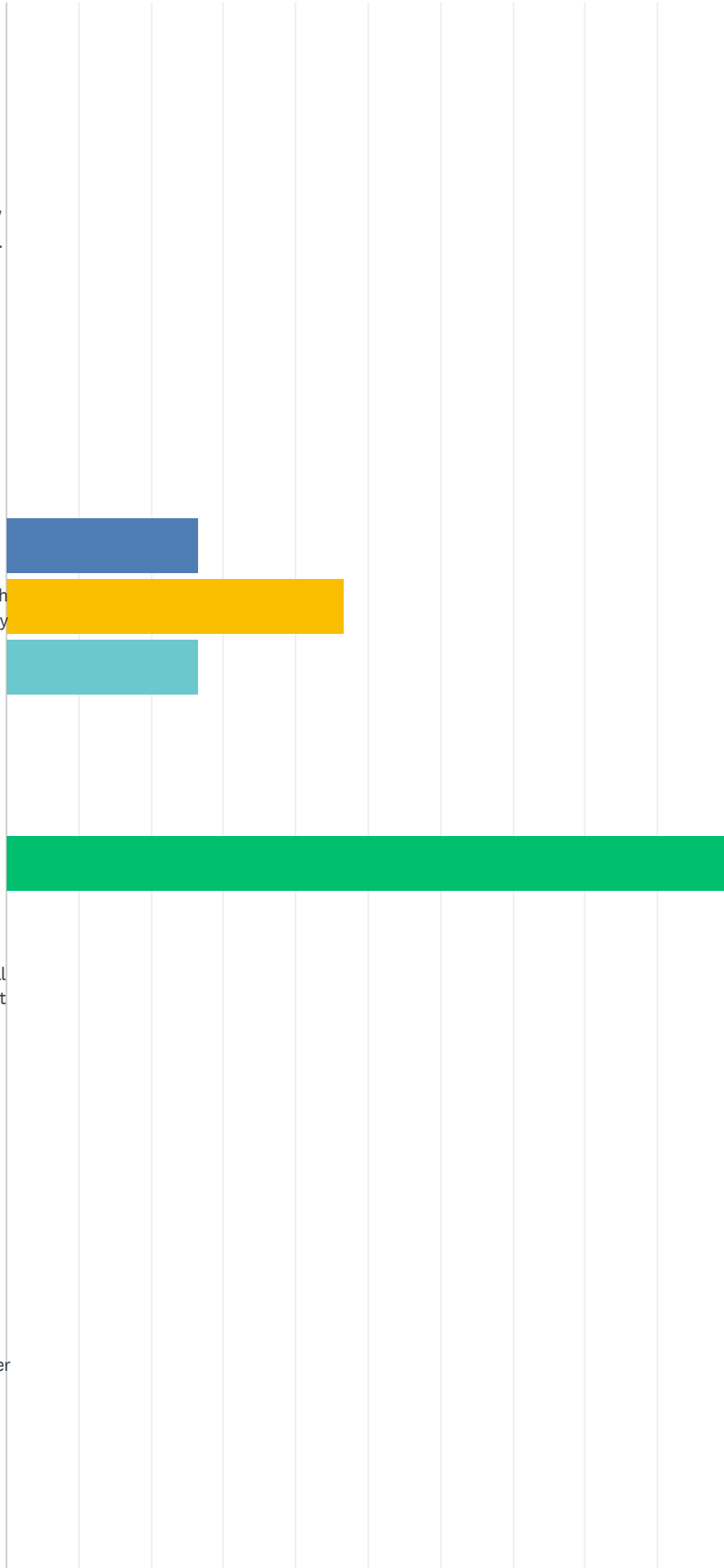
# Marin Municipal Water District Local Hazard Mitigation Plan Survey 2021

High Rise /  
High Occupan...

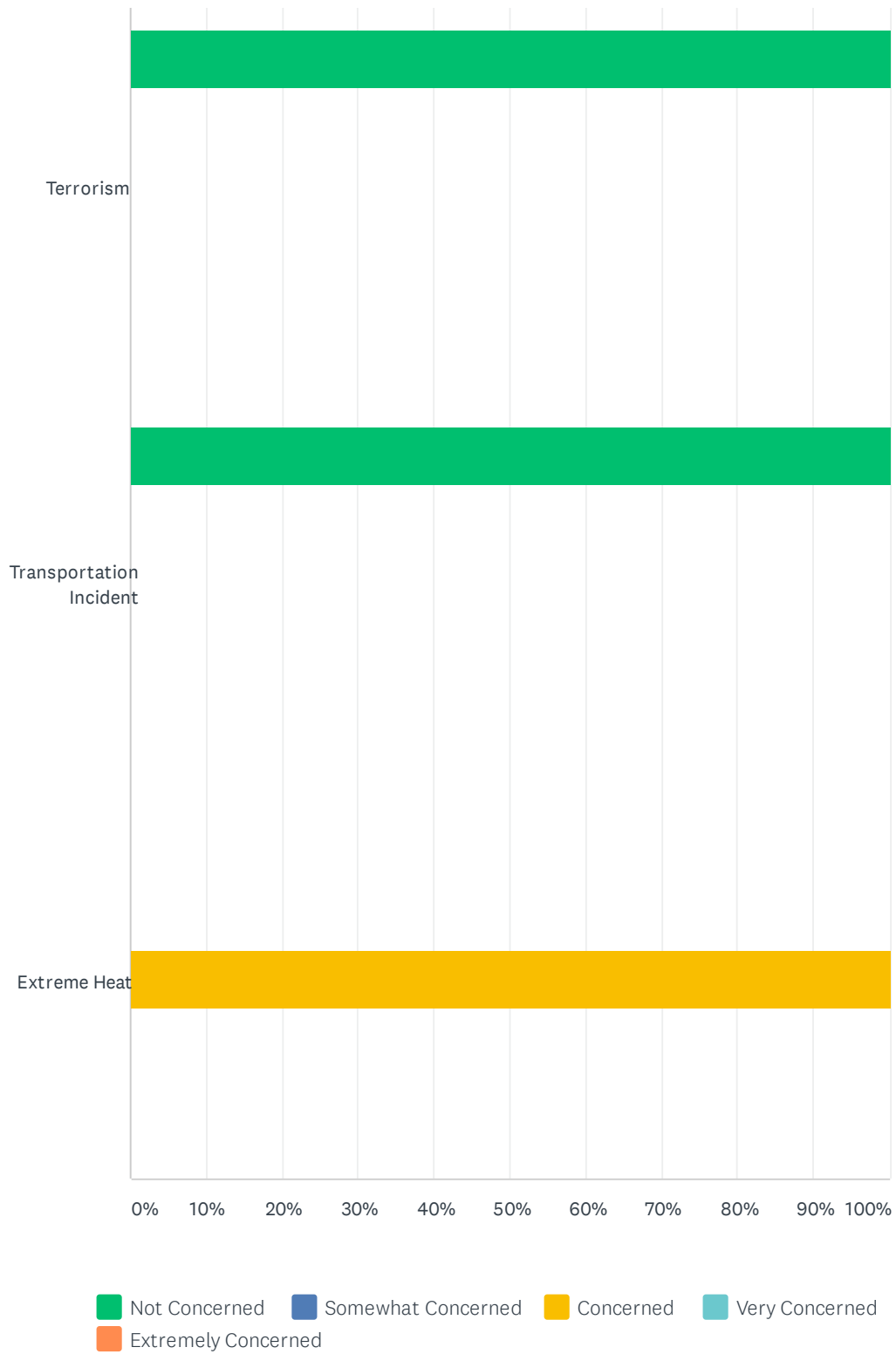
Public Health  
Emergency

Radiological  
Incident

Space Weather



# Marin Municipal Water District Local Hazard Mitigation Plan Survey 2021



# Marin Municipal Water District Local Hazard Mitigation Plan Survey 2021

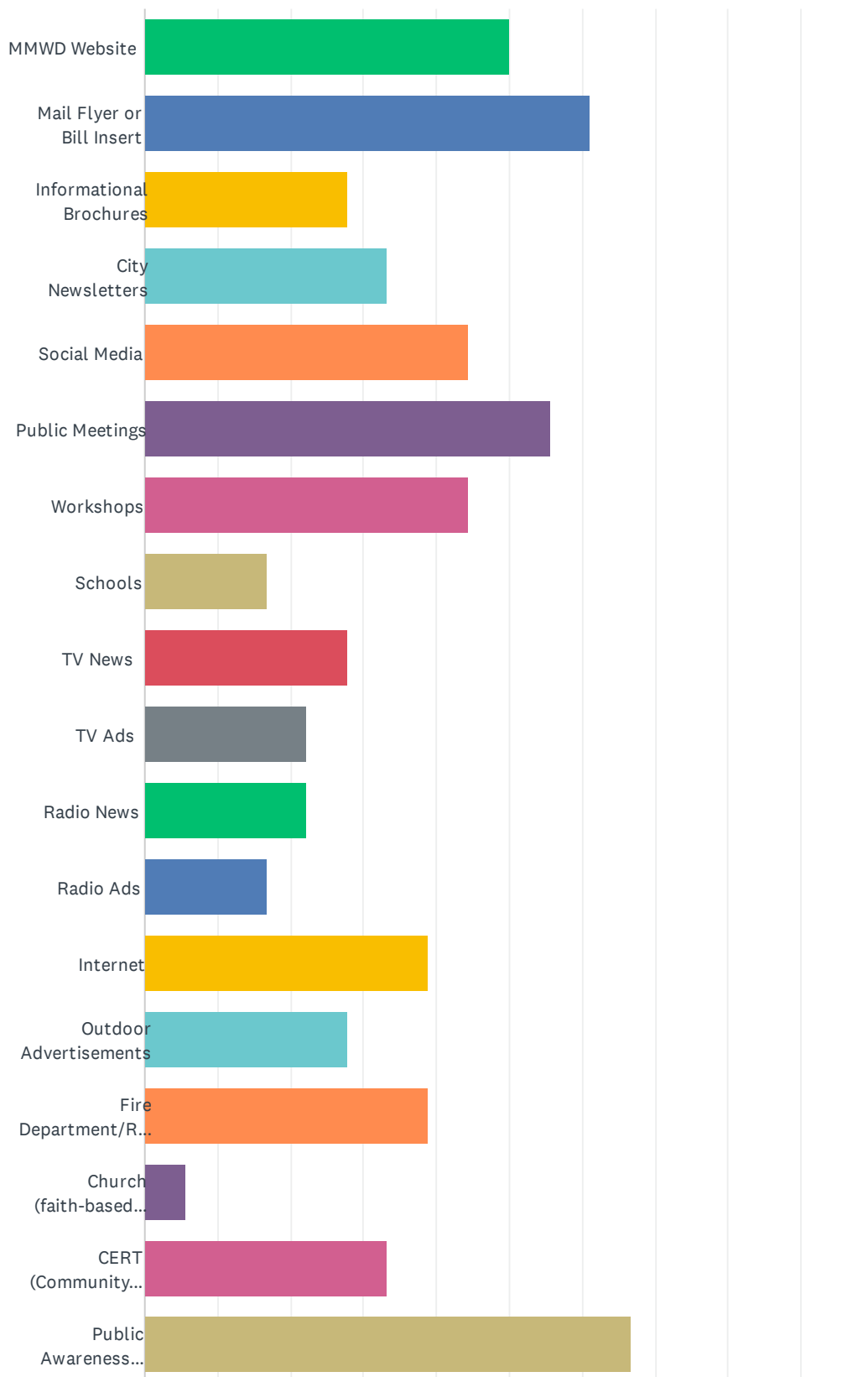
	NOT CONCERNED	SOMEWHAT CONCERNED	CONCERNED	VERY CONCERNED	EXTREMELY CONCERNED	TOTAL	WEIGHTED AVERAGE
Severe Weather (e.g. extreme heat, power outages, wind)	5.88% 1	17.65% 3	29.41% 5	23.53% 4	23.53% 4	17	3.41
Sea Level Rise	18.75% 3	37.50% 6	25.00% 4	12.50% 2	6.25% 1	16	2.50
Wildfire	0.00% 0	0.00% 0	7.14% 1	21.43% 3	71.43% 10	14	4.64
Landslides/Mass Movements	21.43% 3	21.43% 3	57.14% 8	0.00% 0	0.00% 0	14	2.36
Climate Change	6.25% 1	6.25% 1	18.75% 3	12.50% 2	56.25% 9	16	4.06
Tsunami	80.00% 12	20.00% 3	0.00% 0	0.00% 0	0.00% 0	15	1.20
Cyber Attack or Security Incident	0.00% 0	100.00% 1	0.00% 0	0.00% 0	0.00% 0	1	2.00
Dam Failure	53.33% 8	40.00% 6	6.67% 1	0.00% 0	0.00% 0	15	1.53
Drought	0.00% 0	6.67% 1	6.67% 1	40.00% 6	46.67% 7	15	4.27
Earthquakes	0.00% 0	6.67% 1	20.00% 3	60.00% 9	13.33% 2	15	3.80
Flooding from Storm	11.76% 2	35.29% 6	35.29% 6	11.76% 2	5.88% 1	17	2.65
Hazardous Materials	100.00% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0	1	1.00
High Rise / High Occupancy Building Fire	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0	0.00
Public Health Emergency	0.00% 0	26.67% 4	46.67% 7	26.67% 4	0.00% 0	15	3.00
Radiological Incident	100.00% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0	1	1.00
Space Weather	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0.00% 0	0	0.00
Terrorism	100.00% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0	1	1.00
Transportation Incident	100.00% 1	0.00% 0	0.00% 0	0.00% 0	0.00% 0	1	1.00
Extreme Heat	0.00% 0	0.00% 0	100.00% 1	0.00% 0	0.00% 0	1	3.00

#	(PLEASE SPECIFY OTHER HAZARD)	DATE
1	back up to open space with grassy fields, hiking trails	6/19/2021 2:19 PM

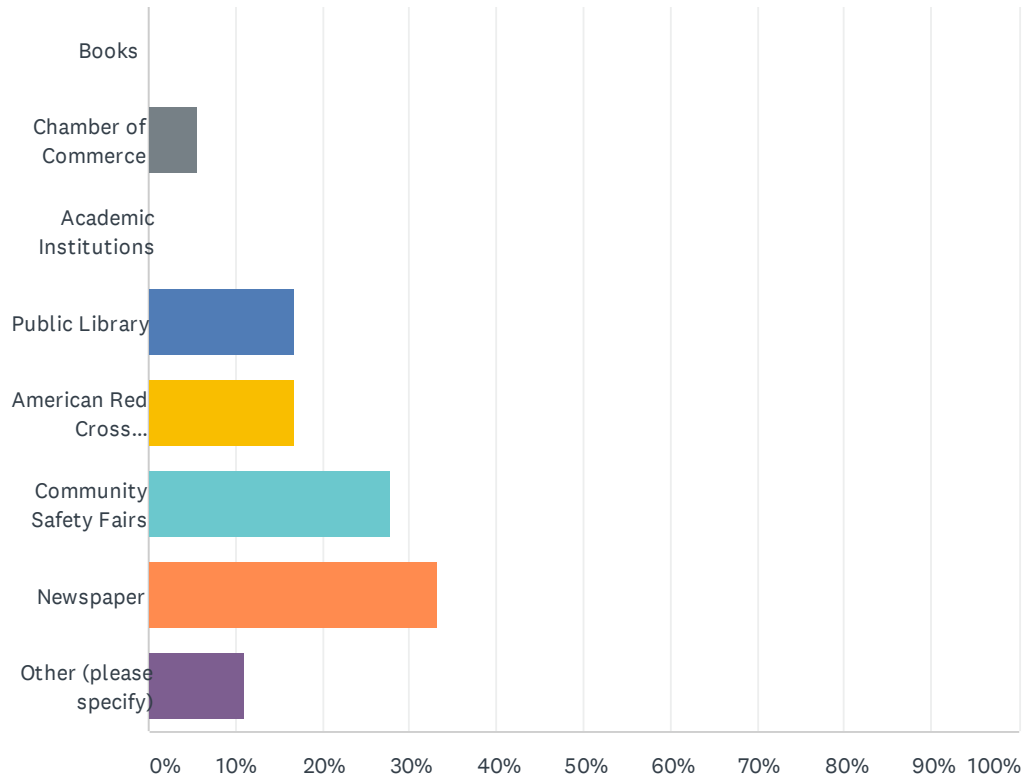


## Q6 In your opinion, what are the most effective ways of providing information on emergency preparedness? (Check all that apply)

Answered: 18 Skipped: 0



## Marin Municipal Water District Local Hazard Mitigation Plan Survey 2021



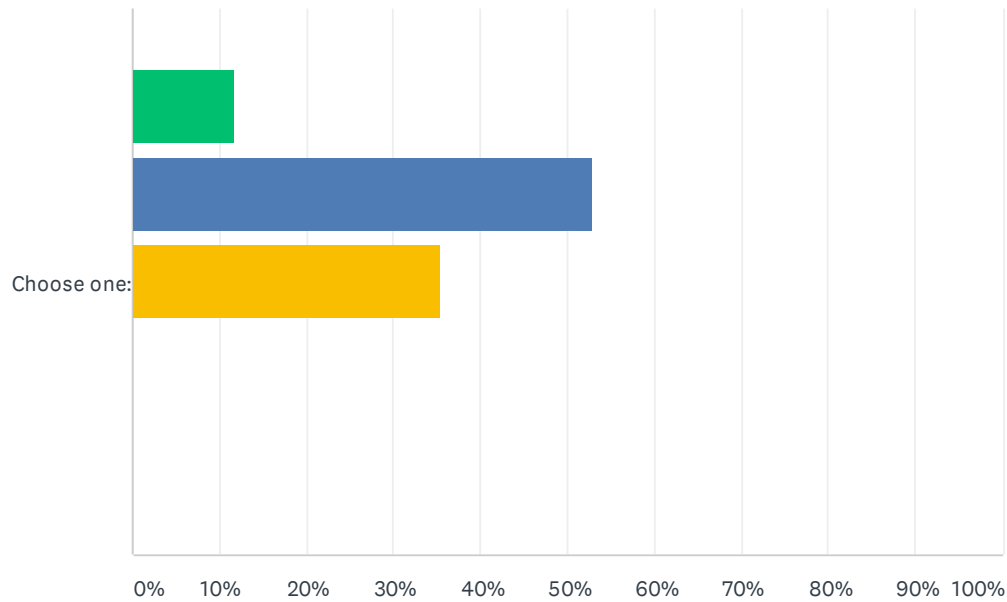
# Marin Municipal Water District Local Hazard Mitigation Plan Survey 2021

ANSWER CHOICES	RESPONSES	
MMWD Website	50.00%	9
Mail Flyer or Bill Insert	61.11%	11
Informational Brochures	27.78%	5
City Newsletters	33.33%	6
Social Media	44.44%	8
Public Meetings	55.56%	10
Workshops	44.44%	8
Schools	16.67%	3
TV News	27.78%	5
TV Ads	22.22%	4
Radio News	22.22%	4
Radio Ads	16.67%	3
Internet	38.89%	7
Outdoor Advertisements	27.78%	5
Fire Department/Rescue	38.89%	7
Church (faith-based institutions)	5.56%	1
CERT (Community Emergency Response Team) Classes	33.33%	6
Public Awareness Campaign (e.g., Flood Awareness Week, Winter Storm Preparedness Month)	66.67%	12
Books	0.00%	0
Chamber of Commerce	5.56%	1
Academic Institutions	0.00%	0
Public Library	16.67%	3
American Red Cross Information	16.67%	3
Community Safety Fairs	27.78%	5
Newspaper	33.33%	6
Other (please specify)	11.11%	2
Total Respondents: 18		

#	OTHER (PLEASE SPECIFY)	DATE
1	zoom and webinar from government officials are of varying help	6/19/2021 2:19 PM
2	Neighborhood Groups	5/4/2021 9:31 AM

## Q7 How prepared do you think MMWD is to provide you with water service following a disaster?

Answered: 17 Skipped: 1

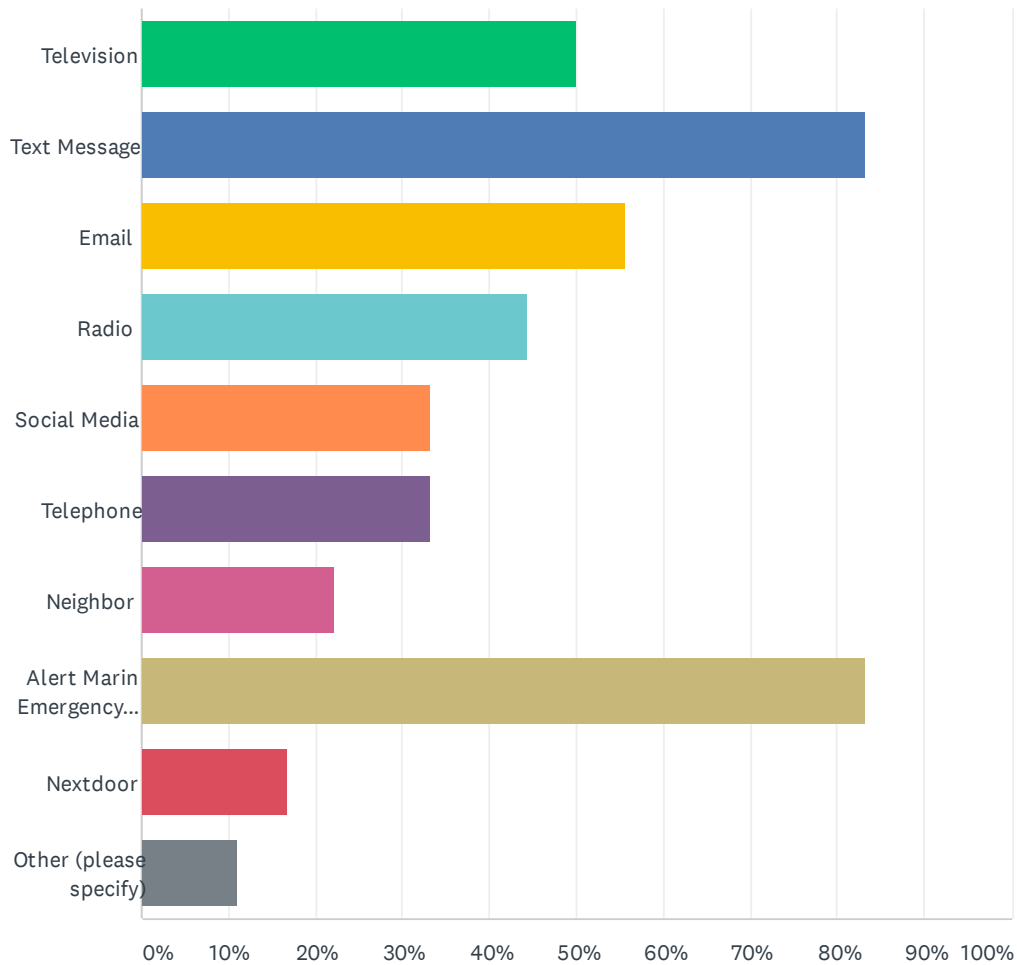


■ Not prepared at all
 ■ Somewhat prepared
 ■ Prepared
 ■ More than prepared
 ■ Very prepared

	NOT PREPARED AT ALL	SOMEWHAT PREPARED	PREPARED	MORE THAN PREPARED	VERY PREPARED	TOTAL	WEIGHTED AVERAGE
Choose one:	11.76% 2	52.94% 9	35.29% 6	0.00% 0	0.00% 0	17	2.24

## Q8 How would you expect to be notified in case of an immediate threat caused by a local hazard? (Check all that apply)

Answered: 18 Skipped: 0



# Marin Municipal Water District Local Hazard Mitigation Plan Survey 2021

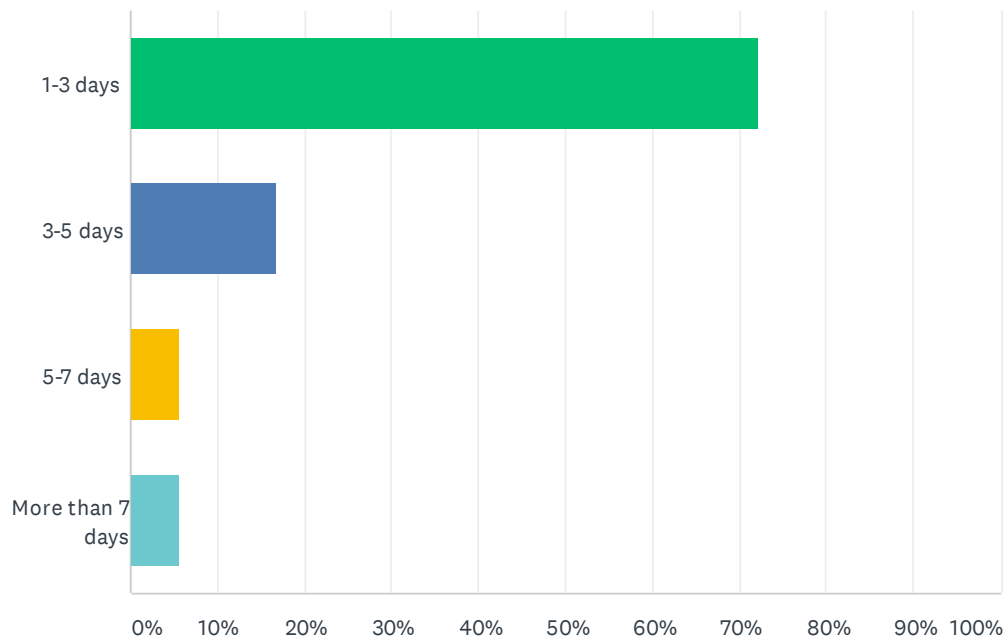
ANSWER CHOICES	RESPONSES	
Television	50.00%	9
Text Message	83.33%	15
Email	55.56%	10
Radio	44.44%	8
Social Media	33.33%	6
Telephone	33.33%	6
Neighbor	22.22%	4
Alert Marin Emergency Notification System	83.33%	15
Nextdoor	16.67%	3
Other (please specify)	11.11%	2
Total Respondents: 18		

#	OTHER (PLEASE SPECIFY)	DATE
1	Family and Friends using one of the above	5/4/2021 9:32 AM
2	Cell phone alerts, Nixel and Alert Marin	4/28/2021 5:55 PM



## Q9 If water service was temporarily disrupted, how long could you continue without any drinking water?

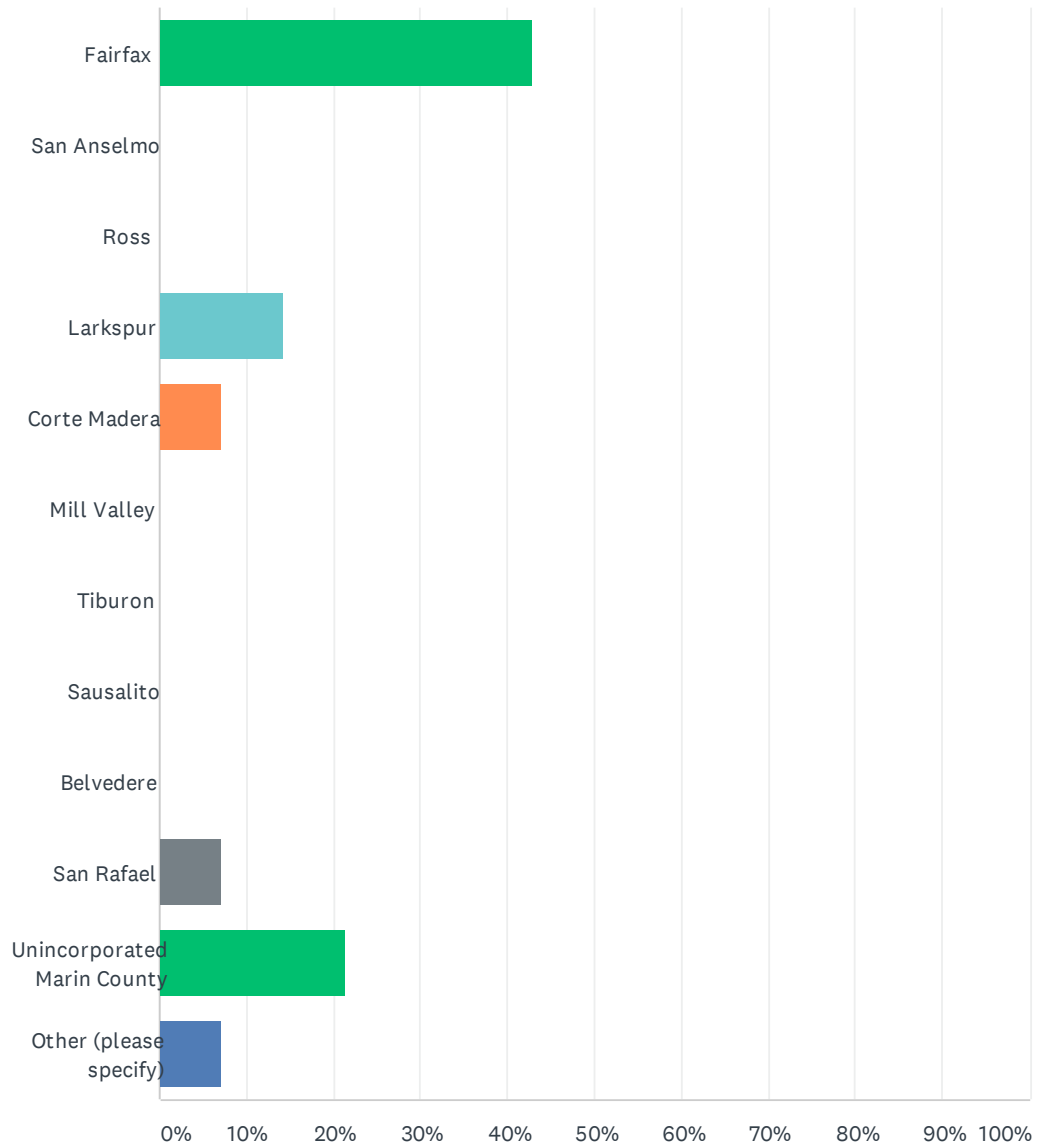
Answered: 18 Skipped: 0



ANSWER CHOICES	RESPONSES	
1-3 days	72.22%	13
3-5 days	16.67%	3
5-7 days	5.56%	1
More than 7 days	5.56%	1
TOTAL		18

## Q10 I live or work in: (needed for demographic data)

Answered: 14 Skipped: 4



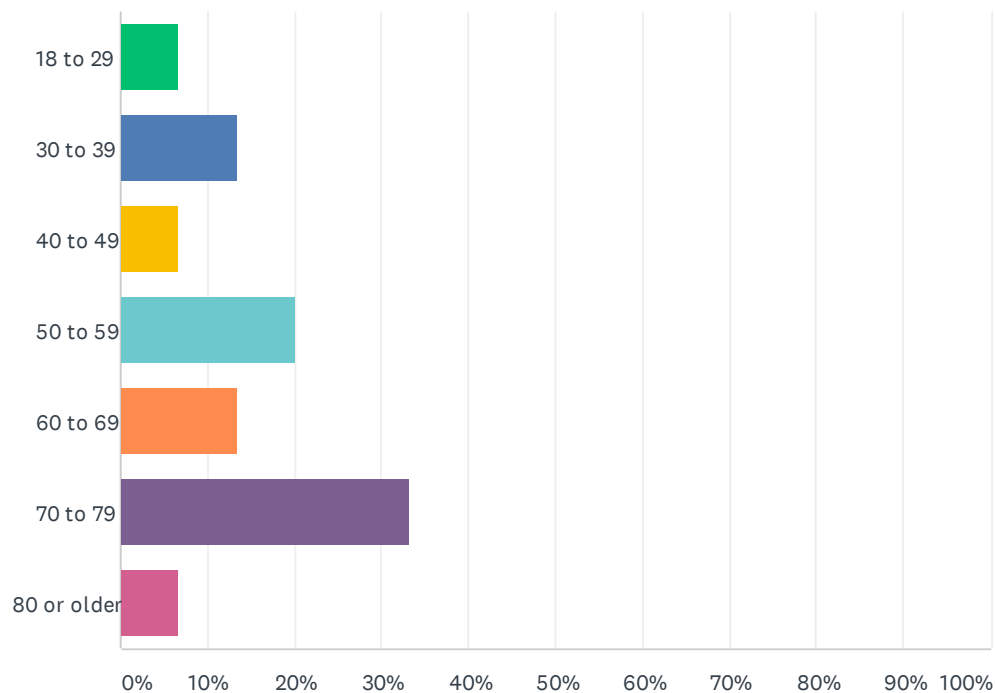
# Marin Municipal Water District Local Hazard Mitigation Plan Survey 2021

ANSWER CHOICES	RESPONSES	
Fairfax	42.86%	6
San Anselmo	0.00%	0
Ross	0.00%	0
Larkspur	14.29%	2
Corte Madera	7.14%	1
Mill Valley	0.00%	0
Tiburon	0.00%	0
Sausalito	0.00%	0
Belvedere	0.00%	0
San Rafael	7.14%	1
Unincorporated Marin County	21.43%	3
Other (please specify)	7.14%	1
TOTAL		14

#	OTHER (PLEASE SPECIFY)	DATE
1	woodacre	6/19/2021 2:21 PM

## Q11 Please indicate your age range:

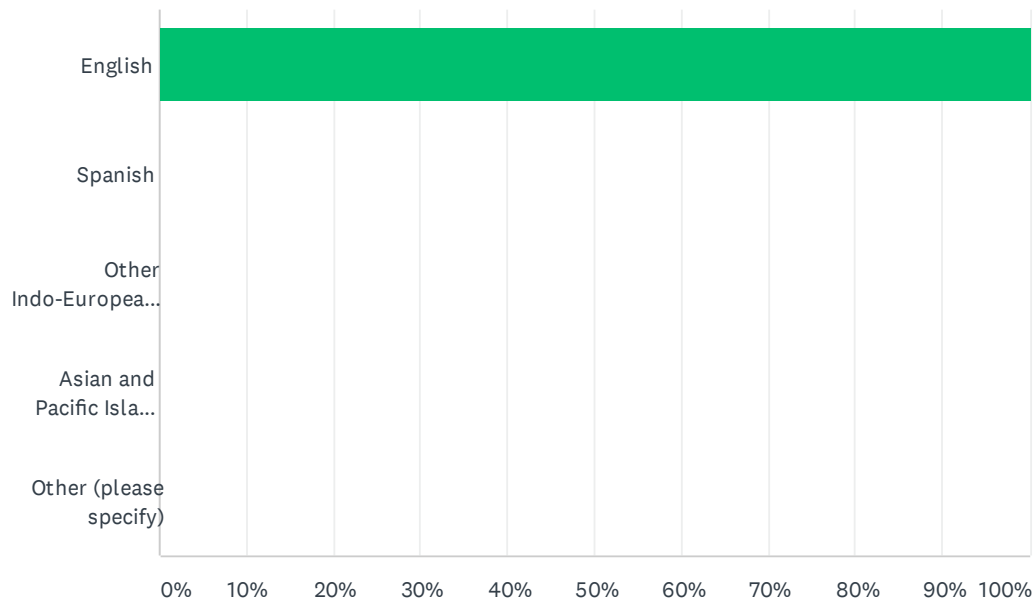
Answered: 15   Skipped: 3



ANSWER CHOICES	RESPONSES	
18 to 29	6.67%	1
30 to 39	13.33%	2
40 to 49	6.67%	1
50 to 59	20.00%	3
60 to 69	13.33%	2
70 to 79	33.33%	5
80 or older	6.67%	1
TOTAL		15

## Q12 Please indicate the primary language spoken in your household.

Answered: 14 Skipped: 4

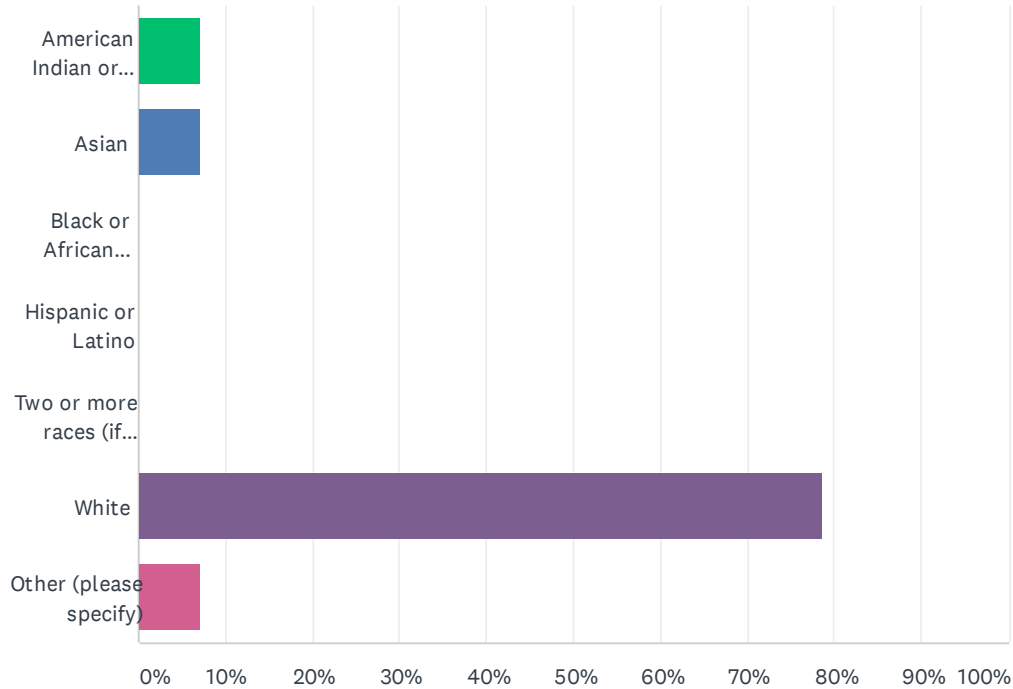


ANSWER CHOICES	RESPONSES	
English	100.00%	14
Spanish	0.00%	0
Other Indo-European languages	0.00%	0
Asian and Pacific Island languages	0.00%	0
Other (please specify)	0.00%	0
<b>TOTAL</b>		<b>14</b>

#	OTHER (PLEASE SPECIFY)	DATE
	There are no responses.	

## Q13 What is your race?

Answered: 14 Skipped: 4



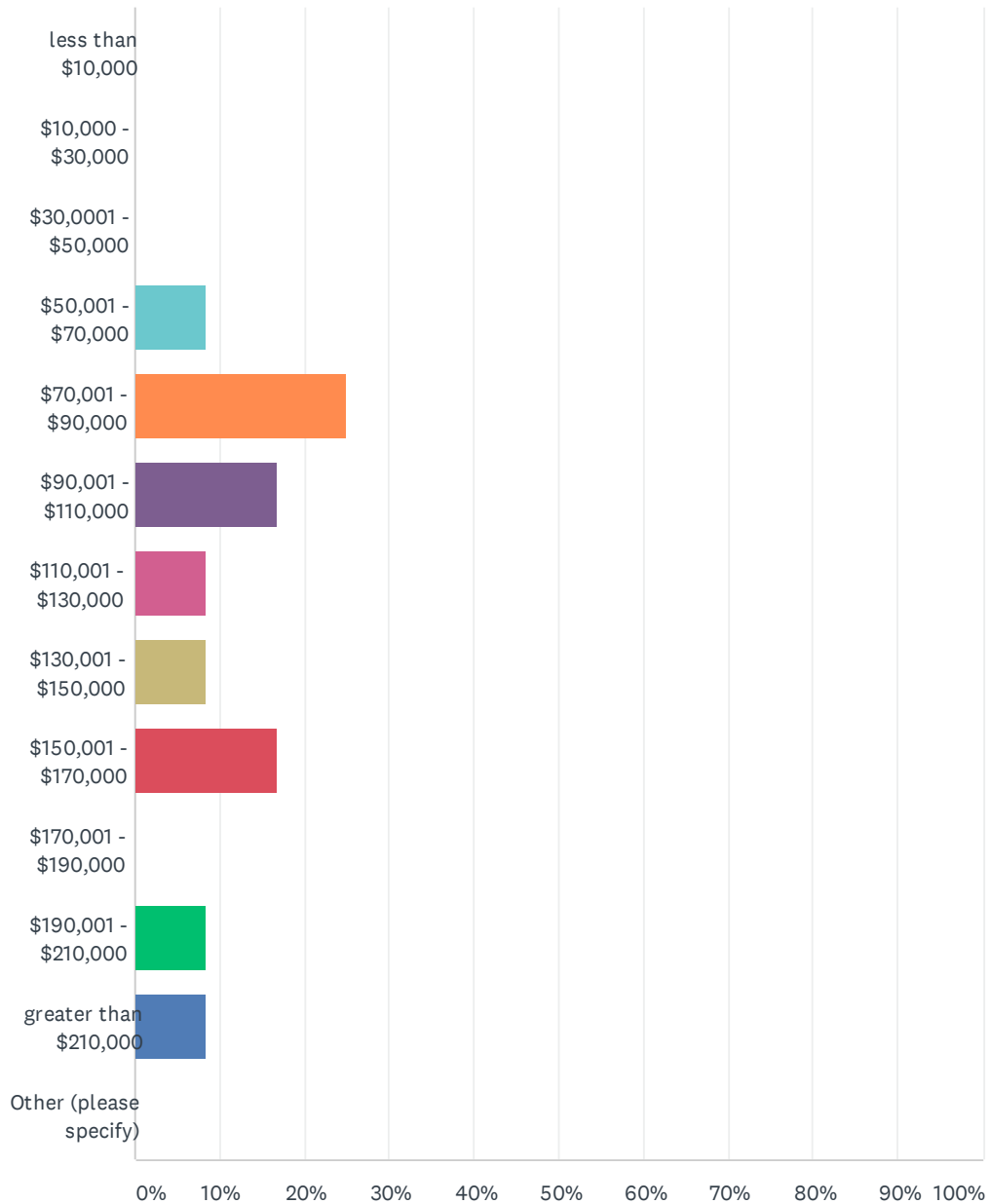
ANSWER CHOICES	RESPONSES	
American Indian or Alaska Native	7.14%	1
Asian	7.14%	1
Black or African American	0.00%	0
Hispanic or Latino	0.00%	0
Two or more races (if selected, please explain below)	0.00%	0
White	78.57%	11
Other (please specify)	7.14%	1
<b>TOTAL</b>		<b>14</b>

#	OTHER (PLEASE SPECIFY)	DATE
1	Mexican American	5/4/2021 9:33 AM



## Q14 What is your household income?

Answered: 12 Skipped: 6



# Marin Municipal Water District Local Hazard Mitigation Plan Survey 2021

ANSWER CHOICES	RESPONSES	
less than \$10,000	0.00%	0
\$10,000 - \$30,000	0.00%	0
\$30,0001 - \$50,000	0.00%	0
\$50,001 - \$70,000	8.33%	1
\$70,001 - \$90,000	25.00%	3
\$90,001 - \$110,000	16.67%	2
\$110,001 - \$130,000	8.33%	1
\$130,001 - \$150,000	8.33%	1
\$150,001 - \$170,000	16.67%	2
\$170,001 - \$190,000	0.00%	0
\$190,001 - \$210,000	8.33%	1
greater than \$210,000	8.33%	1
Other (please specify)	0.00%	0
TOTAL		12

#	OTHER (PLEASE SPECIFY)	DATE
	There are no responses.	

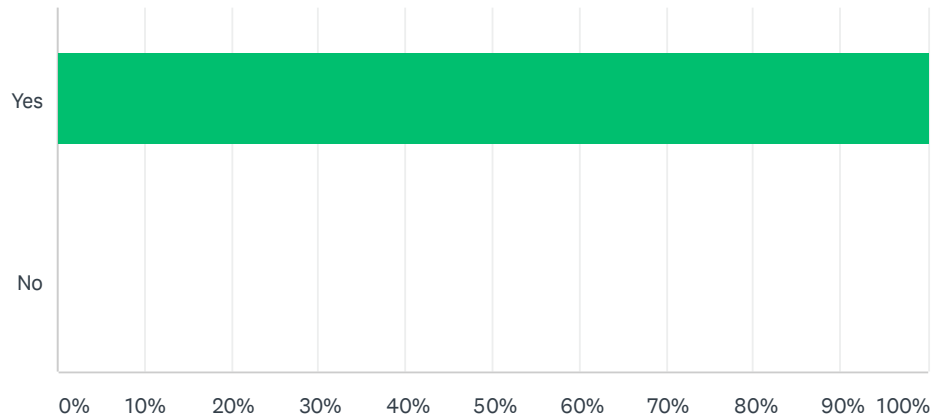
## Q15 What is your zipcode?

Answered: 15   Skipped: 3

#	RESPONSES	DATE
1	94973	6/19/2021 2:21 PM
2	94904	6/14/2021 2:00 PM
3	94925	6/9/2021 10:43 AM
4	94939	5/4/2021 9:33 AM
5	94930	4/29/2021 8:27 AM
6	94930	4/28/2021 11:41 PM
7	94930	4/28/2021 8:02 PM
8	94930	4/28/2021 5:56 PM
9	94930	4/28/2021 4:30 PM
10	94930	4/28/2021 3:09 PM
11	94939	4/28/2021 12:12 PM
12	94901	4/28/2021 12:04 PM
13	94973	3/25/2021 10:39 AM
14	99999	2/25/2021 12:28 PM
15	94925	1/25/2021 4:19 PM

## Q16 Do you have access to the Internet?

Answered: 14 Skipped: 4



ANSWER CHOICES	RESPONSES	
Yes	100.00%	14
No	0.00%	0
TOTAL		14

## Q17 Comments

Answered: 6   Skipped: 12

#	RESPONSES	DATE
1	I need to have a better understanding of MMWD oversight of stored water in tanks around our areas for disaster and oversight of controlled burns for vegetation management	6/19/2021 2:23 PM
2	I would like to see more communication about this. In the mail, by email, in local communications channels, etc. Thanks.	4/28/2021 8:10 PM
3	It seems MMWD does not prepare for water emergencies (drought) until they happen. Shame of the staff and Board.	4/28/2021 5:58 PM
4	Where I live, in a box canyon, when the power goes out there is no internet connection. My internet connection for cell phone and email requires electricity. I have a plug in land line that I use. This is an issue. Thank you for doing this survey.	4/28/2021 3:09 PM
5	We are active in the Neighborhood Resource Group (NRG) program run mostly by volunteers with support from the Town of San Anselmo and the City of Larkspur.	4/28/2021 12:14 PM
6	Questions about post-fire recovery?	4/28/2021 12:05 PM





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**Marin Municipal Water District Hazard Mitigation Plan**

## **Appendix B. Summary of Federal and State Agencies, Programs and Regulations**

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## B. SUMMARY OF FEDERAL AND STATE AGENCIES, PROGRAMS AND REGULATIONS

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Existing laws, ordinances, plans and programs at the federal and state level can support or impact hazard mitigation actions identified in this plan. Hazard mitigation plans are required to include a review and incorporation, if appropriate, of existing plans, studies, reports, and technical information as part of the planning process (44 CFR, Section 201.6(b)(3)). The following federal and state programs have been identified as programs that may interface with the actions identified in this plan. Each program enhances capabilities to implement mitigation actions or has a nexus with a mitigation action in this plan. Information presented in this section can be used to review local capabilities to implement mitigation actions. A review of local plans, studies, reports, and technical information is provided in Chapter 4 of the hazard mitigation plan.

### FEDERAL

#### **A Collaborative Approach for Reducing Wildfire Risks to Communities and the Environment; 10-Year Comprehensive Strategy**

This strategy, reflecting the views of a broad cross-section of governmental and nongovernmental stakeholders, outlines a comprehensive approach to the management of wildland fire, hazardous fuels, and ecosystem restoration and rehabilitation on federal and adjacent state, tribal, and private forest and range lands in the United States. The strategy emphasizes measures to reduce the risk to communities and the environment and provides an effective framework for collaboration to accomplish this. Congress directed the Secretaries of the Interior and Agriculture to work with the governors to develop this strategy in the FY 2001 Interior and Related Agencies Appropriations Act. A set of core principles was developed to guide the identification of goals for the strategy. These principles include such concepts as collaboration, priority setting, and accountability.

#### **America's Water Infrastructure Act**

AWIA improves drinking water and water quality, deepens infrastructure investments, enhances public health and quality of life, increases jobs, and bolsters the economy. The AWIA provisions are the most far-reaching changes to the Safe Drinking Water Act since the 1996 Amendments, with over 30 mandated programs.

Included in this act is the requirement that community (drinking) water systems serving more than 3,300 people to develop or update risk assessments and emergency response plans (ERPs). The law specifies the components that the risk assessments and ERPs must address and establishes deadlines by which water systems must certify to the U.S. Environmental Protection Agency completion of the risk assessment and ERP.

## **Americans with Disabilities Act**

The Americans with Disabilities Act (ADA) seeks to prevent discrimination against people with disabilities in employment, transportation, public accommodation, communications, and government activities. Title II of the ADA deals with compliance with the Act in emergency management and disaster-related programs, services, and activities. It applies to state and local governments as well as third parties, including religious entities and private nonprofit organizations.

The ADA has implications for sheltering requirements and public notifications. During an emergency alert, officials must use a combination of warning methods to ensure that all residents have all necessary information. Those with hearing impairments may not hear radio, television, sirens, or other audible alerts, while those with visual impairments may not see flashing lights or other visual alerts. Two technical documents for shelter operators address physical accessibility needs of people with disabilities, as well as medical needs and service animals.

The ADA intersects with disaster preparedness programs in regards to transportation, social services, temporary housing, and rebuilding. Persons with disabilities may require additional assistance in evacuation and transit (e.g., vehicles with wheelchair lifts or paratransit buses). Evacuation and other response plans should address the unique needs of residents. Local governments may be interested in implementing a special-needs registry to identify the home addresses, contact information, and needs for residents who may require more assistance.

FEMA hazard mitigation project grant applications require full compliance with applicable federal acts. Any action identified in this plan that falls within the scope of this act will need to meet its requirements.

## **Civil Rights Act of 1964**

The Civil Rights Act of 1964 prohibits discrimination based on race, color, religion, sex or nation origin and requires equal access to public places and employment. The Act is relevant to emergency management and hazard mitigation in that it prohibits local governments from favoring the needs of one population group over another. Local government and emergency response must ensure the continued safety and well-being of all residents equally, to the extent possible. FEMA hazard mitigation project grant applications require full compliance with applicable federal acts. Any action identified in this plan that falls within the scope of this act will need to meet its requirements.

## **Clean Water Act**

The federal Clean Water Act (CWA) employs regulatory and non-regulatory tools to reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. These tools are employed to achieve the broader goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's surface waters so that they can support "the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water."

Evolution of CWA programs over the last decade has included a shift from a program-by-program, source-by-source, and pollutant-by-pollutant approach to more holistic watershed-based strategies. Under the watershed approach, equal emphasis is placed on protecting healthy waters and restoring impaired ones. Numerous issues are addressed, not just those subject to CWA regulatory authority. Involvement of stakeholder groups in the

development and implementation of strategies for achieving and maintaining water quality and other environmental goals is a hallmark of this approach.

The CWA is important to hazard mitigation in several ways. There are often permitting requirements for any construction within 200 feet of water of the United States, which may have implications for mitigation projects identified by a local jurisdiction. Additionally, CWA requirements apply to wetlands, which serve important functions related to preserving and protecting the natural and beneficial functions of floodplains and are linked with a community's floodplain management program. Finally, the National Pollutant Discharge Elimination System is part of the CWA and addresses local stormwater management programs. Stormwater management plays a critical role in hazard mitigation by addressing urban drainage or localized flooding issues within jurisdictions.

FEMA hazard mitigation project grant applications require full compliance with applicable federal acts. Any action identified in this plan that falls within the scope of this act will need to meet its requirements.

## **Community Development Block Grant Disaster Resilience Program**

In response to disasters, Congress may appropriate additional funding for the U.S. Department of Housing and Urban Development Community Development Block Grant programs to be distributed as Disaster Recovery grants (CDBG-DR). These grants can be used to rebuild affected areas and provide seed money to start the recovery process. CDBG-DR assistance may fund a broad range of recovery activities, helping communities and neighborhoods that otherwise might not recover due to limited resources. CDBG-DR grants often supplement disaster programs of FEMA, the Small Business Administration, and the U.S. Army Corps of Engineers. Housing and Urban Development generally awards noncompetitive, nonrecurring CDBG-DR grants by a formula that considers disaster recovery needs unmet by other federal disaster assistance programs. To be eligible for CDBG-DR funds, projects must meet the following criteria:

- Address a disaster-related impact (direct or indirect) in a presidentially declared county for the covered disaster
- Be a CDBG-eligible activity (according to regulations and waivers)
- Meet a national objective.

Incorporating preparedness and mitigation into these actions is encouraged, as the goal is to rebuild in ways that are safer and stronger. CDBG-DR funding is a potential alternative source of funding for actions identified in this plan.

## **Disaster Mitigation Act**

The DMA is the current federal legislation addressing hazard mitigation planning. It emphasizes planning for disasters before they occur. It specifically addresses planning at the local level, requiring plans to be in place before Hazard Mitigation Assistance grant funds are available to communities. This plan is designed to meet the requirements of DMA, improving eligibility for future hazard mitigation funds.

## **Endangered Species Act**

The federal Endangered Species Act (ESA) was enacted in 1973 to conserve species facing depletion or extinction and the ecosystems that support them. The act sets forth a process for determining which species are threatened and endangered and requires the conservation of the critical habitat in which those species live. The ESA provides

broad protection for species of fish, wildlife and plants that are listed as threatened or endangered. Provisions are made for listing species, as well as for recovery plans and the designation of critical habitat for listed species. The ESA outlines procedures for federal agencies to follow when taking actions that may jeopardize listed species and contains exceptions and exemptions. It is the enabling legislation for the Convention on International Trade in Endangered Species of Wild Fauna and Flora. Criminal and civil penalties are provided for violations of the ESA and the Convention.

Federal agencies must seek to conserve endangered and threatened species and use their authorities in furtherance of the ESA's purposes. The ESA defines three fundamental terms:

- Endangered means that a species of fish, animal or plant is “in danger of extinction throughout all or a significant portion of its range.” (For salmon and other vertebrate species, this may include subspecies and distinct population segments.)
- Threatened means that a species “is likely to become endangered within the foreseeable future.” Regulations may be less restrictive for threatened species than for endangered species.
- Critical habitat means “specific geographical areas that are...essential for the conservation and management of a listed species, whether occupied by the species or not.”

Five sections of the ESA are of critical importance to understanding it:

- Section 4: Listing of a Species—The National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries) is responsible for listing marine species; the U.S. Fish and Wildlife Service is responsible for listing terrestrial and freshwater aquatic species. The agencies may initiate reviews for listings, or citizens may petition for them. A listing must be made “solely on the basis of the best scientific and commercial data available.” After a listing has been proposed, agencies receive comment and conduct further scientific reviews for 12 to 18 months, after which they must decide if the listing is warranted. Economic impacts cannot be considered in this decision, but it may include an evaluation of the adequacy of local and state protections. Critical habitat for the species may be designated at the time of listing.
- Section 7: Consultation—Federal agencies must ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed or proposed species or adversely modify its critical habitat. This includes private and public actions that require a federal permit. Once a final listing is made, non-federal actions are subject to the same review, termed a “consultation.” If the listing agency finds that an action will “take” a species, it must propose mitigations or “reasonable and prudent” alternatives to the action; if the proponent rejects these, the action cannot proceed.
- Section 9: Prohibition of Take—It is unlawful to “take” an endangered species, including killing or injuring it or modifying its habitat in a way that interferes with essential behavioral patterns, including breeding, feeding or sheltering.
- Section 10: Permitted Take—Through voluntary agreements with the federal government that provide protections to an endangered species, a non-federal applicant may commit a take that would otherwise be prohibited as long as it is incidental to an otherwise lawful activity (such as developing land or building a road). These agreements often take the form of a “Habitat Conservation Plan.”
- Section 11: Citizen Lawsuits—Civil actions initiated by any citizen can require the listing agency to enforce the ESA's prohibition of taking or to meet the requirements of the consultation process.

FEMA hazard mitigation project grant applications require full compliance with applicable federal acts. Any action identified in this plan that falls within the scope of this act will need to meet its requirements.



## **Federal Energy Regulatory Commission Dam Safety Program**

The Federal Energy Regulatory Commission (FERC) cooperates with a large number of federal and state agencies to ensure and promote dam safety. More than 3,000 dams are part of regulated hydroelectric projects in the FERC program. Two-thirds of these are more than 50 years old. As dams age, concern about their safety and integrity grows, so oversight and regular inspection are important. FERC inspects hydroelectric projects on an unscheduled basis to investigate the following:

- Potential dam safety problems
- Complaints about constructing and operating a project
- Safety concerns related to natural disasters
- Issues concerning compliance with the terms and conditions of a license.

Every five years, an independent engineer approved by the FERC must inspect and evaluate projects with dams higher than 32.8 feet (10 meters), or with a total storage capacity of more than 2,000 acre-feet.

FERC monitors seismic research and applies it in performing structural analyses of hydroelectric projects. FERC also evaluates the effects of potential and actual large floods on the safety of dams. During and following floods, FERC visits dams and licensed projects, determines the extent of damage, if any, and directs any necessary studies or remedial measures the licensee must undertake. The FERC publication *Engineering Guidelines for the Evaluation of Hydropower Projects* guides the FERC engineering staff and licensees in evaluating dam safety. The publication is frequently revised to reflect current information and methodologies.

FERC requires licensees to prepare emergency action plans and conducts training sessions on how to develop and test these plans. The plans outline an early warning system if there is an actual or potential sudden release of water from a dam due to failure. The plans include operational procedures that may be used, such as reducing reservoir levels and reducing downstream flows, as well as procedures for notifying affected residents and agencies responsible for emergency management. These plans are frequently updated and tested to ensure that everyone knows what to do in emergency situations.

## **Federal Wildfire Management Policy and Healthy Forests Restoration Act**

Federal Wildfire Management Policy and Healthy Forests Restoration Act (2003). These documents call for a single comprehensive federal fire policy for the Interior and Agriculture Departments (the agencies using federal fire management resources). They mandate community-based collaboration to reduce risks from wildfire.

## **National Dam Safety Act**

Potential for catastrophic flooding due to dam failures led to passage of the National Dam Inspection Act in 1972, creation of the National Dam Safety Program in 1996, and reauthorization of the program through the Dam Safety Act in 2006. National Dam Safety Program, administered by FEMA requires a periodic engineering analysis of the majority of dams in the country; exceptions include the following:

- Dams under jurisdiction of the Bureau of Reclamation, Tennessee Valley Authority, or International Boundary and Water Commission
- Dams constructed pursuant to licenses issued under the Federal Power Act

- Dams that the Secretary of the Army determines do not pose any threat to human life or property.

The goal of this FEMA-monitored effort is to identify and mitigate the risk of dam failure so as to protect lives and property of the public. The National Dam Safety Program is a partnership among the states, federal agencies, and other stakeholders that encourages individual and community responsibility for dam safety. Under FEMA's leadership, state assistance funds have allowed all participating states to improve their programs through increased inspections, emergency action planning, and purchases of needed equipment. FEMA has also expanded existing and initiated new training programs. Grant assistance from FEMA provides support for improvement of dam safety programs that regulate most of the dams in the United States.

## **National Environmental Policy Act**

The National Environmental Policy Act requires federal agencies to consider the environmental impacts of proposed actions and reasonable alternatives to those actions, alongside technical and economic considerations. The National Environmental Policy Act established the Council on Environmental Quality, whose regulations (40 CFR Parts 1500-1508) set standards for compliance. Consideration and decision-making regarding environmental impacts must be documented in an environmental impact statement or environmental assessment. Environmental impact assessment requires the evaluation of reasonable alternatives to a proposed action, solicitation of input from organizations and individuals that could be affected, and an unbiased presentation of direct, indirect, and cumulative environmental impacts. FEMA hazard mitigation project grant applications require full compliance with applicable federal acts. Any action identified in this plan that falls within the scope of this act will need to meet its requirements.

## **National Fire Plan (2001)**

The 2001 National Fire Plan was developed based on the National Fire Policy. A major aspect of the National Fire Plan is joint risk reduction planning and implementation carried out by federal, state and local agencies and communities. The National Fire Plan presented a comprehensive strategy in five key initiatives:

- Firefighting—Be adequately prepared to fight fires each fire season.
- Rehabilitation and Restoration—Restore landscapes and rebuild communities damaged by wildfires.
- Hazardous Fuel Reduction—Invest in projects to reduce fire risk.
- Community Assistance—Work directly with communities to ensure adequate protection.
- Accountability—Be accountable and establish adequate oversight, coordination, program development, and monitoring for performance.

## **National Flood Insurance Program**

The National Flood Insurance Program (NFIP) makes federally backed flood insurance available to homeowners, renters, and business owners in participating communities that enact floodplain regulations. Participation and good standing under NFIP are prerequisites to grant funding eligibility under the Robert T. Stafford Act.

For most participating communities, FEMA has prepared a detailed Flood Insurance Study. The study presents water surface elevations for floods of various magnitudes, including the 1-percent-annual-chance flood and the 0.2-percent-annual-chance flood. Base flood elevations and the boundaries of the flood hazard areas are shown on Flood Insurance Rate Maps, which are the principle tool for identifying the extent and location of the flood

hazard. Flood Insurance Rate Maps are the most detailed and consistent data source available, and for many communities they represent the minimum area of oversight under the local floodplain management program. In recent years, Flood Insurance Rate Maps have been digitized as Digital Flood Insurance Rate Maps, which are more accessible to residents, local governments and stakeholders.

NFIP participants must, at a minimum, regulate development in floodplain areas in accordance with NFIP criteria. Before issuing a permit to build in a floodplain, participating jurisdictions must ensure that three criteria are met:

- New buildings and those undergoing substantial improvements must, at a minimum, be elevated to protect against damage by the 1-percent-annual-chance flood.
- New floodplain development must not aggravate existing flood problems or increase damage to other properties.
- New floodplain development must exercise a reasonable and prudent effort to reduce its adverse impacts on threatened salmonid species.

NFIP participation is limited to local governments that possess permit authority and have the ability to adopt and enforce regulations that govern land use. This does not typically apply to special purpose districts.

## **National Incident Management System**

The National Incident Management System (NIMS) is a systematic approach for government, nongovernmental organizations, and the private sector to work together to manage incidents involving hazards. The NIMS provides a flexible but standardized set of incident management practices. Incidents typically begin and end locally, and they are managed at the lowest possible geographical, organizational, and jurisdictional level. In some cases, success depends on the involvement of multiple jurisdictions, levels of government, functional agencies, and emergency responder disciplines. These cases necessitate coordination across a spectrum of organizations. Communities using NIMS follow a comprehensive national approach that improves the effectiveness of emergency management and response personnel across the full spectrum of potential hazards (including natural hazards, technological hazards, and human-caused hazards) regardless of size or complexity.

Although participation is voluntary, federal departments and agencies are required to make adoption of NIMS by local and state jurisdictions a condition to receive federal preparedness grants and awards. The content of this plan is considered to be a viable support tool for any phase of emergency management. The NIMS program is considered as a response function, and information in this hazard mitigation plan can support the implementation and update of all NIMS-compliant plans within the planning area.

## **Presidential Executive Order 11988, Floodplain Management**

Executive Order 11988 requires federal agencies to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative. It requires federal agencies to provide leadership and take action to reduce the risk of flood loss, minimize the impact of floods on human safety, health, and welfare, and restore and preserve the natural and beneficial values of floodplains. The requirements apply to the following activities (FEMA, 2015a):

- Acquiring, managing, and disposing of federal lands and facilities
- Providing federally undertaken, financed, or assisted construction and improvements

- Conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing.

## **Presidential Executive Order 11990, Protection of Wetlands**

Executive Order 11990 requires federal agencies to provide leadership and take action to minimize the destruction, loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands. The requirements apply to the following activities (National Archives, 2016):

- Acquiring, managing, and disposing of federal lands and facilities
- Providing federally undertaken, financed, or assisted construction and improvements
- Conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing.

All actions identified in this plan will seek full compliance with all applicable presidential executive orders.

## **U.S. Army Corps of Engineers Dam Safety Program**

The U.S. Army Corps of Engineers operates and maintains approximately 700 dams nationwide. It is also responsible for safety inspections of some federal and non-federal dams in the United States that meet the size and storage limitations specified in the National Dam Safety Act. The Corps has inventoried dams; surveyed each state and federal agency's capabilities, practices and regulations regarding design, construction, operation and maintenance of the dams; and developed guidelines for inspection and evaluation of dam safety. The Corps maintains the National Inventory of Dams, which contains information about a dam's location, size, purpose, type, last inspection and regulatory status (U.S. Army Corps of Engineers, 2017).

## **U.S. Army Corps of Engineers Flood Hazard Management**

The following U.S. Army Corps of Engineers authorities and programs related to flood hazard management:

- The Floodplain Management Services program offers 100-percent federally funded technical services such as development and interpretation of site-specific data related to the extent, duration and frequency of flooding. Special studies may be conducted to help a community understand and respond to flood risk. These may include flood hazard evaluation, flood warning and preparedness, or flood modeling.
- For more extensive studies, the Corps of Engineers offers a cost-shared program called Planning Assistance to States and Tribes. Studies under this program generally range from \$25,000 to \$100,000 with the local jurisdiction providing 50 percent of the cost.
- The Corps of Engineers has several cost-shared programs (typically 65 percent federal and 35 percent non-federal) aimed at developing, evaluating and implementing structural and non-structural capital projects to address flood risks at specific locations or within a specific watershed:
  - The Continuing Authorities Program for smaller-scale projects includes Section 205 for Flood Control, with a \$7 million federal limit and Section 14 for Emergency Streambank Protection with a \$1.5 million federal limit. These can be implemented without specific authorization from Congress.
  - Larger scale studies, referred to as General Investigations, and projects for flood risk management, for ecosystem restoration or to address other water resource issues, can be pursued through a specific authorization from Congress and are cost-shared, typically at 65 percent federal and 35 percent non-federal.

- Watershed management planning studies can be specifically authorized and are cost-shared at 50 percent federal and 50 percent non-federal.
- The Corps of Engineers provides emergency response assistance during and following natural disasters. Public Law 84-99 enables the Corps to assist state and local authorities in flood fight activities and cost share in the repair of flood protective structures. Assistance is provided in the following categories:
  - Preparedness—The Flood Control and Coastal Emergency Act establishes an emergency fund for preparedness for emergency response to natural disasters; for flood fighting and rescue operations; for rehabilitation of flood control and hurricane protection structures. Funding for Corps of Engineers emergency response under this authority is provided by Congress through the annual Energy and Water Development Appropriation Act. Disaster preparedness activities include coordination, planning, training and conduct of response exercises with local, state and federal agencies.
  - Response Activities—Public Law 84-99 allows the Corps of Engineers to supplement state and local entities in flood fighting urban and other non-agricultural areas under certain conditions (Engineering Regulation 500-1-1 provides specific details). All flood fight efforts require a project cooperation agreement signed by the public sponsor and the sponsor must remove all flood fight material after the flood has receded. Public Law 84-99 also authorizes emergency water support and drought assistance in certain situations and allows for “advance measures” assistance to prevent or reduce flood damage conditions of imminent threat of unusual flooding.
  - Rehabilitation—Under Public Law 84-99, an eligible flood protection system can be rehabilitated if damaged by a flood event. The flood system would be restored to its pre-disaster status at no cost to the federal system owner, and at 20-percent cost to the eligible non-federal system owner. All systems considered eligible for Public Law 84-99 rehabilitation assistance have to be in the Rehabilitation and Inspection Program prior to the flood event. Acceptable operation and maintenance by the public levee sponsor are verified by levee inspections conducted by the Corps on a regular basis. The Corps has the responsibility to coordinate levee repair issues with interested federal, state, and local agencies following natural disaster events where flood control works are damaged.

These authorities and programs are all available to support any related hazard mitigation actions.

## U.S. Fire Administration

There are federal agencies that provide technical support to fire agencies/organizations. For example, the U.S. Fire Administration, which is a part of FEMA, provides leadership, advocacy, coordination, and support for fire agencies and organizations.

## U.S. Fish and Wildlife Service

The U.S. Fish and Wildlife Service fire management strategy uses prescribed fire to maintain early successional fire-adapted grasslands and other ecological communities throughout the National Wildlife Refuge system.

## STATE

### AB 32: The California Global Warming Solutions Act

This bill identifies the following potential adverse impacts of global warming:

“... the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal

businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems.”

AB 32 establishes a state goal of reducing greenhouse gas emissions to 1990 levels by 2020 (a reduction of approximately 25 percent from forecast emission levels), with further reductions to follow. The law requires the state Air Resources Board to do the following:

- Establish a program to track and report greenhouse gas emissions.
- Approve a scoping plan for achieving the maximum technologically feasible and cost-effective reductions from sources of greenhouse gas emissions.
- Adopt early reduction measures to begin moving forward.
- Adopt, implement and enforce regulations—including market mechanisms such as “cap and-trade” programs—to ensure that the required reductions occur.

The Air Resources Board has adopted a statewide greenhouse gas emissions limit and an emissions inventory, along with requirements to measure, track, and report greenhouse gas emissions by the industries it determined to be significant sources of greenhouse gas emissions.

## **AB 756: Public Water System PFAs**

Existing law, the California Safe Drinking Water Act, requires the State Water Resources Control Board to administer provisions relating to the regulation of drinking water to protect public health, including, but not limited to, conducting research, studies, and demonstration programs relating to the provision of a dependable, safe supply of drinking water, enforcing the federal Safe Drinking Water Act, adopting implementing regulations, and conducting studies and investigations to assess the quality of water in private domestic water supplies. Under the California Safe Drinking Water Act, the implementing regulations are required to include, but are not limited to, monitoring of contaminants and requirements for notifying the public of the quality of the water delivered to customers.

This bill authorizes the state Water Resources Control Board to order a public water system to monitor for perfluoroalkyl substances and polyfluoroalkyl substances (PFAs). It requires a community water system or a non-transient noncommunity water system, upon a detection of these substances, to report that detection, as specified. The bill requires a community water system or a non-transient noncommunity water system where a detected level of these substances exceeds the response level to take a water source where the detected levels exceed the response level out of use or provide a prescribed public notification.

## **AB 2242: Urban Water Management Planning Act**

The Urban Water Management Planning Act, requires every public and private urban water supplier that directly or indirectly provides water for municipal purposes to prepare and adopt an urban water management plan and to update its plan once every 5 years on or before December 31 in years ending in 5 and zero, except as specified. Existing law requires an urban water management plan, among other things, to describe the reliability of the water supply and vulnerability to seasonal or climatic shortage, to the extent practicable, and provide data for average, single-dry, and multiple-dry water years. Existing law requires that an urban water management plan provides an urban water shortage contingency analysis that includes, among other things, an estimate of the minimum water supply available during each of the following 3 water years based on the driest 3-year historic sequence for the agency’s water supply.



This bill would require an urban water supplier to include in its urban water management plan an assessment of the reliability of its water service, as specified, to its customers during normal, dry, and multiple dry years, including a repeat of the 5 consecutive historic driest years the urban water supplier has experienced.

## **AB 2800: Climate Change—Infrastructure Planning**

This California State Assembly bill passed in 2016 and until July 1, 2020, requires state agencies to take into account the current and future impacts of climate change when planning, designing, building, operating, maintaining, and investing in state infrastructure. The bill, by July 1, 2017, and until July 1, 2020, requires an agency to establish a Climate-Safe Infrastructure Working Group to examine how to integrate scientific data concerning projected climate change impacts into state infrastructure engineering.

## **Alquist-Priolo Earthquake Fault Zoning Act**

The Alquist-Priolo Earthquake Fault Zoning Act was enacted in 1972 to mitigate the hazard of surface faulting to structures for human occupancy. The Alquist-Priolo Earthquake Fault Zoning Act's main purpose is to prevent construction of buildings used for human occupancy on the surface trace of active faults. Before a new project is permitted, cities and counties require a geologic investigation to demonstrate that proposed buildings will not be constructed on active faults. The act addresses only the hazard of surface fault rupture and is not directed toward other earthquake hazards, such as liquefaction or seismically induced landslides. The law requires the State of California Geologist to establish regulatory zones around the surface traces of active faults and to issue appropriate maps. The maps are distributed to all affected cities, counties, and state agencies for their use in planning and controlling new or renewed construction. Local agencies must regulate most development projects within the zones. Projects include all land divisions and most structures for human occupancy. All seismic hazard mitigation actions identified in this plan will seek full compliance with the Alquist-Priolo Earthquake Fault Zoning Act.

## **California Department of Forestry and Fire Protection**

CAL FIRE has responsibility for wildfires in areas that are not under the jurisdiction of the Forest Service or a local fire organization, including lands designated as State Responsibility Areas. CAL FIRE also has fire protection responsibilities by contract and mutual aid agreements. For example, CAL FIRE provides year-round fire protection under Amador Plan agreements with certain local government agencies (Public Resources Code §4144). Through these agreements, CAL FIRE provides local structural and wildfire protection or dispatch services to a community and maintains a staffing level that otherwise would be available only during the fire season. The local entity pays the additional cost of the service.

## **California Department of Parks and Recreation (State Parks)**

State Parks manages portions of the California coastline including coastal wetlands, estuaries, beaches, and dune systems. The State Parks Resources Management Division has limited wildfire protection resources available to suppress fires on State Park lands.

## **California Department of Water Resources**

In California, the DWR is the coordinating agency for floodplain management. The DWR works with FEMA and local governments by providing grants and technical assistance, evaluating community floodplain management

programs, reviewing local floodplain ordinances, participating in statewide flood hazard mitigation planning, and facilitating annual statewide workshops. Compliance is monitored by FEMA regional staff and by the DWR.

## **California Division of Safety of Dams**

California's Division of Safety of Dams (a division of the DWR) monitors the dam safety program at the state level and maintains a working list of dams in the state. When a new dam is proposed, Division engineers and geologists inspect the site and the subsurface. Upon submittal of an application, the Division reviews the plans and specifications prepared by the owner to ensure that the dam is designed to meet minimum requirements and that the design is appropriate for the known geologic conditions. After approval of the application, the Division inspects all aspects of the construction to ensure that the work is done in accordance with the approved plans and specifications. After construction, the Division inspects each dam to ensure that it is performing as intended and is not developing problems. The Division periodically reviews the stability of dams and their major appurtenances in light of improved design approaches and requirements, as well as new findings regarding earthquake hazards and hydrologic estimates in California. Over 1,200 dams are inspected by Division engineers on a yearly schedule to ensure performance and maintenance of dams (California Division of Safety of Dams, 2017).

## **California Environmental Quality Act**

The California Environmental Quality Act (CEQA) was passed in 1970, shortly after the federal government enacted the National Environmental Policy Act, to institute a statewide policy of environmental protection. CEQA requires state and local agencies in California to follow a protocol of analysis and public disclosure of the potential environmental impacts of development projects. CEQA makes environmental protection a mandatory part of every California state and local agency's decision-making process.

CEQA establishes a statewide environmental policy and mandates actions all state and local agencies must take to advance the policy. Jurisdictions conduct analysis of the project to determine if there are potentially significant environmental impacts, identify mitigation measures, and possible project alternatives by preparing environmental reports for projects that requires CEQA review. This environmental review is required before an agency takes action on any policy, program, or project. Any project action identified in this plan will seek full CEQA compliance upon implementation.

## **California Fire Alliance**

The California Fire Alliance (CFA) was established in response to directives from the 2001 National Fire Plan. The CFA pursues four strategies to deal with the National Fire Plan's community assistance initiative:

- Work with communities at risk from wildfires to develop community-based planning leadership and facilitate the development of community fire loss mitigation plans, which transcend jurisdiction and ownership boundaries.
- Assist communities in development of fire loss mitigation planning, education and projects to reduce the threat of wildfire losses on public and private lands.
- Develop an information and education outreach plan to increase awareness of wildfire protection program opportunities available to communities at risk.
- Work collaboratively to develop, modify and maintain a comprehensive list of communities at risk.

## California Fire Plan

The State Board of Forestry and CAL FIRE have prepared a comprehensive update of the California Fire Plan for wildfire protection. The planning process included defining a level of service measurement; considering assets at risk; incorporating the cooperative interdependent relationships of wildfire protection providers; providing for public stakeholder involvement; and creating a fiscal framework for policy analysis. The California Fire Plan's overall goal is to reduce costs and losses from wildfire in the state by protecting assets at risk through pre-fire management and by reducing the spread of fire through more successful initial response.

## California Fire Safe Council

In 1993, the statewide Fire Safe Council, consisting of private and public membership, was formed to educate and encourage Californians to plan and prepare for wildfires by reducing the risk of fire to property, communities, and natural/structural resources. In 2002, this group created a nonprofit organization and board of directors, called the California Fire Safe Council. The Council works with the California Fire Alliance to facilitate the distribution of National Fire Plan grants for wildfire risk reduction and education ([www.grants.firesafecouncil.org](http://www.grants.firesafecouncil.org)). The Council also provides assistance to local Fire Safe Councils through its website ([www.firesafecouncil.org](http://www.firesafecouncil.org)), the distribution of educational materials, and technical assistance, primarily through regional representatives. More than 130 local Fire Safe Councils have formed in California to plan, coordinate, and implement fire prevention activities.

## California Fire Service and Rescue Emergency Mutual Aid Plan

The Governor's Office of Emergency Services Fire and Rescue Branch administers the California Fire Service and Rescue Emergency Mutual Aid Plan. The agency provides guidance and procedures for agencies developing emergency operations plans, as well as training and technical support, primarily to overall emergency service organizations and urban search and rescue teams.

## California Multi-Hazard Mitigation Plan

Under the DMA, California must adopt a federally approved state multi-hazard mitigation plan to be eligible for certain disaster assistance and mitigation funding. The intent of the State of California Multi-Hazard Mitigation Plan is to reduce or prevent injury and damage from hazards in the state through the following:

- Documenting statewide hazard mitigation planning in California
- Describing strategies and priorities for future mitigation activities
- Facilitating the integration of local and tribal hazard mitigation planning activities into statewide efforts
- Meeting state and federal statutory and regulatory requirements.

The plan is an annex to the State Emergency Plan, and it identifies past and present mitigation activities, current policies and programs, and mitigation strategies for the future. It also establishes hazard mitigation goals and objectives. The plan will be reviewed and updated annually to reflect changing conditions and new information, especially information on local planning activities.

Under 44 CFR Section 201.6, local hazard mitigation plans must be consistent with their state's hazard mitigation plan. In updating this plan, the Steering Committee reviewed the California State Hazard Mitigation Plan to identify key relevant state plan elements (see Section 3.7).

## California Water Use Efficiency Legislation

Two long-term water-use efficiency/conservation bills signed into law in 2018 (SB 606 and AB 1668) are intended to help the state better prepare for droughts and climate change. One of the biggest components of the bills is the creation of water-use objectives for water agencies (not individual households or businesses). Local water agencies are responsible for calculating their water-use objective and determining whether their systemwide, aggregate water use meets that objective. If necessary, they will also have flexibility in how best to help customers use water more efficiently, such as conservation rebates and educational programs.

Starting in 2027, the State Water Board could issue fines to local water agencies that have not met their water-use objectives. These fines would be levied on agencies, not individuals. The bills also establish new planning and submittal requirements for Agricultural Water Management and Urban Water Management plans. Water agencies must calculate their system-wide, water-use objectives by November 2023 based on the following components:

- Water efficiency standards for indoor water use—This will be based on a provisional standard of 55 gallons of water a day per person served by the water agency.
- Outdoor water use—This standard is still being determined, but will account for local climate and irrigable acres.
- Commercial, industrial and institutional landscape irrigation
- Water loss (system leaks)
- Unique local circumstances (e.g., livestock water use)
- Credit for recycled water use

## Disadvantaged and Low-Income Communities Investments

Senate Bill (SB) 535 directs state and local agencies to make investments that benefit California's disadvantaged communities. It also directs the California Environmental Protection Agency to identify disadvantaged communities for the purposes of these investments based on geographic, socio-economic, public health, and environmental hazard criteria. Assembly Bill (AB) 1550 increased the percent of funds for projects located in disadvantaged communities from 10 to 25 percent and added a focus on investments in low-income communities and households. This program is a potential alternative source of funding for actions identified in this plan.

## Governor's Executive Order B-37-16

Governor's Executive Order B-37-16 requires water districts to conduct a "stress test;" that is, examine the projected reliability of all their water supply resources over the next three years, and assume that water demand is high, and that precipitation levels are low. Results of this analysis could support the identification of projects for this hazard mitigation plan.

## Governor's Executive Order S-13-08

Governor's Executive Order S-13-08 enhances the state's management of climate impacts from sea level rise, increased temperatures, shifting precipitation and extreme weather events. There are four key actions in the executive order:

- Initiate California's first statewide climate change adaptation strategy to assess expected climate change impacts, identify where California is most vulnerable, and recommend adaptation policies. This effort will improve coordination within state government so that better planning can more effectively address climate impacts on human health, the environment, the state's water supply and the economy.
- Request that the National Academy of Science establish an expert panel to report on sea level rise impacts in California, to inform state planning and development efforts.
- Issue interim guidance to state agencies for how to plan for sea level rise in designated coastal and floodplain areas for new projects.
- Initiate a report on critical infrastructure projects vulnerable to sea level rise.

## **Office of the State Fire Marshal**

The Office of the State Fire Marshal is a division of CAL FIRE that has a wide variety of fire safety and training responsibilities and provides technical support to fire agencies/organizations.

## **Senate Bill 97: Guidelines for Greenhouse Gas Emissions**

Senate Bill 97, enacted in 2007, amends CEQA to clearly establish that greenhouse gas emissions and the effects of greenhouse gas emissions are appropriate subjects for CEQA analysis. It directs the Governor's Office of Planning and Research to develop draft CEQA guidelines for the mitigation of greenhouse gas emissions or their effects by July 1, 2009 and directs the California Natural Resources Agency to certify and adopt the CEQA Guidelines by January 1, 2010.

## **Standardized Emergency Management System**

CCR Title 19 establishes the Standardized Emergency Management System to standardize the response to emergencies involving multiple jurisdictions. The system is intended to be flexible and adaptable to the needs of all emergency responders in California. It requires emergency response agencies to use basic principles and components of emergency management. Local governments must use the system by December 1, 1996, to be eligible for state funding of response-related personnel costs under CCR Title 19 (Sections 2920, 2925 and 2930). The roles and responsibilities of individual agencies contained in existing laws or the state emergency plan are not superseded by these regulations. This hazard mitigation plan is considered to be a support document for all phases of emergency management, including those associated with the system.

## **Western Governors Association Ten-Year Comprehensive Strategy**

The Western Governors Association Ten-Year Comprehensive Strategy: A Collaborative Approach for Reducing Wildfire Risks to Communities and the Environment (August 2001),





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**Marin Municipal Water District Hazard Mitigation Plan**

## **Appendix C. Detailed Risk Assessment Results**

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			Structural - Probability of Damage				
Type	Facility Name	Structure Replacement Cost	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Building	Administration Building - Headquarter Office	\$8,192,293	25.55%	55.65%	17.59%	0.98%	0.20%
Building	Corporation Yard - Boat Barn	\$1,000,000	19.36%	42.17%	13.33%	20.12%	5.00%
Building	Corporation Yard - Facilities Offices	\$15,000,000	25.55%	55.65%	17.59%	0.98%	0.20%
Building	Corporation Yard - Laboratory	\$5,000,000	73.83%	24.16%	0.97%	0.82%	0.20%
Building	Corporation Yard - Satellite Office	\$500,000	11.40%	29.32%	26.92%	26.15%	6.19%
Building	Pelican Yard - Vehicle Storage	\$500,000	54.21%	19.54%	1.24%	20.00%	5.00%
Building	Pelican Yard - Vehicle Storage	\$750,000	54.21%	19.54%	1.24%	20.00%	5.00%
Building	Ranger Housing - Alpine Dam - Residence	\$500,000	38.13%	42.24%	19.15%	0.46%	0.00%
Building	Ranger Housing - Lagunitas Dam	\$250,000	85.18%	14.44%	0.36%	0.00%	0.00%
Building	Ranger Housing - Lagunitas Dam	\$500,000	85.18%	14.44%	0.36%	0.00%	0.00%
Building	Ranger Housing - Phoenix Dam - Residence	\$500,000	85.18%	14.44%	0.36%	0.00%	0.00%
Building	Ranger Housing - Phoenix Dam - Shed	\$46,514	53.23%	21.45%	1.22%	19.27%	4.81%
Building	Ranger Housing - Portius House	\$500,000	94.55%	5.42%	0.01%	0.00%	0.00%
Building	Ranger Housing - Portius House - Garage	\$236,142	92.74%	3.80%	0.01%	2.74%	0.68%
Building	Ranger Housing - Portius House - Shed	\$99,111	53.23%	21.45%	1.22%	19.27%	4.81%
Building	Ranger Housing - Portius House - Shed	\$47,981	53.23%	21.45%	1.22%	19.27%	4.81%
Building	Ranger Housing - Sky Oaks - Residence	\$500,000	82.26%	13.95%	0.35%	2.74%	0.68%
Building	Ranger Housing - Soulajule Residence	\$500,000	86.51%	13.17%	0.30%	0.00%	0.00%
Building	Sky Oaks Headquarters - Entrance Kiosk	\$23,793	86.79%	12.78%	0.42%	0.00%	0.00%
Building	Sky Oaks Headquarters - Fisheries Office	\$272,737	44.21%	39.97%	15.50%	0.30%	0.00%
Building	Sky Oaks Headquarters - Headquarter Office	\$1,500,000	70.13%	28.25%	1.60%	0.00%	0.00%
Building	Sky Oaks Headquarters - Seed Shed	\$83,465	67.72%	27.28%	1.55%	2.74%	0.68%
Building	Sky Oaks Headquarters - Storage Shed	\$131,768	70.13%	28.25%	1.60%	0.00%	0.00%
Building	Sky Oaks Headquarters - Watershed Office	\$676,918	44.21%	39.97%	15.50%	0.30%	0.00%
<b>Average or Total</b>			<b>60.70%</b>	<b>25.37%</b>	<b>5.82%</b>	<b>6.51%</b>	<b>1.59%</b>

Type	Facility Name	Nonstructural Acceleration-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Building	Administration Building - Headquarter Office	37.04%	41.93%	17.67%	3.04%	0.29%
Building	Corporation Yard - Boat Barn	28.07%	31.77%	13.39%	21.66%	5.08%
Building	Corporation Yard - Facilities Offices	37.04%	41.93%	17.67%	3.04%	0.29%
Building	Corporation Yard - Laboratory	41.83%	40.45%	14.96%	2.47%	0.26%
Building	Corporation Yard - Satellite Office	33.30%	26.67%	8.47%	25.31%	6.23%
Building	Pelican Yard - Vehicle Storage	33.11%	30.12%	10.60%	21.09%	5.05%
Building	Pelican Yard - Vehicle Storage	33.11%	30.12%	10.60%	21.09%	5.05%
Building	Ranger Housing - Alpine Dam - Residence	57.62%	33.47%	8.27%	0.60%	0.02%
Building	Ranger Housing - Lagunitas Dam	58.63%	32.87%	7.90%	0.56%	0.02%
Building	Ranger Housing - Lagunitas Dam	58.63%	32.87%	7.90%	0.56%	0.02%
Building	Ranger Housing - Phoenix Dam - Residence	58.63%	32.87%	7.90%	0.56%	0.02%
Building	Ranger Housing - Phoenix Dam - Shed	39.35%	27.83%	8.00%	19.94%	4.84%
Building	Ranger Housing - Portius House	88.45%	10.60%	0.90%	0.03%	0.00%
Building	Ranger Housing - Portius House - Garage	81.61%	13.50%	1.40%	2.79%	0.68%
Building	Ranger Housing - Portius House - Shed	39.35%	27.83%	8.00%	19.94%	4.84%
Building	Ranger Housing - Portius House - Shed	39.35%	27.83%	8.00%	19.94%	4.84%
Building	Ranger Housing - Sky Oaks - Residence	56.62%	31.75%	7.63%	3.28%	0.70%
Building	Ranger Housing - Soulajule Residence	60.49%	31.73%	7.25%	0.48%	0.01%
Building	Sky Oaks Headquarters - Entrance Kiosk	55.90%	34.47%	8.91%	0.68%	0.02%
Building	Sky Oaks Headquarters - Fisheries Office	59.81%	32.15%	7.49%	0.51%	0.02%
Building	Sky Oaks Headquarters - Headquarter Office	51.84%	36.66%	10.55%	0.89%	0.03%
Building	Sky Oaks Headquarters - Seed Shed	50.07%	35.41%	10.19%	3.60%	0.71%
Building	Sky Oaks Headquarters - Storage Shed	51.84%	36.66%	10.55%	0.89%	0.03%
Building	Sky Oaks Headquarters - Watershed Office	59.81%	32.15%	7.49%	0.51%	0.02%
<b>Average or Total</b>		<b>50.48%</b>	<b>31.40%</b>	<b>9.24%</b>	<b>7.23%</b>	<b>1.63%</b>

		Nonstructural Drift-Sensitive - Probability of Damage				
Type	Facility Name	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Building	Administration Building - Headquarter Office	27.76%	39.97%	30.11%	1.86%	0.28%
Building	Corporation Yard - Boat Barn	21.03%	30.29%	22.82%	20.77%	5.07%
Building	Corporation Yard - Facilities Offices	27.76%	39.97%	30.11%	1.86%	0.28%
Building	Corporation Yard - Laboratory	71.12%	23.49%	4.29%	0.87%	0.20%
Building	Corporation Yard - Satellite Office	13.44%	26.64%	26.91%	26.70%	6.29%
Building	Pelican Yard - Vehicle Storage	52.43%	18.27%	4.24%	20.04%	5.00%
Building	Pelican Yard - Vehicle Storage	52.43%	18.27%	4.24%	20.04%	5.00%
Building	Ranger Housing - Alpine Dam - Residence	39.46%	38.30%	21.39%	0.81%	0.02%
Building	Ranger Housing - Lagunitas Dam	82.01%	15.83%	2.13%	0.01%	0.00%
Building	Ranger Housing - Lagunitas Dam	82.01%	15.83%	2.13%	0.01%	0.00%
Building	Ranger Housing - Phoenix Dam - Residence	82.01%	15.83%	2.13%	0.01%	0.00%
Building	Ranger Housing - Phoenix Dam - Shed	51.77%	19.62%	4.48%	19.30%	4.81%
Building	Ranger Housing - Portius House	82.92%	15.37%	1.69%	0.00%	0.00%
Building	Ranger Housing - Portius House - Garage	83.12%	12.25%	1.19%	2.74%	0.68%
Building	Ranger Housing - Portius House - Shed	51.77%	19.62%	4.48%	19.30%	4.81%
Building	Ranger Housing - Portius House - Shed	51.77%	19.62%	4.48%	19.30%	4.81%
Building	Ranger Housing - Sky Oaks - Residence	79.20%	15.29%	2.06%	2.75%	0.68%
Building	Ranger Housing - Soulajule Residence	83.34%	14.75%	1.88%	0.01%	0.00%
Building	Sky Oaks Headquarters - Entrance Kiosk	83.78%	14.10%	2.09%	0.01%	0.00%
Building	Sky Oaks Headquarters - Fisheries Office	44.87%	36.60%	17.92%	0.56%	0.01%
Building	Sky Oaks Headquarters - Headquarter Office	68.19%	25.84%	5.90%	0.04%	0.00%
Building	Sky Oaks Headquarters - Seed Shed	65.86%	24.96%	5.70%	2.78%	0.68%
Building	Sky Oaks Headquarters - Storage Shed	68.19%	25.84%	5.90%	0.04%	0.00%
Building	Sky Oaks Headquarters - Watershed Office	44.87%	36.60%	17.92%	0.56%	0.01%
<b>Average or Total</b>		<b>58.80%</b>	<b>23.46%</b>	<b>9.42%</b>	<b>6.68%</b>	<b>1.61%</b>

Type	Facility Name	Losses (in dollars)			
		Structure	Nonstructural Drift-Sensitive	Nonstructural Acceleration-Sensitive	Total Building Loss
Building	Administration Building - Headquarter Office	\$56,469	\$136,859	\$147,642	\$340,969
Building	Corporation Yard - Boat Barn	\$55,590	\$48,603	\$55,903	\$160,095
Building	Corporation Yard - Facilities Offices	\$103,394	\$250,587	\$270,330	\$624,311
Building	Corporation Yard - Laboratory	\$11,610	\$25,724	\$78,118	\$115,451
Building	Corporation Yard - Satellite Office	\$21,638	\$37,614	\$36,377	\$95,629
Building	Pelican Yard - Vehicle Storage	\$25,085	\$20,951	\$26,884	\$72,920
Building	Pelican Yard - Vehicle Storage	\$37,627	\$31,426	\$40,327	\$109,380
Building	Ranger Housing - Alpine Dam - Residence	\$3,527	\$8,325	\$2,220	\$14,072
Building	Ranger Housing - Lagunitas Dam	\$201	\$668	\$1,069	\$1,939
Building	Ranger Housing - Lagunitas Dam	\$402	\$1,337	\$2,139	\$3,878
Building	Ranger Housing - Phoenix Dam - Residence	\$402	\$1,337	\$2,139	\$3,878
Building	Ranger Housing - Phoenix Dam - Shed	\$2,255	\$1,887	\$2,335	\$6,477
Building	Ranger Housing - Portius House	\$137	\$1,191	\$399	\$1,726
Building	Ranger Housing - Portius House - Garage	\$1,623	\$1,526	\$1,871	\$5,020
Building	Ranger Housing - Portius House - Shed	\$4,805	\$4,020	\$4,976	\$13,801
Building	Ranger Housing - Portius House - Shed	\$2,326	\$1,946	\$2,409	\$6,681
Building	Ranger Housing - Sky Oaks - Residence	\$2,788	\$6,417	\$4,067	\$13,271
Building	Ranger Housing - Soulajule Residence	\$364	\$1,220	\$1,977	\$3,561
Building	Sky Oaks Headquarters - Entrance Kiosk	\$14	\$40	\$201	\$256
Building	Sky Oaks Headquarters - Fisheries Office	\$1,318	\$2,571	\$1,996	\$5,885
Building	Sky Oaks Headquarters - Headquarter Office	\$2,151	\$5,732	\$14,683	\$22,566
Building	Sky Oaks Headquarters - Seed Shed	\$732	\$705	\$1,210	\$2,648
Building	Sky Oaks Headquarters - Storage Shed	\$291	\$413	\$1,132	\$1,836
Building	Sky Oaks Headquarters - Watershed Office	\$3,271	\$6,381	\$4,954	\$14,606
<b>Average or Total</b>		<b>\$338,019</b>	<b>\$597,480</b>	<b>\$705,356</b>	<b>\$1,640,855</b>



		Functionality (%)					
Type	Facility Name	At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Building	Administration Building - Headquarter Office	34.10	35.90	70.90	71.00	95.90	99.20
Building	Corporation Yard - Boat Barn	25.80	27.20	53.70	53.80	72.70	94.40
Building	Corporation Yard - Facilities Offices	34.10	35.90	70.90	71.00	95.90	99.20
Building	Corporation Yard - Laboratory	66.00	67.30	92.40	92.50	98.40	99.70
Building	Corporation Yard - Satellite Office	18.60	19.60	38.20	38.30	61.20	93.20
Building	Pelican Yard - Vehicle Storage	48.40	49.30	67.90	68.00	74.50	94.90
Building	Pelican Yard - Vehicle Storage	48.40	49.30	67.90	68.00	74.50	94.90
Building	Ranger Housing - Alpine Dam - Residence	42.40	43.70	69.70	69.80	94.10	99.80
Building	Ranger Housing - Lagunitas Dam	75.00	76.00	95.70	95.70	99.80	99.90
Building	Ranger Housing - Lagunitas Dam	75.00	76.00	95.70	95.70	99.80	99.90
Building	Ranger Housing - Phoenix Dam - Residence	75.00	76.00	95.70	95.70	99.80	99.90
Building	Ranger Housing - Phoenix Dam - Shed	47.60	48.60	69.00	69.10	75.60	95.10
Building	Ranger Housing - Portius House	88.70	89.20	99.50	99.50	99.90	99.90
Building	Ranger Housing - Portius House - Garage	86.70	87.10	95.90	96.00	96.50	99.20
Building	Ranger Housing - Portius House - Shed	47.60	48.60	69.00	69.10	75.60	95.10
Building	Ranger Housing - Portius House - Shed	47.60	48.60	69.00	69.10	75.60	95.10
Building	Ranger Housing - Sky Oaks - Residence	72.50	73.40	92.40	92.40	96.30	99.20
Building	Ranger Housing - Soulajule Residence	76.20	77.20	96.00	96.10	99.80	99.90
Building	Sky Oaks Headquarters - Entrance Kiosk	76.00	76.90	94.80	94.90	99.70	99.90
Building	Sky Oaks Headquarters - Fisheries Office	46.30	47.60	72.80	72.80	95.10	99.80
Building	Sky Oaks Headquarters - Headquarter Office	62.70	64.00	91.00	91.10	99.60	99.90
Building	Sky Oaks Headquarters - Seed Shed	60.50	61.80	87.80	87.90	96.10	99.20
Building	Sky Oaks Headquarters - Storage Shed	62.70	64.00	91.00	91.10	99.60	99.90
Building	Sky Oaks Headquarters - Watershed Office	46.30	47.60	72.80	72.80	95.10	99.80
<b>Average or Total</b>		<b>56.84</b>	<b>57.95</b>	<b>79.99</b>	<b>80.06</b>	<b>90.46</b>	<b>98.21</b>

Type	Facility Name	Structure Replacement Cost	Structural - Probability of Damage				
			No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Building	Alpine Dam Facility - Alum House	\$326,237	55.10%	40.68%	4.19%	0.01%	0.00%
Facility - Pump Station	Alpine Lake Facility - Aerator House		51.03%	17.36%	21.30%	9.96%	0.33%
Facility - Pump Station	Alpine Lake Facility - Pump House	\$1,000,000	62.72%	28.38%	8.51%	0.31%	0.06%
Facility - Pump Station	Kent Pump Facility - Power Supply	\$750,000	60.47%	15.20%	18.05%	6.07%	0.18%
Facility - Pump Station	Kent Pump Facility - Pump Station	\$2,000,000	60.47%	15.20%	18.05%	6.07%	0.18%
<b>AVERAGE</b>			<b>57.96%</b>	<b>23.36%</b>	<b>14.02%</b>	<b>4.48%</b>	<b>0.15%</b>

		Nonstructural Acceleration-Sensitive - Probability of Damage				
Type	Facility Name	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Building	Alpine Dam Facility - Alum House	47.94%	38.56%	12.29%	1.16%	0.04%
Facility - Pump Station	Alpine Lake Facility - Aerator House					
Facility - Pump Station	Alpine Lake Facility - Pump House					
Facility - Pump Station	Kent Pump Facility - Power Supply					
Facility - Pump Station	Kent Pump Facility - Pump Station					
AVERAGE		47.94%	38.56%	12.29%	1.16%	0.04%

		Nonstructural Drift-Sensitive - Probability of Damage				
Type	Facility Name	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Building	Alpine Dam Facility - Alum House	54.57%	33.76%	11.51%	0.12%	0.01%
Facility - Pump Station	Alpine Lake Facility - Aerator House					
Facility - Pump Station	Alpine Lake Facility - Pump House					
Facility - Pump Station	Kent Pump Facility - Power Supply					
Facility - Pump Station	Kent Pump Facility - Pump Station					
<b>AVERAGE</b>		<b>54.57%</b>	<b>33.76%</b>	<b>11.51%</b>	<b>0.12%</b>	<b>0.01%</b>

Type	Facility Name	Losses (in dollars)			
		Structure	Nonstructural Drift-Sensitive	Nonstructural Acceleration- Sensitive	Total Building Loss
Building	Alpine Dam Facility - Alum House	\$794	\$2,085	\$3,664	\$6,543
Facility - Pump Station	Alpine Lake Facility - Aerator House				
Facility - Pump Station	Alpine Lake Facility - Pump House	\$29,415			\$29,415
Facility - Pump Station	Kent Pump Facility - Power Supply	\$54,671			\$54,671
Facility - Pump Station	Kent Pump Facility - Pump Station	\$145,790			\$145,790
<b>AVERAGE</b>		<b>\$230,670</b>	<b>\$2,085</b>	<b>\$3,664</b>	<b>\$236,419</b>

Type	Facility Name	Functionality (%)					
		At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Building	Alpine Dam Facility - Alum House	53.10	54.70	86.00	86.10	99.10	99.80
Facility - Pump Station	Alpine Lake Facility - Aerator House	67.60	80.20	90.60	94.90	99.20	99.90
Facility - Pump Station	Alpine Lake Facility - Pump House	82.50	95.20	99.00	99.70	99.90	99.90
Facility - Pump Station	Kent Pump Facility - Power Supply	74.60	85.30	93.90	96.80	99.50	99.90
Facility - Pump Station	Kent Pump Facility - Pump Station	74.60	85.30	93.90	96.80	99.50	99.90
<b>AVERAGE</b>		<b>70.48</b>	<b>80.14</b>	<b>92.68</b>	<b>94.86</b>	<b>99.44</b>	<b>99.88</b>

Type	Facility Name	Structure Replacement Cost	Structural - Probability of Damage				
			No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Clarifier		38.73%	13.17%	16.17%	26.76%	5.14%
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Filter Plant	\$100,000,000	38.73%	13.17%	16.17%	26.76%	5.14%
Tank	Bon Tempe Treatment Plant - Wash Water Sup	\$1,500,000	49.28%	16.76%	20.57%	12.35%	1.02%
Facility - Water Treatment Plant	Ignacio Pump Station - Chemical Rooms		67.24%	11.25%	7.87%	11.16%	2.46%
Facility - Water Treatment Plant	Ignacio Pump Station - Control Room		53.42%	25.81%	8.19%	10.05%	2.51%
Facility - Water Treatment Plant	Ignacio Pump Station - Fluoride Storage Facility		53.42%	25.81%	8.19%	10.05%	2.51%
Facility - Water Treatment Plant	Ignacio Pump Station - Fuel Storage		73.81%	11.72%	2.21%	9.80%	2.43%
Facility - Water Treatment Plant	Ignacio Pump Station - Pumps	\$50,000,000	53.42%	25.81%	8.19%	10.05%	2.51%
Building	Phoenix Lake Facility - Boat Barn	\$383,300	53.23%	21.45%	1.22%	19.27%	4.81%
Pump Station	PS-001 - Federal Works Booster Pump Station	\$1,000,000	78.19%	14.26%	4.42%	2.49%	0.61%
Pump Station	PS-002 - Chapman Park Pump Station	\$1,000,000	39.36%	18.38%	26.19%	15.12%	0.91%
Pump Station	PS-003 - Summit Drive Pump Station PS-003	\$1,000,000	51.75%	17.25%	20.97%	9.69%	0.31%
Pump Station	PS-005 - H-Line Booster Station	\$1,000,000	43.11%	16.57%	21.48%	16.82%	1.99%
Pump Station	PS-006 - Madera Park Pump Station	\$1,000,000	29.57%	13.81%	19.68%	31.08%	5.84%
Pump Station	PS-007 - Mariner Highlands Pump Station	\$1,000,000	34.14%	15.94%	22.72%	23.63%	3.54%
Pump Station	PS-010 - Cascade Pump Station	\$1,000,000	9.17%	9.94%	23.78%	43.97%	13.12%
Pump Station	PS-011 - Fairfax Manor 1st Pump Station	\$1,000,000	9.17%	9.94%	23.78%	43.97%	13.12%
Pump Station	PS-012 - Fairfax Manor 2nd Lift Pump Station	\$1,000,000	9.17%	9.94%	23.78%	43.97%	13.12%
Pump Station	PS-013 - Oak Manor 1st Lift Pump Station	\$1,000,000	9.17%	9.94%	23.78%	43.97%	13.12%
Pump Station	PS-014 - Oak Manor 2nd Lift Pump Station	\$1,000,000	9.17%	9.94%	23.78%	43.97%	13.12%
Pump Station	PS-016 - Scott Pump Station	\$1,000,000	9.17%	9.94%	23.78%	43.97%	13.12%
Pump Station	PS-017 - Smith Saddle Booster Station	\$1,000,000	9.17%	9.94%	23.78%	43.97%	13.12%
Pump Station	PS-019 - Bret Harte Pump Station	\$1,000,000	22.64%	13.54%	22.03%	34.95%	6.83%
Pump Station	PS-020 - Greenbrae Pump Station	\$1,000,000	35.18%	13.52%	17.53%	28.37%	5.37%
Pump Station	PS-022 - Ignacio Boosters	\$1,000,000	54.42%	17.16%	13.51%	12.14%	2.74%
Pump Station	PS-023 - Kent Fire Trail 1st Pump Station	\$1,000,000	43.11%	16.57%	21.48%	16.82%	1.99%
Pump Station	PS-025 - Kent Woodlands 2nd Pump Station	\$1,000,000	46.64%	17.93%	23.24%	11.69%	0.48%
Pump Station	PS-026 - Lagunitas Booster Station	\$1,000,000	42.36%	13.37%	15.90%	23.89%	4.46%
Pump Station	PS-029 - Phoenix Lake Barge Pump	\$1,000,000	79.98%	15.10%	4.73%	0.14%	0.03%
Pump Station	PS-030 - Phoenix Transfer Pump Station	\$1,000,000	63.41%	19.06%	14.64%	2.57%	0.29%
Pump Station	PS-031 - Soulajule Pump Station	\$1,000,000	57.97%	16.67%	12.52%	10.47%	2.34%
Pump Station	PS-032 - Elinor Avenue Pump Station	\$1,000,000	50.26%	16.75%	20.37%	11.71%	0.89%
Pump Station	PS-033 - Fern Canyon Pump Station	\$1,000,000	39.34%	13.11%	15.94%	26.49%	5.10%
Pump Station	PS-034 - Lapachet Pump Station	\$1,000,000	50.26%	16.75%	20.37%	11.71%	0.89%
Pump Station	PS-035 - Mine Ridge Pump Station	\$1,000,000	51.75%	17.25%	20.97%	9.69%	0.31%
Pump Station	PS-036 - Scott Highlands Pump (OUT OF SERVICE)	\$1,000,000	39.34%	13.11%	15.94%	26.49%	5.10%
Pump Station	PS-040 - Summit Avenue Upper Pump Station	\$1,000,000	50.26%	16.75%	20.37%	11.71%	0.89%
Pump Station	PS-042 - Del Mesa Pump Station	\$1,000,000	46.64%	17.93%	23.24%	11.69%	0.48%
Pump Station	PS-043 - Fawn Drive Pump Station	\$1,000,000	44.31%	16.69%	21.43%	15.81%	1.74%
Pump Station	PS-044 - Mann Pump Station	\$1,000,000	9.80%	10.63%	25.42%	41.95%	12.17%
Pump Station	PS-046 - Scenic Avenue Pump Station	\$1,000,000	42.04%	23.07%	24.84%	8.52%	1.52%
Pump Station	PS-047 - Sequoia Park Pump Station	\$1,000,000	44.31%	16.69%	21.43%	15.81%	1.74%
Pump Station	PS-050 - Chula Vista Pump Station	\$1,000,000	44.31%	16.69%	21.43%	15.81%	1.74%
Pump Station	PS-052 - Elda Drive Pump Station	\$1,000,000	35.78%	13.47%	17.31%	28.09%	5.32%
Pump Station	PS-053 - Fairhills 1st Lift Pump Station	\$1,000,000	44.31%	16.69%	21.43%	15.81%	1.74%
Pump Station	PS-054 - Fairhills 2nd Lift Pump Station	\$1,000,000	44.31%	16.69%	21.43%	15.81%	1.74%
Pump Station	PS-055 - Grove Hill Pump Station	\$1,000,000	47.38%	17.84%	22.92%	11.38%	0.45%
Pump Station	PS-056 - Rafael Highlands Pump Station	\$1,000,000	61.88%	19.57%	15.42%	2.79%	0.32%
Pump Station	PS-057 - Hind Pump Station	\$1,000,000	51.51%	16.63%	19.95%	11.09%	0.80%
Pump Station	PS-058 - Knight Drive Pump Station	\$1,000,000	40.22%	12.98%	15.58%	26.14%	5.05%
Pump Station	PS-060 - Lockwood Drive Pump Station	\$1,000,000	40.22%	12.98%	15.58%	26.14%	5.05%
Pump Station	PS-061 - Lucas Valley Pump Station	\$1,000,000	57.87%	18.30%	14.42%	7.78%	1.61%
Pump Station	PS-062 - Manderly Pump Station	\$1,000,000	40.22%	12.98%	15.58%	26.14%	5.05%
Pump Station	PS-064 - Marinwood Pump Station (NOT IN USE)	\$1,000,000	46.80%	14.76%	11.62%	21.61%	5.19%
Pump Station	PS-065 - McNear Drive Pump Station	\$1,000,000	40.22%	12.98%	15.58%	26.14%	5.05%
Pump Station	PS-066 - Mesa Vista Pump Station	\$1,000,000	35.18%	13.52%	17.53%	28.37%	5.37%
Pump Station	PS-069 - San Quentin Pump Station	\$1,000,000	39.81%	16.50%	15.03%	23.11%	5.53%
Pump Station	PS-070 - Santa Margarita Pump Station	\$1,000,000	46.73%	14.78%	11.65%	21.62%	5.20%
Pump Station	PS-071 - Sky View Terrace Pump Station	\$1,000,000	35.78%	13.47%	17.31%	28.09%	5.32%
Pump Station	PS-073 - Swig Pump Station	\$1,000,000	54.62%	11.78%	12.08%	18.01%	3.49%
Pump Station	PS-074 - Via Montebello Pump Station	\$1,000,000	44.36%	18.12%	24.18%	12.72%	0.60%



Type	Facility Name	Nonstructural Acceleration-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Clarifier					
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Filter Plant					
Tank	Bon Tempe Treatment Plant - Wash Water Sup					
Facility - Water Treatment Plant	Ignacio Pump Station - Chemical Rooms					
Facility - Water Treatment Plant	Ignacio Pump Station - Control Room					
Facility - Water Treatment Plant	Ignacio Pump Station - Fluoride Storage Facility					
Facility - Water Treatment Plant	Ignacio Pump Station - Fuel Storage					
Facility - Water Treatment Plant	Ignacio Pump Station - Pumps					
Building	Phoenix Lake Facility - Boat Barn	39.35%	27.83%	8.00%	19.94%	4.84%
Pump Station	PS-001 - Federal Works Booster Pump Station					
Pump Station	PS-002 - Chapman Park Pump Station					
Pump Station	PS-003 - Summit Drive Pump Station PS-003					
Pump Station	PS-005 - H-Line Booster Station					
Pump Station	PS-006 - Madera Park Pump Station					
Pump Station	PS-007 - Mariner Highlands Pump Station					
Pump Station	PS-010 - Cascade Pump Station					
Pump Station	PS-011 - Fairfax Manor 1st Pump Station					
Pump Station	PS-012 - Fairfax Manor 2nd Lift Pump Station					
Pump Station	PS-013 - Oak Manor 1st Lift Pump Station					
Pump Station	PS-014 - Oak Manor 2nd Lift Pump Station					
Pump Station	PS-016 - Scott Pump Station					
Pump Station	PS-017 - Smith Saddle Booster Station					
Pump Station	PS-019 - Bret Harte Pump Station					
Pump Station	PS-020 - Greenbrae Pump Station					
Pump Station	PS-022 - Ignacio Boosters					
Pump Station	PS-023 - Kent Fire Trail 1st Pump Station					
Pump Station	PS-025 - Kent Woodlands 2nd Pump Station					
Pump Station	PS-026 - Lagunitas Booster Station					
Pump Station	PS-029 - Phoenix Lake Barge Pump					
Pump Station	PS-030 - Phoenix Transfer Pump Station					
Pump Station	PS-031 - Soulajule Pump Station					
Pump Station	PS-032 - Elinor Avenue Pump Station					
Pump Station	PS-033 - Fern Canyon Pump Station					
Pump Station	PS-034 - Lapachet Pump Station					
Pump Station	PS-035 - Mine Ridge Pump Station					
Pump Station	PS-036 - Scott Highlands Pump (OUT OF SERVICE)					
Pump Station	PS-040 - Summit Avenue Upper Pump Station					
Pump Station	PS-042 - Del Mesa Pump Station					
Pump Station	PS-043 - Fawn Drive Pump Station					
Pump Station	PS-044 - Mann Pump Station					
Pump Station	PS-046 - Scenic Avenue Pump Station					
Pump Station	PS-047 - Sequoia Park Pump Station					
Pump Station	PS-050 - Chula Vista Pump Station					
Pump Station	PS-052 - Elda Drive Pump Station					
Pump Station	PS-053 - Fairhills 1st Lift Pump Station					
Pump Station	PS-054 - Fairhills 2nd Lift Pump Station					
Pump Station	PS-055 - Grove Hill Pump Station					
Pump Station	PS-056 - Rafael Highlands Pump Station					
Pump Station	PS-057 - Hind Pump Station					
Pump Station	PS-058 - Knight Drive Pump Station					
Pump Station	PS-060 - Lockwood Drive Pump Station					
Pump Station	PS-061 - Lucas Valley Pump Station					
Pump Station	PS-062 - Manderly Pump Station					
Pump Station	PS-064 - Marinwood Pump Station (NOT IN USE)					
Pump Station	PS-065 - McNear Drive Pump Station					
Pump Station	PS-066 - Mesa Vista Pump Station					
Pump Station	PS-069 - San Quentin Pump Station					
Pump Station	PS-070 - Santa Margarita Pump Station					
Pump Station	PS-071 - Sky View Terrace Pump Station					
Pump Station	PS-073 - Swig Pump Station					
Pump Station	PS-074 - Via Montebello Pump Station					

Type	Facility Name	Nonstructural Drift-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Clarifier					
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Filter Plant					
Tank	Bon Tempe Treatment Plant - Wash Water Sup					
Facility - Water Treatment Plant	Ignacio Pump Station - Chemical Rooms					
Facility - Water Treatment Plant	Ignacio Pump Station - Control Room					
Facility - Water Treatment Plant	Ignacio Pump Station - Fluoride Storage Facility					
Facility - Water Treatment Plant	Ignacio Pump Station - Fuel Storage					
Facility - Water Treatment Plant	Ignacio Pump Station - Pumps					
Building	Phoenix Lake Facility - Boat Barn	51.77%	19.62%	4.48%	19.30%	4.81%
Pump Station	PS-001 - Federal Works Booster Pump Station					
Pump Station	PS-002 - Chapman Park Pump Station					
Pump Station	PS-003 - Summit Drive Pump Station PS-003					
Pump Station	PS-005 - H-Line Booster Station					
Pump Station	PS-006 - Madera Park Pump Station					
Pump Station	PS-007 - Mariner Highlands Pump Station					
Pump Station	PS-010 - Cascade Pump Station					
Pump Station	PS-011 - Fairfax Manor 1st Pump Station					
Pump Station	PS-012 - Fairfax Manor 2nd Lift Pump Station					
Pump Station	PS-013 - Oak Manor 1st Lift Pump Station					
Pump Station	PS-014 - Oak Manor 2nd Lift Pump Station					
Pump Station	PS-016 - Scott Pump Station					
Pump Station	PS-017 - Smith Saddle Booster Station					
Pump Station	PS-019 - Bret Harte Pump Station					
Pump Station	PS-020 - Greenbrae Pump Station					
Pump Station	PS-022 - Ignacio Boosters					
Pump Station	PS-023 - Kent Fire Trail 1st Pump Station					
Pump Station	PS-025 - Kent Woodlands 2nd Pump Station					
Pump Station	PS-026 - Lagunitas Booster Station					
Pump Station	PS-029 - Phoenix Lake Barge Pump					
Pump Station	PS-030 - Phoenix Transfer Pump Station					
Pump Station	PS-031 - SoulaJule Pump Station					
Pump Station	PS-032 - Elinor Avenue Pump Station					
Pump Station	PS-033 - Fern Canyon Pump Station					
Pump Station	PS-034 - Lapachet Pump Station					
Pump Station	PS-035 - Mine Ridge Pump Station					
Pump Station	PS-036 - Scott Highlands Pump (OUT OF SERVICE)					
Pump Station	PS-040 - Summit Avenue Upper Pump Station					
Pump Station	PS-042 - Del Mesa Pump Station					
Pump Station	PS-043 - Fawn Drive Pump Station					
Pump Station	PS-044 - Mann Pump Station					
Pump Station	PS-046 - Scenic Avenue Pump Station					
Pump Station	PS-047 - Sequoia Park Pump Station					
Pump Station	PS-050 - Chula Vista Pump Station					
Pump Station	PS-052 - Elda Drive Pump Station					
Pump Station	PS-053 - Fairhills 1st Lift Pump Station					
Pump Station	PS-054 - Fairhills 2nd Lift Pump Station					
Pump Station	PS-055 - Grove Hill Pump Station					
Pump Station	PS-056 - Rafael Highlands Pump Station					
Pump Station	PS-057 - Hind Pump Station					
Pump Station	PS-058 - Knight Drive Pump Station					
Pump Station	PS-060 - Lockwood Drive Pump Station					
Pump Station	PS-061 - Lucas Valley Pump Station					
Pump Station	PS-062 - Manderly Pump Station					
Pump Station	PS-064 - Marinwood Pump Station (NOT IN USE)					
Pump Station	PS-065 - McNear Drive Pump Station					
Pump Station	PS-066 - Mesa Vista Pump Station					
Pump Station	PS-069 - San Quentin Pump Station					
Pump Station	PS-070 - Santa Margarita Pump Station					
Pump Station	PS-071 - Sky View Terrace Pump Station					
Pump Station	PS-073 - Swig Pump Station					
Pump Station	PS-074 - Via Montebello Pump Station					

Type	Facility Name	Losses (in dollars)			
		Structure	Nonstructural Drift Sensitive	Nonstructural Acceleration-Sensitive	Total Building Loss
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Clarifier				
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Filter Plant	\$24,280,000			\$24,280,000
Tank	Bon Tempe Treatment Plant - Wash Water Sup	\$185,303			\$185,303
Facility - Water Treatment Plant	Ignacio Pump Station - Chemical Rooms				
Facility - Water Treatment Plant	Ignacio Pump Station - Control Room				
Facility - Water Treatment Plant	Ignacio Pump Station - Fluoride Storage Facility				
Facility - Water Treatment Plant	Ignacio Pump Station - Fuel Storage				
Facility - Water Treatment Plant	Ignacio Pump Station - Pumps	\$5,529,501			\$5,529,501
Building	Phoenix Lake Facility - Boat Barn	\$18,582	\$15,548	\$19,243	\$53,374
Pump Station	PS-001 - Federal Works Booster Pump Station	\$34,800			\$34,800
Pump Station	PS-002 - Chapman Park Pump Station	\$148,295			\$148,295
Pump Station	PS-003 - Summit Drive Pump Station PS-003	\$101,320			\$101,320
Pump Station	PS-005 - H-Line Booster Station	\$161,325			\$161,325
Pump Station	PS-006 - Madera Park Pump Station	\$281,305			\$281,305
Pump Station	PS-007 - Mariner Highlands Pump Station	\$219,230			\$219,230
Pump Station	PS-010 - Cascade Pump Station	\$435,660			\$435,660
Pump Station	PS-011 - Fairfax Manor 1st Pump Station	\$435,660			\$435,660
Pump Station	PS-012 - Fairfax Manor 2nd Lift Pump Station	\$435,660			\$435,660
Pump Station	PS-013 - Oak Manor 1st Lift Pump Station	\$435,660			\$435,660
Pump Station	PS-014 - Oak Manor 2nd Lift Pump Station	\$435,660			\$435,660
Pump Station	PS-016 - Scott Pump Station	\$435,660			\$435,660
Pump Station	PS-017 - Smith Saddle Booster Station	\$435,660			\$435,660
Pump Station	PS-019 - Bret Harte Pump Station	\$317,815			\$317,815
Pump Station	PS-020 - Greenbrae Pump Station	\$256,975			\$256,975
Pump Station	PS-022 - Ignacio Boosters	\$129,085			\$129,085
Pump Station	PS-023 - Kent Fire Trail 1st Pump Station	\$161,325			\$161,325
Pump Station	PS-025 - Kent Woodlands 2nd Pump Station	\$118,765			\$118,765
Pump Station	PS-026 - Lagunitas Booster Station	\$218,475			\$218,475
Pump Station	PS-029 - Phoenix Lake Barge Pump	\$15,785			\$15,785
Pump Station	PS-030 - Phoenix Transfer Pump Station	\$49,810			\$49,810
Pump Station	PS-031 - Soulajule Pump Station	\$113,335			\$113,335
Pump Station	PS-032 - Elinor Avenue Pump Station	\$118,090			\$118,090
Pump Station	PS-033 - Fern Canyon Pump Station	\$240,405			\$240,405
Pump Station	PS-034 - Lapachet Pump Station	\$118,090			\$118,090
Pump Station	PS-035 - Mine Ridge Pump Station	\$101,320			\$101,320
Pump Station	PS-036 - Scott Highlands Pump (OUT OF SERVICE)	\$240,405			\$240,405
Pump Station	PS-040 - Summit Avenue Upper Pump Station	\$118,090			\$118,090
Pump Station	PS-042 - Del Mesa Pump Station	\$118,765			\$118,765
Pump Station	PS-043 - Fawn Drive Pump Station	\$152,750			\$152,750
Pump Station	PS-044 - Mann Pump Station	\$416,845			\$416,845
Pump Station	PS-046 - Scenic Avenue Pump Station	\$115,115			\$115,115
Pump Station	PS-047 - Sequoia Park Pump Station	\$152,750			\$152,750
Pump Station	PS-050 - Chula Vista Pump Station	\$152,750			\$152,750
Pump Station	PS-052 - Elda Drive Pump Station	\$254,440			\$254,440
Pump Station	PS-053 - Fairhills 1st Lift Pump Station	\$152,750			\$152,750
Pump Station	PS-054 - Fairhills 2nd Lift Pump Station	\$152,750			\$152,750
Pump Station	PS-055 - Grove Hill Pump Station	\$116,080			\$116,080
Pump Station	PS-056 - Rafael Highlands Pump Station	\$52,855			\$52,855
Pump Station	PS-057 - Hind Pump Station	\$112,780			\$112,780
Pump Station	PS-058 - Knight Drive Pump Station	\$237,200			\$237,200
Pump Station	PS-060 - Lockwood Drive Pump Station	\$237,200			\$237,200
Pump Station	PS-061 - Lucas Valley Pump Station	\$93,560			\$93,560
Pump Station	PS-062 - Manderly Pump Station	\$237,200			\$237,200
Pump Station	PS-064 - Marinwood Pump Station (NOT IN USE)	\$206,370			\$206,370
Pump Station	PS-065 - McNear Drive Pump Station	\$237,200			\$237,200
Pump Station	PS-066 - Mesa Vista Pump Station	\$256,975			\$256,975
Pump Station	PS-069 - San Quentin Pump Station	\$224,755			\$224,755
Pump Station	PS-070 - Santa Margarita Pump Station	\$206,585			\$206,585
Pump Station	PS-071 - Sky View Terrace Pump Station	\$254,440			\$254,440
Pump Station	PS-073 - Swig Pump Station	\$166,970			\$166,970
Pump Station	PS-074 - Via Montebello Pump Station	\$127,650			\$127,650

Type	Facility Name	Functionality (%)					
		At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Clarifier	55.30	70.20	74.10	76.10	81.50	96.40
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Filter Plant	55.30	70.20	74.10	76.10	81.50	96.40
Tank	Bon Tempe Treatment Plant - Wash Water Sup	60.70	77.90	87.10	88.90	89.50	92.90
Facility - Water Treatment Plant	Ignacio Pump Station - Chemical Rooms	78.00	87.00	88.90	89.70	92.00	98.30
Facility - Water Treatment Plant	Ignacio Pump Station - Control Room	73.30	87.90	89.70	90.50	92.50	98.30
Facility - Water Treatment Plant	Ignacio Pump Station - Fluoride Storage Facility	73.30	87.90	89.70	90.50	92.50	98.30
Facility - Water Treatment Plant	Ignacio Pump Station - Fuel Storage	83.40	89.20	90.00	90.70	92.70	98.30
Facility - Water Treatment Plant	Ignacio Pump Station - Pumps	73.30	87.90	89.70	90.50	92.50	98.30
Building	Phoenix Lake Facility - Boat Barn	47.60	48.60	69.00	69.10	75.60	95.10
Pump Station	PS-001 - Federal Works Booster Pump Station	88.40	94.90	97.20	98.20	99.40	99.90
Pump Station	PS-002 - Chapman Park Pump Station	58.20	72.70	85.90	91.90	98.60	99.90
Pump Station	PS-003 - Summit Drive Pump Station PS-003	68.20	80.60	90.90	95.00	99.30	99.90
Pump Station	PS-005 - H-Line Booster Station	60.00	72.60	84.00	90.10	97.90	99.90
Pump Station	PS-006 - Madera Park Pump Station	46.00	57.70	69.90	79.90	94.80	99.90
Pump Station	PS-007 - Mariner Highlands Pump Station	51.70	64.70	77.40	85.50	96.60	99.90
Pump Station	PS-010 - Cascade Pump Station	25.60	37.60	53.20	67.30	89.80	99.90
Pump Station	PS-011 - Fairfax Manor 1st Pump Station	25.60	37.60	53.20	67.30	89.80	99.90
Pump Station	PS-012 - Fairfax Manor 2nd Lift Pump Station	25.60	37.60	53.20	67.30	89.80	99.90
Pump Station	PS-013 - Oak Manor 1st Lift Pump Station	25.60	37.60	53.20	67.30	89.80	99.90
Pump Station	PS-014 - Oak Manor 2nd Lift Pump Station	25.60	37.60	53.20	67.30	89.80	99.90
Pump Station	PS-016 - Scott Pump Station	25.60	37.60	53.20	67.30	89.80	99.90
Pump Station	PS-017 - Smith Saddle Booster Station	25.60	37.60	53.20	67.30	89.80	99.90
Pump Station	PS-019 - Bret Harte Pump Station	39.80	52.20	65.90	77.20	94.00	99.90
Pump Station	PS-020 - Greenbrae Pump Station	50.60	61.50	72.50	81.60	95.20	99.90
Pump Station	PS-022 - Ignacio Boosters	69.50	80.00	87.30	91.70	97.60	99.90
Pump Station	PS-023 - Kent Fire Trail 1st Pump Station	60.00	72.60	84.00	90.10	97.90	99.90
Pump Station	PS-025 - Kent Woodlands 2nd Pump Station	64.20	77.50	89.10	93.90	99.10	99.90
Pump Station	PS-026 - Lagunitas Booster Station	56.90	67.10	76.80	84.50	96.00	99.90
Pump Station	PS-029 - Phoenix Lake Barge Pump	90.50	97.30	99.40	99.80	99.90	99.90
Pump Station	PS-030 - Phoenix Transfer Pump Station	78.90	89.90	96.70	98.40	99.60	99.90
Pump Station	PS-031 - Soulajule Pump Station	72.30	82.30	89.00	92.80	98.00	99.90
Pump Station	PS-032 - Elinor Avenue Pump Station	66.50	78.60	88.90	93.50	98.80	99.90
Pump Station	PS-033 - Fern Canyon Pump Station	54.00	64.20	74.30	82.70	95.50	99.90
Pump Station	PS-034 - Lapachet Pump Station	66.50	78.60	88.90	93.50	98.80	99.90
Pump Station	PS-035 - Mine Ridge Pump Station	68.20	80.60	90.90	95.00	99.30	99.90
Pump Station	PS-036 - Scott Highlands Pump (OUT OF SERVICE)	54.00	64.20	74.30	82.70	95.50	99.90
Pump Station	PS-040 - Summit Avenue Upper Pump Station	66.50	78.60	88.90	93.50	98.80	99.90
Pump Station	PS-042 - Del Mesa Pump Station	64.20	77.50	89.10	93.90	99.10	99.90
Pump Station	PS-043 - Fawn Drive Pump Station	61.20	73.70	85.00	90.80	98.10	99.90
Pump Station	PS-044 - Mann Pump Station	26.80	39.30	55.50	69.10	90.40	99.90
Pump Station	PS-046 - Scenic Avenue Pump Station	62.90	78.40	90.30	94.50	98.60	99.90
Pump Station	PS-047 - Sequoia Park Pump Station	61.20	73.70	85.00	90.80	98.10	99.90
Pump Station	PS-050 - Chula Vista Pump Station	61.20	73.70	85.00	90.80	98.10	99.90
Pump Station	PS-052 - Elda Drive Pump Station	51.10	61.90	72.80	81.80	95.30	99.90
Pump Station	PS-053 - Fairhills 1st Lift Pump Station	61.20	73.70	85.00	90.80	98.10	99.90
Pump Station	PS-054 - Fairhills 2nd Lift Pump Station	61.20	73.70	85.00	90.80	98.10	99.90
Pump Station	PS-055 - Grove Hill Pump Station	64.80	78.00	89.30	94.10	99.10	99.90
Pump Station	PS-056 - Rafael Highlands Pump Station	77.80	89.30	96.40	98.30	99.60	99.90
Pump Station	PS-057 - Hind Pump Station	67.50	79.40	89.50	93.90	98.90	99.90
Pump Station	PS-058 - Knight Drive Pump Station	54.70	64.70	74.60	82.90	95.50	99.90
Pump Station	PS-060 - Lockwood Drive Pump Station	54.70	64.70	74.60	82.90	95.50	99.90
Pump Station	PS-061 - Lucas Valley Pump Station	73.40	84.30	91.60	94.80	98.60	99.90
Pump Station	PS-062 - Manderly Pump Station	54.70	64.70	74.60	82.90	95.50	99.90
Pump Station	PS-064 - Marinwood Pump Station (NOT IN USE)	61.00	70.50	78.20	85.00	95.70	99.90
Pump Station	PS-065 - McNear Drive Pump Station	54.70	64.70	74.60	82.90	95.50	99.90
Pump Station	PS-066 - Mesa Vista Pump Station	50.60	61.50	72.50	81.60	95.20	99.90
Pump Station	PS-069 - San Quentin Pump Station	56.10	67.20	76.50	84.00	95.40	99.90
Pump Station	PS-070 - Santa Margarita Pump Station	61.00	70.50	78.10	85.00	95.70	99.90
Pump Station	PS-071 - Sky View Terrace Pump Station	51.10	61.90	72.80	81.80	95.30	99.90
Pump Station	PS-073 - Swig Pump Station	66.60	75.00	82.40	88.20	96.90	99.90
Pump Station	PS-074 - Via Montebello Pump Station	62.40	76.10	88.10	93.30	98.90	99.90

Type	Facility Name	Structure Replacement Cost	Structural - Probability of Damage				
			No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Pump Station	PS-077 - Beacon Hill Pump Station	\$1,000,000	34.48%	18.33%	27.96%	17.83%	1.37%
Pump Station	PS-078 - Crescent Avenue Pump Station	\$1,000,000	34.48%	18.33%	27.96%	17.83%	1.37%
Pump Station	PS-079 - Marin City Pump Station	\$1,000,000	29.57%	13.81%	19.68%	31.08%	5.84%
Pump Station	PS-080 - Monte Mar Vista Pump Station	\$1,000,000	25.87%	13.76%	20.98%	33.07%	6.30%
Pump Station	PS-081 - Sausalito Pumphouse Pump Station	\$1,000,000	52.54%	15.87%	5.83%	20.57%	5.17%
Pump Station	PS-082 - Sausalito Boulevard Pump Station	\$1,000,000	34.33%	18.25%	27.84%	18.09%	1.46%
Pump Station	PS-083 - Richardson Drive Pump Station	\$1,000,000	34.14%	15.94%	22.72%	23.63%	3.54%
Pump Station	PS-084 - Eastwood Way Pump Station	\$1,000,000	48.65%	14.34%	10.91%	21.02%	5.06%
Pump Station	PS-085 - Fairview Park Pump Station	\$1,000,000	48.65%	14.34%	10.91%	21.02%	5.06%
Pump Station	PS-087 - Marinview Pump Station	\$1,000,000	46.10%	16.69%	21.06%	14.62%	1.50%
Pump Station	PS-088 - Tam Woods 1st Lift Pump Station	\$1,000,000	39.34%	13.11%	15.94%	26.49%	5.10%
Pump Station	PS-089 - Tam Woods 2nd Lift Pump Station	\$1,000,000	46.10%	16.69%	21.06%	14.62%	1.50%
Pump Station	PS-090 - Hill Haven Pump Station	\$1,000,000	34.77%	13.53%	17.64%	28.61%	5.42%
Pump Station	PS-091 - Sugarloaf Pump Station	\$1,000,000	41.71%	16.23%	21.16%	18.45%	2.43%
Pump Station	PS-092 - Tiburon Belvedere Pump Station	\$1,000,000	46.18%	17.97%	23.43%	11.90%	0.51%
Pump Station	PS-093 - Tiburon Booster Pump Station	\$1,000,000	29.62%	13.83%	19.71%	31.02%	5.81%
Pump Station	PS-095 - Pine Mountain Tunnel Pump Station	\$1,000,000	57.47%	18.29%	14.47%	8.07%	1.68%
Pump Station	PS-097 - Tocaloma Booster Pump Station	\$1,000,000	47.01%	13.10%	14.79%	21.14%	3.92%
Pump Station	PS-101 - Redwood Drive Lower Pump	\$1,000,000	48.22%	12.28%	13.39%	21.81%	4.26%
Pump Station	PS-102 - North Marin Line Boosters	\$1,000,000	78.80%	10.32%	2.92%	6.35%	1.59%
Pump Station	PS-103 - San Geronimo Valley Pump Station	\$1,000,000	78.80%	10.32%	2.92%	6.35%	1.59%
Pump Station	PS-104 - Conifer Way Pump Station	\$1,000,000	54.89%	13.47%	9.38%	17.93%	4.31%
Pump Station	PS-106 - Los Altos Pump Station	\$1,000,000	43.31%	15.56%	13.11%	22.56%	5.43%
Pump Station	PS-108 - Indian Rock Pump Station	\$1,000,000	46.73%	14.78%	11.65%	21.62%	5.20%
Pump Station	PS-109 - Cibrian Pump Station	\$1,000,000	50.01%	17.97%	15.14%	13.75%	3.12%
Pump Station	PS-113 - Lag Picnic Grounds Pump Station	\$1,000,000	61.24%	18.41%	14.14%	5.21%	0.97%
Pump Station	PS-114 - Cortez Avenue Pump Station	\$1,000,000	51.52%	16.18%	8.14%	19.36%	4.78%
Pump Station	PS-115 - Redwood Drive Upper Pump Station	\$1,000,000	85.49%	11.20%	3.17%	0.10%	0.02%
Pump Station	PS-116 - North Redwood Drive Boosters	\$1,000,000	63.66%	23.08%	12.27%	0.88%	0.09%
Pump Station	PS-117 - Wolfback Ridge Pump Station	\$1,000,000	55.37%	26.31%	15.67%	2.24%	0.37%
Pump Station	PS-118 - Fire Road Pump Station	\$1,000,000	67.87%	8.89%	2.52%	16.56%	4.14%
Pump Station	PS-122 - Upper Road Pump Station	\$1,000,000	77.39%	16.85%	5.52%	0.18%	0.03%
Pump Station	PS-123 - Southern Marin Line Syphon	\$1,000,000	60.71%	11.46%	3.59%	19.37%	4.84%
Pump Station	PS-124 - Throckmorton Booster New Pumpstat	\$1,000,000	80.57%	14.69%	4.56%	0.13%	0.02%
Pump Station	PS-125 - Kent Fire Trail 2nd Lift Pump Station	\$1,000,000	71.54%	15.58%	5.11%	6.21%	1.54%
Pump Station	PS-126 - Oak woodlands Pump Station	\$1,000,000	61.64%	10.94%	3.37%	19.22%	4.81%
Pump Station	PS-127 - Marin Terrace Pump Station	\$1,000,000	78.25%	14.27%	4.43%	2.43%	0.60%
Pump Station	PS-128 - Alpine Bon-Tempe Pump Station	\$1,000,000	77.84%	16.55%	5.39%	0.17%	0.03%
Pump Station	PS-129 - Slide Gulch Pump Station	\$1,000,000	78.25%	14.27%	4.43%	2.43%	0.60%
Pump Station	PS-130 - Smith Conifer Pump Station	\$1,000,000	41.64%	21.32%	9.75%	21.75%	5.52%
Building	San Geronimo Treatment Plant - Boat Barn		84.50%	7.46%	0.18%	6.27%	1.56%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Chemical Stor	\$100,000,000	55.98%	14.26%	15.55%	12.47%	1.71%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #1		55.98%	14.26%	15.55%	12.47%	1.71%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #2		63.72%	15.64%	10.89%	7.96%	1.76%
Building	San Geronimo Treatment Plant - Facilities Shed		75.61%	16.03%	0.50%	6.27%	1.56%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Flash Mixer		63.72%	15.64%	10.89%	7.96%	1.76%
Building	San Geronimo Treatment Plant - Gardeners Shed		84.50%	7.46%	0.18%	6.27%	1.56%
Facility - Pump Station	San Geronimo Treatment Plant - North Marin L	\$5,000,000	55.98%	14.26%	15.55%	12.47%	1.71%
Facility - Pump Station	Southern Marin Line - Pump Station	\$2,000,000	63.93%	14.55%	16.31%	5.06%	0.13%
Water Tank	TK-006 - MADERA PARK TANK #1	\$200,000	37.48%	25.57%	11.05%	20.68%	5.20%
Water Tank	TK-009 - SAN CLEMENTE TANK	\$3,000,000	27.05%	17.75%	33.18%	19.47%	2.52%
Water Tank	TK-011 - CANON VILLAGE TANK	\$3,000,000	16.64%	16.73%	26.62%	33.09%	6.91%
Water Tank	TK-012 - FAIRFAX GRADE TANK	\$1,000,000	39.40%	19.02%	28.29%	12.29%	0.98%
Water Tank	TK-015 - MEADOW CLUB UPPER TANK	\$600,000	21.60%	12.52%	24.27%	34.79%	6.79%
Water Tank	TK-019 - OAK MANOR TOP TANK	\$500,000	16.64%	16.73%	26.62%	33.09%	6.91%
Water Tank	TK-025 - BRET HARTE TANK	\$1,000,000	11.00%	10.29%	26.07%	41.00%	11.61%
Water Tank	TK-027 - GREENBRAE TANK	\$3,000,000	11.00%	10.29%	26.07%	41.00%	11.61%
Water Tank	TK-030 - ESCALLE TANK	\$2,000,000	26.81%	14.23%	22.65%	30.13%	6.15%
Water Tank	TK-033 - INDIAN FIRE TRAIL TANK	\$500,000	32.86%	17.44%	27.76%	19.12%	2.80%
Water Tank	TK-046 - ALTO TANK #1	\$6,000,000	42.32%	19.00%	26.90%	10.97%	0.78%
Water Tank	TK-047 - BOLSA TANK	\$400,000	76.63%	18.49%	4.65%	0.20%	0.01%

Type	Facility Name	Nonstructural Acceleration-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Pump Station	PS-077 - Beacon Hill Pump Station					
Pump Station	PS-078 - Crescent Avenue Pump Station					
Pump Station	PS-079 - Marin City Pump Station					
Pump Station	PS-080 - Monte Mar Vista Pump Station					
Pump Station	PS-081 - Sausalito Pumphouse Pump Station					
Pump Station	PS-082 - Sausalito Boulevard Pump Station					
Pump Station	PS-083 - Richardson Drive Pump Station					
Pump Station	PS-084 - Eastwood Way Pump Station					
Pump Station	PS-085 - Fairview Park Pump Station					
Pump Station	PS-087 - Marinview Pump Station					
Pump Station	PS-088 - Tam Woods 1st Lift Pump Station					
Pump Station	PS-089 - Tam Woods 2nd Lift Pump Station					
Pump Station	PS-090 - Hill Haven Pump Station					
Pump Station	PS-091 - Sugarloaf Pump Station					
Pump Station	PS-092 - Tiburon Belvedere Pump Station					
Pump Station	PS-093 - Tiburon Booster Pump Station					
Pump Station	PS-095 - Pine Mountain Tunnel Pump Station					
Pump Station	PS-097 - Tocaloma Booster Pump Station					
Pump Station	PS-101 - Redwood Drive Lower Pump					
Pump Station	PS-102 - North Marin Line Boosters					
Pump Station	PS-103 - San Geronimo Valley Pump Station					
Pump Station	PS-104 - Conifer Way Pump Station					
Pump Station	PS-106 - Los Altos Pump Station					
Pump Station	PS-108 - Indian Rock Pump Station					
Pump Station	PS-109 - Cibrian Pump Station					
Pump Station	PS-113 - Lag Picnic Grounds Pump Station					
Pump Station	PS-114 - Cortez Avenue Pump Station					
Pump Station	PS-115 - Redwood Drive Upper Pump Station					
Pump Station	PS-116 - North Redwood Drive Boosters					
Pump Station	PS-117 - Wolfback Ridge Pump Station					
Pump Station	PS-118 - Fire Road Pump Station					
Pump Station	PS-122 - Upper Road Pump Station					
Pump Station	PS-123 - Southern Marin Line Syphon					
Pump Station	PS-124 - Throckmorton Booster New Pumpstat					
Pump Station	PS-125 - Kent Fire Trail 2nd Lift Pump Station					
Pump Station	PS-126 - Oak woodlands Pump Station					
Pump Station	PS-127 - Marin Terrace Pump Station					
Pump Station	PS-128 - Alpine Bon-Tempe Pump Station					
Pump Station	PS-129 - Slide Gulch Pump Station					
Pump Station	PS-130 - Smith Conifer Pump Station					
Building	San Geronimo Treatment Plant - Boat Barn	57.42%	28.18%	6.13%	6.67%	1.58%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Chemical Stor					
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #1					
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #2					
Building	San Geronimo Treatment Plant - Facilities Shed	54.01%	30.30%	7.29%	6.79%	1.59%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Flash Mixer					
Building	San Geronimo Treatment Plant - Gardeners She	57.42%	28.18%	6.13%	6.67%	1.58%
Facility - Pump Station	San Geronimo Treatment Plant - North Marin L					
Facility - Pump Station	Southern Marin Line - Pump Station					
Water Tank	TK-006 - MADERA PARK TANK #1					
Water Tank	TK-009 - SAN CLEMENTE TANK					
Water Tank	TK-011 - CANON VILLAGE TANK					
Water Tank	TK-012 - FAIRFAX GRADE TANK					
Water Tank	TK-015 - MEADOW CLUB UPPER TANK					
Water Tank	TK-019 - OAK MANOR TOP TANK					
Water Tank	TK-025 - BRET HARTE TANK					
Water Tank	TK-027 - GREENBRAE TANK					
Water Tank	TK-030 - ESCALLE TANK					
Water Tank	TK-033 - INDIAN FIRE TRAIL TANK					
Water Tank	TK-046 - ALTO TANK #1					
Water Tank	TK-047 - BOLSA TANK					

Type	Facility Name	Nonstructural Drift-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Pump Station	PS-077 - Beacon Hill Pump Station					
Pump Station	PS-078 - Crescent Avenue Pump Station					
Pump Station	PS-079 - Marin City Pump Station					
Pump Station	PS-080 - Monte Mar Vista Pump Station					
Pump Station	PS-081 - Sausalito Pumphouse Pump Station					
Pump Station	PS-082 - Sausalito Boulevard Pump Station					
Pump Station	PS-083 - Richardson Drive Pump Station					
Pump Station	PS-084 - Eastwood Way Pump Station					
Pump Station	PS-085 - Fairview Park Pump Station					
Pump Station	PS-087 - Marinview Pump Station					
Pump Station	PS-088 - Tam Woods 1st Lift Pump Station					
Pump Station	PS-089 - Tam Woods 2nd Lift Pump Station					
Pump Station	PS-090 - Hill Haven Pump Station					
Pump Station	PS-091 - Sugarloaf Pump Station					
Pump Station	PS-092 - Tiburon Belvedere Pump Station					
Pump Station	PS-093 - Tiburon Booster Pump Station					
Pump Station	PS-095 - Pine Mountain Tunnel Pump Station					
Pump Station	PS-097 - Tocaloma Booster Pump Station					
Pump Station	PS-101 - Redwood Drive Lower Pump					
Pump Station	PS-102 - North Marin Line Boosters					
Pump Station	PS-103 - San Geronimo Valley Pump Station					
Pump Station	PS-104 - Conifer Way Pump Station					
Pump Station	PS-106 - Los Altos Pump Station					
Pump Station	PS-108 - Indian Rock Pump Station					
Pump Station	PS-109 - Cibrian Pump Station					
Pump Station	PS-113 - Lag Picnic Grounds Pump Station					
Pump Station	PS-114 - Cortez Avenue Pump Station					
Pump Station	PS-115 - Redwood Drive Upper Pump Station					
Pump Station	PS-116 - North Redwood Drive Boosters					
Pump Station	PS-117 - Wolfback Ridge Pump Station					
Pump Station	PS-118 - Fire Road Pump Station					
Pump Station	PS-122 - Upper Road Pump Station					
Pump Station	PS-123 - Southern Marin Line Syphon					
Pump Station	PS-124 - Throckmorton Booster New Pumpstat					
Pump Station	PS-125 - Kent Fire Trail 2nd Lift Pump Station					
Pump Station	PS-126 - Oak woodlands Pump Station					
Pump Station	PS-127 - Marin Terrace Pump Station					
Pump Station	PS-128 - Alpine Bon-Tempe Pump Station					
Pump Station	PS-129 - Slide Gulch Pump Station					
Pump Station	PS-130 - Smith Conifer Pump Station					
Building	San Geronimo Treatment Plant - Boat Barn	81.94%	9.10%	1.08%	6.29%	1.56%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Chemical Stor					
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #1					
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #2					
Building	San Geronimo Treatment Plant - Facilities Shed	73.21%	16.38%	2.54%	6.29%	1.56%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Flash Mixer					
Building	San Geronimo Treatment Plant - Gardeners She	81.94%	9.10%	1.08%	6.29%	1.56%
Facility - Pump Station	San Geronimo Treatment Plant - North Marin L					
Facility - Pump Station	Southern Marin Line - Pump Station					
Water Tank	TK-006 - MADERA PARK TANK #1					
Water Tank	TK-009 - SAN CLEMENTE TANK					
Water Tank	TK-011 - CANON VILLAGE TANK					
Water Tank	TK-012 - FAIRFAX GRADE TANK					
Water Tank	TK-015 - MEADOW CLUB UPPER TANK					
Water Tank	TK-019 - OAK MANOR TOP TANK					
Water Tank	TK-025 - BRET HARTE TANK					
Water Tank	TK-027 - GREENBRAE TANK					
Water Tank	TK-030 - ESCALLE TANK					
Water Tank	TK-033 - INDIAN FIRE TRAIL TANK					
Water Tank	TK-046 - ALTO TANK #1					
Water Tank	TK-047 - BOLSA TANK					



Type	Facility Name	Losses (in dollars)			
		Structure	Nonstructural Drift Sensitive	Nonstructural Acceleration-Sensitive	Total Building Loss
Pump Station	PS-077 - Beacon Hill Pump Station	\$171,785			\$171,785
Pump Station	PS-078 - Crescent Avenue Pump Station	\$171,785			\$171,785
Pump Station	PS-079 - Marin City Pump Station	\$281,305			\$281,305
Pump Station	PS-080 - Monte Mar Vista Pump Station	\$299,770			\$299,770
Pump Station	PS-081 - Sausalito Pumphouse Pump Station	\$191,800			\$191,800
Pump Station	PS-082 - Sausalito Boulevard Pump Station	\$174,025			\$174,025
Pump Station	PS-083 - Richardson Drive Pump Station	\$219,230			\$219,230
Pump Station	PS-084 - Eastwood Way Pump Station	\$200,255			\$200,255
Pump Station	PS-085 - Fairview Park Pump Station	\$200,255			\$200,255
Pump Station	PS-087 - Marinview Pump Station	\$142,655			\$142,655
Pump Station	PS-088 - Tam Woods 1st Lift Pump Station	\$240,405			\$240,405
Pump Station	PS-089 - Tam Woods 2nd Lift Pump Station	\$142,655			\$142,655
Pump Station	PS-090 - Hill Haven Pump Station	\$259,085			\$259,085
Pump Station	PS-091 - Sugarloaf Pump Station	\$174,855			\$174,855
Pump Station	PS-092 - Tiburon Belvedere Pump Station	\$120,630			\$120,630
Pump Station	PS-093 - Tiburon Booster Pump Station	\$280,700			\$280,700
Pump Station	PS-095 - Pine Mountain Tunnel Pump Station	\$96,070			\$96,070
Pump Station	PS-097 - Tocaloma Booster Pump Station	\$194,775			\$194,775
Pump Station	PS-101 - Redwood Drive Lower Pump	\$199,685			\$199,685
Pump Station	PS-102 - North Marin Line Boosters	\$63,540			\$63,540
Pump Station	PS-103 - San Geronimo Valley Pump Station	\$63,540			\$63,540
Pump Station	PS-104 - Conifer Way Pump Station	\$171,485			\$171,485
Pump Station	PS-106 - Los Altos Pump Station	\$217,105			\$217,105
Pump Station	PS-108 - Indian Rock Pump Station	\$206,585			\$206,585
Pump Station	PS-109 - Cibiria Pump Station	\$145,395			\$145,395
Pump Station	PS-113 - Lag Picnic Grounds Pump Station	\$71,375			\$71,375
Pump Station	PS-114 - Cortez Avenue Pump Station	\$184,260			\$184,260
Pump Station	PS-115 - Redwood Drive Upper Pump Station	\$11,155			\$11,155
Pump Station	PS-116 - North Redwood Drive Boosters	\$36,125			\$36,125
Pump Station	PS-117 - Wolfback Ridge Pump Station	\$53,800			\$53,800
Pump Station	PS-118 - Fire Road Pump Station	\$148,985			\$148,985
Pump Station	PS-122 - Upper Road Pump Station	\$18,085			\$18,085
Pump Station	PS-123 - Southern Marin Line Syphon	\$175,735			\$175,735
Pump Station	PS-124 - Throckmorton Booster New Pumpstat	\$15,165			\$15,165
Pump Station	PS-125 - Kent Fire Trail 2nd Lift Pump Station	\$68,115			\$68,115
Pump Station	PS-126 - Oak woodlands Pump Station	\$173,945			\$173,945
Pump Station	PS-127 - Marin Terrace Pump Station	\$34,360			\$34,360
Pump Station	PS-128 - Alpine Bon-Tempe Pump Station	\$17,680			\$17,680
Pump Station	PS-129 - Slide Gulch Pump Station	\$34,360			\$34,360
Pump Station	PS-130 - Smith Conifer Pump Station	\$210,985			\$210,985
Building	San Geronimo Treatment Plant - Boat Barn				
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Chemical Stor	\$12,237,501			\$12,237,501
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #1				
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #2				
Building	San Geronimo Treatment Plant - Facilities Shed				
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Flash Mixer				
Building	San Geronimo Treatment Plant - Gardeners She				
Facility - Pump Station	San Geronimo Treatment Plant - North Marin L	\$611,875			\$611,875
Facility - Pump Station	Southern Marin Line - Pump Station	\$126,800			\$126,800
Water Tank	TK-006 - MADERA PARK TANK #1	\$41,088			\$41,088
Water Tank	TK-009 - SAN CLEMENTE TANK	\$601,995			\$601,995
Water Tank	TK-011 - CANON VILLAGE TANK	\$947,805			\$947,805
Water Tank	TK-012 - FAIRFAX GRADE TANK	\$135,485			\$135,485
Water Tank	TK-015 - MEADOW CLUB UPPER TANK	\$191,583			\$191,583
Water Tank	TK-019 - OAK MANOR TOP TANK	\$157,968			\$157,968
Water Tank	TK-025 - BRET HARTE TANK	\$406,350			\$406,350
Water Tank	TK-027 - GREENBRAE TANK	\$1,219,050			\$1,219,050
Water Tank	TK-030 - ESCALLE TANK	\$566,740			\$566,740
Water Tank	TK-033 - INDIAN FIRE TRAIL TANK	\$96,540			\$96,540
Water Tank	TK-046 - ALTO TANK #1	\$740,820			\$740,820
Water Tank	TK-047 - BOLSA TANK	\$7,008			\$7,008

Type	Facility Name	Functionality (%)					
		At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Pump Station	PS-077 - Beacon Hill Pump Station	54.00	69.00	83.30	90.20	98.20	99.90
Pump Station	PS-078 - Crescent Avenue Pump Station	54.00	69.00	83.30	90.20	98.20	99.90
Pump Station	PS-079 - Marin City Pump Station	46.00	57.70	69.90	79.90	94.80	99.90
Pump Station	PS-080 - Monte Mar Vista Pump Station	42.80	54.90	67.90	78.50	94.50	99.90
Pump Station	PS-081 - Sausalito Pumphouse Pump Station	66.10	74.40	79.40	85.50	95.80	99.90
Pump Station	PS-082 - Sausalito Boulevard Pump Station	53.80	68.80	83.10	90.00	98.10	99.90
Pump Station	PS-083 - Richardson Drive Pump Station	51.70	64.70	77.40	85.50	96.60	99.90
Pump Station	PS-084 - Eastwood Way Pump Station	62.40	71.50	78.80	85.40	95.80	99.90
Pump Station	PS-085 - Fairview Park Pump Station	62.40	71.50	78.80	85.40	95.80	99.90
Pump Station	PS-087 - Marinview Pump Station	62.80	75.20	86.10	91.60	98.30	99.90
Pump Station	PS-088 - Tam Woods 1st Lift Pump Station	54.00	64.20	74.30	82.70	95.50	99.90
Pump Station	PS-089 - Tam Woods 2nd Lift Pump Station	62.80	75.20	86.10	91.60	98.30	99.90
Pump Station	PS-090 - Hill Haven Pump Station	50.30	61.20	72.30	81.40	95.20	99.90
Pump Station	PS-091 - Sugarloaf Pump Station	58.50	71.00	82.40	88.90	97.50	99.90
Pump Station	PS-092 - Tiburon Belvedere Pump Station	63.90	77.20	88.90	93.80	99.00	99.90
Pump Station	PS-093 - Tiburon Booster Pump Station	46.00	57.70	70.00	79.90	94.90	99.90
Pump Station	PS-095 - Pine Mountain Tunnel Pump Station	73.00	84.00	91.30	94.60	98.50	99.90
Pump Station	PS-097 - Tocaloma Booster Pump Station	60.80	70.50	79.40	86.30	96.50	99.90
Pump Station	PS-101 - Redwood Drive Lower Pump	61.30	70.30	78.70	85.70	96.20	99.90
Pump Station	PS-102 - North Marin Line Boosters	86.60	91.50	93.50	95.50	98.60	99.90
Pump Station	PS-103 - San Geronimo Valley Pump Station	86.60	91.50	93.50	95.50	98.60	99.90
Pump Station	PS-104 - Conifer Way Pump Station	67.40	75.70	81.90	87.50	96.40	99.90
Pump Station	PS-106 - Los Altos Pump Station	58.50	68.70	77.10	84.30	95.50	99.90
Pump Station	PS-108 - Indian Rock Pump Station	61.00	70.50	78.10	85.00	95.70	99.90
Pump Station	PS-109 - Cibrian Pump Station	66.10	77.40	85.70	90.60	97.40	99.90
Pump Station	PS-113 - Lag Picnic Grounds Pump Station	76.50	87.30	94.10	96.60	99.10	99.90
Pump Station	PS-114 - Cortez Avenue Pump Station	65.60	74.60	80.50	86.40	96.10	99.90
Pump Station	PS-115 - Redwood Drive Upper Pump Station	93.20	98.20	99.60	99.90	99.90	99.90
Pump Station	PS-116 - North Redwood Drive Boosters	80.90	92.80	98.30	99.40	99.80	99.90
Pump Station	PS-117 - Wolfback Ridge Pump Station	75.60	89.60	96.70	98.50	99.60	99.90
Pump Station	PS-118 - Fire Road Pump Station	75.80	80.50	83.60	88.30	96.60	99.90
Pump Station	PS-122 - Upper Road Pump Station	89.20	96.90	99.30	99.80	99.90	99.90
Pump Station	PS-123 - Southern Marin Line Syphon	70.90	76.90	80.70	86.40	96.00	99.90
Pump Station	PS-124 - Throckmorton Booster New Pumpstat	90.80	97.40	99.50	99.80	99.90	99.90
Pump Station	PS-125 - Kent Fire Trail 2nd Lift Pump Station	83.10	90.50	93.50	95.60	98.70	99.90
Pump Station	PS-126 - Oak woodlands Pump Station	71.40	77.20	80.90	86.50	96.00	99.90
Pump Station	PS-127 - Marin Terrace Pump Station	88.40	95.00	97.20	98.20	99.40	99.90
Pump Station	PS-128 - Alpine Bon-Tempe Pump Station	89.40	97.00	99.40	99.80	99.90	99.90
Pump Station	PS-129 - Slide Gulch Pump Station	88.40	95.00	97.20	98.20	99.40	99.90
Pump Station	PS-130 - Smith Conifer Pump Station	59.60	71.00	77.90	84.60	95.50	99.90
Building	San Geronimo Treatment Plant - Boat Barn	74.60	75.30	88.70	88.80	92.00	98.40
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Chemical Stor	70.60	85.30	88.50	89.40	91.90	98.60
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #1	70.60	85.30	88.50	89.40	91.90	98.60
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #2	77.40	89.80	92.00	92.60	94.30	98.70
Building	San Geronimo Treatment Plant - Facilities Shed	65.70	66.70	87.00	87.10	91.90	98.30
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Flash Mixer	77.40	89.80	92.00	92.60	94.30	98.70
Building	San Geronimo Treatment Plant - Gardeners She	74.60	75.30	88.70	88.80	92.00	98.40
Facility - Pump Station	San Geronimo Treatment Plant - North Marin L	69.70	79.60	87.90	92.40	98.30	99.90
Facility - Pump Station	Southern Marin Line - Pump Station	77.20	87.10	94.80	97.40	99.60	99.90
Water Tank	TK-006 - MADERA PARK TANK #1	51.10	71.90	77.00	78.30	79.60	85.60
Water Tank	TK-009 - SAN CLEMENTE TANK	42.70	63.90	78.80	81.70	82.80	88.10
Water Tank	TK-011 - CANON VILLAGE TANK	32.90	51.70	63.90	66.60	68.60	78.10
Water Tank	TK-012 - FAIRFAX GRADE TANK	53.20	74.00	86.60	88.90	89.60	92.90
Water Tank	TK-015 - MEADOW CLUB UPPER TANK	36.20	51.60	62.70	65.30	67.30	77.20
Water Tank	TK-019 - OAK MANOR TOP TANK	32.90	51.70	63.90	66.60	68.60	78.10
Water Tank	TK-025 - BRET HARTE TANK	26.70	41.00	53.00	55.90	58.40	70.60
Water Tank	TK-027 - GREENBRAE TANK	26.70	41.00	53.00	55.90	58.40	70.60
Water Tank	TK-030 - ESCALLE TANK	40.90	57.00	67.30	69.70	71.50	80.10
Water Tank	TK-033 - INDIAN FIRE TRAIL TANK	47.20	66.80	79.20	81.70	82.80	88.10
Water Tank	TK-046 - ALTO TANK #1	55.60	76.00	88.00	90.20	90.80	93.70
Water Tank	TK-047 - BOLSA TANK	83.30	97.40	99.40	99.80	99.80	99.80

Type	Facility Name	Structure Replacement Cost	Structural - Probability of Damage				
			No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Water Tank	TK-055 - MILL VALLEY TANK	\$10,000,000	42.32%	19.00%	26.90%	10.97%	0.78%
Water Tank	TK-060 - SCOTT HIGHLANDS TANK	\$500,000	41.10%	18.46%	26.12%	12.94%	1.36%
Water Tank	TK-064 - STRAWBERRY TANK	\$3,000,000	20.32%	13.33%	24.92%	34.03%	7.37%
Water Tank	TK-068 - ELDA DRIVE TANK	\$300,000	34.66%	17.72%	27.46%	17.69%	2.45%
Water Tank	TK-069 - HAWTHORNE HILLS UPPER TANK	\$4,000,000	2.76%	3.71%	20.67%	39.03%	33.81%
Water Tank	TK-074 - SCENIC AVENUE TANK	\$40,000	51.58%	31.49%	13.45%	2.96%	0.51%
Water Tank	TK-078 - CHULA VISTA TANK	\$500,000	37.06%	18.95%	29.36%	13.44%	1.16%
Water Tank	TK-081 - FAIRHILLS TOP TANK #1	\$120,000	48.20%	22.79%	22.90%	5.86%	0.22%
Water Tank	TK-083 - GLENWOOD TANK	\$3,000,000	44.30%	18.94%	25.93%	10.13%	0.67%
Water Tank	TK-085 - HIND TANK #1	\$200,000	51.21%	19.57%	5.09%	19.27%	4.82%
Water Tank	TK-086 - HIND TANK #2	\$400,000	58.56%	13.89%	3.46%	19.28%	4.79%
Water Tank	TK-087 - LOCH LOMOND TANK	\$2,000,000	43.17%	18.45%	25.27%	11.90%	1.18%
Water Tank	TK-089 - LOS RANCHITOS TANK	\$2,000,000	34.66%	17.72%	27.46%	17.69%	2.45%
Water Tank	TK-090 - MARINWOOD TANK	\$1,000,000	34.97%	17.75%	27.36%	17.49%	2.40%
Water Tank	TK-091 - MARIN PROFESSIONAL CENTER TANK	\$500,000	27.99%	14.31%	22.17%	29.50%	6.00%
Water Tank	TK-094 - MILLER CREEK TANK	\$1,000,000	58.31%	17.22%	18.78%	5.45%	0.22%
Water Tank	TK-096 - PUERTO SUELLO TANK	\$3,000,000	33.70%	14.41%	19.73%	26.71%	5.42%
Water Tank	TK-097 - RAFAEL HIGHLANDS TANK	\$1,000,000	37.06%	18.95%	29.36%	13.44%	1.16%
Water Tank	TK-098 - SANTA MARGARITA TANK	\$3,000,000	17.72%	17.72%	27.46%	17.69%	2.45%
Water Tank	TK-100 - SKYVIEW TERRACE TANK	\$300,000	37.06%	18.95%	29.36%	13.44%	1.16%
Water Tank	TK-105 - COURTRIGHT TANK	\$100,000	58.96%	30.34%	10.17%	0.43%	0.09%
Water Tank	TK-106 - LUCAS VALLEY TANK	\$3,000,000	27.99%	14.31%	22.17%	29.50%	6.00%
Water Tank	TK-108 - CLOUDVIEW TANK	\$440,000	12.99%	11.15%	32.93%	34.28%	8.62%
Water Tank	TK-113 - SAUSALITO PUMP HOUSE TANK #1	\$620,000	9.75%	8.37%	24.71%	43.96%	13.18%
Water Tank	TK-114 - SAUSALITO PUMP HOUSE TANK #2	\$620,000	9.75%	8.37%	24.71%	43.96%	13.18%
Water Tank	TK-115 - ROMER TANK	\$620,000	9.75%	8.37%	24.71%	43.96%	13.18%
Water Tank	TK-116 - SAUSALITO BLVD. TANK	\$460,000	12.94%	11.10%	32.79%	34.44%	8.70%
Water Tank	TK-117 - MESA VISTA TANK #1	\$1,000,000	26.81%	14.23%	22.65%	30.13%	6.15%
Water Tank	TK-118 - COUNTYVIEW DRIVE TANK	\$300,000	39.66%	19.02%	28.17%	12.17%	0.96%
Water Tank	TK-119 - LATTIE LANE TANK	\$500,000	32.17%	14.45%	20.44%	27.37%	5.54%
Water Tank	TK-125 - TENNESSEE VALLEY TANK	\$2,000,000	37.47%	17.97%	26.61%	15.87%	2.05%
Water Tank	TK-126 - HILL HAVEN TANK	\$330,000	45.98%	23.16%	24.08%	6.49%	0.27%
Water Tank	TK-127 - PARADISE DRIVE TANK	\$2,000,000	34.62%	17.44%	18.13%	24.58%	5.20%
Water Tank	TK-128 - MOUNT TIBURON TANK #1	\$1,000,000	28.10%	14.27%	22.01%	29.57%	6.03%
Water Tank	TK-130 - SPRING LANE TANK #1	\$3,000,000	26.56%	16.08%	32.52%	22.37%	2.45%
Water Tank	TK-131 - CONIFER WAY TANK	\$1,000,000	38.98%	14.75%	18.67%	23.01%	4.57%
Water Tank	TK-139 - BUCKEYE CIRCLE TANK	\$60,000	46.12%	16.19%	14.02%	19.42%	4.22%
Water Tank	TK-145 - ROSS RESERVOIR	\$2,000,000	51.03%	17.36%	21.30%	9.96%	0.33%
Water Tank	TK-146 - FORBES HILL RESERVOIR	\$8,000,000	35.58%	16.21%	27.85%	18.04%	2.30%
Water Tank	TK-147 - SMITH SADDLE TANK #1	\$10,000,000	3.83%	5.46%	21.13%	45.77%	23.79%
Water Tank	TK-148 - SMITH SADDLE TANK #2	\$10,000,000	4.09%	5.83%	22.59%	44.50%	22.96%
Water Tank	TK-150 - LOS ALTOS TANK	\$120,000	42.28%	23.59%	25.95%	7.74%	0.41%
Water Tank	TK-152 - MADERA PARK (H/P) TANK	\$3,000	20.32%	13.33%	24.92%	34.03%	7.37%
Water Tank	TK-153 - RAFAEL HIGHLANDS (H/P) TANK	\$5,000	37.06%	18.95%	29.36%	13.44%	1.16%
Water Tank	TK-155 - PINE MOUNTAIN TUNNEL TANK	\$6,000,000	5.36%	5.60%	19.13%	42.99%	26.88%
Water Tank	TK-156 - BON TEMPE CLEARWELL TANK	\$4,000,000	49.28%	16.76%	20.57%	12.35%	1.02%
Water Tank	TK-157 - SAN GERONIMO CLEARWELL TANK #1	\$4,000,000	55.98%	14.26%	15.55%	12.47%	1.71%
Water Tank	TK-158 - FAWN DRIVE TANK	\$180,000	48.20%	22.79%	22.90%	5.86%	0.22%
Water Tank	TK-159 - PEACOCK GAP TANK	\$1,000,000	44.45%	15.33%	12.63%	22.22%	5.34%
Water Tank	TK-160 - MARIN BAY TANK	\$240,000	39.37%	20.78%	22.16%	15.12%	2.55%
Water Tank	TK-164 - TOMAHAWK DRIVE TANK	\$80,000	45.07%	21.31%	21.41%	10.66%	1.52%
Water Tank	TK-165 - ALTO TANK #2	\$6,000,000	39.13%	16.81%	16.07%	23.01%	4.96%
Water Tank	TK-166 - RING MOUNTAIN TANK	\$300,000	42.28%	23.59%	25.95%	7.74%	0.41%
Water Tank	TK-167 - CREEKSIDE DRIVE TANK	\$360,000	52.75%	15.48%	12.37%	15.91%	3.46%
Water Tank	TK-168 - MCNEAR DRIVE #1 (H/P) TANK	\$2,000	33.70%	14.41%	19.73%	26.71%	5.42%
Water Tank	TK-169 - MCNEAR DRIVE #2 (H/P) TANK	\$3,000	33.70%	14.41%	19.73%	26.71%	5.42%
Water Tank	TK-174 - VIA MONTEBELLO (H/P) TANK	\$7,000	44.31%	23.39%	24.94%	7.01%	0.33%
Water Tank	TK-175 - MARINSHIP TANK	\$3,000,000	45.99%	17.85%	15.68%	16.61%	3.86%
Water Tank	TK-181 - REDWOOD DRIVE UPPER TANK	\$120,000	58.80%	26.54%	13.10%	1.49%	0.05%
Water Tank	TK-182 - ALTA AVENUE TANK	\$1,000,000	52.83%	28.07%	15.43%	3.25%	0.39%
Water Tank	TK-183 - MINE RIDGE TANK	\$440,000	54.66%	27.71%	14.76%	2.59%	0.26%

Type	Facility Name	Nonstructural Acceleration-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Water Tank	TK-055 - MILL VALLEY TANK					
Water Tank	TK-060 - SCOTT HIGHLANDS TANK					
Water Tank	TK-064 - STRAWBERRY TANK					
Water Tank	TK-068 - ELDA DRIVE TANK					
Water Tank	TK-069 - HAWTHORNE HILLS UPPER TANK					
Water Tank	TK-074 - SCENIC AVENUE TANK					
Water Tank	TK-078 - CHULA VISTA TANK					
Water Tank	TK-081 - FAIRHILLS TOP TANK #1					
Water Tank	TK-083 - GLENWOOD TANK					
Water Tank	TK-085 - HIND TANK #1					
Water Tank	TK-086 - HIND TANK #2					
Water Tank	TK-087 - LOCH LOMOND TANK					
Water Tank	TK-089 - LOS RANCHITOS TANK					
Water Tank	TK-090 - MARINWOOD TANK					
Water Tank	TK-091 - MARIN PROFESSIONAL CENTER TANK					
Water Tank	TK-094 - MILLER CREEK TANK					
Water Tank	TK-096 - PUERTO SUELLO TANK					
Water Tank	TK-097 - RAFAEL HIGHLANDS TANK					
Water Tank	TK-098 - SANTA MARGARITA TANK					
Water Tank	TK-100 - SKYVIEW TERRACE TANK					
Water Tank	TK-105 - COURTRIGHT TANK					
Water Tank	TK-106 - LUCAS VALLEY TANK					
Water Tank	TK-108 - CLOUDVIEW TANK					
Water Tank	TK-113 - SAUSALITO PUMP HOUSE TANK #1					
Water Tank	TK-114 - SAUSALITO PUMP HOUSE TANK #2					
Water Tank	TK-115 - ROMER TANK					
Water Tank	TK-116 - SAUSALITO BLVD. TANK					
Water Tank	TK-117 - MESA VISTA TANK #1					
Water Tank	TK-118 - COUNTYVIEW DRIVE TANK					
Water Tank	TK-119 - LATTIE LANE TANK					
Water Tank	TK-125 - TENNESSEE VALLEY TANK					
Water Tank	TK-126 - HILL HAVEN TANK					
Water Tank	TK-127 - PARADISE DRIVE TANK					
Water Tank	TK-128 - MOUNT TIBURON TANK #1					
Water Tank	TK-130 - SPRING LANE TANK #1					
Water Tank	TK-131 - CONIFER WAY TANK					
Water Tank	TK-139 - BUCKEYE CIRCLE TANK					
Water Tank	TK-145 - ROSS RESERVOIR					
Water Tank	TK-146 - FORBES HILL RESERVOIR					
Water Tank	TK-147 - SMITH SADDLE TANK #1					
Water Tank	TK-148 - SMITH SADDLE TANK #2					
Water Tank	TK-150 - LOS ALTOS TANK					
Water Tank	TK-152 - MADERA PARK (H/P) TANK					
Water Tank	TK-153 - RAFAEL HIGHLANDS (H/P) TANK					
Water Tank	TK-155 - PINE MOUNTAIN TUNNEL TANK					
Water Tank	TK-156 - BON TEMPE CLEARWELL TANK					
Water Tank	TK-157 - SAN GERONIMO CLEARWELL TANK #1					
Water Tank	TK-158 - FAWN DRIVE TANK					
Water Tank	TK-159 - PEACOCK GAP TANK					
Water Tank	TK-160 - MARIN BAY TANK					
Water Tank	TK-164 - TOMAHAWK DRIVE TANK					
Water Tank	TK-165 - ALTO TANK #2					
Water Tank	TK-166 - RING MOUNTAIN TANK					
Water Tank	TK-167 - CREEKSIDE DRIVE TANK					
Water Tank	TK-168 - MCNEAR DRIVE #1 (H/P) TANK					
Water Tank	TK-169 - MCNEAR DRIVE #2 (H/P) TANK					
Water Tank	TK-174 - VIA MONTEBELLO (H/P) TANK					
Water Tank	TK-175 - MARINSHIP TANK					
Water Tank	TK-181 - REDWOOD DRIVE UPPER TANK					
Water Tank	TK-182 - ALTA AVENUE TANK					
Water Tank	TK-183 - MINE RIDGE TANK					

Type	Facility Name	Nonstructural Drift-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Water Tank	TK-055 - MILL VALLEY TANK					
Water Tank	TK-060 - SCOTT HIGHLANDS TANK					
Water Tank	TK-064 - STRAWBERRY TANK					
Water Tank	TK-068 - ELDA DRIVE TANK					
Water Tank	TK-069 - HAWTHORNE HILLS UPPER TANK					
Water Tank	TK-074 - SCENIC AVENUE TANK					
Water Tank	TK-078 - CHULA VISTA TANK					
Water Tank	TK-081 - FAIRHILLS TOP TANK #1					
Water Tank	TK-083 - GLENWOOD TANK					
Water Tank	TK-085 - HIND TANK #1					
Water Tank	TK-086 - HIND TANK #2					
Water Tank	TK-087 - LOCH LOMOND TANK					
Water Tank	TK-089 - LOS RANCHITOS TANK					
Water Tank	TK-090 - MARINWOOD TANK					
Water Tank	TK-091 - MARIN PROFESSIONAL CENTER TANK					
Water Tank	TK-094 - MILLER CREEK TANK					
Water Tank	TK-096 - PUERTO SUELLO TANK					
Water Tank	TK-097 - RAFAEL HIGHLANDS TANK					
Water Tank	TK-098 - SANTA MARGARITA TANK					
Water Tank	TK-100 - SKYVIEW TERRACE TANK					
Water Tank	TK-105 - COURTRIGHT TANK					
Water Tank	TK-106 - LUCAS VALLEY TANK					
Water Tank	TK-108 - CLOUDVIEW TANK					
Water Tank	TK-113 - SAUSALITO PUMP HOUSE TANK #1					
Water Tank	TK-114 - SAUSALITO PUMP HOUSE TANK #2					
Water Tank	TK-115 - ROMER TANK					
Water Tank	TK-116 - SAUSALITO BLVD. TANK					
Water Tank	TK-117 - MESA VISTA TANK #1					
Water Tank	TK-118 - COUNTYVIEW DRIVE TANK					
Water Tank	TK-119 - LATTIE LANE TANK					
Water Tank	TK-125 - TENNESSEE VALLEY TANK					
Water Tank	TK-126 - HILL HAVEN TANK					
Water Tank	TK-127 - PARADISE DRIVE TANK					
Water Tank	TK-128 - MOUNT TIBURON TANK #1					
Water Tank	TK-130 - SPRING LANE TANK #1					
Water Tank	TK-131 - CONIFER WAY TANK					
Water Tank	TK-139 - BUCKEYE CIRCLE TANK					
Water Tank	TK-145 - ROSS RESERVOIR					
Water Tank	TK-146 - FORBES HILL RESERVOIR					
Water Tank	TK-147 - SMITH SADDLE TANK #1					
Water Tank	TK-148 - SMITH SADDLE TANK #2					
Water Tank	TK-150 - LOS ALTOS TANK					
Water Tank	TK-152 - MADERA PARK (H/P) TANK					
Water Tank	TK-153 - RAFAEL HIGHLANDS (H/P) TANK					
Water Tank	TK-155 - PINE MOUNTAIN TUNNEL TANK					
Water Tank	TK-156 - BON TEMPE CLEARWELL TANK					
Water Tank	TK-157 - SAN GERONIMO CLEARWELL TANK #1					
Water Tank	TK-158 - FAWN DRIVE TANK					
Water Tank	TK-159 - PEACOCK GAP TANK					
Water Tank	TK-160 - MARIN BAY TANK					
Water Tank	TK-164 - TOMAHAWK DRIVE TANK					
Water Tank	TK-165 - ALTO TANK #2					
Water Tank	TK-166 - RING MOUNTAIN TANK					
Water Tank	TK-167 - CREEKSIDE DRIVE TANK					
Water Tank	TK-168 - MCNEAR DRIVE #1 (H/P) TANK					
Water Tank	TK-169 - MCNEAR DRIVE #2 (H/P) TANK					
Water Tank	TK-174 - VIA MONTEBELLO (H/P) TANK					
Water Tank	TK-175 - MARINSHIP TANK					
Water Tank	TK-181 - REDWOOD DRIVE UPPER TANK					
Water Tank	TK-182 - ALTA AVENUE TANK					
Water Tank	TK-183 - MINE RIDGE TANK					

Type	Facility Name	Losses (in dollars)			
		Structure	Nonstructural Drift Sensitive	Nonstructural Acceleration-Sensitive	Total Building Loss
Water Tank	TK-055 - MILL VALLEY TANK	\$1,234,700			\$1,234,700
Water Tank	TK-060 - SCOTT HIGHLANDS TANK	\$69,825			\$69,825
Water Tank	TK-064 - STRAWBERRY TANK	\$965,775			\$965,775
Water Tank	TK-068 - ELDA DRIVE TANK	\$54,207			\$54,207
Water Tank	TK-069 - HAWTHORNE HILLS UPPER TANK	\$2,420,560			\$2,420,560
Water Tank	TK-074 - SCENIC AVENUE TANK	\$2,351			\$2,351
Water Tank	TK-078 - CHULA VISTA TANK	\$72,878			\$72,878
Water Tank	TK-081 - FAIRHILLS TOP TANK #1	\$9,973			\$9,973
Water Tank	TK-083 - GLENWOOD TANK	\$347,535			\$347,535
Water Tank	TK-085 - HIND TANK #1	\$36,248			\$36,248
Water Tank	TK-086 - HIND TANK #2	\$70,286			\$70,286
Water Tank	TK-087 - LOCH LOMOND TANK	\$260,660			\$260,660
Water Tank	TK-089 - LOS RANCHITOS TANK	\$361,380			\$361,380
Water Tank	TK-090 - MARINWOOD TANK	\$178,855			\$178,855
Water Tank	TK-091 - MARIN PROFESSIONAL CENTER TANK	\$138,705			\$138,705
Water Tank	TK-094 - MILLER CREEK TANK	\$71,680			\$71,680
Water Tank	TK-096 - PUERTO SUELLO TANK	\$753,780			\$753,780
Water Tank	TK-097 - RAFAEL HIGHLANDS TANK	\$145,755			\$145,755
Water Tank	TK-098 - SANTA MARGARITA TANK	\$542,070			\$542,070
Water Tank	TK-100 - SKYVIEW TERRACE TANK	\$43,727			\$43,727
Water Tank	TK-105 - COURTRIGHT TANK	\$3,391			\$3,391
Water Tank	TK-106 - LUCAS VALLEY TANK	\$832,230			\$832,230
Water Tank	TK-108 - CLOUDVIEW TANK	\$152,614			\$152,614
Water Tank	TK-113 - SAUSALITO PUMP HOUSE TANK #1	\$270,822			\$270,822
Water Tank	TK-114 - SAUSALITO PUMP HOUSE TANK #2	\$270,822			\$270,822
Water Tank	TK-115 - ROMER TANK	\$270,822			\$270,822
Water Tank	TK-116 - SAUSALITO BLVD. TANK	\$160,253			\$160,253
Water Tank	TK-117 - MESA VISTA TANK #1	\$283,370			\$283,370
Water Tank	TK-118 - COUNTYVIEW DRIVE TANK	\$40,316			\$40,316
Water Tank	TK-119 - LATTIE LANE TANK	\$128,753			\$128,753
Water Tank	TK-125 - TENNESSEE VALLEY TANK	\$329,240			\$329,240
Water Tank	TK-126 - HILL HAVEN TANK	\$29,482			\$29,482
Water Tank	TK-127 - PARADISE DRIVE TANK	\$470,790			\$470,790
Water Tank	TK-128 - MOUNT TIBURON TANK #1	\$277,870			\$277,870
Water Tank	TK-130 - SPRING LANE TANK #1	\$646,620			\$646,620
Water Tank	TK-131 - CONIFER WAY TANK	\$219,140			\$219,140
Water Tank	TK-139 - BUCKEYE CIRCLE TANK	\$11,271			\$11,271
Water Tank	TK-145 - ROSS RESERVOIR	\$207,380			\$207,380
Water Tank	TK-146 - FORBES HILL RESERVOIR	\$1,448,960			\$1,448,960
Water Tank	TK-147 - SMITH SADDLE TANK #1	\$5,469,450			\$5,469,450
Water Tank	TK-148 - SMITH SADDLE TANK #2	\$5,334,000			\$5,334,000
Water Tank	TK-150 - LOS ALTOS TANK	\$12,151			\$12,151
Water Tank	TK-152 - MADERA PARK (H/P) TANK	\$966			\$966
Water Tank	TK-153 - RAFAEL HIGHLANDS (H/P) TANK	\$729			\$729
Water Tank	TK-155 - PINE MOUNTAIN TUNNEL TANK	\$3,349,410			\$3,349,410
Water Tank	TK-156 - BON TEMPE CLEARWELL TANK	\$494,140			\$494,140
Water Tank	TK-157 - SAN GERONIMO CLEARWELL TANK #1	\$489,500			\$489,500
Water Tank	TK-158 - FAWN DRIVE TANK	\$14,959			\$14,959
Water Tank	TK-159 - PEACOCK GAP TANK	\$213,330			\$213,330
Water Tank	TK-160 - MARIN BAY TANK	\$38,364			\$38,364
Water Tank	TK-164 - TOMAHAWK DRIVE TANK	\$9,754			\$9,754
Water Tank	TK-165 - ALTO TANK #2	\$1,321,020			\$1,321,020
Water Tank	TK-166 - RING MOUNTAIN TANK	\$30,378			\$30,378
Water Tank	TK-167 - CREEKSIDE DRIVE TANK	\$56,288			\$56,288
Water Tank	TK-168 - MCNEAR DRIVE #1 (H/P) TANK	\$503			\$503
Water Tank	TK-169 - MCNEAR DRIVE #2 (H/P) TANK	\$754			\$754
Water Tank	TK-174 - VIA MONTEBELLO (H/P) TANK	\$661			\$661
Water Tank	TK-175 - MARINSHIP TANK	\$512,115			\$512,115
Water Tank	TK-181 - REDWOOD DRIVE UPPER TANK	\$5,083			\$5,083
Water Tank	TK-182 - ALTA AVENUE TANK	\$60,580			\$60,580
Water Tank	TK-183 - MINE RIDGE TANK	\$23,819			\$23,819

Type	Facility Name	Functionality (%)					
		At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Water Tank	TK-055 - MILL VALLEY TANK	55.60	76.00	88.00	90.20	90.80	93.70
Water Tank	TK-060 - SCOTT HIGHLANDS TANK	54.40	74.20	85.90	88.10	88.80	92.30
Water Tank	TK-064 - STRAWBERRY TANK	35.30	51.40	62.80	65.40	67.40	77.20
Water Tank	TK-068 - ELDA DRIVE TANK	48.80	68.50	80.80	83.20	84.20	89.10
Water Tank	TK-069 - HAWTHORNE HILLS UPPER TANK	17.20	25.60	35.30	38.00	41.10	56.00
Water Tank	TK-074 - SCENIC AVENUE TANK	64.60	90.00	96.00	97.10	97.20	98.10
Water Tank	TK-078 - CHULA VISTA TANK	51.30	72.30	85.40	87.80	88.60	92.20
Water Tank	TK-081 - FAIRHILLS TOP TANK #1	61.00	82.90	93.10	94.90	95.20	96.80
Water Tank	TK-083 - GLENWOOD TANK	57.20	77.30	88.80	91.00	91.50	94.20
Water Tank	TK-085 - HIND TANK #1	61.50	76.50	79.00	79.80	81.00	86.60
Water Tank	TK-086 - HIND TANK #2	66.70	77.40	79.10	79.80	81.00	86.60
Water Tank	TK-087 - LOCH LOMOND TANK	56.10	75.70	86.90	89.10	89.70	93.00
Water Tank	TK-089 - LOS RANCHITOS TANK	48.80	68.50	80.80	83.20	84.20	89.10
Water Tank	TK-090 - MARINWOOD TANK	49.10	68.70	81.00	83.40	84.40	89.20
Water Tank	TK-091 - MARIN PROFESSIONAL CENTER TANK	41.90	57.90	68.00	70.30	72.10	80.50
Water Tank	TK-094 - MILLER CREEK TANK	68.50	85.40	93.70	95.20	95.50	97.00
Water Tank	TK-096 - PUERTO SUELLO TANK	46.70	62.10	71.10	73.20	74.70	82.40
Water Tank	TK-097 - RAFAEL HIGHLANDS TANK	51.30	72.30	85.40	87.80	88.60	92.20
Water Tank	TK-098 - SANTA MARGARITA TANK	48.80	68.50	80.80	83.20	84.20	89.10
Water Tank	TK-100 - SKYVIEW TERRACE TANK	51.30	72.30	85.40	87.80	88.60	92.20
Water Tank	TK-105 - COURTRIGHT TANK	70.60	94.30	98.70	99.50	99.50	99.70
Water Tank	TK-106 - LUCAS VALLEY TANK	41.90	57.90	68.00	70.30	72.10	80.50
Water Tank	TK-108 - CLOUDVIEW TANK	29.20	45.90	60.90	64.10	66.20	76.20
Water Tank	TK-113 - SAUSALITO PUMP HOUSE TANK #1	25.10	37.80	49.20	52.10	54.80	68.00
Water Tank	TK-114 - SAUSALITO PUMP HOUSE TANK #2	25.10	37.80	49.20	52.10	54.80	68.00
Water Tank	TK-115 - ROMER TANK	25.10	37.80	49.20	52.10	54.80	68.00
Water Tank	TK-116 - SAUSALITO BLVD. TANK	29.20	45.80	60.70	63.90	66.00	76.10
Water Tank	TK-117 - MESA VISTA TANK #1	40.90	57.00	67.30	69.70	71.50	80.10
Water Tank	TK-118 - COUNTYVIEW DRIVE TANK	53.40	74.20	86.70	89.10	89.70	93.00
Water Tank	TK-119 - LATTIE LANE TANK	45.40	61.00	70.40	72.50	74.10	81.90
Water Tank	TK-125 - TENNESSEE VALLEY TANK	51.20	70.80	82.70	85.00	85.90	90.30
Water Tank	TK-126 - HILL HAVEN TANK	59.30	81.70	92.40	94.30	94.70	96.40
Water Tank	TK-127 - PARADISE DRIVE TANK	47.90	64.90	73.20	75.10	76.60	83.60
Water Tank	TK-128 - MOUNT TIBURON TANK #1	42.00	57.90	68.00	70.30	72.00	80.50
Water Tank	TK-130 - SPRING LANE TANK #1	41.90	61.90	76.40	79.40	80.60	86.70
Water Tank	TK-131 - CONIFER WAY TANK	51.20	66.50	75.00	77.00	78.30	84.90
Water Tank	TK-139 - BUCKEYE CIRCLE TANK	57.30	72.30	78.70	80.20	81.40	87.00
Water Tank	TK-145 - ROSS RESERVOIR	62.40	80.20	89.60	91.40	92.00	94.60
Water Tank	TK-146 - FORBES HILL RESERVOIR	49.40	68.10	80.60	83.00	84.10	89.00
Water Tank	TK-147 - SMITH SADDLE TANK #1	18.80	28.60	38.50	41.30	44.40	59.60
Water Tank	TK-148 - SMITH SADDLE TANK #2	19.30	29.60	40.20	43.10	46.10	60.80
Water Tank	TK-150 - LOS ALTOS TANK	56.30	79.60	91.10	93.20	93.60	95.70
Water Tank	TK-152 - MADERA PARK (H/P) TANK	35.30	51.40	62.80	65.40	67.40	77.20
Water Tank	TK-153 - RAFAEL HIGHLANDS (H/P) TANK	51.30	72.30	85.40	87.80	88.60	92.20
Water Tank	TK-155 - PINE MOUNTAIN TUNNEL TANK	19.90	29.20	38.20	40.90	43.90	58.80
Water Tank	TK-156 - BON TEMPE CLEARWELL TANK	60.70	77.90	87.10	88.90	89.50	92.90
Water Tank	TK-157 - SAN GERONIMO CLEARWELL TANK #1	65.60	79.70	86.70	88.10	88.90	92.30
Water Tank	TK-158 - FAWN DRIVE TANK	61.00	82.90	93.10	94.90	95.20	96.80
Water Tank	TK-159 - PEACOCK GAP TANK	55.50	69.60	75.50	76.90	78.30	84.70
Water Tank	TK-160 - MARIN BAY TANK	52.90	73.30	83.20	85.20	86.10	90.40
Water Tank	TK-164 - TOMAHAWK DRIVE TANK	57.90	78.40	88.00	89.80	90.40	93.40
Water Tank	TK-165 - ALTO TANK #2	51.50	67.50	74.90	76.60	78.00	84.60
Water Tank	TK-166 - RING MOUNTAIN TANK	56.30	79.60	91.10	93.20	93.60	95.70
Water Tank	TK-167 - CREEKSIDE DRIVE TANK	62.70	76.80	82.50	83.80	84.70	89.30
Water Tank	TK-168 - MCNEAR DRIVE #1 (H/P) TANK	46.70	62.10	71.10	73.20	74.70	82.40
Water Tank	TK-169 - MCNEAR DRIVE #2 (H/P) TANK	46.70	62.10	71.10	73.20	74.70	82.40
Water Tank	TK-174 - VIA MONTEBELLO (H/P) TANK	57.90	80.80	91.90	93.90	94.20	96.10
Water Tank	TK-175 - MARINSHIP TANK	57.60	74.20	81.30	82.90	83.90	88.70
Water Tank	TK-181 - REDWOOD DRIVE UPPER TANK	70.00	91.90	97.70	98.70	98.70	99.10
Water Tank	TK-182 - ALTA AVENUE TANK	65.30	88.80	95.70	96.90	97.10	98.00
Water Tank	TK-183 - MINE RIDGE TANK	66.80	89.90	96.40	97.60	97.70	98.40



Type	Facility Name	Structure Replacement Cost	Structural - Probability of Damage				
			No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Water Tank	TK-184 - PACHECO RIDGE TANK #1	\$6,000,000	46.84%	27.89%	16.58%	7.32%	1.35%
Water Tank	TK-185 - PACHECO RIDGE TANK #2	\$6,000,000	46.84%	27.89%	16.58%	7.32%	1.35%
Water Tank	TK-186 - SAN GERONIMO CLEARWELL TANK #2	\$6,000,000	66.52%	17.10%	8.00%	6.73%	1.62%
Water Tank	TK-187 - MANZANITA TANK	\$120,000	41.07%	21.82%	12.00%	20.32%	4.77%
Water Tank	TK-188 - WOLFBACK RIDGE TANK #1	\$50,000	42.25%	31.49%	21.98%	3.98%	0.28%
Water Tank	TK-189 - WOLFBACK RIDGE TANK #2	\$50,000	42.25%	31.49%	21.98%	3.98%	0.28%
Water Tank	TK-190 - INVERNESS DRIVE TANK	\$280,000	40.47%	21.87%	12.15%	20.64%	4.84%
Water Tank	TK-191 - LONE TREE AVENUE TANK	\$200,000	51.17%	28.08%	15.78%	4.31%	0.64%
Water Tank	TK-192 - VERNAL AVE TANK	\$600,000	52.69%	28.92%	16.25%	2.06%	0.06%
Water Tank	TK-193 - H-LINE ROAD TANK	\$1,000,000	37.12%	22.66%	13.70%	21.50%	4.99%
Water Tank	TK-195 - Fire Road Pressure Tank	\$2,000	46.68%	21.07%	10.40%	17.66%	4.16%
Water Tank	TK-196 - WILSON WAY TANK	\$200,000	62.89%	26.84%	9.67%	0.53%	0.04%
Water Tank	TK-197 - SUMMIT TRAIL TANK	\$260,000	66.92%	24.48%	8.14%	0.41%	0.03%
Water Tank	TK-198 - SCOTT TANKS	\$120,000	66.15%	24.94%	8.42%	0.43%	0.03%
Water Tank	TK-199 - SCOTT TANKS	\$120,000	66.15%	24.94%	8.42%	0.43%	0.03%
Water Tank	TK-200 - OAK WOODLANDS TANK #1	\$230,000	51.36%	18.36%	6.03%	19.42%	4.81%
Water Tank	TK-201 - OAK WOODLANDS TANK #2	\$230,000	65.77%	23.51%	7.72%	2.42%	0.54%
Water Tank	TK-202 - Fairfax Manor 1st Lift Tank	\$40,000	29.62%	26.93%	15.31%	22.54%	5.57%
Water Tank	TK-203 - MONTE MAR VISTA TANK	\$120,000	54.37%	30.90%	13.09%	1.41%	0.21%
Water Tank	TK-204 - Bay Road Tank	\$240,000	5.11%	7.28%	28.18%	39.64%	19.78%
Water Tank	TK-205 - RICHARDSON DRIVE (H/P) TANK	\$2,000	57.97%	29.32%	11.61%	0.96%	0.12%
Water Tank	TK-206 - SANTA VENETIA TANK	\$620,000	67.50%	24.13%	7.93%	0.39%	0.03%
Water Tank	TK-207 - GOODHILL ROAD TANK	\$120,000	62.89%	26.84%	9.67%	0.53%	0.04%
Water Tank	TK-208 - SPRING LANE TANK #2	\$3,000,000	61.64%	27.51%	10.16%	0.60%	0.05%
Water Tank	TK-209 - FAIRHILLS TOP TANK #2	\$120,000	63.75%	26.35%	9.34%	0.50%	0.04%
Water Tank	TK-210 - BEACON HILL TANK	\$200,000	54.15%	30.77%	13.03%	1.74%	0.29%
Water Tank	TK-211 - Kent Fire Trail Tank #1	\$200,000	58.13%	24.80%	8.94%	6.54%	1.56%
Water Tank	TK-212 - Kent Fire Trail Tank #2	\$200,000	58.13%	24.80%	8.94%	6.54%	1.56%
Water Tank	TK-213 - MARIN CITY TANK	\$400,000	40.80%	23.19%	9.82%	20.97%	5.19%
Water Tank	TK-214 - SLIDE GULCH TANK	\$194,348	50.87%	18.60%	6.18%	19.49%	4.83%
Water Tank	TK-215 - SEQUOIA PARK TANK #1	\$220,000	48.14%	19.90%	7.05%	19.95%	4.93%
Water Tank	TK-216 - SEQUOIA PARK TANK #2	\$100,000	63.75%	26.35%	9.34%	0.50%	0.04%
Water Tank	TK-217 - KENT WOODLANDS 1ST LIFT TANK	\$200,000	62.89%	26.84%	9.67%	0.53%	0.04%
Water Tank	TK-218 - MOUNT TIBURON TANK #2	\$1,180,000	46.42%	20.72%	7.65%	20.20%	4.99%
Water Tank	TK-219 - OAK MANOR FIRST LIFT TANK	\$200,000	29.62%	26.93%	15.31%	22.54%	5.57%
Water Tank	TK-220 - TAM WOODS TOP TANK	\$160,000	48.96%	19.48%	6.77%	19.85%	4.91%
Water Tank	TK-221 - SUMMIT AVENUE LOWER TANK	\$200,000	66.92%	24.48%	8.14%	0.41%	0.03%
Water Tank	TK-222 - FRIAR TUCK LANE TANK	\$250,000	65.77%	23.51%	7.72%	2.42%	0.54%
Water Tank	TK-223 - CASCADE TANK #1	\$120,000	39.49%	35.91%	20.41%	3.56%	0.60%
Water Tank	TK-224 - CASCADE TANK #2	\$120,000	39.49%	35.91%	20.41%	3.56%	0.60%
Water Tank	TK-225 - SUGARLOAF TANK #1	\$254,000	46.42%	20.72%	7.65%	20.20%	4.99%
Water Tank	TK-226 - SUGARLOAF TANK #2	\$254,000	46.42%	20.72%	7.65%	20.20%	4.99%
Water Tank	TK-228 - GLENWOOD FOREST TANK	\$180,000	51.36%	18.36%	6.03%	19.42%	4.81%
Water Tank	TK-229 - KENT FIRE TRAIL TOP TANK	\$20,000	47.44%	20.24%	7.30%	20.05%	4.95%
Water Tank	TK-230 - SWIG TANK	\$100,000	78.43%	16.96%	4.39%	0.17%	0.02%
Water Tank	TK-232 - SKY RANCH TANK	\$240,000	39.34%	35.77%	20.34%	3.85%	0.68%
Water Tank	TK-233 - FAIRFAX MANOR TOP TANK	\$216,000	29.62%	26.93%	15.31%	22.54%	5.57%
Water Tank	TK-234 - TAM WOODS FIRST LIFT TANK	\$170,000	61.17%	24.34%	8.46%	4.86%	1.14%
Water Tank	TK-235 - FAIRVIEW PARK TANK	\$200,000	50.87%	18.60%	6.18%	19.49%	4.83%
Water Tank	TK-236 - FERN CANYON TANK	\$60,000	50.87%	18.60%	6.18%	19.49%	4.83%
Water Tank	TK-237 - CONIFER WAY UPPER TANK	\$200,000	58.42%	16.07%	4.64%	16.70%	4.15%
Water Tank	TK-238 - OAK AVENUE TANK	\$200,000	50.21%	18.93%	6.39%	19.59%	4.85%
Water Tank	TK-239 - ELINOR AVE TANK	\$226,000	50.87%	18.60%	6.18%	19.49%	4.83%
Water Tank	TK-240 - Summit Ave Upper Tank	\$240,000	64.99%	23.77%	7.90%	2.70%	0.61%
Water Tank	TK-241 - LAGUNITAS PICNIC GROUNDS TANK	\$1,100	86.75%	9.26%	0.52%	2.76%	0.68%
Water Tank	TK-243 - MARINER HIGHLANDS TANK	\$120,000	43.55%	22.02%	8.72%	20.59%	5.09%
Water Tank	TK-244 - UPPER ROAD TANK	\$80,000	47.44%	20.24%	7.30%	20.05%	4.95%
AVERAGE			45.34%	17.80%	16.27%	16.81%	3.76%

Type	Facility Name	Nonstructural Acceleration-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Water Tank	TK-184 - PACHECO RIDGE TANK #1					
Water Tank	TK-185 - PACHECO RIDGE TANK #2					
Water Tank	TK-186 - SAN GERONIMO CLEARWELL TANK #2					
Water Tank	TK-187 - MANZANITA TANK					
Water Tank	TK-188 - WOLFBACK RIDGE TANK #1					
Water Tank	TK-189 - WOLFBACK RIDGE TANK #2					
Water Tank	TK-190 - INVERNESS DRIVE TANK					
Water Tank	TK-191 - LONE TREE AVENUE TANK					
Water Tank	TK-192 - VERNAL AVE TANK					
Water Tank	TK-193 - H-LINE ROAD TANK					
Water Tank	TK-195 - Fire Road Pressure Tank					
Water Tank	TK-196 - WILSON WAY TANK					
Water Tank	TK-197 - SUMMIT TRAIL TANK					
Water Tank	TK-198 - SCOTT TANKS					
Water Tank	TK-199 - SCOTT TANKS					
Water Tank	TK-200 - OAK WOODLANDS TANK #1					
Water Tank	TK-201 - OAK WOODLANDS TANK #2					
Water Tank	TK-202 - Fairfax Manor 1st Lift Tank					
Water Tank	TK-203 - MONTE MAR VISTA TANK					
Water Tank	TK-204 - Bay Road Tank					
Water Tank	TK-205 - RICHARDSON DRIVE (H/P) TANK					
Water Tank	TK-206 - SANTA VENETIA TANK					
Water Tank	TK-207 - GOODHILL ROAD TANK					
Water Tank	TK-208 - SPRING LANE TANK #2					
Water Tank	TK-209 - FAIRHILLS TOP TANK #2					
Water Tank	TK-210 - BEACON HILL TANK					
Water Tank	TK-211 - Kent Fire Trail Tank #1					
Water Tank	TK-212 - Kent Fire Trail Tank #2					
Water Tank	TK-213 - MARIN CITY TANK					
Water Tank	TK-214 - SLIDE GULCH TANK					
Water Tank	TK-215 - SEQUOIA PARK TANK #1					
Water Tank	TK-216 - SEQUOIA PARK TANK #2					
Water Tank	TK-217 - KENT WOODLANDS 1ST LIFT TANK					
Water Tank	TK-218 - MOUNT TIBURON TANK #2					
Water Tank	TK-219 - OAK MANOR FIRST LIFT TANK					
Water Tank	TK-220 - TAM WOODS TOP TANK					
Water Tank	TK-221 - SUMMIT AVENUE LOWER TANK					
Water Tank	TK-222 - FRIAR TUCK LANE TANK					
Water Tank	TK-223 - CASCADE TANK #1					
Water Tank	TK-224 - CASCADE TANK #2					
Water Tank	TK-225 - SUGARLOAF TANK #1					
Water Tank	TK-226 - SUGARLOAF TANK #2					
Water Tank	TK-228 - GLENWOOD FOREST TANK					
Water Tank	TK-229 - KENT FIRE TRAIL TOP TANK					
Water Tank	TK-230 - SWIG TANK					
Water Tank	TK-232 - SKY RANCH TANK					
Water Tank	TK-233 - FAIRFAX MANOR TOP TANK					
Water Tank	TK-234 - TAM WOODS FIRST LIFT TANK					
Water Tank	TK-235 - FAIRVIEW PARK TANK					
Water Tank	TK-236 - FERN CANYON TANK					
Water Tank	TK-237 - CONIFER WAY UPPER TANK					
Water Tank	TK-238 - OAK AVENUE TANK					
Water Tank	TK-239 - ELINOR AVE TANK					
Water Tank	TK-240 - Summit Ave Upper Tank					
Water Tank	TK-241 - LAGUNITAS PICNIC GROUNDS TANK					
Water Tank	TK-243 - MARINER HIGHLANDS TANK					
Water Tank	TK-244 - UPPER ROAD TANK					
<b>AVERAGE</b>		<b>52.05%</b>	<b>28.62%</b>	<b>6.89%</b>	<b>10.02%</b>	<b>2.40%</b>

Type	Facility Name	Nonstructural Drift-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Water Tank	TK-184 - PACHECO RIDGE TANK #1					
Water Tank	TK-185 - PACHECO RIDGE TANK #2					
Water Tank	TK-186 - SAN GERONIMO CLEARWELL TANK #2					
Water Tank	TK-187 - MANZANITA TANK					
Water Tank	TK-188 - WOLFBACK RIDGE TANK #1					
Water Tank	TK-189 - WOLFBACK RIDGE TANK #2					
Water Tank	TK-190 - INVERNESS DRIVE TANK					
Water Tank	TK-191 - LONE TREE AVENUE TANK					
Water Tank	TK-192 - VERNAL AVE TANK					
Water Tank	TK-193 - H-LINE ROAD TANK					
Water Tank	TK-195 - Fire Road Pressure Tank					
Water Tank	TK-196 - WILSON WAY TANK					
Water Tank	TK-197 - SUMMIT TRAIL TANK					
Water Tank	TK-198 - SCOTT TANKS					
Water Tank	TK-199 - SCOTT TANKS					
Water Tank	TK-200 - OAK WOODLANDS TANK #1					
Water Tank	TK-201 - OAK WOODLANDS TANK #2					
Water Tank	TK-202 - Fairfax Manor 1st Lift Tank					
Water Tank	TK-203 - MONTE MAR VISTA TANK					
Water Tank	TK-204 - Bay Road Tank					
Water Tank	TK-205 - RICHARDSON DRIVE (H/P) TANK					
Water Tank	TK-206 - SANTA VENETIA TANK					
Water Tank	TK-207 - GOODHILL ROAD TANK					
Water Tank	TK-208 - SPRING LANE TANK #2					
Water Tank	TK-209 - FAIRHILLS TOP TANK #2					
Water Tank	TK-210 - BEACON HILL TANK					
Water Tank	TK-211 - Kent Fire Trail Tank #1					
Water Tank	TK-212 - Kent Fire Trail Tank #2					
Water Tank	TK-213 - MARIN CITY TANK					
Water Tank	TK-214 - SLIDE GULCH TANK					
Water Tank	TK-215 - SEQUOIA PARK TANK #1					
Water Tank	TK-216 - SEQUOIA PARK TANK #2					
Water Tank	TK-217 - KENT WOODLANDS 1ST LIFT TANK					
Water Tank	TK-218 - MOUNT TIBURON TANK #2					
Water Tank	TK-219 - OAK MANOR FIRST LIFT TANK					
Water Tank	TK-220 - TAM WOODS TOP TANK					
Water Tank	TK-221 - SUMMIT AVENUE LOWER TANK					
Water Tank	TK-222 - FRIAR TUCK LANE TANK					
Water Tank	TK-223 - CASCADE TANK #1					
Water Tank	TK-224 - CASCADE TANK #2					
Water Tank	TK-225 - SUGARLOAF TANK #1					
Water Tank	TK-226 - SUGARLOAF TANK #2					
Water Tank	TK-228 - GLENWOOD FOREST TANK					
Water Tank	TK-229 - KENT FIRE TRAIL TOP TANK					
Water Tank	TK-230 - SWIG TANK					
Water Tank	TK-232 - SKY RANCH TANK					
Water Tank	TK-233 - FAIRFAX MANOR TOP TANK					
Water Tank	TK-234 - TAM WOODS FIRST LIFT TANK					
Water Tank	TK-235 - FAIRVIEW PARK TANK					
Water Tank	TK-236 - FERN CANYON TANK					
Water Tank	TK-237 - CONIFER WAY UPPER TANK					
Water Tank	TK-238 - OAK AVENUE TANK					
Water Tank	TK-239 - ELINOR AVE TANK					
Water Tank	TK-240 - Summit Ave Upper Tank					
Water Tank	TK-241 - LAGUNITAS PICNIC GROUNDS TANK					
Water Tank	TK-243 - MARINER HIGHLANDS TANK					
Water Tank	TK-244 - UPPER ROAD TANK					
<b>AVERAGE</b>		<b>72.22%</b>	<b>13.55%</b>	<b>2.30%</b>	<b>9.54%</b>	<b>2.37%</b>

Type	Facility Name	Losses (in dollars)			
		Structure	Nonstructural Drift Sensitive	Nonstructural Acceleration-Sensitive	Total Building Loss
Water Tank	TK-184 - PACHECO RIDGE TANK #1	\$577,410			\$577,410
Water Tank	TK-185 - PACHECO RIDGE TANK #2	\$577,410			\$577,410
Water Tank	TK-186 - SAN GERONIMO CLEARWELL TANK #2	\$462,780			\$462,780
Water Tank	TK-187 - MANZANITA TANK	\$23,824			\$23,824
Water Tank	TK-188 - WOLFBACK RIDGE TANK #1	\$3,770			\$3,770
Water Tank	TK-189 - WOLFBACK RIDGE TANK #2	\$3,770			\$3,770
Water Tank	TK-190 - INVERNESS DRIVE TANK	\$56,392			\$56,392
Water Tank	TK-191 - LONE TREE AVENUE TANK	\$13,994			\$13,994
Water Tank	TK-192 - VERNAL AVE TANK	\$31,077			\$31,077
Water Tank	TK-193 - H-LINE ROAD TANK	\$210,780			\$210,780
Water Tank	TK-195 - Fire Road Pressure Tank	\$347			\$347
Water Tank	TK-196 - WILSON WAY TANK	\$6,301			\$6,301
Water Tank	TK-197 - SUMMIT TRAIL TANK	\$7,075			\$7,075
Water Tank	TK-198 - SCOTT TANKS	\$3,358			\$3,358
Water Tank	TK-199 - SCOTT TANKS	\$3,358			\$3,358
Water Tank	TK-200 - OAK WOODLANDS TANK #1	\$42,054			\$42,054
Water Tank	TK-201 - OAK WOODLANDS TANK #2	\$9,949			\$9,949
Water Tank	TK-202 - Fairfax Manor 1st Lift Tank	\$9,095			\$9,095
Water Tank	TK-203 - MONTE MAR VISTA TANK	\$5,477			\$5,477
Water Tank	TK-204 - Bay Road Tank	\$115,572			\$115,572
Water Tank	TK-205 - RICHARDSON DRIVE (H/P) TANK	\$78			\$78
Water Tank	TK-206 - SANTA VENETIA TANK	\$16,492			\$16,492
Water Tank	TK-207 - GOODHILL ROAD TANK	\$3,781			\$3,781
Water Tank	TK-208 - SPRING LANE TANK #2	\$99,285			\$99,285
Water Tank	TK-209 - FAIRHILLS TOP TANK #2	\$3,670			\$3,670
Water Tank	TK-210 - BEACON HILL TANK	\$9,654			\$9,654
Water Tank	TK-211 - Kent Fire Trail Tank #1	\$16,130			\$16,130
Water Tank	TK-212 - Kent Fire Trail Tank #2	\$16,130			\$16,130
Water Tank	TK-213 - MARIN CITY TANK	\$81,618			\$81,618
Water Tank	TK-214 - SLIDE GULCH TANK	\$35,723			\$35,723
Water Tank	TK-215 - SEQUOIA PARK TANK #1	\$41,696			\$41,696
Water Tank	TK-216 - SEQUOIA PARK TANK #2	\$3,059			\$3,059
Water Tank	TK-217 - KENT WOODLANDS 1ST LIFT TANK	\$6,301			\$6,301
Water Tank	TK-218 - MOUNT TIBURON TANK #2	\$227,663			\$227,663
Water Tank	TK-219 - OAK MANOR FIRST LIFT TANK	\$45,474			\$45,474
Water Tank	TK-220 - TAM WOODS TOP TANK	\$30,095			\$30,095
Water Tank	TK-221 - SUMMIT AVENUE LOWER TANK	\$5,442			\$5,442
Water Tank	TK-222 - FRIAR TUCK LANE TANK	\$10,814			\$10,814
Water Tank	TK-223 - CASCADE TANK #1	\$9,112			\$9,112
Water Tank	TK-224 - CASCADE TANK #2	\$9,112			\$9,112
Water Tank	TK-225 - SUGARLOAF TANK #1	\$49,005			\$49,005
Water Tank	TK-226 - SUGARLOAF TANK #2	\$49,005			\$49,005
Water Tank	TK-228 - GLENWOOD FOREST TANK	\$32,912			\$32,912
Water Tank	TK-229 - KENT FIRE TRAIL TOP TANK	\$3,817			\$3,817
Water Tank	TK-230 - SWIG TANK	\$1,629			\$1,629
Water Tank	TK-232 - SKY RANCH TANK	\$18,791			\$18,791
Water Tank	TK-233 - FAIRFAX MANOR TOP TANK	\$49,112			\$49,112
Water Tank	TK-234 - TAM WOODS FIRST LIFT TANK	\$11,121			\$11,121
Water Tank	TK-235 - FAIRVIEW PARK TANK	\$36,762			\$36,762
Water Tank	TK-236 - FERN CANYON TANK	\$11,029			\$11,029
Water Tank	TK-237 - CONIFER WAY UPPER TANK	\$31,339			\$31,339
Water Tank	TK-238 - OAK AVENUE TANK	\$37,018			\$37,018
Water Tank	TK-239 - ELINOR AVE TANK	\$41,541			\$41,541
Water Tank	TK-240 - Summit Ave Upper Tank	\$11,048			\$11,048
Water Tank	TK-241 - LAGUNITAS PICNIC GROUNDS TANK	\$32			\$32
Water Tank	TK-243 - MARINER HIGHLANDS TANK	\$23,824			\$23,824
Water Tank	TK-244 - UPPER ROAD TANK	\$15,270			\$15,270
<b>AVERAGE</b>		<b>\$99,267,320</b>	<b>\$15,548</b>	<b>\$19,243</b>	<b>\$99,302,112</b>

Type	Facility Name	Functionality (%)					
		At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Water Tank	TK-184 - PACHECO RIDGE TANK #1	60.20	83.90	91.30	92.70	93.10	95.20
Water Tank	TK-185 - PACHECO RIDGE TANK #2	60.20	83.90	91.30	92.70	93.10	95.20
Water Tank	TK-186 - SAN GERONIMO CLEARWELL TANK #2	74.60	88.60	92.20	93.00	93.40	95.30
Water Tank	TK-187 - MANZANITA TANK	53.70	72.10	77.60	79.00	80.20	86.10
Water Tank	TK-188 - WOLFBACK RIDGE TANK #1	57.30	85.00	94.70	96.40	96.60	97.70
Water Tank	TK-189 - WOLFBACK RIDGE TANK #2	57.30	85.00	94.70	96.40	96.60	97.70
Water Tank	TK-190 - INVERNESS DRIVE TANK	53.20	71.70	77.30	78.70	79.90	85.90
Water Tank	TK-191 - LONE TREE AVENUE TANK	63.90	87.50	94.50	95.80	96.10	97.30
Water Tank	TK-192 - VERNAL AVE TANK	65.40	89.70	96.90	98.20	98.30	98.80
Water Tank	TK-193 - H-LINE ROAD TANK	50.60	70.00	76.30	77.80	79.10	85.30
Water Tank	TK-195 - Fire Road Pressure Tank	58.30	75.70	80.50	81.70	82.80	87.90
Water Tank	TK-196 - WILSON WAY TANK	73.30	94.50	98.70	99.40	99.50	99.60
Water Tank	TK-197 - SUMMIT TRAIL TANK	76.30	95.40	99.00	99.60	99.60	99.70
Water Tank	TK-198 - SCOTT TANKS	75.70	95.20	98.90	99.50	99.60	99.70
Water Tank	TK-199 - SCOTT TANKS	75.70	95.20	98.90	99.50	99.60	99.70
Water Tank	TK-200 - OAK WOODLANDS TANK #1	61.50	75.90	78.80	79.70	80.90	86.60
Water Tank	TK-201 - OAK WOODLANDS TANK #2	75.10	93.40	96.80	97.40	97.60	98.30
Water Tank	TK-202 - Fairfax Manor 1st Lift Tank	44.90	67.80	74.80	76.50	77.80	84.40
Water Tank	TK-203 - MONTE MAR VISTA TANK	66.90	91.80	97.60	98.60	98.70	99.10
Water Tank	TK-204 - Bay Road Tank	21.00	33.80	46.80	49.90	52.60	65.60
Water Tank	TK-205 - RICHARDSON DRIVE (H/P) TANK	69.60	93.00	98.10	99.00	99.10	99.40
Water Tank	TK-206 - SANTA VENETIA TANK	76.70	95.50	99.00	99.60	99.60	99.70
Water Tank	TK-207 - GOODHILL ROAD TANK	73.30	94.50	98.70	99.40	99.50	99.60
Water Tank	TK-208 - SPRING LANE TANK #2	72.40	94.10	98.60	99.40	99.40	99.60
Water Tank	TK-209 - FAIRHILLS TOP TANK #2	73.90	94.70	98.80	99.50	99.50	99.60
Water Tank	TK-210 - BEACON HILL TANK	66.70	91.50	97.20	98.20	98.30	98.80
Water Tank	TK-211 - Kent Fire Trail Tank #1	68.80	88.30	92.30	93.20	93.60	95.50
Water Tank	TK-212 - Kent Fire Trail Tank #2	68.80	88.30	92.30	93.20	93.60	95.50
Water Tank	TK-213 - MARIN CITY TANK	53.50	72.30	76.90	78.10	79.30	85.50
Water Tank	TK-214 - SLIDE GULCH TANK	61.10	75.70	78.70	79.60	80.80	86.50
Water Tank	TK-215 - SEQUOIA PARK TANK #1	59.00	74.80	78.20	79.20	80.30	86.20
Water Tank	TK-216 - SEQUOIA PARK TANK #2	73.90	94.70	98.80	99.50	99.50	99.60
Water Tank	TK-217 - KENT WOODLANDS 1ST LIFT TANK	73.30	94.50	98.70	99.40	99.50	99.60
Water Tank	TK-218 - MOUNT TIBURON TANK #2	57.80	74.20	77.90	78.90	80.10	86.00
Water Tank	TK-219 - OAK MANOR FIRST LIFT TANK	44.90	67.80	74.80	76.50	77.80	84.40
Water Tank	TK-220 - TAM WOODS TOP TANK	59.70	75.10	78.30	79.30	80.40	86.20
Water Tank	TK-221 - SUMMIT AVENUE LOWER TANK	76.30	95.40	99.00	99.60	99.60	99.70
Water Tank	TK-222 - FRIAR TUCK LANE TANK	75.10	93.40	96.80	97.40	97.60	98.30
Water Tank	TK-223 - CASCADE TANK #1	55.50	85.80	94.90	96.50	96.70	97.70
Water Tank	TK-224 - CASCADE TANK #2	55.50	85.80	94.90	96.50	96.70	97.70
Water Tank	TK-225 - SUGARLOAF TANK #1	57.80	74.20	77.90	78.90	80.10	86.00
Water Tank	TK-226 - SUGARLOAF TANK #2	57.80	74.20	77.90	78.90	80.10	86.00
Water Tank	TK-228 - GLENWOOD FOREST TANK	61.50	75.90	78.80	79.70	80.90	86.60
Water Tank	TK-229 - KENT FIRE TRAIL TOP TANK	58.50	74.60	78.10	79.10	80.30	86.10
Water Tank	TK-230 - SWIG TANK	84.60	97.50	99.40	99.80	99.80	99.80
Water Tank	TK-232 - SKY RANCH TANK	55.40	85.60	94.60	96.20	96.40	97.50
Water Tank	TK-233 - FAIRFAX MANOR TOP TANK	44.90	67.80	74.80	76.50	77.80	84.40
Water Tank	TK-234 - TAM WOODS FIRST LIFT TANK	71.30	90.40	94.20	94.90	95.20	96.60
Water Tank	TK-235 - FAIRVIEW PARK TANK	61.10	75.70	78.70	79.60	80.80	86.50
Water Tank	TK-236 - FERN CANYON TANK	61.10	75.70	78.70	79.60	80.80	86.50
Water Tank	TK-237 - CONIFER WAY UPPER TANK	67.10	79.50	81.80	82.50	83.50	88.40
Water Tank	TK-238 - OAK AVENUE TANK	60.60	75.50	78.60	79.50	80.70	86.40
Water Tank	TK-239 - ELINOR AVE TANK	61.10	75.70	78.70	79.60	80.80	86.50
Water Tank	TK-240 - Summit Ave Upper Tank	74.40	93.00	96.50	97.20	97.30	98.10
Water Tank	TK-241 - LAGUNITAS PICNIC GROUNDS TANK	90.10	96.70	96.90	97.00	97.20	98.00
Water Tank	TK-243 - MARINER HIGHLANDS TANK	55.60	73.30	77.40	78.50	79.70	85.70
Water Tank	TK-244 - UPPER ROAD TANK	58.50	74.60	78.10	79.10	80.30	86.10
AVERAGE		58.64	73.53	81.81	85.20	89.42	93.72

			Structural - Probability of Damage				
Type	Facility Name	Structure Replacement Cost	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Pump Station	PS-049 - Channing Way Pump Station	\$1,000,000	35.78%	13.47%	17.31%	28.09%	5.32%
Pump Station	PS-111 - Quail Hill Pump Station	\$1,000,000	61.88%	19.57%	15.42%	2.79%	0.32%
Pump Station	PS-112 - Freitas Parkway Pump Station	\$1,000,000	78.08%	16.39%	5.31%	0.17%	0.03%
Water Tank	TK-103 - TERRA LINDA TANK #1	\$1,000,000	27.99%	14.31%	22.17%	29.50%	6.00%
Water Tank	TK-170 - TERRA LINDA TANK #2	\$1,000,000	36.40%	17.21%	17.29%	23.97%	5.11%
Water Tank	TK-227 - LGWRP Clearwell	\$1,800,000	51.36%	18.36%	6.03%	19.42%	4.81%
<b>AVERAGE</b>			<b>48.58%</b>	<b>16.55%</b>	<b>13.92%</b>	<b>17.32%</b>	<b>3.60%</b>

Type	Facility Name	Nonstructural Acceleration-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Pump Station	PS-049 - Channing Way Pump Station					
Pump Station	PS-111 - Quail Hill Pump Station					
Pump Station	PS-112 - Freitas Parkway Pump Station					
Water Tank	TK-103 - TERRA LINDA TANK #1					
Water Tank	TK-170 - TERRA LINDA TANK #2					
Water Tank	TK-227 - LGWRP Clearwell					
<b>AVERAGE</b>		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!



Type	Facility Name	Nonstructural Drift-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Pump Station	PS-049 - Channing Way Pump Station					
Pump Station	PS-111 - Quail Hill Pump Station					
Pump Station	PS-112 - Freitas Parkway Pump Station					
Water Tank	TK-103 - TERRA LINDA TANK #1					
Water Tank	TK-170 - TERRA LINDA TANK #2					
Water Tank	TK-227 - LGWRP Clearwell					
<b>AVERAGE</b>		<b>#DIV/0!</b>	<b>#DIV/0!</b>	<b>#DIV/0!</b>	<b>#DIV/0!</b>	<b>#DIV/0!</b>

Type	Facility Name	Losses (in dollars)			
		Structure	Nonstructural Drift-Sensitive	Nonstructural Acceleration- Sensitive	Total Building Loss
Pump Station	PS-049 - Channing Way Pump Station	\$254,440			\$254,440
Pump Station	PS-111 - Quail Hill Pump Station	\$52,855			\$52,855
Pump Station	PS-112 - Freitas Parkway Pump Station	\$17,480			\$17,480
Water Tank	TK-103 - TERRA LINDA TANK #1	\$277,410			\$277,410
Water Tank	TK-170 - TERRA LINDA TANK #2	\$229,460			\$229,460
Water Tank	TK-227 - LGWRP Clearwell	\$329,121			\$329,121
<b>AVERAGE</b>		<b>\$1,160,766</b>	<b>\$0</b>	<b>\$0</b>	<b>\$1,160,766</b>

Type	Facility Name	Functionality (%)					
		At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Pump Station	PS-049 - Channing Way Pump Station	43.20	59.70	69.90	74.50	88.70	99.10
Pump Station	PS-111 - Quail Hill Pump Station	69.90	89.10	97.10	97.60	99.00	99.90
Pump Station	PS-112 - Freitas Parkway Pump Station	84.00	97.00	99.70	99.80	99.90	99.90
Water Tank	TK-103 - TERRA LINDA TANK #1	41.90	57.90	68.00	70.30	72.10	80.50
Water Tank	TK-170 - TERRA LINDA TANK #2	49.30	65.90	73.90	75.70	77.10	84.00
Water Tank	TK-227 - LGWRP Clearwell	61.50	75.90	78.80	79.70	80.90	86.60
<b>AVERAGE</b>		<b>58.30</b>	<b>74.25</b>	<b>81.23</b>	<b>82.93</b>	<b>86.28</b>	<b>91.67</b>

Replacement Cost	Total Number of Leaks	Total Number of Breaks	Total Number of Repairs	Days to Repair Leaks	Days to Repair Breaks	Total Days of Repairs	Economic Loss
\$3,215,180,970	4.5	1.1	5.6	0.6	0.2	0.8	\$28,207

Replacement Cost	Total Number of Leaks	Total Number of Breaks	Total Number of Repairs	Days to Repair Leaks	Days to Repair Breaks	Total Days of Repairs	Economic Loss
\$90,567,746	0.5	0.1	0.7	0.1	0.0	0.1	\$3,376

			Structural - Probability of Damage				
Type	Facility Name	Structure Replacement Cost	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Building	Administration Building - Headquarter Office	\$8,192,293	0.24%	8.45%	63.78%	25.18%	2.34%
Building	Corporation Yard - Boat Barn	\$1,000,000	0.42%	10.53%	51.02%	32.08%	5.93%
Building	Corporation Yard - Facilities Offices	\$15,000,000	0.24%	8.45%	63.78%	25.18%	2.34%
Building	Corporation Yard - Laboratory	\$5,000,000	56.93%	38.30%	2.92%	1.47%	0.36%
Building	Corporation Yard - Satellite Office	\$500,000	0.03%	1.60%	28.05%	59.54%	10.75%
Building	Pelican Yard - Vehicle Storage	\$500,000	9.32%	41.10%	23.91%	20.64%	5.01%
Building	Pelican Yard - Vehicle Storage	\$750,000	9.32%	41.10%	23.91%	20.64%	5.01%
Building	Ranger Housing - Alpine Dam - Residence	\$500,000	54.72%	34.72%	10.40%	0.14%	0.00%
Building	Ranger Housing - Lagunitas Dam	\$250,000	88.42%	11.33%	0.23%	0.00%	0.00%
Building	Ranger Housing - Lagunitas Dam	\$500,000	88.42%	11.33%	0.23%	0.00%	0.00%
Building	Ranger Housing - Phoenix Dam - Residence	\$500,000	84.21%	15.37%	0.41%	0.00%	0.00%
Building	Ranger Housing - Phoenix Dam - Shed	\$46,514	45.52%	27.51%	2.31%	19.71%	4.92%
Building	Ranger Housing - Portius House	\$500,000	96.14%	3.83%	0.01%	0.00%	0.00%
Building	Ranger Housing - Portius House - Garage	\$236,142	92.47%	2.59%	0.01%	3.93%	0.98%
Building	Ranger Housing - Portius House - Shed	\$99,111	45.52%	27.51%	2.31%	19.71%	4.92%
Building	Ranger Housing - Portius House - Shed	\$47,981	45.52%	27.51%	2.31%	19.71%	4.92%
Building	Ranger Housing - Sky Oaks - Residence	\$500,000	84.07%	10.77%	0.22%	3.93%	0.98%
Building	Ranger Housing - Soulajule Residence	\$500,000	92.11%	7.76%	0.12%	0.00%	0.00%
Building	Sky Oaks Headquarters - Entrance Kiosk	\$23,793	88.08%	11.56%	0.35%	0.00%	0.00%
Building	Sky Oaks Headquarters - Fisheries Office	\$272,737	29.34%	44.16%	25.62%	0.86%	0.00%
Building	Sky Oaks Headquarters - Headquarter Office	\$1,500,000	60.39%	36.51%	3.07%	0.01%	0.00%
Building	Sky Oaks Headquarters - Seed Shed	\$83,465	57.42%	34.71%	2.92%	3.94%	0.98%
Building	Sky Oaks Headquarters - Storage Shed	\$131,768	60.39%	36.51%	3.07%	0.01%	0.00%
Building	Sky Oaks Headquarters - Watershed Office	\$676,918	29.34%	44.16%	25.62%	0.86%	0.00%
<b>Average or Total</b>			<b>50.77%</b>	<b>22.39%</b>	<b>14.02%</b>	<b>10.73%</b>	<b>2.06%</b>

Type	Facility Name	Nonstructural Acceleration-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Building	Administration Building - Headquarter Office	30.79%	41.83%	20.57%	4.90%	1.88%
Building	Corporation Yard - Boat Barn	23.76%	32.28%	15.87%	22.33%	5.73%
Building	Corporation Yard - Facilities Offices	30.79%	41.83%	20.57%	4.90%	1.88%
Building	Corporation Yard - Laboratory	34.04%	42.21%	19.21%	4.05%	0.47%
Building	Corporation Yard - Satellite Office	26.37%	27.24%	10.64%	26.07%	9.66%
Building	Pelican Yard - Vehicle Storage	22.44%	32.69%	17.06%	22.63%	5.16%
Building	Pelican Yard - Vehicle Storage	22.44%	32.69%	17.06%	22.63%	5.16%
Building	Ranger Housing - Alpine Dam - Residence	67.88%	26.84%	4.98%	0.27%	0.01%
Building	Ranger Housing - Lagunitas Dam	61.86%	30.87%	6.80%	0.44%	0.01%
Building	Ranger Housing - Lagunitas Dam	61.86%	30.87%	6.80%	0.44%	0.01%
Building	Ranger Housing - Phoenix Dam - Residence	58.24%	33.10%	8.04%	0.57%	0.02%
Building	Ranger Housing - Phoenix Dam - Shed	38.20%	28.07%	8.32%	20.42%	4.95%
Building	Ranger Housing - Portius House	89.99%	9.25%	0.72%	0.02%	0.00%
Building	Ranger Housing - Portius House - Garage	82.27%	11.66%	1.10%	3.97%	0.98%
Building	Ranger Housing - Portius House - Shed	38.20%	28.07%	8.32%	20.42%	4.95%
Building	Ranger Housing - Portius House - Shed	38.20%	28.07%	8.32%	20.42%	4.95%
Building	Ranger Housing - Sky Oaks - Residence	58.81%	29.35%	6.46%	4.35%	1.00%
Building	Ranger Housing - Soulajule Residence	71.90%	23.95%	3.94%	0.20%	0.00%
Building	Sky Oaks Headquarters - Entrance Kiosk	56.91%	33.89%	8.53%	0.63%	0.02%
Building	Sky Oaks Headquarters - Fisheries Office	58.07%	33.20%	8.10%	0.58%	0.02%
Building	Sky Oaks Headquarters - Headquarter Office	50.69%	37.25%	11.04%	0.97%	0.03%
Building	Sky Oaks Headquarters - Seed Shed	48.20%	35.41%	10.50%	4.85%	1.01%
Building	Sky Oaks Headquarters - Storage Shed	50.69%	37.25%	11.04%	0.97%	0.03%
Building	Sky Oaks Headquarters - Watershed Office	58.07%	33.20%	8.10%	0.58%	0.02%
<b>Average or Total</b>		<b>49.19%</b>	<b>30.88%</b>	<b>10.09%</b>	<b>7.82%</b>	<b>2.00%</b>



		Nonstructural Drift-Sensitive - Probability of Damage				
Type	Facility Name	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Building	Administration Building - Headquarter Office	0.56%	5.81%	52.07%	30.79%	10.74%
Building	Corporation Yard - Boat Barn	0.86%	7.01%	44.19%	36.69%	11.23%
Building	Corporation Yard - Facilities Offices	0.56%	5.81%	52.07%	30.79%	10.74%
Building	Corporation Yard - Laboratory	55.96%	32.80%	9.27%	1.59%	0.36%
Building	Corporation Yard - Satellite Office	0.12%	2.52%	29.14%	46.73%	21.47%
Building	Pelican Yard - Vehicle Storage	11.57%	28.12%	32.56%	22.60%	5.13%
Building	Pelican Yard - Vehicle Storage	11.57%	28.12%	32.56%	22.60%	5.13%
Building	Ranger Housing - Alpine Dam - Residence	54.18%	32.63%	12.86%	0.31%	0.00%
Building	Ranger Housing - Lagunitas Dam	85.29%	13.14%	1.54%	0.01%	0.00%
Building	Ranger Housing - Lagunitas Dam	85.29%	13.14%	1.54%	0.01%	0.00%
Building	Ranger Housing - Phoenix Dam - Residence	81.04%	16.60%	2.32%	0.01%	0.00%
Building	Ranger Housing - Phoenix Dam - Shed	44.72%	23.55%	7.01%	19.76%	4.93%
Building	Ranger Housing - Portius House	86.18%	12.61%	1.19%	0.00%	0.00%
Building	Ranger Housing - Portius House - Garage	84.52%	9.73%	0.81%	3.93%	0.98%
Building	Ranger Housing - Portius House - Shed	44.72%	23.55%	7.01%	19.76%	4.93%
Building	Ranger Housing - Portius House - Shed	44.72%	23.55%	7.01%	19.76%	4.93%
Building	Ranger Housing - Sky Oaks - Residence	81.10%	12.49%	1.47%	3.94%	0.98%
Building	Ranger Housing - Soulajule Residence	89.23%	9.80%	0.96%	0.00%	0.00%
Building	Sky Oaks Headquarters - Entrance Kiosk	85.09%	13.04%	1.84%	0.01%	0.00%
Building	Sky Oaks Headquarters - Fisheries Office	31.54%	39.74%	27.30%	1.37%	0.03%
Building	Sky Oaks Headquarters - Headquarter Office	59.33%	31.25%	9.30%	0.08%	0.01%
Building	Sky Oaks Headquarters - Seed Shed	56.41%	29.72%	8.85%	4.01%	0.99%
Building	Sky Oaks Headquarters - Storage Shed	59.33%	31.25%	9.30%	0.08%	0.01%
Building	Sky Oaks Headquarters - Watershed Office	31.54%	39.74%	27.30%	1.37%	0.03%
<b>Average or Total</b>		<b>49.39%</b>	<b>20.24%</b>	<b>15.81%</b>	<b>11.09%</b>	<b>3.44%</b>

Type	Facility Name	Losses (in dollars)			
		Structure	Nonstructural Drift-Sensitive	Nonstructural Acceleration- Sensitive	Total Building Loss
Building	Administration Building - Headquarter Office	\$336,882	\$847,247	\$243,307	\$1,427,436
Building	Corporation Yard - Boat Barn	\$88,141	\$90,100	\$60,487	\$238,729
Building	Corporation Yard - Facilities Offices	\$616,827	\$1,551,300	\$445,493	\$2,613,620
Building	Corporation Yard - Laboratory	\$20,946	\$45,736	\$105,515	\$172,197
Building	Corporation Yard - Satellite Office	\$41,596	\$78,533	\$45,686	\$165,815
Building	Pelican Yard - Vehicle Storage	\$29,893	\$26,790	\$29,525	\$86,208
Building	Pelican Yard - Vehicle Storage	\$44,840	\$40,185	\$44,287	\$129,311
Building	Ranger Housing - Alpine Dam - Residence	\$2,146	\$5,234	\$1,465	\$8,845
Building	Ranger Housing - Lagunitas Dam	\$155	\$527	\$940	\$1,622
Building	Ranger Housing - Lagunitas Dam	\$310	\$1,055	\$1,879	\$3,243
Building	Ranger Housing - Phoenix Dam - Residence	\$431	\$1,423	\$2,168	\$4,021
Building	Ranger Housing - Phoenix Dam - Shed	\$2,338	\$1,971	\$2,391	\$6,700
Building	Ranger Housing - Portius House	\$97	\$928	\$337	\$1,361
Building	Ranger Housing - Portius House - Garage	\$2,291	\$2,026	\$2,443	\$6,760
Building	Ranger Housing - Portius House - Shed	\$4,981	\$4,201	\$5,095	\$14,277
Building	Ranger Housing - Portius House - Shed	\$2,412	\$2,034	\$2,467	\$6,912
Building	Ranger Housing - Sky Oaks - Residence	\$3,740	\$8,367	\$4,676	\$16,783
Building	Ranger Housing - Soulajule Residence	\$208	\$730	\$1,211	\$2,149
Building	Sky Oaks Headquarters - Entrance Kiosk	\$13	\$37	\$194	\$243
Building	Sky Oaks Headquarters - Fisheries Office	\$2,035	\$3,856	\$2,129	\$8,019
Building	Sky Oaks Headquarters - Headquarter Office	\$3,080	\$8,131	\$15,288	\$26,499
Building	Sky Oaks Headquarters - Seed Shed	\$1,050	\$1,002	\$1,453	\$3,504
Building	Sky Oaks Headquarters - Storage Shed	\$420	\$583	\$1,178	\$2,182
Building	Sky Oaks Headquarters - Watershed Office	\$5,050	\$9,569	\$5,285	\$19,904
<b>Average or Total</b>		<b>\$1,209,880</b>	<b>\$2,731,562</b>	<b>\$1,024,896</b>	<b>\$4,966,337</b>

Type	Facility Name	Functionality (%)					
		At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Building	Administration Building - Headquarter Office	0.20	0.60	8.60	8.60	72.40	97.60
Building	Corporation Yard - Boat Barn	0.40	0.90	10.90	10.90	61.90	94.00
Building	Corporation Yard - Facilities Offices	0.20	0.60	8.60	8.60	72.40	97.60
Building	Corporation Yard - Laboratory	56.90	58.70	95.10	95.20	98.10	99.60
Building	Corporation Yard - Satellite Office	0.00	0.10	1.60	1.60	29.60	89.20
Building	Pelican Yard - Vehicle Storage	9.30	11.20	50.30	50.40	74.30	94.90
Building	Pelican Yard - Vehicle Storage	9.30	11.20	50.30	50.40	74.30	94.90
Building	Ranger Housing - Alpine Dam - Residence	54.70	56.30	89.30	89.40	99.80	99.90
Building	Ranger Housing - Lagunitas Dam	88.40	88.90	99.70	99.70	99.90	99.90
Building	Ranger Housing - Lagunitas Dam	88.40	88.90	99.70	99.70	99.90	99.90
Building	Ranger Housing - Phoenix Dam - Residence	84.20	84.90	99.50	99.50	99.90	99.90
Building	Ranger Housing - Phoenix Dam - Shed	45.50	46.80	72.90	73.00	75.30	95.00
Building	Ranger Housing - Portius House	96.10	96.30	99.90	99.90	99.90	99.90
Building	Ranger Housing - Portius House - Garage	92.40	92.50	95.00	95.00	95.00	99.00
Building	Ranger Housing - Portius House - Shed	45.50	46.80	72.90	73.00	75.30	95.00
Building	Ranger Housing - Portius House - Shed	45.50	46.80	72.90	73.00	75.30	95.00
Building	Ranger Housing - Sky Oaks - Residence	84.00	84.50	94.80	94.80	95.00	98.90
Building	Ranger Housing - Soulajule Residence	92.10	92.40	99.80	99.80	99.90	99.90
Building	Sky Oaks Headquarters - Entrance Kiosk	88.00	88.60	99.60	99.60	99.90	99.90
Building	Sky Oaks Headquarters - Fisheries Office	29.30	31.40	73.30	73.50	99.10	99.90
Building	Sky Oaks Headquarters - Headquarter Office	60.30	62.10	96.70	96.90	99.90	99.90
Building	Sky Oaks Headquarters - Seed Shed	57.40	59.00	92.00	92.10	95.00	98.90
Building	Sky Oaks Headquarters - Storage Shed	60.30	62.10	96.70	96.90	99.90	99.90
Building	Sky Oaks Headquarters - Watershed Office	29.30	31.40	73.30	73.50	99.10	99.90
<b>Average or Total</b>		<b>50.74</b>	<b>51.79</b>	<b>73.06</b>	<b>73.13</b>	<b>87.13</b>	<b>97.85</b>

Type	Facility Name	Structure Replacement Cost	Structural - Probability of Damage				
			No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Building	Alpine Dam Facility - Alum House	\$326,237	82.79%	16.70%	0.50%	0.00%	0.00%
Facility - Pump Station	Alpine Lake Facility - Aerator House		35.90%	29.96%	30.35%	3.75%	0.01%
Facility - Pump Station	Alpine Lake Facility - Pump House	\$1,000,000	60.39%	36.51%	3.07%	0.01%	0.00%
Facility - Pump Station	Kent Pump Facility - Power Supply	\$750,000	79.60%	14.43%	5.80%	0.15%	0.00%
Facility - Pump Station	Kent Pump Facility - Pump Station	\$2,000,000	79.60%	14.43%	5.80%	0.15%	0.00%
<b>AVERAGE</b>			<b>67.66%</b>	<b>22.41%</b>	<b>9.10%</b>	<b>0.81%</b>	<b>0.00%</b>

Type	Facility Name	Nonstructural Acceleration-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Building	Alpine Dam Facility - Alum House	62.30%	30.59%	6.65%	0.42%	0.01%
Facility - Pump Station	Alpine Lake Facility - Aerator House					
Facility - Pump Station	Alpine Lake Facility - Pump House					
Facility - Pump Station	Kent Pump Facility - Power Supply					
Facility - Pump Station	Kent Pump Facility - Pump Station					
<b>AVERAGE</b>		<b>62.30%</b>	<b>30.59%</b>	<b>6.65%</b>	<b>0.42%</b>	<b>0.01%</b>

Type	Facility Name	Nonstructural Drift-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Building	Alpine Dam Facility - Alum House	80.16%	17.22%	2.59%	0.01%	0.00%
Facility - Pump Station	Alpine Lake Facility - Aerator House					
Facility - Pump Station	Alpine Lake Facility - Pump House					
Facility - Pump Station	Kent Pump Facility - Power Supply					
Facility - Pump Station	Kent Pump Facility - Pump Station					
<b>AVERAGE</b>		<b>80.16%</b>	<b>17.22%</b>	<b>2.59%</b>	<b>0.01%</b>	<b>0.00%</b>

Type	Facility Name	Losses (in dollars)			
		Structure	Nonstructural Drift-Sensitive	Nonstructural Acceleration- Sensitive	Total Building Loss
Building	Alpine Dam Facility - Alum House	\$249	\$677	\$2,152	\$3,079
Facility - Pump Station	Alpine Lake Facility - Aerator House				
Facility - Pump Station	Alpine Lake Facility - Pump House	\$22,920			\$22,920
Facility - Pump Station	Kent Pump Facility - Power Supply	\$12,611			\$12,611
Facility - Pump Station	Kent Pump Facility - Pump Station	\$33,630			\$33,630
<b>AVERAGE</b>		<b>\$69,410</b>	<b>\$677</b>	<b>\$2,152</b>	<b>\$72,240</b>



		Functionality (%)					
Type	Facility Name	At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Building	Alpine Dam Facility - Alum House	82.70	83.50	99.40	99.40	99.90	99.90
Facility - Pump Station	Alpine Lake Facility - Aerator House	61.80	81.10	94.90	98.10	99.70	99.90
Facility - Pump Station	Alpine Lake Facility - Pump House	84.00	98.30	99.70	99.90	99.90	99.90
Facility - Pump Station	Kent Pump Facility - Power Supply	89.90	96.80	99.40	99.90	99.90	99.90
Facility - Pump Station	Kent Pump Facility - Pump Station	89.90	96.80	99.40	99.90	99.90	99.90
<b>AVERAGE</b>		<b>81.66</b>	<b>91.30</b>	<b>98.56</b>	<b>99.44</b>	<b>99.86</b>	<b>99.90</b>

Type	Facility Name	Structure Replacement Cost	Structural - Probability of Damage				
			No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Clarifier		27.06%	22.58%	22.87%	22.53%	4.94%
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Filter Plant	\$100,000,000	27.06%	22.58%	22.87%	22.53%	4.94%
Tank	Bon Tempe Treatment Plant - Wash Water Sup	\$1,500,000	34.13%	28.49%	28.86%	7.50%	0.99%
Facility - Water Treatment Plant	Ignacio Pump Station - Chemical Rooms		10.86%	23.94%	38.94%	22.18%	4.05%
Facility - Water Treatment Plant	Ignacio Pump Station - Control Room		0.01%	0.77%	27.67%	55.14%	16.40%
Facility - Water Treatment Plant	Ignacio Pump Station - Fluoride Storage Facility		0.01%	0.77%	27.67%	55.14%	16.40%
Facility - Water Treatment Plant	Ignacio Pump Station - Fuel Storage		38.44%	34.30%	7.17%	16.06%	4.00%
Facility - Water Treatment Plant	Ignacio Pump Station - Pumps	\$50,000,000	0.01%	0.77%	27.67%	55.14%	16.40%
Building	Phoenix Lake Facility - Boat Barn	\$383,300	45.52%	27.51%	2.31%	19.71%	4.92%
Pump Station	PS-001 - Federal Works Booster Pump Station	\$1,000,000	70.12%	21.62%	2.09%	4.91%	1.23%
Pump Station	PS-002 - Chapman Park Pump Station	\$1,000,000	18.06%	26.83%	44.32%	10.57%	0.20%
Pump Station	PS-003 - Summit Drive Pump Station PS-003	\$1,000,000	35.90%	29.96%	30.35%	3.75%	0.01%
Pump Station	PS-005 - H-Line Booster Station	\$1,000,000	34.13%	28.49%	28.86%	7.50%	0.99%
Pump Station	PS-006 - Madera Park Pump Station	\$1,000,000	13.54%	20.13%	33.24%	27.87%	5.18%
Pump Station	PS-007 - Mariner Highlands Pump Station	\$1,000,000	6.88%	16.24%	42.18%	30.70%	3.96%
Pump Station	PS-010 - Cascade Pump Station	\$1,000,000	27.06%	22.58%	22.87%	22.53%	4.94%
Pump Station	PS-011 - Fairfax Manor 1st Pump Station	\$1,000,000	13.54%	20.13%	33.24%	27.87%	5.18%
Pump Station	PS-012 - Fairfax Manor 2nd Lift Pump Station	\$1,000,000	27.06%	22.58%	22.87%	22.53%	4.94%
Pump Station	PS-013 - Oak Manor 1st Lift Pump Station	\$1,000,000	27.06%	22.58%	22.87%	22.53%	4.94%
Pump Station	PS-014 - Oak Manor 2nd Lift Pump Station	\$1,000,000	27.06%	22.58%	22.87%	22.53%	4.94%
Pump Station	PS-016 - Scott Pump Station	\$1,000,000	27.06%	22.58%	22.87%	22.53%	4.94%
Pump Station	PS-017 - Smith Saddle Booster Station	\$1,000,000	27.06%	22.58%	22.87%	22.53%	4.94%
Pump Station	PS-019 - Bret Harte Pump Station	\$1,000,000	6.20%	14.64%	38.02%	35.49%	5.62%
Pump Station	PS-020 - Greenbrae Pump Station	\$1,000,000	13.54%	20.13%	33.24%	27.87%	5.18%
Pump Station	PS-022 - Ignacio Boosters	\$1,000,000	2.81%	13.90%	47.94%	30.70%	4.62%
Pump Station	PS-023 - Kent Fire Trail 1st Pump Station	\$1,000,000	34.13%	28.49%	28.86%	7.50%	0.99%
Pump Station	PS-025 - Kent Woodlands 2nd Pump Station	\$1,000,000	35.90%	29.96%	30.35%	3.75%	0.01%
Pump Station	PS-026 - Lagunitas Booster Station	\$1,000,000	52.47%	19.87%	11.72%	12.88%	3.04%
Pump Station	PS-029 - Phoenix Lake Barge Pump	\$1,000,000	89.26%	10.22%	0.50%	0.00%	0.00%
Pump Station	PS-030 - Phoenix Transfer Pump Station	\$1,000,000	75.45%	19.45%	5.01%	0.07%	0.00%
Pump Station	PS-031 - Soulajule Pump Station	\$1,000,000	76.75%	14.29%	3.05%	4.72%	1.17%
Pump Station	PS-032 - Elinor Avenue Pump Station	\$1,000,000	17.29%	25.69%	42.43%	13.52%	1.04%
Pump Station	PS-033 - Fern Canyon Pump Station	\$1,000,000	46.64%	17.66%	10.42%	20.34%	4.92%
Pump Station	PS-034 - Lapachet Pump Station	\$1,000,000	58.84%	22.28%	13.14%	4.74%	0.98%
Pump Station	PS-035 - Mine Ridge Pump Station	\$1,000,000	61.88%	23.43%	13.82%	0.84%	0.00%
Pump Station	PS-036 - Scott Highlands Pump (OUT OF SERVICE)	\$1,000,000	13.70%	20.36%	33.63%	27.29%	4.98%
Pump Station	PS-040 - Summit Avenue Upper Pump Station	\$1,000,000	58.84%	22.28%	13.14%	4.74%	0.98%
Pump Station	PS-042 - Del Mesa Pump Station	\$1,000,000	18.06%	26.83%	44.32%	10.57%	0.20%
Pump Station	PS-043 - Fawn Drive Pump Station	\$1,000,000	14.85%	22.07%	36.46%	22.85%	3.74%
Pump Station	PS-044 - Mann Pump Station	\$1,000,000	6.88%	16.24%	42.18%	30.70%	3.96%
Pump Station	PS-046 - Scenic Avenue Pump Station	\$1,000,000	41.71%	35.53%	21.23%	1.37%	0.15%
Pump Station	PS-047 - Sequoia Park Pump Station	\$1,000,000	14.85%	22.07%	36.46%	22.85%	3.74%
Pump Station	PS-050 - Chula Vista Pump Station	\$1,000,000	6.64%	15.66%	40.66%	32.43%	4.59%
Pump Station	PS-052 - Elda Drive Pump Station	\$1,000,000	6.28%	14.81%	38.46%	35.02%	5.41%
Pump Station	PS-053 - Fairhills 1st Lift Pump Station	\$1,000,000	14.85%	22.07%	36.46%	22.85%	3.74%
Pump Station	PS-054 - Fairhills 2nd Lift Pump Station	\$1,000,000	14.85%	22.07%	36.46%	22.85%	3.74%
Pump Station	PS-055 - Grove Hill Pump Station	\$1,000,000	18.06%	26.83%	44.32%	10.57%	0.20%
Pump Station	PS-056 - Rafael Highlands Pump Station	\$1,000,000	50.48%	32.65%	15.70%	1.01%	0.13%
Pump Station	PS-057 - Hind Pump Station	\$1,000,000	6.64%	15.66%	40.66%	32.43%	4.59%
Pump Station	PS-058 - Knight Drive Pump Station	\$1,000,000	2.60%	9.20%	37.15%	44.46%	6.57%
Pump Station	PS-060 - Lockwood Drive Pump Station	\$1,000,000	6.14%	14.48%	37.60%	35.93%	5.83%
Pump Station	PS-061 - Lucas Valley Pump Station	\$1,000,000	33.07%	28.17%	16.83%	17.58%	4.31%
Pump Station	PS-062 - Manderly Pump Station	\$1,000,000	6.20%	14.64%	38.02%	35.49%	5.62%
Pump Station	PS-064 - Marinwood Pump Station (NOT IN USE)	\$1,000,000	13.70%	25.49%	30.69%	24.50%	5.59%
Pump Station	PS-065 - McNear Drive Pump Station	\$1,000,000	1.06%	5.35%	32.76%	52.47%	8.34%
Pump Station	PS-066 - Mesa Vista Pump Station	\$1,000,000	6.28%	14.81%	38.46%	35.02%	5.41%
Pump Station	PS-069 - San Quentin Pump Station	\$1,000,000	6.64%	20.32%	40.85%	26.98%	5.18%
Pump Station	PS-070 - Santa Margarita Pump Station	\$1,000,000	31.28%	26.65%	15.92%	20.98%	5.14%
Pump Station	PS-071 - Sky View Terrace Pump Station	\$1,000,000	2.62%	9.30%	37.56%	44.12%	6.37%
Pump Station	PS-073 - Swig Pump Station	\$1,000,000	13.54%	20.13%	33.24%	27.87%	5.18%
Pump Station	PS-074 - Via Montebello Pump Station	\$1,000,000	0.51%	3.65%	34.26%	53.87%	7.68%

Type	Facility Name	Nonstructural Acceleration-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Clarifier					
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Filter Plant					
Tank	Bon Tempe Treatment Plant - Wash Water Sup					
Facility - Water Treatment Plant	Ignacio Pump Station - Chemical Rooms					
Facility - Water Treatment Plant	Ignacio Pump Station - Control Room					
Facility - Water Treatment Plant	Ignacio Pump Station - Fluoride Storage Facility					
Facility - Water Treatment Plant	Ignacio Pump Station - Fuel Storage					
Facility - Water Treatment Plant	Ignacio Pump Station - Pumps					
Building	Phoenix Lake Facility - Boat Barn	38.20%	28.07%	8.32%	20.42%	4.95%
Pump Station	PS-001 - Federal Works Booster Pump Station					
Pump Station	PS-002 - Chapman Park Pump Station					
Pump Station	PS-003 - Summit Drive Pump Station PS-003					
Pump Station	PS-005 - H-Line Booster Station					
Pump Station	PS-006 - Madera Park Pump Station					
Pump Station	PS-007 - Mariner Highlands Pump Station					
Pump Station	PS-010 - Cascade Pump Station					
Pump Station	PS-011 - Fairfax Manor 1st Pump Station					
Pump Station	PS-012 - Fairfax Manor 2nd Lift Pump Station					
Pump Station	PS-013 - Oak Manor 1st Lift Pump Station					
Pump Station	PS-014 - Oak Manor 2nd Lift Pump Station					
Pump Station	PS-016 - Scott Pump Station					
Pump Station	PS-017 - Smith Saddle Booster Station					
Pump Station	PS-019 - Bret Harte Pump Station					
Pump Station	PS-020 - Greenbrae Pump Station					
Pump Station	PS-022 - Ignacio Boosters					
Pump Station	PS-023 - Kent Fire Trail 1st Pump Station					
Pump Station	PS-025 - Kent Woodlands 2nd Pump Station					
Pump Station	PS-026 - Lagunitas Booster Station					
Pump Station	PS-029 - Phoenix Lake Barge Pump					
Pump Station	PS-030 - Phoenix Transfer Pump Station					
Pump Station	PS-031 - Soulajule Pump Station					
Pump Station	PS-032 - Elinor Avenue Pump Station					
Pump Station	PS-033 - Fern Canyon Pump Station					
Pump Station	PS-034 - Lapachet Pump Station					
Pump Station	PS-035 - Mine Ridge Pump Station					
Pump Station	PS-036 - Scott Highlands Pump (OUT OF SERVICE)					
Pump Station	PS-040 - Summit Avenue Upper Pump Station					
Pump Station	PS-042 - Del Mesa Pump Station					
Pump Station	PS-043 - Fawn Drive Pump Station					
Pump Station	PS-044 - Mann Pump Station					
Pump Station	PS-046 - Scenic Avenue Pump Station					
Pump Station	PS-047 - Sequoia Park Pump Station					
Pump Station	PS-050 - Chula Vista Pump Station					
Pump Station	PS-052 - Elda Drive Pump Station					
Pump Station	PS-053 - Fairhills 1st Lift Pump Station					
Pump Station	PS-054 - Fairhills 2nd Lift Pump Station					
Pump Station	PS-055 - Grove Hill Pump Station					
Pump Station	PS-056 - Rafael Highlands Pump Station					
Pump Station	PS-057 - Hind Pump Station					
Pump Station	PS-058 - Knight Drive Pump Station					
Pump Station	PS-060 - Lockwood Drive Pump Station					
Pump Station	PS-061 - Lucas Valley Pump Station					
Pump Station	PS-062 - Manderly Pump Station					
Pump Station	PS-064 - Marinwood Pump Station (NOT IN USE)					
Pump Station	PS-065 - McNear Drive Pump Station					
Pump Station	PS-066 - Mesa Vista Pump Station					
Pump Station	PS-069 - San Quentin Pump Station					
Pump Station	PS-070 - Santa Margarita Pump Station					
Pump Station	PS-071 - Sky View Terrace Pump Station					
Pump Station	PS-073 - Swig Pump Station					
Pump Station	PS-074 - Via Montebello Pump Station					

Type	Facility Name	Nonstructural Drift-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Clarifier					
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Filter Plant					
Tank	Bon Tempe Treatment Plant - Wash Water Sup					
Facility - Water Treatment Plant	Ignacio Pump Station - Chemical Rooms					
Facility - Water Treatment Plant	Ignacio Pump Station - Control Room					
Facility - Water Treatment Plant	Ignacio Pump Station - Fluoride Storage Facility					
Facility - Water Treatment Plant	Ignacio Pump Station - Fuel Storage					
Facility - Water Treatment Plant	Ignacio Pump Station - Pumps					
Building	Phoenix Lake Facility - Boat Barn	44.72%	23.55%	7.01%	19.76%	4.93%
Pump Station	PS-001 - Federal Works Booster Pump Station					
Pump Station	PS-002 - Chapman Park Pump Station					
Pump Station	PS-003 - Summit Drive Pump Station PS-003					
Pump Station	PS-005 - H-Line Booster Station					
Pump Station	PS-006 - Madera Park Pump Station					
Pump Station	PS-007 - Mariner Highlands Pump Station					
Pump Station	PS-010 - Cascade Pump Station					
Pump Station	PS-011 - Fairfax Manor 1st Pump Station					
Pump Station	PS-012 - Fairfax Manor 2nd Lift Pump Station					
Pump Station	PS-013 - Oak Manor 1st Lift Pump Station					
Pump Station	PS-014 - Oak Manor 2nd Lift Pump Station					
Pump Station	PS-016 - Scott Pump Station					
Pump Station	PS-017 - Smith Saddle Booster Station					
Pump Station	PS-019 - Bret Harte Pump Station					
Pump Station	PS-020 - Greenbrae Pump Station					
Pump Station	PS-022 - Ignacio Boosters					
Pump Station	PS-023 - Kent Fire Trail 1st Pump Station					
Pump Station	PS-025 - Kent Woodlands 2nd Pump Station					
Pump Station	PS-026 - Lagunitas Booster Station					
Pump Station	PS-029 - Phoenix Lake Barge Pump					
Pump Station	PS-030 - Phoenix Transfer Pump Station					
Pump Station	PS-031 - SoulaJule Pump Station					
Pump Station	PS-032 - Elinor Avenue Pump Station					
Pump Station	PS-033 - Fern Canyon Pump Station					
Pump Station	PS-034 - Lapachet Pump Station					
Pump Station	PS-035 - Mine Ridge Pump Station					
Pump Station	PS-036 - Scott Highlands Pump (OUT OF SERVICE)					
Pump Station	PS-040 - Summit Avenue Upper Pump Station					
Pump Station	PS-042 - Del Mesa Pump Station					
Pump Station	PS-043 - Fawn Drive Pump Station					
Pump Station	PS-044 - Mann Pump Station					
Pump Station	PS-046 - Scenic Avenue Pump Station					
Pump Station	PS-047 - Sequoia Park Pump Station					
Pump Station	PS-050 - Chula Vista Pump Station					
Pump Station	PS-052 - Elda Drive Pump Station					
Pump Station	PS-053 - Fairhills 1st Lift Pump Station					
Pump Station	PS-054 - Fairhills 2nd Lift Pump Station					
Pump Station	PS-055 - Grove Hill Pump Station					
Pump Station	PS-056 - Rafael Highlands Pump Station					
Pump Station	PS-057 - Hind Pump Station					
Pump Station	PS-058 - Knight Drive Pump Station					
Pump Station	PS-060 - Lockwood Drive Pump Station					
Pump Station	PS-061 - Lucas Valley Pump Station					
Pump Station	PS-062 - Manderly Pump Station					
Pump Station	PS-064 - Marinwood Pump Station (NOT IN USE)					
Pump Station	PS-065 - McNear Drive Pump Station					
Pump Station	PS-066 - Mesa Vista Pump Station					
Pump Station	PS-069 - San Quentin Pump Station					
Pump Station	PS-070 - Santa Margarita Pump Station					
Pump Station	PS-071 - Sky View Terrace Pump Station					
Pump Station	PS-073 - Swig Pump Station					
Pump Station	PS-074 - Via Montebello Pump Station					

Type	Facility Name	Losses (in dollars)			
		Structure	Nonstructural Drift-Sensitive	Nonstructural Acceleration-Sensitive	Total Building Loss
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Clarifier				
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Filter Plant	\$23,017,500			\$23,017,500
Tank	Bon Tempe Treatment Plant - Wash Water Sup	\$168,653			\$168,653
Facility - Water Treatment Plant	Ignacio Pump Station - Chemical Rooms				
Facility - Water Treatment Plant	Ignacio Pump Station - Control Room				
Facility - Water Treatment Plant	Ignacio Pump Station - Fluoride Storage Facility				
Facility - Water Treatment Plant	Ignacio Pump Station - Fuel Storage				
Facility - Water Treatment Plant	Ignacio Pump Station - Pumps	\$26,836,502			\$26,836,502
Building	Phoenix Lake Facility - Boat Barn	\$19,265	\$16,246	\$19,704	\$55,214
Pump Station	PS-001 - Federal Works Booster Pump Station	\$55,705			\$55,705
Pump Station	PS-002 - Chapman Park Pump Station	\$145,315			\$145,315
Pump Station	PS-003 - Summit Drive Pump Station PS-003	\$83,105			\$83,105
Pump Station	PS-005 - H-Line Booster Station	\$112,435			\$112,435
Pump Station	PS-006 - Madera Park Pump Station	\$278,945			\$278,945
Pump Station	PS-007 - Mariner Highlands Pump Station	\$295,190			\$295,190
Pump Station	PS-010 - Cascade Pump Station	\$230,175			\$230,175
Pump Station	PS-011 - Fairfax Manor 1st Pump Station	\$278,945			\$278,945
Pump Station	PS-012 - Fairfax Manor 2nd Lift Pump Station	\$230,175			\$230,175
Pump Station	PS-013 - Oak Manor 1st Lift Pump Station	\$230,175			\$230,175
Pump Station	PS-014 - Oak Manor 2nd Lift Pump Station	\$230,175			\$230,175
Pump Station	PS-016 - Scott Pump Station	\$230,175			\$230,175
Pump Station	PS-017 - Smith Saddle Booster Station	\$230,175			\$230,175
Pump Station	PS-019 - Bret Harte Pump Station	\$333,490			\$333,490
Pump Station	PS-020 - Greenbrae Pump Station	\$278,945			\$278,945
Pump Station	PS-022 - Ignacio Boosters	\$309,260			\$309,260
Pump Station	PS-023 - Kent Fire Trail 1st Pump Station	\$112,435			\$112,435
Pump Station	PS-025 - Kent Woodlands 2nd Pump Station	\$83,105			\$83,105
Pump Station	PS-026 - Lagunitas Booster Station	\$135,195			\$135,195
Pump Station	PS-029 - Phoenix Lake Barge Pump	\$5,860			\$5,860
Pump Station	PS-030 - Phoenix Transfer Pump Station	\$17,660			\$17,660
Pump Station	PS-031 - Soulajule Pump Station	\$51,740			\$51,740
Pump Station	PS-032 - Elinor Avenue Pump Station	\$168,010			\$168,010
Pump Station	PS-033 - Fern Canyon Pump Station	\$195,700			\$195,700
Pump Station	PS-034 - Lapachet Pump Station	\$69,090			\$69,090
Pump Station	PS-035 - Mine Ridge Pump Station	\$37,485			\$37,485
Pump Station	PS-036 - Scott Highlands Pump (OUT OF SERVICE)	\$274,165			\$274,165
Pump Station	PS-040 - Summit Avenue Upper Pump Station	\$69,090			\$69,090
Pump Station	PS-042 - Del Mesa Pump Station	\$145,315			\$145,315
Pump Station	PS-043 - Fawn Drive Pump Station	\$240,225			\$240,225
Pump Station	PS-044 - Mann Pump Station	\$295,190			\$295,190
Pump Station	PS-046 - Scenic Avenue Pump Station	\$59,330			\$59,330
Pump Station	PS-047 - Sequoia Park Pump Station	\$240,225			\$240,225
Pump Station	PS-050 - Chula Vista Pump Station	\$309,300			\$309,300
Pump Station	PS-052 - Elda Drive Pump Station	\$329,315			\$329,315
Pump Station	PS-053 - Fairhills 1st Lift Pump Station	\$240,225			\$240,225
Pump Station	PS-054 - Fairhills 2nd Lift Pump Station	\$240,225			\$240,225
Pump Station	PS-055 - Grove Hill Pump Station	\$145,315			\$145,315
Pump Station	PS-056 - Rafael Highlands Pump Station	\$47,235			\$47,235
Pump Station	PS-057 - Hind Pump Station	\$309,300			\$309,300
Pump Station	PS-058 - Knight Drive Pump Station	\$392,785			\$392,785
Pump Station	PS-060 - Lockwood Drive Pump Station	\$337,520			\$337,520
Pump Station	PS-061 - Lucas Valley Pump Station	\$187,910			\$187,910
Pump Station	PS-062 - Manderly Pump Station	\$333,490			\$333,490
Pump Station	PS-064 - Marinwood Pump Station (NOT IN USE)	\$261,680			\$261,680
Pump Station	PS-065 - McNear Drive Pump Station	\$450,035			\$450,035
Pump Station	PS-066 - Mesa Vista Pump Station	\$329,315			\$329,315
Pump Station	PS-069 - San Quentin Pump Station	\$285,115			\$285,115
Pump Station	PS-070 - Santa Margarita Pump Station	\$214,485			\$214,485
Pump Station	PS-071 - Sky View Terrace Pump Station	\$389,410			\$389,410
Pump Station	PS-073 - Swig Pump Station	\$278,945			\$278,945
Pump Station	PS-074 - Via Montebello Pump Station	\$453,235			\$453,235

Type	Facility Name	Functionality (%)					
		At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Clarifier	50.40	72.70	77.60	79.30	83.90	96.60
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Filter Plant	50.40	72.70	77.60	79.30	83.90	96.60
Tank	Bon Tempe Treatment Plant - Wash Water Sup	50.30	77.80	90.60	92.90	93.30	95.40
Facility - Water Treatment Plant	Ignacio Pump Station - Chemical Rooms	38.60	70.90	78.70	80.30	84.90	97.10
Facility - Water Treatment Plant	Ignacio Pump Station - Control Room	16.70	34.40	41.40	45.60	57.20	89.50
Facility - Water Treatment Plant	Ignacio Pump Station - Fluoride Storage Facility	16.70	34.40	41.40	45.60	57.20	89.50
Facility - Water Treatment Plant	Ignacio Pump Station - Fuel Storage	64.50	81.70	83.60	84.80	88.10	97.30
Facility - Water Treatment Plant	Ignacio Pump Station - Pumps	16.70	34.40	41.40	45.60	57.20	89.50
Building	Phoenix Lake Facility - Boat Barn	45.50	46.80	72.90	73.00	75.30	95.00
Pump Station	PS-001 - Federal Works Booster Pump Station	84.70	93.50	95.00	96.50	98.90	99.90
Pump Station	PS-002 - Chapman Park Pump Station	45.70	67.90	88.60	94.70	99.30	99.90
Pump Station	PS-003 - Summit Drive Pump Station PS-003	61.80	81.10	94.90	98.10	99.70	99.90
Pump Station	PS-005 - H-Line Booster Station	59.20	77.70	91.30	95.50	98.90	99.90
Pump Station	PS-006 - Madera Park Pump Station	36.50	54.00	71.90	82.00	95.40	99.90
Pump Station	PS-007 - Mariner Highlands Pump Station	29.60	48.20	70.30	81.70	96.00	99.90
Pump Station	PS-010 - Cascade Pump Station	48.80	64.20	76.90	84.80	95.80	99.90
Pump Station	PS-011 - Fairfax Manor 1st Pump Station	36.50	54.00	71.90	82.00	95.40	99.90
Pump Station	PS-012 - Fairfax Manor 2nd Lift Pump Station	48.80	64.20	76.90	84.80	95.80	99.90
Pump Station	PS-013 - Oak Manor 1st Lift Pump Station	48.80	64.20	76.90	84.80	95.80	99.90
Pump Station	PS-014 - Oak Manor 2nd Lift Pump Station	48.80	64.20	76.90	84.80	95.80	99.90
Pump Station	PS-016 - Scott Pump Station	48.80	64.20	76.90	84.80	95.80	99.90
Pump Station	PS-017 - Smith Saddle Booster Station	48.80	64.20	76.90	84.80	95.80	99.90
Pump Station	PS-019 - Bret Harte Pump Station	27.60	44.70	65.50	77.90	94.70	99.90
Pump Station	PS-020 - Greenbrae Pump Station	36.50	54.00	71.90	82.00	95.40	99.90
Pump Station	PS-022 - Ignacio Boosters	25.40	44.60	69.20	81.10	95.60	99.90
Pump Station	PS-023 - Kent Fire Trail 1st Pump Station	59.20	77.70	91.30	95.50	98.90	99.90
Pump Station	PS-025 - Kent Woodlands 2nd Pump Station	61.80	81.10	94.90	98.10	99.70	99.90
Pump Station	PS-026 - Lagunitas Booster Station	69.00	80.00	86.60	91.10	97.40	99.90
Pump Station	PS-029 - Phoenix Lake Barge Pump	95.80	99.70	99.90	99.90	99.90	99.90
Pump Station	PS-030 - Phoenix Transfer Pump Station	88.80	97.30	99.50	99.90	99.90	99.90
Pump Station	PS-031 - Soulagule Pump Station	86.90	93.20	95.10	96.60	99.00	99.90
Pump Station	PS-032 - Elinor Avenue Pump Station	44.20	65.50	85.80	92.50	98.60	99.90
Pump Station	PS-033 - Fern Canyon Pump Station	62.30	72.50	79.40	85.80	95.90	99.90
Pump Station	PS-034 - Lapachet Pump Station	76.20	88.20	94.50	96.80	99.10	99.90
Pump Station	PS-035 - Mine Ridge Pump Station	79.70	92.10	98.30	99.50	99.90	99.90
Pump Station	PS-036 - Scott Highlands Pump (OUT OF SERVICE)	36.90	54.50	72.50	82.40	95.50	99.90
Pump Station	PS-040 - Summit Avenue Upper Pump Station	76.20	88.20	94.50	96.80	99.10	99.90
Pump Station	PS-042 - Del Mesa Pump Station	45.70	67.90	88.60	94.70	99.30	99.90
Pump Station	PS-043 - Fawn Drive Pump Station	39.20	58.10	76.70	85.70	96.50	99.90
Pump Station	PS-044 - Mann Pump Station	29.60	48.20	70.30	81.70	96.00	99.90
Pump Station	PS-046 - Scenic Avenue Pump Station	68.80	87.70	97.20	99.20	99.80	99.90
Pump Station	PS-047 - Sequoia Park Pump Station	39.20	58.10	76.70	85.70	96.50	99.90
Pump Station	PS-050 - Chula Vista Pump Station	28.90	46.90	68.50	80.30	95.50	99.90
Pump Station	PS-052 - Elda Drive Pump Station	27.80	45.10	66.00	78.40	94.90	99.90
Pump Station	PS-053 - Fairhills 1st Lift Pump Station	39.20	58.10	76.70	85.70	96.50	99.90
Pump Station	PS-054 - Fairhills 2nd Lift Pump Station	39.20	58.10	76.70	85.70	96.50	99.90
Pump Station	PS-055 - Grove Hill Pump Station	45.70	67.90	88.60	94.70	99.30	99.90
Pump Station	PS-056 - Rafael Highlands Pump Station	74.60	90.90	97.90	99.30	99.80	99.90
Pump Station	PS-057 - Hind Pump Station	28.90	46.90	68.50	80.30	95.50	99.90
Pump Station	PS-058 - Knight Drive Pump Station	21.40	36.60	58.00	72.80	93.70	99.90
Pump Station	PS-060 - Lockwood Drive Pump Station	27.40	44.30	65.00	77.60	94.60	99.90
Pump Station	PS-061 - Lucas Valley Pump Station	56.40	72.10	81.60	87.70	96.40	99.90
Pump Station	PS-062 - Manderly Pump Station	27.60	44.70	65.50	77.90	94.70	99.90
Pump Station	PS-064 - Marinwood Pump Station (NOT IN USE)	39.20	57.80	74.20	83.20	95.30	99.90
Pump Station	PS-065 - McNear Drive Pump Station	17.30	30.30	50.70	67.40	92.20	99.90
Pump Station	PS-066 - Mesa Vista Pump Station	27.80	45.10	66.00	78.40	94.90	99.90
Pump Station	PS-069 - San Quentin Pump Station	31.30	50.90	72.00	82.40	95.40	99.90
Pump Station	PS-070 - Santa Margarita Pump Station	53.90	68.90	78.30	85.30	95.70	99.90
Pump Station	PS-071 - Sky View Terrace Pump Station	21.50	36.80	58.40	73.10	93.90	99.90
Pump Station	PS-073 - Swig Pump Station	36.50	54.00	71.90	82.00	95.40	99.90
Pump Station	PS-074 - Via Montebello Pump Station	16.20	28.90	50.20	67.30	92.60	99.90

Type	Facility Name	Structure Replacement Cost	Structural - Probability of Damage				
			No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Pump Station	PS-077 - Beacon Hill Pump Station	\$1,000,000	35.90%	29.96%	30.35%	3.75%	0.01%
Pump Station	PS-078 - Crescent Avenue Pump Station	\$1,000,000	35.90%	29.96%	30.35%	3.75%	0.01%
Pump Station	PS-079 - Marin City Pump Station	\$1,000,000	13.70%	20.36%	33.63%	27.29%	4.98%
Pump Station	PS-080 - Monte Mar Vista Pump Station	\$1,000,000	13.70%	20.36%	33.63%	27.29%	4.98%
Pump Station	PS-081 - Sausalito Pumphouse Pump Station	\$1,000,000	55.66%	17.16%	1.66%	20.37%	5.12%
Pump Station	PS-082 - Sausalito Boulevard Pump Station	\$1,000,000	35.90%	29.96%	30.35%	3.75%	0.01%
Pump Station	PS-083 - Richardson Drive Pump Station	\$1,000,000	17.29%	25.69%	42.43%	13.52%	1.04%
Pump Station	PS-084 - Eastwood Way Pump Station	\$1,000,000	66.53%	12.39%	2.64%	14.74%	3.67%
Pump Station	PS-085 - Fairview Park Pump Station	\$1,000,000	56.86%	14.66%	3.78%	19.75%	4.92%
Pump Station	PS-087 - Marinview Pump Station	\$1,000,000	34.13%	28.49%	28.86%	7.50%	0.99%
Pump Station	PS-088 - Tam Woods 1st Lift Pump Station	\$1,000,000	46.64%	17.66%	10.42%	20.34%	4.92%
Pump Station	PS-089 - Tam Woods 2nd Lift Pump Station	\$1,000,000	58.84%	22.28%	13.14%	4.74%	0.98%
Pump Station	PS-090 - Hill Haven Pump Station	\$1,000,000	13.54%	20.13%	33.24%	27.87%	5.18%
Pump Station	PS-091 - Sugarloaf Pump Station	\$1,000,000	14.85%	22.07%	36.46%	22.85%	3.74%
Pump Station	PS-092 - Tiburon Belvedere Pump Station	\$1,000,000	35.65%	29.76%	30.14%	4.28%	0.15%
Pump Station	PS-093 - Tiburon Booster Pump Station	\$1,000,000	13.64%	20.26%	33.47%	27.55%	5.06%
Pump Station	PS-095 - Pine Mountain Tunnel Pump Station	\$1,000,000	81.53%	15.18%	3.24%	0.03%	0.00%
Pump Station	PS-097 - Tocaloma Booster Pump Station	\$1,000,000	59.42%	16.67%	8.29%	12.56%	3.04%
Pump Station	PS-101 - Redwood Drive Lower Pump	\$1,000,000	27.06%	22.58%	22.87%	22.53%	4.94%
Pump Station	PS-102 - North Marin Line Boosters	\$1,000,000	78.76%	9.02%	0.44%	9.41%	2.35%
Pump Station	PS-103 - San Geronimo Valley Pump Station	\$1,000,000	78.76%	9.02%	0.44%	9.41%	2.35%
Pump Station	PS-104 - Conifer Way Pump Station	\$1,000,000	56.86%	14.66%	3.78%	19.75%	4.92%
Pump Station	PS-106 - Los Altos Pump Station	\$1,000,000	44.69%	21.37%	8.24%	20.55%	5.12%
Pump Station	PS-108 - Indian Rock Pump Station	\$1,000,000	31.28%	26.65%	15.92%	20.98%	5.14%
Pump Station	PS-109 - Cibiran Pump Station	\$1,000,000	34.31%	29.22%	17.46%	15.29%	3.69%
Pump Station	PS-113 - Lag Picnic Grounds Pump Station	\$1,000,000	71.74%	18.50%	4.76%	4.00%	0.98%
Pump Station	PS-114 - Cortez Avenue Pump Station	\$1,000,000	68.41%	11.97%	1.21%	14.71%	3.67%
Pump Station	PS-115 - Redwood Drive Upper Pump Station	\$1,000,000	84.87%	9.72%	0.48%	3.93%	0.98%
Pump Station	PS-116 - North Redwood Drive Boosters	\$1,000,000	26.99%	46.82%	22.90%	2.69%	0.57%
Pump Station	PS-117 - Wolfback Ridge Pump Station	\$1,000,000	71.01%	25.14%	3.81%	0.02%	0.00%
Pump Station	PS-118 - Fire Road Pump Station	\$1,000,000	67.28%	7.70%	0.38%	19.70%	4.92%
Pump Station	PS-122 - Upper Road Pump Station	\$1,000,000	79.94%	18.58%	1.46%	0.00%	0.00%
Pump Station	PS-123 - Southern Marin Line Syphon	\$1,000,000	67.28%	7.70%	0.38%	19.70%	4.92%
Pump Station	PS-124 - Throckmorton Booster New Pumpstat	\$1,000,000	89.26%	10.22%	0.50%	0.00%	0.00%
Pump Station	PS-125 - Kent Fire Trail 2nd Lift Pump Station	\$1,000,000	84.87%	9.72%	0.48%	3.93%	0.98%
Pump Station	PS-126 - Oak woodlands Pump Station	\$1,000,000	43.22%	26.12%	4.27%	21.03%	5.34%
Pump Station	PS-127 - Marin Terrace Pump Station	\$1,000,000	80.68%	13.54%	0.85%	3.93%	0.98%
Pump Station	PS-128 - Alpine Bon-Tempe Pump Station	\$1,000,000	93.00%	6.73%	0.25%	0.00%	0.00%
Pump Station	PS-129 - Slide Gulch Pump Station	\$1,000,000	84.87%	9.72%	0.48%	3.93%	0.98%
Pump Station	PS-130 - Smith Conifer Pump Station	\$1,000,000	63.95%	10.73%	0.67%	19.70%	4.92%
Building	San Geronimo Treatment Plant - Boat Barn		77.71%	10.20%	0.31%	9.41%	2.35%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Chemical Stor	\$100,000,000	31.67%	26.43%	26.78%	12.72%	2.36%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #1		31.67%	26.43%	26.78%	12.72%	2.36%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #2		66.57%	17.16%	4.42%	9.47%	2.35%
Building	San Geronimo Treatment Plant - Facilities Shed		53.28%	32.21%	2.71%	9.42%	2.35%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Flash Mixer		66.57%	17.16%	4.42%	9.47%	2.35%
Building	San Geronimo Treatment Plant - Gardeners Shed		77.71%	10.20%	0.31%	9.41%	2.35%
Facility - Pump Station	San Geronimo Treatment Plant - North Marin L	\$5,000,000	31.67%	26.43%	26.78%	12.72%	2.36%
Facility - Pump Station	Southern Marin Line - Pump Station	\$2,000,000	57.85%	24.29%	16.87%	0.97%	0.00%
Water Tank	TK-006 - MADERA PARK TANK #1	\$200,000	28.95%	38.32%	7.18%	20.41%	5.12%
Water Tank	TK-009 - SAN CLEMENTE TANK	\$3,000,000	2.71%	10.04%	51.36%	34.15%	1.71%
Water Tank	TK-011 - CANON VILLAGE TANK	\$3,000,000	30.87%	27.07%	16.74%	20.38%	4.92%
Water Tank	TK-012 - FAIRFAX GRADE TANK	\$1,000,000	20.98%	28.30%	43.69%	6.96%	0.05%
Water Tank	TK-015 - MEADOW CLUB UPPER TANK	\$600,000	5.39%	12.09%	40.31%	36.84%	5.34%
Water Tank	TK-019 - OAK MANOR TOP TANK	\$500,000	30.51%	26.76%	16.55%	21.04%	5.12%
Water Tank	TK-025 - BRET HARTE TANK	\$1,000,000	2.01%	7.45%	38.08%	45.61%	6.83%
Water Tank	TK-027 - GREENBRAE TANK	\$3,000,000	2.01%	7.45%	38.08%	45.61%	6.83%
Water Tank	TK-030 - ESCALLE TANK	\$2,000,000	2.03%	7.53%	38.53%	45.26%	6.62%
Water Tank	TK-033 - INDIAN FIRE TRAIL TANK	\$500,000	19.94%	26.91%	41.54%	10.55%	1.03%
Water Tank	TK-046 - ALTO TANK #1	\$6,000,000	20.98%	28.30%	43.69%	6.96%	0.05%
Water Tank	TK-047 - BOLSA TANK	\$400,000	88.08%	11.56%	0.35%	0.00%	0.00%



Type	Facility Name	Nonstructural Acceleration-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Pump Station	PS-077 - Beacon Hill Pump Station					
Pump Station	PS-078 - Crescent Avenue Pump Station					
Pump Station	PS-079 - Marin City Pump Station					
Pump Station	PS-080 - Monte Mar Vista Pump Station					
Pump Station	PS-081 - Sausalito Pumphouse Pump Station					
Pump Station	PS-082 - Sausalito Boulevard Pump Station					
Pump Station	PS-083 - Richardson Drive Pump Station					
Pump Station	PS-084 - Eastwood Way Pump Station					
Pump Station	PS-085 - Fairview Park Pump Station					
Pump Station	PS-087 - Marinview Pump Station					
Pump Station	PS-088 - Tam Woods 1st Lift Pump Station					
Pump Station	PS-089 - Tam Woods 2nd Lift Pump Station					
Pump Station	PS-090 - Hill Haven Pump Station					
Pump Station	PS-091 - Sugarloaf Pump Station					
Pump Station	PS-092 - Tiburon Belvedere Pump Station					
Pump Station	PS-093 - Tiburon Booster Pump Station					
Pump Station	PS-095 - Pine Mountain Tunnel Pump Station					
Pump Station	PS-097 - Tocaloma Booster Pump Station					
Pump Station	PS-101 - Redwood Drive Lower Pump					
Pump Station	PS-102 - North Marin Line Boosters					
Pump Station	PS-103 - San Geronimo Valley Pump Station					
Pump Station	PS-104 - Conifer Way Pump Station					
Pump Station	PS-106 - Los Altos Pump Station					
Pump Station	PS-108 - Indian Rock Pump Station					
Pump Station	PS-109 - Cibrian Pump Station					
Pump Station	PS-113 - Lag Picnic Grounds Pump Station					
Pump Station	PS-114 - Cortez Avenue Pump Station					
Pump Station	PS-115 - Redwood Drive Upper Pump Station					
Pump Station	PS-116 - North Redwood Drive Boosters					
Pump Station	PS-117 - Wolfback Ridge Pump Station					
Pump Station	PS-118 - Fire Road Pump Station					
Pump Station	PS-122 - Upper Road Pump Station					
Pump Station	PS-123 - Southern Marin Line Syphon					
Pump Station	PS-124 - Throckmorton Booster New Pumpstat					
Pump Station	PS-125 - Kent Fire Trail 2nd Lift Pump Station					
Pump Station	PS-126 - Oak woodlands Pump Station					
Pump Station	PS-127 - Marin Terrace Pump Station					
Pump Station	PS-128 - Alpine Bon-Tempe Pump Station					
Pump Station	PS-129 - Slide Gulch Pump Station					
Pump Station	PS-130 - Smith Conifer Pump Station					
Building	San Geronimo Treatment Plant - Boat Barn	50.21%	29.90%	7.52%	9.97%	2.37%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Chemical Stor					
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #1					
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #2					
Building	San Geronimo Treatment Plant - Facilities Shed	44.72%	32.86%	9.74%	10.26%	2.38%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Flash Mixer					
Building	San Geronimo Treatment Plant - Gardeners She	50.21%	29.90%	7.52%	9.97%	2.37%
Facility - Pump Station	San Geronimo Treatment Plant - North Marin L					
Facility - Pump Station	Southern Marin Line - Pump Station					
Water Tank	TK-006 - MADERA PARK TANK #1					
Water Tank	TK-009 - SAN CLEMENTE TANK					
Water Tank	TK-011 - CANON VILLAGE TANK					
Water Tank	TK-012 - FAIRFAX GRADE TANK					
Water Tank	TK-015 - MEADOW CLUB UPPER TANK					
Water Tank	TK-019 - OAK MANOR TOP TANK					
Water Tank	TK-025 - BRET HARTE TANK					
Water Tank	TK-027 - GREENBRAE TANK					
Water Tank	TK-030 - ESCALLE TANK					
Water Tank	TK-033 - INDIAN FIRE TRAIL TANK					
Water Tank	TK-046 - ALTO TANK #1					
Water Tank	TK-047 - BOLSA TANK					

Type	Facility Name	Nonstructural Drift-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Pump Station	PS-077 - Beacon Hill Pump Station					
Pump Station	PS-078 - Crescent Avenue Pump Station					
Pump Station	PS-079 - Marin City Pump Station					
Pump Station	PS-080 - Monte Mar Vista Pump Station					
Pump Station	PS-081 - Sausalito Pumphouse Pump Station					
Pump Station	PS-082 - Sausalito Boulevard Pump Station					
Pump Station	PS-083 - Richardson Drive Pump Station					
Pump Station	PS-084 - Eastwood Way Pump Station					
Pump Station	PS-085 - Fairview Park Pump Station					
Pump Station	PS-087 - Marinview Pump Station					
Pump Station	PS-088 - Tam Woods 1st Lift Pump Station					
Pump Station	PS-089 - Tam Woods 2nd Lift Pump Station					
Pump Station	PS-090 - Hill Haven Pump Station					
Pump Station	PS-091 - Sugarloaf Pump Station					
Pump Station	PS-092 - Tiburon Belvedere Pump Station					
Pump Station	PS-093 - Tiburon Booster Pump Station					
Pump Station	PS-095 - Pine Mountain Tunnel Pump Station					
Pump Station	PS-097 - Tocaloma Booster Pump Station					
Pump Station	PS-101 - Redwood Drive Lower Pump					
Pump Station	PS-102 - North Marin Line Boosters					
Pump Station	PS-103 - San Geronimo Valley Pump Station					
Pump Station	PS-104 - Conifer Way Pump Station					
Pump Station	PS-106 - Los Altos Pump Station					
Pump Station	PS-108 - Indian Rock Pump Station					
Pump Station	PS-109 - Cibiria Pump Station					
Pump Station	PS-113 - Lag Picnic Grounds Pump Station					
Pump Station	PS-114 - Cortez Avenue Pump Station					
Pump Station	PS-115 - Redwood Drive Upper Pump Station					
Pump Station	PS-116 - North Redwood Drive Boosters					
Pump Station	PS-117 - Wolfback Ridge Pump Station					
Pump Station	PS-118 - Fire Road Pump Station					
Pump Station	PS-122 - Upper Road Pump Station					
Pump Station	PS-123 - Southern Marin Line Syphon					
Pump Station	PS-124 - Throckmorton Booster New Pumpstat					
Pump Station	PS-125 - Kent Fire Trail 2nd Lift Pump Station					
Pump Station	PS-126 - Oak woodlands Pump Station					
Pump Station	PS-127 - Marin Terrace Pump Station					
Pump Station	PS-128 - Alpine Bon-Tempe Pump Station					
Pump Station	PS-129 - Slide Gulch Pump Station					
Pump Station	PS-130 - Smith Conifer Pump Station					
Building	San Geronimo Treatment Plant - Boat Barn	75.08%	11.51%	1.62%	9.43%	2.35%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Chemical Stor					
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #1					
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #2					
Building	San Geronimo Treatment Plant - Facilities Shed	52.35%	27.57%	8.21%	9.48%	2.36%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Flash Mixer					
Building	San Geronimo Treatment Plant - Gardeners Sh	75.08%	11.51%	1.62%	9.43%	2.35%
Facility - Pump Station	San Geronimo Treatment Plant - North Marin L					
Facility - Pump Station	Southern Marin Line - Pump Station					
Water Tank	TK-006 - MADERA PARK TANK #1					
Water Tank	TK-009 - SAN CLEMENTE TANK					
Water Tank	TK-011 - CANON VILLAGE TANK					
Water Tank	TK-012 - FAIRFAX GRADE TANK					
Water Tank	TK-015 - MEADOW CLUB UPPER TANK					
Water Tank	TK-019 - OAK MANOR TOP TANK					
Water Tank	TK-025 - BRET HARTE TANK					
Water Tank	TK-027 - GREENBRAE TANK					
Water Tank	TK-030 - ESCALLE TANK					
Water Tank	TK-033 - INDIAN FIRE TRAIL TANK					
Water Tank	TK-046 - ALTO TANK #1					
Water Tank	TK-047 - BOLSA TANK					

Type	Facility Name	Losses (in dollars)			
		Structure	Nonstructural Drift-Sensitive	Nonstructural Acceleration-Sensitive	Total Building Loss
Pump Station	PS-077 - Beacon Hill Pump Station	\$83,105			\$83,105
Pump Station	PS-078 - Crescent Avenue Pump Station	\$83,105			\$83,105
Pump Station	PS-079 - Marin City Pump Station	\$274,165			\$274,165
Pump Station	PS-080 - Monte Mar Vista Pump Station	\$274,165			\$274,165
Pump Station	PS-081 - Sausalito Pumphouse Pump Station	\$184,490			\$184,490
Pump Station	PS-082 - Sausalito Boulevard Pump Station	\$83,105			\$83,105
Pump Station	PS-083 - Richardson Drive Pump Station	\$168,010			\$168,010
Pump Station	PS-084 - Eastwood Way Pump Station	\$135,295			\$135,295
Pump Station	PS-085 - Fairview Park Pump Station	\$180,700			\$180,700
Pump Station	PS-087 - Marinview Pump Station	\$112,435			\$112,435
Pump Station	PS-088 - Tam Woods 1st Lift Pump Station	\$195,700			\$195,700
Pump Station	PS-089 - Tam Woods 2nd Lift Pump Station	\$69,090			\$69,090
Pump Station	PS-090 - Hill Haven Pump Station	\$278,945			\$278,945
Pump Station	PS-091 - Sugarloaf Pump Station	\$240,225			\$240,225
Pump Station	PS-092 - Tiburon Belvedere Pump Station	\$87,270			\$87,270
Pump Station	PS-093 - Tiburon Booster Pump Station	\$276,235			\$276,235
Pump Station	PS-095 - Pine Mountain Tunnel Pump Station	\$12,630			\$12,630
Pump Station	PS-097 - Tocaloma Booster Pump Station	\$126,530			\$126,530
Pump Station	PS-101 - Redwood Drive Lower Pump	\$230,175			\$230,175
Pump Station	PS-102 - North Marin Line Boosters	\$85,130			\$85,130
Pump Station	PS-103 - San Geronimo Valley Pump Station	\$85,130			\$85,130
Pump Station	PS-104 - Conifer Way Pump Station	\$180,700			\$180,700
Pump Station	PS-106 - Los Altos Pump Station	\$197,545			\$197,545
Pump Station	PS-108 - Indian Rock Pump Station	\$214,485			\$214,485
Pump Station	PS-109 - Cibrian Pump Station	\$169,440			\$169,440
Pump Station	PS-113 - Lag Picnic Grounds Pump Station	\$50,190			\$50,190
Pump Station	PS-114 - Cortez Avenue Pump Station	\$132,760			\$132,760
Pump Station	PS-115 - Redwood Drive Upper Pump Station	\$38,960			\$38,960
Pump Station	PS-116 - North Redwood Drive Boosters	\$79,600			\$79,600
Pump Station	PS-117 - Wolfback Ridge Pump Station	\$18,405			\$18,405
Pump Station	PS-118 - Fire Road Pump Station	\$171,820			\$171,820
Pump Station	PS-122 - Upper Road Pump Station	\$11,480			\$11,480
Pump Station	PS-123 - Southern Marin Line Syphon	\$171,820			\$171,820
Pump Station	PS-124 - Throckmorton Booster New Pumpstat	\$5,860			\$5,860
Pump Station	PS-125 - Kent Fire Trail 2nd Lift Pump Station	\$38,960			\$38,960
Pump Station	PS-126 - Oak woodlands Pump Station	\$199,045			\$199,045
Pump Station	PS-127 - Marin Terrace Pump Station	\$41,425			\$41,425
Pump Station	PS-128 - Alpine Bon-Tempe Pump Station	\$3,740			\$3,740
Pump Station	PS-129 - Slide Gulch Pump Station	\$38,960			\$38,960
Pump Station	PS-130 - Smith Conifer Pump Station	\$173,770			\$173,770
Building	San Geronimo Treatment Plant - Boat Barn				
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Chemical Stor	\$15,330,501			\$15,330,501
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #1				
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #2				
Building	San Geronimo Treatment Plant - Facilities Shed				
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Flash Mixer				
Building	San Geronimo Treatment Plant - Gardeners Sh				
Facility - Pump Station	San Geronimo Treatment Plant - North Marin L	\$766,525			\$766,525
Facility - Pump Station	Southern Marin Line - Pump Station	\$86,540			\$86,540
Water Tank	TK-006 - MADERA PARK TANK #1	\$40,718			\$40,718
Water Tank	TK-009 - SAN CLEMENTE TANK	\$912,180			\$912,180
Water Tank	TK-011 - CANON VILLAGE TANK	\$630,375			\$630,375
Water Tank	TK-012 - FAIRFAX GRADE TANK	\$121,945			\$121,945
Water Tank	TK-015 - MEADOW CLUB UPPER TANK	\$204,570			\$204,570
Water Tank	TK-019 - OAK MANOR TOP TANK	\$107,823			\$107,823
Water Tank	TK-025 - BRET HARTE TANK	\$402,805			\$402,805
Water Tank	TK-027 - GREENBRAE TANK	\$1,208,415			\$1,208,415
Water Tank	TK-030 - ESCALLE TANK	\$798,640			\$798,640
Water Tank	TK-033 - INDIAN FIRE TRAIL TANK	\$74,683			\$74,683
Water Tank	TK-046 - ALTO TANK #1	\$731,670			\$731,670
Water Tank	TK-047 - BOLSA TANK	\$2,522			\$2,522

Type	Facility Name	Functionality (%)					
		At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Pump Station	PS-077 - Beacon Hill Pump Station	61.80	81.10	94.90	98.10	99.70	99.90
Pump Station	PS-078 - Crescent Avenue Pump Station	61.80	81.10	94.90	98.10	99.70	99.90
Pump Station	PS-079 - Marin City Pump Station	36.90	54.50	72.50	82.40	95.50	99.90
Pump Station	PS-080 - Monte Mar Vista Pump Station	36.90	54.50	72.50	82.40	95.50	99.90
Pump Station	PS-081 - Sausalito Pumphouse Pump Station	69.10	76.80	79.90	85.60	95.80	99.90
Pump Station	PS-082 - Sausalito Boulevard Pump Station	61.80	81.10	94.90	98.10	99.70	99.90
Pump Station	PS-083 - Richardson Drive Pump Station	44.20	65.50	85.80	92.50	98.60	99.90
Pump Station	PS-084 - Eastwood Way Pump Station	76.50	82.50	85.30	89.60	97.00	99.90
Pump Station	PS-085 - Fairview Park Pump Station	69.10	76.40	80.40	86.10	95.90	99.90
Pump Station	PS-087 - Marinview Pump Station	59.20	77.70	91.30	95.50	98.90	99.90
Pump Station	PS-088 - Tam Woods 1st Lift Pump Station	62.30	72.50	79.40	85.80	95.90	99.90
Pump Station	PS-089 - Tam Woods 2nd Lift Pump Station	76.20	88.20	94.50	96.80	99.10	99.90
Pump Station	PS-090 - Hill Haven Pump Station	36.50	54.00	71.90	82.00	95.40	99.90
Pump Station	PS-091 - Sugarloaf Pump Station	39.20	58.10	76.70	85.70	96.50	99.90
Pump Station	PS-092 - Tiburon Belvedere Pump Station	61.40	80.60	94.40	97.70	99.60	99.90
Pump Station	PS-093 - Tiburon Booster Pump Station	36.70	54.30	72.20	82.30	95.50	99.90
Pump Station	PS-095 - Pine Mountain Tunnel Pump Station	91.80	98.20	99.70	99.90	99.90	99.90
Pump Station	PS-097 - Tocaloma Booster Pump Station	73.10	82.00	87.10	91.20	97.50	99.90
Pump Station	PS-101 - Redwood Drive Lower Pump	48.80	64.20	76.90	84.80	95.80	99.90
Pump Station	PS-102 - North Marin Line Boosters	85.60	89.40	90.70	93.30	98.00	99.90
Pump Station	PS-103 - San Geronimo Valley Pump Station	85.60	89.40	90.70	93.30	98.00	99.90
Pump Station	PS-104 - Conifer Way Pump Station	69.10	76.40	80.40	86.10	95.90	99.90
Pump Station	PS-106 - Los Altos Pump Station	62.20	73.20	79.20	85.60	95.80	99.90
Pump Station	PS-108 - Indian Rock Pump Station	53.90	68.90	78.30	85.30	95.70	99.90
Pump Station	PS-109 - Cibirian Pump Station	58.20	74.30	83.80	89.30	96.90	99.90
Pump Station	PS-113 - Lag Picnic Grounds Pump Station	84.80	93.10	95.70	97.10	99.10	99.90
Pump Station	PS-114 - Cortez Avenue Pump Station	77.80	83.20	85.50	89.60	97.00	99.90
Pump Station	PS-115 - Redwood Drive Upper Pump Station	91.50	95.40	96.10	97.20	99.10	99.90
Pump Station	PS-116 - North Redwood Drive Boosters	61.80	85.30	95.70	98.10	99.40	99.90
Pump Station	PS-117 - Wolfback Ridge Pump Station	87.60	98.00	99.60	99.90	99.90	99.90
Pump Station	PS-118 - Fire Road Pump Station	74.40	78.20	80.70	86.20	96.00	99.90
Pump Station	PS-122 - Upper Road Pump Station	91.90	99.20	99.80	99.90	99.90	99.90
Pump Station	PS-123 - Southern Marin Line Syphon	74.40	78.20	80.70	86.20	96.00	99.90
Pump Station	PS-124 - Throckmorton Booster New Pumpstat	95.80	99.70	99.90	99.90	99.90	99.90
Pump Station	PS-125 - Kent Fire Trail 2nd Lift Pump Station	91.50	95.40	96.10	97.20	99.10	99.90
Pump Station	PS-126 - Oak woodlands Pump Station	63.00	74.70	79.00	85.10	95.60	99.90
Pump Station	PS-127 - Marin Terrace Pump Station	89.80	95.20	96.00	97.20	99.10	99.90
Pump Station	PS-128 - Alpine Bon-Tempe Pump Station	97.20	99.80	99.90	99.90	99.90	99.90
Pump Station	PS-129 - Slide Gulch Pump Station	91.50	95.40	96.10	97.20	99.10	99.90
Pump Station	PS-130 - Smith Conifer Pump Station	73.00	78.00	80.60	86.10	95.90	99.90
Building	San Geronimo Treatment Plant - Boat Barn	77.70	78.10	87.80	87.90	88.20	97.60
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Chemical Stor	56.50	82.40	87.70	88.70	91.20	98.30
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #1	56.50	82.40	87.70	88.70	91.20	98.30
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #2	80.00	89.10	90.30	91.00	93.00	98.40
Building	San Geronimo Treatment Plant - Facilities Shed	53.20	54.80	85.30	85.40	88.20	97.60
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Flash Mixer	80.00	89.10	90.30	91.00	93.00	98.40
Building	San Geronimo Treatment Plant - Gardeners Sh	77.70	78.10	87.80	87.90	88.20	97.60
Facility - Pump Station	San Geronimo Treatment Plant - North Marin L	55.50	73.00	86.30	91.70	97.80	99.90
Facility - Pump Station	Southern Marin Line - Pump Station	76.90	90.40	98.00	99.50	99.90	99.90
Water Tank	TK-006 - MADERA PARK TANK #1	45.70	74.20	77.60	78.60	79.80	85.80
Water Tank	TK-009 - SAN CLEMENTE TANK	21.90	42.70	65.70	70.30	72.10	81.20
Water Tank	TK-011 - CANON VILLAGE TANK	46.20	69.50	77.10	78.80	80.00	86.00
Water Tank	TK-012 - FAIRFAX GRADE TANK	40.20	71.40	90.80	94.20	94.50	96.30
Water Tank	TK-015 - MEADOW CLUB UPPER TANK	23.60	42.90	61.10	64.90	67.00	77.20
Water Tank	TK-019 - OAK MANOR TOP TANK	45.80	68.80	76.40	78.10	79.40	85.50
Water Tank	TK-025 - BRET HARTE TANK	19.60	35.20	52.50	56.40	59.00	71.70
Water Tank	TK-027 - GREENBRAE TANK	19.60	35.20	52.50	56.40	59.00	71.70
Water Tank	TK-030 - ESCALLE TANK	19.70	35.40	52.90	56.80	59.40	72.00
Water Tank	TK-033 - INDIAN FIRE TRAIL TANK	38.80	68.60	87.00	90.30	90.90	93.80
Water Tank	TK-046 - ALTO TANK #1	40.20	71.40	90.80	94.20	94.50	96.30
Water Tank	TK-047 - BOLSA TANK	91.70	99.80	99.90	99.90	99.90	99.90

Type	Facility Name	Structure Replacement Cost	Structural - Probability of Damage				
			No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Water Tank	TK-055 - MILL VALLEY TANK	\$10,000,000	46.17%	29.41%	22.92%	1.48%	0.00%
Water Tank	TK-060 - SCOTT HIGHLANDS TANK	\$500,000	6.59%	15.50%	44.32%	29.55%	4.01%
Water Tank	TK-064 - STRAWBERRY TANK	\$3,000,000	15.81%	21.33%	32.93%	24.94%	4.97%
Water Tank	TK-068 - ELDA DRIVE TANK	\$300,000	6.59%	15.50%	44.32%	29.55%	4.01%
Water Tank	TK-069 - HAWTHORNE HILLS UPPER TANK	\$4,000,000	1.72%	6.38%	44.88%	43.93%	3.06%
Water Tank	TK-074 - SCENIC AVENUE TANK	\$40,000	63.88%	32.66%	2.74%	0.56%	0.13%
Water Tank	TK-078 - CHULA VISTA TANK	\$500,000	8.01%	18.84%	53.87%	18.77%	0.48%
Water Tank	TK-081 - FAIRHILLS TOP TANK #1	\$120,000	23.00%	36.35%	37.06%	3.42%	0.15%
Water Tank	TK-083 - GLENWOOD TANK	\$3,000,000	0.23%	1.79%	27.37%	58.54%	12.04%
Water Tank	TK-085 - HIND TANK #1	\$200,000	16.76%	41.60%	15.10%	21.18%	5.34%
Water Tank	TK-086 - HIND TANK #2	\$400,000	34.33%	34.18%	5.09%	21.04%	5.34%
Water Tank	TK-087 - LOCH LOMOND TANK	\$2,000,000	2.15%	7.96%	40.73%	43.32%	5.81%
Water Tank	TK-089 - LOS RANCHITOS TANK	\$2,000,000	6.59%	15.50%	44.32%	29.55%	4.01%
Water Tank	TK-090 - MARINWOOD TANK	\$1,000,000	0.64%	3.53%	31.69%	54.83%	9.29%
Water Tank	TK-091 - MARIN PROFESSIONAL CENTER TANK	\$500,000	0.05%	0.52%	13.03%	60.80%	25.58%
Water Tank	TK-094 - MILLER CREEK TANK	\$1,000,000	6.59%	15.50%	44.32%	29.55%	4.01%
Water Tank	TK-096 - PUERTO SUELLO TANK	\$3,000,000	2.01%	7.45%	38.08%	45.61%	6.83%
Water Tank	TK-097 - RAFAEL HIGHLANDS TANK	\$1,000,000	8.01%	18.84%	53.87%	18.77%	0.48%
Water Tank	TK-098 - SANTA MARGARITA TANK	\$3,000,000	2.23%	8.26%	42.25%	42.04%	5.19%
Water Tank	TK-100 - SKYVIEW TERRACE TANK	\$300,000	0.81%	4.46%	40.05%	49.35%	5.31%
Water Tank	TK-105 - COURTRIGHT TANK	\$100,000	22.60%	56.11%	20.36%	0.77%	0.13%
Water Tank	TK-106 - LUCAS VALLEY TANK	\$3,000,000	6.01%	14.13%	40.41%	33.97%	5.46%
Water Tank	TK-108 - CLOUDVIEW TANK	\$440,000	7.15%	16.04%	53.49%	22.86%	0.44%
Water Tank	TK-113 - SAUSALITO PUMP HOUSE TANK #1	\$620,000	0.26%	1.47%	21.37%	61.41%	15.45%
Water Tank	TK-114 - SAUSALITO PUMP HOUSE TANK #2	\$620,000	0.26%	1.47%	21.37%	61.41%	15.45%
Water Tank	TK-115 - ROMER TANK	\$620,000	1.30%	4.84%	34.06%	52.06%	7.71%
Water Tank	TK-116 - SAUSALITO BLVD. TANK	\$460,000	7.15%	16.04%	53.49%	22.86%	0.44%
Water Tank	TK-117 - MESA VISTA TANK #1	\$1,000,000	6.01%	14.13%	40.41%	33.97%	5.46%
Water Tank	TK-118 - COUNTYVIEW DRIVE TANK	\$300,000	20.98%	28.30%	43.69%	6.96%	0.05%
Water Tank	TK-119 - LATTIE LANE TANK	\$500,000	15.81%	21.33%	32.93%	24.94%	4.97%
Water Tank	TK-125 - TENNESSEE VALLEY TANK	\$2,000,000	19.94%	26.91%	41.54%	10.55%	1.03%
Water Tank	TK-126 - HILL HAVEN TANK	\$330,000	23.00%	36.35%	37.06%	3.42%	0.15%
Water Tank	TK-127 - PARADISE DRIVE TANK	\$2,000,000	17.25%	27.27%	27.80%	22.52%	5.14%
Water Tank	TK-128 - MOUNT TIBURON TANK #1	\$1,000,000	6.01%	14.13%	40.41%	33.97%	5.46%
Water Tank	TK-130 - SPRING LANE TANK #1	\$3,000,000	7.10%	15.93%	53.12%	23.25%	0.57%
Water Tank	TK-131 - CONIFER WAY TANK	\$1,000,000	15.81%	21.33%	32.93%	24.94%	4.97%
Water Tank	TK-139 - BUCKEYE CIRCLE TANK	\$60,000	35.76%	25.61%	13.54%	20.14%	4.92%
Water Tank	TK-145 - ROSS RESERVOIR	\$2,000,000	35.90%	29.96%	30.35%	3.75%	0.01%
Water Tank	TK-146 - FORBES HILL RESERVOIR	\$8,000,000	6.96%	15.05%	50.04%	26.82%	1.11%
Water Tank	TK-147 - SMITH SADDLE TANK #1	\$10,000,000	15.81%	21.33%	32.93%	24.94%	4.97%
Water Tank	TK-148 - SMITH SADDLE TANK #2	\$10,000,000	19.94%	26.91%	41.54%	10.55%	1.03%
Water Tank	TK-150 - LOS ALTOS TANK	\$120,000	40.67%	35.67%	22.06%	1.44%	0.13%
Water Tank	TK-152 - MADERA PARK (H/P) TANK	\$3,000	6.01%	14.13%	40.41%	33.97%	5.46%
Water Tank	TK-153 - RAFAEL HIGHLANDS (H/P) TANK	\$5,000	8.01%	18.84%	53.87%	18.77%	0.48%
Water Tank	TK-155 - PINE MOUNTAIN TUNNEL TANK	\$6,000,000	30.35%	20.75%	21.57%	22.36%	4.94%
Water Tank	TK-156 - BON TEMPE CLEARWELL TANK	\$4,000,000	34.13%	28.49%	28.86%	7.50%	0.99%
Water Tank	TK-157 - SAN GERONIMO CLEARWELL TANK #1	\$4,000,000	31.67%	26.43%	26.78%	12.72%	2.36%
Water Tank	TK-158 - FAWN DRIVE TANK	\$180,000	23.00%	36.35%	37.06%	3.42%	0.15%
Water Tank	TK-159 - PEACOCK GAP TANK	\$1,000,000	9.61%	22.99%	35.60%	26.13%	5.64%
Water Tank	TK-160 - MARIN BAY TANK	\$240,000	2.25%	12.47%	45.96%	34.19%	5.11%
Water Tank	TK-164 - TOMAHAWK DRIVE TANK	\$80,000	18.92%	29.90%	30.49%	16.98%	3.69%
Water Tank	TK-165 - ALTO TANK #2	\$6,000,000	30.87%	27.07%	16.74%	20.38%	4.92%
Water Tank	TK-166 - RING MOUNTAIN TANK	\$300,000	23.00%	36.35%	37.06%	3.42%	0.15%
Water Tank	TK-167 - CREEKSIDE DRIVE TANK	\$360,000	17.25%	27.27%	27.80%	22.52%	5.14%
Water Tank	TK-168 - MCNEAR DRIVE #1 (H/P) TANK	\$2,000	0.17%	1.34%	20.52%	61.50%	16.44%
Water Tank	TK-169 - MCNEAR DRIVE #2 (H/P) TANK	\$3,000	0.60%	3.31%	29.71%	56.13%	10.23%
Water Tank	TK-174 - VIA MONTEBELLO (H/P) TANK	\$7,000	1.33%	10.25%	54.95%	31.65%	1.79%
Water Tank	TK-175 - MARINSHIP TANK	\$3,000,000	48.33%	31.26%	15.03%	4.38%	0.98%
Water Tank	TK-181 - REDWOOD DRIVE UPPER TANK	\$120,000	56.23%	32.61%	6.18%	3.98%	0.98%
Water Tank	TK-182 - ALTA AVENUE TANK	\$1,000,000	67.44%	28.34%	4.17%	0.02%	0.00%
Water Tank	TK-183 - MINE RIDGE TANK	\$440,000	67.44%	28.34%	4.17%	0.02%	0.00%

Type	Facility Name	Nonstructural Acceleration-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Water Tank	TK-055 - MILL VALLEY TANK					
Water Tank	TK-060 - SCOTT HIGHLANDS TANK					
Water Tank	TK-064 - STRAWBERRY TANK					
Water Tank	TK-068 - ELDA DRIVE TANK					
Water Tank	TK-069 - HAWTHORNE HILLS UPPER TANK					
Water Tank	TK-074 - SCENIC AVENUE TANK					
Water Tank	TK-078 - CHULA VISTA TANK					
Water Tank	TK-081 - FAIRHILLS TOP TANK #1					
Water Tank	TK-083 - GLENWOOD TANK					
Water Tank	TK-085 - HIND TANK #1					
Water Tank	TK-086 - HIND TANK #2					
Water Tank	TK-087 - LOCH LOMOND TANK					
Water Tank	TK-089 - LOS RANCHITOS TANK					
Water Tank	TK-090 - MARINWOOD TANK					
Water Tank	TK-091 - MARIN PROFESSIONAL CENTER TANK					
Water Tank	TK-094 - MILLER CREEK TANK					
Water Tank	TK-096 - PUERTO SUELLO TANK					
Water Tank	TK-097 - RAFAEL HIGHLANDS TANK					
Water Tank	TK-098 - SANTA MARGARITA TANK					
Water Tank	TK-100 - SKYVIEW TERRACE TANK					
Water Tank	TK-105 - COURTRIGHT TANK					
Water Tank	TK-106 - LUCAS VALLEY TANK					
Water Tank	TK-108 - CLOUDVIEW TANK					
Water Tank	TK-113 - SAUSALITO PUMP HOUSE TANK #1					
Water Tank	TK-114 - SAUSALITO PUMP HOUSE TANK #2					
Water Tank	TK-115 - ROMER TANK					
Water Tank	TK-116 - SAUSALITO BLVD. TANK					
Water Tank	TK-117 - MESA VISTA TANK #1					
Water Tank	TK-118 - COUNTYVIEW DRIVE TANK					
Water Tank	TK-119 - LATTIE LANE TANK					
Water Tank	TK-125 - TENNESSEE VALLEY TANK					
Water Tank	TK-126 - HILL HAVEN TANK					
Water Tank	TK-127 - PARADISE DRIVE TANK					
Water Tank	TK-128 - MOUNT TIBURON TANK #1					
Water Tank	TK-130 - SPRING LANE TANK #1					
Water Tank	TK-131 - CONIFER WAY TANK					
Water Tank	TK-139 - BUCKEYE CIRCLE TANK					
Water Tank	TK-145 - ROSS RESERVOIR					
Water Tank	TK-146 - FORBES HILL RESERVOIR					
Water Tank	TK-147 - SMITH SADDLE TANK #1					
Water Tank	TK-148 - SMITH SADDLE TANK #2					
Water Tank	TK-150 - LOS ALTOS TANK					
Water Tank	TK-152 - MADERA PARK (H/P) TANK					
Water Tank	TK-153 - RAFAEL HIGHLANDS (H/P) TANK					
Water Tank	TK-155 - PINE MOUNTAIN TUNNEL TANK					
Water Tank	TK-156 - BON TEMPE CLEARWELL TANK					
Water Tank	TK-157 - SAN GERONIMO CLEARWELL TANK #1					
Water Tank	TK-158 - FAWN DRIVE TANK					
Water Tank	TK-159 - PEACOCK GAP TANK					
Water Tank	TK-160 - MARIN BAY TANK					
Water Tank	TK-164 - TOMAHAWK DRIVE TANK					
Water Tank	TK-165 - ALTO TANK #2					
Water Tank	TK-166 - RING MOUNTAIN TANK					
Water Tank	TK-167 - CREEKSIDE DRIVE TANK					
Water Tank	TK-168 - MCNEAR DRIVE #1 (H/P) TANK					
Water Tank	TK-169 - MCNEAR DRIVE #2 (H/P) TANK					
Water Tank	TK-174 - VIA MONTEBELLO (H/P) TANK					
Water Tank	TK-175 - MARINSHIP TANK					
Water Tank	TK-181 - REDWOOD DRIVE UPPER TANK					
Water Tank	TK-182 - ALTA AVENUE TANK					
Water Tank	TK-183 - MINE RIDGE TANK					

Type	Facility Name	Nonstructural Drift-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Water Tank	TK-055 - MILL VALLEY TANK					
Water Tank	TK-060 - SCOTT HIGHLANDS TANK					
Water Tank	TK-064 - STRAWBERRY TANK					
Water Tank	TK-068 - ELDA DRIVE TANK					
Water Tank	TK-069 - HAWTHORNE HILLS UPPER TANK					
Water Tank	TK-074 - SCENIC AVENUE TANK					
Water Tank	TK-078 - CHULA VISTA TANK					
Water Tank	TK-081 - FAIRHILLS TOP TANK #1					
Water Tank	TK-083 - GLENWOOD TANK					
Water Tank	TK-085 - HIND TANK #1					
Water Tank	TK-086 - HIND TANK #2					
Water Tank	TK-087 - LOCH LOMOND TANK					
Water Tank	TK-089 - LOS RANCHITOS TANK					
Water Tank	TK-090 - MARINWOOD TANK					
Water Tank	TK-091 - MARIN PROFESSIONAL CENTER TANK					
Water Tank	TK-094 - MILLER CREEK TANK					
Water Tank	TK-096 - PUERTO SUELLO TANK					
Water Tank	TK-097 - RAFAEL HIGHLANDS TANK					
Water Tank	TK-098 - SANTA MARGARITA TANK					
Water Tank	TK-100 - SKYVIEW TERRACE TANK					
Water Tank	TK-105 - COURTRIGHT TANK					
Water Tank	TK-106 - LUCAS VALLEY TANK					
Water Tank	TK-108 - CLOUDVIEW TANK					
Water Tank	TK-113 - SAUSALITO PUMP HOUSE TANK #1					
Water Tank	TK-114 - SAUSALITO PUMP HOUSE TANK #2					
Water Tank	TK-115 - ROMER TANK					
Water Tank	TK-116 - SAUSALITO BLVD. TANK					
Water Tank	TK-117 - MESA VISTA TANK #1					
Water Tank	TK-118 - COUNTYVIEW DRIVE TANK					
Water Tank	TK-119 - LATTIE LANE TANK					
Water Tank	TK-125 - TENNESSEE VALLEY TANK					
Water Tank	TK-126 - HILL HAVEN TANK					
Water Tank	TK-127 - PARADISE DRIVE TANK					
Water Tank	TK-128 - MOUNT TIBURON TANK #1					
Water Tank	TK-130 - SPRING LANE TANK #1					
Water Tank	TK-131 - CONIFER WAY TANK					
Water Tank	TK-139 - BUCKEYE CIRCLE TANK					
Water Tank	TK-145 - ROSS RESERVOIR					
Water Tank	TK-146 - FORBES HILL RESERVOIR					
Water Tank	TK-147 - SMITH SADDLE TANK #1					
Water Tank	TK-148 - SMITH SADDLE TANK #2					
Water Tank	TK-150 - LOS ALTOS TANK					
Water Tank	TK-152 - MADERA PARK (H/P) TANK					
Water Tank	TK-153 - RAFAEL HIGHLANDS (H/P) TANK					
Water Tank	TK-155 - PINE MOUNTAIN TUNNEL TANK					
Water Tank	TK-156 - BON TEMPE CLEARWELL TANK					
Water Tank	TK-157 - SAN GERONIMO CLEARWELL TANK #1					
Water Tank	TK-158 - FAWN DRIVE TANK					
Water Tank	TK-159 - PEACOCK GAP TANK					
Water Tank	TK-160 - MARIN BAY TANK					
Water Tank	TK-164 - TOMAHAWK DRIVE TANK					
Water Tank	TK-165 - ALTO TANK #2					
Water Tank	TK-166 - RING MOUNTAIN TANK					
Water Tank	TK-167 - CREEKSIDE DRIVE TANK					
Water Tank	TK-168 - MCNEAR DRIVE #1 (H/P) TANK					
Water Tank	TK-169 - MCNEAR DRIVE #2 (H/P) TANK					
Water Tank	TK-174 - VIA MONTEBELLO (H/P) TANK					
Water Tank	TK-175 - MARINSHIP TANK					
Water Tank	TK-181 - REDWOOD DRIVE UPPER TANK					
Water Tank	TK-182 - ALTA AVENUE TANK					
Water Tank	TK-183 - MINE RIDGE TANK					



Type	Facility Name	Losses (in dollars)			
		Structure	Nonstructural Drift Sensitive	Nonstructural Acceleration-Sensitive	Total Building Loss
Water Tank	TK-055 - MILL VALLEY TANK	\$579,650			\$579,650
Water Tank	TK-060 - SCOTT HIGHLANDS TANK	\$145,815			\$145,815
Water Tank	TK-064 - STRAWBERRY TANK	\$778,200			\$778,200
Water Tank	TK-068 - ELDA DRIVE TANK	\$87,489			\$87,489
Water Tank	TK-069 - HAWTHORNE HILLS UPPER TANK	\$1,458,760			\$1,458,760
Water Tank	TK-074 - SCENIC AVENUE TANK	\$1,004			\$1,004
Water Tank	TK-078 - CHULA VISTA TANK	\$103,823			\$103,823
Water Tank	TK-081 - FAIRHILLS TOP TANK #1	\$11,494			\$11,494
Water Tank	TK-083 - GLENWOOD TANK	\$1,540,770			\$1,540,770
Water Tank	TK-085 - HIND TANK #1	\$44,786			\$44,786
Water Tank	TK-086 - HIND TANK #2	\$81,746			\$81,746
Water Tank	TK-087 - LOCH LOMOND TANK	\$766,190			\$766,190
Water Tank	TK-089 - LOS RANCHITOS TANK	\$583,260			\$583,260
Water Tank	TK-090 - MARINWOOD TANK	\$471,180			\$471,180
Water Tank	TK-091 - MARIN PROFESSIONAL CENTER TANK	\$320,203			\$320,203
Water Tank	TK-094 - MILLER CREEK TANK	\$291,630			\$291,630
Water Tank	TK-096 - PUERTO SUELLO TANK	\$1,208,415			\$1,208,415
Water Tank	TK-097 - RAFAEL HIGHLANDS TANK	\$207,645			\$207,645
Water Tank	TK-098 - SANTA MARGARITA TANK	\$1,114,935			\$1,114,935
Water Tank	TK-100 - SKYVIEW TERRACE TANK	\$123,452			\$123,452
Water Tank	TK-105 - COURTRIGHT TANK	\$6,452			\$6,452
Water Tank	TK-106 - LUCAS VALLEY TANK	\$978,300			\$978,300
Water Tank	TK-108 - CLOUDVIEW TANK	\$101,119			\$101,119
Water Tank	TK-113 - SAUSALITO PUMP HOUSE TANK #1	\$344,565			\$344,565
Water Tank	TK-114 - SAUSALITO PUMP HOUSE TANK #2	\$344,565			\$344,565
Water Tank	TK-115 - ROMER TANK	\$274,641			\$274,641
Water Tank	TK-116 - SAUSALITO BLVD. TANK	\$105,715			\$105,715
Water Tank	TK-117 - MESA VISTA TANK #1	\$326,100			\$326,100
Water Tank	TK-118 - COUNTYVIEW DRIVE TANK	\$36,584			\$36,584
Water Tank	TK-119 - LATTIE LANE TANK	\$129,700			\$129,700
Water Tank	TK-125 - TENNESSEE VALLEY TANK	\$298,730			\$298,730
Water Tank	TK-126 - HILL HAVEN TANK	\$31,609			\$31,609
Water Tank	TK-127 - PARADISE DRIVE TANK	\$483,710			\$483,710
Water Tank	TK-128 - MOUNT TIBURON TANK #1	\$326,100			\$326,100
Water Tank	TK-130 - SPRING LANE TANK #1	\$698,535			\$698,535
Water Tank	TK-131 - CONIFER WAY TANK	\$259,400			\$259,400
Water Tank	TK-139 - BUCKEYE CIRCLE TANK	\$12,189			\$12,189
Water Tank	TK-145 - ROSS RESERVOIR	\$166,210			\$166,210
Water Tank	TK-146 - FORBES HILL RESERVOIR	\$2,036,840			\$2,036,840
Water Tank	TK-147 - SMITH SADDLE TANK #1	\$2,594,000			\$2,594,000
Water Tank	TK-148 - SMITH SADDLE TANK #2	\$1,493,650			\$1,493,650
Water Tank	TK-150 - LOS ALTOS TANK	\$7,304			\$7,304
Water Tank	TK-152 - MADERA PARK (H/P) TANK	\$978			\$978
Water Tank	TK-153 - RAFAEL HIGHLANDS (H/P) TANK	\$1,038			\$1,038
Water Tank	TK-155 - PINE MOUNTAIN TUNNEL TANK	\$1,357,740			\$1,357,740
Water Tank	TK-156 - BON TEMPE CLEARWELL TANK	\$449,740			\$449,740
Water Tank	TK-157 - SAN GERONIMO CLEARWELL TANK #1	\$613,220			\$613,220
Water Tank	TK-158 - FAWN DRIVE TANK	\$17,241			\$17,241
Water Tank	TK-159 - PEACOCK GAP TANK	\$278,075			\$278,075
Water Tank	TK-160 - MARIN BAY TANK	\$79,540			\$79,540
Water Tank	TK-164 - TOMAHAWK DRIVE TANK	\$15,957			\$15,957
Water Tank	TK-165 - ALTO TANK #2	\$1,260,750			\$1,260,750
Water Tank	TK-166 - RING MOUNTAIN TANK	\$28,736			\$28,736
Water Tank	TK-167 - CREEKSIDE DRIVE TANK	\$87,068			\$87,068
Water Tank	TK-168 - MCNEAR DRIVE #1 (H/P) TANK	\$1,130			\$1,130
Water Tank	TK-169 - MCNEAR DRIVE #2 (H/P) TANK	\$1,456			\$1,456
Water Tank	TK-174 - VIA MONTEBELLO (H/P) TANK	\$2,067			\$2,067
Water Tank	TK-175 - MARINSHIP TANK	\$222,765			\$222,765
Water Tank	TK-181 - REDWOOD DRIVE UPPER TANK	\$7,111			\$7,111
Water Tank	TK-182 - ALTA AVENUE TANK	\$20,545			\$20,545
Water Tank	TK-183 - MINE RIDGE TANK	\$9,040			\$9,040

Type	Facility Name	Functionality (%)					
		At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Water Tank	TK-055 - MILL VALLEY TANK	60.40	86.90	97.00	98.70	98.80	99.20
Water Tank	TK-060 - SCOTT HIGHLANDS TANK	25.50	48.20	68.10	72.10	73.70	81.90
Water Tank	TK-064 - STRAWBERRY TANK	33.50	57.20	72.00	75.00	76.50	83.60
Water Tank	TK-068 - ELDA DRIVE TANK	25.50	48.20	68.10	72.10	73.70	81.90
Water Tank	TK-069 - HAWTHORNE HILLS UPPER TANK	19.90	36.50	56.80	61.00	63.50	75.20
Water Tank	TK-074 - SCENIC AVENUE TANK	74.60	97.90	99.10	99.30	99.40	99.50
Water Tank	TK-078 - CHULA VISTA TANK	28.20	55.70	79.60	84.00	85.00	89.90
Water Tank	TK-081 - FAIRHILLS TOP TANK #1	42.80	77.80	94.20	97.00	97.20	98.10
Water Tank	TK-083 - GLENWOOD TANK	16.10	25.00	37.70	41.10	44.60	61.30
Water Tank	TK-085 - HIND TANK #1	36.30	69.30	76.20	77.80	79.10	85.30
Water Tank	TK-086 - HIND TANK #2	49.40	74.50	77.00	77.90	79.20	85.30
Water Tank	TK-087 - LOCH LOMOND TANK	20.10	36.70	55.10	59.10	61.60	73.50
Water Tank	TK-089 - LOS RANCHITOS TANK	25.50	48.20	68.10	72.10	73.70	81.90
Water Tank	TK-090 - MARINWOOD TANK	17.20	28.40	43.00	46.60	49.80	65.20
Water Tank	TK-091 - MARIN PROFESSIONAL CENTER TANK	14.00	18.30	24.80	27.30	31.30	50.60
Water Tank	TK-094 - MILLER CREEK TANK	25.50	48.20	68.10	72.10	73.70	81.90
Water Tank	TK-096 - PUERTO SUELLO TANK	19.60	35.20	52.50	56.40	59.00	71.70
Water Tank	TK-097 - RAFAEL HIGHLANDS TANK	28.20	55.70	79.60	84.00	85.00	89.90
Water Tank	TK-098 - SANTA MARGARITA TANK	20.30	37.60	56.70	60.70	63.10	74.60
Water Tank	TK-100 - SKYVIEW TERRACE TANK	18.30	32.40	50.60	54.60	57.40	70.80
Water Tank	TK-105 - COURTRIGHT TANK	44.40	88.70	97.60	99.20	99.20	99.40
Water Tank	TK-106 - LUCAS VALLEY TANK	24.40	45.20	63.40	67.10	69.10	78.60
Water Tank	TK-108 - CLOUDVIEW TANK	27.00	52.50	76.30	80.70	81.90	87.90
Water Tank	TK-113 - SAUSALITO PUMP HOUSE TANK #1	15.40	22.50	32.70	35.70	39.40	57.40
Water Tank	TK-114 - SAUSALITO PUMP HOUSE TANK #2	15.40	22.50	32.70	35.70	39.40	57.40
Water Tank	TK-115 - ROMER TANK	18.20	31.00	46.60	50.30	53.20	67.70
Water Tank	TK-116 - SAUSALITO BLVD. TANK	27.00	52.50	76.30	80.70	81.90	87.90
Water Tank	TK-117 - MESA VISTA TANK #1	24.40	45.20	63.40	67.10	69.10	78.60
Water Tank	TK-118 - COUNTYVIEW DRIVE TANK	40.20	71.40	90.80	94.20	94.50	96.30
Water Tank	TK-119 - LATTIE LANE TANK	33.50	57.20	72.00	75.00	76.50	83.60
Water Tank	TK-125 - TENNESSEE VALLEY TANK	38.80	68.60	87.00	90.30	90.90	93.80
Water Tank	TK-126 - HILL HAVEN TANK	42.80	77.80	94.20	97.00	97.20	98.10
Water Tank	TK-127 - PARADISE DRIVE TANK	35.30	61.80	74.30	76.90	78.20	84.70
Water Tank	TK-128 - MOUNT TIBURON TANK #1	24.40	45.20	63.40	67.10	69.10	78.60
Water Tank	TK-130 - SPRING LANE TANK #1	26.90	52.20	75.80	80.30	81.50	87.60
Water Tank	TK-131 - CONIFER WAY TANK	33.50	57.20	72.00	75.00	76.50	83.60
Water Tank	TK-139 - BUCKEYE CIRCLE TANK	49.90	71.30	77.50	79.00	80.20	86.10
Water Tank	TK-145 - ROSS RESERVOIR	52.20	81.10	94.50	96.80	97.00	98.00
Water Tank	TK-146 - FORBES HILL RESERVOIR	26.30	50.20	72.60	76.90	78.30	85.40
Water Tank	TK-147 - SMITH SADDLE TANK #1	33.50	57.20	72.00	75.00	76.50	83.60
Water Tank	TK-148 - SMITH SADDLE TANK #2	38.80	68.60	87.00	90.30	90.90	93.80
Water Tank	TK-150 - LOS ALTOS TANK	56.70	87.20	96.90	98.60	98.70	99.10
Water Tank	TK-152 - MADERA PARK (H/P) TANK	24.40	45.20	63.40	67.10	69.10	78.60
Water Tank	TK-153 - RAFAEL HIGHLANDS (H/P) TANK	28.20	55.70	79.60	84.00	85.00	89.90
Water Tank	TK-155 - PINE MOUNTAIN TUNNEL TANK	45.00	65.30	75.00	77.20	78.50	84.90
Water Tank	TK-156 - BON TEMPE CLEARWELL TANK	50.30	77.80	90.60	92.90	93.30	95.40
Water Tank	TK-157 - SAN GERONIMO CLEARWELL TANK #1	47.60	73.10	85.10	87.40	88.10	91.70
Water Tank	TK-158 - FAWN DRIVE TANK	42.80	77.80	94.20	97.00	97.20	98.10
Water Tank	TK-159 - PEACOCK GAP TANK	28.60	54.20	70.20	73.40	75.00	82.50
Water Tank	TK-160 - MARIN BAY TANK	21.40	42.50	63.10	67.30	69.20	78.70
Water Tank	TK-164 - TOMAHAWK DRIVE TANK	37.50	66.40	80.00	82.70	83.70	88.60
Water Tank	TK-165 - ALTO TANK #2	46.20	69.50	77.10	78.80	80.00	86.00
Water Tank	TK-166 - RING MOUNTAIN TANK	42.80	77.80	94.20	97.00	97.20	98.10
Water Tank	TK-167 - CREEKSIDE DRIVE TANK	35.30	61.80	74.30	76.90	78.20	84.70
Water Tank	TK-168 - MCNEAR DRIVE #1 (H/P) TANK	15.20	22.00	31.80	34.80	38.50	56.70
Water Tank	TK-169 - MCNEAR DRIVE #2 (H/P) TANK	16.90	27.50	41.20	44.70	48.00	63.90
Water Tank	TK-174 - VIA MONTEBELLO (H/P) TANK	21.00	43.00	67.50	72.30	74.00	82.40
Water Tank	TK-175 - MARINSHIP TANK	61.90	87.60	94.20	95.50	95.70	97.00
Water Tank	TK-181 - REDWOOD DRIVE UPPER TANK	68.20	92.50	95.20	95.80	96.00	97.20
Water Tank	TK-182 - ALTA AVENUE TANK	77.00	97.80	99.60	99.90	99.90	99.90
Water Tank	TK-183 - MINE RIDGE TANK	77.00	97.80	99.60	99.90	99.90	99.90

Type	Facility Name	Structure Replacement Cost	Structural - Probability of Damage				
			No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Water Tank	TK-184 - PACHECO RIDGE TANK #1	\$6,000,000	10.98%	34.71%	30.71%	19.03%	4.55%
Water Tank	TK-185 - PACHECO RIDGE TANK #2	\$6,000,000	8.60%	32.61%	34.68%	19.52%	4.56%
Water Tank	TK-186 - SAN GERONIMO CLEARWELL TANK #2	\$6,000,000	68.46%	17.55%	2.19%	9.42%	2.35%
Water Tank	TK-187 - MANZANITA TANK	\$120,000	55.04%	23.13%	3.40%	14.73%	3.67%
Water Tank	TK-188 - WOLFBACK RIDGE TANK #1	\$50,000	59.14%	34.29%	6.50%	0.05%	0.00%
Water Tank	TK-189 - WOLFBACK RIDGE TANK #2	\$50,000	59.14%	34.29%	6.50%	0.05%	0.00%
Water Tank	TK-190 - INVERNESS DRIVE TANK	\$280,000	16.31%	35.26%	21.47%	21.59%	5.34%
Water Tank	TK-191 - LONE TREE AVENUE TANK	\$200,000	67.44%	28.34%	4.17%	0.02%	0.00%
Water Tank	TK-192 - VERNAL AVE TANK	\$600,000	59.14%	34.29%	6.50%	0.05%	0.00%
Water Tank	TK-193 - H-LINE ROAD TANK	\$1,000,000	44.57%	25.85%	4.90%	19.74%	4.92%
Water Tank	TK-195 - Fire Road Pressure Tank	\$2,000	44.57%	25.85%	4.90%	19.74%	4.92%
Water Tank	TK-196 - WILSON WAY TANK	\$200,000	68.99%	27.90%	3.08%	0.01%	0.00%
Water Tank	TK-197 - SUMMIT TRAIL TANK	\$260,000	68.99%	27.90%	3.08%	0.01%	0.00%
Water Tank	TK-198 - SCOTT TANKS	\$120,000	76.00%	22.10%	1.89%	0.00%	0.00%
Water Tank	TK-199 - SCOTT TANKS	\$120,000	76.00%	22.10%	1.89%	0.00%	0.00%
Water Tank	TK-200 - OAK WOODLANDS TANK #1	\$230,000	31.64%	33.43%	8.50%	21.06%	5.34%
Water Tank	TK-201 - OAK WOODLANDS TANK #2	\$230,000	33.84%	35.76%	9.09%	16.99%	4.30%
Water Tank	TK-202 - Fairfax Manor 1st Lift Tank	\$40,000	47.66%	24.41%	3.28%	19.71%	4.92%
Water Tank	TK-203 - MONTE MAR VISTA TANK	\$120,000	63.23%	32.38%	4.35%	0.02%	0.00%
Water Tank	TK-204 - Bay Road Tank	\$240,000	20.98%	28.30%	43.69%	6.96%	0.05%
Water Tank	TK-205 - RICHARDSON DRIVE (H/P) TANK	\$2,000	63.23%	32.38%	4.35%	0.02%	0.00%
Water Tank	TK-206 - SANTA VENETIA TANK	\$620,000	21.10%	49.04%	26.56%	2.70%	0.57%
Water Tank	TK-207 - GOODHILL ROAD TANK	\$120,000	68.99%	27.90%	3.08%	0.01%	0.00%
Water Tank	TK-208 - SPRING LANE TANK #2	\$3,000,000	62.80%	32.16%	4.32%	0.57%	0.13%
Water Tank	TK-209 - FAIRHILLS TOP TANK #2	\$120,000	48.50%	41.88%	8.86%	0.59%	0.13%
Water Tank	TK-210 - BEACON HILL TANK	\$200,000	68.99%	27.90%	3.08%	0.01%	0.00%
Water Tank	TK-211 - Kent Fire Trail Tank #1	\$200,000	72.26%	21.01%	1.80%	3.93%	0.98%
Water Tank	TK-212 - Kent Fire Trail Tank #2	\$200,000	72.26%	21.01%	1.80%	3.93%	0.98%
Water Tank	TK-213 - MARIN CITY TANK	\$400,000	57.28%	16.66%	1.42%	19.70%	4.92%
Water Tank	TK-214 - SLIDE GULCH TANK	\$194,348	61.76%	12.75%	0.84%	19.70%	4.92%
Water Tank	TK-215 - SEQUOIA PARK TANK #1	\$220,000	41.13%	28.40%	4.93%	20.39%	5.12%
Water Tank	TK-216 - SEQUOIA PARK TANK #2	\$100,000	54.83%	37.86%	6.57%	0.58%	0.13%
Water Tank	TK-217 - KENT WOODLANDS 1ST LIFT TANK	\$200,000	68.99%	27.90%	3.08%	0.01%	0.00%
Water Tank	TK-218 - MOUNT TIBURON TANK #2	\$1,180,000	46.17%	24.82%	3.47%	20.38%	5.12%
Water Tank	TK-219 - OAK MANOR FIRST LIFT TANK	\$200,000	52.00%	21.03%	2.32%	19.71%	4.92%
Water Tank	TK-220 - TAM WOODS TOP TANK	\$160,000	67.48%	13.27%	0.85%	14.71%	3.67%
Water Tank	TK-221 - SUMMIT AVENUE LOWER TANK	\$200,000	81.94%	16.92%	1.12%	0.00%	0.00%
Water Tank	TK-222 - FRIAR TUCK LANE TANK	\$250,000	29.24%	37.15%	11.22%	17.82%	4.55%
Water Tank	TK-223 - CASCADE TANK #1	\$120,000	76.00%	22.10%	1.89%	0.00%	0.00%
Water Tank	TK-224 - CASCADE TANK #2	\$120,000	76.00%	22.10%	1.89%	0.00%	0.00%
Water Tank	TK-225 - SUGARLOAF TANK #1	\$254,000	46.17%	24.82%	3.47%	20.38%	5.12%
Water Tank	TK-226 - SUGARLOAF TANK #2	\$254,000	46.17%	24.82%	3.47%	20.38%	5.12%
Water Tank	TK-228 - GLENWOOD FOREST TANK	\$180,000	20.82%	36.70%	15.14%	21.77%	5.54%
Water Tank	TK-229 - KENT FIRE TRAIL TOP TANK	\$20,000	57.28%	16.66%	1.42%	19.70%	4.92%
Water Tank	TK-230 - SWIG TANK	\$100,000	50.64%	27.22%	3.81%	14.63%	3.67%
Water Tank	TK-232 - SKY RANCH TANK	\$240,000	61.98%	33.32%	4.66%	0.02%	0.00%
Water Tank	TK-233 - FAIRFAX MANOR TOP TANK	\$216,000	52.00%	21.03%	2.32%	19.71%	4.92%
Water Tank	TK-234 - TAM WOODS FIRST LIFT TANK	\$170,000	77.91%	16.09%	1.06%	3.93%	0.98%
Water Tank	TK-235 - FAIRVIEW PARK TANK	\$200,000	61.76%	12.75%	0.84%	19.70%	4.92%
Water Tank	TK-236 - FERN CANYON TANK	\$60,000	61.76%	12.75%	0.84%	19.70%	4.92%
Water Tank	TK-237 - CONIFER WAY UPPER TANK	\$200,000	57.28%	16.66%	1.42%	19.70%	4.92%
Water Tank	TK-238 - OAK AVENUE TANK	\$200,000	47.66%	24.41%	3.28%	19.71%	4.92%
Water Tank	TK-239 - ELINOR AVE TANK	\$226,000	52.00%	21.03%	2.32%	19.71%	4.92%
Water Tank	TK-240 - Summit Ave Upper Tank	\$240,000	77.91%	16.09%	1.06%	3.93%	0.98%
Water Tank	TK-241 - LAGUNITAS PICNIC GROUNDS TANK	\$1,100	93.11%	1.96%	0.00%	3.93%	0.98%
Water Tank	TK-243 - MARINER HIGHLANDS TANK	\$120,000	41.13%	28.40%	4.93%	20.39%	5.12%
Water Tank	TK-244 - UPPER ROAD TANK	\$80,000	52.00%	21.03%	2.32%	19.71%	4.92%
AVERAGE			35.74%	21.34%	21.10%	18.31%	3.48%

Type	Facility Name	Nonstructural Acceleration-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Water Tank	TK-184 - PACHECO RIDGE TANK #1					
Water Tank	TK-185 - PACHECO RIDGE TANK #2					
Water Tank	TK-186 - SAN GERONIMO CLEARWELL TANK #2					
Water Tank	TK-187 - MANZANITA TANK					
Water Tank	TK-188 - WOLFBACK RIDGE TANK #1					
Water Tank	TK-189 - WOLFBACK RIDGE TANK #2					
Water Tank	TK-190 - INVERNESS DRIVE TANK					
Water Tank	TK-191 - LONE TREE AVENUE TANK					
Water Tank	TK-192 - VERNAL AVE TANK					
Water Tank	TK-193 - H-LINE ROAD TANK					
Water Tank	TK-195 - Fire Road Pressure Tank					
Water Tank	TK-196 - WILSON WAY TANK					
Water Tank	TK-197 - SUMMIT TRAIL TANK					
Water Tank	TK-198 - SCOTT TANKS					
Water Tank	TK-199 - SCOTT TANKS					
Water Tank	TK-200 - OAK WOODLANDS TANK #1					
Water Tank	TK-201 - OAK WOODLANDS TANK #2					
Water Tank	TK-202 - Fairfax Manor 1st Lift Tank					
Water Tank	TK-203 - MONTE MAR VISTA TANK					
Water Tank	TK-204 - Bay Road Tank					
Water Tank	TK-205 - RICHARDSON DRIVE (H/P) TANK					
Water Tank	TK-206 - SANTA VENETIA TANK					
Water Tank	TK-207 - GOODHILL ROAD TANK					
Water Tank	TK-208 - SPRING LANE TANK #2					
Water Tank	TK-209 - FAIRHILLS TOP TANK #2					
Water Tank	TK-210 - BEACON HILL TANK					
Water Tank	TK-211 - Kent Fire Trail Tank #1					
Water Tank	TK-212 - Kent Fire Trail Tank #2					
Water Tank	TK-213 - MARIN CITY TANK					
Water Tank	TK-214 - SLIDE GULCH TANK					
Water Tank	TK-215 - SEQUOIA PARK TANK #1					
Water Tank	TK-216 - SEQUOIA PARK TANK #2					
Water Tank	TK-217 - KENT WOODLANDS 1ST LIFT TANK					
Water Tank	TK-218 - MOUNT TIBURON TANK #2					
Water Tank	TK-219 - OAK MANOR FIRST LIFT TANK					
Water Tank	TK-220 - TAM WOODS TOP TANK					
Water Tank	TK-221 - SUMMIT AVENUE LOWER TANK					
Water Tank	TK-222 - FRIAR TUCK LANE TANK					
Water Tank	TK-223 - CASCADE TANK #1					
Water Tank	TK-224 - CASCADE TANK #2					
Water Tank	TK-225 - SUGARLOAF TANK #1					
Water Tank	TK-226 - SUGARLOAF TANK #2					
Water Tank	TK-228 - GLENWOOD FOREST TANK					
Water Tank	TK-229 - KENT FIRE TRAIL TOP TANK					
Water Tank	TK-230 - SWIG TANK					
Water Tank	TK-232 - SKY RANCH TANK					
Water Tank	TK-233 - FAIRFAX MANOR TOP TANK					
Water Tank	TK-234 - TAM WOODS FIRST LIFT TANK					
Water Tank	TK-235 - FAIRVIEW PARK TANK					
Water Tank	TK-236 - FERN CANYON TANK					
Water Tank	TK-237 - CONIFER WAY UPPER TANK					
Water Tank	TK-238 - OAK AVENUE TANK					
Water Tank	TK-239 - ELINOR AVE TANK					
Water Tank	TK-240 - Summit Ave Upper Tank					
Water Tank	TK-241 - LAGUNITAS PICNIC GROUNDS TANK					
Water Tank	TK-243 - MARINER HIGHLANDS TANK					
Water Tank	TK-244 - UPPER ROAD TANK					
<b>AVERAGE</b>		<b>45.84%</b>	<b>30.18%</b>	<b>8.28%</b>	<b>12.66%</b>	<b>3.02%</b>

Type	Facility Name	Nonstructural Drift-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Water Tank	TK-184 - PACHECO RIDGE TANK #1					
Water Tank	TK-185 - PACHECO RIDGE TANK #2					
Water Tank	TK-186 - SAN GERONIMO CLEARWELL TANK #2					
Water Tank	TK-187 - MANZANITA TANK					
Water Tank	TK-188 - WOLFBACK RIDGE TANK #1					
Water Tank	TK-189 - WOLFBACK RIDGE TANK #2					
Water Tank	TK-190 - INVERNESS DRIVE TANK					
Water Tank	TK-191 - LONE TREE AVENUE TANK					
Water Tank	TK-192 - VERNAL AVE TANK					
Water Tank	TK-193 - H-LINE ROAD TANK					
Water Tank	TK-195 - Fire Road Pressure Tank					
Water Tank	TK-196 - WILSON WAY TANK					
Water Tank	TK-197 - SUMMIT TRAIL TANK					
Water Tank	TK-198 - SCOTT TANKS					
Water Tank	TK-199 - SCOTT TANKS					
Water Tank	TK-200 - OAK WOODLANDS TANK #1					
Water Tank	TK-201 - OAK WOODLANDS TANK #2					
Water Tank	TK-202 - Fairfax Manor 1st Lift Tank					
Water Tank	TK-203 - MONTE MAR VISTA TANK					
Water Tank	TK-204 - Bay Road Tank					
Water Tank	TK-205 - RICHARDSON DRIVE (H/P) TANK					
Water Tank	TK-206 - SANTA VENETIA TANK					
Water Tank	TK-207 - GOODHILL ROAD TANK					
Water Tank	TK-208 - SPRING LANE TANK #2					
Water Tank	TK-209 - FAIRHILLS TOP TANK #2					
Water Tank	TK-210 - BEACON HILL TANK					
Water Tank	TK-211 - Kent Fire Trail Tank #1					
Water Tank	TK-212 - Kent Fire Trail Tank #2					
Water Tank	TK-213 - MARIN CITY TANK					
Water Tank	TK-214 - SLIDE GULCH TANK					
Water Tank	TK-215 - SEQUOIA PARK TANK #1					
Water Tank	TK-216 - SEQUOIA PARK TANK #2					
Water Tank	TK-217 - KENT WOODLANDS 1ST LIFT TANK					
Water Tank	TK-218 - MOUNT TIBURON TANK #2					
Water Tank	TK-219 - OAK MANOR FIRST LIFT TANK					
Water Tank	TK-220 - TAM WOODS TOP TANK					
Water Tank	TK-221 - SUMMIT AVENUE LOWER TANK					
Water Tank	TK-222 - FRIAR TUCK LANE TANK					
Water Tank	TK-223 - CASCADE TANK #1					
Water Tank	TK-224 - CASCADE TANK #2					
Water Tank	TK-225 - SUGARLOAF TANK #1					
Water Tank	TK-226 - SUGARLOAF TANK #2					
Water Tank	TK-228 - GLENWOOD FOREST TANK					
Water Tank	TK-229 - KENT FIRE TRAIL TOP TANK					
Water Tank	TK-230 - SWIG TANK					
Water Tank	TK-232 - SKY RANCH TANK					
Water Tank	TK-233 - FAIRFAX MANOR TOP TANK					
Water Tank	TK-234 - TAM WOODS FIRST LIFT TANK					
Water Tank	TK-235 - FAIRVIEW PARK TANK					
Water Tank	TK-236 - FERN CANYON TANK					
Water Tank	TK-237 - CONIFER WAY UPPER TANK					
Water Tank	TK-238 - OAK AVENUE TANK					
Water Tank	TK-239 - ELINOR AVE TANK					
Water Tank	TK-240 - Summit Ave Upper Tank					
Water Tank	TK-241 - LAGUNITAS PICNIC GROUNDS TANK					
Water Tank	TK-243 - MARINER HIGHLANDS TANK					
Water Tank	TK-244 - UPPER ROAD TANK					
<b>AVERAGE</b>		<b>61.81%</b>	<b>18.54%</b>	<b>4.62%</b>	<b>12.03%</b>	<b>3.00%</b>

Type	Facility Name	Losses (in dollars)			
		Structure	Nonstructural Drift-Sensitive	Nonstructural Acceleration-Sensitive	Total Building Loss
Water Tank	TK-184 - PACHECO RIDGE TANK #1	\$1,338,600			\$1,338,600
Water Tank	TK-185 - PACHECO RIDGE TANK #2	\$1,386,270			\$1,386,270
Water Tank	TK-186 - SAN GERONIMO CLEARWELL TANK #2	\$552,480			\$552,480
Water Tank	TK-187 - MANZANITA TANK	\$17,009			\$17,009
Water Tank	TK-188 - WOLFBACK RIDGE TANK #1	\$1,360			\$1,360
Water Tank	TK-189 - WOLFBACK RIDGE TANK #2	\$1,360			\$1,360
Water Tank	TK-190 - INVERNESS DRIVE TANK	\$65,177			\$65,177
Water Tank	TK-191 - LONE TREE AVENUE TANK	\$4,109			\$4,109
Water Tank	TK-192 - VERNAL AVE TANK	\$16,317			\$16,317
Water Tank	TK-193 - H-LINE ROAD TANK	\$187,915			\$187,915
Water Tank	TK-195 - Fire Road Pressure Tank	\$376			\$376
Water Tank	TK-196 - WILSON WAY TANK	\$3,726			\$3,726
Water Tank	TK-197 - SUMMIT TRAIL TANK	\$4,844			\$4,844
Water Tank	TK-198 - SCOTT TANKS	\$1,666			\$1,666
Water Tank	TK-199 - SCOTT TANKS	\$1,666			\$1,666
Water Tank	TK-200 - OAK WOODLANDS TANK #1	\$48,122			\$48,122
Water Tank	TK-201 - OAK WOODLANDS TANK #2	\$40,585			\$40,585
Water Tank	TK-202 - Fairfax Manor 1st Lift Tank	\$7,383			\$7,383
Water Tank	TK-203 - MONTE MAR VISTA TANK	\$2,740			\$2,740
Water Tank	TK-204 - Bay Road Tank	\$29,267			\$29,267
Water Tank	TK-205 - RICHARDSON DRIVE (H/P) TANK	\$46			\$46
Water Tank	TK-206 - SANTA VENETIA TANK	\$53,481			\$53,481
Water Tank	TK-207 - GOODHILL ROAD TANK	\$2,236			\$2,236
Water Tank	TK-208 - SPRING LANE TANK #2	\$81,840			\$81,840
Water Tank	TK-209 - FAIRHILLS TOP TANK #2	\$4,688			\$4,688
Water Tank	TK-210 - BEACON HILL TANK	\$3,726			\$3,726
Water Tank	TK-211 - Kent Fire Trail Tank #1	\$9,317			\$9,317
Water Tank	TK-212 - Kent Fire Trail Tank #2	\$9,317			\$9,317
Water Tank	TK-213 - MARIN CITY TANK	\$71,144			\$71,144
Water Tank	TK-214 - SLIDE GULCH TANK	\$34,018			\$34,018
Water Tank	TK-215 - SEQUOIA PARK TANK #1	\$42,930			\$42,930
Water Tank	TK-216 - SEQUOIA PARK TANK #2	\$3,357			\$3,357
Water Tank	TK-217 - KENT WOODLANDS 1ST LIFT TANK	\$3,726			\$3,726
Water Tank	TK-218 - MOUNT TIBURON TANK #2	\$225,492			\$225,492
Water Tank	TK-219 - OAK MANOR FIRST LIFT TANK	\$36,291			\$36,291
Water Tank	TK-220 - TAM WOODS TOP TANK	\$21,259			\$21,259
Water Tank	TK-221 - SUMMIT AVENUE LOWER TANK	\$2,028			\$2,028
Water Tank	TK-222 - FRIAR TUCK LANE TANK	\$46,956			\$46,956
Water Tank	TK-223 - CASCADE TANK #1	\$1,666			\$1,666
Water Tank	TK-224 - CASCADE TANK #2	\$1,666			\$1,666
Water Tank	TK-225 - SUGARLOAF TANK #1	\$48,538			\$48,538
Water Tank	TK-226 - SUGARLOAF TANK #2	\$48,538			\$48,538
Water Tank	TK-228 - GLENWOOD FOREST TANK	\$40,874			\$40,874
Water Tank	TK-229 - KENT FIRE TRAIL TOP TANK	\$3,557			\$3,557
Water Tank	TK-230 - SWIG TANK	\$14,381			\$14,381
Water Tank	TK-232 - SKY RANCH TANK	\$5,705			\$5,705
Water Tank	TK-233 - FAIRFAX MANOR TOP TANK	\$39,194			\$39,194
Water Tank	TK-234 - TAM WOODS FIRST LIFT TANK	\$7,313			\$7,313
Water Tank	TK-235 - FAIRVIEW PARK TANK	\$35,007			\$35,007
Water Tank	TK-236 - FERN CANYON TANK	\$10,502			\$10,502
Water Tank	TK-237 - CONIFER WAY UPPER TANK	\$35,572			\$35,572
Water Tank	TK-238 - OAK AVENUE TANK	\$36,917			\$36,917
Water Tank	TK-239 - ELINOR AVE TANK	\$41,009			\$41,009
Water Tank	TK-240 - Summit Ave Upper Tank	\$10,324			\$10,324
Water Tank	TK-241 - LAGUNITAS PICNIC GROUNDS TANK	\$38			\$38
Water Tank	TK-243 - MARINER HIGHLANDS TANK	\$23,416			\$23,416
Water Tank	TK-244 - UPPER ROAD TANK	\$14,516			\$14,516
<b>AVERAGE</b>		<b>\$118,165,692</b>	<b>\$16,246</b>	<b>\$19,704</b>	<b>\$118,201,641</b>

Type	Facility Name	Functionality (%)					
		At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Water Tank	TK-184 - PACHECO RIDGE TANK #1	31.50	63.80	77.50	80.30	81.40	86.90
Water Tank	TK-185 - PACHECO RIDGE TANK #2	29.40	61.30	76.80	79.80	81.00	86.70
Water Tank	TK-186 - SAN GERONIMO CLEARWELL TANK #2	75.90	88.60	89.70	90.10	90.70	93.40
Water Tank	TK-187 - MANZANITA TANK	65.30	82.30	84.00	84.60	85.40	89.80
Water Tank	TK-188 - WOLFBACK RIDGE TANK #1	71.10	96.50	99.40	99.90	99.90	99.90
Water Tank	TK-189 - WOLFBACK RIDGE TANK #2	71.10	96.50	99.40	99.90	99.90	99.90
Water Tank	TK-190 - INVERNESS DRIVE TANK	35.40	65.60	75.30	77.40	78.70	85.10
Water Tank	TK-191 - LONE TREE AVENUE TANK	77.00	97.80	99.60	99.90	99.90	99.90
Water Tank	TK-192 - VERNAL AVE TANK	71.10	96.50	99.40	99.90	99.90	99.90
Water Tank	TK-193 - H-LINE ROAD TANK	56.80	76.10	78.50	79.30	80.50	86.30
Water Tank	TK-195 - Fire Road Pressure Tank	56.80	76.10	78.50	79.30	80.50	86.30
Water Tank	TK-196 - WILSON WAY TANK	78.20	98.30	99.70	99.90	99.90	99.90
Water Tank	TK-197 - SUMMIT TRAIL TANK	78.20	98.30	99.70	99.90	99.90	99.90
Water Tank	TK-198 - SCOTT TANKS	83.20	99.00	99.80	99.90	99.90	99.90
Water Tank	TK-199 - SCOTT TANKS	83.20	99.00	99.80	99.90	99.90	99.90
Water Tank	TK-200 - OAK WOODLANDS TANK #1	47.20	72.70	76.80	77.90	79.10	85.30
Water Tank	TK-201 - OAK WOODLANDS TANK #2	49.60	76.90	81.10	82.20	83.20	88.20
Water Tank	TK-202 - Fairfax Manor 1st Lift Tank	59.10	77.00	78.70	79.40	80.60	86.30
Water Tank	TK-203 - MONTE MAR VISTA TANK	74.10	97.70	99.60	99.90	99.90	99.90
Water Tank	TK-204 - Bay Road Tank	40.20	71.40	90.80	94.20	94.50	96.30
Water Tank	TK-205 - RICHARDSON DRIVE (H/P) TANK	74.10	97.70	99.60	99.90	99.90	99.90
Water Tank	TK-206 - SANTA VENETIA TANK	42.40	83.40	95.20	97.20	97.40	98.10
Water Tank	TK-207 - GOODHILL ROAD TANK	78.20	98.30	99.70	99.90	99.90	99.90
Water Tank	TK-208 - SPRING LANE TANK #2	73.70	97.10	99.00	99.30	99.40	99.50
Water Tank	TK-209 - FAIRHILLS TOP TANK #2	63.40	94.70	98.60	99.30	99.30	99.50
Water Tank	TK-210 - BEACON HILL TANK	78.20	98.30	99.70	99.90	99.90	99.90
Water Tank	TK-211 - Kent Fire Trail Tank #1	79.70	94.80	95.60	95.80	96.10	97.20
Water Tank	TK-212 - Kent Fire Trail Tank #2	79.70	94.80	95.60	95.80	96.10	97.20
Water Tank	TK-213 - MARIN CITY TANK	65.90	77.90	78.80	79.40	80.60	86.30
Water Tank	TK-214 - SLIDE GULCH TANK	69.10	78.20	78.80	79.40	80.60	86.30
Water Tank	TK-215 - SEQUOIA PARK TANK #1	54.30	75.40	77.80	78.60	79.80	85.80
Water Tank	TK-216 - SEQUOIA PARK TANK #2	68.00	95.90	98.80	99.30	99.40	99.50
Water Tank	TK-217 - KENT WOODLANDS 1ST LIFT TANK	78.20	98.30	99.70	99.90	99.90	99.90
Water Tank	TK-218 - MOUNT TIBURON TANK #2	57.90	76.10	77.90	78.60	79.80	85.80
Water Tank	TK-219 - OAK MANOR FIRST LIFT TANK	62.20	77.50	78.70	79.40	80.60	86.30
Water Tank	TK-220 - TAM WOODS TOP TANK	74.10	83.60	84.20	84.60	85.50	89.80
Water Tank	TK-221 - SUMMIT AVENUE LOWER TANK	87.40	99.40	99.80	99.90	99.90	99.90
Water Tank	TK-222 - FRIAR TUCK LANE TANK	46.00	74.80	80.00	81.20	82.30	87.60
Water Tank	TK-223 - CASCADE TANK #1	83.20	99.00	99.80	99.90	99.90	99.90
Water Tank	TK-224 - CASCADE TANK #2	83.20	99.00	99.80	99.90	99.90	99.90
Water Tank	TK-225 - SUGARLOAF TANK #1	57.90	76.10	77.90	78.60	79.80	85.80
Water Tank	TK-226 - SUGARLOAF TANK #2	57.90	76.10	77.90	78.60	79.80	85.80
Water Tank	TK-228 - GLENWOOD FOREST TANK	39.00	68.50	75.50	77.10	78.40	84.80
Water Tank	TK-229 - KENT FIRE TRAIL TOP TANK	65.90	77.90	78.80	79.40	80.60	86.30
Water Tank	TK-230 - SWIG TANK	62.20	82.20	84.00	84.60	85.50	89.80
Water Tank	TK-232 - SKY RANCH TANK	73.20	97.50	99.60	99.90	99.90	99.90
Water Tank	TK-233 - FAIRFAX MANOR TOP TANK	62.20	77.50	78.70	79.40	80.60	86.30
Water Tank	TK-234 - TAM WOODS FIRST LIFT TANK	83.70	95.10	95.70	95.80	96.10	97.20
Water Tank	TK-235 - FAIRVIEW PARK TANK	69.10	78.20	78.80	79.40	80.60	86.30
Water Tank	TK-236 - FERN CANYON TANK	69.10	78.20	78.80	79.40	80.60	86.30
Water Tank	TK-237 - CONIFER WAY UPPER TANK	65.90	77.90	78.80	79.40	80.60	86.30
Water Tank	TK-238 - OAK AVENUE TANK	59.10	77.00	78.70	79.40	80.60	86.30
Water Tank	TK-239 - ELINOR AVE TANK	62.20	77.50	78.70	79.40	80.60	86.30
Water Tank	TK-240 - Summit Ave Upper Tank	83.70	95.10	95.70	95.80	96.10	97.20
Water Tank	TK-241 - LAGUNITAS PICNIC GROUNDS TANK	94.30	95.70	95.70	95.80	96.10	97.20
Water Tank	TK-243 - MARINER HIGHLANDS TANK	54.30	75.40	77.80	78.60	79.80	85.80
Water Tank	TK-244 - UPPER ROAD TANK	62.20	77.50	78.70	79.40	80.60	86.30
AVERAGE		52.12	70.21	80.50	84.15	88.25	93.11



			Structural - Probability of Damage				
Type	Facility Name	Structure Replacement Cost	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Pump Station	PS-049 - Channing Way Pump Station	\$1,000,000	0.39%	2.78%	26.17%	58.65%	11.98%
Pump Station	PS-111 - Quail Hill Pump Station	\$1,000,000	25.16%	36.29%	34.29%	3.85%	0.39%
Pump Station	PS-112 - Freitas Parkway Pump Station	\$1,000,000	63.52%	31.40%	4.36%	0.56%	0.13%
Water Tank	TK-103 - TERRA LINDA TANK #1	\$1,000,000	0.61%	3.34%	30.04%	55.95%	10.04%
Water Tank	TK-170 - TERRA LINDA TANK #2	\$1,000,000	4.45%	17.18%	42.43%	30.46%	5.47%
Water Tank	TK-227 - LGWRP Clearwell	\$1,800,000	21.05%	37.10%	15.31%	21.17%	5.34%
<b>AVERAGE</b>			<b>19.20%</b>	<b>21.35%</b>	<b>25.43%</b>	<b>28.44%</b>	<b>5.56%</b>

Type	Facility Name	Nonstructural Acceleration-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Pump Station	PS-049 - Channing Way Pump Station					
Pump Station	PS-111 - Quail Hill Pump Station					
Pump Station	PS-112 - Freitas Parkway Pump Station					
Water Tank	TK-103 - TERRA LINDA TANK #1					
Water Tank	TK-170 - TERRA LINDA TANK #2					
Water Tank	TK-227 - LGWRP Clearwell					
<b>AVERAGE</b>		<b>#DIV/0!</b>	<b>#DIV/0!</b>	<b>#DIV/0!</b>	<b>#DIV/0!</b>	<b>#DIV/0!</b>

Type	Facility Name	Nonstructural Drift-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Pump Station	PS-049 - Channing Way Pump Station					
Pump Station	PS-111 - Quail Hill Pump Station					
Pump Station	PS-112 - Freitas Parkway Pump Station					
Water Tank	TK-103 - TERRA LINDA TANK #1					
Water Tank	TK-170 - TERRA LINDA TANK #2					
Water Tank	TK-227 - LGWRP Clearwell					
<b>AVERAGE</b>		<b>#DIV/0!</b>	<b>#DIV/0!</b>	<b>#DIV/0!</b>	<b>#DIV/0!</b>	<b>#DIV/0!</b>

Type	Facility Name	Losses (in dollars)			
		Structure	Nonstructural Drift-Sensitive	Nonstructural Acceleration- Sensitive	Total Building Loss
Pump Station	PS-049 - Channing Way Pump Station	\$512,345			\$512,345
Pump Station	PS-111 - Quail Hill Pump Station	\$96,580			\$96,580
Pump Station	PS-112 - Freitas Parkway Pump Station	\$26,900			\$26,900
Water Tank	TK-103 - TERRA LINDA TANK #1	\$482,830			\$482,830
Water Tank	TK-170 - TERRA LINDA TANK #2	\$309,695			\$309,695
Water Tank	TK-227 - LGWRP Clearwell	\$399,483			\$399,483
<b>AVERAGE</b>		<b>\$1,827,833</b>	<b>\$0</b>	<b>\$0</b>	<b>\$1,827,833</b>

Type	Facility Name	Functionality (%)					
		At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Pump Station	PS-049 - Channing Way Pump Station	6.50	20.20	36.50	46.00	75.60	98.00
Pump Station	PS-111 - Quail Hill Pump Station	40.60	78.50	96.00	96.80	98.70	99.90
Pump Station	PS-112 - Freitas Parkway Pump Station	74.40	96.80	99.30	99.40	99.70	99.90
Water Tank	TK-103 - TERRA LINDA TANK #1	17.00	27.60	41.50	45.00	48.30	64.10
Water Tank	TK-170 - TERRA LINDA TANK #2	23.80	47.10	66.20	70.00	71.80	80.40
Water Tank	TK-227 - LGWRP Clearwell	39.30	69.10	76.20	77.80	79.10	85.30
<b>AVERAGE</b>		<b>33.60</b>	<b>56.55</b>	<b>69.28</b>	<b>72.50</b>	<b>78.87</b>	<b>87.93</b>

Replacement Cost	Total Number of Leaks	Total Number of Breaks	Total Number of Repairs	Days to Repair Leaks	Days to Repair Breaks	Total Days of Repairs	Economic Loss
\$3,215,180,970	114.2	28.5	142.7	16.3	4.1	20.4	\$713,606

Replacement Cost	Total Number of Leaks	Total Number of Breaks	Total Number of Repairs	Days to Repair Leaks	Days to Repair Breaks	Total Days of Repairs	Economic Loss
\$90,567,746	3.2	0.8	3.9	0.5	0.1	0.6	\$19,749



			Structural - Probability of Damage				
Type	Facility Name	Structure Replacement Cost	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Building	Administration Building - Headquarter Office	\$8,192,293	0.11%	5.09%	57.84%	33.04%	3.90%
Building	Corporation Yard - Boat Barn	\$1,000,000	0.18%	6.45%	48.71%	37.75%	6.88%
Building	Corporation Yard - Facilities Offices	\$15,000,000	0.10%	5.03%	57.18%	33.54%	4.12%
Building	Corporation Yard - Laboratory	\$5,000,000	47.70%	45.53%	4.83%	1.55%	0.37%
Building	Corporation Yard - Satellite Office	\$500,000	0.01%	0.43%	16.75%	64.39%	18.40%
Building	Pelican Yard - Vehicle Storage	\$500,000	18.79%	42.62%	13.40%	20.17%	5.00%
Building	Pelican Yard - Vehicle Storage	\$750,000	18.79%	42.62%	13.40%	20.17%	5.00%
Building	Ranger Housing - Alpine Dam - Residence	\$500,000	0.30%	6.49%	46.71%	41.50%	4.97%
Building	Ranger Housing - Lagunitas Dam	\$250,000	45.15%	44.47%	5.17%	4.15%	1.04%
Building	Ranger Housing - Lagunitas Dam	\$500,000	47.09%	46.39%	5.39%	0.89%	0.21%
Building	Ranger Housing - Phoenix Dam - Residence	\$500,000	56.91%	37.12%	2.93%	2.42%	0.60%
Building	Ranger Housing - Phoenix Dam - Shed	\$46,514	16.55%	41.09%	14.91%	21.85%	5.57%
Building	Ranger Housing - Portius House	\$500,000	74.93%	21.89%	0.16%	2.40%	0.60%
Building	Ranger Housing - Portius House - Garage	\$236,142	63.30%	14.16%	0.12%	17.82%	4.57%
Building	Ranger Housing - Portius House - Shed	\$99,111	16.55%	41.09%	14.91%	21.85%	5.57%
Building	Ranger Housing - Portius House - Shed	\$47,981	16.55%	41.09%	14.91%	21.85%	5.57%
Building	Ranger Housing - Sky Oaks - Residence	\$500,000	41.38%	33.04%	3.15%	17.83%	4.57%
Building	Ranger Housing - Soulajule Residence	\$500,000	45.65%	44.96%	5.23%	3.32%	0.82%
Building	Sky Oaks Headquarters - Entrance Kiosk	\$23,793	27.13%	45.03%	10.63%	13.70%	3.48%
Building	Sky Oaks Headquarters - Fisheries Office	\$272,737	2.39%	20.77%	60.10%	15.98%	0.73%
Building	Sky Oaks Headquarters - Headquarter Office	\$1,500,000	11.90%	51.06%	33.24%	3.17%	0.62%
Building	Sky Oaks Headquarters - Seed Shed	\$83,465	9.52%	40.85%	26.59%	18.43%	4.59%
Building	Sky Oaks Headquarters - Storage Shed	\$131,768	11.90%	51.06%	33.24%	3.17%	0.62%
Building	Sky Oaks Headquarters - Watershed Office	\$676,918	2.39%	20.77%	60.10%	15.98%	0.73%
<b>Average or Total</b>			<b>23.97%</b>	<b>31.21%</b>	<b>22.90%</b>	<b>18.21%</b>	<b>3.69%</b>

Type	Facility Name	Nonstructural Acceleration-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Building	Administration Building - Headquarter Office	30.28%	41.14%	20.23%	5.28%	3.06%
Building	Corporation Yard - Boat Barn	20.44%	32.14%	17.92%	23.02%	6.46%
Building	Corporation Yard - Facilities Offices	26.02%	40.91%	22.81%	6.96%	3.29%
Building	Corporation Yard - Laboratory	31.95%	42.51%	20.53%	4.47%	0.51%
Building	Corporation Yard - Satellite Office	24.09%	24.88%	9.72%	25.88%	15.40%
Building	Pelican Yard - Vehicle Storage	24.62%	32.47%	15.56%	22.20%	5.12%
Building	Pelican Yard - Vehicle Storage	24.62%	32.47%	15.56%	22.20%	5.12%
Building	Ranger Housing - Alpine Dam - Residence	23.01%	34.93%	18.89%	18.38%	4.77%
Building	Ranger Housing - Lagunitas Dam	23.84%	41.22%	24.96%	8.65%	1.30%
Building	Ranger Housing - Lagunitas Dam	24.87%	42.99%	26.03%	5.60%	0.48%
Building	Ranger Housing - Phoenix Dam - Residence	30.03%	42.20%	21.36%	5.63%	0.76%
Building	Ranger Housing - Phoenix Dam - Shed	21.57%	31.71%	16.69%	24.27%	5.74%
Building	Ranger Housing - Portius House	65.78%	26.07%	4.85%	2.67%	0.61%
Building	Ranger Housing - Portius House - Garage	47.43%	24.32%	5.46%	18.18%	4.59%
Building	Ranger Housing - Portius House - Shed	21.57%	31.71%	16.69%	24.27%	5.74%
Building	Ranger Housing - Portius House - Shed	21.57%	31.71%	16.69%	24.27%	5.74%
Building	Ranger Housing - Sky Oaks - Residence	22.92%	33.84%	17.86%	20.61%	4.74%
Building	Ranger Housing - Soulajule Residence	24.10%	41.68%	25.24%	7.87%	1.09%
Building	Sky Oaks Headquarters - Entrance Kiosk	25.39%	36.09%	18.45%	16.40%	3.64%
Building	Sky Oaks Headquarters - Fisheries Office	35.89%	41.17%	17.55%	4.64%	0.72%
Building	Sky Oaks Headquarters - Headquarter Office	27.60%	42.32%	23.09%	6.17%	0.79%
Building	Sky Oaks Headquarters - Seed Shed	22.08%	33.86%	18.47%	20.80%	4.76%
Building	Sky Oaks Headquarters - Storage Shed	27.60%	42.32%	23.09%	6.17%	0.79%
Building	Sky Oaks Headquarters - Watershed Office	35.89%	41.17%	17.55%	4.64%	0.72%
<b>Average or Total</b>		<b>28.47%</b>	<b>36.08%</b>	<b>18.14%</b>	<b>13.72%</b>	<b>3.58%</b>

		Nonstructural Drift-Sensitive - Probability of Damage				
Type	Facility Name	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Building	Administration Building - Headquarter Office	0.29%	3.65%	45.17%	35.44%	15.43%
Building	Corporation Yard - Boat Barn	0.43%	4.44%	39.77%	40.44%	14.90%
Building	Corporation Yard - Facilities Offices	0.28%	3.61%	44.65%	35.81%	15.62%
Building	Corporation Yard - Laboratory	47.87%	36.90%	13.06%	1.76%	0.39%
Building	Corporation Yard - Satellite Office	0.02%	0.86%	19.22%	44.54%	35.34%
Building	Pelican Yard - Vehicle Storage	20.73%	30.82%	22.40%	21.00%	5.03%
Building	Pelican Yard - Vehicle Storage	20.73%	30.82%	22.40%	21.00%	5.03%
Building	Ranger Housing - Alpine Dam - Residence	0.72%	8.08%	45.15%	36.40%	9.61%
Building	Ranger Housing - Lagunitas Dam	45.43%	35.84%	13.36%	4.29%	1.06%
Building	Ranger Housing - Lagunitas Dam	47.38%	37.38%	13.94%	1.04%	0.23%
Building	Ranger Housing - Phoenix Dam - Residence	55.89%	31.86%	9.14%	2.48%	0.61%
Building	Ranger Housing - Phoenix Dam - Shed	18.31%	29.10%	24.28%	22.62%	5.67%
Building	Ranger Housing - Portius House	57.60%	31.68%	7.64%	2.46%	0.60%
Building	Ranger Housing - Portius House - Garage	50.00%	22.75%	4.80%	17.86%	4.57%
Building	Ranger Housing - Portius House - Shed	18.31%	29.10%	24.28%	22.62%	5.67%
Building	Ranger Housing - Portius House - Shed	18.31%	29.10%	24.28%	22.62%	5.67%
Building	Ranger Housing - Sky Oaks - Residence	41.06%	27.47%	8.95%	17.91%	4.59%
Building	Ranger Housing - Soulajule Residence	45.93%	36.24%	13.51%	3.46%	0.84%
Building	Sky Oaks Headquarters - Entrance Kiosk	28.72%	33.66%	19.81%	14.28%	3.51%
Building	Sky Oaks Headquarters - Fisheries Office	3.97%	21.52%	56.61%	15.91%	1.97%
Building	Sky Oaks Headquarters - Headquarter Office	14.45%	34.42%	44.63%	5.56%	0.92%
Building	Sky Oaks Headquarters - Seed Shed	11.56%	27.54%	35.71%	20.29%	4.88%
Building	Sky Oaks Headquarters - Storage Shed	14.45%	34.42%	44.63%	5.56%	0.92%
Building	Sky Oaks Headquarters - Watershed Office	3.97%	21.52%	56.61%	15.91%	1.97%
<b>Average or Total</b>		<b>23.60%</b>	<b>25.12%</b>	<b>27.25%</b>	<b>17.97%</b>	<b>6.04%</b>

Type	Facility Name	Losses (in dollars)			
		Structure	Nonstructural Drift-Sensitive	Nonstructural Acceleration-Sensitive	Total Building Loss
Building	Administration Building - Headquarter Office	\$412,888	\$1,016,237	\$292,249	\$1,721,374
Building	Corporation Yard - Boat Barn	\$99,420	\$103,472	\$65,193	\$268,086
Building	Corporation Yard - Facilities Offices	\$767,613	\$1,876,581	\$606,183	\$3,250,377
Building	Corporation Yard - Laboratory	\$24,687	\$55,312	\$112,800	\$192,798
Building	Corporation Yard - Satellite Office	\$50,171	\$97,859	\$58,969	\$206,999
Building	Pelican Yard - Vehicle Storage	\$27,860	\$24,361	\$28,852	\$81,074
Building	Pelican Yard - Vehicle Storage	\$41,791	\$36,542	\$43,278	\$121,611
Building	Ranger Housing - Alpine Dam - Residence	\$35,626	\$81,217	\$17,120	\$133,962
Building	Ranger Housing - Lagunitas Dam	\$2,675	\$6,572	\$4,795	\$14,042
Building	Ranger Housing - Lagunitas Dam	\$2,546	\$7,229	\$7,467	\$17,242
Building	Ranger Housing - Phoenix Dam - Residence	\$3,383	\$8,503	\$7,201	\$19,087
Building	Ranger Housing - Phoenix Dam - Shed	\$2,823	\$2,463	\$2,941	\$8,226
Building	Ranger Housing - Portius House	\$2,672	\$8,069	\$3,186	\$13,927
Building	Ranger Housing - Portius House - Garage	\$10,523	\$9,044	\$10,779	\$30,346
Building	Ranger Housing - Portius House - Shed	\$6,014	\$5,247	\$6,267	\$17,528
Building	Ranger Housing - Portius House - Shed	\$2,912	\$2,540	\$3,034	\$8,486
Building	Ranger Housing - Sky Oaks - Residence	\$16,966	\$37,474	\$17,805	\$72,245
Building	Ranger Housing - Soulajule Residence	\$4,627	\$11,615	\$9,047	\$25,289
Building	Sky Oaks Headquarters - Entrance Kiosk	\$563	\$1,044	\$1,265	\$2,871
Building	Sky Oaks Headquarters - Fisheries Office	\$7,907	\$14,390	\$6,071	\$28,368
Building	Sky Oaks Headquarters - Headquarter Office	\$18,887	\$43,924	\$41,341	\$104,153
Building	Sky Oaks Headquarters - Seed Shed	\$4,648	\$4,228	\$4,659	\$13,535
Building	Sky Oaks Headquarters - Storage Shed	\$2,747	\$3,090	\$3,160	\$8,996
Building	Sky Oaks Headquarters - Watershed Office	\$19,625	\$35,715	\$15,068	\$70,408
<b>Average or Total</b>		<b>\$1,569,574</b>	<b>\$3,492,725</b>	<b>\$1,368,730</b>	<b>\$6,431,029</b>

Type	Facility Name	Functionality (%)					
		At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Building	Administration Building - Headquarter Office	0.10	0.30	5.10	5.20	63.00	96.00
Building	Corporation Yard - Boat Barn	0.10	0.40	6.60	6.60	55.30	93.00
Building	Corporation Yard - Facilities Offices	0.10	0.30	5.10	5.10	62.30	95.80
Building	Corporation Yard - Laboratory	47.70	49.80	93.10	93.20	98.00	99.60
Building	Corporation Yard - Satellite Office	0.00	0.00	0.40	0.40	17.10	81.50
Building	Pelican Yard - Vehicle Storage	18.70	20.80	61.20	61.40	74.80	94.90
Building	Pelican Yard - Vehicle Storage	18.70	20.80	61.20	61.40	74.80	94.90
Building	Ranger Housing - Alpine Dam - Residence	0.30	0.60	6.70	6.70	53.50	95.00
Building	Ranger Housing - Lagunitas Dam	45.10	47.20	89.40	89.60	94.70	98.90
Building	Ranger Housing - Lagunitas Dam	47.00	49.30	93.30	93.40	98.80	99.70
Building	Ranger Housing - Phoenix Dam - Residence	56.90	58.60	93.90	94.00	96.90	99.30
Building	Ranger Housing - Phoenix Dam - Shed	16.50	18.50	57.50	57.60	72.50	94.40
Building	Ranger Housing - Portius House	74.90	75.90	96.70	96.80	96.90	99.30
Building	Ranger Housing - Portius House - Garage	63.30	63.90	77.40	77.40	77.50	95.40
Building	Ranger Housing - Portius House - Shed	16.50	18.50	57.50	57.60	72.50	94.40
Building	Ranger Housing - Portius House - Shed	16.50	18.50	57.50	57.60	72.50	94.40
Building	Ranger Housing - Sky Oaks - Residence	41.30	42.90	74.30	74.40	77.50	95.40
Building	Ranger Housing - Soulajule Residence	45.60	47.80	90.40	90.60	95.80	99.10
Building	Sky Oaks Headquarters - Entrance Kiosk	27.10	29.20	72.00	72.10	82.70	96.40
Building	Sky Oaks Headquarters - Fisheries Office	2.30	3.30	23.10	23.10	83.20	99.20
Building	Sky Oaks Headquarters - Headquarter Office	11.90	14.30	62.80	62.90	96.20	99.30
Building	Sky Oaks Headquarters - Seed Shed	9.50	11.40	50.20	50.30	76.90	95.30
Building	Sky Oaks Headquarters - Storage Shed	11.90	14.30	62.80	62.90	96.20	99.30
Building	Sky Oaks Headquarters - Watershed Office	2.30	3.30	23.10	23.10	83.20	99.20
<b>Average or Total</b>		<b>23.93</b>	<b>25.41</b>	<b>55.05</b>	<b>55.14</b>	<b>78.03</b>	<b>96.24</b>

Type	Facility Name	Structure Replacement Cost	Structural - Probability of Damage				
			No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Building	Alpine Dam Facility - Alum House	\$326,237	2.33%	25.94%	48.25%	19.34%	4.12%
Facility - Pump Station	Alpine Lake Facility - Aerator House		1.44%	7.26%	44.50%	43.61%	3.17%
Facility - Pump Station	Alpine Lake Facility - Pump House	\$1,000,000	6.12%	42.91%	47.64%	3.04%	0.27%
Facility - Pump Station	Kent Pump Facility - Power Supply	\$750,000	2.64%	7.66%	40.72%	43.86%	5.09%
Facility - Pump Station	Kent Pump Facility - Pump Station	\$2,000,000	2.49%	7.23%	38.45%	45.73%	6.06%
<b>AVERAGE</b>			<b>3.00%</b>	<b>18.20%</b>	<b>43.91%</b>	<b>31.12%</b>	<b>3.74%</b>

		Nonstructural Acceleration-Sensitive - Probability of Damage				
Type	Facility Name	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Building	Alpine Dam Facility - Alum House	16.89%	34.40%	24.06%	20.27%	4.35%
Facility - Pump Station	Alpine Lake Facility - Aerator House					
Facility - Pump Station	Alpine Lake Facility - Pump House					
Facility - Pump Station	Kent Pump Facility - Power Supply					
Facility - Pump Station	Kent Pump Facility - Pump Station					
<b>AVERAGE</b>		<b>16.89%</b>	<b>34.40%</b>	<b>24.06%</b>	<b>20.27%</b>	<b>4.35%</b>



Type	Facility Name	Nonstructural Drift-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Building	Alpine Dam Facility - Alum House	3.59%	16.82%	49.55%	24.24%	5.78%
Facility - Pump Station	Alpine Lake Facility - Aerator House					
Facility - Pump Station	Alpine Lake Facility - Pump House					
Facility - Pump Station	Kent Pump Facility - Power Supply					
Facility - Pump Station	Kent Pump Facility - Pump Station					
<b>AVERAGE</b>		<b>3.59%</b>	<b>16.82%</b>	<b>49.55%</b>	<b>24.24%</b>	<b>5.78%</b>

Type	Facility Name	Losses (in dollars)			
		Structure	Nonstructural Drift-Sensitive	Nonstructural Acceleration- Sensitive	Total Building Loss
Building	Alpine Dam Facility - Alum House	\$11,967	\$24,892	\$21,098	\$57,956
Facility - Pump Station	Alpine Lake Facility - Aerator House				
Facility - Pump Station	Alpine Lake Facility - Pump House	\$113,855			\$113,855
Facility - Pump Station	Kent Pump Facility - Power Supply	\$284,228			\$284,228
Facility - Pump Station	Kent Pump Facility - Pump Station	\$792,540			\$792,540
<b>AVERAGE</b>		<b>\$1,202,590</b>	<b>\$24,892</b>	<b>\$21,098</b>	<b>\$1,248,579</b>

Type	Facility Name	Functionality (%)					
		At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Building	Alpine Dam Facility - Alum House	2.30	3.50	28.10	28.20	76.50	95.80
Facility - Pump Station	Alpine Lake Facility - Aerator House	20.40	36.80	61.30	76.20	95.80	99.90
Facility - Pump Station	Alpine Lake Facility - Pump House	43.90	72.60	93.90	98.20	99.60	99.90
Facility - Pump Station	Kent Pump Facility - Power Supply	21.10	36.60	59.60	74.40	94.60	99.90
Facility - Pump Station	Kent Pump Facility - Pump Station	20.40	35.30	57.40	72.60	94.00	99.90
<b>AVERAGE</b>		<b>21.62</b>	<b>36.96</b>	<b>60.06</b>	<b>69.92</b>	<b>92.10</b>	<b>99.08</b>

Type	Facility Name	Structure Replacement Cost	Structural - Probability of Damage				
			No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Clarifier		2.59%	9.19%	37.10%	44.50%	6.60%
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Filter Plant	\$100,000,000	2.59%	9.19%	37.10%	44.50%	6.60%
Tank	Bon Tempe Treatment Plant - Wash Water Sup	\$1,500,000	2.77%	9.80%	39.58%	42.22%	5.61%
Facility - Water Treatment Plant	Ignacio Pump Station - Chemical Rooms		42.46%	25.31%	13.31%	15.22%	3.67%
Facility - Water Treatment Plant	Ignacio Pump Station - Control Room		1.05%	17.92%	54.30%	22.63%	4.08%
Facility - Water Treatment Plant	Ignacio Pump Station - Fluoride Storage Facility		1.05%	17.92%	54.30%	22.63%	4.08%
Facility - Water Treatment Plant	Ignacio Pump Station - Fuel Storage		55.27%	23.68%	2.63%	14.73%	3.67%
Facility - Water Treatment Plant	Ignacio Pump Station - Pumps	\$50,000,000	1.05%	17.92%	54.30%	22.63%	4.08%
Building	Phoenix Lake Facility - Boat Barn	\$383,300	16.55%	41.09%	14.91%	21.85%	5.57%
Pump Station	PS-001 - Federal Works Booster Pump Station	\$1,000,000	37.52%	32.24%	7.11%	18.26%	4.84%
Pump Station	PS-002 - Chapman Park Pump Station	\$1,000,000	1.41%	7.12%	43.63%	44.27%	3.54%
Pump Station	PS-003 - Summit Drive Pump Station PS-003	\$1,000,000	3.46%	12.25%	49.47%	33.12%	1.68%
Pump Station	PS-005 - H-Line Booster Station	\$1,000,000	6.54%	15.43%	40.07%	33.09%	4.86%
Pump Station	PS-006 - Madera Park Pump Station	\$1,000,000	1.06%	5.34%	32.72%	52.49%	8.36%
Pump Station	PS-007 - Mariner Highlands Pump Station	\$1,000,000	1.14%	5.77%	35.36%	50.54%	7.17%
Pump Station	PS-010 - Cascade Pump Station	\$1,000,000	2.59%	9.19%	37.10%	44.50%	6.60%
Pump Station	PS-011 - Fairfax Manor 1st Pump Station	\$1,000,000	2.59%	9.19%	37.10%	44.50%	6.60%
Pump Station	PS-012 - Fairfax Manor 2nd Lift Pump Station	\$1,000,000	2.59%	9.19%	37.10%	44.50%	6.60%
Pump Station	PS-013 - Oak Manor 1st Lift Pump Station	\$1,000,000	6.20%	14.63%	37.99%	35.52%	5.64%
Pump Station	PS-014 - Oak Manor 2nd Lift Pump Station	\$1,000,000	6.20%	14.63%	37.99%	35.52%	5.64%
Pump Station	PS-016 - Scott Pump Station	\$1,000,000	2.59%	9.19%	37.10%	44.50%	6.60%
Pump Station	PS-017 - Smith Saddle Booster Station	\$1,000,000	6.20%	14.63%	37.99%	35.52%	5.64%
Pump Station	PS-019 - Bret Harte Pump Station	\$1,000,000	0.40%	2.81%	26.44%	58.52%	11.81%
Pump Station	PS-020 - Greenbrae Pump Station	\$1,000,000	2.62%	9.29%	37.53%	44.15%	6.39%
Pump Station	PS-022 - Ignacio Boosters	\$1,000,000	20.91%	30.16%	28.50%	16.71%	3.70%
Pump Station	PS-023 - Kent Fire Trail 1st Pump Station	\$1,000,000	6.54%	15.43%	40.07%	33.09%	4.86%
Pump Station	PS-025 - Kent Woodlands 2nd Pump Station	\$1,000,000	3.46%	12.25%	49.47%	33.12%	1.68%
Pump Station	PS-026 - Lagunitas Booster Station	\$1,000,000	0.40%	2.87%	26.95%	58.28%	11.47%
Pump Station	PS-029 - Phoenix Lake Barge Pump	\$1,000,000	56.92%	34.40%	5.63%	2.43%	0.60%
Pump Station	PS-030 - Phoenix Transfer Pump Station	\$1,000,000	24.85%	35.85%	33.87%	4.78%	0.63%
Pump Station	PS-031 - Soulajule Pump Station	\$1,000,000	10.56%	25.25%	39.10%	20.97%	4.09%
Pump Station	PS-032 - Elinor Avenue Pump Station	\$1,000,000	2.77%	9.80%	39.58%	42.22%	5.61%
Pump Station	PS-033 - Fern Canyon Pump Station	\$1,000,000	2.59%	9.19%	37.10%	44.50%	6.60%
Pump Station	PS-034 - Lapachet Pump Station	\$1,000,000	2.77%	9.80%	39.58%	42.22%	5.61%
Pump Station	PS-035 - Mine Ridge Pump Station	\$1,000,000	3.38%	11.98%	48.37%	34.14%	2.11%
Pump Station	PS-036 - Scott Highlands Pump (OUT OF SERVICE)	\$1,000,000	2.59%	9.19%	37.10%	44.50%	6.60%
Pump Station	PS-040 - Summit Avenue Upper Pump Station	\$1,000,000	2.77%	9.80%	39.58%	42.22%	5.61%
Pump Station	PS-042 - Del Mesa Pump Station	\$1,000,000	3.50%	12.39%	50.04%	32.59%	1.46%
Pump Station	PS-043 - Fawn Drive Pump Station	\$1,000,000	6.62%	15.62%	40.58%	32.53%	4.62%
Pump Station	PS-044 - Mann Pump Station	\$1,000,000	0.42%	2.97%	27.89%	57.63%	11.07%
Pump Station	PS-046 - Scenic Avenue Pump Station	\$1,000,000	5.25%	20.54%	54.11%	18.26%	1.81%
Pump Station	PS-047 - Sequoia Park Pump Station	\$1,000,000	2.80%	9.93%	40.08%	41.78%	5.38%
Pump Station	PS-050 - Chula Vista Pump Station	\$1,000,000	6.62%	15.62%	40.58%	32.53%	4.62%
Pump Station	PS-052 - Elda Drive Pump Station	\$1,000,000	2.62%	9.29%	37.53%	44.15%	6.39%
Pump Station	PS-053 - Fairhills 1st Lift Pump Station	\$1,000,000	6.62%	15.62%	40.58%	32.53%	4.62%
Pump Station	PS-054 - Fairhills 2nd Lift Pump Station	\$1,000,000	6.62%	15.62%	40.58%	32.53%	4.62%
Pump Station	PS-055 - Grove Hill Pump Station	\$1,000,000	8.27%	19.50%	50.65%	20.88%	0.67%
Pump Station	PS-056 - Rafael Highlands Pump Station	\$1,000,000	41.20%	35.09%	20.97%	2.32%	0.39%
Pump Station	PS-057 - Hind Pump Station	\$1,000,000	6.81%	16.08%	41.75%	31.20%	4.13%
Pump Station	PS-058 - Knight Drive Pump Station	\$1,000,000	13.54%	20.12%	33.22%	27.90%	5.20%
Pump Station	PS-060 - Lockwood Drive Pump Station	\$1,000,000	13.54%	20.12%	33.22%	27.90%	5.20%
Pump Station	PS-061 - Lucas Valley Pump Station	\$1,000,000	33.96%	28.93%	17.29%	15.94%	3.86%
Pump Station	PS-062 - Manderly Pump Station	\$1,000,000	13.54%	20.12%	33.22%	27.90%	5.20%
Pump Station	PS-064 - Marinwood Pump Station (NOT IN USE)	\$1,000,000	37.84%	24.47%	11.77%	20.75%	5.13%
Pump Station	PS-065 - McNear Drive Pump Station	\$1,000,000	13.54%	20.12%	33.22%	27.90%	5.20%
Pump Station	PS-066 - Mesa Vista Pump Station	\$1,000,000	6.20%	14.63%	37.99%	35.52%	5.64%
Pump Station	PS-069 - San Quentin Pump Station	\$1,000,000	19.22%	27.72%	26.19%	21.83%	5.02%
Pump Station	PS-070 - Santa Margarita Pump Station	\$1,000,000	24.59%	27.38%	20.51%	22.12%	5.37%
Pump Station	PS-071 - Sky View Terrace Pump Station	\$1,000,000	6.20%	14.63%	37.99%	35.52%	5.64%
Pump Station	PS-073 - Swig Pump Station	\$1,000,000	13.54%	20.12%	33.22%	27.90%	5.20%
Pump Station	PS-074 - Via Montebello Pump Station	\$1,000,000	18.05%	26.82%	44.30%	10.60%	0.21%

Type	Facility Name	Nonstructural Acceleration-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Clarifier					
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Filter Plant					
Tank	Bon Tempe Treatment Plant - Wash Water Sup					
Facility - Water Treatment Plant	Ignacio Pump Station - Chemical Rooms					
Facility - Water Treatment Plant	Ignacio Pump Station - Control Room					
Facility - Water Treatment Plant	Ignacio Pump Station - Fluoride Storage Facility					
Facility - Water Treatment Plant	Ignacio Pump Station - Fuel Storage					
Facility - Water Treatment Plant	Ignacio Pump Station - Pumps					
Building	Phoenix Lake Facility - Boat Barn	21.57%	31.71%	16.69%	24.27%	5.74%
Pump Station	PS-001 - Federal Works Booster Pump Station					
Pump Station	PS-002 - Chapman Park Pump Station					
Pump Station	PS-003 - Summit Drive Pump Station PS-003					
Pump Station	PS-005 - H-Line Booster Station					
Pump Station	PS-006 - Madera Park Pump Station					
Pump Station	PS-007 - Mariner Highlands Pump Station					
Pump Station	PS-010 - Cascade Pump Station					
Pump Station	PS-011 - Fairfax Manor 1st Pump Station					
Pump Station	PS-012 - Fairfax Manor 2nd Lift Pump Station					
Pump Station	PS-013 - Oak Manor 1st Lift Pump Station					
Pump Station	PS-014 - Oak Manor 2nd Lift Pump Station					
Pump Station	PS-016 - Scott Pump Station					
Pump Station	PS-017 - Smith Saddle Booster Station					
Pump Station	PS-019 - Bret Harte Pump Station					
Pump Station	PS-020 - Greenbrae Pump Station					
Pump Station	PS-022 - Ignacio Boosters					
Pump Station	PS-023 - Kent Fire Trail 1st Pump Station					
Pump Station	PS-025 - Kent Woodlands 2nd Pump Station					
Pump Station	PS-026 - Lagunitas Booster Station					
Pump Station	PS-029 - Phoenix Lake Barge Pump					
Pump Station	PS-030 - Phoenix Transfer Pump Station					
Pump Station	PS-031 - Soulajule Pump Station					
Pump Station	PS-032 - Elinor Avenue Pump Station					
Pump Station	PS-033 - Fern Canyon Pump Station					
Pump Station	PS-034 - Lapachet Pump Station					
Pump Station	PS-035 - Mine Ridge Pump Station					
Pump Station	PS-036 - Scott Highlands Pump (OUT OF SERVICE)					
Pump Station	PS-040 - Summit Avenue Upper Pump Station					
Pump Station	PS-042 - Del Mesa Pump Station					
Pump Station	PS-043 - Fawn Drive Pump Station					
Pump Station	PS-044 - Mann Pump Station					
Pump Station	PS-046 - Scenic Avenue Pump Station					
Pump Station	PS-047 - Sequoia Park Pump Station					
Pump Station	PS-050 - Chula Vista Pump Station					
Pump Station	PS-052 - Elda Drive Pump Station					
Pump Station	PS-053 - Fairhills 1st Lift Pump Station					
Pump Station	PS-054 - Fairhills 2nd Lift Pump Station					
Pump Station	PS-055 - Grove Hill Pump Station					
Pump Station	PS-056 - Rafael Highlands Pump Station					
Pump Station	PS-057 - Hind Pump Station					
Pump Station	PS-058 - Knight Drive Pump Station					
Pump Station	PS-060 - Lockwood Drive Pump Station					
Pump Station	PS-061 - Lucas Valley Pump Station					
Pump Station	PS-062 - Manderly Pump Station					
Pump Station	PS-064 - Marinwood Pump Station (NOT IN USE)					
Pump Station	PS-065 - McNear Drive Pump Station					
Pump Station	PS-066 - Mesa Vista Pump Station					
Pump Station	PS-069 - San Quentin Pump Station					
Pump Station	PS-070 - Santa Margarita Pump Station					
Pump Station	PS-071 - Sky View Terrace Pump Station					
Pump Station	PS-073 - Swig Pump Station					
Pump Station	PS-074 - Via Montebello Pump Station					

Type	Facility Name	Nonstructural Drift-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Clarifier					
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Filter Plant					
Tank	Bon Tempe Treatment Plant - Wash Water Sup					
Facility - Water Treatment Plant	Ignacio Pump Station - Chemical Rooms					
Facility - Water Treatment Plant	Ignacio Pump Station - Control Room					
Facility - Water Treatment Plant	Ignacio Pump Station - Fluoride Storage Facility					
Facility - Water Treatment Plant	Ignacio Pump Station - Fuel Storage					
Facility - Water Treatment Plant	Ignacio Pump Station - Pumps					
Building	Phoenix Lake Facility - Boat Barn	18.31%	29.10%	24.28%	22.62%	5.67%
Pump Station	PS-001 - Federal Works Booster Pump Station					
Pump Station	PS-002 - Chapman Park Pump Station					
Pump Station	PS-003 - Summit Drive Pump Station PS-003					
Pump Station	PS-005 - H-Line Booster Station					
Pump Station	PS-006 - Madera Park Pump Station					
Pump Station	PS-007 - Mariner Highlands Pump Station					
Pump Station	PS-010 - Cascade Pump Station					
Pump Station	PS-011 - Fairfax Manor 1st Pump Station					
Pump Station	PS-012 - Fairfax Manor 2nd Lift Pump Station					
Pump Station	PS-013 - Oak Manor 1st Lift Pump Station					
Pump Station	PS-014 - Oak Manor 2nd Lift Pump Station					
Pump Station	PS-016 - Scott Pump Station					
Pump Station	PS-017 - Smith Saddle Booster Station					
Pump Station	PS-019 - Bret Harte Pump Station					
Pump Station	PS-020 - Greenbrae Pump Station					
Pump Station	PS-022 - Ignacio Boosters					
Pump Station	PS-023 - Kent Fire Trail 1st Pump Station					
Pump Station	PS-025 - Kent Woodlands 2nd Pump Station					
Pump Station	PS-026 - Lagunitas Booster Station					
Pump Station	PS-029 - Phoenix Lake Barge Pump					
Pump Station	PS-030 - Phoenix Transfer Pump Station					
Pump Station	PS-031 - SoulaJule Pump Station					
Pump Station	PS-032 - Elinor Avenue Pump Station					
Pump Station	PS-033 - Fern Canyon Pump Station					
Pump Station	PS-034 - Lapachet Pump Station					
Pump Station	PS-035 - Mine Ridge Pump Station					
Pump Station	PS-036 - Scott Highlands Pump (OUT OF SERVICE)					
Pump Station	PS-040 - Summit Avenue Upper Pump Station					
Pump Station	PS-042 - Del Mesa Pump Station					
Pump Station	PS-043 - Fawn Drive Pump Station					
Pump Station	PS-044 - Mann Pump Station					
Pump Station	PS-046 - Scenic Avenue Pump Station					
Pump Station	PS-047 - Sequoia Park Pump Station					
Pump Station	PS-050 - Chula Vista Pump Station					
Pump Station	PS-052 - Elda Drive Pump Station					
Pump Station	PS-053 - Fairhills 1st Lift Pump Station					
Pump Station	PS-054 - Fairhills 2nd Lift Pump Station					
Pump Station	PS-055 - Grove Hill Pump Station					
Pump Station	PS-056 - Rafael Highlands Pump Station					
Pump Station	PS-057 - Hind Pump Station					
Pump Station	PS-058 - Knight Drive Pump Station					
Pump Station	PS-060 - Lockwood Drive Pump Station					
Pump Station	PS-061 - Lucas Valley Pump Station					
Pump Station	PS-062 - Manderly Pump Station					
Pump Station	PS-064 - Marinwood Pump Station (NOT IN USE)					
Pump Station	PS-065 - McNear Drive Pump Station					
Pump Station	PS-066 - Mesa Vista Pump Station					
Pump Station	PS-069 - San Quentin Pump Station					
Pump Station	PS-070 - Santa Margarita Pump Station					
Pump Station	PS-071 - Sky View Terrace Pump Station					
Pump Station	PS-073 - Swig Pump Station					
Pump Station	PS-074 - Via Montebello Pump Station					

Type	Facility Name	Losses (in dollars)			
		Structure	Nonstructural Drift Sensitive	Nonstructural Acceleration-Sensitive	Total Building Loss
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Clarifier				
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Filter Plant	\$39,324,500			\$39,324,500
Tank	Bon Tempe Treatment Plant - Wash Water Sup	\$560,535			\$560,535
Facility - Water Treatment Plant	Ignacio Pump Station - Chemical Rooms				
Facility - Water Treatment Plant	Ignacio Pump Station - Control Room				
Facility - Water Treatment Plant	Ignacio Pump Station - Fluoride Storage Facility				
Facility - Water Treatment Plant	Ignacio Pump Station - Fuel Storage				
Facility - Water Treatment Plant	Ignacio Pump Station - Pumps	\$13,349,500			\$13,349,500
Building	Phoenix Lake Facility - Boat Barn	\$23,259	\$20,293	\$24,237	\$67,789
Pump Station	PS-001 - Federal Works Booster Pump Station	\$184,745			\$184,745
Pump Station	PS-002 - Chapman Park Pump Station	\$370,025			\$370,025
Pump Station	PS-003 - Summit Drive Pump Station PS-003	\$295,850			\$295,850
Pump Station	PS-005 - H-Line Booster Station	\$314,960			\$314,960
Pump Station	PS-006 - Madera Park Pump Station	\$450,290			\$450,290
Pump Station	PS-007 - Mariner Highlands Pump Station	\$430,865			\$430,865
Pump Station	PS-010 - Cascade Pump Station	\$393,245			\$393,245
Pump Station	PS-011 - Fairfax Manor 1st Pump Station	\$393,245			\$393,245
Pump Station	PS-012 - Fairfax Manor 2nd Lift Pump Station	\$393,245			\$393,245
Pump Station	PS-013 - Oak Manor 1st Lift Pump Station	\$333,820			\$333,820
Pump Station	PS-014 - Oak Manor 2nd Lift Pump Station	\$333,820			\$333,820
Pump Station	PS-016 - Scott Pump Station	\$393,245			\$393,245
Pump Station	PS-017 - Smith Saddle Booster Station	\$333,820			\$333,820
Pump Station	PS-019 - Bret Harte Pump Station	\$510,285			\$510,285
Pump Station	PS-020 - Greenbrae Pump Station	\$389,740			\$389,740
Pump Station	PS-022 - Ignacio Boosters	\$195,090			\$195,090
Pump Station	PS-023 - Kent Fire Trail 1st Pump Station	\$314,960			\$314,960
Pump Station	PS-025 - Kent Woodlands 2nd Pump Station	\$295,850			\$295,850
Pump Station	PS-026 - Lagunitas Booster Station	\$506,240			\$506,240
Pump Station	PS-029 - Phoenix Lake Barge Pump	\$46,225			\$46,225
Pump Station	PS-030 - Phoenix Transfer Pump Station	\$103,710			\$103,710
Pump Station	PS-031 - Soulajule Pump Station	\$237,995			\$237,995
Pump Station	PS-032 - Elinor Avenue Pump Station	\$373,690			\$373,690
Pump Station	PS-033 - Fern Canyon Pump Station	\$393,245			\$393,245
Pump Station	PS-034 - Lapachet Pump Station	\$373,690			\$373,690
Pump Station	PS-035 - Mine Ridge Pump Station	\$304,485			\$304,485
Pump Station	PS-036 - Scott Highlands Pump (OUT OF SERVICE)	\$393,245			\$393,245
Pump Station	PS-040 - Summit Avenue Upper Pump Station	\$373,690			\$373,690
Pump Station	PS-042 - Del Mesa Pump Station	\$291,395			\$291,395
Pump Station	PS-043 - Fawn Drive Pump Station	\$310,060			\$310,060
Pump Station	PS-044 - Mann Pump Station	\$499,800			\$499,800
Pump Station	PS-046 - Scenic Avenue Pump Station	\$219,095			\$219,095
Pump Station	PS-047 - Sequoia Park Pump Station	\$369,565			\$369,565
Pump Station	PS-050 - Chula Vista Pump Station	\$310,060			\$310,060
Pump Station	PS-052 - Elda Drive Pump Station	\$389,740			\$389,740
Pump Station	PS-053 - Fairhills 1st Lift Pump Station	\$310,060			\$310,060
Pump Station	PS-054 - Fairhills 2nd Lift Pump Station	\$310,060			\$310,060
Pump Station	PS-055 - Grove Hill Pump Station	\$217,705			\$217,705
Pump Station	PS-056 - Rafael Highlands Pump Station	\$66,820			\$66,820
Pump Station	PS-057 - Hind Pump Station	\$299,165			\$299,165
Pump Station	PS-058 - Knight Drive Pump Station	\$279,290			\$279,290
Pump Station	PS-060 - Lockwood Drive Pump Station	\$279,290			\$279,290
Pump Station	PS-061 - Lucas Valley Pump Station	\$174,640			\$174,640
Pump Station	PS-062 - Manderly Pump Station	\$279,290			\$279,290
Pump Station	PS-064 - Marinwood Pump Station (NOT IN USE)	\$205,690			\$205,690
Pump Station	PS-065 - McNear Drive Pump Station	\$279,290			\$279,290
Pump Station	PS-066 - Mesa Vista Pump Station	\$333,820			\$333,820
Pump Station	PS-069 - San Quentin Pump Station	\$234,325			\$234,325
Pump Station	PS-070 - Santa Margarita Pump Station	\$230,875			\$230,875
Pump Station	PS-071 - Sky View Terrace Pump Station	\$333,820			\$333,820
Pump Station	PS-073 - Swig Pump Station	\$279,290			\$279,290
Pump Station	PS-074 - Via Montebello Pump Station	\$145,560			\$145,560



Type	Facility Name	Functionality (%)					
		At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Clarifier	24.30	50.50	58.80	62.00	71.00	95.10
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Filter Plant	24.30	50.50	58.80	62.00	71.00	95.10
Tank	Bon Tempe Treatment Plant - Wash Water Sup	20.80	38.40	56.30	60.20	62.60	74.30
Facility - Water Treatment Plant	Ignacio Pump Station - Chemical Rooms	64.10	81.60	84.50	85.70	88.80	97.50
Facility - Water Treatment Plant	Ignacio Pump Station - Control Room	28.50	67.70	78.30	80.00	84.60	97.10
Facility - Water Treatment Plant	Ignacio Pump Station - Fluoride Storage Facility	28.50	67.70	78.30	80.00	84.60	97.10
Facility - Water Treatment Plant	Ignacio Pump Station - Fuel Storage	73.40	83.90	84.90	86.10	89.10	97.50
Facility - Water Treatment Plant	Ignacio Pump Station - Pumps	28.50	67.70	78.30	80.00	84.60	97.10
Building	Phoenix Lake Facility - Boat Barn	16.50	18.50	57.50	57.60	72.50	94.40
Pump Station	PS-001 - Federal Works Booster Pump Station	61.40	76.00	81.30	86.90	96.10	99.90
Pump Station	PS-002 - Chapman Park Pump Station	20.20	36.30	60.50	75.60	95.60	99.90
Pump Station	PS-003 - Summit Drive Pump Station PS-003	25.50	44.60	70.10	82.60	97.30	99.90
Pump Station	PS-005 - H-Line Booster Station	28.60	46.40	67.80	79.80	95.30	99.90
Pump Station	PS-006 - Madera Park Pump Station	17.30	30.30	50.70	67.40	92.20	99.90
Pump Station	PS-007 - Mariner Highlands Pump Station	18.00	31.70	53.10	69.40	93.10	99.90
Pump Station	PS-010 - Cascade Pump Station	21.30	36.50	57.90	72.80	93.70	99.90
Pump Station	PS-011 - Fairfax Manor 1st Pump Station	21.30	36.50	57.90	72.80	93.70	99.90
Pump Station	PS-012 - Fairfax Manor 2nd Lift Pump Station	21.30	36.50	57.90	72.80	93.70	99.90
Pump Station	PS-013 - Oak Manor 1st Lift Pump Station	27.60	44.60	65.40	77.90	94.70	99.90
Pump Station	PS-014 - Oak Manor 2nd Lift Pump Station	27.60	44.60	65.40	77.90	94.70	99.90
Pump Station	PS-016 - Scott Pump Station	21.30	36.50	57.90	72.80	93.70	99.90
Pump Station	PS-017 - Smith Saddle Booster Station	27.60	44.60	65.40	77.90	94.70	99.90
Pump Station	PS-019 - Bret Harte Pump Station	14.40	25.00	43.40	61.50	89.80	99.90
Pump Station	PS-020 - Greenbrae Pump Station	21.50	36.80	58.40	73.10	93.80	99.90
Pump Station	PS-022 - Ignacio Boosters	48.00	67.40	81.90	88.70	96.80	99.90
Pump Station	PS-023 - Kent Fire Trail 1st Pump Station	28.60	46.40	67.80	79.80	95.30	99.90
Pump Station	PS-025 - Kent Woodlands 2nd Pump Station	25.50	44.60	70.10	82.60	97.30	99.90
Pump Station	PS-026 - Lagunitas Booster Station	14.50	25.30	43.90	61.90	90.00	99.90
Pump Station	PS-029 - Phoenix Lake Barge Pump	80.10	94.40	97.10	98.20	99.40	99.90
Pump Station	PS-030 - Phoenix Transfer Pump Station	55.30	77.80	93.30	97.10	99.30	99.90
Pump Station	PS-031 - Soulajule Pump Station	37.30	58.00	77.60	86.30	96.40	99.90
Pump Station	PS-032 - Elinor Avenue Pump Station	22.20	38.10	60.40	74.70	94.40	99.90
Pump Station	PS-033 - Fern Canyon Pump Station	21.30	36.50	57.90	72.80	93.70	99.90
Pump Station	PS-034 - Lapachet Pump Station	22.20	38.10	60.40	74.70	94.40	99.90
Pump Station	PS-035 - Mine Ridge Pump Station	25.10	43.90	69.00	81.70	97.00	99.90
Pump Station	PS-036 - Scott Highlands Pump (OUT OF SERVICE)	21.30	36.50	57.90	72.80	93.70	99.90
Pump Station	PS-040 - Summit Avenue Upper Pump Station	22.20	38.10	60.40	74.70	94.40	99.90
Pump Station	PS-042 - Del Mesa Pump Station	25.70	45.00	70.60	83.00	97.40	99.90
Pump Station	PS-043 - Fawn Drive Pump Station	28.90	46.80	68.40	80.20	95.50	99.90
Pump Station	PS-044 - Mann Pump Station	14.80	25.80	44.70	62.50	90.30	99.90
Pump Station	PS-046 - Scenic Avenue Pump Station	32.00	54.70	80.60	89.60	97.90	99.90
Pump Station	PS-047 - Sequoia Park Pump Station	22.30	38.50	60.90	75.10	94.60	99.90
Pump Station	PS-050 - Chula Vista Pump Station	28.90	46.80	68.40	80.20	95.50	99.90
Pump Station	PS-052 - Elda Drive Pump Station	21.50	36.80	58.40	73.10	93.80	99.90
Pump Station	PS-053 - Fairhills 1st Lift Pump Station	28.90	46.80	68.40	80.20	95.50	99.90
Pump Station	PS-054 - Fairhills 2nd Lift Pump Station	28.90	46.80	68.40	80.20	95.50	99.90
Pump Station	PS-055 - Grove Hill Pump Station	33.80	55.40	80.00	89.30	98.50	99.90
Pump Station	PS-056 - Rafael Highlands Pump Station	68.10	86.80	96.30	98.50	99.60	99.90
Pump Station	PS-057 - Hind Pump Station	29.40	47.80	69.80	81.30	95.90	99.90
Pump Station	PS-058 - Knight Drive Pump Station	36.50	54.00	71.90	82.00	95.40	99.90
Pump Station	PS-060 - Lockwood Drive Pump Station	36.50	54.00	71.90	82.00	95.40	99.90
Pump Station	PS-061 - Lucas Valley Pump Station	57.70	73.70	83.20	88.90	96.80	99.90
Pump Station	PS-062 - Manderly Pump Station	36.50	54.00	71.90	82.00	95.40	99.90
Pump Station	PS-064 - Marinwood Pump Station (NOT IN USE)	58.10	71.20	78.80	85.40	95.80	99.90
Pump Station	PS-065 - McNear Drive Pump Station	36.50	54.00	71.90	82.00	95.40	99.90
Pump Station	PS-066 - Mesa Vista Pump Station	27.60	44.60	65.40	77.90	94.70	99.90
Pump Station	PS-069 - San Quentin Pump Station	44.80	63.00	77.10	85.00	95.80	99.90
Pump Station	PS-070 - Santa Margarita Pump Station	48.80	65.30	76.90	84.60	95.60	99.90
Pump Station	PS-071 - Sky View Terrace Pump Station	27.60	44.60	65.40	77.90	94.70	99.90
Pump Station	PS-073 - Swig Pump Station	36.50	54.00	71.90	82.00	95.40	99.90
Pump Station	PS-074 - Via Montebello Pump Station	45.70	67.90	88.60	94.70	99.30	99.90

Type	Facility Name	Structure Replacement Cost	Structural - Probability of Damage				
			No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Pump Station	PS-077 - Beacon Hill Pump Station	\$1,000,000	3.50%	12.39%	50.04%	32.59%	1.46%
Pump Station	PS-078 - Crescent Avenue Pump Station	\$1,000,000	8.27%	19.50%	50.65%	20.88%	0.67%
Pump Station	PS-079 - Marin City Pump Station	\$1,000,000	2.59%	9.19%	37.10%	44.50%	6.60%
Pump Station	PS-080 - Monte Mar Vista Pump Station	\$1,000,000	0.39%	2.78%	26.14%	58.66%	12.00%
Pump Station	PS-081 - Sausalito Pumphouse Pump Station	\$1,000,000	32.18%	32.32%	8.18%	21.73%	5.57%
Pump Station	PS-082 - Sausalito Boulevard Pump Station	\$1,000,000	7.36%	17.36%	45.08%	27.32%	2.86%
Pump Station	PS-083 - Richardson Drive Pump Station	\$1,000,000	6.62%	15.62%	40.58%	32.53%	4.62%
Pump Station	PS-084 - Eastwood Way Pump Station	\$1,000,000	13.68%	25.46%	30.65%	24.57%	5.62%
Pump Station	PS-085 - Fairview Park Pump Station	\$1,000,000	13.68%	25.46%	30.65%	24.57%	5.62%
Pump Station	PS-087 - Marinview Pump Station	\$1,000,000	1.11%	5.63%	34.51%	51.12%	7.60%
Pump Station	PS-088 - Tam Woods 1st Lift Pump Station	\$1,000,000	2.59%	9.19%	37.10%	44.50%	6.60%
Pump Station	PS-089 - Tam Woods 2nd Lift Pump Station	\$1,000,000	2.73%	9.69%	39.12%	42.61%	5.82%
Pump Station	PS-090 - Hill Haven Pump Station	\$1,000,000	13.54%	20.12%	33.22%	27.90%	5.20%
Pump Station	PS-091 - Sugarloaf Pump Station	\$1,000,000	14.70%	21.85%	36.09%	23.43%	3.90%
Pump Station	PS-092 - Tiburon Belvedere Pump Station	\$1,000,000	18.05%	26.82%	44.30%	10.60%	0.21%
Pump Station	PS-093 - Tiburon Booster Pump Station	\$1,000,000	6.32%	14.91%	38.72%	34.75%	5.28%
Pump Station	PS-095 - Pine Mountain Tunnel Pump Station	\$1,000,000	3.14%	14.37%	45.32%	31.67%	5.47%
Pump Station	PS-097 - Tocaloma Booster Pump Station	\$1,000,000	0.13%	1.22%	17.15%	61.75%	19.73%
Pump Station	PS-101 - Redwood Drive Lower Pump	\$1,000,000	2.59%	9.19%	37.10%	44.50%	6.60%
Pump Station	PS-102 - North Marin Line Boosters	\$1,000,000	33.19%	28.52%	6.29%	25.11%	6.86%
Pump Station	PS-103 - San Geronimo Valley Pump Station	\$1,000,000	33.19%	28.52%	6.29%	25.11%	6.86%
Pump Station	PS-104 - Conifer Way Pump Station	\$1,000,000	9.49%	22.70%	35.15%	26.76%	5.87%
Pump Station	PS-106 - Los Altos Pump Station	\$1,000,000	24.59%	27.38%	20.51%	22.12%	5.37%
Pump Station	PS-108 - Indian Rock Pump Station	\$1,000,000	18.85%	27.19%	25.69%	22.85%	5.38%
Pump Station	PS-109 - Cibrian Pump Station	\$1,000,000	33.01%	28.11%	16.80%	17.71%	4.35%
Pump Station	PS-113 - Lag Picnic Grounds Pump Station	\$1,000,000	14.59%	27.16%	32.70%	20.90%	4.62%
Pump Station	PS-114 - Cortez Avenue Pump Station	\$1,000,000	17.28%	34.54%	19.04%	23.18%	5.95%
Pump Station	PS-115 - Redwood Drive Upper Pump Station	\$1,000,000	37.41%	32.15%	7.09%	18.54%	4.79%
Pump Station	PS-116 - North Redwood Drive Boosters	\$1,000,000	39.96%	43.43%	14.56%	1.66%	0.37%
Pump Station	PS-117 - Wolfback Ridge Pump Station	\$1,000,000	40.17%	36.43%	10.62%	10.19%	2.56%
Pump Station	PS-118 - Fire Road Pump Station	\$1,000,000	38.99%	28.31%	5.40%	21.70%	5.57%
Pump Station	PS-122 - Upper Road Pump Station	\$1,000,000	51.99%	37.75%	7.20%	2.43%	0.60%
Pump Station	PS-123 - Southern Marin Line Syphon	\$1,000,000	42.69%	25.80%	4.22%	21.70%	5.57%
Pump Station	PS-124 - Throckmorton Booster New Pumpstat	\$1,000,000	51.99%	37.75%	7.20%	2.43%	0.60%
Pump Station	PS-125 - Kent Fire Trail 2nd Lift Pump Station	\$1,000,000	45.54%	27.52%	4.50%	17.84%	4.57%
Pump Station	PS-126 - Oak woodlands Pump Station	\$1,000,000	47.62%	23.54%	3.26%	20.42%	5.13%
Pump Station	PS-127 - Marin Terrace Pump Station	\$1,000,000	34.33%	34.48%	8.73%	17.87%	4.57%
Pump Station	PS-128 - Alpine Bon-Tempe Pump Station	\$1,000,000	40.01%	46.48%	13.41%	0.09%	0.00%
Pump Station	PS-129 - Slide Gulch Pump Station	\$1,000,000	41.60%	30.20%	5.76%	17.84%	4.57%
Pump Station	PS-130 - Smith Conifer Pump Station	\$1,000,000	47.06%	23.26%	3.23%	21.07%	5.35%
Building	San Geronimo Treatment Plant - Boat Barn		26.18%	43.45%	10.26%	16.09%	4.00%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Chemical Stor	\$100,000,000	2.85%	10.10%	40.80%	41.18%	5.04%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #1		2.42%	8.59%	34.70%	46.38%	7.88%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #2		10.56%	25.25%	39.10%	20.97%	4.09%
Building	San Geronimo Treatment Plant - Facilities Shed		8.34%	35.82%	23.32%	25.61%	6.88%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Flash Mixer		10.56%	25.25%	39.10%	20.97%	4.09%
Building	San Geronimo Treatment Plant - Gardeners Shed		26.18%	43.45%	10.26%	16.09%	4.00%
Facility - Pump Station	San Geronimo Treatment Plant - North Marin L	\$5,000,000	2.42%	8.59%	34.70%	46.38%	7.88%
Facility - Pump Station	Southern Marin Line - Pump Station	\$2,000,000	11.89%	19.51%	49.24%	18.50%	0.84%
Water Tank	TK-006 - MADERA PARK TANK #1	\$200,000	4.50%	31.56%	35.04%	23.27%	5.62%
Water Tank	TK-009 - SAN CLEMENTE TANK	\$3,000,000	0.24%	1.81%	27.65%	58.42%	11.86%
Water Tank	TK-011 - CANON VILLAGE TANK	\$3,000,000	8.88%	22.77%	36.84%	26.09%	5.40%
Water Tank	TK-012 - FAIRFAX GRADE TANK	\$1,000,000	0.80%	4.40%	39.56%	49.68%	5.53%
Water Tank	TK-015 - MEADOW CLUB UPPER TANK	\$600,000	0.05%	0.41%	11.36%	59.14%	29.02%
Water Tank	TK-019 - OAK MANOR TOP TANK	\$500,000	8.88%	22.77%	36.84%	26.09%	5.40%
Water Tank	TK-025 - BRET HARTE TANK	\$1,000,000	0.18%	1.36%	20.73%	61.44%	16.27%
Water Tank	TK-027 - GREENBRAE TANK	\$3,000,000	0.05%	0.52%	13.16%	60.81%	25.43%
Water Tank	TK-030 - ESCALLE TANK	\$2,000,000	0.05%	0.52%	13.01%	60.80%	25.60%
Water Tank	TK-033 - INDIAN FIRE TRAIL TANK	\$500,000	2.12%	7.85%	40.13%	43.80%	6.08%
Water Tank	TK-046 - ALTO TANK #1	\$6,000,000	0.80%	4.40%	39.56%	49.68%	5.53%
Water Tank	TK-047 - BOLSA TANK	\$400,000	33.10%	52.07%	11.70%	2.50%	0.60%

Type	Facility Name	Nonstructural Acceleration-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Pump Station	PS-077 - Beacon Hill Pump Station					
Pump Station	PS-078 - Crescent Avenue Pump Station					
Pump Station	PS-079 - Marin City Pump Station					
Pump Station	PS-080 - Monte Mar Vista Pump Station					
Pump Station	PS-081 - Sausalito Pumphouse Pump Station					
Pump Station	PS-082 - Sausalito Boulevard Pump Station					
Pump Station	PS-083 - Richardson Drive Pump Station					
Pump Station	PS-084 - Eastwood Way Pump Station					
Pump Station	PS-085 - Fairview Park Pump Station					
Pump Station	PS-087 - Marinview Pump Station					
Pump Station	PS-088 - Tam Woods 1st Lift Pump Station					
Pump Station	PS-089 - Tam Woods 2nd Lift Pump Station					
Pump Station	PS-090 - Hill Haven Pump Station					
Pump Station	PS-091 - Sugarloaf Pump Station					
Pump Station	PS-092 - Tiburon Belvedere Pump Station					
Pump Station	PS-093 - Tiburon Booster Pump Station					
Pump Station	PS-095 - Pine Mountain Tunnel Pump Station					
Pump Station	PS-097 - Tocaloma Booster Pump Station					
Pump Station	PS-101 - Redwood Drive Lower Pump					
Pump Station	PS-102 - North Marin Line Boosters					
Pump Station	PS-103 - San Geronimo Valley Pump Station					
Pump Station	PS-104 - Conifer Way Pump Station					
Pump Station	PS-106 - Los Altos Pump Station					
Pump Station	PS-108 - Indian Rock Pump Station					
Pump Station	PS-109 - Cibrian Pump Station					
Pump Station	PS-113 - Lag Picnic Grounds Pump Station					
Pump Station	PS-114 - Cortez Avenue Pump Station					
Pump Station	PS-115 - Redwood Drive Upper Pump Station					
Pump Station	PS-116 - North Redwood Drive Boosters					
Pump Station	PS-117 - Wolfback Ridge Pump Station					
Pump Station	PS-118 - Fire Road Pump Station					
Pump Station	PS-122 - Upper Road Pump Station					
Pump Station	PS-123 - Southern Marin Line Syphon					
Pump Station	PS-124 - Throckmorton Booster New Pumpstat					
Pump Station	PS-125 - Kent Fire Trail 2nd Lift Pump Station					
Pump Station	PS-126 - Oak woodlands Pump Station					
Pump Station	PS-127 - Marin Terrace Pump Station					
Pump Station	PS-128 - Alpine Bon-Tempe Pump Station					
Pump Station	PS-129 - Slide Gulch Pump Station					
Pump Station	PS-130 - Smith Conifer Pump Station					
Building	San Geronimo Treatment Plant - Boat Barn	21.88%	34.90%	19.70%	19.29%	4.21%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Chemical Stor					
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #1					
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #2					
Building	San Geronimo Treatment Plant - Facilities Shed	16.81%	29.54%	18.14%	28.36%	7.13%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Flash Mixer					
Building	San Geronimo Treatment Plant - Gardeners She	21.88%	34.90%	19.70%	19.29%	4.21%
Facility - Pump Station	San Geronimo Treatment Plant - North Marin L					
Facility - Pump Station	Southern Marin Line - Pump Station					
Water Tank	TK-006 - MADERA PARK TANK #1					
Water Tank	TK-009 - SAN CLEMENTE TANK					
Water Tank	TK-011 - CANON VILLAGE TANK					
Water Tank	TK-012 - FAIRFAX GRADE TANK					
Water Tank	TK-015 - MEADOW CLUB UPPER TANK					
Water Tank	TK-019 - OAK MANOR TOP TANK					
Water Tank	TK-025 - BRET HARTE TANK					
Water Tank	TK-027 - GREENBRAE TANK					
Water Tank	TK-030 - ESCALLE TANK					
Water Tank	TK-033 - INDIAN FIRE TRAIL TANK					
Water Tank	TK-046 - ALTO TANK #1					
Water Tank	TK-047 - BOLSA TANK					

Type	Facility Name	Nonstructural Drift-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Pump Station	PS-077 - Beacon Hill Pump Station					
Pump Station	PS-078 - Crescent Avenue Pump Station					
Pump Station	PS-079 - Marin City Pump Station					
Pump Station	PS-080 - Monte Mar Vista Pump Station					
Pump Station	PS-081 - Sausalito Pumphouse Pump Station					
Pump Station	PS-082 - Sausalito Boulevard Pump Station					
Pump Station	PS-083 - Richardson Drive Pump Station					
Pump Station	PS-084 - Eastwood Way Pump Station					
Pump Station	PS-085 - Fairview Park Pump Station					
Pump Station	PS-087 - Marinview Pump Station					
Pump Station	PS-088 - Tam Woods 1st Lift Pump Station					
Pump Station	PS-089 - Tam Woods 2nd Lift Pump Station					
Pump Station	PS-090 - Hill Haven Pump Station					
Pump Station	PS-091 - Sugarloaf Pump Station					
Pump Station	PS-092 - Tiburon Belvedere Pump Station					
Pump Station	PS-093 - Tiburon Booster Pump Station					
Pump Station	PS-095 - Pine Mountain Tunnel Pump Station					
Pump Station	PS-097 - Tocaloma Booster Pump Station					
Pump Station	PS-101 - Redwood Drive Lower Pump					
Pump Station	PS-102 - North Marin Line Boosters					
Pump Station	PS-103 - San Geronimo Valley Pump Station					
Pump Station	PS-104 - Conifer Way Pump Station					
Pump Station	PS-106 - Los Altos Pump Station					
Pump Station	PS-108 - Indian Rock Pump Station					
Pump Station	PS-109 - Cibiria Pump Station					
Pump Station	PS-113 - Lag Picnic Grounds Pump Station					
Pump Station	PS-114 - Cortez Avenue Pump Station					
Pump Station	PS-115 - Redwood Drive Upper Pump Station					
Pump Station	PS-116 - North Redwood Drive Boosters					
Pump Station	PS-117 - Wolfback Ridge Pump Station					
Pump Station	PS-118 - Fire Road Pump Station					
Pump Station	PS-122 - Upper Road Pump Station					
Pump Station	PS-123 - Southern Marin Line Syphon					
Pump Station	PS-124 - Throckmorton Booster New Pumpstat					
Pump Station	PS-125 - Kent Fire Trail 2nd Lift Pump Station					
Pump Station	PS-126 - Oak woodlands Pump Station					
Pump Station	PS-127 - Marin Terrace Pump Station					
Pump Station	PS-128 - Alpine Bon-Tempe Pump Station					
Pump Station	PS-129 - Slide Gulch Pump Station					
Pump Station	PS-130 - Smith Conifer Pump Station					
Building	San Geronimo Treatment Plant - Boat Barn	27.71%	32.49%	19.11%	16.64%	4.02%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Chemical Stor					
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #1					
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #2					
Building	San Geronimo Treatment Plant - Facilities Shed	10.13%	24.15%	31.31%	27.22%	7.17%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Flash Mixer					
Building	San Geronimo Treatment Plant - Gardeners She	27.71%	32.49%	19.11%	16.64%	4.02%
Facility - Pump Station	San Geronimo Treatment Plant - North Marin L					
Facility - Pump Station	Southern Marin Line - Pump Station					
Water Tank	TK-006 - MADERA PARK TANK #1					
Water Tank	TK-009 - SAN CLEMENTE TANK					
Water Tank	TK-011 - CANON VILLAGE TANK					
Water Tank	TK-012 - FAIRFAX GRADE TANK					
Water Tank	TK-015 - MEADOW CLUB UPPER TANK					
Water Tank	TK-019 - OAK MANOR TOP TANK					
Water Tank	TK-025 - BRET HARTE TANK					
Water Tank	TK-027 - GREENBRAE TANK					
Water Tank	TK-030 - ESCALLE TANK					
Water Tank	TK-033 - INDIAN FIRE TRAIL TANK					
Water Tank	TK-046 - ALTO TANK #1					
Water Tank	TK-047 - BOLSA TANK					

Type	Facility Name	Losses (in dollars)			
		Structure	Nonstructural Drift Sensitive	Nonstructural Acceleration-Sensitive	Total Building Loss
Pump Station	PS-077 - Beacon Hill Pump Station	\$291,395			\$291,395
Pump Station	PS-078 - Crescent Avenue Pump Station	\$217,705			\$217,705
Pump Station	PS-079 - Marin City Pump Station	\$393,245			\$393,245
Pump Station	PS-080 - Monte Mar Vista Pump Station	\$512,560			\$512,560
Pump Station	PS-081 - Sausalito Pumphouse Pump Station	\$214,510			\$214,510
Pump Station	PS-082 - Sausalito Boulevard Pump Station	\$268,820			\$268,820
Pump Station	PS-083 - Richardson Drive Pump Station	\$310,060			\$310,060
Pump Station	PS-084 - Eastwood Way Pump Station	\$262,325			\$262,325
Pump Station	PS-085 - Fairview Park Pump Station	\$262,325			\$262,325
Pump Station	PS-087 - Marinview Pump Station	\$437,300			\$437,300
Pump Station	PS-088 - Tam Woods 1st Lift Pump Station	\$393,245			\$393,245
Pump Station	PS-089 - Tam Woods 2nd Lift Pump Station	\$377,385			\$377,385
Pump Station	PS-090 - Hill Haven Pump Station	\$279,290			\$279,290
Pump Station	PS-091 - Sugarloaf Pump Station	\$244,640			\$244,640
Pump Station	PS-092 - Tiburon Belvedere Pump Station	\$145,560			\$145,560
Pump Station	PS-093 - Tiburon Booster Pump Station	\$326,835			\$326,835
Pump Station	PS-095 - Pine Mountain Tunnel Pump Station	\$319,885			\$319,885
Pump Station	PS-097 - Tocaloma Booster Pump Station	\$594,135			\$594,135
Pump Station	PS-101 - Redwood Drive Lower Pump	\$393,245			\$393,245
Pump Station	PS-102 - North Marin Line Boosters	\$242,955			\$242,955
Pump Station	PS-103 - San Geronimo Valley Pump Station	\$242,955			\$242,955
Pump Station	PS-104 - Conifer Way Pump Station	\$283,335			\$283,335
Pump Station	PS-106 - Los Altos Pump Station	\$230,875			\$230,875
Pump Station	PS-108 - Indian Rock Pump Station	\$243,030			\$243,030
Pump Station	PS-109 - Cibrian Pump Station	\$189,015			\$189,015
Pump Station	PS-113 - Lag Picnic Grounds Pump Station	\$234,230			\$234,230
Pump Station	PS-114 - Cortez Avenue Pump Station	\$244,410			\$244,410
Pump Station	PS-115 - Redwood Drive Upper Pump Station	\$185,850			\$185,850
Pump Station	PS-116 - North Redwood Drive Boosters	\$57,215			\$57,215
Pump Station	PS-117 - Wolfback Ridge Pump Station	\$120,885			\$120,885
Pump Station	PS-118 - Fire Road Pump Station	\$208,155			\$208,155
Pump Station	PS-122 - Upper Road Pump Station	\$50,255			\$50,255
Pump Station	PS-123 - Southern Marin Line Syphon	\$205,130			\$205,130
Pump Station	PS-124 - Throckmorton Booster New Pumpstat	\$50,255			\$50,255
Pump Station	PS-125 - Kent Fire Trail 2nd Lift Pump Station	\$173,250			\$173,250
Pump Station	PS-126 - Oak woodlands Pump Station	\$190,480			\$190,480
Pump Station	PS-127 - Marin Terrace Pump Station	\$183,255			\$183,255
Pump Station	PS-128 - Alpine Bon-Tempe Pump Station	\$43,895			\$43,895
Pump Station	PS-129 - Slide Gulch Pump Station	\$176,480			\$176,480
Pump Station	PS-130 - Smith Conifer Pump Station	\$196,395			\$196,395
Building	San Geronimo Treatment Plant - Boat Barn				
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Chemical Stor	\$36,373,000			\$36,373,000
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #1				
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #2				
Building	San Geronimo Treatment Plant - Facilities Shed				
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Flash Mixer				
Building	San Geronimo Treatment Plant - Gardeners She				
Facility - Pump Station	San Geronimo Treatment Plant - North Marin L	\$2,067,125			\$2,067,125
Facility - Pump Station	Southern Marin Line - Pump Station	\$406,030			\$406,030
Water Tank	TK-006 - MADERA PARK TANK #1	\$52,832			\$52,832
Water Tank	TK-009 - SAN CLEMENTE TANK	\$1,534,500			\$1,534,500
Water Tank	TK-011 - CANON VILLAGE TANK	\$831,555			\$831,555
Water Tank	TK-012 - FAIRFAX GRADE TANK	\$414,920			\$414,920
Water Tank	TK-015 - MEADOW CLUB UPPER TANK	\$397,371			\$397,371
Water Tank	TK-019 - OAK MANOR TOP TANK	\$138,593			\$138,593
Water Tank	TK-025 - BRET HARTE TANK	\$563,115			\$563,115
Water Tank	TK-027 - GREENBRAE TANK	\$1,917,480			\$1,917,480
Water Tank	TK-030 - ESCALLE TANK	\$1,281,150			\$1,281,150
Water Tank	TK-033 - INDIAN FIRE TRAIL TANK	\$193,860			\$193,860
Water Tank	TK-046 - ALTO TANK #1	\$2,489,520			\$2,489,520
Water Tank	TK-047 - BOLSA TANK	\$25,834			\$25,834

Type	Facility Name	Functionality (%)					
		At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Pump Station	PS-077 - Beacon Hill Pump Station	25.70	45.00	70.60	83.00	97.40	99.90
Pump Station	PS-078 - Crescent Avenue Pump Station	33.80	55.40	80.00	89.30	98.50	99.90
Pump Station	PS-079 - Marin City Pump Station	21.30	36.50	57.90	72.80	93.70	99.90
Pump Station	PS-080 - Monte Mar Vista Pump Station	14.40	24.90	43.20	61.20	89.70	99.90
Pump Station	PS-081 - Sausalito Pumphouse Pump Station	56.80	71.80	78.00	84.60	95.50	99.90
Pump Station	PS-082 - Sausalito Boulevard Pump Station	31.10	50.70	73.60	84.30	96.80	99.90
Pump Station	PS-083 - Richardson Drive Pump Station	28.90	46.80	68.40	80.20	95.50	99.90
Pump Station	PS-084 - Eastwood Way Pump Station	39.10	57.80	74.10	83.20	95.30	99.90
Pump Station	PS-085 - Fairview Park Pump Station	39.10	57.80	74.10	83.20	95.30	99.90
Pump Station	PS-087 - Marinview Pump Station	17.80	31.20	52.30	68.70	92.80	99.90
Pump Station	PS-088 - Tam Woods 1st Lift Pump Station	21.30	36.50	57.90	72.80	93.70	99.90
Pump Station	PS-089 - Tam Woods 2nd Lift Pump Station	22.00	37.80	59.90	74.40	94.30	99.90
Pump Station	PS-090 - Hill Haven Pump Station	36.50	54.00	71.90	82.00	95.40	99.90
Pump Station	PS-091 - Sugarloaf Pump Station	38.90	57.60	76.20	85.20	96.40	99.90
Pump Station	PS-092 - Tiburon Belvedere Pump Station	45.70	67.90	88.60	94.70	99.30	99.90
Pump Station	PS-093 - Tiburon Booster Pump Station	28.00	45.30	66.30	78.60	95.00	99.90
Pump Station	PS-095 - Pine Mountain Tunnel Pump Station	25.60	44.30	67.90	79.90	95.00	99.90
Pump Station	PS-097 - Tocaloma Booster Pump Station	11.70	19.40	34.30	53.00	84.80	99.90
Pump Station	PS-101 - Redwood Drive Lower Pump	21.30	36.50	57.90	72.80	93.70	99.90
Pump Station	PS-102 - North Marin Line Boosters	55.40	68.70	74.40	81.80	94.50	99.90
Pump Station	PS-103 - San Geronimo Valley Pump Station	55.40	68.70	74.40	81.80	94.50	99.90
Pump Station	PS-104 - Conifer Way Pump Station	34.40	53.30	71.90	81.90	95.00	99.90
Pump Station	PS-106 - Los Altos Pump Station	48.80	65.30	76.90	84.60	95.60	99.90
Pump Station	PS-108 - Indian Rock Pump Station	44.10	62.00	76.00	84.20	95.50	99.90
Pump Station	PS-109 - Cibrian Pump Station	56.40	72.00	81.40	87.60	96.40	99.90
Pump Station	PS-113 - Lag Picnic Grounds Pump Station	41.20	60.80	77.60	85.80	96.10	99.90
Pump Station	PS-114 - Cortez Avenue Pump Station	45.80	64.60	75.70	83.60	95.20	99.90
Pump Station	PS-115 - Redwood Drive Upper Pump Station	61.30	75.90	81.10	86.80	96.10	99.90
Pump Station	PS-116 - North Redwood Drive Boosters	70.70	90.70	97.30	98.80	99.60	99.90
Pump Station	PS-117 - Wolfback Ridge Pump Station	66.60	83.30	89.20	92.80	97.90	99.90
Pump Station	PS-118 - Fire Road Pump Station	60.40	73.30	78.20	84.60	95.50	99.90
Pump Station	PS-122 - Upper Road Pump Station	77.60	93.60	97.00	98.20	99.40	99.90
Pump Station	PS-123 - Southern Marin Line Syphon	62.30	73.90	78.30	84.60	95.50	99.90
Pump Station	PS-124 - Throckmorton Booster New Pumpstat	77.60	93.60	97.00	98.20	99.40	99.90
Pump Station	PS-125 - Kent Fire Trail 2nd Lift Pump Station	65.80	78.00	82.10	87.30	96.30	99.90
Pump Station	PS-126 - Oak woodlands Pump Station	65.40	75.90	79.70	85.60	95.80	99.90
Pump Station	PS-127 - Marin Terrace Pump Station	60.00	75.80	81.70	87.30	96.30	99.90
Pump Station	PS-128 - Alpine Bon-Tempe Pump Station	72.20	93.00	98.90	99.90	99.90	99.90
Pump Station	PS-129 - Slide Gulch Pump Station	63.90	77.30	82.00	87.30	96.30	99.90
Pump Station	PS-130 - Smith Conifer Pump Station	64.80	75.10	79.00	85.10	95.60	99.90
Building	San Geronimo Treatment Plant - Boat Barn	26.10	28.20	69.50	69.60	79.80	95.90
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Chemical Stor	25.30	54.00	62.80	65.80	74.00	96.00
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #1	23.60	48.20	56.10	59.50	68.90	94.30
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #2	38.90	71.80	79.60	81.20	85.50	97.10
Building	San Geronimo Treatment Plant - Facilities Shed	8.30	10.00	44.00	44.10	67.40	93.00
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Flash Mixer	38.90	71.80	79.60	81.20	85.50	97.10
Building	San Geronimo Treatment Plant - Gardeners She	26.10	28.20	69.50	69.60	79.80	95.90
Facility - Pump Station	San Geronimo Treatment Plant - North Marin L	20.50	34.90	55.50	70.70	92.80	99.90
Facility - Pump Station	Southern Marin Line - Pump Station	36.90	58.00	81.70	90.30	98.50	99.90
Water Tank	TK-006 - MADERA PARK TANK #1	25.70	57.00	72.70	75.80	77.20	84.00
Water Tank	TK-009 - SAN CLEMENTE TANK	16.10	25.10	38.00	41.40	44.80	61.50
Water Tank	TK-011 - CANON VILLAGE TANK	28.10	53.80	70.40	73.70	75.20	82.70
Water Tank	TK-012 - FAIRFAX GRADE TANK	18.20	32.10	50.10	54.10	56.90	70.50
Water Tank	TK-015 - MEADOW CLUB UPPER TANK	13.80	17.50	23.30	25.70	29.70	49.00
Water Tank	TK-019 - OAK MANOR TOP TANK	28.10	53.80	70.40	73.70	75.20	82.70
Water Tank	TK-025 - BRET HARTE TANK	15.30	22.10	32.00	35.00	38.70	56.90
Water Tank	TK-027 - GREENBRAE TANK	14.10	18.30	24.90	27.50	31.40	50.70
Water Tank	TK-030 - ESCALLE TANK	14.00	18.30	24.80	27.30	31.30	50.60
Water Tank	TK-033 - INDIAN FIRE TRAIL TANK	20.00	36.40	54.60	58.50	61.00	73.10
Water Tank	TK-046 - ALTO TANK #1	18.20	32.10	50.10	54.10	56.90	70.50
Water Tank	TK-047 - BOLSA TANK	52.10	91.20	96.40	97.30	97.50	98.20

Type	Facility Name	Structure Replacement Cost	Structural - Probability of Damage				
			No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Water Tank	TK-055 - MILL VALLEY TANK	\$10,000,000	0.80%	4.40%	39.56%	49.68%	5.53%
Water Tank	TK-060 - SCOTT HIGHLANDS TANK	\$500,000	0.64%	3.52%	31.65%	54.85%	9.31%
Water Tank	TK-064 - STRAWBERRY TANK	\$3,000,000	2.01%	7.44%	38.05%	45.63%	6.85%
Water Tank	TK-068 - ELDA DRIVE TANK	\$300,000	2.14%	7.95%	40.65%	43.39%	5.85%
Water Tank	TK-069 - HAWTHORNE HILLS UPPER TANK	\$4,000,000	0.08%	0.56%	15.32%	58.91%	25.11%
Water Tank	TK-074 - SCENIC AVENUE TANK	\$40,000	14.18%	54.37%	27.78%	3.05%	0.60%
Water Tank	TK-078 - CHULA VISTA TANK	\$500,000	2.68%	9.92%	50.74%	34.69%	1.95%
Water Tank	TK-081 - FAIRHILLS TOP TANK #1	\$120,000	11.84%	30.37%	49.12%	8.24%	0.42%
Water Tank	TK-083 - GLENWOOD TANK	\$3,000,000	8.01%	18.83%	53.84%	18.80%	0.49%
Water Tank	TK-085 - HIND TANK #1	\$200,000	28.93%	38.29%	7.18%	20.44%	5.13%
Water Tank	TK-086 - HIND TANK #2	\$400,000	54.91%	18.42%	1.10%	20.40%	5.13%
Water Tank	TK-087 - LOCH LOMOND TANK	\$2,000,000	6.52%	15.34%	43.87%	30.06%	4.18%
Water Tank	TK-089 - LOS RANCHITOS TANK	\$2,000,000	2.14%	7.95%	40.65%	43.39%	5.85%
Water Tank	TK-090 - MARINWOOD TANK	\$1,000,000	6.52%	15.34%	43.87%	30.06%	4.18%
Water Tank	TK-091 - MARIN PROFESSIONAL CENTER TANK	\$500,000	0.18%	1.36%	20.73%	61.44%	16.27%
Water Tank	TK-094 - MILLER CREEK TANK	\$1,000,000	6.52%	15.34%	43.87%	30.06%	4.18%
Water Tank	TK-096 - PUERTO SUELLO TANK	\$3,000,000	2.01%	7.44%	38.05%	45.63%	6.85%
Water Tank	TK-097 - RAFAEL HIGHLANDS TANK	\$1,000,000	2.68%	9.92%	50.74%	34.69%	1.95%
Water Tank	TK-098 - SANTA MARGARITA TANK	\$3,000,000	2.14%	7.95%	40.65%	43.39%	5.85%
Water Tank	TK-100 - SKYVIEW TERRACE TANK	\$300,000	0.81%	4.45%	40.02%	49.37%	5.32%
Water Tank	TK-105 - COURTRIGHT TANK	\$100,000	12.03%	51.64%	33.62%	2.28%	0.39%
Water Tank	TK-106 - LUCAS VALLEY TANK	\$3,000,000	6.00%	14.12%	40.39%	33.99%	5.47%
Water Tank	TK-108 - CLOUDVIEW TANK	\$440,000	0.08%	0.56%	15.50%	58.90%	24.94%
Water Tank	TK-113 - SAUSALITO PUMP HOUSE TANK #1	\$620,000	0.00%	0.03%	2.77%	36.35%	60.82%
Water Tank	TK-114 - SAUSALITO PUMP HOUSE TANK #2	\$620,000	0.00%	0.03%	2.77%	36.35%	60.82%
Water Tank	TK-115 - ROMER TANK	\$620,000	0.00%	0.03%	2.77%	36.35%	60.82%
Water Tank	TK-116 - SAUSALITO BLVD. TANK	\$460,000	0.31%	1.73%	25.05%	59.71%	13.17%
Water Tank	TK-117 - MESA VISTA TANK #1	\$1,000,000	0.61%	3.34%	30.01%	55.96%	10.05%
Water Tank	TK-118 - COUNTYVIEW DRIVE TANK	\$300,000	0.78%	4.31%	38.68%	50.26%	5.95%
Water Tank	TK-119 - LATTIE LANE TANK	\$500,000	0.60%	3.30%	29.67%	56.15%	10.26%
Water Tank	TK-125 - TENNESSEE VALLEY TANK	\$2,000,000	0.19%	1.43%	21.87%	60.91%	15.58%
Water Tank	TK-126 - HILL HAVEN TANK	\$330,000	22.98%	36.33%	37.04%	3.46%	0.16%
Water Tank	TK-127 - PARADISE DRIVE TANK	\$2,000,000	17.24%	27.25%	27.78%	22.56%	5.15%
Water Tank	TK-128 - MOUNT TIBURON TANK #1	\$1,000,000	6.00%	14.12%	40.39%	33.99%	5.47%
Water Tank	TK-130 - SPRING LANE TANK #1	\$3,000,000	1.72%	6.38%	44.85%	43.95%	3.07%
Water Tank	TK-131 - CONIFER WAY TANK	\$1,000,000	0.59%	3.26%	29.33%	56.33%	10.46%
Water Tank	TK-139 - BUCKEYE CIRCLE TANK	\$60,000	4.39%	16.97%	41.91%	31.01%	5.69%
Water Tank	TK-145 - ROSS RESERVOIR	\$2,000,000	8.17%	19.28%	50.08%	21.55%	0.90%
Water Tank	TK-146 - FORBES HILL RESERVOIR	\$8,000,000	2.46%	7.89%	43.56%	42.15%	3.92%
Water Tank	TK-147 - SMITH SADDLE TANK #1	\$10,000,000	2.01%	7.44%	38.05%	45.63%	6.85%
Water Tank	TK-148 - SMITH SADDLE TANK #2	\$10,000,000	2.14%	7.95%	40.65%	43.39%	5.85%
Water Tank	TK-150 - LOS ALTOS TANK	\$120,000	11.84%	30.37%	49.12%	8.24%	0.42%
Water Tank	TK-152 - MADERA PARK (H/P) TANK	\$3,000	0.17%	1.34%	20.50%	61.50%	16.46%
Water Tank	TK-153 - RAFAEL HIGHLANDS (H/P) TANK	\$5,000	2.68%	9.92%	50.74%	34.69%	1.95%
Water Tank	TK-155 - PINE MOUNTAIN TUNNEL TANK	\$6,000,000	0.57%	2.59%	23.71%	58.25%	14.86%
Water Tank	TK-156 - BON TEMPE CLEARWELL TANK	\$4,000,000	2.77%	9.80%	39.58%	42.22%	5.61%
Water Tank	TK-157 - SAN GERONIMO CLEARWELL TANK #1	\$4,000,000	2.42%	8.59%	34.70%	46.38%	7.88%
Water Tank	TK-158 - FAWN DRIVE TANK	\$180,000	11.84%	30.37%	49.12%	8.24%	0.42%
Water Tank	TK-159 - PEACOCK GAP TANK	\$1,000,000	45.11%	21.58%	8.32%	20.02%	4.96%
Water Tank	TK-160 - MARIN BAY TANK	\$240,000	21.64%	34.20%	34.87%	7.94%	1.32%
Water Tank	TK-164 - TOMAHAWK DRIVE TANK	\$80,000	9.48%	24.33%	39.35%	22.44%	4.38%
Water Tank	TK-165 - ALTO TANK #2	\$6,000,000	4.39%	16.97%	41.91%	31.01%	5.69%
Water Tank	TK-166 - RING MOUNTAIN TANK	\$300,000	11.84%	30.37%	49.12%	8.24%	0.42%
Water Tank	TK-167 - CREEKSIDE DRIVE TANK	\$360,000	17.04%	26.93%	27.46%	23.18%	5.37%
Water Tank	TK-168 - MCNEAR DRIVE #1 (H/P) TANK	\$2,000	6.00%	14.12%	40.39%	33.99%	5.47%
Water Tank	TK-169 - MCNEAR DRIVE #2 (H/P) TANK	\$3,000	6.00%	14.12%	40.39%	33.99%	5.47%
Water Tank	TK-174 - VIA MONTEBELLO (H/P) TANK	\$7,000	22.98%	36.33%	37.04%	3.46%	0.16%
Water Tank	TK-175 - MARINSHIP TANK	\$3,000,000	6.87%	21.03%	42.27%	25.05%	4.76%
Water Tank	TK-181 - REDWOOD DRIVE UPPER TANK	\$120,000	10.84%	34.27%	30.31%	19.77%	4.79%
Water Tank	TK-182 - ALTA AVENUE TANK	\$1,000,000	3.40%	23.01%	44.97%	23.60%	4.99%
Water Tank	TK-183 - MINE RIDGE TANK	\$440,000	10.84%	34.27%	30.31%	19.77%	4.79%



Type	Facility Name	Nonstructural Acceleration-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Water Tank	TK-055 - MILL VALLEY TANK					
Water Tank	TK-060 - SCOTT HIGHLANDS TANK					
Water Tank	TK-064 - STRAWBERRY TANK					
Water Tank	TK-068 - ELDA DRIVE TANK					
Water Tank	TK-069 - HAWTHORNE HILLS UPPER TANK					
Water Tank	TK-074 - SCENIC AVENUE TANK					
Water Tank	TK-078 - CHULA VISTA TANK					
Water Tank	TK-081 - FAIRHILLS TOP TANK #1					
Water Tank	TK-083 - GLENWOOD TANK					
Water Tank	TK-085 - HIND TANK #1					
Water Tank	TK-086 - HIND TANK #2					
Water Tank	TK-087 - LOCH LOMOND TANK					
Water Tank	TK-089 - LOS RANCHITOS TANK					
Water Tank	TK-090 - MARINWOOD TANK					
Water Tank	TK-091 - MARIN PROFESSIONAL CENTER TANK					
Water Tank	TK-094 - MILLER CREEK TANK					
Water Tank	TK-096 - PUERTO SUELLO TANK					
Water Tank	TK-097 - RAFAEL HIGHLANDS TANK					
Water Tank	TK-098 - SANTA MARGARITA TANK					
Water Tank	TK-100 - SKYVIEW TERRACE TANK					
Water Tank	TK-105 - COURTRIGHT TANK					
Water Tank	TK-106 - LUCAS VALLEY TANK					
Water Tank	TK-108 - CLOUDVIEW TANK					
Water Tank	TK-113 - SAUSALITO PUMP HOUSE TANK #1					
Water Tank	TK-114 - SAUSALITO PUMP HOUSE TANK #2					
Water Tank	TK-115 - ROMER TANK					
Water Tank	TK-116 - SAUSALITO BLVD. TANK					
Water Tank	TK-117 - MESA VISTA TANK #1					
Water Tank	TK-118 - COUNTYVIEW DRIVE TANK					
Water Tank	TK-119 - LATTIE LANE TANK					
Water Tank	TK-125 - TENNESSEE VALLEY TANK					
Water Tank	TK-126 - HILL HAVEN TANK					
Water Tank	TK-127 - PARADISE DRIVE TANK					
Water Tank	TK-128 - MOUNT TIBURON TANK #1					
Water Tank	TK-130 - SPRING LANE TANK #1					
Water Tank	TK-131 - CONIFER WAY TANK					
Water Tank	TK-139 - BUCKEYE CIRCLE TANK					
Water Tank	TK-145 - ROSS RESERVOIR					
Water Tank	TK-146 - FORBES HILL RESERVOIR					
Water Tank	TK-147 - SMITH SADDLE TANK #1					
Water Tank	TK-148 - SMITH SADDLE TANK #2					
Water Tank	TK-150 - LOS ALTOS TANK					
Water Tank	TK-152 - MADERA PARK (H/P) TANK					
Water Tank	TK-153 - RAFAEL HIGHLANDS (H/P) TANK					
Water Tank	TK-155 - PINE MOUNTAIN TUNNEL TANK					
Water Tank	TK-156 - BON TEMPE CLEARWELL TANK					
Water Tank	TK-157 - SAN GERONIMO CLEARWELL TANK #1					
Water Tank	TK-158 - FAWN DRIVE TANK					
Water Tank	TK-159 - PEACOCK GAP TANK					
Water Tank	TK-160 - MARIN BAY TANK					
Water Tank	TK-164 - TOMAHAWK DRIVE TANK					
Water Tank	TK-165 - ALTO TANK #2					
Water Tank	TK-166 - RING MOUNTAIN TANK					
Water Tank	TK-167 - CREEKSIDE DRIVE TANK					
Water Tank	TK-168 - MCNEAR DRIVE #1 (H/P) TANK					
Water Tank	TK-169 - MCNEAR DRIVE #2 (H/P) TANK					
Water Tank	TK-174 - VIA MONTEBELLO (H/P) TANK					
Water Tank	TK-175 - MARINSHIP TANK					
Water Tank	TK-181 - REDWOOD DRIVE UPPER TANK					
Water Tank	TK-182 - ALTA AVENUE TANK					
Water Tank	TK-183 - MINE RIDGE TANK					

Type	Facility Name	Nonstructural Drift-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Water Tank	TK-055 - MILL VALLEY TANK					
Water Tank	TK-060 - SCOTT HIGHLANDS TANK					
Water Tank	TK-064 - STRAWBERRY TANK					
Water Tank	TK-068 - ELDA DRIVE TANK					
Water Tank	TK-069 - HAWTHORNE HILLS UPPER TANK					
Water Tank	TK-074 - SCENIC AVENUE TANK					
Water Tank	TK-078 - CHULA VISTA TANK					
Water Tank	TK-081 - FAIRHILLS TOP TANK #1					
Water Tank	TK-083 - GLENWOOD TANK					
Water Tank	TK-085 - HIND TANK #1					
Water Tank	TK-086 - HIND TANK #2					
Water Tank	TK-087 - LOCH LOMOND TANK					
Water Tank	TK-089 - LOS RANCHITOS TANK					
Water Tank	TK-090 - MARINWOOD TANK					
Water Tank	TK-091 - MARIN PROFESSIONAL CENTER TANK					
Water Tank	TK-094 - MILLER CREEK TANK					
Water Tank	TK-096 - PUERTO SUELLO TANK					
Water Tank	TK-097 - RAFAEL HIGHLANDS TANK					
Water Tank	TK-098 - SANTA MARGARITA TANK					
Water Tank	TK-100 - SKYVIEW TERRACE TANK					
Water Tank	TK-105 - COURTRIGHT TANK					
Water Tank	TK-106 - LUCAS VALLEY TANK					
Water Tank	TK-108 - CLOUDVIEW TANK					
Water Tank	TK-113 - SAUSALITO PUMP HOUSE TANK #1					
Water Tank	TK-114 - SAUSALITO PUMP HOUSE TANK #2					
Water Tank	TK-115 - ROMER TANK					
Water Tank	TK-116 - SAUSALITO BLVD. TANK					
Water Tank	TK-117 - MESA VISTA TANK #1					
Water Tank	TK-118 - COUNTYVIEW DRIVE TANK					
Water Tank	TK-119 - LATTIE LANE TANK					
Water Tank	TK-125 - TENNESSEE VALLEY TANK					
Water Tank	TK-126 - HILL HAVEN TANK					
Water Tank	TK-127 - PARADISE DRIVE TANK					
Water Tank	TK-128 - MOUNT TIBURON TANK #1					
Water Tank	TK-130 - SPRING LANE TANK #1					
Water Tank	TK-131 - CONIFER WAY TANK					
Water Tank	TK-139 - BUCKEYE CIRCLE TANK					
Water Tank	TK-145 - ROSS RESERVOIR					
Water Tank	TK-146 - FORBES HILL RESERVOIR					
Water Tank	TK-147 - SMITH SADDLE TANK #1					
Water Tank	TK-148 - SMITH SADDLE TANK #2					
Water Tank	TK-150 - LOS ALTOS TANK					
Water Tank	TK-152 - MADERA PARK (H/P) TANK					
Water Tank	TK-153 - RAFAEL HIGHLANDS (H/P) TANK					
Water Tank	TK-155 - PINE MOUNTAIN TUNNEL TANK					
Water Tank	TK-156 - BON TEMPE CLEARWELL TANK					
Water Tank	TK-157 - SAN GERONIMO CLEARWELL TANK #1					
Water Tank	TK-158 - FAWN DRIVE TANK					
Water Tank	TK-159 - PEACOCK GAP TANK					
Water Tank	TK-160 - MARIN BAY TANK					
Water Tank	TK-164 - TOMAHAWK DRIVE TANK					
Water Tank	TK-165 - ALTO TANK #2					
Water Tank	TK-166 - RING MOUNTAIN TANK					
Water Tank	TK-167 - CREEKSIDE DRIVE TANK					
Water Tank	TK-168 - MCNEAR DRIVE #1 (H/P) TANK					
Water Tank	TK-169 - MCNEAR DRIVE #2 (H/P) TANK					
Water Tank	TK-174 - VIA MONTEBELLO (H/P) TANK					
Water Tank	TK-175 - MARINSHIP TANK					
Water Tank	TK-181 - REDWOOD DRIVE UPPER TANK					
Water Tank	TK-182 - ALTA AVENUE TANK					
Water Tank	TK-183 - MINE RIDGE TANK					

Type	Facility Name	Losses (in dollars)			
		Structure	Nonstructural Drift Sensitive	Nonstructural Acceleration-Sensitive	Total Building Loss
Water Tank	TK-055 - MILL VALLEY TANK	\$4,149,200			\$4,149,200
Water Tank	TK-060 - SCOTT HIGHLANDS TANK	\$235,718			\$235,718
Water Tank	TK-064 - STRAWBERRY TANK	\$1,209,225			\$1,209,225
Water Tank	TK-068 - ELDA DRIVE TANK	\$115,137			\$115,137
Water Tank	TK-069 - HAWTHORNE HILLS UPPER TANK	\$2,511,280			\$2,511,280
Water Tank	TK-074 - SCENIC AVENUE TANK	\$3,726			\$3,726
Water Tank	TK-078 - CHULA VISTA TANK	\$154,355			\$154,355
Water Tank	TK-081 - FAIRHILLS TOP TANK #1	\$17,101			\$17,101
Water Tank	TK-083 - GLENWOOD TANK	\$623,625			\$623,625
Water Tank	TK-085 - HIND TANK #1	\$40,771			\$40,771
Water Tank	TK-086 - HIND TANK #2	\$73,824			\$73,824
Water Tank	TK-087 - LOCH LOMOND TANK	\$591,270			\$591,270
Water Tank	TK-089 - LOS RANCHITOS TANK	\$767,580			\$767,580
Water Tank	TK-090 - MARINWOOD TANK	\$295,635			\$295,635
Water Tank	TK-091 - MARIN PROFESSIONAL CENTER TANK	\$281,558			\$281,558
Water Tank	TK-094 - MILLER CREEK TANK	\$295,635			\$295,635
Water Tank	TK-096 - PUERTO SUELLO TANK	\$1,209,225			\$1,209,225
Water Tank	TK-097 - RAFAEL HIGHLANDS TANK	\$308,710			\$308,710
Water Tank	TK-098 - SANTA MARGARITA TANK	\$1,151,370			\$1,151,370
Water Tank	TK-100 - SKYVIEW TERRACE TANK	\$123,503			\$123,503
Water Tank	TK-105 - COURTRIGHT TANK	\$9,383			\$9,383
Water Tank	TK-106 - LUCAS VALLEY TANK	\$978,855			\$978,855
Water Tank	TK-108 - CLOUDVIEW TANK	\$275,585			\$275,585
Water Tank	TK-113 - SAUSALITO PUMP HOUSE TANK #1	\$514,891			\$514,891
Water Tank	TK-114 - SAUSALITO PUMP HOUSE TANK #2	\$514,891			\$514,891
Water Tank	TK-115 - ROMER TANK	\$514,891			\$514,891
Water Tank	TK-116 - SAUSALITO BLVD. TANK	\$243,064			\$243,064
Water Tank	TK-117 - MESA VISTA TANK #1	\$482,945			\$482,945
Water Tank	TK-118 - COUNTYVIEW DRIVE TANK	\$126,371			\$126,371
Water Tank	TK-119 - LATTIE LANE TANK	\$242,828			\$242,828
Water Tank	TK-125 - TENNESSEE VALLEY TANK	\$1,109,560			\$1,109,560
Water Tank	TK-126 - HILL HAVEN TANK	\$31,708			\$31,708
Water Tank	TK-127 - PARADISE DRIVE TANK	\$484,310			\$484,310
Water Tank	TK-128 - MOUNT TIBURON TANK #1	\$326,285			\$326,285
Water Tank	TK-130 - SPRING LANE TANK #1	\$1,094,595			\$1,094,595
Water Tank	TK-131 - CONIFER WAY TANK	\$488,205			\$488,205
Water Tank	TK-139 - BUCKEYE CIRCLE TANK	\$18,859			\$18,859
Water Tank	TK-145 - ROSS RESERVOIR	\$446,120			\$446,120
Water Tank	TK-146 - FORBES HILL RESERVOIR	\$2,891,080			\$2,891,080
Water Tank	TK-147 - SMITH SADDLE TANK #1	\$4,030,750			\$4,030,750
Water Tank	TK-148 - SMITH SADDLE TANK #2	\$3,837,900			\$3,837,900
Water Tank	TK-150 - LOS ALTOS TANK	\$17,101			\$17,101
Water Tank	TK-152 - MADERA PARK (H/P) TANK	\$1,695			\$1,695
Water Tank	TK-153 - RAFAEL HIGHLANDS (H/P) TANK	\$1,544			\$1,544
Water Tank	TK-155 - PINE MOUNTAIN TUNNEL TANK	\$3,209,760			\$3,209,760
Water Tank	TK-156 - BON TEMPE CLEARWELL TANK	\$1,494,760			\$1,494,760
Water Tank	TK-157 - SAN GERONIMO CLEARWELL TANK #1	\$1,653,700			\$1,653,700
Water Tank	TK-158 - FAWN DRIVE TANK	\$25,651			\$25,651
Water Tank	TK-159 - PEACOCK GAP TANK	\$192,990			\$192,990
Water Tank	TK-160 - MARIN BAY TANK	\$31,259			\$31,259
Water Tank	TK-164 - TOMAHAWK DRIVE TANK	\$19,970			\$19,970
Water Tank	TK-165 - ALTO TANK #2	\$1,885,860			\$1,885,860
Water Tank	TK-166 - RING MOUNTAIN TANK	\$42,752			\$42,752
Water Tank	TK-167 - CREEKSIDE DRIVE TANK	\$89,077			\$89,077
Water Tank	TK-168 - MCNEAR DRIVE #1 (H/P) TANK	\$653			\$653
Water Tank	TK-169 - MCNEAR DRIVE #2 (H/P) TANK	\$979			\$979
Water Tank	TK-174 - VIA MONTEBELLO (H/P) TANK	\$673			\$673
Water Tank	TK-175 - MARINSHIP TANK	\$815,460			\$815,460
Water Tank	TK-181 - REDWOOD DRIVE UPPER TANK	\$27,494			\$27,494
Water Tank	TK-182 - ALTA AVENUE TANK	\$270,460			\$270,460
Water Tank	TK-183 - MINE RIDGE TANK	\$100,813			\$100,813

Type	Facility Name	Functionality (%)					
		At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Water Tank	TK-055 - MILL VALLEY TANK	18.20	32.10	50.10	54.10	56.90	70.50
Water Tank	TK-060 - SCOTT HIGHLANDS TANK	17.20	28.40	43.00	46.60	49.70	65.20
Water Tank	TK-064 - STRAWBERRY TANK	19.60	35.20	52.50	56.30	58.90	71.60
Water Tank	TK-068 - ELDA DRIVE TANK	20.10	36.70	55.10	59.00	61.50	73.50
Water Tank	TK-069 - HAWTHORNE HILLS UPPER TANK	14.30	19.10	26.70	29.30	33.20	51.90
Water Tank	TK-074 - SCENIC AVENUE TANK	37.50	82.50	94.80	96.90	97.10	97.90
Water Tank	TK-078 - CHULA VISTA TANK	21.80	42.40	65.10	69.60	71.50	80.70
Water Tank	TK-081 - FAIRHILLS TOP TANK #1	33.10	67.20	89.00	92.80	93.20	95.40
Water Tank	TK-083 - GLENWOOD TANK	28.20	55.70	79.60	84.00	85.00	89.90
Water Tank	TK-085 - HIND TANK #1	45.60	74.10	77.60	78.60	79.80	85.80
Water Tank	TK-086 - HIND TANK #2	64.10	77.30	78.00	78.60	79.80	85.80
Water Tank	TK-087 - LOCH LOMOND TANK	25.40	47.90	67.60	71.50	73.20	81.50
Water Tank	TK-089 - LOS RANCHITOS TANK	20.10	36.70	55.10	59.00	61.50	73.50
Water Tank	TK-090 - MARINWOOD TANK	25.40	47.90	67.60	71.50	73.20	81.50
Water Tank	TK-091 - MARIN PROFESSIONAL CENTER TANK	15.30	22.10	32.00	35.00	38.70	56.90
Water Tank	TK-094 - MILLER CREEK TANK	25.40	47.90	67.60	71.50	73.20	81.50
Water Tank	TK-096 - PUERTO SUELLO TANK	19.60	35.20	52.50	56.30	58.90	71.60
Water Tank	TK-097 - RAFAEL HIGHLANDS TANK	21.80	42.40	65.10	69.60	71.50	80.70
Water Tank	TK-098 - SANTA MARGARITA TANK	20.10	36.70	55.10	59.00	61.50	73.50
Water Tank	TK-100 - SKYVIEW TERRACE TANK	18.30	32.30	50.50	54.60	57.30	70.80
Water Tank	TK-105 - COURTRIGHT TANK	35.60	80.30	95.10	97.70	97.80	98.50
Water Tank	TK-106 - LUCAS VALLEY TANK	24.40	45.20	63.30	67.10	69.10	78.60
Water Tank	TK-108 - CLOUDVIEW TANK	14.30	19.20	26.80	29.50	33.30	52.00
Water Tank	TK-113 - SAUSALITO PUMP HOUSE TANK #1	11.70	12.80	14.80	16.50	20.10	38.30
Water Tank	TK-114 - SAUSALITO PUMP HOUSE TANK #2	11.70	12.80	14.80	16.50	20.10	38.30
Water Tank	TK-115 - ROMER TANK	11.70	12.80	14.80	16.50	20.10	38.30
Water Tank	TK-116 - SAUSALITO BLVD. TANK	15.90	24.20	35.90	39.20	42.70	59.90
Water Tank	TK-117 - MESA VISTA TANK #1	17.00	27.60	41.50	45.00	48.20	64.10
Water Tank	TK-118 - COUNTYVIEW DRIVE TANK	18.10	31.70	49.30	53.30	56.10	69.90
Water Tank	TK-119 - LATTIE LANE TANK	16.90	27.40	41.20	44.70	47.90	63.80
Water Tank	TK-125 - TENNESSEE VALLEY TANK	15.40	22.60	33.00	36.10	39.70	57.60
Water Tank	TK-126 - HILL HAVEN TANK	42.70	77.80	94.10	96.90	97.10	98.00
Water Tank	TK-127 - PARADISE DRIVE TANK	35.30	61.70	74.20	76.80	78.20	84.70
Water Tank	TK-128 - MOUNT TIBURON TANK #1	24.40	45.20	63.30	67.10	69.10	78.60
Water Tank	TK-130 - SPRING LANE TANK #1	19.90	36.50	56.70	61.00	63.40	75.20
Water Tank	TK-131 - CONIFER WAY TANK	16.90	27.30	40.90	44.30	47.60	63.60
Water Tank	TK-139 - BUCKEYE CIRCLE TANK	23.60	46.70	65.60	69.40	71.20	80.00
Water Tank	TK-145 - ROSS RESERVOIR	28.10	54.90	77.20	81.40	82.60	88.20
Water Tank	TK-146 - FORBES HILL RESERVOIR	20.60	37.90	57.60	61.80	64.10	75.50
Water Tank	TK-147 - SMITH SADDLE TANK #1	19.60	35.20	52.50	56.30	58.90	71.60
Water Tank	TK-148 - SMITH SADDLE TANK #2	20.10	36.70	55.10	59.00	61.50	73.50
Water Tank	TK-150 - LOS ALTOS TANK	33.10	67.20	89.00	92.80	93.20	95.40
Water Tank	TK-152 - MADERA PARK (H/P) TANK	15.20	22.00	31.80	34.80	38.50	56.70
Water Tank	TK-153 - RAFAEL HIGHLANDS (H/P) TANK	21.80	42.40	65.10	69.60	71.50	80.70
Water Tank	TK-155 - PINE MOUNTAIN TUNNEL TANK	16.10	24.60	35.80	38.90	42.40	59.50
Water Tank	TK-156 - BON TEMPE CLEARWELL TANK	20.80	38.40	56.30	60.20	62.60	74.30
Water Tank	TK-157 - SAN GERONIMO CLEARWELL TANK #1	19.90	35.30	51.20	54.80	57.50	70.50
Water Tank	TK-158 - FAWN DRIVE TANK	33.10	67.20	89.00	92.80	93.20	95.40
Water Tank	TK-159 - PEACOCK GAP TANK	56.80	74.10	78.00	79.10	80.30	86.10
Water Tank	TK-160 - MARIN BAY TANK	41.00	74.00	89.40	92.20	92.70	94.90
Water Tank	TK-164 - TOMAHAWK DRIVE TANK	29.10	56.60	74.20	77.60	78.90	85.30
Water Tank	TK-165 - ALTO TANK #2	23.60	46.70	65.60	69.40	71.20	80.00
Water Tank	TK-166 - RING MOUNTAIN TANK	33.10	67.20	89.00	92.80	93.20	95.40
Water Tank	TK-167 - CREEKSIDE DRIVE TANK	35.10	61.20	73.50	76.10	77.50	84.20
Water Tank	TK-168 - MCNEAR DRIVE #1 (H/P) TANK	24.40	45.20	63.30	67.10	69.10	78.60
Water Tank	TK-169 - MCNEAR DRIVE #2 (H/P) TANK	24.40	45.20	63.30	67.10	69.10	78.60
Water Tank	TK-174 - VIA MONTEBELLO (H/P) TANK	42.70	77.80	94.10	96.90	97.10	98.00
Water Tank	TK-175 - MARINSHIP TANK	26.50	52.50	71.40	75.10	76.60	83.70
Water Tank	TK-181 - REDWOOD DRIVE UPPER TANK	31.20	63.10	76.70	79.40	80.60	86.40
Water Tank	TK-182 - ALTA AVENUE TANK	24.10	52.10	72.20	76.10	77.50	84.30
Water Tank	TK-183 - MINE RIDGE TANK	31.20	63.10	76.70	79.40	80.60	86.40

Type	Facility Name	Structure Replacement Cost	Structural - Probability of Damage				
			No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Water Tank	TK-184 - PACHECO RIDGE TANK #1	\$6,000,000	30.64%	36.96%	13.08%	15.46%	3.84%
Water Tank	TK-185 - PACHECO RIDGE TANK #2	\$6,000,000	25.89%	38.34%	16.34%	15.56%	3.84%
Water Tank	TK-186 - SAN GERONIMO CLEARWELL TANK #2	\$6,000,000	21.52%	32.29%	14.01%	25.28%	6.86%
Water Tank	TK-187 - MANZANITA TANK	\$120,000	5.92%	27.35%	35.63%	25.11%	5.96%
Water Tank	TK-188 - WOLFBACK RIDGE TANK #1	\$50,000	26.38%	47.20%	23.99%	2.03%	0.37%
Water Tank	TK-189 - WOLFBACK RIDGE TANK #2	\$50,000	26.38%	47.20%	23.99%	2.03%	0.37%
Water Tank	TK-190 - INVERNESS DRIVE TANK	\$280,000	32.92%	32.03%	9.37%	20.51%	5.13%
Water Tank	TK-191 - LONE TREE AVENUE TANK	\$200,000	10.84%	34.27%	30.31%	19.77%	4.79%
Water Tank	TK-192 - VERNAL AVE TANK	\$600,000	13.70%	43.33%	38.33%	4.01%	0.60%
Water Tank	TK-193 - H-LINE ROAD TANK	\$1,000,000	16.11%	34.83%	21.21%	22.25%	5.57%
Water Tank	TK-195 - Fire Road Pressure Tank	\$2,000	13.02%	34.00%	24.87%	22.52%	5.57%
Water Tank	TK-196 - WILSON WAY TANK	\$200,000	36.50%	46.38%	14.00%	2.51%	0.60%
Water Tank	TK-197 - SUMMIT TRAIL TANK	\$260,000	36.50%	46.38%	14.00%	2.51%	0.60%
Water Tank	TK-198 - SCOTT TANKS	\$120,000	31.85%	47.97%	17.01%	2.55%	0.60%
Water Tank	TK-199 - SCOTT TANKS	\$120,000	31.85%	47.97%	17.01%	2.55%	0.60%
Water Tank	TK-200 - OAK WOODLANDS TANK #1	\$230,000	46.14%	24.81%	3.47%	20.42%	5.13%
Water Tank	TK-201 - OAK WOODLANDS TANK #2	\$230,000	50.12%	26.95%	3.77%	15.29%	3.84%
Water Tank	TK-202 - Fairfax Manor 1st Lift Tank	\$40,000	23.89%	35.97%	12.75%	21.79%	5.57%
Water Tank	TK-203 - MONTE MAR VISTA TANK	\$120,000	27.73%	48.87%	20.16%	2.62%	0.60%
Water Tank	TK-204 - Bay Road Tank	\$240,000	0.80%	4.40%	39.56%	49.68%	5.53%
Water Tank	TK-205 - RICHARDSON DRIVE (H/P) TANK	\$2,000	42.15%	44.54%	11.33%	1.58%	0.37%
Water Tank	TK-206 - SANTA VENETIA TANK	\$620,000	42.65%	45.06%	11.46%	0.66%	0.14%
Water Tank	TK-207 - GOODHILL ROAD TANK	\$120,000	36.50%	46.38%	14.00%	2.51%	0.60%
Water Tank	TK-208 - SPRING LANE TANK #2	\$3,000,000	54.80%	37.84%	6.57%	0.62%	0.14%
Water Tank	TK-209 - FAIRHILLS TOP TANK #2	\$120,000	42.15%	44.54%	11.33%	1.58%	0.37%
Water Tank	TK-210 - BEACON HILL TANK	\$200,000	37.52%	39.64%	10.08%	10.17%	2.56%
Water Tank	TK-211 - Kent Fire Trail Tank #1	\$200,000	29.20%	37.10%	11.20%	17.90%	4.57%
Water Tank	TK-212 - Kent Fire Trail Tank #2	\$200,000	29.20%	37.10%	11.20%	17.90%	4.57%
Water Tank	TK-213 - MARIN CITY TANK	\$400,000	23.89%	35.97%	12.75%	21.79%	5.57%
Water Tank	TK-214 - SLIDE GULCH TANK	\$194,348	23.89%	35.97%	12.75%	21.79%	5.57%
Water Tank	TK-215 - SEQUOIA PARK TANK #1	\$220,000	31.61%	33.41%	8.50%	21.11%	5.35%
Water Tank	TK-216 - SEQUOIA PARK TANK #2	\$100,000	42.15%	44.54%	11.33%	1.58%	0.37%
Water Tank	TK-217 - KENT WOODLANDS 1ST LIFT TANK	\$200,000	36.50%	46.38%	14.00%	2.51%	0.60%
Water Tank	TK-218 - MOUNT TIBURON TANK #2	\$1,180,000	41.10%	28.38%	4.93%	20.43%	5.13%
Water Tank	TK-219 - OAK MANOR FIRST LIFT TANK	\$200,000	31.61%	33.41%	8.50%	21.11%	5.35%
Water Tank	TK-220 - TAM WOODS TOP TANK	\$160,000	20.55%	36.23%	14.95%	22.46%	5.78%
Water Tank	TK-221 - SUMMIT AVENUE LOWER TANK	\$200,000	31.85%	47.97%	17.01%	2.55%	0.60%
Water Tank	TK-222 - FRIAR TUCK LANE TANK	\$250,000	50.12%	26.95%	3.77%	15.29%	3.84%
Water Tank	TK-223 - CASCADE TANK #1	\$120,000	31.85%	47.97%	17.01%	2.55%	0.60%
Water Tank	TK-224 - CASCADE TANK #2	\$120,000	31.85%	47.97%	17.01%	2.55%	0.60%
Water Tank	TK-225 - SUGARLOAF TANK #1	\$254,000	41.10%	28.38%	4.93%	20.43%	5.13%
Water Tank	TK-226 - SUGARLOAF TANK #2	\$254,000	41.10%	28.38%	4.93%	20.43%	5.13%
Water Tank	TK-228 - GLENWOOD FOREST TANK	\$180,000	41.10%	28.38%	4.93%	20.43%	5.13%
Water Tank	TK-229 - KENT FIRE TRAIL TOP TANK	\$20,000	27.37%	34.78%	10.50%	21.76%	5.57%
Water Tank	TK-230 - SWIG TANK	\$100,000	38.39%	33.14%	7.01%	17.09%	4.34%
Water Tank	TK-232 - SKY RANCH TANK	\$240,000	23.05%	47.05%	22.41%	6.01%	1.45%
Water Tank	TK-233 - FAIRFAX MANOR TOP TANK	\$216,000	23.89%	35.97%	12.75%	21.79%	5.57%
Water Tank	TK-234 - TAM WOODS FIRST LIFT TANK	\$170,000	21.93%	38.65%	15.94%	18.67%	4.79%
Water Tank	TK-235 - FAIRVIEW PARK TANK	\$200,000	20.79%	36.65%	15.12%	21.84%	5.57%
Water Tank	TK-236 - FERN CANYON TANK	\$60,000	23.89%	35.97%	12.75%	21.79%	5.57%
Water Tank	TK-237 - CONIFER WAY UPPER TANK	\$200,000	17.85%	36.46%	17.36%	22.52%	5.78%
Water Tank	TK-238 - OAK AVENUE TANK	\$200,000	27.37%	34.78%	10.50%	21.76%	5.57%
Water Tank	TK-239 - ELINOR AVE TANK	\$226,000	27.37%	34.78%	10.50%	21.76%	5.57%
Water Tank	TK-240 - Summit Ave Upper Tank	\$240,000	25.49%	38.38%	13.60%	17.94%	4.57%
Water Tank	TK-241 - LAGUNITAS PICNIC GROUNDS TANK	\$1,100	56.90%	19.54%	0.25%	18.50%	4.79%
Water Tank	TK-243 - MARINER HIGHLANDS TANK	\$120,000	27.69%	35.18%	10.62%	21.13%	5.35%
Water Tank	TK-244 - UPPER ROAD TANK	\$80,000	27.37%	34.78%	10.50%	21.76%	5.57%
AVERAGE			16.26%	22.39%	27.49%	27.87%	5.96%

Type	Facility Name	Nonstructural Acceleration-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Water Tank	TK-184 - PACHECO RIDGE TANK #1					
Water Tank	TK-185 - PACHECO RIDGE TANK #2					
Water Tank	TK-186 - SAN GERONIMO CLEARWELL TANK #2					
Water Tank	TK-187 - MANZANITA TANK					
Water Tank	TK-188 - WOLFBACK RIDGE TANK #1					
Water Tank	TK-189 - WOLFBACK RIDGE TANK #2					
Water Tank	TK-190 - INVERNESS DRIVE TANK					
Water Tank	TK-191 - LONE TREE AVENUE TANK					
Water Tank	TK-192 - VERNAL AVE TANK					
Water Tank	TK-193 - H-LINE ROAD TANK					
Water Tank	TK-195 - Fire Road Pressure Tank					
Water Tank	TK-196 - WILSON WAY TANK					
Water Tank	TK-197 - SUMMIT TRAIL TANK					
Water Tank	TK-198 - SCOTT TANKS					
Water Tank	TK-199 - SCOTT TANKS					
Water Tank	TK-200 - OAK WOODLANDS TANK #1					
Water Tank	TK-201 - OAK WOODLANDS TANK #2					
Water Tank	TK-202 - Fairfax Manor 1st Lift Tank					
Water Tank	TK-203 - MONTE MAR VISTA TANK					
Water Tank	TK-204 - Bay Road Tank					
Water Tank	TK-205 - RICHARDSON DRIVE (H/P) TANK					
Water Tank	TK-206 - SANTA VENETIA TANK					
Water Tank	TK-207 - GOODHILL ROAD TANK					
Water Tank	TK-208 - SPRING LANE TANK #2					
Water Tank	TK-209 - FAIRHILLS TOP TANK #2					
Water Tank	TK-210 - BEACON HILL TANK					
Water Tank	TK-211 - Kent Fire Trail Tank #1					
Water Tank	TK-212 - Kent Fire Trail Tank #2					
Water Tank	TK-213 - MARIN CITY TANK					
Water Tank	TK-214 - SLIDE GULCH TANK					
Water Tank	TK-215 - SEQUOIA PARK TANK #1					
Water Tank	TK-216 - SEQUOIA PARK TANK #2					
Water Tank	TK-217 - KENT WOODLANDS 1ST LIFT TANK					
Water Tank	TK-218 - MOUNT TIBURON TANK #2					
Water Tank	TK-219 - OAK MANOR FIRST LIFT TANK					
Water Tank	TK-220 - TAM WOODS TOP TANK					
Water Tank	TK-221 - SUMMIT AVENUE LOWER TANK					
Water Tank	TK-222 - FRIAR TUCK LANE TANK					
Water Tank	TK-223 - CASCADE TANK #1					
Water Tank	TK-224 - CASCADE TANK #2					
Water Tank	TK-225 - SUGARLOAF TANK #1					
Water Tank	TK-226 - SUGARLOAF TANK #2					
Water Tank	TK-228 - GLENWOOD FOREST TANK					
Water Tank	TK-229 - KENT FIRE TRAIL TOP TANK					
Water Tank	TK-230 - SWIG TANK					
Water Tank	TK-232 - SKY RANCH TANK					
Water Tank	TK-233 - FAIRFAX MANOR TOP TANK					
Water Tank	TK-234 - TAM WOODS FIRST LIFT TANK					
Water Tank	TK-235 - FAIRVIEW PARK TANK					
Water Tank	TK-236 - FERN CANYON TANK					
Water Tank	TK-237 - CONIFER WAY UPPER TANK					
Water Tank	TK-238 - OAK AVENUE TANK					
Water Tank	TK-239 - ELINOR AVE TANK					
Water Tank	TK-240 - Summit Ave Upper Tank					
Water Tank	TK-241 - LAGUNITAS PICNIC GROUNDS TANK					
Water Tank	TK-243 - MARINER HIGHLANDS TANK					
Water Tank	TK-244 - UPPER ROAD TANK					
<b>AVERAGE</b>		<b>20.54%</b>	<b>32.76%</b>	<b>18.56%</b>	<b>22.80%</b>	<b>5.32%</b>

Type	Facility Name	Nonstructural Drift-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Water Tank	TK-184 - PACHECO RIDGE TANK #1					
Water Tank	TK-185 - PACHECO RIDGE TANK #2					
Water Tank	TK-186 - SAN GERONIMO CLEARWELL TANK #2					
Water Tank	TK-187 - MANZANITA TANK					
Water Tank	TK-188 - WOLFBACK RIDGE TANK #1					
Water Tank	TK-189 - WOLFBACK RIDGE TANK #2					
Water Tank	TK-190 - INVERNESS DRIVE TANK					
Water Tank	TK-191 - LONE TREE AVENUE TANK					
Water Tank	TK-192 - VERNAL AVE TANK					
Water Tank	TK-193 - H-LINE ROAD TANK					
Water Tank	TK-195 - Fire Road Pressure Tank					
Water Tank	TK-196 - WILSON WAY TANK					
Water Tank	TK-197 - SUMMIT TRAIL TANK					
Water Tank	TK-198 - SCOTT TANKS					
Water Tank	TK-199 - SCOTT TANKS					
Water Tank	TK-200 - OAK WOODLANDS TANK #1					
Water Tank	TK-201 - OAK WOODLANDS TANK #2					
Water Tank	TK-202 - Fairfax Manor 1st Lift Tank					
Water Tank	TK-203 - MONTE MAR VISTA TANK					
Water Tank	TK-204 - Bay Road Tank					
Water Tank	TK-205 - RICHARDSON DRIVE (H/P) TANK					
Water Tank	TK-206 - SANTA VENETIA TANK					
Water Tank	TK-207 - GOODHILL ROAD TANK					
Water Tank	TK-208 - SPRING LANE TANK #2					
Water Tank	TK-209 - FAIRHILLS TOP TANK #2					
Water Tank	TK-210 - BEACON HILL TANK					
Water Tank	TK-211 - Kent Fire Trail Tank #1					
Water Tank	TK-212 - Kent Fire Trail Tank #2					
Water Tank	TK-213 - MARIN CITY TANK					
Water Tank	TK-214 - SLIDE GULCH TANK					
Water Tank	TK-215 - SEQUOIA PARK TANK #1					
Water Tank	TK-216 - SEQUOIA PARK TANK #2					
Water Tank	TK-217 - KENT WOODLANDS 1ST LIFT TANK					
Water Tank	TK-218 - MOUNT TIBURON TANK #2					
Water Tank	TK-219 - OAK MANOR FIRST LIFT TANK					
Water Tank	TK-220 - TAM WOODS TOP TANK					
Water Tank	TK-221 - SUMMIT AVENUE LOWER TANK					
Water Tank	TK-222 - FRIAR TUCK LANE TANK					
Water Tank	TK-223 - CASCADE TANK #1					
Water Tank	TK-224 - CASCADE TANK #2					
Water Tank	TK-225 - SUGARLOAF TANK #1					
Water Tank	TK-226 - SUGARLOAF TANK #2					
Water Tank	TK-228 - GLENWOOD FOREST TANK					
Water Tank	TK-229 - KENT FIRE TRAIL TOP TANK					
Water Tank	TK-230 - SWIG TANK					
Water Tank	TK-232 - SKY RANCH TANK					
Water Tank	TK-233 - FAIRFAX MANOR TOP TANK					
Water Tank	TK-234 - TAM WOODS FIRST LIFT TANK					
Water Tank	TK-235 - FAIRVIEW PARK TANK					
Water Tank	TK-236 - FERN CANYON TANK					
Water Tank	TK-237 - CONIFER WAY UPPER TANK					
Water Tank	TK-238 - OAK AVENUE TANK					
Water Tank	TK-239 - ELINOR AVE TANK					
Water Tank	TK-240 - Summit Ave Upper Tank					
Water Tank	TK-241 - LAGUNITAS PICNIC GROUNDS TANK					
Water Tank	TK-243 - MARINER HIGHLANDS TANK					
Water Tank	TK-244 - UPPER ROAD TANK					
<b>AVERAGE</b>		<b>20.97%</b>	<b>29.56%</b>	<b>23.45%</b>	<b>20.78%</b>	<b>5.22%</b>



Type	Facility Name	Losses (in dollars)			
		Structure	Nonstructural Drift Sensitive	Nonstructural Acceleration-Sensitive	Total Building Loss
Water Tank	TK-184 - PACHECO RIDGE TANK #1	\$1,015,560			\$1,015,560
Water Tank	TK-185 - PACHECO RIDGE TANK #2	\$1,052,640			\$1,052,640
Water Tank	TK-186 - SAN GERONIMO CLEARWELL TANK #2	\$1,544,640			\$1,544,640
Water Tank	TK-187 - MANZANITA TANK	\$33,286			\$33,286
Water Tank	TK-188 - WOLFBACK RIDGE TANK #1	\$3,773			\$3,773
Water Tank	TK-189 - WOLFBACK RIDGE TANK #2	\$3,773			\$3,773
Water Tank	TK-190 - INVERNESS DRIVE TANK	\$57,240			\$57,240
Water Tank	TK-191 - LONE TREE AVENUE TANK	\$45,824			\$45,824
Water Tank	TK-192 - VERNAL AVE TANK	\$65,532			\$65,532
Water Tank	TK-193 - H-LINE ROAD TANK	\$238,430			\$238,430
Water Tank	TK-195 - Fire Road Pressure Tank	\$490			\$490
Water Tank	TK-196 - WILSON WAY TANK	\$13,050			\$13,050
Water Tank	TK-197 - SUMMIT TRAIL TANK	\$16,965			\$16,965
Water Tank	TK-198 - SCOTT TANKS	\$8,496			\$8,496
Water Tank	TK-199 - SCOTT TANKS	\$8,496			\$8,496
Water Tank	TK-200 - OAK WOODLANDS TANK #1	\$44,029			\$44,029
Water Tank	TK-201 - OAK WOODLANDS TANK #2	\$34,332			\$34,332
Water Tank	TK-202 - Fairfax Manor 1st Lift Tank	\$8,942			\$8,942
Water Tank	TK-203 - MONTE MAR VISTA TANK	\$9,167			\$9,167
Water Tank	TK-204 - Bay Road Tank	\$99,581			\$99,581
Water Tank	TK-205 - RICHARDSON DRIVE (H/P) TANK	\$105			\$105
Water Tank	TK-206 - SANTA VENETIA TANK	\$27,950			\$27,950
Water Tank	TK-207 - GOODHILL ROAD TANK	\$7,830			\$7,830
Water Tank	TK-208 - SPRING LANE TANK #2	\$101,685			\$101,685
Water Tank	TK-209 - FAIRHILLS TOP TANK #2	\$6,293			\$6,293
Water Tank	TK-210 - BEACON HILL TANK	\$24,312			\$24,312
Water Tank	TK-211 - Kent Fire Trail Tank #1	\$37,690			\$37,690
Water Tank	TK-212 - Kent Fire Trail Tank #2	\$37,690			\$37,690
Water Tank	TK-213 - MARIN CITY TANK	\$89,420			\$89,420
Water Tank	TK-214 - SLIDE GULCH TANK	\$43,446			\$43,446
Water Tank	TK-215 - SEQUOIA PARK TANK #1	\$46,115			\$46,115
Water Tank	TK-216 - SEQUOIA PARK TANK #2	\$5,245			\$5,245
Water Tank	TK-217 - KENT WOODLANDS 1ST LIFT TANK	\$13,050			\$13,050
Water Tank	TK-218 - MOUNT TIBURON TANK #2	\$230,649			\$230,649
Water Tank	TK-219 - OAK MANOR FIRST LIFT TANK	\$41,923			\$41,923
Water Tank	TK-220 - TAM WOODS TOP TANK	\$37,296			\$37,296
Water Tank	TK-221 - SUMMIT AVENUE LOWER TANK	\$14,160			\$14,160
Water Tank	TK-222 - FRIAR TUCK LANE TANK	\$37,318			\$37,318
Water Tank	TK-223 - CASCADE TANK #1	\$8,496			\$8,496
Water Tank	TK-224 - CASCADE TANK #2	\$8,496			\$8,496
Water Tank	TK-225 - SUGARLOAF TANK #1	\$49,648			\$49,648
Water Tank	TK-226 - SUGARLOAF TANK #2	\$49,648			\$49,648
Water Tank	TK-228 - GLENWOOD FOREST TANK	\$35,184			\$35,184
Water Tank	TK-229 - KENT FIRE TRAIL TOP TANK	\$4,388			\$4,388
Water Tank	TK-230 - SWIG TANK	\$17,303			\$17,303
Water Tank	TK-232 - SKY RANCH TANK	\$25,848			\$25,848
Water Tank	TK-233 - FAIRFAX MANOR TOP TANK	\$48,287			\$48,287
Water Tank	TK-234 - TAM WOODS FIRST LIFT TANK	\$34,536			\$34,536
Water Tank	TK-235 - FAIRVIEW PARK TANK	\$45,549			\$45,549
Water Tank	TK-236 - FERN CANYON TANK	\$13,413			\$13,413
Water Tank	TK-237 - CONIFER WAY UPPER TANK	\$47,438			\$47,438
Water Tank	TK-238 - OAK AVENUE TANK	\$43,880			\$43,880
Water Tank	TK-239 - ELINOR AVE TANK	\$49,584			\$49,584
Water Tank	TK-240 - Summit Ave Upper Tank	\$46,303			\$46,303
Water Tank	TK-241 - LAGUNITAS PICNIC GROUNDS TANK	\$186			\$186
Water Tank	TK-243 - MARINER HIGHLANDS TANK	\$25,656			\$25,656
Water Tank	TK-244 - UPPER ROAD TANK	\$17,552			\$17,552
<b>AVERAGE</b>		<b>\$176,405,460</b>	<b>\$20,293</b>	<b>\$24,237</b>	<b>\$176,449,990</b>

Type	Facility Name	Functionality (%)					
		At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Water Tank	TK-184 - PACHECO RIDGE TANK #1	47.40	76.50	82.50	83.80	84.70	89.30
Water Tank	TK-185 - PACHECO RIDGE TANK #2	43.80	74.80	82.10	83.70	84.70	89.20
Water Tank	TK-186 - SAN GERONIMO CLEARWELL TANK #2	38.70	64.90	71.40	73.10	74.60	82.10
Water Tank	TK-187 - MANZANITA TANK	26.20	54.80	70.80	74.00	75.50	82.80
Water Tank	TK-188 - WOLFBACK RIDGE TANK #1	46.50	85.50	96.10	97.90	98.00	98.60
Water Tank	TK-189 - WOLFBACK RIDGE TANK #2	46.50	85.50	96.10	97.90	98.00	98.60
Water Tank	TK-190 - INVERNESS DRIVE TANK	48.20	72.90	77.30	78.50	79.70	85.70
Water Tank	TK-191 - LONE TREE AVENUE TANK	31.20	63.10	76.70	79.40	80.60	86.40
Water Tank	TK-192 - VERNAL AVE TANK	36.00	76.20	93.10	96.10	96.30	97.40
Water Tank	TK-193 - H-LINE ROAD TANK	35.10	65.00	74.60	76.70	78.00	84.50
Water Tank	TK-195 - Fire Road Pressure Tank	32.60	62.90	74.10	76.50	77.80	84.40
Water Tank	TK-196 - WILSON WAY TANK	54.20	90.00	96.20	97.30	97.50	98.20
Water Tank	TK-197 - SUMMIT TRAIL TANK	54.20	90.00	96.20	97.30	97.50	98.20
Water Tank	TK-198 - SCOTT TANKS	50.70	88.50	96.00	97.30	97.50	98.20
Water Tank	TK-199 - SCOTT TANKS	50.70	88.50	96.00	97.30	97.50	98.20
Water Tank	TK-200 - OAK WOODLANDS TANK #1	57.90	76.10	77.90	78.60	79.80	85.80
Water Tank	TK-201 - OAK WOODLANDS TANK #2	61.70	81.50	83.30	83.90	84.90	89.30
Water Tank	TK-202 - Fairfax Manor 1st Lift Tank	41.30	69.70	75.60	77.10	78.40	84.80
Water Tank	TK-203 - MONTE MAR VISTA TANK	47.60	86.80	95.70	97.20	97.40	98.20
Water Tank	TK-204 - Bay Road Tank	18.20	32.10	50.10	54.10	56.90	70.50
Water Tank	TK-205 - RICHARDSON DRIVE (H/P) TANK	58.60	92.40	97.40	98.30	98.40	98.80
Water Tank	TK-206 - SANTA VENETIA TANK	59.10	93.30	98.40	99.30	99.30	99.50
Water Tank	TK-207 - GOODHILL ROAD TANK	54.20	90.00	96.20	97.30	97.50	98.20
Water Tank	TK-208 - SPRING LANE TANK #2	68.00	95.90	98.80	99.30	99.30	99.50
Water Tank	TK-209 - FAIRHILLS TOP TANK #2	58.60	92.40	97.40	98.30	98.40	98.80
Water Tank	TK-210 - BEACON HILL TANK	53.60	83.70	88.30	89.30	89.90	92.90
Water Tank	TK-211 - Kent Fire Trail Tank #1	46.00	74.70	79.90	81.20	82.20	87.50
Water Tank	TK-212 - Kent Fire Trail Tank #2	46.00	74.70	79.90	81.20	82.20	87.50
Water Tank	TK-213 - MARIN CITY TANK	41.30	69.70	75.60	77.10	78.40	84.80
Water Tank	TK-214 - SLIDE GULCH TANK	41.30	69.70	75.60	77.10	78.40	84.80
Water Tank	TK-215 - SEQUOIA PARK TANK #1	47.20	72.70	76.70	77.80	79.10	85.30
Water Tank	TK-216 - SEQUOIA PARK TANK #2	58.60	92.40	97.40	98.30	98.40	98.80
Water Tank	TK-217 - KENT WOODLANDS 1ST LIFT TANK	54.20	90.00	96.20	97.30	97.50	98.20
Water Tank	TK-218 - MOUNT TIBURON TANK #2	54.20	75.30	77.70	78.60	79.80	85.80
Water Tank	TK-219 - OAK MANOR FIRST LIFT TANK	47.20	72.70	76.70	77.80	79.10	85.30
Water Tank	TK-220 - TAM WOODS TOP TANK	38.70	67.80	74.70	76.30	77.70	84.30
Water Tank	TK-221 - SUMMIT AVENUE LOWER TANK	50.70	88.50	96.00	97.30	97.50	98.20
Water Tank	TK-222 - FRIAR TUCK LANE TANK	61.70	81.50	83.30	83.90	84.90	89.30
Water Tank	TK-223 - CASCADE TANK #1	50.70	88.50	96.00	97.30	97.50	98.20
Water Tank	TK-224 - CASCADE TANK #2	50.70	88.50	96.00	97.30	97.50	98.20
Water Tank	TK-225 - SUGARLOAF TANK #1	54.20	75.30	77.70	78.60	79.80	85.80
Water Tank	TK-226 - SUGARLOAF TANK #2	54.20	75.30	77.70	78.60	79.80	85.80
Water Tank	TK-228 - GLENWOOD FOREST TANK	54.20	75.30	77.70	78.60	79.80	85.80
Water Tank	TK-229 - KENT FIRE TRAIL TOP TANK	43.90	70.90	75.80	77.10	78.40	84.80
Water Tank	TK-230 - SWIG TANK	52.90	77.80	81.10	82.00	83.10	88.10
Water Tank	TK-232 - SKY RANCH TANK	43.40	81.90	91.90	93.70	94.10	95.80
Water Tank	TK-233 - FAIRFAX MANOR TOP TANK	41.30	69.70	75.60	77.10	78.40	84.80
Water Tank	TK-234 - TAM WOODS FIRST LIFT TANK	40.40	71.50	78.70	80.30	81.50	87.00
Water Tank	TK-235 - FAIRVIEW PARK TANK	39.00	68.50	75.40	77.00	78.30	84.80
Water Tank	TK-236 - FERN CANYON TANK	41.30	69.70	75.60	77.10	78.40	84.80
Water Tank	TK-237 - CONIFER WAY UPPER TANK	36.60	66.50	74.50	76.30	77.60	84.30
Water Tank	TK-238 - OAK AVENUE TANK	43.90	70.90	75.80	77.10	78.40	84.80
Water Tank	TK-239 - ELINOR AVE TANK	43.90	70.90	75.80	77.10	78.40	84.80
Water Tank	TK-240 - Summit Ave Upper Tank	43.20	73.50	79.70	81.10	82.20	87.50
Water Tank	TK-241 - LAGUNITAS PICNIC GROUNDS TANK	66.00	79.70	80.00	80.50	81.60	87.00
Water Tank	TK-243 - MARINER HIGHLANDS TANK	44.30	71.60	76.50	77.80	79.10	85.30
Water Tank	TK-244 - UPPER ROAD TANK	43.90	70.90	75.80	77.10	78.40	84.80
AVERAGE		35.48	56.26	70.03	75.56	82.49	89.58

			Structural - Probability of Damage				
Type	Facility Name	Structure Replacement Cost	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Pump Station	PS-049 - Channing Way Pump Station	\$1,000,000	0.40%	2.81%	26.44%	58.52%	11.81%
Pump Station	PS-111 - Quail Hill Pump Station	\$1,000,000	25.14%	36.26%	34.26%	3.91%	0.40%
Pump Station	PS-112 - Freitas Parkway Pump Station	\$1,000,000	62.75%	31.02%	4.30%	1.53%	0.37%
Water Tank	TK-103 - TERRA LINDA TANK #1	\$1,000,000	0.61%	3.34%	30.01%	55.96%	10.05%
Water Tank	TK-170 - TERRA LINDA TANK #2	\$1,000,000	4.44%	17.16%	42.40%	30.49%	5.48%
Water Tank	TK-227 - LGWRP Clearwell	\$1,800,000	28.01%	35.60%	10.75%	20.48%	5.13%
<b>AVERAGE</b>			<b>20.23%</b>	<b>21.03%</b>	<b>24.69%</b>	<b>28.48%</b>	<b>5.54%</b>

		Nonstructural Acceleration-Sensitive - Probability of Damage				
Type	Facility Name	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Pump Station	PS-049 - Channing Way Pump Station					
Pump Station	PS-111 - Quail Hill Pump Station					
Pump Station	PS-112 - Freitas Parkway Pump Station					
Water Tank	TK-103 - TERRA LINDA TANK #1					
Water Tank	TK-170 - TERRA LINDA TANK #2					
Water Tank	TK-227 - LGWRP Clearwell					
<b>AVERAGE</b>		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Type	Facility Name	Nonstructural Drift-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Pump Station	PS-049 - Channing Way Pump Station					
Pump Station	PS-111 - Quail Hill Pump Station					
Pump Station	PS-112 - Freitas Parkway Pump Station					
Water Tank	TK-103 - TERRA LINDA TANK #1					
Water Tank	TK-170 - TERRA LINDA TANK #2					
Water Tank	TK-227 - LGWRP Clearwell					
<b>AVERAGE</b>		<b>#DIV/0!</b>	<b>#DIV/0!</b>	<b>#DIV/0!</b>	<b>#DIV/0!</b>	<b>#DIV/0!</b>

Type	Facility Name	Losses (in dollars)			
		Structure	Nonstructural Drift-Sensitive	Nonstructural Acceleration- Sensitive	Total Building Loss
Pump Station	PS-049 - Channing Way Pump Station	\$510,285			\$510,285
Pump Station	PS-111 - Quail Hill Pump Station	\$96,980			\$96,980
Pump Station	PS-112 - Freitas Parkway Pump Station	\$34,840			\$34,840
Water Tank	TK-103 - TERRA LINDA TANK #1	\$482,945			\$482,945
Water Tank	TK-170 - TERRA LINDA TANK #2	\$309,920			\$309,920
Water Tank	TK-227 - LGWRP Clearwell	\$374,589			\$374,589
<b>AVERAGE</b>		<b>\$1,809,559</b>	<b>\$0</b>	<b>\$0</b>	<b>\$1,809,559</b>

Type	Facility Name	Functionality (%)					
		At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Pump Station	PS-049 - Channing Way Pump Station	6.60	20.40	36.70	46.20	75.80	98.10
Pump Station	PS-111 - Quail Hill Pump Station	40.50	78.50	96.00	96.70	98.70	99.90
Pump Station	PS-112 - Freitas Parkway Pump Station	73.50	95.70	98.20	98.50	99.20	99.90
Water Tank	TK-103 - TERRA LINDA TANK #1	17.00	27.60	41.50	45.00	48.20	64.10
Water Tank	TK-170 - TERRA LINDA TANK #2	23.70	47.10	66.10	70.00	71.80	80.40
Water Tank	TK-227 - LGWRP Clearwell	44.70	72.30	77.30	78.50	79.80	85.80
<b>AVERAGE</b>		<b>34.33</b>	<b>56.93</b>	<b>69.30</b>	<b>72.48</b>	<b>78.92</b>	<b>88.03</b>



Replacement Cost	Total Number of Leaks	Total Number of Breaks	Total Number of Repairs	Days to Repair Leaks	Days to Repair Breaks	Total Days of Repairs	Economic Loss
\$3,215,180,970	202.9	50.7	253.6	29.0	7.2	36.2	\$1,268,055

Replacement Cost	Total Number of Leaks	Total Number of Breaks	Total Number of Repairs	Days to Repair Leaks	Days to Repair Breaks	Total Days of Repairs	Economic Loss
\$90,567,746	2.6	0.6	3.2	0.4	0.1	0.5	\$16,171

			Structural - Probability of Damage				
Type	Facility Name	Structure Replacement Cost	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Building	Administration Building - Headquarter Office	\$8,192,293	1.49%	23.48%	65.27%	9.25%	0.49%
Building	Corporation Yard - Boat Barn	\$1,000,000	1.12%	17.73%	49.28%	26.51%	5.34%
Building	Corporation Yard - Facilities Offices	\$15,000,000	1.49%	23.48%	65.27%	9.25%	0.49%
Building	Corporation Yard - Laboratory	\$5,000,000	60.99%	35.90%	2.42%	0.54%	0.13%
Building	Corporation Yard - Satellite Office	\$500,000	0.91%	10.97%	43.67%	38.03%	6.40%
Building	Pelican Yard - Vehicle Storage	\$500,000	40.96%	30.49%	3.52%	20.01%	5.00%
Building	Pelican Yard - Vehicle Storage	\$750,000	40.96%	30.49%	3.52%	20.01%	5.00%
Building	Ranger Housing - Alpine Dam - Residence	\$500,000	2.64%	19.84%	49.66%	24.02%	3.81%
Building	Ranger Housing - Lagunitas Dam	\$250,000	63.72%	32.44%	2.04%	1.42%	0.35%
Building	Ranger Housing - Lagunitas Dam	\$500,000	64.87%	33.02%	2.08%	0.01%	0.00%
Building	Ranger Housing - Phoenix Dam - Residence	\$500,000	68.65%	28.10%	1.47%	1.41%	0.35%
Building	Ranger Housing - Phoenix Dam - Shed	\$46,514	39.09%	31.10%	3.45%	21.00%	5.33%
Building	Ranger Housing - Portius House	\$500,000	83.43%	14.72%	0.07%	1.41%	0.35%
Building	Ranger Housing - Portius House - Garage	\$236,142	69.57%	9.23%	0.05%	16.85%	4.28%
Building	Ranger Housing - Portius House - Shed	\$99,111	39.09%	31.10%	3.45%	21.00%	5.33%
Building	Ranger Housing - Portius House - Shed	\$47,981	39.09%	31.10%	3.45%	21.00%	5.33%
Building	Ranger Housing - Sky Oaks - Residence	\$500,000	51.16%	26.04%	1.64%	16.86%	4.28%
Building	Ranger Housing - Soulajule Residence	\$500,000	95.13%	4.81%	0.05%	0.00%	0.00%
Building	Sky Oaks Headquarters - Entrance Kiosk	\$23,793	55.09%	31.31%	2.87%	8.55%	2.16%
Building	Sky Oaks Headquarters - Fisheries Office	\$272,737	12.62%	39.37%	43.00%	4.62%	0.37%
Building	Sky Oaks Headquarters - Headquarter Office	\$1,500,000	35.99%	51.63%	10.53%	1.47%	0.35%
Building	Sky Oaks Headquarters - Seed Shed	\$83,465	28.89%	41.45%	8.45%	16.90%	4.28%
Building	Sky Oaks Headquarters - Storage Shed	\$131,768	35.99%	51.63%	10.53%	1.47%	0.35%
Building	Sky Oaks Headquarters - Watershed Office	\$676,918	12.62%	39.37%	43.00%	4.62%	0.37%
<b>Average or Total</b>			<b>39.40%</b>	<b>28.70%</b>	<b>17.45%</b>	<b>11.93%</b>	<b>2.51%</b>

Type	Facility Name	Nonstructural Acceleration-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Building	Administration Building - Headquarter Office	36.42%	42.14%	18.09%	2.91%	0.42%
Building	Corporation Yard - Boat Barn	27.49%	31.81%	13.66%	21.74%	5.27%
Building	Corporation Yard - Facilities Offices	36.42%	42.14%	18.09%	2.91%	0.42%
Building	Corporation Yard - Laboratory	38.72%	41.66%	16.83%	2.55%	0.21%
Building	Corporation Yard - Satellite Office	31.50%	27.51%	9.36%	25.27%	6.34%
Building	Pelican Yard - Vehicle Storage	31.86%	30.59%	11.25%	21.21%	5.05%
Building	Pelican Yard - Vehicle Storage	31.86%	30.59%	11.25%	21.21%	5.05%
Building	Ranger Housing - Alpine Dam - Residence	27.33%	35.36%	16.68%	16.76%	3.84%
Building	Ranger Housing - Lagunitas Dam	36.10%	41.78%	17.94%	3.71%	0.45%
Building	Ranger Housing - Lagunitas Dam	36.75%	42.53%	18.26%	2.34%	0.09%
Building	Ranger Housing - Phoenix Dam - Residence	38.14%	41.24%	16.73%	3.43%	0.43%
Building	Ranger Housing - Phoenix Dam - Shed	27.79%	31.16%	13.03%	22.59%	5.42%
Building	Ranger Housing - Portius House	74.27%	20.78%	3.03%	1.55%	0.35%
Building	Ranger Housing - Portius House - Garage	54.93%	20.17%	3.55%	17.03%	4.29%
Building	Ranger Housing - Portius House - Shed	27.79%	31.16%	13.03%	22.59%	5.42%
Building	Ranger Housing - Portius House - Shed	27.79%	31.16%	13.03%	22.59%	5.42%
Building	Ranger Housing - Sky Oaks - Residence	28.98%	33.54%	14.40%	18.68%	4.37%
Building	Ranger Housing - Soulajule Residence	75.73%	21.06%	3.05%	0.14%	0.00%
Building	Sky Oaks Headquarters - Entrance Kiosk	35.10%	37.36%	14.96%	10.31%	2.24%
Building	Sky Oaks Headquarters - Fisheries Office	43.67%	39.33%	13.73%	2.84%	0.40%
Building	Sky Oaks Headquarters - Headquarter Office	35.16%	42.00%	18.51%	3.85%	0.45%
Building	Sky Oaks Headquarters - Seed Shed	28.23%	33.72%	14.86%	18.79%	4.38%
Building	Sky Oaks Headquarters - Storage Shed	35.16%	42.00%	18.51%	3.85%	0.45%
Building	Sky Oaks Headquarters - Watershed Office	43.67%	39.33%	13.73%	2.84%	0.40%
<b>Average or Total</b>		<b>37.95%</b>	<b>34.59%</b>	<b>13.57%</b>	<b>11.32%</b>	<b>2.55%</b>

		Nonstructural Drift-Sensitive - Probability of Damage				
Type	Facility Name	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Building	Administration Building - Headquarter Office	2.57%	15.28%	61.93%	16.74%	3.45%
Building	Corporation Yard - Boat Barn	1.94%	11.54%	46.76%	31.59%	8.15%
Building	Corporation Yard - Facilities Offices	2.57%	15.28%	61.93%	16.74%	3.45%
Building	Corporation Yard - Laboratory	59.60%	31.44%	8.16%	0.64%	0.13%
Building	Corporation Yard - Satellite Office	1.71%	12.03%	41.26%	36.57%	8.40%
Building	Pelican Yard - Vehicle Storage	40.55%	25.34%	8.93%	20.15%	5.00%
Building	Pelican Yard - Vehicle Storage	40.55%	25.34%	8.93%	20.15%	5.00%
Building	Ranger Housing - Alpine Dam - Residence	4.18%	20.07%	46.83%	24.16%	4.73%
Building	Ranger Housing - Lagunitas Dam	61.99%	29.00%	7.16%	1.47%	0.35%
Building	Ranger Housing - Lagunitas Dam	63.11%	29.53%	7.29%	0.06%	0.00%
Building	Ranger Housing - Phoenix Dam - Residence	66.42%	26.09%	5.66%	1.45%	0.35%
Building	Ranger Housing - Phoenix Dam - Shed	38.85%	25.52%	9.16%	21.09%	5.35%
Building	Ranger Housing - Portius House	67.10%	26.24%	4.85%	1.44%	0.35%
Building	Ranger Housing - Portius House - Garage	57.47%	18.38%	2.98%	16.87%	4.28%
Building	Ranger Housing - Portius House - Shed	38.85%	25.52%	9.16%	21.09%	5.35%
Building	Ranger Housing - Portius House - Shed	38.85%	25.52%	9.16%	21.09%	5.35%
Building	Ranger Housing - Sky Oaks - Residence	49.77%	23.28%	5.75%	16.90%	4.28%
Building	Ranger Housing - Soulajule Residence	92.69%	6.76%	0.53%	0.00%	0.00%
Building	Sky Oaks Headquarters - Entrance Kiosk	53.89%	27.13%	8.14%	8.65%	2.16%
Building	Sky Oaks Headquarters - Fisheries Office	15.52%	36.17%	42.24%	5.53%	0.52%
Building	Sky Oaks Headquarters - Headquarter Office	37.31%	39.00%	21.40%	1.88%	0.39%
Building	Sky Oaks Headquarters - Seed Shed	29.95%	31.31%	17.18%	17.22%	4.31%
Building	Sky Oaks Headquarters - Storage Shed	37.31%	39.00%	21.40%	1.88%	0.39%
Building	Sky Oaks Headquarters - Watershed Office	15.52%	36.17%	42.24%	5.53%	0.52%
<b>Average or Total</b>		<b>38.26%</b>	<b>25.04%</b>	<b>20.79%</b>	<b>12.87%</b>	<b>3.01%</b>

Type	Facility Name	Losses (in dollars)			
		Structure	Nonstructural Drift-Sensitive	Nonstructural Acceleration- Sensitive	Total Building Loss
Building	Administration Building - Headquarter Office	\$189,744	\$494,082	\$153,016	\$836,842
Building	Corporation Yard - Boat Barn	\$77,081	\$76,146	\$56,899	\$210,127
Building	Corporation Yard - Facilities Offices	\$347,420	\$904,659	\$280,170	\$1,532,249
Building	Corporation Yard - Laboratory	\$13,319	\$31,855	\$82,529	\$127,702
Building	Corporation Yard - Satellite Office	\$28,767	\$51,034	\$36,863	\$116,664
Building	Pelican Yard - Vehicle Storage	\$25,786	\$21,845	\$27,114	\$74,745
Building	Pelican Yard - Vehicle Storage	\$38,679	\$32,768	\$40,671	\$112,118
Building	Ranger Housing - Alpine Dam - Residence	\$24,716	\$54,736	\$14,947	\$94,399
Building	Ranger Housing - Lagunitas Dam	\$1,143	\$2,976	\$2,775	\$6,894
Building	Ranger Housing - Lagunitas Dam	\$1,071	\$3,374	\$4,584	\$9,029
Building	Ranger Housing - Phoenix Dam - Residence	\$2,106	\$5,407	\$5,234	\$12,746
Building	Ranger Housing - Phoenix Dam - Shed	\$2,524	\$2,136	\$2,710	\$7,370
Building	Ranger Housing - Portius House	\$1,610	\$5,200	\$2,014	\$8,824
Building	Ranger Housing - Portius House - Garage	\$9,855	\$8,380	\$9,883	\$28,119
Building	Ranger Housing - Portius House - Shed	\$5,378	\$4,552	\$5,774	\$15,703
Building	Ranger Housing - Portius House - Shed	\$2,603	\$2,204	\$2,795	\$7,602
Building	Ranger Housing - Sky Oaks - Residence	\$15,710	\$34,427	\$16,067	\$66,203
Building	Ranger Housing - Soulajule Residence	\$126	\$471	\$994	\$1,591
Building	Sky Oaks Headquarters - Entrance Kiosk	\$337	\$616	\$859	\$1,812
Building	Sky Oaks Headquarters - Fisheries Office	\$4,061	\$7,432	\$4,401	\$15,894
Building	Sky Oaks Headquarters - Headquarter Office	\$9,224	\$21,238	\$30,547	\$61,008
Building	Sky Oaks Headquarters - Seed Shed	\$3,876	\$3,380	\$4,193	\$11,449
Building	Sky Oaks Headquarters - Storage Shed	\$1,315	\$1,505	\$2,340	\$5,160
Building	Sky Oaks Headquarters - Watershed Office	\$10,080	\$18,447	\$10,923	\$39,449
<b>Average or Total</b>		<b>\$816,530</b>	<b>\$1,788,869</b>	<b>\$798,300</b>	<b>\$3,403,699</b>

Type	Facility Name	Functionality (%)					
		At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Building	Administration Building - Headquarter Office	1.40	2.60	24.90	24.90	90.20	99.40
Building	Corporation Yard - Boat Barn	1.10	1.90	18.70	18.80	68.10	94.60
Building	Corporation Yard - Facilities Offices	1.40	2.60	24.90	24.90	90.20	99.40
Building	Corporation Yard - Laboratory	60.90	62.70	96.70	96.80	99.30	99.80
Building	Corporation Yard - Satellite Office	0.90	1.40	11.80	11.80	55.50	93.50
Building	Pelican Yard - Vehicle Storage	40.90	42.40	71.30	71.40	74.90	94.90
Building	Pelican Yard - Vehicle Storage	40.90	42.40	71.30	71.40	74.90	94.90
Building	Ranger Housing - Alpine Dam - Residence	2.60	3.50	22.40	22.40	72.10	96.10
Building	Ranger Housing - Lagunitas Dam	63.70	65.20	96.00	96.10	98.20	99.60
Building	Ranger Housing - Lagunitas Dam	64.80	66.40	97.70	97.80	99.90	99.90
Building	Ranger Housing - Phoenix Dam - Residence	68.60	69.90	96.60	96.70	98.20	99.60
Building	Ranger Housing - Phoenix Dam - Shed	39.00	40.50	70.10	70.10	73.60	94.60
Building	Ranger Housing - Portius House	83.40	84.10	98.10	98.10	98.20	99.60
Building	Ranger Housing - Portius House - Garage	69.50	70.00	78.70	78.80	78.80	95.70
Building	Ranger Housing - Portius House - Shed	39.00	40.50	70.10	70.10	73.60	94.60
Building	Ranger Housing - Portius House - Shed	39.00	40.50	70.10	70.10	73.60	94.60
Building	Ranger Housing - Sky Oaks - Residence	51.10	52.40	77.10	77.20	78.80	95.70
Building	Ranger Housing - Soulajule Residence	95.10	95.30	99.90	99.90	99.90	99.90
Building	Sky Oaks Headquarters - Entrance Kiosk	55.00	56.50	86.30	86.40	89.20	97.80
Building	Sky Oaks Headquarters - Fisheries Office	12.60	14.50	51.80	51.90	94.90	99.60
Building	Sky Oaks Headquarters - Headquarter Office	35.90	38.40	87.40	87.60	98.10	99.60
Building	Sky Oaks Headquarters - Seed Shed	28.80	30.80	70.20	70.30	78.70	95.60
Building	Sky Oaks Headquarters - Storage Shed	35.90	38.40	87.40	87.60	98.10	99.60
Building	Sky Oaks Headquarters - Watershed Office	12.60	14.50	51.80	51.90	94.90	99.60
<b>Average or Total</b>		<b>39.34</b>	<b>40.73</b>	<b>67.97</b>	<b>68.04</b>	<b>85.50</b>	<b>97.42</b>



Type	Facility Name	Structure Replacement Cost	Structural - Probability of Damage				
			No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Building	Alpine Dam Facility - Alum House	\$326,237	12.05%	44.57%	24.73%	14.88%	3.73%
Facility - Pump Station	Alpine Lake Facility - Aerator House		9.78%	21.29%	50.94%	17.74%	0.23%
Facility - Pump Station	Alpine Lake Facility - Pump House	\$1,000,000	23.77%	56.46%	19.56%	0.20%	0.00%
Facility - Pump Station	Kent Pump Facility - Power Supply	\$750,000	12.82%	18.92%	42.19%	22.99%	3.05%
Facility - Pump Station	Kent Pump Facility - Pump Station	\$2,000,000	12.07%	17.81%	39.71%	26.30%	4.10%
<b>AVERAGE</b>			<b>14.10%</b>	<b>31.81%</b>	<b>35.43%</b>	<b>16.42%</b>	<b>2.22%</b>

Type	Facility Name	Nonstructural Acceleration-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Building	Alpine Dam Facility - Alum House	20.42%	35.56%	21.66%	18.35%	3.98%
Facility - Pump Station	Alpine Lake Facility - Aerator House					
Facility - Pump Station	Alpine Lake Facility - Pump House					
Facility - Pump Station	Kent Pump Facility - Power Supply					
Facility - Pump Station	Kent Pump Facility - Pump Station					
<b>AVERAGE</b>		<b>20.42%</b>	<b>35.56%</b>	<b>21.66%</b>	<b>18.35%</b>	<b>3.98%</b>

		Nonstructural Drift-Sensitive - Probability of Damage				
Type	Facility Name	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Building	Alpine Dam Facility - Alum House	14.22%	30.40%	34.89%	16.51%	3.95%
Facility - Pump Station	Alpine Lake Facility - Aerator House					
Facility - Pump Station	Alpine Lake Facility - Pump House					
Facility - Pump Station	Kent Pump Facility - Power Supply					
Facility - Pump Station	Kent Pump Facility - Pump Station					
<b>AVERAGE</b>		<b>14.22%</b>	<b>30.40%</b>	<b>34.89%</b>	<b>16.51%</b>	<b>3.95%</b>

Type	Facility Name	Losses (in dollars)			
		Structure	Nonstructural Drift-Sensitive	Nonstructural Acceleration- Sensitive	Total Building Loss
Building	Alpine Dam Facility - Alum House	\$9,111	\$17,523	\$19,276	\$45,910
Facility - Pump Station	Alpine Lake Facility - Aerator House				
Facility - Pump Station	Alpine Lake Facility - Pump House	\$58,770			\$58,770
Facility - Pump Station	Kent Pump Facility - Power Supply	\$180,889			\$180,889
Facility - Pump Station	Kent Pump Facility - Pump Station	\$534,540			\$534,540
<b>AVERAGE</b>		<b>\$783,310</b>	<b>\$17,523</b>	<b>\$19,276</b>	<b>\$820,109</b>

Type	Facility Name	Functionality (%)					
		At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Building	Alpine Dam Facility - Alum House	12.00	14.10	56.40	56.60	81.30	96.20
Facility - Pump Station	Alpine Lake Facility - Aerator House	36.20	58.40	82.80	91.20	98.90	99.90
Facility - Pump Station	Alpine Lake Facility - Pump House	63.60	89.70	98.30	99.80	99.90	99.90
Facility - Pump Station	Kent Pump Facility - Power Supply	36.40	55.70	76.90	86.20	96.90	99.90
Facility - Pump Station	Kent Pump Facility - Pump Station	34.80	53.10	73.60	83.70	96.10	99.90
<b>AVERAGE</b>		<b>36.60</b>	<b>54.20</b>	<b>77.60</b>	<b>83.50</b>	<b>94.62</b>	<b>99.16</b>

Type	Facility Name	Structure Replacement Cost	Structural - Probability of Damage				
			No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Clarifier		22.47%	22.05%	25.42%	24.68%	5.35%
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Filter Plant	\$100,000,000	22.47%	22.05%	25.42%	24.68%	5.35%
Tank	Bon Tempe Treatment Plant - Wash Water Sup	\$1,500,000	24.05%	23.61%	27.21%	20.81%	4.30%
Facility - Water Treatment Plant	Ignacio Pump Station - Chemical Rooms		63.23%	18.83%	6.26%	9.35%	2.30%
Facility - Water Treatment Plant	Ignacio Pump Station - Control Room		4.35%	35.33%	46.14%	11.78%	2.38%
Facility - Water Treatment Plant	Ignacio Pump Station - Fluoride Storage Facility		4.35%	35.33%	46.14%	11.78%	2.38%
Facility - Water Treatment Plant	Ignacio Pump Station - Fuel Storage		64.97%	21.53%	1.94%	9.23%	2.30%
Facility - Water Treatment Plant	Ignacio Pump Station - Pumps	\$50,000,000	4.35%	35.33%	46.14%	11.78%	2.38%
Building	Phoenix Lake Facility - Boat Barn	\$383,300	39.09%	31.10%	3.45%	21.00%	5.33%
Pump Station	PS-001 - Federal Works Booster Pump Station	\$1,000,000	60.20%	29.71%	4.12%	4.76%	1.19%
Pump Station	PS-002 - Chapman Park Pump Station	\$1,000,000	9.71%	21.15%	50.60%	18.15%	0.36%
Pump Station	PS-003 - Summit Drive Pump Station PS-003	\$1,000,000	30.29%	29.74%	34.27%	5.52%	0.15%
Pump Station	PS-005 - H-Line Booster Station	\$1,000,000	25.06%	24.60%	28.36%	18.36%	3.60%
Pump Station	PS-006 - Madera Park Pump Station	\$1,000,000	11.45%	19.05%	34.97%	29.29%	5.21%
Pump Station	PS-007 - Mariner Highlands Pump Station	\$1,000,000	25.06%	24.60%	28.36%	18.36%	3.60%
Pump Station	PS-010 - Cascade Pump Station	\$1,000,000	13.07%	19.76%	33.15%	28.61%	5.40%
Pump Station	PS-011 - Fairfax Manor 1st Pump Station	\$1,000,000	7.20%	15.69%	37.53%	34.01%	5.55%
Pump Station	PS-012 - Fairfax Manor 2nd Lift Pump Station	\$1,000,000	13.07%	19.76%	33.15%	28.61%	5.40%
Pump Station	PS-013 - Oak Manor 1st Lift Pump Station	\$1,000,000	22.73%	22.31%	25.71%	24.09%	5.14%
Pump Station	PS-014 - Oak Manor 2nd Lift Pump Station	\$1,000,000	22.73%	22.31%	25.71%	24.09%	5.14%
Pump Station	PS-016 - Scott Pump Station	\$1,000,000	12.93%	19.54%	32.79%	29.12%	5.60%
Pump Station	PS-017 - Smith Saddle Booster Station	\$1,000,000	22.73%	22.31%	25.71%	24.09%	5.14%
Pump Station	PS-019 - Bret Harte Pump Station	\$1,000,000	36.88%	21.04%	16.15%	21.01%	4.90%
Pump Station	PS-020 - Greenbrae Pump Station	\$1,000,000	22.73%	22.31%	25.71%	24.09%	5.14%
Pump Station	PS-022 - Ignacio Boosters	\$1,000,000	40.13%	30.80%	16.92%	9.82%	2.30%
Pump Station	PS-023 - Kent Fire Trail 1st Pump Station	\$1,000,000	25.06%	24.60%	28.36%	18.36%	3.60%
Pump Station	PS-025 - Kent Woodlands 2nd Pump Station	\$1,000,000	30.29%	29.74%	34.27%	5.52%	0.15%
Pump Station	PS-026 - Lagunitas Booster Station	\$1,000,000	13.30%	20.11%	33.74%	27.76%	5.06%
Pump Station	PS-029 - Phoenix Lake Barge Pump	\$1,000,000	68.15%	26.92%	3.13%	1.43%	0.35%
Pump Station	PS-030 - Phoenix Transfer Pump Station	\$1,000,000	50.42%	32.10%	15.25%	1.86%	0.35%
Pump Station	PS-031 - Soulajule Pump Station	\$1,000,000	82.17%	10.29%	1.78%	4.60%	1.14%
Pump Station	PS-032 - Elinor Avenue Pump Station	\$1,000,000	25.06%	24.60%	28.36%	18.36%	3.60%
Pump Station	PS-033 - Fern Canyon Pump Station	\$1,000,000	22.47%	22.05%	25.42%	24.68%	5.35%
Pump Station	PS-034 - Lapachet Pump Station	\$1,000,000	24.05%	23.61%	27.21%	20.81%	4.30%
Pump Station	PS-035 - Mine Ridge Pump Station	\$1,000,000	29.96%	29.41%	33.89%	6.35%	0.37%
Pump Station	PS-036 - Scott Highlands Pump (OUT OF SERVICE)	\$1,000,000	26.90%	22.32%	22.51%	23.11%	5.13%
Pump Station	PS-040 - Summit Avenue Upper Pump Station	\$1,000,000	24.05%	23.61%	27.21%	20.81%	4.30%
Pump Station	PS-042 - Del Mesa Pump Station	\$1,000,000	30.29%	29.74%	34.27%	5.52%	0.15%
Pump Station	PS-043 - Fawn Drive Pump Station	\$1,000,000	25.06%	24.60%	28.36%	18.36%	3.60%
Pump Station	PS-044 - Mann Pump Station	\$1,000,000	4.12%	12.30%	41.11%	37.55%	4.90%
Pump Station	PS-046 - Scenic Avenue Pump Station	\$1,000,000	32.92%	36.55%	27.30%	2.83%	0.37%
Pump Station	PS-047 - Sequoia Park Pump Station	\$1,000,000	25.06%	24.60%	28.36%	18.36%	3.60%
Pump Station	PS-050 - Chula Vista Pump Station	\$1,000,000	25.06%	24.60%	28.36%	18.36%	3.60%
Pump Station	PS-052 - Elda Drive Pump Station	\$1,000,000	13.22%	19.98%	33.53%	28.06%	5.18%
Pump Station	PS-053 - Fairhills 1st Lift Pump Station	\$1,000,000	29.67%	24.61%	24.82%	17.28%	3.59%
Pump Station	PS-054 - Fairhills 2nd Lift Pump Station	\$1,000,000	29.67%	24.61%	24.82%	17.28%	3.59%
Pump Station	PS-055 - Grove Hill Pump Station	\$1,000,000	30.29%	29.74%	34.27%	5.52%	0.15%
Pump Station	PS-056 - Rafael Highlands Pump Station	\$1,000,000	63.05%	26.66%	9.43%	0.71%	0.13%
Pump Station	PS-057 - Hind Pump Station	\$1,000,000	58.94%	22.57%	13.40%	4.21%	0.84%
Pump Station	PS-058 - Knight Drive Pump Station	\$1,000,000	50.82%	19.46%	11.56%	14.66%	3.48%
Pump Station	PS-060 - Lockwood Drive Pump Station	\$1,000,000	46.46%	17.79%	10.56%	20.26%	4.90%
Pump Station	PS-061 - Lucas Valley Pump Station	\$1,000,000	60.78%	25.70%	9.09%	3.57%	0.84%
Pump Station	PS-062 - Manderly Pump Station	\$1,000,000	46.46%	17.79%	10.56%	20.26%	4.90%
Pump Station	PS-064 - Marinwood Pump Station (NOT IN USE)	\$1,000,000	52.47%	17.58%	5.33%	19.69%	4.90%
Pump Station	PS-065 - McNear Drive Pump Station	\$1,000,000	36.88%	21.04%	16.15%	21.01%	4.90%
Pump Station	PS-066 - Mesa Vista Pump Station	\$1,000,000	22.73%	22.31%	25.71%	24.09%	5.14%
Pump Station	PS-069 - San Quentin Pump Station	\$1,000,000	39.30%	25.02%	11.89%	19.09%	4.68%
Pump Station	PS-070 - Santa Margarita Pump Station	\$1,000,000	42.89%	22.29%	9.11%	20.57%	5.12%
Pump Station	PS-071 - Sky View Terrace Pump Station	\$1,000,000	22.73%	22.31%	25.71%	24.09%	5.14%
Pump Station	PS-073 - Swig Pump Station	\$1,000,000	36.41%	20.77%	15.94%	21.73%	5.12%
Pump Station	PS-074 - Via Montebello Pump Station	\$1,000,000	36.10%	29.95%	30.20%	3.71%	0.01%

Type	Facility Name	Nonstructural Acceleration-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Clarifier					
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Filter Plant					
Tank	Bon Tempe Treatment Plant - Wash Water Sup					
Facility - Water Treatment Plant	Ignacio Pump Station - Chemical Rooms					
Facility - Water Treatment Plant	Ignacio Pump Station - Control Room					
Facility - Water Treatment Plant	Ignacio Pump Station - Fluoride Storage Facility					
Facility - Water Treatment Plant	Ignacio Pump Station - Fuel Storage					
Facility - Water Treatment Plant	Ignacio Pump Station - Pumps					
Building	Phoenix Lake Facility - Boat Barn	27.79%	31.16%	13.03%	22.59%	5.42%
Pump Station	PS-001 - Federal Works Booster Pump Station					
Pump Station	PS-002 - Chapman Park Pump Station					
Pump Station	PS-003 - Summit Drive Pump Station PS-003					
Pump Station	PS-005 - H-Line Booster Station					
Pump Station	PS-006 - Madera Park Pump Station					
Pump Station	PS-007 - Mariner Highlands Pump Station					
Pump Station	PS-010 - Cascade Pump Station					
Pump Station	PS-011 - Fairfax Manor 1st Pump Station					
Pump Station	PS-012 - Fairfax Manor 2nd Lift Pump Station					
Pump Station	PS-013 - Oak Manor 1st Lift Pump Station					
Pump Station	PS-014 - Oak Manor 2nd Lift Pump Station					
Pump Station	PS-016 - Scott Pump Station					
Pump Station	PS-017 - Smith Saddle Booster Station					
Pump Station	PS-019 - Bret Harte Pump Station					
Pump Station	PS-020 - Greenbrae Pump Station					
Pump Station	PS-022 - Ignacio Boosters					
Pump Station	PS-023 - Kent Fire Trail 1st Pump Station					
Pump Station	PS-025 - Kent Woodlands 2nd Pump Station					
Pump Station	PS-026 - Lagunitas Booster Station					
Pump Station	PS-029 - Phoenix Lake Barge Pump					
Pump Station	PS-030 - Phoenix Transfer Pump Station					
Pump Station	PS-031 - Soulajule Pump Station					
Pump Station	PS-032 - Elinor Avenue Pump Station					
Pump Station	PS-033 - Fern Canyon Pump Station					
Pump Station	PS-034 - Lapachet Pump Station					
Pump Station	PS-035 - Mine Ridge Pump Station					
Pump Station	PS-036 - Scott Highlands Pump (OUT OF SERVICE)					
Pump Station	PS-040 - Summit Avenue Upper Pump Station					
Pump Station	PS-042 - Del Mesa Pump Station					
Pump Station	PS-043 - Fawn Drive Pump Station					
Pump Station	PS-044 - Mann Pump Station					
Pump Station	PS-046 - Scenic Avenue Pump Station					
Pump Station	PS-047 - Sequoia Park Pump Station					
Pump Station	PS-050 - Chula Vista Pump Station					
Pump Station	PS-052 - Elda Drive Pump Station					
Pump Station	PS-053 - Fairhills 1st Lift Pump Station					
Pump Station	PS-054 - Fairhills 2nd Lift Pump Station					
Pump Station	PS-055 - Grove Hill Pump Station					
Pump Station	PS-056 - Rafael Highlands Pump Station					
Pump Station	PS-057 - Hind Pump Station					
Pump Station	PS-058 - Knight Drive Pump Station					
Pump Station	PS-060 - Lockwood Drive Pump Station					
Pump Station	PS-061 - Lucas Valley Pump Station					
Pump Station	PS-062 - Manderly Pump Station					
Pump Station	PS-064 - Marinwood Pump Station (NOT IN USE)					
Pump Station	PS-065 - McNear Drive Pump Station					
Pump Station	PS-066 - Mesa Vista Pump Station					
Pump Station	PS-069 - San Quentin Pump Station					
Pump Station	PS-070 - Santa Margarita Pump Station					
Pump Station	PS-071 - Sky View Terrace Pump Station					
Pump Station	PS-073 - Swig Pump Station					
Pump Station	PS-074 - Via Montebello Pump Station					



Type	Facility Name	Nonstructural Drift-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Clarifier					
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Filter Plant					
Tank	Bon Tempe Treatment Plant - Wash Water Sup					
Facility - Water Treatment Plant	Ignacio Pump Station - Chemical Rooms					
Facility - Water Treatment Plant	Ignacio Pump Station - Control Room					
Facility - Water Treatment Plant	Ignacio Pump Station - Fluoride Storage Facility					
Facility - Water Treatment Plant	Ignacio Pump Station - Fuel Storage					
Facility - Water Treatment Plant	Ignacio Pump Station - Pumps					
Building	Phoenix Lake Facility - Boat Barn	38.85%	25.52%	9.16%	21.09%	5.35%
Pump Station	PS-001 - Federal Works Booster Pump Station					
Pump Station	PS-002 - Chapman Park Pump Station					
Pump Station	PS-003 - Summit Drive Pump Station PS-003					
Pump Station	PS-005 - H-Line Booster Station					
Pump Station	PS-006 - Madera Park Pump Station					
Pump Station	PS-007 - Mariner Highlands Pump Station					
Pump Station	PS-010 - Cascade Pump Station					
Pump Station	PS-011 - Fairfax Manor 1st Pump Station					
Pump Station	PS-012 - Fairfax Manor 2nd Lift Pump Station					
Pump Station	PS-013 - Oak Manor 1st Lift Pump Station					
Pump Station	PS-014 - Oak Manor 2nd Lift Pump Station					
Pump Station	PS-016 - Scott Pump Station					
Pump Station	PS-017 - Smith Saddle Booster Station					
Pump Station	PS-019 - Bret Harte Pump Station					
Pump Station	PS-020 - Greenbrae Pump Station					
Pump Station	PS-022 - Ignacio Boosters					
Pump Station	PS-023 - Kent Fire Trail 1st Pump Station					
Pump Station	PS-025 - Kent Woodlands 2nd Pump Station					
Pump Station	PS-026 - Lagunitas Booster Station					
Pump Station	PS-029 - Phoenix Lake Barge Pump					
Pump Station	PS-030 - Phoenix Transfer Pump Station					
Pump Station	PS-031 - SoulaJule Pump Station					
Pump Station	PS-032 - Elinor Avenue Pump Station					
Pump Station	PS-033 - Fern Canyon Pump Station					
Pump Station	PS-034 - Lapachet Pump Station					
Pump Station	PS-035 - Mine Ridge Pump Station					
Pump Station	PS-036 - Scott Highlands Pump (OUT OF SERVICE)					
Pump Station	PS-040 - Summit Avenue Upper Pump Station					
Pump Station	PS-042 - Del Mesa Pump Station					
Pump Station	PS-043 - Fawn Drive Pump Station					
Pump Station	PS-044 - Mann Pump Station					
Pump Station	PS-046 - Scenic Avenue Pump Station					
Pump Station	PS-047 - Sequoia Park Pump Station					
Pump Station	PS-050 - Chula Vista Pump Station					
Pump Station	PS-052 - Elda Drive Pump Station					
Pump Station	PS-053 - Fairhills 1st Lift Pump Station					
Pump Station	PS-054 - Fairhills 2nd Lift Pump Station					
Pump Station	PS-055 - Grove Hill Pump Station					
Pump Station	PS-056 - Rafael Highlands Pump Station					
Pump Station	PS-057 - Hind Pump Station					
Pump Station	PS-058 - Knight Drive Pump Station					
Pump Station	PS-060 - Lockwood Drive Pump Station					
Pump Station	PS-061 - Lucas Valley Pump Station					
Pump Station	PS-062 - Manderly Pump Station					
Pump Station	PS-064 - Marinwood Pump Station (NOT IN USE)					
Pump Station	PS-065 - McNear Drive Pump Station					
Pump Station	PS-066 - Mesa Vista Pump Station					
Pump Station	PS-069 - San Quentin Pump Station					
Pump Station	PS-070 - Santa Margarita Pump Station					
Pump Station	PS-071 - Sky View Terrace Pump Station					
Pump Station	PS-073 - Swig Pump Station					
Pump Station	PS-074 - Via Montebello Pump Station					

Type	Facility Name	Losses (in dollars)			
		Structure	Nonstructural Drift Sensitive	Nonstructural Acceleration-Sensitive	Total Building Loss
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Clarifier				
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Filter Plant	\$25,073,502			\$25,073,502
Tank	Bon Tempe Treatment Plant - Wash Water Sup	\$330,720			\$330,720
Facility - Water Treatment Plant	Ignacio Pump Station - Chemical Rooms				
Facility - Water Treatment Plant	Ignacio Pump Station - Control Room				
Facility - Water Treatment Plant	Ignacio Pump Station - Fluoride Storage Facility				
Facility - Water Treatment Plant	Ignacio Pump Station - Fuel Storage				
Facility - Water Treatment Plant	Ignacio Pump Station - Pumps	\$9,067,750			\$9,067,750
Building	Phoenix Lake Facility - Boat Barn	\$20,798	\$17,605	\$22,329	\$60,731
Pump Station	PS-001 - Federal Works Booster Pump Station	\$61,495			\$61,495
Pump Station	PS-002 - Chapman Park Pump Station	\$198,975			\$198,975
Pump Station	PS-003 - Summit Drive Pump Station PS-003	\$100,895			\$100,895
Pump Station	PS-005 - H-Line Booster Station	\$201,000			\$201,000
Pump Station	PS-006 - Madera Park Pump Station	\$289,820			\$289,820
Pump Station	PS-007 - Mariner Highlands Pump Station	\$201,000			\$201,000
Pump Station	PS-010 - Cascade Pump Station	\$285,265			\$285,265
Pump Station	PS-011 - Fairfax Manor 1st Pump Station	\$323,700			\$323,700
Pump Station	PS-012 - Fairfax Manor 2nd Lift Pump Station	\$285,265			\$285,265
Pump Station	PS-013 - Oak Manor 1st Lift Pump Station	\$245,660			\$245,660
Pump Station	PS-014 - Oak Manor 2nd Lift Pump Station	\$245,660			\$245,660
Pump Station	PS-016 - Scott Pump Station	\$289,675			\$289,675
Pump Station	PS-017 - Smith Saddle Booster Station	\$245,660			\$245,660
Pump Station	PS-019 - Bret Harte Pump Station	\$209,805			\$209,805
Pump Station	PS-020 - Greenbrae Pump Station	\$245,660			\$245,660
Pump Station	PS-022 - Ignacio Boosters	\$122,700			\$122,700
Pump Station	PS-023 - Kent Fire Trail 1st Pump Station	\$201,000			\$201,000
Pump Station	PS-025 - Kent Woodlands 2nd Pump Station	\$100,895			\$100,895
Pump Station	PS-026 - Lagunitas Booster Station	\$277,825			\$277,825
Pump Station	PS-029 - Phoenix Lake Barge Pump	\$30,235			\$30,235
Pump Station	PS-030 - Phoenix Transfer Pump Station	\$53,585			\$53,585
Pump Station	PS-031 - Soulajule Pump Station	\$46,815			\$46,815
Pump Station	PS-032 - Elinor Avenue Pump Station	\$201,000			\$201,000
Pump Station	PS-033 - Fern Canyon Pump Station	\$250,735			\$250,735
Pump Station	PS-034 - Lapachet Pump Station	\$220,480			\$220,480
Pump Station	PS-035 - Mine Ridge Pump Station	\$107,340			\$107,340
Pump Station	PS-036 - Scott Highlands Pump (OUT OF SERVICE)	\$234,885			\$234,885
Pump Station	PS-040 - Summit Avenue Upper Pump Station	\$220,480			\$220,480
Pump Station	PS-042 - Del Mesa Pump Station	\$100,895			\$100,895
Pump Station	PS-043 - Fawn Drive Pump Station	\$201,000			\$201,000
Pump Station	PS-044 - Mann Pump Station	\$342,115			\$342,115
Pump Station	PS-046 - Scenic Avenue Pump Station	\$79,905			\$79,905
Pump Station	PS-047 - Sequoia Park Pump Station	\$201,000			\$201,000
Pump Station	PS-050 - Chula Vista Pump Station	\$201,000			\$201,000
Pump Station	PS-052 - Elda Drive Pump Station	\$280,445			\$280,445
Pump Station	PS-053 - Fairhills 1st Lift Pump Station	\$189,115			\$189,115
Pump Station	PS-054 - Fairhills 2nd Lift Pump Station	\$189,115			\$189,115
Pump Station	PS-055 - Grove Hill Pump Station	\$100,895			\$100,895
Pump Station	PS-056 - Rafael Highlands Pump Station	\$33,035			\$33,035
Pump Station	PS-057 - Hind Pump Station	\$65,045			\$65,045
Pump Station	PS-058 - Knight Drive Pump Station	\$149,830			\$149,830
Pump Station	PS-060 - Lockwood Drive Pump Station	\$195,295			\$195,295
Pump Station	PS-061 - Lucas Valley Pump Station	\$56,305			\$56,305
Pump Station	PS-062 - Manderly Pump Station	\$195,295			\$195,295
Pump Station	PS-064 - Marinwood Pump Station (NOT IN USE)	\$183,925			\$183,925
Pump Station	PS-065 - McNear Drive Pump Station	\$209,805			\$209,805
Pump Station	PS-066 - Mesa Vista Pump Station	\$245,660			\$245,660
Pump Station	PS-069 - San Quentin Pump Station	\$191,685			\$191,685
Pump Station	PS-070 - Santa Margarita Pump Station	\$199,430			\$199,430
Pump Station	PS-071 - Sky View Terrace Pump Station	\$245,660			\$245,660
Pump Station	PS-073 - Swig Pump Station	\$215,875			\$215,875
Pump Station	PS-074 - Via Montebello Pump Station	\$82,635			\$82,635

Type	Facility Name	Functionality (%)					
		At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Clarifier	46.40	70.10	75.50	77.40	82.40	96.30
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Filter Plant	46.40	70.10	75.50	77.40	82.40	96.30
Tank	Bon Tempe Treatment Plant - Wash Water Sup	40.60	64.30	76.50	79.00	80.20	86.20
Facility - Water Treatment Plant	Ignacio Pump Station - Chemical Rooms	78.10	89.00	90.40	91.10	93.10	98.40
Facility - Water Treatment Plant	Ignacio Pump Station - Control Room	39.10	79.70	88.50	89.30	91.70	98.30
Facility - Water Treatment Plant	Ignacio Pump Station - Fluoride Storage Facility	39.10	79.70	88.50	89.30	91.70	98.30
Facility - Water Treatment Plant	Ignacio Pump Station - Fuel Storage	80.60	89.80	90.50	91.20	93.10	98.40
Facility - Water Treatment Plant	Ignacio Pump Station - Pumps	39.10	79.70	88.50	89.30	91.70	98.30
Building	Phoenix Lake Facility - Boat Barn	39.00	40.50	70.10	70.10	73.60	94.60
Pump Station	PS-001 - Federal Works Booster Pump Station	80.30	92.60	95.00	96.60	99.00	99.90
Pump Station	PS-002 - Chapman Park Pump Station	36.00	58.00	82.30	90.90	98.80	99.90
Pump Station	PS-003 - Summit Drive Pump Station PS-003	57.10	77.40	93.10	97.10	99.60	99.90
Pump Station	PS-005 - H-Line Booster Station	48.80	66.20	80.80	88.00	96.80	99.90
Pump Station	PS-006 - Madera Park Pump Station	34.30	51.90	70.70	81.30	95.30	99.90
Pump Station	PS-007 - Mariner Highlands Pump Station	48.80	66.20	80.80	88.00	96.80	99.90
Pump Station	PS-010 - Cascade Pump Station	35.90	53.30	71.20	81.50	95.20	99.90
Pump Station	PS-011 - Fairfax Manor 1st Pump Station	29.00	46.30	66.70	78.70	94.90	99.90
Pump Station	PS-012 - Fairfax Manor 2nd Lift Pump Station	35.90	53.30	71.20	81.50	95.20	99.90
Pump Station	PS-013 - Oak Manor 1st Lift Pump Station	45.10	61.20	75.30	83.90	95.60	99.90
Pump Station	PS-014 - Oak Manor 2nd Lift Pump Station	45.10	61.20	75.30	83.90	95.60	99.90
Pump Station	PS-016 - Scott Pump Station	35.60	52.80	70.60	81.00	95.10	99.90
Pump Station	PS-017 - Smith Saddle Booster Station	45.10	61.20	75.30	83.90	95.60	99.90
Pump Station	PS-019 - Bret Harte Pump Station	56.00	69.00	78.50	85.50	95.90	99.90
Pump Station	PS-020 - Greenbrae Pump Station	45.10	61.20	75.30	83.90	95.60	99.90
Pump Station	PS-022 - Ignacio Boosters	64.30	80.60	89.20	93.20	98.00	99.90
Pump Station	PS-023 - Kent Fire Trail 1st Pump Station	48.80	66.20	80.80	88.00	96.80	99.90
Pump Station	PS-025 - Kent Woodlands 2nd Pump Station	57.10	77.40	93.10	97.10	99.60	99.90
Pump Station	PS-026 - Lagunitas Booster Station	36.40	54.00	72.10	82.10	95.50	99.90
Pump Station	PS-029 - Phoenix Lake Barge Pump	85.90	96.80	98.30	98.90	99.60	99.90
Pump Station	PS-030 - Phoenix Transfer Pump Station	74.10	90.20	97.10	98.70	99.60	99.90
Pump Station	PS-031 - Soulajule Pump Station	89.50	94.00	95.30	96.70	99.00	99.90
Pump Station	PS-032 - Elinor Avenue Pump Station	48.80	66.20	80.80	88.00	96.80	99.90
Pump Station	PS-033 - Fern Canyon Pump Station	44.60	60.60	74.70	83.40	95.40	99.90
Pump Station	PS-034 - Lapachet Pump Station	47.20	64.00	78.40	86.20	96.30	99.90
Pump Station	PS-035 - Mine Ridge Pump Station	56.50	76.70	92.30	96.60	99.40	99.90
Pump Station	PS-036 - Scott Highlands Pump (OUT OF SERVICE)	48.40	63.70	76.30	84.30	95.60	99.90
Pump Station	PS-040 - Summit Avenue Upper Pump Station	47.20	64.00	78.40	86.20	96.30	99.90
Pump Station	PS-042 - Del Mesa Pump Station	57.10	77.40	93.10	97.10	99.60	99.90
Pump Station	PS-043 - Fawn Drive Pump Station	48.80	66.20	80.80	88.00	96.80	99.90
Pump Station	PS-044 - Mann Pump Station	24.90	42.00	64.40	77.60	95.10	99.90
Pump Station	PS-046 - Scenic Avenue Pump Station	62.20	83.10	95.40	98.20	99.60	99.90
Pump Station	PS-047 - Sequoia Park Pump Station	48.80	66.20	80.80	88.00	96.80	99.90
Pump Station	PS-050 - Chula Vista Pump Station	48.80	66.20	80.80	88.00	96.80	99.90
Pump Station	PS-052 - Elda Drive Pump Station	36.20	53.70	71.70	81.90	95.40	99.90
Pump Station	PS-053 - Fairhills 1st Lift Pump Station	52.50	68.90	81.90	88.50	96.90	99.90
Pump Station	PS-054 - Fairhills 2nd Lift Pump Station	52.50	68.90	81.90	88.50	96.90	99.90
Pump Station	PS-055 - Grove Hill Pump Station	57.10	77.40	93.10	97.10	99.60	99.90
Pump Station	PS-056 - Rafael Highlands Pump Station	81.90	94.30	98.60	99.50	99.80	99.90
Pump Station	PS-057 - Hind Pump Station	76.50	88.60	95.00	97.20	99.20	99.90
Pump Station	PS-058 - Knight Drive Pump Station	67.20	78.10	84.90	89.80	97.10	99.90
Pump Station	PS-060 - Lockwood Drive Pump Station	62.20	72.50	79.50	85.90	95.90	99.90
Pump Station	PS-061 - Lucas Valley Pump Station	79.30	91.40	95.80	97.50	99.20	99.90
Pump Station	PS-062 - Manderly Pump Station	62.20	72.50	79.50	85.90	95.90	99.90
Pump Station	PS-064 - Marinwood Pump Station (NOT IN USE)	66.90	75.70	80.30	86.20	96.00	99.90
Pump Station	PS-065 - McNear Drive Pump Station	56.00	69.00	78.50	85.50	95.90	99.90
Pump Station	PS-066 - Mesa Vista Pump Station	45.10	61.20	75.30	83.90	95.60	99.90
Pump Station	PS-069 - San Quentin Pump Station	59.80	73.00	80.50	86.70	96.10	99.90
Pump Station	PS-070 - Santa Margarita Pump Station	61.20	72.80	79.20	85.60	95.80	99.90
Pump Station	PS-071 - Sky View Terrace Pump Station	45.10	61.20	75.30	83.90	95.60	99.90
Pump Station	PS-073 - Swig Pump Station	55.40	68.30	77.80	85.00	95.70	99.90
Pump Station	PS-074 - Via Montebello Pump Station	61.90	81.20	94.90	98.10	99.70	99.90

Type	Facility Name	Structure Replacement Cost	Structural - Probability of Damage				
			No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Pump Station	PS-077 - Beacon Hill Pump Station	\$1,000,000	35.86%	29.75%	30.00%	4.22%	0.14%
Pump Station	PS-078 - Crescent Avenue Pump Station	\$1,000,000	48.53%	27.69%	21.25%	2.37%	0.13%
Pump Station	PS-079 - Marin City Pump Station	\$1,000,000	13.22%	19.98%	33.53%	28.06%	5.18%
Pump Station	PS-080 - Monte Mar Vista Pump Station	\$1,000,000	13.22%	19.98%	33.53%	28.06%	5.18%
Pump Station	PS-081 - Sausalito Pumphouse Pump Station	\$1,000,000	47.70%	23.54%	3.26%	20.36%	5.12%
Pump Station	PS-082 - Sausalito Boulevard Pump Station	\$1,000,000	48.38%	27.61%	21.18%	2.62%	0.19%
Pump Station	PS-083 - Richardson Drive Pump Station	\$1,000,000	29.67%	24.61%	24.82%	17.28%	3.59%
Pump Station	PS-084 - Eastwood Way Pump Station	\$1,000,000	37.82%	24.07%	11.44%	21.32%	5.33%
Pump Station	PS-085 - Fairview Park Pump Station	\$1,000,000	37.82%	24.07%	11.44%	21.32%	5.33%
Pump Station	PS-087 - Marinview Pump Station	\$1,000,000	13.99%	21.15%	35.48%	25.01%	4.34%
Pump Station	PS-088 - Tam Woods 1st Lift Pump Station	\$1,000,000	22.47%	22.05%	25.42%	24.68%	5.35%
Pump Station	PS-089 - Tam Woods 2nd Lift Pump Station	\$1,000,000	24.05%	23.61%	27.21%	20.81%	4.30%
Pump Station	PS-090 - Hill Haven Pump Station	\$1,000,000	36.88%	21.04%	16.15%	21.01%	4.90%
Pump Station	PS-091 - Sugarloaf Pump Station	\$1,000,000	46.79%	26.70%	20.48%	5.16%	0.84%
Pump Station	PS-092 - Tiburon Belvedere Pump Station	\$1,000,000	48.86%	27.88%	21.39%	1.85%	0.00%
Pump Station	PS-093 - Tiburon Booster Pump Station	\$1,000,000	22.87%	22.45%	25.88%	23.76%	5.02%
Pump Station	PS-095 - Pine Mountain Tunnel Pump Station	\$1,000,000	17.96%	28.09%	28.61%	20.55%	4.77%
Pump Station	PS-097 - Tocaloma Booster Pump Station	\$1,000,000	36.52%	20.84%	15.99%	21.56%	5.06%
Pump Station	PS-101 - Redwood Drive Lower Pump	\$1,000,000	13.07%	19.76%	33.15%	28.61%	5.40%
Pump Station	PS-102 - North Marin Line Boosters	\$1,000,000	46.54%	22.97%	3.18%	21.54%	5.74%
Pump Station	PS-103 - San Geronimo Valley Pump Station	\$1,000,000	46.54%	22.97%	3.18%	21.54%	5.74%
Pump Station	PS-104 - Conifer Way Pump Station	\$1,000,000	33.42%	25.65%	14.09%	21.48%	5.33%
Pump Station	PS-106 - Los Altos Pump Station	\$1,000,000	47.30%	20.00%	7.07%	20.49%	5.12%
Pump Station	PS-108 - Indian Rock Pump Station	\$1,000,000	38.25%	24.35%	11.57%	20.69%	5.12%
Pump Station	PS-109 - Cibiran Pump Station	\$1,000,000	66.56%	22.31%	6.77%	3.50%	0.84%
Pump Station	PS-113 - Lag Picnic Grounds Pump Station	\$1,000,000	40.48%	25.77%	12.24%	17.21%	4.28%
Pump Station	PS-114 - Cortez Avenue Pump Station	\$1,000,000	29.71%	32.25%	10.80%	21.69%	5.53%
Pump Station	PS-115 - Redwood Drive Upper Pump Station	\$1,000,000	45.67%	27.56%	4.50%	17.71%	4.53%
Pump Station	PS-116 - North Redwood Drive Boosters	\$1,000,000	57.55%	34.35%	7.37%	0.57%	0.13%
Pump Station	PS-117 - Wolfback Ridge Pump Station	\$1,000,000	63.78%	29.79%	5.41%	0.81%	0.19%
Pump Station	PS-118 - Fire Road Pump Station	\$1,000,000	47.15%	23.27%	3.22%	21.00%	5.33%
Pump Station	PS-122 - Upper Road Pump Station	\$1,000,000	68.15%	26.92%	3.13%	1.43%	0.35%
Pump Station	PS-123 - Southern Marin Line Syphon	\$1,000,000	51.11%	20.19%	2.34%	21.00%	5.33%
Pump Station	PS-124 - Throckmorton Booster New Pumpstat	\$1,000,000	68.15%	26.92%	3.13%	1.43%	0.35%
Pump Station	PS-125 - Kent Fire Trail 2nd Lift Pump Station	\$1,000,000	61.43%	18.91%	1.82%	14.23%	3.58%
Pump Station	PS-126 - Oak woodlands Pump Station	\$1,000,000	60.37%	14.01%	1.10%	19.60%	4.90%
Pump Station	PS-127 - Marin Terrace Pump Station	\$1,000,000	50.47%	24.91%	3.45%	16.86%	4.28%
Pump Station	PS-128 - Alpine Bon-Tempe Pump Station	\$1,000,000	48.81%	41.89%	9.23%	0.04%	0.00%
Pump Station	PS-129 - Slide Gulch Pump Station	\$1,000,000	54.72%	21.61%	2.51%	16.86%	4.28%
Pump Station	PS-130 - Smith Conifer Pump Station	\$1,000,000	55.71%	17.15%	1.65%	20.35%	5.12%
Building	San Geronimo Treatment Plant - Boat Barn		49.35%	28.05%	2.57%	16.01%	4.00%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Chemical Stor	\$100,000,000	14.19%	21.45%	35.99%	24.28%	4.06%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #1		12.90%	19.50%	32.72%	29.05%	5.81%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #2		36.29%	27.85%	15.30%	16.54%	4.00%
Building	San Geronimo Treatment Plant - Facilities Shed		26.64%	38.23%	7.80%	21.57%	5.74%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Flash Mixer		36.29%	27.85%	15.30%	16.54%	4.00%
Building	San Geronimo Treatment Plant - Gardeners Shed		49.35%	28.05%	2.57%	16.01%	4.00%
Facility - Pump Station	San Geronimo Treatment Plant - North Marin L	\$5,000,000	12.90%	19.50%	32.72%	29.05%	5.81%
Facility - Pump Station	Southern Marin Line - Pump Station	\$2,000,000	49.91%	25.78%	21.00%	2.94%	0.35%
Water Tank	TK-006 - MADERA PARK TANK #1	\$200,000	17.71%	42.07%	14.57%	20.50%	5.12%
Water Tank	TK-009 - SAN CLEMENTE TANK	\$3,000,000	17.92%	26.82%	46.09%	8.94%	0.20%
Water Tank	TK-011 - CANON VILLAGE TANK	\$3,000,000	23.29%	27.81%	22.16%	21.61%	5.12%
Water Tank	TK-012 - FAIRFAX GRADE TANK	\$1,000,000	8.40%	19.21%	53.06%	18.64%	0.67%
Water Tank	TK-015 - MEADOW CLUB UPPER TANK	\$600,000	2.10%	6.65%	36.23%	47.91%	7.08%
Water Tank	TK-019 - OAK MANOR TOP TANK	\$500,000	23.36%	27.81%	22.10%	21.60%	5.12%
Water Tank	TK-025 - BRET HARTE TANK	\$1,000,000	13.45%	20.12%	34.58%	26.65%	5.19%
Water Tank	TK-027 - GREENBRAE TANK	\$3,000,000	26.16%	23.16%	23.89%	21.85%	4.91%
Water Tank	TK-030 - ESCALLE TANK	\$2,000,000	1.20%	5.33%	35.03%	50.51%	7.90%
Water Tank	TK-033 - INDIAN FIRE TRAIL TANK	\$500,000	14.23%	21.29%	36.59%	23.52%	4.35%
Water Tank	TK-046 - ALTO TANK #1	\$6,000,000	17.92%	26.82%	46.09%	8.94%	0.20%
Water Tank	TK-047 - BOLSA TANK	\$400,000	74.57%	23.42%	1.33%	0.52%	0.13%

Type	Facility Name	Nonstructural Acceleration-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Pump Station	PS-077 - Beacon Hill Pump Station					
Pump Station	PS-078 - Crescent Avenue Pump Station					
Pump Station	PS-079 - Marin City Pump Station					
Pump Station	PS-080 - Monte Mar Vista Pump Station					
Pump Station	PS-081 - Sausalito Pumphouse Pump Station					
Pump Station	PS-082 - Sausalito Boulevard Pump Station					
Pump Station	PS-083 - Richardson Drive Pump Station					
Pump Station	PS-084 - Eastwood Way Pump Station					
Pump Station	PS-085 - Fairview Park Pump Station					
Pump Station	PS-087 - Marinview Pump Station					
Pump Station	PS-088 - Tam Woods 1st Lift Pump Station					
Pump Station	PS-089 - Tam Woods 2nd Lift Pump Station					
Pump Station	PS-090 - Hill Haven Pump Station					
Pump Station	PS-091 - Sugarloaf Pump Station					
Pump Station	PS-092 - Tiburon Belvedere Pump Station					
Pump Station	PS-093 - Tiburon Booster Pump Station					
Pump Station	PS-095 - Pine Mountain Tunnel Pump Station					
Pump Station	PS-097 - Tocaloma Booster Pump Station					
Pump Station	PS-101 - Redwood Drive Lower Pump					
Pump Station	PS-102 - North Marin Line Boosters					
Pump Station	PS-103 - San Geronimo Valley Pump Station					
Pump Station	PS-104 - Conifer Way Pump Station					
Pump Station	PS-106 - Los Altos Pump Station					
Pump Station	PS-108 - Indian Rock Pump Station					
Pump Station	PS-109 - Cibrian Pump Station					
Pump Station	PS-113 - Lag Picnic Grounds Pump Station					
Pump Station	PS-114 - Cortez Avenue Pump Station					
Pump Station	PS-115 - Redwood Drive Upper Pump Station					
Pump Station	PS-116 - North Redwood Drive Boosters					
Pump Station	PS-117 - Wolfback Ridge Pump Station					
Pump Station	PS-118 - Fire Road Pump Station					
Pump Station	PS-122 - Upper Road Pump Station					
Pump Station	PS-123 - Southern Marin Line Syphon					
Pump Station	PS-124 - Throckmorton Booster New Pumpstat					
Pump Station	PS-125 - Kent Fire Trail 2nd Lift Pump Station					
Pump Station	PS-126 - Oak woodlands Pump Station					
Pump Station	PS-127 - Marin Terrace Pump Station					
Pump Station	PS-128 - Alpine Bon-Tempe Pump Station					
Pump Station	PS-129 - Slide Gulch Pump Station					
Pump Station	PS-130 - Smith Conifer Pump Station					
Building	San Geronimo Treatment Plant - Boat Barn	31.44%	33.47%	13.40%	17.58%	4.07%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Chemical Stor					
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #1					
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #2					
Building	San Geronimo Treatment Plant - Facilities Shed	26.03%	31.09%	13.71%	23.31%	5.84%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Flash Mixer					
Building	San Geronimo Treatment Plant - Gardeners She	31.44%	33.47%	13.40%	17.58%	4.07%
Facility - Pump Station	San Geronimo Treatment Plant - North Marin L					
Facility - Pump Station	Southern Marin Line - Pump Station					
Water Tank	TK-006 - MADERA PARK TANK #1					
Water Tank	TK-009 - SAN CLEMENTE TANK					
Water Tank	TK-011 - CANON VILLAGE TANK					
Water Tank	TK-012 - FAIRFAX GRADE TANK					
Water Tank	TK-015 - MEADOW CLUB UPPER TANK					
Water Tank	TK-019 - OAK MANOR TOP TANK					
Water Tank	TK-025 - BRET HARTE TANK					
Water Tank	TK-027 - GREENBRAE TANK					
Water Tank	TK-030 - ESCALLE TANK					
Water Tank	TK-033 - INDIAN FIRE TRAIL TANK					
Water Tank	TK-046 - ALTO TANK #1					
Water Tank	TK-047 - BOLSA TANK					

Type	Facility Name	Nonstructural Drift-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Pump Station	PS-077 - Beacon Hill Pump Station					
Pump Station	PS-078 - Crescent Avenue Pump Station					
Pump Station	PS-079 - Marin City Pump Station					
Pump Station	PS-080 - Monte Mar Vista Pump Station					
Pump Station	PS-081 - Sausalito Pumphouse Pump Station					
Pump Station	PS-082 - Sausalito Boulevard Pump Station					
Pump Station	PS-083 - Richardson Drive Pump Station					
Pump Station	PS-084 - Eastwood Way Pump Station					
Pump Station	PS-085 - Fairview Park Pump Station					
Pump Station	PS-087 - Marinview Pump Station					
Pump Station	PS-088 - Tam Woods 1st Lift Pump Station					
Pump Station	PS-089 - Tam Woods 2nd Lift Pump Station					
Pump Station	PS-090 - Hill Haven Pump Station					
Pump Station	PS-091 - Sugarloaf Pump Station					
Pump Station	PS-092 - Tiburon Belvedere Pump Station					
Pump Station	PS-093 - Tiburon Booster Pump Station					
Pump Station	PS-095 - Pine Mountain Tunnel Pump Station					
Pump Station	PS-097 - Tocaloma Booster Pump Station					
Pump Station	PS-101 - Redwood Drive Lower Pump					
Pump Station	PS-102 - North Marin Line Boosters					
Pump Station	PS-103 - San Geronimo Valley Pump Station					
Pump Station	PS-104 - Conifer Way Pump Station					
Pump Station	PS-106 - Los Altos Pump Station					
Pump Station	PS-108 - Indian Rock Pump Station					
Pump Station	PS-109 - Cibrian Pump Station					
Pump Station	PS-113 - Lag Picnic Grounds Pump Station					
Pump Station	PS-114 - Cortez Avenue Pump Station					
Pump Station	PS-115 - Redwood Drive Upper Pump Station					
Pump Station	PS-116 - North Redwood Drive Boosters					
Pump Station	PS-117 - Wolfback Ridge Pump Station					
Pump Station	PS-118 - Fire Road Pump Station					
Pump Station	PS-122 - Upper Road Pump Station					
Pump Station	PS-123 - Southern Marin Line Syphon					
Pump Station	PS-124 - Throckmorton Booster New Pumpstat					
Pump Station	PS-125 - Kent Fire Trail 2nd Lift Pump Station					
Pump Station	PS-126 - Oak woodlands Pump Station					
Pump Station	PS-127 - Marin Terrace Pump Station					
Pump Station	PS-128 - Alpine Bon-Tempe Pump Station					
Pump Station	PS-129 - Slide Gulch Pump Station					
Pump Station	PS-130 - Smith Conifer Pump Station					
Building	San Geronimo Treatment Plant - Boat Barn	48.28%	24.30%	7.30%	16.10%	4.00%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Chemical Stor					
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #1					
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #2					
Building	San Geronimo Treatment Plant - Facilities Shed	27.62%	28.87%	15.84%	21.86%	5.78%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Flash Mixer					
Building	San Geronimo Treatment Plant - Gardeners She	48.28%	24.30%	7.30%	16.10%	4.00%
Facility - Pump Station	San Geronimo Treatment Plant - North Marin L					
Facility - Pump Station	Southern Marin Line - Pump Station					
Water Tank	TK-006 - MADERA PARK TANK #1					
Water Tank	TK-009 - SAN CLEMENTE TANK					
Water Tank	TK-011 - CANON VILLAGE TANK					
Water Tank	TK-012 - FAIRFAX GRADE TANK					
Water Tank	TK-015 - MEADOW CLUB UPPER TANK					
Water Tank	TK-019 - OAK MANOR TOP TANK					
Water Tank	TK-025 - BRET HARTE TANK					
Water Tank	TK-027 - GREENBRAE TANK					
Water Tank	TK-030 - ESCALLE TANK					
Water Tank	TK-033 - INDIAN FIRE TRAIL TANK					
Water Tank	TK-046 - ALTO TANK #1					
Water Tank	TK-047 - BOLSA TANK					

Type	Facility Name	Losses (in dollars)			
		Structure	Nonstructural Drift Sensitive	Nonstructural Acceleration-Sensitive	Total Building Loss
Pump Station	PS-077 - Beacon Hill Pump Station	\$86,595			\$86,595
Pump Station	PS-078 - Crescent Avenue Pump Station	\$61,240			\$61,240
Pump Station	PS-079 - Marin City Pump Station	\$280,445			\$280,445
Pump Station	PS-080 - Monte Mar Vista Pump Station	\$280,445			\$280,445
Pump Station	PS-081 - Sausalito Pumphouse Pump Station	\$190,020			\$190,020
Pump Station	PS-082 - Sausalito Boulevard Pump Station	\$63,195			\$63,195
Pump Station	PS-083 - Richardson Drive Pump Station	\$189,115			\$189,115
Pump Station	PS-084 - Eastwood Way Pump Station	\$210,415			\$210,415
Pump Station	PS-085 - Fairview Park Pump Station	\$210,415			\$210,415
Pump Station	PS-087 - Marinview Pump Station	\$257,255			\$257,255
Pump Station	PS-088 - Tam Woods 1st Lift Pump Station	\$250,735			\$250,735
Pump Station	PS-089 - Tam Woods 2nd Lift Pump Station	\$220,480			\$220,480
Pump Station	PS-090 - Hill Haven Pump Station	\$209,805			\$209,805
Pump Station	PS-091 - Sugarloaf Pump Station	\$83,430			\$83,430
Pump Station	PS-092 - Tiburon Belvedere Pump Station	\$57,125			\$57,125
Pump Station	PS-093 - Tiburon Booster Pump Station	\$242,805			\$242,805
Pump Station	PS-095 - Pine Mountain Tunnel Pump Station	\$227,960			\$227,960
Pump Station	PS-097 - Tocaloma Booster Pump Station	\$214,365			\$214,365
Pump Station	PS-101 - Redwood Drive Lower Pump	\$285,265			\$285,265
Pump Station	PS-102 - North Marin Line Boosters	\$202,895			\$202,895
Pump Station	PS-103 - San Geronimo Valley Pump Station	\$202,895			\$202,895
Pump Station	PS-104 - Conifer Way Pump Station	\$216,140			\$216,140
Pump Station	PS-106 - Los Altos Pump Station	\$194,745			\$194,745
Pump Station	PS-108 - Indian Rock Pump Station	\$204,870			\$204,870
Pump Station	PS-109 - Cibrian Pump Station	\$50,710			\$50,710
Pump Station	PS-113 - Lag Picnic Grounds Pump Station	\$177,305			\$177,305
Pump Station	PS-114 - Cortez Avenue Pump Station	\$217,765			\$217,765
Pump Station	PS-115 - Redwood Drive Upper Pump Station	\$172,090			\$172,090
Pump Station	PS-116 - North Redwood Drive Boosters	\$32,950			\$32,950
Pump Station	PS-117 - Wolfback Ridge Pump Station	\$29,770			\$29,770
Pump Station	PS-118 - Fire Road Pump Station	\$195,765			\$195,765
Pump Station	PS-122 - Upper Road Pump Station	\$30,235			\$30,235
Pump Station	PS-123 - Southern Marin Line Syphon	\$192,905			\$192,905
Pump Station	PS-124 - Throckmorton Booster New Pumpstat	\$30,235			\$30,235
Pump Station	PS-125 - Kent Fire Trail 2nd Lift Pump Station	\$133,365			\$133,365
Pump Station	PS-126 - Oak woodlands Pump Station	\$175,255			\$175,255
Pump Station	PS-127 - Marin Terrace Pump Station	\$161,590			\$161,590
Pump Station	PS-128 - Alpine Bon-Tempe Pump Station	\$35,030			\$35,030
Pump Station	PS-129 - Slide Gulch Pump Station	\$158,530			\$158,530
Pump Station	PS-130 - Smith Conifer Pump Station	\$184,350			\$184,350
Building	San Geronimo Treatment Plant - Boat Barn				
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Chemical Stor	\$25,099,000			\$25,099,000
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #1				
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #2				
Building	San Geronimo Treatment Plant - Facilities Shed				
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Flash Mixer				
Building	San Geronimo Treatment Plant - Gardeners She				
Facility - Pump Station	San Geronimo Treatment Plant - North Marin L	\$1,456,150			\$1,456,150
Facility - Pump Station	Southern Marin Line - Pump Station	\$131,060			\$131,060
Water Tank	TK-006 - MADERA PARK TANK #1	\$43,418			\$43,418
Water Tank	TK-009 - SAN CLEMENTE TANK	\$414,555			\$414,555
Water Tank	TK-011 - CANON VILLAGE TANK	\$684,015			\$684,015
Water Tank	TK-012 - FAIRFAX GRADE TANK	\$207,735			\$207,735
Water Tank	TK-015 - MEADOW CLUB UPPER TANK	\$249,558			\$249,558
Water Tank	TK-019 - OAK MANOR TOP TANK	\$113,928			\$113,928
Water Tank	TK-025 - BRET HARTE TANK	\$273,730			\$273,730
Water Tank	TK-027 - GREENBRAE TANK	\$682,845			\$682,845
Water Tank	TK-030 - ESCALLE TANK	\$874,540			\$874,540
Water Tank	TK-033 - INDIAN FIRE TRAIL TANK	\$125,075			\$125,075
Water Tank	TK-046 - ALTO TANK #1	\$829,110			\$829,110
Water Tank	TK-047 - BOLSA TANK	\$7,250			\$7,250



Type	Facility Name	Functionality (%)					
		At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Pump Station	PS-077 - Beacon Hill Pump Station	61.60	80.70	94.40	97.80	99.60	99.90
Pump Station	PS-078 - Crescent Avenue Pump Station	70.80	86.80	96.50	98.70	99.70	99.90
Pump Station	PS-079 - Marin City Pump Station	36.20	53.70	71.70	81.90	95.40	99.90
Pump Station	PS-080 - Monte Mar Vista Pump Station	36.20	53.70	71.70	81.90	95.40	99.90
Pump Station	PS-081 - Sausalito Pumphouse Pump Station	65.50	76.00	79.80	85.70	95.80	99.90
Pump Station	PS-082 - Sausalito Boulevard Pump Station	70.60	86.60	96.20	98.50	99.70	99.90
Pump Station	PS-083 - Richardson Drive Pump Station	52.50	68.90	81.90	88.50	96.90	99.90
Pump Station	PS-084 - Eastwood Way Pump Station	57.90	70.70	78.20	85.00	95.60	99.90
Pump Station	PS-085 - Fairview Park Pump Station	57.90	70.70	78.20	85.00	95.60	99.90
Pump Station	PS-087 - Marinview Pump Station	37.80	56.10	74.60	84.10	96.00	99.90
Pump Station	PS-088 - Tam Woods 1st Lift Pump Station	44.60	60.60	74.70	83.40	95.40	99.90
Pump Station	PS-089 - Tam Woods 2nd Lift Pump Station	47.20	64.00	78.40	86.20	96.30	99.90
Pump Station	PS-090 - Hill Haven Pump Station	56.00	69.00	78.50	85.50	95.90	99.90
Pump Station	PS-091 - Sugarloaf Pump Station	68.60	84.20	93.80	96.70	99.20	99.90
Pump Station	PS-092 - Tiburon Belvedere Pump Station	71.30	87.30	97.00	99.00	99.80	99.90
Pump Station	PS-093 - Tiburon Booster Pump Station	45.30	61.50	75.70	84.10	95.70	99.90
Pump Station	PS-095 - Pine Mountain Tunnel Pump Station	44.20	63.10	78.10	85.90	96.00	99.90
Pump Station	PS-097 - Tocaloma Booster Pump Station	55.50	68.40	78.00	85.10	95.80	99.90
Pump Station	PS-101 - Redwood Drive Lower Pump	35.90	53.30	71.20	81.50	95.20	99.90
Pump Station	PS-102 - North Marin Line Boosters	64.10	74.40	78.30	84.50	95.40	99.90
Pump Station	PS-103 - San Geronimo Valley Pump Station	64.10	74.40	78.30	84.50	95.40	99.90
Pump Station	PS-104 - Conifer Way Pump Station	55.00	69.20	77.90	84.90	95.60	99.90
Pump Station	PS-106 - Los Altos Pump Station	63.70	73.90	79.40	85.60	95.80	99.90
Pump Station	PS-108 - Indian Rock Pump Station	58.40	71.40	78.90	85.50	95.80	99.90
Pump Station	PS-109 - Cibrian Pump Station	82.50	92.70	96.00	97.50	99.20	99.90
Pump Station	PS-113 - Lag Picnic Grounds Pump Station	61.30	74.80	82.20	87.90	96.50	99.90
Pump Station	PS-114 - Cortez Avenue Pump Station	54.80	70.50	77.80	84.70	95.50	99.90
Pump Station	PS-115 - Redwood Drive Upper Pump Station	66.00	78.10	82.20	87.40	96.30	99.90
Pump Station	PS-116 - North Redwood Drive Boosters	80.80	95.50	98.80	99.50	99.80	99.90
Pump Station	PS-117 - Wolfback Ridge Pump Station	83.80	96.30	98.70	99.40	99.80	99.90
Pump Station	PS-118 - Fire Road Pump Station	64.90	75.20	79.10	85.20	95.60	99.90
Pump Station	PS-122 - Upper Road Pump Station	85.90	96.80	98.30	98.90	99.60	99.90
Pump Station	PS-123 - Southern Marin Line Syphon	66.70	75.70	79.20	85.20	95.60	99.90
Pump Station	PS-124 - Throckmorton Booster New Pumpstat	85.90	96.80	98.30	98.90	99.60	99.90
Pump Station	PS-125 - Kent Fire Trail 2nd Lift Pump Station	75.30	83.40	85.90	89.90	97.00	99.90
Pump Station	PS-126 - Oak woodlands Pump Station	71.60	77.90	80.70	86.20	96.00	99.90
Pump Station	PS-127 - Marin Terrace Pump Station	68.80	79.60	83.10	88.10	96.50	99.90
Pump Station	PS-128 - Alpine Bon-Tempe Pump Station	77.20	95.10	99.20	99.90	99.90	99.90
Pump Station	PS-129 - Slide Gulch Pump Station	70.80	80.10	83.20	88.10	96.50	99.90
Pump Station	PS-130 - Smith Conifer Pump Station	69.10	76.80	79.90	85.70	95.80	99.90
Building	San Geronimo Treatment Plant - Boat Barn	49.30	50.60	77.30	77.40	79.90	95.90
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Chemical Stor	40.00	69.70	77.00	78.80	83.70	97.00
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #1	37.60	64.70	71.70	73.80	79.80	96.00
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #2	60.20	79.80	83.20	84.50	87.90	97.30
Building	San Geronimo Treatment Plant - Facilities Shed	26.60	28.40	64.70	64.80	72.60	94.20
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Flash Mixer	60.20	79.80	83.20	84.50	87.90	97.30
Building	San Geronimo Treatment Plant - Gardeners She	49.30	50.60	77.30	77.40	79.90	95.90
Facility - Pump Station	San Geronimo Treatment Plant - North Marin L	35.50	52.70	70.50	80.90	94.90	99.90
Facility - Pump Station	Southern Marin Line - Pump Station	71.00	86.30	95.90	98.20	99.60	99.90
Water Tank	TK-006 - MADERA PARK TANK #1	37.20	70.30	77.00	78.50	79.80	85.80
Water Tank	TK-009 - SAN CLEMENTE TANK	37.50	68.40	88.80	92.40	92.90	95.20
Water Tank	TK-011 - CANON VILLAGE TANK	40.20	65.50	75.50	77.60	78.90	85.20
Water Tank	TK-012 - FAIRFAX GRADE TANK	28.50	56.10	79.70	84.00	85.00	89.90
Water Tank	TK-015 - MEADOW CLUB UPPER TANK	19.40	33.90	50.50	54.20	57.00	70.30
Water Tank	TK-019 - OAK MANOR TOP TANK	40.20	65.50	75.50	77.60	78.90	85.20
Water Tank	TK-025 - BRET HARTE TANK	31.40	54.70	70.20	73.40	75.00	82.60
Water Tank	TK-027 - GREENBRAE TANK	42.00	64.50	75.30	77.60	78.90	85.20
Water Tank	TK-030 - ESCALLE TANK	18.30	31.60	47.60	51.40	54.30	68.40
Water Tank	TK-033 - INDIAN FIRE TRAIL TANK	32.50	57.10	73.50	76.70	78.10	84.80
Water Tank	TK-046 - ALTO TANK #1	37.50	68.40	88.80	92.40	92.90	95.20
Water Tank	TK-047 - BOLSA TANK	82.10	98.70	99.30	99.40	99.40	99.60

Type	Facility Name	Structure Replacement Cost	Structural - Probability of Damage				
			No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Water Tank	TK-055 - MILL VALLEY TANK	\$10,000,000	17.72%	26.52%	45.58%	9.73%	0.42%
Water Tank	TK-060 - SCOTT HIGHLANDS TANK	\$500,000	14.83%	22.19%	38.13%	21.18%	3.65%
Water Tank	TK-064 - STRAWBERRY TANK	\$3,000,000	25.83%	22.86%	23.58%	22.57%	5.13%
Water Tank	TK-068 - ELDA DRIVE TANK	\$300,000	14.83%	22.19%	38.13%	21.18%	3.65%
Water Tank	TK-069 - HAWTHORNE HILLS UPPER TANK	\$4,000,000	7.58%	16.53%	53.08%	22.27%	0.52%
Water Tank	TK-074 - SCENIC AVENUE TANK	\$40,000	53.65%	39.93%	4.61%	1.44%	0.35%
Water Tank	TK-078 - CHULA VISTA TANK	\$500,000	34.66%	30.68%	31.64%	2.98%	0.01%
Water Tank	TK-081 - FAIRHILLS TOP TANK #1	\$120,000	47.92%	33.81%	17.69%	0.57%	0.00%
Water Tank	TK-083 - GLENWOOD TANK	\$3,000,000	34.66%	30.68%	31.64%	2.98%	0.01%
Water Tank	TK-085 - HIND TANK #1	\$200,000	54.16%	20.24%	1.07%	19.60%	4.90%
Water Tank	TK-086 - HIND TANK #2	\$400,000	67.98%	7.30%	0.19%	19.60%	4.90%
Water Tank	TK-087 - LOCH LOMOND TANK	\$2,000,000	33.19%	29.38%	30.30%	6.24%	0.86%
Water Tank	TK-089 - LOS RANCHITOS TANK	\$2,000,000	14.83%	22.19%	38.13%	21.18%	3.65%
Water Tank	TK-090 - MARINWOOD TANK	\$1,000,000	33.19%	29.38%	30.30%	6.24%	0.86%
Water Tank	TK-091 - MARIN PROFESSIONAL CENTER TANK	\$500,000	6.38%	14.57%	40.25%	33.36%	5.42%
Water Tank	TK-094 - MILLER CREEK TANK	\$1,000,000	28.48%	25.22%	26.00%	16.68%	3.59%
Water Tank	TK-096 - PUERTO SUELLO TANK	\$3,000,000	13.62%	20.38%	35.02%	25.98%	4.97%
Water Tank	TK-097 - RAFAEL HIGHLANDS TANK	\$1,000,000	34.43%	30.48%	31.43%	3.49%	0.15%
Water Tank	TK-098 - SANTA MARGARITA TANK	\$3,000,000	22.19%	22.19%	38.13%	21.18%	3.65%
Water Tank	TK-100 - SKYVIEW TERRACE TANK	\$300,000	17.92%	26.82%	46.09%	8.94%	0.20%
Water Tank	TK-105 - COURTRIGHT TANK	\$100,000	53.06%	42.22%	4.69%	0.01%	0.00%
Water Tank	TK-106 - LUCAS VALLEY TANK	\$3,000,000	26.16%	23.16%	23.89%	21.85%	4.91%
Water Tank	TK-108 - CLOUDVIEW TANK	\$440,000	7.58%	16.53%	53.08%	22.27%	0.52%
Water Tank	TK-113 - SAUSALITO PUMP HOUSE TANK #1	\$620,000	2.15%	6.80%	37.05%	47.30%	6.68%
Water Tank	TK-114 - SAUSALITO PUMP HOUSE TANK #2	\$620,000	2.15%	6.80%	37.05%	47.30%	6.68%
Water Tank	TK-115 - ROMER TANK	\$620,000	2.15%	6.80%	37.05%	47.30%	6.68%
Water Tank	TK-116 - SAUSALITO BLVD. TANK	\$460,000	18.09%	25.06%	46.00%	10.56%	0.26%
Water Tank	TK-117 - MESA VISTA TANK #1	\$1,000,000	13.45%	20.12%	34.58%	26.65%	5.19%
Water Tank	TK-118 - COUNTYVIEW DRIVE TANK	\$300,000	8.40%	19.21%	53.06%	18.64%	0.67%
Water Tank	TK-119 - LATTIE LANE TANK	\$500,000	13.29%	19.89%	34.18%	27.21%	5.40%
Water Tank	TK-125 - TENNESSEE VALLEY TANK	\$2,000,000	6.75%	15.42%	42.60%	30.63%	4.58%
Water Tank	TK-126 - HILL HAVEN TANK	\$330,000	58.11%	29.44%	12.15%	0.28%	0.00%
Water Tank	TK-127 - PARADISE DRIVE TANK	\$2,000,000	43.86%	22.23%	9.17%	19.82%	4.90%
Water Tank	TK-128 - MOUNT TIBURON TANK #1	\$1,000,000	26.16%	23.16%	23.89%	21.85%	4.91%
Water Tank	TK-130 - SPRING LANE TANK #1	\$3,000,000	18.27%	25.31%	46.46%	9.88%	0.06%
Water Tank	TK-131 - CONIFER WAY TANK	\$1,000,000	6.30%	14.40%	39.79%	33.84%	5.63%
Water Tank	TK-139 - BUCKEY CIRCLE TANK	\$60,000	13.96%	25.77%	30.31%	24.39%	5.55%
Water Tank	TK-145 - ROSS RESERVOIR	\$2,000,000	29.96%	29.41%	33.89%	6.35%	0.37%
Water Tank	TK-146 - FORBES HILL RESERVOIR	\$8,000,000	16.70%	23.05%	46.18%	13.73%	0.32%
Water Tank	TK-147 - SMITH SADDLE TANK #1	\$10,000,000	13.45%	20.12%	34.58%	26.65%	5.19%
Water Tank	TK-148 - SMITH SADDLE TANK #2	\$10,000,000	14.83%	22.19%	38.13%	21.18%	3.65%
Water Tank	TK-150 - LOS ALTOS TANK	\$120,000	47.60%	33.59%	17.57%	1.09%	0.13%
Water Tank	TK-152 - MADERA PARK (H/P) TANK	\$3,000	2.92%	9.43%	40.06%	41.48%	6.08%
Water Tank	TK-153 - RAFAEL HIGHLANDS (H/P) TANK	\$5,000	34.43%	30.48%	31.43%	3.49%	0.15%
Water Tank	TK-155 - PINE MOUNTAIN TUNNEL TANK	\$6,000,000	6.33%	12.42%	36.77%	38.27%	6.18%
Water Tank	TK-156 - BON TEMPE CLEARWELL TANK	\$4,000,000	24.05%	23.61%	27.21%	20.81%	4.30%
Water Tank	TK-157 - SAN GERONIMO CLEARWELL TANK #1	\$4,000,000	12.90%	19.50%	32.72%	29.05%	5.81%
Water Tank	TK-158 - FAWN DRIVE TANK	\$180,000	31.14%	37.07%	29.45%	2.19%	0.13%
Water Tank	TK-159 - PEACOCK GAP TANK	\$1,000,000	67.32%	12.53%	2.67%	13.97%	3.48%
Water Tank	TK-160 - MARIN BAY TANK	\$240,000	58.11%	29.44%	12.15%	0.28%	0.00%
Water Tank	TK-164 - TOMAHAWK DRIVE TANK	\$80,000	25.76%	30.66%	24.37%	15.61%	3.58%
Water Tank	TK-165 - ALTO TANK #2	\$6,000,000	23.36%	27.81%	22.10%	21.60%	5.12%
Water Tank	TK-166 - RING MOUNTAIN TANK	\$300,000	49.04%	33.40%	17.02%	0.53%	0.00%
Water Tank	TK-167 - CREEKSIDE DRIVE TANK	\$360,000	35.71%	25.20%	13.18%	20.77%	5.12%
Water Tank	TK-168 - MCNEAR DRIVE #1 (H/P) TANK	\$2,000	26.16%	23.16%	23.89%	21.85%	4.91%
Water Tank	TK-169 - MCNEAR DRIVE #2 (H/P) TANK	\$3,000	26.16%	23.16%	23.89%	21.85%	4.91%
Water Tank	TK-174 - VIA MONTEBELLO (H/P) TANK	\$7,000	40.11%	36.12%	22.81%	0.95%	0.00%
Water Tank	TK-175 - MARINSHIP TANK	\$3,000,000	42.18%	26.85%	12.76%	14.60%	3.58%
Water Tank	TK-181 - REDWOOD DRIVE UPPER TANK	\$120,000	19.51%	37.43%	20.33%	18.17%	4.53%
Water Tank	TK-182 - ALTA AVENUE TANK	\$1,000,000	19.51%	37.43%	20.33%	18.17%	4.53%
Water Tank	TK-183 - MINE RIDGE TANK	\$440,000	23.05%	37.77%	17.68%	17.20%	4.28%

Type	Facility Name	Nonstructural Acceleration-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Water Tank	TK-055 - MILL VALLEY TANK					
Water Tank	TK-060 - SCOTT HIGHLANDS TANK					
Water Tank	TK-064 - STRAWBERRY TANK					
Water Tank	TK-068 - ELDA DRIVE TANK					
Water Tank	TK-069 - HAWTHORNE HILLS UPPER TANK					
Water Tank	TK-074 - SCENIC AVENUE TANK					
Water Tank	TK-078 - CHULA VISTA TANK					
Water Tank	TK-081 - FAIRHILLS TOP TANK #1					
Water Tank	TK-083 - GLENWOOD TANK					
Water Tank	TK-085 - HIND TANK #1					
Water Tank	TK-086 - HIND TANK #2					
Water Tank	TK-087 - LOCH LOMOND TANK					
Water Tank	TK-089 - LOS RANCHITOS TANK					
Water Tank	TK-090 - MARINWOOD TANK					
Water Tank	TK-091 - MARIN PROFESSIONAL CENTER TANK					
Water Tank	TK-094 - MILLER CREEK TANK					
Water Tank	TK-096 - PUERTO SUELLO TANK					
Water Tank	TK-097 - RAFAEL HIGHLANDS TANK					
Water Tank	TK-098 - SANTA MARGARITA TANK					
Water Tank	TK-100 - SKYVIEW TERRACE TANK					
Water Tank	TK-105 - COURTRIGHT TANK					
Water Tank	TK-106 - LUCAS VALLEY TANK					
Water Tank	TK-108 - CLOUDVIEW TANK					
Water Tank	TK-113 - SAUSALITO PUMP HOUSE TANK #1					
Water Tank	TK-114 - SAUSALITO PUMP HOUSE TANK #2					
Water Tank	TK-115 - ROMER TANK					
Water Tank	TK-116 - SAUSALITO BLVD. TANK					
Water Tank	TK-117 - MESA VISTA TANK #1					
Water Tank	TK-118 - COUNTYVIEW DRIVE TANK					
Water Tank	TK-119 - LATTIE LANE TANK					
Water Tank	TK-125 - TENNESSEE VALLEY TANK					
Water Tank	TK-126 - HILL HAVEN TANK					
Water Tank	TK-127 - PARADISE DRIVE TANK					
Water Tank	TK-128 - MOUNT TIBURON TANK #1					
Water Tank	TK-130 - SPRING LANE TANK #1					
Water Tank	TK-131 - CONIFER WAY TANK					
Water Tank	TK-139 - BUCKEYE CIRCLE TANK					
Water Tank	TK-145 - ROSS RESERVOIR					
Water Tank	TK-146 - FORBES HILL RESERVOIR					
Water Tank	TK-147 - SMITH SADDLE TANK #1					
Water Tank	TK-148 - SMITH SADDLE TANK #2					
Water Tank	TK-150 - LOS ALTOS TANK					
Water Tank	TK-152 - MADERA PARK (H/P) TANK					
Water Tank	TK-153 - RAFAEL HIGHLANDS (H/P) TANK					
Water Tank	TK-155 - PINE MOUNTAIN TUNNEL TANK					
Water Tank	TK-156 - BON TEMPE CLEARWELL TANK					
Water Tank	TK-157 - SAN GERONIMO CLEARWELL TANK #1					
Water Tank	TK-158 - FAWN DRIVE TANK					
Water Tank	TK-159 - PEACOCK GAP TANK					
Water Tank	TK-160 - MARIN BAY TANK					
Water Tank	TK-164 - TOMAHAWK DRIVE TANK					
Water Tank	TK-165 - ALTO TANK #2					
Water Tank	TK-166 - RING MOUNTAIN TANK					
Water Tank	TK-167 - CREEKSIDE DRIVE TANK					
Water Tank	TK-168 - MCNEAR DRIVE #1 (H/P) TANK					
Water Tank	TK-169 - MCNEAR DRIVE #2 (H/P) TANK					
Water Tank	TK-174 - VIA MONTEBELLO (H/P) TANK					
Water Tank	TK-175 - MARINSHIP TANK					
Water Tank	TK-181 - REDWOOD DRIVE UPPER TANK					
Water Tank	TK-182 - ALTA AVENUE TANK					
Water Tank	TK-183 - MINE RIDGE TANK					

Type	Facility Name	Nonstructural Drift-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Water Tank	TK-055 - MILL VALLEY TANK					
Water Tank	TK-060 - SCOTT HIGHLANDS TANK					
Water Tank	TK-064 - STRAWBERRY TANK					
Water Tank	TK-068 - ELDA DRIVE TANK					
Water Tank	TK-069 - HAWTHORNE HILLS UPPER TANK					
Water Tank	TK-074 - SCENIC AVENUE TANK					
Water Tank	TK-078 - CHULA VISTA TANK					
Water Tank	TK-081 - FAIRHILLS TOP TANK #1					
Water Tank	TK-083 - GLENWOOD TANK					
Water Tank	TK-085 - HIND TANK #1					
Water Tank	TK-086 - HIND TANK #2					
Water Tank	TK-087 - LOCH LOMOND TANK					
Water Tank	TK-089 - LOS RANCHITOS TANK					
Water Tank	TK-090 - MARINWOOD TANK					
Water Tank	TK-091 - MARIN PROFESSIONAL CENTER TANK					
Water Tank	TK-094 - MILLER CREEK TANK					
Water Tank	TK-096 - PUERTO SUELLO TANK					
Water Tank	TK-097 - RAFAEL HIGHLANDS TANK					
Water Tank	TK-098 - SANTA MARGARITA TANK					
Water Tank	TK-100 - SKYVIEW TERRACE TANK					
Water Tank	TK-105 - COURTRIGHT TANK					
Water Tank	TK-106 - LUCAS VALLEY TANK					
Water Tank	TK-108 - CLOUDVIEW TANK					
Water Tank	TK-113 - SAUSALITO PUMP HOUSE TANK #1					
Water Tank	TK-114 - SAUSALITO PUMP HOUSE TANK #2					
Water Tank	TK-115 - ROMER TANK					
Water Tank	TK-116 - SAUSALITO BLVD. TANK					
Water Tank	TK-117 - MESA VISTA TANK #1					
Water Tank	TK-118 - COUNTYVIEW DRIVE TANK					
Water Tank	TK-119 - LATTIE LANE TANK					
Water Tank	TK-125 - TENNESSEE VALLEY TANK					
Water Tank	TK-126 - HILL HAVEN TANK					
Water Tank	TK-127 - PARADISE DRIVE TANK					
Water Tank	TK-128 - MOUNT TIBURON TANK #1					
Water Tank	TK-130 - SPRING LANE TANK #1					
Water Tank	TK-131 - CONIFER WAY TANK					
Water Tank	TK-139 - BUCKEYE CIRCLE TANK					
Water Tank	TK-145 - ROSS RESERVOIR					
Water Tank	TK-146 - FORBES HILL RESERVOIR					
Water Tank	TK-147 - SMITH SADDLE TANK #1					
Water Tank	TK-148 - SMITH SADDLE TANK #2					
Water Tank	TK-150 - LOS ALTOS TANK					
Water Tank	TK-152 - MADERA PARK (H/P) TANK					
Water Tank	TK-153 - RAFAEL HIGHLANDS (H/P) TANK					
Water Tank	TK-155 - PINE MOUNTAIN TUNNEL TANK					
Water Tank	TK-156 - BON TEMPE CLEARWELL TANK					
Water Tank	TK-157 - SAN GERONIMO CLEARWELL TANK #1					
Water Tank	TK-158 - FAWN DRIVE TANK					
Water Tank	TK-159 - PEACOCK GAP TANK					
Water Tank	TK-160 - MARIN BAY TANK					
Water Tank	TK-164 - TOMAHAWK DRIVE TANK					
Water Tank	TK-165 - ALTO TANK #2					
Water Tank	TK-166 - RING MOUNTAIN TANK					
Water Tank	TK-167 - CREEKSIDE DRIVE TANK					
Water Tank	TK-168 - MCNEAR DRIVE #1 (H/P) TANK					
Water Tank	TK-169 - MCNEAR DRIVE #2 (H/P) TANK					
Water Tank	TK-174 - VIA MONTEBELLO (H/P) TANK					
Water Tank	TK-175 - MARINSHIP TANK					
Water Tank	TK-181 - REDWOOD DRIVE UPPER TANK					
Water Tank	TK-182 - ALTA AVENUE TANK					
Water Tank	TK-183 - MINE RIDGE TANK					

Type	Facility Name	Losses (in dollars)			
		Structure	Nonstructural Drift Sensitive	Nonstructural Acceleration-Sensitive	Total Building Loss
Water Tank	TK-055 - MILL VALLEY TANK	\$1,442,100			\$1,442,100
Water Tank	TK-060 - SCOTT HIGHLANDS TANK	\$115,935			\$115,935
Water Tank	TK-064 - STRAWBERRY TANK	\$700,560			\$700,560
Water Tank	TK-068 - ELDA DRIVE TANK	\$69,561			\$69,561
Water Tank	TK-069 - HAWTHORNE HILLS UPPER TANK	\$906,820			\$906,820
Water Tank	TK-074 - SCENIC AVENUE TANK	\$1,561			\$1,561
Water Tank	TK-078 - CHULA VISTA TANK	\$40,390			\$40,390
Water Tank	TK-081 - FAIRHILLS TOP TANK #1	\$5,623			\$5,623
Water Tank	TK-083 - GLENWOOD TANK	\$242,340			\$242,340
Water Tank	TK-085 - HIND TANK #1	\$35,665			\$35,665
Water Tank	TK-086 - HIND TANK #2	\$68,214			\$68,214
Water Tank	TK-087 - LOCH LOMOND TANK	\$212,360			\$212,360
Water Tank	TK-089 - LOS RANCHITOS TANK	\$463,740			\$463,740
Water Tank	TK-090 - MARINWOOD TANK	\$106,180			\$106,180
Water Tank	TK-091 - MARIN PROFESSIONAL CENTER TANK	\$161,010			\$161,010
Water Tank	TK-094 - MILLER CREEK TANK	\$187,590			\$187,590
Water Tank	TK-096 - PUERTO SUELLO TANK	\$804,900			\$804,900
Water Tank	TK-097 - RAFAEL HIGHLANDS TANK	\$84,825			\$84,825
Water Tank	TK-098 - SANTA MARGARITA TANK	\$695,610			\$695,610
Water Tank	TK-100 - SKYVIEW TERRACE TANK	\$41,456			\$41,456
Water Tank	TK-105 - COURTRIGHT TANK	\$2,821			\$2,821
Water Tank	TK-106 - LUCAS VALLEY TANK	\$682,845			\$682,845
Water Tank	TK-108 - CLOUDVIEW TANK	\$99,750			\$99,750
Water Tank	TK-113 - SAUSALITO PUMP HOUSE TANK #1	\$253,937			\$253,937
Water Tank	TK-114 - SAUSALITO PUMP HOUSE TANK #2	\$253,937			\$253,937
Water Tank	TK-115 - ROMER TANK	\$253,937			\$253,937
Water Tank	TK-116 - SAUSALITO BLVD. TANK	\$67,845			\$67,845
Water Tank	TK-117 - MESA VISTA TANK #1	\$273,730			\$273,730
Water Tank	TK-118 - COUNTYVIEW DRIVE TANK	\$62,321			\$62,321
Water Tank	TK-119 - LATTIE LANE TANK	\$139,238			\$139,238
Water Tank	TK-125 - TENNESSEE VALLEY TANK	\$602,380			\$602,380
Water Tank	TK-126 - HILL HAVEN TANK	\$11,426			\$11,426
Water Tank	TK-127 - PARADISE DRIVE TANK	\$385,580			\$385,580
Water Tank	TK-128 - MOUNT TIBURON TANK #1	\$227,615			\$227,615
Water Tank	TK-130 - SPRING LANE TANK #1	\$426,675			\$426,675
Water Tank	TK-131 - CONIFER WAY TANK	\$326,225			\$326,225
Water Tank	TK-139 - BUCKEYE CIRCLE TANK	\$15,611			\$15,611
Water Tank	TK-145 - ROSS RESERVOIR	\$214,680			\$214,680
Water Tank	TK-146 - FORBES HILL RESERVOIR	\$1,331,000			\$1,331,000
Water Tank	TK-147 - SMITH SADDLE TANK #1	\$2,737,300			\$2,737,300
Water Tank	TK-148 - SMITH SADDLE TANK #2	\$2,318,700			\$2,318,700
Water Tank	TK-150 - LOS ALTOS TANK	\$6,119			\$6,119
Water Tank	TK-152 - MADERA PARK (H/P) TANK	\$1,123			\$1,123
Water Tank	TK-153 - RAFAEL HIGHLANDS (H/P) TANK	\$424			\$424
Water Tank	TK-155 - PINE MOUNTAIN TUNNEL TANK	\$2,116,710			\$2,116,710
Water Tank	TK-156 - BON TEMPE CLEARWELL TANK	\$881,920			\$881,920
Water Tank	TK-157 - SAN GERONIMO CLEARWELL TANK #1	\$1,164,920			\$1,164,920
Water Tank	TK-158 - FAWN DRIVE TANK	\$13,887			\$13,887
Water Tank	TK-159 - PEACOCK GAP TANK	\$128,890			\$128,890
Water Tank	TK-160 - MARIN BAY TANK	\$8,310			\$8,310
Water Tank	TK-164 - TOMAHAWK DRIVE TANK	\$14,508			\$14,508
Water Tank	TK-165 - ALTO TANK #2	\$1,367,130			\$1,367,130
Water Tank	TK-166 - RING MOUNTAIN TANK	\$13,623			\$13,623
Water Tank	TK-167 - CREEKSIDE DRIVE TANK	\$74,948			\$74,948
Water Tank	TK-168 - MCNEAR DRIVE #1 (H/P) TANK	\$455			\$455
Water Tank	TK-169 - MCNEAR DRIVE #2 (H/P) TANK	\$683			\$683
Water Tank	TK-174 - VIA MONTEBELLO (H/P) TANK	\$406			\$406
Water Tank	TK-175 - MARINSHIP TANK	\$467,895			\$467,895
Water Tank	TK-181 - REDWOOD DRIVE UPPER TANK	\$24,424			\$24,424
Water Tank	TK-182 - ALTA AVENUE TANK	\$203,530			\$203,530
Water Tank	TK-183 - MINE RIDGE TANK	\$84,218			\$84,218

Type	Facility Name	Functionality (%)					
		At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Water Tank	TK-055 - MILL VALLEY TANK	37.20	67.80	87.90	91.50	92.10	94.60
Water Tank	TK-060 - SCOTT HIGHLANDS TANK	33.30	58.90	76.00	79.30	80.50	86.50
Water Tank	TK-064 - STRAWBERRY TANK	41.60	63.90	74.50	76.80	78.20	84.70
Water Tank	TK-068 - ELDA DRIVE TANK	33.30	58.90	76.00	79.30	80.50	86.50
Water Tank	TK-069 - HAWTHORNE HILLS UPPER TANK	27.40	53.10	76.70	81.10	82.30	88.10
Water Tank	TK-074 - SCENIC AVENUE TANK	67.20	96.00	98.10	98.40	98.50	98.90
Water Tank	TK-078 - CHULA VISTA TANK	51.40	81.10	95.00	97.50	97.60	98.40
Water Tank	TK-081 - FAIRHILLS TOP TANK #1	62.20	90.30	98.10	99.50	99.50	99.60
Water Tank	TK-083 - GLENWOOD TANK	51.40	81.10	95.00	97.50	97.60	98.40
Water Tank	TK-085 - HIND TANK #1	63.80	78.20	78.90	79.50	80.60	86.40
Water Tank	TK-086 - HIND TANK #2	73.40	78.70	79.00	79.50	80.60	86.40
Water Tank	TK-087 - LOCH LOMOND TANK	49.80	78.20	91.60	94.00	94.40	96.10
Water Tank	TK-089 - LOS RANCHITOS TANK	33.30	58.90	76.00	79.30	80.50	86.50
Water Tank	TK-090 - MARINWOOD TANK	49.80	78.20	91.60	94.00	94.40	96.10
Water Tank	TK-091 - MARIN PROFESSIONAL CENTER TANK	24.80	45.80	63.90	67.70	69.60	79.00
Water Tank	TK-094 - MILLER CREEK TANK	44.60	69.10	80.70	83.00	84.00	88.80
Water Tank	TK-096 - PUERTO SUELLO TANK	31.60	55.20	71.00	74.10	75.70	83.10
Water Tank	TK-097 - RAFAEL HIGHLANDS TANK	51.20	80.60	94.50	96.90	97.10	98.00
Water Tank	TK-098 - SANTA MARGARITA TANK	33.30	58.90	76.00	79.30	80.50	86.50
Water Tank	TK-100 - SKYVIEW TERRACE TANK	37.50	68.40	88.80	92.40	92.90	95.20
Water Tank	TK-105 - COURTRIGHT TANK	67.10	97.50	99.60	99.90	99.90	99.90
Water Tank	TK-106 - LUCAS VALLEY TANK	42.00	64.50	75.30	77.60	78.90	85.20
Water Tank	TK-108 - CLOUDVIEW TANK	27.40	53.10	76.70	81.10	82.30	88.10
Water Tank	TK-113 - SAUSALITO PUMP HOUSE TANK #1	19.60	34.40	51.30	55.10	57.80	70.90
Water Tank	TK-114 - SAUSALITO PUMP HOUSE TANK #2	19.60	34.40	51.30	55.10	57.80	70.90
Water Tank	TK-115 - ROMER TANK	19.60	34.40	51.30	55.10	57.80	70.90
Water Tank	TK-116 - SAUSALITO BLVD. TANK	37.30	67.00	87.40	91.00	91.60	94.30
Water Tank	TK-117 - MESA VISTA TANK #1	31.40	54.70	70.20	73.40	75.00	82.60
Water Tank	TK-118 - COUNTYVIEW DRIVE TANK	28.50	56.10	79.70	84.00	85.00	89.90
Water Tank	TK-119 - LATTIE LANE TANK	31.20	54.20	69.60	72.80	74.40	82.10
Water Tank	TK-125 - TENNESSEE VALLEY TANK	25.50	47.70	66.80	70.70	72.40	81.00
Water Tank	TK-126 - HILL HAVEN TANK	69.80	93.40	98.80	99.70	99.70	99.80
Water Tank	TK-127 - PARADISE DRIVE TANK	55.90	73.90	78.20	79.30	80.50	86.30
Water Tank	TK-128 - MOUNT TIBURON TANK #1	42.00	64.50	75.30	77.60	78.90	85.20
Water Tank	TK-130 - SPRING LANE TANK #1	37.60	67.50	88.10	91.70	92.30	94.80
Water Tank	TK-131 - CONIFER WAY TANK	24.70	45.40	63.40	67.10	69.00	78.50
Water Tank	TK-139 - BUCKEYE CIRCLE TANK	32.40	58.50	72.10	75.00	76.40	83.50
Water Tank	TK-145 - ROSS RESERVOIR	47.30	76.70	91.70	94.40	94.70	96.40
Water Tank	TK-146 - FORBES HILL RESERVOIR	35.80	64.10	84.60	88.30	89.10	92.60
Water Tank	TK-147 - SMITH SADDLE TANK #1	31.40	54.70	70.20	73.40	75.00	82.60
Water Tank	TK-148 - SMITH SADDLE TANK #2	33.30	58.90	76.00	79.30	80.50	86.50
Water Tank	TK-150 - LOS ALTOS TANK	61.90	89.80	97.60	98.90	99.00	99.30
Water Tank	TK-152 - MADERA PARK (H/P) TANK	20.90	38.40	56.50	60.40	62.80	74.30
Water Tank	TK-153 - RAFAEL HIGHLANDS (H/P) TANK	51.20	80.60	94.50	96.90	97.10	98.00
Water Tank	TK-155 - PINE MOUNTAIN TUNNEL TANK	24.10	42.70	59.40	63.00	65.20	75.90
Water Tank	TK-156 - BON TEMPE CLEARWELL TANK	40.60	64.30	76.50	79.00	80.20	86.20
Water Tank	TK-157 - SAN GERONIMO CLEARWELL TANK #1	30.60	53.00	67.80	70.90	72.60	80.90
Water Tank	TK-158 - FAWN DRIVE TANK	49.30	82.80	95.80	98.00	98.10	98.70
Water Tank	TK-159 - PEACOCK GAP TANK	74.00	83.50	84.80	85.40	86.20	90.30
Water Tank	TK-160 - MARIN BAY TANK	69.80	93.40	98.80	99.70	99.70	99.80
Water Tank	TK-164 - TOMAHAWK DRIVE TANK	43.00	70.80	81.80	83.90	84.90	89.40
Water Tank	TK-165 - ALTO TANK #2	40.20	65.50	75.50	77.60	78.90	85.20
Water Tank	TK-166 - RING MOUNTAIN TANK	63.10	90.70	98.20	99.50	99.50	99.70
Water Tank	TK-167 - CREEKSIDE DRIVE TANK	49.70	70.80	76.90	78.30	79.60	85.60
Water Tank	TK-168 - MCNEAR DRIVE #1 (H/P) TANK	42.00	64.50	75.30	77.60	78.90	85.20
Water Tank	TK-169 - MCNEAR DRIVE #2 (H/P) TANK	42.00	64.50	75.30	77.60	78.90	85.20
Water Tank	TK-174 - VIA MONTEBELLO (H/P) TANK	56.30	87.40	97.40	99.20	99.20	99.50
Water Tank	TK-175 - MARINSHIP TANK	55.60	77.70	83.50	84.70	85.60	89.90
Water Tank	TK-181 - REDWOOD DRIVE UPPER TANK	38.40	69.90	79.00	81.00	82.10	87.40
Water Tank	TK-182 - ALTA AVENUE TANK	38.40	69.90	79.00	81.00	82.10	87.40
Water Tank	TK-183 - MINE RIDGE TANK	41.30	72.30	80.30	82.00	83.00	88.10

Type	Facility Name	Structure Replacement Cost	Structural - Probability of Damage				
			No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Water Tank	TK-184 - PACHECO RIDGE TANK #1	\$6,000,000	49.20%	37.54%	8.92%	3.47%	0.84%
Water Tank	TK-185 - PACHECO RIDGE TANK #2	\$6,000,000	49.20%	37.54%	8.92%	3.47%	0.84%
Water Tank	TK-186 - SAN GERONIMO CLEARWELL TANK #2	\$6,000,000	33.48%	30.32%	8.83%	21.60%	5.74%
Water Tank	TK-187 - MANZANITA TANK	\$120,000	18.29%	35.08%	19.05%	22.03%	5.53%
Water Tank	TK-188 - WOLFBACK RIDGE TANK #1	\$50,000	45.15%	42.14%	11.90%	0.66%	0.13%
Water Tank	TK-189 - WOLFBACK RIDGE TANK #2	\$50,000	45.15%	42.14%	11.90%	0.66%	0.13%
Water Tank	TK-190 - INVERNESS DRIVE TANK	\$280,000	44.67%	25.87%	4.90%	19.64%	4.90%
Water Tank	TK-191 - LONE TREE AVENUE TANK	\$200,000	26.12%	37.18%	15.29%	17.11%	4.28%
Water Tank	TK-192 - VERNAL AVE TANK	\$600,000	32.53%	46.31%	19.04%	1.74%	0.35%
Water Tank	TK-193 - H-LINE ROAD TANK	\$1,000,000	28.26%	34.05%	12.03%	20.52%	5.12%
Water Tank	TK-195 - Fire Road Pressure Tank	\$2,000	21.53%	35.28%	16.52%	21.31%	5.33%
Water Tank	TK-196 - WILSON WAY TANK	\$200,000	54.88%	37.85%	6.56%	0.56%	0.13%
Water Tank	TK-197 - SUMMIT TRAIL TANK	\$260,000	54.88%	37.85%	6.56%	0.56%	0.13%
Water Tank	TK-198 - SCOTT TANKS	\$120,000	42.24%	44.58%	11.32%	1.48%	0.35%
Water Tank	TK-199 - SCOTT TANKS	\$120,000	42.24%	44.58%	11.32%	1.48%	0.35%
Water Tank	TK-200 - OAK WOODLANDS TANK #1	\$230,000	57.39%	16.66%	1.42%	19.60%	4.90%
Water Tank	TK-201 - OAK WOODLANDS TANK #2	\$230,000	72.81%	21.14%	1.81%	3.38%	0.84%
Water Tank	TK-202 - Fairfax Manor 1st Lift Tank	\$40,000	31.68%	33.43%	8.49%	21.04%	5.33%
Water Tank	TK-203 - MONTE MAR VISTA TANK	\$120,000	48.56%	41.87%	8.85%	0.57%	0.13%
Water Tank	TK-204 - Bay Road Tank	\$240,000	8.40%	19.21%	53.06%	18.64%	0.67%
Water Tank	TK-205 - RICHARDSON DRIVE (H/P) TANK	\$2,000	61.61%	33.07%	4.62%	0.55%	0.13%
Water Tank	TK-206 - SANTA VENETIA TANK	\$620,000	55.25%	38.10%	6.61%	0.03%	0.00%
Water Tank	TK-207 - GOODHILL ROAD TANK	\$120,000	48.56%	41.87%	8.85%	0.57%	0.13%
Water Tank	TK-208 - SPRING LANE TANK #2	\$3,000,000	69.02%	27.87%	3.07%	0.01%	0.00%
Water Tank	TK-209 - FAIRHILLS TOP TANK #2	\$120,000	63.26%	32.36%	4.34%	0.02%	0.00%
Water Tank	TK-210 - BEACON HILL TANK	\$200,000	62.64%	32.05%	4.30%	0.80%	0.19%
Water Tank	TK-211 - Kent Fire Trail Tank #1	\$200,000	45.41%	31.31%	5.43%	14.25%	3.58%
Water Tank	TK-212 - Kent Fire Trail Tank #2	\$200,000	45.41%	31.31%	5.43%	14.25%	3.58%
Water Tank	TK-213 - MARIN CITY TANK	\$400,000	41.17%	28.39%	4.92%	20.37%	5.12%
Water Tank	TK-214 - SLIDE GULCH TANK	\$194,348	36.01%	31.05%	6.56%	21.02%	5.33%
Water Tank	TK-215 - SEQUOIA PARK TANK #1	\$220,000	46.22%	24.81%	3.47%	20.36%	5.12%
Water Tank	TK-216 - SEQUOIA PARK TANK #2	\$100,000	61.61%	33.07%	4.62%	0.55%	0.13%
Water Tank	TK-217 - KENT WOODLANDS 1ST LIFT TANK	\$200,000	54.88%	37.85%	6.56%	0.56%	0.13%
Water Tank	TK-218 - MOUNT TIBURON TANK #2	\$1,180,000	52.10%	21.04%	2.32%	19.61%	4.90%
Water Tank	TK-219 - OAK MANOR FIRST LIFT TANK	\$200,000	41.17%	28.39%	4.92%	20.37%	5.12%
Water Tank	TK-220 - TAM WOODS TOP TANK	\$160,000	36.01%	31.05%	6.56%	21.02%	5.33%
Water Tank	TK-221 - SUMMIT AVENUE LOWER TANK	\$200,000	48.01%	41.40%	8.75%	1.46%	0.35%
Water Tank	TK-222 - FRIAR TUCK LANE TANK	\$250,000	72.81%	21.14%	1.81%	3.38%	0.84%
Water Tank	TK-223 - CASCADE TANK #1	\$120,000	42.24%	44.58%	11.32%	1.48%	0.35%
Water Tank	TK-224 - CASCADE TANK #2	\$120,000	42.24%	44.58%	11.32%	1.48%	0.35%
Water Tank	TK-225 - SUGARLOAF TANK #1	\$254,000	57.39%	16.66%	1.42%	19.60%	4.90%
Water Tank	TK-226 - SUGARLOAF TANK #2	\$254,000	57.39%	16.66%	1.42%	19.60%	4.90%
Water Tank	TK-228 - GLENWOOD FOREST TANK	\$180,000	67.67%	13.96%	0.92%	13.94%	3.48%
Water Tank	TK-229 - KENT FIRE TRAIL TOP TANK	\$20,000	41.17%	28.39%	4.92%	20.37%	5.12%
Water Tank	TK-230 - SWIG TANK	\$100,000	51.99%	26.60%	3.57%	14.25%	3.58%
Water Tank	TK-232 - SKY RANCH TANK	\$240,000	42.24%	44.58%	11.32%	1.48%	0.35%
Water Tank	TK-233 - FAIRFAX MANOR TOP TANK	\$216,000	31.68%	33.43%	8.49%	21.04%	5.33%
Water Tank	TK-234 - TAM WOODS FIRST LIFT TANK	\$170,000	38.55%	33.24%	7.03%	16.88%	4.28%
Water Tank	TK-235 - FAIRVIEW PARK TANK	\$200,000	36.01%	31.05%	6.56%	21.02%	5.33%
Water Tank	TK-236 - FERN CANYON TANK	\$60,000	36.01%	31.05%	6.56%	21.02%	5.33%
Water Tank	TK-237 - CONIFER WAY UPPER TANK	\$200,000	27.45%	34.83%	10.50%	21.66%	5.53%
Water Tank	TK-238 - OAK AVENUE TANK	\$200,000	36.01%	31.05%	6.56%	21.02%	5.33%
Water Tank	TK-239 - ELINOR AVE TANK	\$226,000	41.17%	28.39%	4.92%	20.37%	5.12%
Water Tank	TK-240 - Summit Ave Upper Tank	\$240,000	38.55%	33.24%	7.03%	16.88%	4.28%
Water Tank	TK-241 - LAGUNITAS PICNIC GROUNDS TANK	\$1,100	67.06%	11.71%	0.08%	16.85%	4.28%
Water Tank	TK-243 - MARINER HIGHLANDS TANK	\$120,000	46.82%	25.13%	3.51%	19.62%	4.90%
Water Tank	TK-244 - UPPER ROAD TANK	\$80,000	41.17%	28.39%	4.92%	20.37%	5.12%
AVERAGE			34.52%	26.04%	19.95%	16.18%	3.28%



Type	Facility Name	Nonstructural Acceleration-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Water Tank	TK-184 - PACHECO RIDGE TANK #1					
Water Tank	TK-185 - PACHECO RIDGE TANK #2					
Water Tank	TK-186 - SAN GERONIMO CLEARWELL TANK #2					
Water Tank	TK-187 - MANZANITA TANK					
Water Tank	TK-188 - WOLFBACK RIDGE TANK #1					
Water Tank	TK-189 - WOLFBACK RIDGE TANK #2					
Water Tank	TK-190 - INVERNESS DRIVE TANK					
Water Tank	TK-191 - LONE TREE AVENUE TANK					
Water Tank	TK-192 - VERNAL AVE TANK					
Water Tank	TK-193 - H-LINE ROAD TANK					
Water Tank	TK-195 - Fire Road Pressure Tank					
Water Tank	TK-196 - WILSON WAY TANK					
Water Tank	TK-197 - SUMMIT TRAIL TANK					
Water Tank	TK-198 - SCOTT TANKS					
Water Tank	TK-199 - SCOTT TANKS					
Water Tank	TK-200 - OAK WOODLANDS TANK #1					
Water Tank	TK-201 - OAK WOODLANDS TANK #2					
Water Tank	TK-202 - Fairfax Manor 1st Lift Tank					
Water Tank	TK-203 - MONTE MAR VISTA TANK					
Water Tank	TK-204 - Bay Road Tank					
Water Tank	TK-205 - RICHARDSON DRIVE (H/P) TANK					
Water Tank	TK-206 - SANTA VENETIA TANK					
Water Tank	TK-207 - GOODHILL ROAD TANK					
Water Tank	TK-208 - SPRING LANE TANK #2					
Water Tank	TK-209 - FAIRHILLS TOP TANK #2					
Water Tank	TK-210 - BEACON HILL TANK					
Water Tank	TK-211 - Kent Fire Trail Tank #1					
Water Tank	TK-212 - Kent Fire Trail Tank #2					
Water Tank	TK-213 - MARIN CITY TANK					
Water Tank	TK-214 - SLIDE GULCH TANK					
Water Tank	TK-215 - SEQUOIA PARK TANK #1					
Water Tank	TK-216 - SEQUOIA PARK TANK #2					
Water Tank	TK-217 - KENT WOODLANDS 1ST LIFT TANK					
Water Tank	TK-218 - MOUNT TIBURON TANK #2					
Water Tank	TK-219 - OAK MANOR FIRST LIFT TANK					
Water Tank	TK-220 - TAM WOODS TOP TANK					
Water Tank	TK-221 - SUMMIT AVENUE LOWER TANK					
Water Tank	TK-222 - FRIAR TUCK LANE TANK					
Water Tank	TK-223 - CASCADE TANK #1					
Water Tank	TK-224 - CASCADE TANK #2					
Water Tank	TK-225 - SUGARLOAF TANK #1					
Water Tank	TK-226 - SUGARLOAF TANK #2					
Water Tank	TK-228 - GLENWOOD FOREST TANK					
Water Tank	TK-229 - KENT FIRE TRAIL TOP TANK					
Water Tank	TK-230 - SWIG TANK					
Water Tank	TK-232 - SKY RANCH TANK					
Water Tank	TK-233 - FAIRFAX MANOR TOP TANK					
Water Tank	TK-234 - TAM WOODS FIRST LIFT TANK					
Water Tank	TK-235 - FAIRVIEW PARK TANK					
Water Tank	TK-236 - FERN CANYON TANK					
Water Tank	TK-237 - CONIFER WAY UPPER TANK					
Water Tank	TK-238 - OAK AVENUE TANK					
Water Tank	TK-239 - ELINOR AVE TANK					
Water Tank	TK-240 - Summit Ave Upper Tank					
Water Tank	TK-241 - LAGUNITAS PICNIC GROUNDS TANK					
Water Tank	TK-243 - MARINER HIGHLANDS TANK					
Water Tank	TK-244 - UPPER ROAD TANK					
<b>AVERAGE</b>		<b>29.18%</b>	<b>32.30%</b>	<b>13.39%</b>	<b>20.27%</b>	<b>4.85%</b>

Type	Facility Name	Nonstructural Drift-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Water Tank	TK-184 - PACHECO RIDGE TANK #1					
Water Tank	TK-185 - PACHECO RIDGE TANK #2					
Water Tank	TK-186 - SAN GERONIMO CLEARWELL TANK #2					
Water Tank	TK-187 - MANZANITA TANK					
Water Tank	TK-188 - WOLFBACK RIDGE TANK #1					
Water Tank	TK-189 - WOLFBACK RIDGE TANK #2					
Water Tank	TK-190 - INVERNESS DRIVE TANK					
Water Tank	TK-191 - LONE TREE AVENUE TANK					
Water Tank	TK-192 - VERNAL AVE TANK					
Water Tank	TK-193 - H-LINE ROAD TANK					
Water Tank	TK-195 - Fire Road Pressure Tank					
Water Tank	TK-196 - WILSON WAY TANK					
Water Tank	TK-197 - SUMMIT TRAIL TANK					
Water Tank	TK-198 - SCOTT TANKS					
Water Tank	TK-199 - SCOTT TANKS					
Water Tank	TK-200 - OAK WOODLANDS TANK #1					
Water Tank	TK-201 - OAK WOODLANDS TANK #2					
Water Tank	TK-202 - Fairfax Manor 1st Lift Tank					
Water Tank	TK-203 - MONTE MAR VISTA TANK					
Water Tank	TK-204 - Bay Road Tank					
Water Tank	TK-205 - RICHARDSON DRIVE (H/P) TANK					
Water Tank	TK-206 - SANTA VENETIA TANK					
Water Tank	TK-207 - GOODHILL ROAD TANK					
Water Tank	TK-208 - SPRING LANE TANK #2					
Water Tank	TK-209 - FAIRHILLS TOP TANK #2					
Water Tank	TK-210 - BEACON HILL TANK					
Water Tank	TK-211 - Kent Fire Trail Tank #1					
Water Tank	TK-212 - Kent Fire Trail Tank #2					
Water Tank	TK-213 - MARIN CITY TANK					
Water Tank	TK-214 - SLIDE GULCH TANK					
Water Tank	TK-215 - SEQUOIA PARK TANK #1					
Water Tank	TK-216 - SEQUOIA PARK TANK #2					
Water Tank	TK-217 - KENT WOODLANDS 1ST LIFT TANK					
Water Tank	TK-218 - MOUNT TIBURON TANK #2					
Water Tank	TK-219 - OAK MANOR FIRST LIFT TANK					
Water Tank	TK-220 - TAM WOODS TOP TANK					
Water Tank	TK-221 - SUMMIT AVENUE LOWER TANK					
Water Tank	TK-222 - FRIAR TUCK LANE TANK					
Water Tank	TK-223 - CASCADE TANK #1					
Water Tank	TK-224 - CASCADE TANK #2					
Water Tank	TK-225 - SUGARLOAF TANK #1					
Water Tank	TK-226 - SUGARLOAF TANK #2					
Water Tank	TK-228 - GLENWOOD FOREST TANK					
Water Tank	TK-229 - KENT FIRE TRAIL TOP TANK					
Water Tank	TK-230 - SWIG TANK					
Water Tank	TK-232 - SKY RANCH TANK					
Water Tank	TK-233 - FAIRFAX MANOR TOP TANK					
Water Tank	TK-234 - TAM WOODS FIRST LIFT TANK					
Water Tank	TK-235 - FAIRVIEW PARK TANK					
Water Tank	TK-236 - FERN CANYON TANK					
Water Tank	TK-237 - CONIFER WAY UPPER TANK					
Water Tank	TK-238 - OAK AVENUE TANK					
Water Tank	TK-239 - ELINOR AVE TANK					
Water Tank	TK-240 - Summit Ave Upper Tank					
Water Tank	TK-241 - LAGUNITAS PICNIC GROUNDS TANK					
Water Tank	TK-243 - MARINER HIGHLANDS TANK					
Water Tank	TK-244 - UPPER ROAD TANK					
<b>AVERAGE</b>		<b>40.76%</b>	<b>25.75%</b>	<b>9.90%</b>	<b>18.79%</b>	<b>4.78%</b>

Type	Facility Name	Losses (in dollars)			
		Structure	Nonstructural Drift Sensitive	Nonstructural Acceleration-Sensitive	Total Building Loss
Water Tank	TK-184 - PACHECO RIDGE TANK #1	\$368,220			\$368,220
Water Tank	TK-185 - PACHECO RIDGE TANK #2	\$368,220			\$368,220
Water Tank	TK-186 - SAN GERONIMO CLEARWELL TANK #2	\$1,292,430			\$1,292,430
Water Tank	TK-187 - MANZANITA TANK	\$28,031			\$28,031
Water Tank	TK-188 - WOLFBACK RIDGE TANK #1	\$2,209			\$2,209
Water Tank	TK-189 - WOLFBACK RIDGE TANK #2	\$2,209			\$2,209
Water Tank	TK-190 - INVERNESS DRIVE TANK	\$52,395			\$52,395
Water Tank	TK-191 - LONE TREE AVENUE TANK	\$37,397			\$37,397
Water Tank	TK-192 - VERNAL AVE TANK	\$39,393			\$39,393
Water Tank	TK-193 - H-LINE ROAD TANK	\$209,390			\$209,390
Water Tank	TK-195 - Fire Road Pressure Tank	\$447			\$447
Water Tank	TK-196 - WILSON WAY TANK	\$6,685			\$6,685
Water Tank	TK-197 - SUMMIT TRAIL TANK	\$8,691			\$8,691
Water Tank	TK-198 - SCOTT TANKS	\$6,198			\$6,198
Water Tank	TK-199 - SCOTT TANKS	\$6,198			\$6,198
Water Tank	TK-200 - OAK WOODLANDS TANK #1	\$40,724			\$40,724
Water Tank	TK-201 - OAK WOODLANDS TANK #2	\$9,652			\$9,652
Water Tank	TK-202 - Fairfax Manor 1st Lift Tank	\$8,360			\$8,360
Water Tank	TK-203 - MONTE MAR VISTA TANK	\$4,672			\$4,672
Water Tank	TK-204 - Bay Road Tank	\$49,856			\$49,856
Water Tank	TK-205 - RICHARDSON DRIVE (H/P) TANK	\$56			\$56
Water Tank	TK-206 - SANTA VENETIA TANK	\$18,070			\$18,070
Water Tank	TK-207 - GOODHILL ROAD TANK	\$4,672			\$4,672
Water Tank	TK-208 - SPRING LANE TANK #2	\$55,800			\$55,800
Water Tank	TK-209 - FAIRHILLS TOP TANK #2	\$2,737			\$2,737
Water Tank	TK-210 - BEACON HILL TANK	\$5,835			\$5,835
Water Tank	TK-211 - Kent Fire Trail Tank #1	\$29,020			\$29,020
Water Tank	TK-212 - Kent Fire Trail Tank #2	\$29,020			\$29,020
Water Tank	TK-213 - MARIN CITY TANK	\$77,998			\$77,998
Water Tank	TK-214 - SLIDE GULCH TANK	\$39,800			\$39,800
Water Tank	TK-215 - SEQUOIA PARK TANK #1	\$42,013			\$42,013
Water Tank	TK-216 - SEQUOIA PARK TANK #2	\$2,807			\$2,807
Water Tank	TK-217 - KENT WOODLANDS 1ST LIFT TANK	\$6,685			\$6,685
Water Tank	TK-218 - MOUNT TIBURON TANK #2	\$213,179			\$213,179
Water Tank	TK-219 - OAK MANOR FIRST LIFT TANK	\$38,999			\$38,999
Water Tank	TK-220 - TAM WOODS TOP TANK	\$32,766			\$32,766
Water Tank	TK-221 - SUMMIT AVENUE LOWER TANK	\$9,217			\$9,217
Water Tank	TK-222 - FRIAR TUCK LANE TANK	\$10,491			\$10,491
Water Tank	TK-223 - CASCADE TANK #1	\$6,198			\$6,198
Water Tank	TK-224 - CASCADE TANK #2	\$6,198			\$6,198
Water Tank	TK-225 - SUGARLOAF TANK #1	\$44,973			\$44,973
Water Tank	TK-226 - SUGARLOAF TANK #2	\$44,973			\$44,973
Water Tank	TK-228 - GLENWOOD FOREST TANK	\$22,824			\$22,824
Water Tank	TK-229 - KENT FIRE TRAIL TOP TANK	\$3,900			\$3,900
Water Tank	TK-230 - SWIG TANK	\$13,996			\$13,996
Water Tank	TK-232 - SKY RANCH TANK	\$12,396			\$12,396
Water Tank	TK-233 - FAIRFAX MANOR TOP TANK	\$45,142			\$45,142
Water Tank	TK-234 - TAM WOODS FIRST LIFT TANK	\$29,112			\$29,112
Water Tank	TK-235 - FAIRVIEW PARK TANK	\$40,957			\$40,957
Water Tank	TK-236 - FERN CANYON TANK	\$12,287			\$12,287
Water Tank	TK-237 - CONIFER WAY UPPER TANK	\$43,685			\$43,685
Water Tank	TK-238 - OAK AVENUE TANK	\$40,957			\$40,957
Water Tank	TK-239 - ELINOR AVE TANK	\$44,069			\$44,069
Water Tank	TK-240 - Summit Ave Upper Tank	\$41,099			\$41,099
Water Tank	TK-241 - LAGUNITAS PICNIC GROUNDS TANK	\$165			\$165
Water Tank	TK-243 - MARINER HIGHLANDS TANK	\$22,146			\$22,146
Water Tank	TK-244 - UPPER ROAD TANK	\$15,600			\$15,600
<b>AVERAGE</b>		<b>\$109,257,049</b>	<b>\$17,605</b>	<b>\$22,329</b>	<b>\$109,296,982</b>

Type	Facility Name	Functionality (%)					
		At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Water Tank	TK-184 - PACHECO RIDGE TANK #1	63.30	91.60	95.60	96.30	96.50	97.50
Water Tank	TK-185 - PACHECO RIDGE TANK #2	63.30	91.60	95.60	96.30	96.50	97.50
Water Tank	TK-186 - SAN GERONIMO CLEARWELL TANK #2	48.30	71.80	75.90	77.10	78.40	84.80
Water Tank	TK-187 - MANZANITA TANK	36.90	66.30	75.00	76.90	78.20	84.70
Water Tank	TK-188 - WOLFBACK RIDGE TANK #1	60.80	93.10	98.40	99.30	99.30	99.50
Water Tank	TK-189 - WOLFBACK RIDGE TANK #2	60.80	93.10	98.40	99.30	99.30	99.50
Water Tank	TK-190 - INVERNESS DRIVE TANK	56.90	76.20	78.60	79.40	80.60	86.40
Water Tank	TK-191 - LONE TREE AVENUE TANK	43.70	73.60	80.50	82.10	83.10	88.10
Water Tank	TK-192 - VERNAL AVE TANK	51.20	88.30	96.70	98.20	98.30	98.80
Water Tank	TK-193 - H-LINE ROAD TANK	44.70	71.60	77.20	78.50	79.80	85.80
Water Tank	TK-195 - Fire Road Pressure Tank	39.50	68.40	76.00	77.70	79.00	85.20
Water Tank	TK-196 - WILSON WAY TANK	68.00	96.00	98.90	99.40	99.40	99.60
Water Tank	TK-197 - SUMMIT TRAIL TANK	68.00	96.00	98.90	99.40	99.40	99.60
Water Tank	TK-198 - SCOTT TANKS	58.70	92.50	97.50	98.40	98.50	98.90
Water Tank	TK-199 - SCOTT TANKS	58.70	92.50	97.50	98.40	98.50	98.90
Water Tank	TK-200 - OAK WOODLANDS TANK #1	66.00	78.00	78.90	79.50	80.60	86.40
Water Tank	TK-201 - OAK WOODLANDS TANK #2	80.20	95.40	96.20	96.40	96.60	97.60
Water Tank	TK-202 - Fairfax Manor 1st Lift Tank	47.30	72.80	76.80	77.90	79.20	85.30
Water Tank	TK-203 - MONTE MAR VISTA TANK	63.50	94.80	98.70	99.30	99.40	99.50
Water Tank	TK-204 - Bay Road Tank	28.50	56.10	79.70	84.00	85.00	89.90
Water Tank	TK-205 - RICHARDSON DRIVE (H/P) TANK	72.90	97.00	99.00	99.40	99.40	99.60
Water Tank	TK-206 - SANTA VENETIA TANK	68.40	96.50	99.40	99.90	99.90	99.90
Water Tank	TK-207 - GOODHILL ROAD TANK	63.50	94.80	98.70	99.30	99.40	99.50
Water Tank	TK-208 - SPRING LANE TANK #2	78.20	98.30	99.70	99.90	99.90	99.90
Water Tank	TK-209 - FAIRHILLS TOP TANK #2	74.10	97.70	99.60	99.90	99.90	99.90
Water Tank	TK-210 - BEACON HILL TANK	73.50	96.90	98.80	99.10	99.20	99.40
Water Tank	TK-211 - Kent Fire Trail Tank #1	58.60	81.70	84.30	85.00	85.90	90.10
Water Tank	TK-212 - Kent Fire Trail Tank #2	58.60	81.70	84.30	85.00	85.90	90.10
Water Tank	TK-213 - MARIN CITY TANK	54.30	75.40	77.80	78.60	79.90	85.80
Water Tank	TK-214 - SLIDE GULCH TANK	50.40	73.80	76.90	77.90	79.20	85.40
Water Tank	TK-215 - SEQUOIA PARK TANK #1	57.90	76.10	77.90	78.70	79.90	85.80
Water Tank	TK-216 - SEQUOIA PARK TANK #2	72.90	97.00	99.00	99.40	99.40	99.60
Water Tank	TK-217 - KENT WOODLANDS 1ST LIFT TANK	68.00	96.00	98.90	99.40	99.40	99.60
Water Tank	TK-218 - MOUNT TIBURON TANK #2	62.30	77.60	78.80	79.50	80.60	86.40
Water Tank	TK-219 - OAK MANOR FIRST LIFT TANK	54.30	75.40	77.80	78.60	79.90	85.80
Water Tank	TK-220 - TAM WOODS TOP TANK	50.40	73.80	76.90	77.90	79.20	85.40
Water Tank	TK-221 - SUMMIT AVENUE LOWER TANK	62.90	93.90	97.70	98.40	98.50	98.90
Water Tank	TK-222 - FRIAR TUCK LANE TANK	80.20	95.40	96.20	96.40	96.60	97.60
Water Tank	TK-223 - CASCADE TANK #1	58.70	92.50	97.50	98.40	98.50	98.90
Water Tank	TK-224 - CASCADE TANK #2	58.70	92.50	97.50	98.40	98.50	98.90
Water Tank	TK-225 - SUGARLOAF TANK #1	66.00	78.00	78.90	79.50	80.60	86.40
Water Tank	TK-226 - SUGARLOAF TANK #2	66.00	78.00	78.90	79.50	80.60	86.40
Water Tank	TK-228 - GLENWOOD FOREST TANK	74.40	84.40	85.00	85.40	86.20	90.30
Water Tank	TK-229 - KENT FIRE TRAIL TOP TANK	54.30	75.40	77.80	78.60	79.90	85.80
Water Tank	TK-230 - SWIG TANK	63.30	82.70	84.50	85.10	85.90	90.10
Water Tank	TK-232 - SKY RANCH TANK	58.70	92.50	97.50	98.40	98.50	98.90
Water Tank	TK-233 - FAIRFAX MANOR TOP TANK	47.30	72.80	76.80	77.90	79.20	85.30
Water Tank	TK-234 - TAM WOODS FIRST LIFT TANK	53.10	78.00	81.30	82.30	83.30	88.20
Water Tank	TK-235 - FAIRVIEW PARK TANK	50.40	73.80	76.90	77.90	79.20	85.40
Water Tank	TK-236 - FERN CANYON TANK	50.40	73.80	76.90	77.90	79.20	85.40
Water Tank	TK-237 - CONIFER WAY UPPER TANK	44.00	71.00	75.90	77.20	78.50	84.90
Water Tank	TK-238 - OAK AVENUE TANK	50.40	73.80	76.90	77.90	79.20	85.40
Water Tank	TK-239 - ELINOR AVE TANK	54.30	75.40	77.80	78.60	79.90	85.80
Water Tank	TK-240 - Summit Ave Upper Tank	53.10	78.00	81.30	82.30	83.30	88.20
Water Tank	TK-241 - LAGUNITAS PICNIC GROUNDS TANK	73.40	81.60	81.90	82.30	83.30	88.20
Water Tank	TK-243 - MARINER HIGHLANDS TANK	58.50	76.90	78.70	79.50	80.60	86.40
Water Tank	TK-244 - UPPER ROAD TANK	54.30	75.40	77.80	78.60	79.90	85.80
AVERAGE		52.32	72.64	82.47	85.91	89.83	94.16

			Structural - Probability of Damage				
Type	Facility Name	Structure Replacement Cost	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Pump Station	PS-049 - Channing Way Pump Station	\$1,000,000	7.29%	15.87%	37.96%	33.53%	5.34%
Pump Station	PS-111 - Quail Hill Pump Station	\$1,000,000	50.99%	32.46%	15.42%	0.98%	0.13%
Pump Station	PS-112 - Freitas Parkway Pump Station	\$1,000,000	68.92%	27.23%	3.16%	0.54%	0.13%
Water Tank	TK-103 - TERRA LINDA TANK #1	\$1,000,000	13.45%	20.12%	34.58%	26.65%	5.19%
Water Tank	TK-170 - TERRA LINDA TANK #2	\$1,000,000	23.36%	27.81%	22.10%	21.60%	5.12%
Water Tank	TK-227 - LGWRP Clearwell	\$1,800,000	32.46%	34.26%	8.70%	19.66%	4.90%
<b>AVERAGE</b>			<b>32.75%</b>	<b>26.29%</b>	<b>20.32%</b>	<b>17.16%</b>	<b>3.47%</b>

Type	Facility Name	Nonstructural Acceleration-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Pump Station	PS-049 - Channing Way Pump Station					
Pump Station	PS-111 - Quail Hill Pump Station					
Pump Station	PS-112 - Freitas Parkway Pump Station					
Water Tank	TK-103 - TERRA LINDA TANK #1					
Water Tank	TK-170 - TERRA LINDA TANK #2					
Water Tank	TK-227 - LGWRP Clearwell					
<b>AVERAGE</b>		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Type	Facility Name	Nonstructural Drift-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Pump Station	PS-049 - Channing Way Pump Station					
Pump Station	PS-111 - Quail Hill Pump Station					
Pump Station	PS-112 - Freitas Parkway Pump Station					
Water Tank	TK-103 - TERRA LINDA TANK #1					
Water Tank	TK-170 - TERRA LINDA TANK #2					
Water Tank	TK-227 - LGWRP Clearwell					
<b>AVERAGE</b>		<b>#DIV/0!</b>	<b>#DIV/0!</b>	<b>#DIV/0!</b>	<b>#DIV/0!</b>	<b>#DIV/0!</b>



Type	Facility Name	Losses (in dollars)			
		Structure	Nonstructural Drift-Sensitive	Nonstructural Acceleration- Sensitive	Total Building Loss
Pump Station	PS-049 - Channing Way Pump Station	\$319,455			\$319,455
Pump Station	PS-111 - Quail Hill Pump Station	\$46,540			\$46,540
Pump Station	PS-112 - Freitas Parkway Pump Station	\$22,895			\$22,895
Water Tank	TK-103 - TERRA LINDA TANK #1	\$273,730			\$273,730
Water Tank	TK-170 - TERRA LINDA TANK #2	\$227,855			\$227,855
Water Tank	TK-227 - LGWRP Clearwell	\$354,852			\$354,852
<b>AVERAGE</b>		<b>\$1,245,327</b>	<b>\$0</b>	<b>\$0</b>	<b>\$1,245,327</b>

Type	Facility Name	Functionality (%)					
		At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Pump Station	PS-049 - Channing Way Pump Station	17.60	44.20	65.10	70.60	87.40	99.10
Pump Station	PS-111 - Quail Hill Pump Station	63.20	90.90	98.90	99.10	99.60	99.90
Pump Station	PS-112 - Freitas Parkway Pump Station	78.30	97.50	99.30	99.40	99.70	99.90
Water Tank	TK-103 - TERRA LINDA TANK #1	31.40	54.70	70.20	73.40	75.00	82.60
Water Tank	TK-170 - TERRA LINDA TANK #2	40.20	65.50	75.50	77.60	78.90	85.20
Water Tank	TK-227 - LGWRP Clearwell	48.10	74.20	78.30	79.40	80.60	86.40
<b>AVERAGE</b>		<b>46.47</b>	<b>71.17</b>	<b>81.22</b>	<b>83.25</b>	<b>86.87</b>	<b>92.18</b>

Replacement Cost	Total Number of Leaks	Total Number of Breaks	Total Number of Repairs	Days to Repair Leaks	Days to Repair Breaks	Total Days of Repairs	Economic Loss
\$3,215,180,970	113.9	28.5	142.4	16.3	4.1	20.3	\$712,085

Replacement Cost	Total Number of Leaks	Total Number of Breaks	Total Number of Repairs	Days to Repair Leaks	Days to Repair Breaks	Total Days of Repairs	Economic Loss
\$90,567,746	1.8	0.4	2.2	0.3	0.1	0.3	\$10,938

			Structural - Probability of Damage				
Type	Facility Name	Structure Replacement Cost	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Building	Administration Building - Headquarter Office	\$8,192,293	53.15%	42.15%	4.67%	0.01%	0.00%
Building	Corporation Yard - Boat Barn	\$1,000,000	64.04%	28.38%	1.77%	4.63%	1.15%
Building	Corporation Yard - Facilities Offices	\$15,000,000	67.98%	30.13%	1.87%	0.00%	0.00%
Building	Corporation Yard - Laboratory	\$5,000,000	89.63%	10.18%	0.18%	0.00%	0.00%
Building	Corporation Yard - Satellite Office	\$500,000	38.28%	25.05%	7.67%	23.21%	5.77%
Building	Pelican Yard - Vehicle Storage	\$500,000	69.59%	15.88%	0.71%	11.04%	2.76%
Building	Pelican Yard - Vehicle Storage	\$750,000	69.59%	15.88%	0.71%	11.04%	2.76%
Building	Ranger Housing - Alpine Dam - Residence	\$500,000	98.56%	1.35%	0.07%	0.00%	0.00%
Building	Ranger Housing - Lagunitas Dam	\$250,000	99.83%	0.16%	0.00%	0.00%	0.00%
Building	Ranger Housing - Lagunitas Dam	\$500,000	99.83%	0.16%	0.00%	0.00%	0.00%
Building	Ranger Housing - Phoenix Dam - Residence	\$500,000	99.62%	0.37%	0.00%	0.00%	0.00%
Building	Ranger Housing - Phoenix Dam - Shed	\$46,514	99.46%	0.53%	0.00%	0.00%	0.00%
Building	Ranger Housing - Portius House	\$500,000	99.95%	0.04%	0.00%	0.00%	0.00%
Building	Ranger Housing - Portius House - Garage	\$236,142	99.97%	0.02%	0.00%	0.00%	0.00%
Building	Ranger Housing - Portius House - Shed	\$99,111	99.46%	0.53%	0.00%	0.00%	0.00%
Building	Ranger Housing - Portius House - Shed	\$47,981	99.46%	0.53%	0.00%	0.00%	0.00%
Building	Ranger Housing - Sky Oaks - Residence	\$500,000	99.62%	0.37%	0.00%	0.00%	0.00%
Building	Ranger Housing - Soulajule Residence	\$500,000	99.83%	0.16%	0.00%	0.00%	0.00%
Building	Sky Oaks Headquarters - Entrance Kiosk	\$23,793	99.95%	0.04%	0.00%	0.00%	0.00%
Building	Sky Oaks Headquarters - Fisheries Office	\$272,737	98.56%	1.35%	0.07%	0.00%	0.00%
Building	Sky Oaks Headquarters - Headquarter Office	\$1,500,000	99.91%	0.08%	0.00%	0.00%	0.00%
Building	Sky Oaks Headquarters - Seed Shed	\$83,465	99.46%	0.53%	0.00%	0.00%	0.00%
Building	Sky Oaks Headquarters - Storage Shed	\$131,768	99.46%	0.53%	0.00%	0.00%	0.00%
Building	Sky Oaks Headquarters - Watershed Office	\$676,918	95.36%	4.30%	0.33%	0.00%	0.00%
<b>Average or Total</b>			<b>89.19%</b>	<b>7.45%</b>	<b>0.75%</b>	<b>2.08%</b>	<b>0.52%</b>

Type	Facility Name	Nonstructural Acceleration-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Building	Administration Building - Headquarter Office	64.00%	29.48%	6.11%	0.37%	0.01%
Building	Corporation Yard - Boat Barn	62.88%	26.03%	4.99%	4.91%	1.17%
Building	Corporation Yard - Facilities Offices	66.74%	27.63%	5.30%	0.29%	0.01%
Building	Corporation Yard - Laboratory	71.74%	24.07%	3.97%	0.20%	0.00%
Building	Corporation Yard - Satellite Office	52.70%	15.86%	2.43%	23.22%	5.77%
Building	Pelican Yard - Vehicle Storage	51.48%	27.75%	6.48%	11.49%	2.78%
Building	Pelican Yard - Vehicle Storage	51.48%	27.75%	6.48%	11.49%	2.78%
Building	Ranger Housing - Alpine Dam - Residence	94.23%	5.44%	0.31%	0.01%	0.00%
Building	Ranger Housing - Lagunitas Dam	96.89%	2.97%	0.13%	0.00%	0.00%
Building	Ranger Housing - Lagunitas Dam	96.89%	2.97%	0.13%	0.00%	0.00%
Building	Ranger Housing - Phoenix Dam - Residence	95.85%	3.94%	0.20%	0.00%	0.00%
Building	Ranger Housing - Phoenix Dam - Shed	88.59%	10.48%	0.88%	0.03%	0.00%
Building	Ranger Housing - Portius House	99.65%	0.32%	0.01%	0.00%	0.00%
Building	Ranger Housing - Portius House - Garage	99.42%	0.55%	0.02%	0.00%	0.00%
Building	Ranger Housing - Portius House - Shed	88.59%	10.48%	0.88%	0.03%	0.00%
Building	Ranger Housing - Portius House - Shed	88.59%	10.48%	0.88%	0.03%	0.00%
Building	Ranger Housing - Sky Oaks - Residence	95.85%	3.94%	0.20%	0.00%	0.00%
Building	Ranger Housing - Soulajule Residence	96.89%	2.97%	0.13%	0.00%	0.00%
Building	Sky Oaks Headquarters - Entrance Kiosk	96.91%	2.95%	0.13%	0.00%	0.00%
Building	Sky Oaks Headquarters - Fisheries Office	94.23%	5.44%	0.31%	0.01%	0.00%
Building	Sky Oaks Headquarters - Headquarter Office	93.29%	6.29%	0.39%	0.01%	0.00%
Building	Sky Oaks Headquarters - Seed Shed	88.59%	10.48%	0.88%	0.03%	0.00%
Building	Sky Oaks Headquarters - Storage Shed	88.59%	10.48%	0.88%	0.03%	0.00%
Building	Sky Oaks Headquarters - Watershed Office	89.87%	9.35%	0.73%	0.02%	0.00%
<b>Average or Total</b>		<b>83.91%</b>	<b>11.59%</b>	<b>1.79%</b>	<b>2.17%</b>	<b>0.52%</b>

Type	Facility Name	Nonstructural Drift-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Building	Administration Building - Headquarter Office	52.82%	34.60%	12.40%	0.14%	0.01%
Building	Corporation Yard - Boat Barn	62.39%	25.55%	6.20%	4.68%	1.15%
Building	Corporation Yard - Facilities Offices	66.22%	27.12%	6.59%	0.05%	0.00%
Building	Corporation Yard - Laboratory	86.49%	12.21%	1.27%	0.01%	0.00%
Building	Corporation Yard - Satellite Office	37.97%	23.48%	9.42%	23.33%	5.77%
Building	Pelican Yard - Vehicle Storage	67.08%	16.12%	2.95%	11.07%	2.76%
Building	Pelican Yard - Vehicle Storage	67.08%	16.12%	2.95%	11.07%	2.76%
Building	Ranger Housing - Alpine Dam - Residence	97.35%	2.42%	0.22%	0.00%	0.00%
Building	Ranger Housing - Lagunitas Dam	99.51%	0.45%	0.02%	0.00%	0.00%
Building	Ranger Housing - Lagunitas Dam	99.51%	0.45%	0.02%	0.00%	0.00%
Building	Ranger Housing - Phoenix Dam - Residence	99.06%	0.89%	0.03%	0.00%	0.00%
Building	Ranger Housing - Phoenix Dam - Shed	98.90%	1.05%	0.04%	0.00%	0.00%
Building	Ranger Housing - Portius House	99.25%	0.71%	0.02%	0.00%	0.00%
Building	Ranger Housing - Portius House - Garage	99.48%	0.49%	0.01%	0.00%	0.00%
Building	Ranger Housing - Portius House - Shed	98.90%	1.05%	0.04%	0.00%	0.00%
Building	Ranger Housing - Portius House - Shed	98.90%	1.05%	0.04%	0.00%	0.00%
Building	Ranger Housing - Sky Oaks - Residence	99.06%	0.89%	0.03%	0.00%	0.00%
Building	Ranger Housing - Soulajule Residence	99.51%	0.45%	0.02%	0.00%	0.00%
Building	Sky Oaks Headquarters - Entrance Kiosk	99.83%	0.15%	0.01%	0.00%	0.00%
Building	Sky Oaks Headquarters - Fisheries Office	97.35%	2.42%	0.22%	0.00%	0.00%
Building	Sky Oaks Headquarters - Headquarter Office	99.76%	0.22%	0.01%	0.00%	0.00%
Building	Sky Oaks Headquarters - Seed Shed	98.90%	1.05%	0.04%	0.00%	0.00%
Building	Sky Oaks Headquarters - Storage Shed	98.90%	1.05%	0.04%	0.00%	0.00%
Building	Sky Oaks Headquarters - Watershed Office	93.15%	6.08%	0.76%	0.00%	0.00%
<b>Average or Total</b>		<b>88.22%</b>	<b>7.34%</b>	<b>1.81%</b>	<b>2.10%</b>	<b>0.52%</b>

Type	Facility Name	Losses (in dollars)			
		Structure	Nonstructural Drift-Sensitive	Nonstructural Acceleration- Sensitive	Total Building Loss
Building	Administration Building - Headquarter Office	\$21,160	\$55,515	\$50,519	\$127,194
Building	Corporation Yard - Boat Barn	\$13,496	\$12,370	\$15,075	\$40,941
Building	Corporation Yard - Facilities Offices	\$23,408	\$62,327	\$82,443	\$168,177
Building	Corporation Yard - Laboratory	\$2,207	\$6,451	\$21,800	\$30,458
Building	Corporation Yard - Satellite Office	\$17,910	\$30,998	\$31,835	\$80,743
Building	Pelican Yard - Vehicle Storage	\$14,004	\$11,830	\$15,308	\$41,141
Building	Pelican Yard - Vehicle Storage	\$21,005	\$17,746	\$22,961	\$61,712
Building	Ranger Housing - Alpine Dam - Residence	\$42	\$176	\$182	\$400
Building	Ranger Housing - Lagunitas Dam	\$2	\$14	\$46	\$62
Building	Ranger Housing - Lagunitas Dam	\$4	\$28	\$92	\$123
Building	Ranger Housing - Phoenix Dam - Residence	\$9	\$52	\$126	\$187
Building	Ranger Housing - Phoenix Dam - Shed	\$2	\$3	\$58	\$63
Building	Ranger Housing - Portius House	\$1	\$41	\$9	\$51
Building	Ranger Housing - Portius House - Garage	\$0	\$8	\$12	\$20
Building	Ranger Housing - Portius House - Shed	\$3	\$7	\$123	\$134
Building	Ranger Housing - Portius House - Shed	\$2	\$4	\$60	\$65
Building	Ranger Housing - Sky Oaks - Residence	\$9	\$52	\$126	\$187
Building	Ranger Housing - Soulajule Residence	\$4	\$28	\$92	\$123
Building	Sky Oaks Headquarters - Entrance Kiosk	\$0	\$0	\$8	\$8
Building	Sky Oaks Headquarters - Fisheries Office	\$18	\$66	\$178	\$262
Building	Sky Oaks Headquarters - Headquarter Office	\$5	\$28	\$1,152	\$1,185
Building	Sky Oaks Headquarters - Seed Shed	\$3	\$6	\$104	\$113
Building	Sky Oaks Headquarters - Storage Shed	\$4	\$10	\$164	\$178
Building	Sky Oaks Headquarters - Watershed Office	\$159	\$458	\$826	\$1,443
<b>Average or Total</b>		<b>\$113,456</b>	<b>\$198,216</b>	<b>\$243,297</b>	<b>\$554,969</b>



Type	Facility Name	Functionality (%)					
		At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Building	Administration Building - Headquarter Office	53.10	55.10	95.10	95.30	99.90	99.90
Building	Corporation Yard - Boat Barn	64.00	65.30	92.30	92.40	94.10	98.80
Building	Corporation Yard - Facilities Offices	67.90	69.40	98.00	98.10	99.90	99.90
Building	Corporation Yard - Laboratory	89.60	90.10	99.70	99.80	99.90	99.90
Building	Corporation Yard - Satellite Office	38.20	39.40	63.20	63.30	71.00	94.20
Building	Pelican Yard - Vehicle Storage	69.50	70.30	85.40	85.40	86.10	97.20
Building	Pelican Yard - Vehicle Storage	69.50	70.30	85.40	85.40	86.10	97.20
Building	Ranger Housing - Alpine Dam - Residence	98.50	98.60	99.90	99.90	99.90	99.90
Building	Ranger Housing - Lagunitas Dam	99.80	99.80	99.90	99.90	99.90	99.90
Building	Ranger Housing - Lagunitas Dam	99.80	99.80	99.90	99.90	99.90	99.90
Building	Ranger Housing - Phoenix Dam - Residence	99.60	99.60	99.90	99.90	99.90	99.90
Building	Ranger Housing - Phoenix Dam - Shed	99.40	99.40	99.90	99.90	99.90	99.90
Building	Ranger Housing - Portius House	99.90	99.90	99.90	99.90	99.90	99.90
Building	Ranger Housing - Portius House - Garage	99.90	99.90	99.90	99.90	99.90	99.90
Building	Ranger Housing - Portius House - Shed	99.40	99.40	99.90	99.90	99.90	99.90
Building	Ranger Housing - Portius House - Shed	99.40	99.40	99.90	99.90	99.90	99.90
Building	Ranger Housing - Sky Oaks - Residence	99.60	99.60	99.90	99.90	99.90	99.90
Building	Ranger Housing - Soulajule Residence	99.80	99.80	99.90	99.90	99.90	99.90
Building	Sky Oaks Headquarters - Entrance Kiosk	99.90	99.90	99.90	99.90	99.90	99.90
Building	Sky Oaks Headquarters - Fisheries Office	98.50	98.60	99.90	99.90	99.90	99.90
Building	Sky Oaks Headquarters - Headquarter Office	99.90	99.90	99.90	99.90	99.90	99.90
Building	Sky Oaks Headquarters - Seed Shed	99.40	99.40	99.90	99.90	99.90	99.90
Building	Sky Oaks Headquarters - Storage Shed	99.40	99.40	99.90	99.90	99.90	99.90
Building	Sky Oaks Headquarters - Watershed Office	95.30	95.50	99.60	99.60	99.90	99.90
<b>Average or Total</b>		<b>89.14</b>	<b>89.49</b>	<b>96.55</b>	<b>96.57</b>	<b>97.30</b>	<b>99.39</b>

Type	Facility Name	Structure Replacement Cost	Structural - Probability of Damage				
			No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Building	Alpine Dam Facility - Alum House	\$326,237	99.91%	0.08%	0.00%	0.00%	0.00%
Facility - Pump Station	Alpine Lake Facility - Aerator House		99.16%	0.72%	0.11%	0.00%	0.00%
Facility - Pump Station	Alpine Lake Facility - Pump House	\$1,000,000	99.91%	0.08%	0.00%	0.00%	0.00%
Facility - Pump Station	Kent Pump Facility - Power Supply	\$750,000	99.73%	0.23%	0.02%	0.00%	0.00%
Facility - Pump Station	Kent Pump Facility - Pump Station	\$2,000,000	99.73%	0.23%	0.02%	0.00%	0.00%
<b>AVERAGE</b>			<b>99.69%</b>	<b>0.27%</b>	<b>0.03%</b>	<b>0.00%</b>	<b>0.00%</b>

		Nonstructural Acceleration-Sensitive - Probability of Damage				
Type	Facility Name	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Building	Alpine Dam Facility - Alum House	93.29%	6.29%	0.39%	0.01%	0.00%
Facility - Pump Station	Alpine Lake Facility - Aerator House					
Facility - Pump Station	Alpine Lake Facility - Pump House					
Facility - Pump Station	Kent Pump Facility - Power Supply					
Facility - Pump Station	Kent Pump Facility - Pump Station					
AVERAGE		93.29%	6.29%	0.39%	0.01%	0.00%

		Nonstructural Drift-Sensitive - Probability of Damage				
Type	Facility Name	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Building	Alpine Dam Facility - Alum House	99.76%	0.22%	0.01%	0.00%	0.00%
Facility - Pump Station	Alpine Lake Facility - Aerator House					
Facility - Pump Station	Alpine Lake Facility - Pump House					
Facility - Pump Station	Kent Pump Facility - Power Supply					
Facility - Pump Station	Kent Pump Facility - Pump Station					
<b>AVERAGE</b>		<b>99.76%</b>	<b>0.22%</b>	<b>0.01%</b>	<b>0.00%</b>	<b>0.00%</b>

Type	Facility Name	Losses (in dollars)			
		Structure	Nonstructural Drift-Sensitive	Nonstructural Acceleration- Sensitive	Total Building Loss
Building	Alpine Dam Facility - Alum House	\$1	\$6	\$251	\$258
Facility - Pump Station	Alpine Lake Facility - Aerator House				
Facility - Pump Station	Alpine Lake Facility - Pump House	\$40			\$40
Facility - Pump Station	Kent Pump Facility - Power Supply	\$109			\$109
Facility - Pump Station	Kent Pump Facility - Pump Station	\$290			\$290
AVERAGE		\$440	\$6	\$251	\$696

		Functionality (%)					
Type	Facility Name	At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Building	Alpine Dam Facility - Alum House	99.90	99.90	99.90	99.90	99.90	99.90
Facility - Pump Station	Alpine Lake Facility - Aerator House	99.60	99.90	99.90	99.90	99.90	99.90
Facility - Pump Station	Alpine Lake Facility - Pump House	99.90	99.90	99.90	99.90	99.90	99.90
Facility - Pump Station	Kent Pump Facility - Power Supply	99.80	99.90	99.90	99.90	99.90	99.90
Facility - Pump Station	Kent Pump Facility - Pump Station	99.80	99.90	99.90	99.90	99.90	99.90
AVERAGE		99.80	99.90	99.90	99.90	99.90	99.90

Type	Facility Name	Structure Replacement Cost	Structural - Probability of Damage				
			No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Clarifier		99.16%	0.72%	0.11%	0.00%	0.00%
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Filter Plant	\$100,000,000	99.16%	0.72%	0.11%	0.00%	0.00%
Tank	Bon Tempe Treatment Plant - Wash Water Sup	\$1,500,000	99.16%	0.72%	0.11%	0.00%	0.00%
Facility - Water Treatment Plant	Ignacio Pump Station - Chemical Rooms		80.53%	11.57%	2.59%	4.24%	1.05%
Facility - Water Treatment Plant	Ignacio Pump Station - Control Room		36.75%	48.76%	9.17%	4.25%	1.05%
Facility - Water Treatment Plant	Ignacio Pump Station - Fluoride Storage Facility		36.75%	48.76%	9.17%	4.25%	1.05%
Facility - Water Treatment Plant	Ignacio Pump Station - Fuel Storage		78.58%	15.22%	0.92%	4.20%	1.05%
Facility - Water Treatment Plant	Ignacio Pump Station - Pumps	\$50,000,000	36.75%	48.76%	9.17%	4.25%	1.05%
Building	Phoenix Lake Facility - Boat Barn	\$383,300	99.46%	0.53%	0.00%	0.00%	0.00%
Pump Station	PS-001 - Federal Works Booster Pump Station	\$1,000,000	97.98%	1.96%	0.04%	0.00%	0.00%
Pump Station	PS-002 - Chapman Park Pump Station	\$1,000,000	89.53%	8.02%	2.37%	0.06%	0.00%
Pump Station	PS-003 - Summit Drive Pump Station PS-003	\$1,000,000	94.46%	4.45%	1.05%	0.02%	0.00%
Pump Station	PS-005 - H-Line Booster Station	\$1,000,000	99.16%	0.72%	0.11%	0.00%	0.00%
Pump Station	PS-006 - Madera Park Pump Station	\$1,000,000	89.76%	7.85%	2.30%	0.06%	0.00%
Pump Station	PS-007 - Mariner Highlands Pump Station	\$1,000,000	94.46%	4.45%	1.05%	0.02%	0.00%
Pump Station	PS-010 - Cascade Pump Station	\$1,000,000	97.55%	2.04%	0.38%	0.01%	0.00%
Pump Station	PS-011 - Fairfax Manor 1st Pump Station	\$1,000,000	94.46%	4.45%	1.05%	0.02%	0.00%
Pump Station	PS-012 - Fairfax Manor 2nd Lift Pump Station	\$1,000,000	94.46%	4.45%	1.05%	0.02%	0.00%
Pump Station	PS-013 - Oak Manor 1st Lift Pump Station	\$1,000,000	97.55%	2.04%	0.38%	0.01%	0.00%
Pump Station	PS-014 - Oak Manor 2nd Lift Pump Station	\$1,000,000	97.55%	2.04%	0.38%	0.01%	0.00%
Pump Station	PS-016 - Scott Pump Station	\$1,000,000	99.16%	0.72%	0.11%	0.00%	0.00%
Pump Station	PS-017 - Smith Saddle Booster Station	\$1,000,000	97.55%	2.04%	0.38%	0.01%	0.00%
Pump Station	PS-019 - Bret Harte Pump Station	\$1,000,000	94.46%	4.45%	1.05%	0.02%	0.00%
Pump Station	PS-020 - Greenbrae Pump Station	\$1,000,000	94.45%	4.45%	1.05%	0.03%	0.00%
Pump Station	PS-022 - Ignacio Boosters	\$1,000,000	60.13%	25.42%	8.99%	4.38%	1.05%
Pump Station	PS-023 - Kent Fire Trail 1st Pump Station	\$1,000,000	97.55%	2.04%	0.38%	0.01%	0.00%
Pump Station	PS-025 - Kent Woodlands 2nd Pump Station	\$1,000,000	97.55%	2.04%	0.38%	0.01%	0.00%
Pump Station	PS-026 - Lagunitas Booster Station	\$1,000,000	99.16%	0.72%	0.11%	0.00%	0.00%
Pump Station	PS-029 - Phoenix Lake Barge Pump	\$1,000,000	99.78%	0.21%	0.00%	0.00%	0.00%
Pump Station	PS-030 - Phoenix Transfer Pump Station	\$1,000,000	98.31%	1.55%	0.12%	0.00%	0.00%
Pump Station	PS-031 - Soulajule Pump Station	\$1,000,000	99.50%	0.46%	0.03%	0.00%	0.00%
Pump Station	PS-032 - Elinor Avenue Pump Station	\$1,000,000	97.55%	2.04%	0.38%	0.01%	0.00%
Pump Station	PS-033 - Fern Canyon Pump Station	\$1,000,000	99.16%	0.72%	0.11%	0.00%	0.00%
Pump Station	PS-034 - Lapachet Pump Station	\$1,000,000	99.16%	0.72%	0.11%	0.00%	0.00%
Pump Station	PS-035 - Mine Ridge Pump Station	\$1,000,000	99.16%	0.72%	0.11%	0.00%	0.00%
Pump Station	PS-036 - Scott Highlands Pump (OUT OF SERVICE)	\$1,000,000	97.55%	2.04%	0.38%	0.01%	0.00%
Pump Station	PS-040 - Summit Avenue Upper Pump Station	\$1,000,000	99.16%	0.72%	0.11%	0.00%	0.00%
Pump Station	PS-042 - Del Mesa Pump Station	\$1,000,000	94.46%	4.45%	1.05%	0.02%	0.00%
Pump Station	PS-043 - Fawn Drive Pump Station	\$1,000,000	94.46%	4.45%	1.05%	0.02%	0.00%
Pump Station	PS-044 - Mann Pump Station	\$1,000,000	89.53%	8.02%	2.37%	0.06%	0.00%
Pump Station	PS-046 - Scenic Avenue Pump Station	\$1,000,000	92.03%	6.99%	0.95%	0.01%	0.00%
Pump Station	PS-047 - Sequoia Park Pump Station	\$1,000,000	94.46%	4.45%	1.05%	0.02%	0.00%
Pump Station	PS-050 - Chula Vista Pump Station	\$1,000,000	89.77%	7.85%	2.30%	0.06%	0.00%
Pump Station	PS-052 - Elda Drive Pump Station	\$1,000,000	89.76%	7.85%	2.30%	0.06%	0.00%
Pump Station	PS-053 - Fairhills 1st Lift Pump Station	\$1,000,000	94.46%	4.45%	1.05%	0.02%	0.00%
Pump Station	PS-054 - Fairhills 2nd Lift Pump Station	\$1,000,000	94.46%	4.45%	1.05%	0.02%	0.00%
Pump Station	PS-055 - Grove Hill Pump Station	\$1,000,000	94.46%	4.45%	1.05%	0.02%	0.00%
Pump Station	PS-056 - Rafael Highlands Pump Station	\$1,000,000	95.82%	3.77%	0.40%	0.00%	0.00%
Pump Station	PS-057 - Hind Pump Station	\$1,000,000	94.46%	4.45%	1.05%	0.02%	0.00%
Pump Station	PS-058 - Knight Drive Pump Station	\$1,000,000	89.76%	7.85%	2.30%	0.06%	0.00%
Pump Station	PS-060 - Lockwood Drive Pump Station	\$1,000,000	89.76%	7.85%	2.30%	0.06%	0.00%
Pump Station	PS-061 - Lucas Valley Pump Station	\$1,000,000	95.82%	3.77%	0.40%	0.00%	0.00%
Pump Station	PS-062 - Manderly Pump Station	\$1,000,000	94.45%	4.45%	1.05%	0.03%	0.00%
Pump Station	PS-064 - Marinwood Pump Station (NOT IN USE)	\$1,000,000	92.02%	6.99%	0.95%	0.02%	0.00%
Pump Station	PS-065 - McNear Drive Pump Station	\$1,000,000	89.76%	7.85%	2.30%	0.06%	0.00%
Pump Station	PS-066 - Mesa Vista Pump Station	\$1,000,000	94.45%	4.45%	1.05%	0.03%	0.00%
Pump Station	PS-069 - San Quentin Pump Station	\$1,000,000	76.81%	14.30%	3.05%	4.67%	1.15%
Pump Station	PS-070 - Santa Margarita Pump Station	\$1,000,000	95.81%	3.77%	0.40%	0.00%	0.00%
Pump Station	PS-071 - Sky View Terrace Pump Station	\$1,000,000	89.52%	8.02%	2.37%	0.07%	0.00%
Pump Station	PS-073 - Swig Pump Station	\$1,000,000	94.46%	4.45%	1.05%	0.02%	0.00%
Pump Station	PS-074 - Via Montebello Pump Station	\$1,000,000	72.66%	18.33%	8.60%	0.39%	0.00%

Type	Facility Name	Nonstructural Acceleration-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Clarifier					
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Filter Plant					
Tank	Bon Tempe Treatment Plant - Wash Water Sup					
Facility - Water Treatment Plant	Ignacio Pump Station - Chemical Rooms					
Facility - Water Treatment Plant	Ignacio Pump Station - Control Room					
Facility - Water Treatment Plant	Ignacio Pump Station - Fluoride Storage Facility					
Facility - Water Treatment Plant	Ignacio Pump Station - Fuel Storage					
Facility - Water Treatment Plant	Ignacio Pump Station - Pumps					
Building	Phoenix Lake Facility - Boat Barn	88.59%	10.48%	0.88%	0.03%	0.00%
Pump Station	PS-001 - Federal Works Booster Pump Station					
Pump Station	PS-002 - Chapman Park Pump Station					
Pump Station	PS-003 - Summit Drive Pump Station PS-003					
Pump Station	PS-005 - H-Line Booster Station					
Pump Station	PS-006 - Madera Park Pump Station					
Pump Station	PS-007 - Mariner Highlands Pump Station					
Pump Station	PS-010 - Cascade Pump Station					
Pump Station	PS-011 - Fairfax Manor 1st Pump Station					
Pump Station	PS-012 - Fairfax Manor 2nd Lift Pump Station					
Pump Station	PS-013 - Oak Manor 1st Lift Pump Station					
Pump Station	PS-014 - Oak Manor 2nd Lift Pump Station					
Pump Station	PS-016 - Scott Pump Station					
Pump Station	PS-017 - Smith Saddle Booster Station					
Pump Station	PS-019 - Bret Harte Pump Station					
Pump Station	PS-020 - Greenbrae Pump Station					
Pump Station	PS-022 - Ignacio Boosters					
Pump Station	PS-023 - Kent Fire Trail 1st Pump Station					
Pump Station	PS-025 - Kent Woodlands 2nd Pump Station					
Pump Station	PS-026 - Lagunitas Booster Station					
Pump Station	PS-029 - Phoenix Lake Barge Pump					
Pump Station	PS-030 - Phoenix Transfer Pump Station					
Pump Station	PS-031 - Soulajule Pump Station					
Pump Station	PS-032 - Elinor Avenue Pump Station					
Pump Station	PS-033 - Fern Canyon Pump Station					
Pump Station	PS-034 - Lapachet Pump Station					
Pump Station	PS-035 - Mine Ridge Pump Station					
Pump Station	PS-036 - Scott Highlands Pump (OUT OF SERVICE)					
Pump Station	PS-040 - Summit Avenue Upper Pump Station					
Pump Station	PS-042 - Del Mesa Pump Station					
Pump Station	PS-043 - Fawn Drive Pump Station					
Pump Station	PS-044 - Mann Pump Station					
Pump Station	PS-046 - Scenic Avenue Pump Station					
Pump Station	PS-047 - Sequoia Park Pump Station					
Pump Station	PS-050 - Chula Vista Pump Station					
Pump Station	PS-052 - Elda Drive Pump Station					
Pump Station	PS-053 - Fairhills 1st Lift Pump Station					
Pump Station	PS-054 - Fairhills 2nd Lift Pump Station					
Pump Station	PS-055 - Grove Hill Pump Station					
Pump Station	PS-056 - Rafael Highlands Pump Station					
Pump Station	PS-057 - Hind Pump Station					
Pump Station	PS-058 - Knight Drive Pump Station					
Pump Station	PS-060 - Lockwood Drive Pump Station					
Pump Station	PS-061 - Lucas Valley Pump Station					
Pump Station	PS-062 - Manderly Pump Station					
Pump Station	PS-064 - Marinwood Pump Station (NOT IN USE)					
Pump Station	PS-065 - McNear Drive Pump Station					
Pump Station	PS-066 - Mesa Vista Pump Station					
Pump Station	PS-069 - San Quentin Pump Station					
Pump Station	PS-070 - Santa Margarita Pump Station					
Pump Station	PS-071 - Sky View Terrace Pump Station					
Pump Station	PS-073 - Swig Pump Station					
Pump Station	PS-074 - Via Montebello Pump Station					



Type	Facility Name	Nonstructural Drift-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Clarifier					
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Filter Plant					
Tank	Bon Tempe Treatment Plant - Wash Water Sup					
Facility - Water Treatment Plant	Ignacio Pump Station - Chemical Rooms					
Facility - Water Treatment Plant	Ignacio Pump Station - Control Room					
Facility - Water Treatment Plant	Ignacio Pump Station - Fluoride Storage Facility					
Facility - Water Treatment Plant	Ignacio Pump Station - Fuel Storage					
Facility - Water Treatment Plant	Ignacio Pump Station - Pumps					
Building	Phoenix Lake Facility - Boat Barn	98.90%	1.05%	0.04%	0.00%	0.00%
Pump Station	PS-001 - Federal Works Booster Pump Station					
Pump Station	PS-002 - Chapman Park Pump Station					
Pump Station	PS-003 - Summit Drive Pump Station PS-003					
Pump Station	PS-005 - H-Line Booster Station					
Pump Station	PS-006 - Madera Park Pump Station					
Pump Station	PS-007 - Mariner Highlands Pump Station					
Pump Station	PS-010 - Cascade Pump Station					
Pump Station	PS-011 - Fairfax Manor 1st Pump Station					
Pump Station	PS-012 - Fairfax Manor 2nd Lift Pump Station					
Pump Station	PS-013 - Oak Manor 1st Lift Pump Station					
Pump Station	PS-014 - Oak Manor 2nd Lift Pump Station					
Pump Station	PS-016 - Scott Pump Station					
Pump Station	PS-017 - Smith Saddle Booster Station					
Pump Station	PS-019 - Bret Harte Pump Station					
Pump Station	PS-020 - Greenbrae Pump Station					
Pump Station	PS-022 - Ignacio Boosters					
Pump Station	PS-023 - Kent Fire Trail 1st Pump Station					
Pump Station	PS-025 - Kent Woodlands 2nd Pump Station					
Pump Station	PS-026 - Lagunitas Booster Station					
Pump Station	PS-029 - Phoenix Lake Barge Pump					
Pump Station	PS-030 - Phoenix Transfer Pump Station					
Pump Station	PS-031 - SoulaJule Pump Station					
Pump Station	PS-032 - Elinor Avenue Pump Station					
Pump Station	PS-033 - Fern Canyon Pump Station					
Pump Station	PS-034 - Lapachet Pump Station					
Pump Station	PS-035 - Mine Ridge Pump Station					
Pump Station	PS-036 - Scott Highlands Pump (OUT OF SERVICE)					
Pump Station	PS-040 - Summit Avenue Upper Pump Station					
Pump Station	PS-042 - Del Mesa Pump Station					
Pump Station	PS-043 - Fawn Drive Pump Station					
Pump Station	PS-044 - Mann Pump Station					
Pump Station	PS-046 - Scenic Avenue Pump Station					
Pump Station	PS-047 - Sequoia Park Pump Station					
Pump Station	PS-050 - Chula Vista Pump Station					
Pump Station	PS-052 - Elda Drive Pump Station					
Pump Station	PS-053 - Fairhills 1st Lift Pump Station					
Pump Station	PS-054 - Fairhills 2nd Lift Pump Station					
Pump Station	PS-055 - Grove Hill Pump Station					
Pump Station	PS-056 - Rafael Highlands Pump Station					
Pump Station	PS-057 - Hind Pump Station					
Pump Station	PS-058 - Knight Drive Pump Station					
Pump Station	PS-060 - Lockwood Drive Pump Station					
Pump Station	PS-061 - Lucas Valley Pump Station					
Pump Station	PS-062 - Manderly Pump Station					
Pump Station	PS-064 - Marinwood Pump Station (NOT IN USE)					
Pump Station	PS-065 - McNear Drive Pump Station					
Pump Station	PS-066 - Mesa Vista Pump Station					
Pump Station	PS-069 - San Quentin Pump Station					
Pump Station	PS-070 - Santa Margarita Pump Station					
Pump Station	PS-071 - Sky View Terrace Pump Station					
Pump Station	PS-073 - Swig Pump Station					
Pump Station	PS-074 - Via Montebello Pump Station					

Type	Facility Name	Losses (in dollars)			
		Structure	Nonstructural Drift Sensitive	Nonstructural Acceleration-Sensitive	Total Building Loss
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Clarifier				
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Filter Plant	\$52,500			\$52,500
Tank	Bon Tempe Treatment Plant - Wash Water Sup	\$788			\$788
Facility - Water Treatment Plant	Ignacio Pump Station - Chemical Rooms				
Facility - Water Treatment Plant	Ignacio Pump Station - Control Room				
Facility - Water Treatment Plant	Ignacio Pump Station - Fluoride Storage Facility				
Facility - Water Treatment Plant	Ignacio Pump Station - Fuel Storage				
Facility - Water Treatment Plant	Ignacio Pump Station - Pumps	\$3,706,750			\$3,706,750
Building	Phoenix Lake Facility - Boat Barn	\$12	\$28	\$477	\$518
Pump Station	PS-001 - Federal Works Booster Pump Station	\$1,040			\$1,040
Pump Station	PS-002 - Chapman Park Pump Station	\$7,925			\$7,925
Pump Station	PS-003 - Summit Drive Pump Station PS-003	\$3,920			\$3,920
Pump Station	PS-005 - H-Line Booster Station	\$525			\$525
Pump Station	PS-006 - Madera Park Pump Station	\$7,735			\$7,735
Pump Station	PS-007 - Mariner Highlands Pump Station	\$3,920			\$3,920
Pump Station	PS-010 - Cascade Pump Station	\$1,650			\$1,650
Pump Station	PS-011 - Fairfax Manor 1st Pump Station	\$3,920			\$3,920
Pump Station	PS-012 - Fairfax Manor 2nd Lift Pump Station	\$3,920			\$3,920
Pump Station	PS-013 - Oak Manor 1st Lift Pump Station	\$1,650			\$1,650
Pump Station	PS-014 - Oak Manor 2nd Lift Pump Station	\$1,650			\$1,650
Pump Station	PS-016 - Scott Pump Station	\$525			\$525
Pump Station	PS-017 - Smith Saddle Booster Station	\$1,650			\$1,650
Pump Station	PS-019 - Bret Harte Pump Station	\$3,920			\$3,920
Pump Station	PS-020 - Greenbrae Pump Station	\$3,980			\$3,980
Pump Station	PS-022 - Ignacio Boosters	\$62,975			\$62,975
Pump Station	PS-023 - Kent Fire Trail 1st Pump Station	\$1,650			\$1,650
Pump Station	PS-025 - Kent Woodlands 2nd Pump Station	\$1,650			\$1,650
Pump Station	PS-026 - Lagunitas Booster Station	\$525			\$525
Pump Station	PS-029 - Phoenix Lake Barge Pump	\$105			\$105
Pump Station	PS-030 - Phoenix Transfer Pump Station	\$955			\$955
Pump Station	PS-031 - Soulajule Pump Station	\$275			\$275
Pump Station	PS-032 - Elinor Avenue Pump Station	\$1,650			\$1,650
Pump Station	PS-033 - Fern Canyon Pump Station	\$525			\$525
Pump Station	PS-034 - Lapachet Pump Station	\$525			\$525
Pump Station	PS-035 - Mine Ridge Pump Station	\$525			\$525
Pump Station	PS-036 - Scott Highlands Pump (OUT OF SERVICE)	\$1,650			\$1,650
Pump Station	PS-040 - Summit Avenue Upper Pump Station	\$525			\$525
Pump Station	PS-042 - Del Mesa Pump Station	\$3,920			\$3,920
Pump Station	PS-043 - Fawn Drive Pump Station	\$3,920			\$3,920
Pump Station	PS-044 - Mann Pump Station	\$7,925			\$7,925
Pump Station	PS-046 - Scenic Avenue Pump Station	\$4,980			\$4,980
Pump Station	PS-047 - Sequoia Park Pump Station	\$3,920			\$3,920
Pump Station	PS-050 - Chula Vista Pump Station	\$7,735			\$7,735
Pump Station	PS-052 - Elda Drive Pump Station	\$7,735			\$7,735
Pump Station	PS-053 - Fairhills 1st Lift Pump Station	\$3,920			\$3,920
Pump Station	PS-054 - Fairhills 2nd Lift Pump Station	\$3,920			\$3,920
Pump Station	PS-055 - Grove Hill Pump Station	\$3,920			\$3,920
Pump Station	PS-056 - Rafael Highlands Pump Station	\$2,485			\$2,485
Pump Station	PS-057 - Hind Pump Station	\$3,920			\$3,920
Pump Station	PS-058 - Knight Drive Pump Station	\$7,735			\$7,735
Pump Station	PS-060 - Lockwood Drive Pump Station	\$7,735			\$7,735
Pump Station	PS-061 - Lucas Valley Pump Station	\$2,485			\$2,485
Pump Station	PS-062 - Manderly Pump Station	\$3,980			\$3,980
Pump Station	PS-064 - Marinwood Pump Station (NOT IN USE)	\$5,040			\$5,040
Pump Station	PS-065 - McNear Drive Pump Station	\$7,735			\$7,735
Pump Station	PS-066 - Mesa Vista Pump Station	\$3,980			\$3,980
Pump Station	PS-069 - San Quentin Pump Station	\$51,245			\$51,245
Pump Station	PS-070 - Santa Margarita Pump Station	\$2,485			\$2,485
Pump Station	PS-071 - Sky View Terrace Pump Station	\$7,985			\$7,985
Pump Station	PS-073 - Swig Pump Station	\$3,920			\$3,920
Pump Station	PS-074 - Via Montebello Pump Station	\$24,405			\$24,405

Type	Facility Name	Functionality (%)					
		At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Clarifier	99.60	99.90	99.90	99.90	99.90	99.90
Facility - Water Treatment Plant	Bon Tempe Treatment Plant - Filter Plant	99.60	99.90	99.90	99.90	99.90	99.90
Tank	Bon Tempe Treatment Plant - Wash Water Sup	99.40	99.90	99.90	99.90	99.90	99.90
Facility - Water Treatment Plant	Ignacio Pump Station - Chemical Rooms	89.10	95.00	95.60	95.90	96.80	99.20
Facility - Water Treatment Plant	Ignacio Pump Station - Control Room	70.30	93.80	95.60	95.90	96.80	99.20
Facility - Water Treatment Plant	Ignacio Pump Station - Fluoride Storage Facility	70.30	93.80	95.60	95.90	96.80	99.20
Facility - Water Treatment Plant	Ignacio Pump Station - Fuel Storage	89.10	95.30	95.60	96.00	96.80	99.20
Facility - Water Treatment Plant	Ignacio Pump Station - Pumps	70.30	93.80	95.60	95.90	96.80	99.20
Building	Phoenix Lake Facility - Boat Barn	99.40	99.40	99.90	99.90	99.90	99.90
Pump Station	PS-001 - Federal Works Booster Pump Station	99.20	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-002 - Chapman Park Pump Station	95.10	98.70	99.70	99.90	99.90	99.90
Pump Station	PS-003 - Summit Drive Pump Station PS-003	97.40	99.40	99.80	99.90	99.90	99.90
Pump Station	PS-005 - H-Line Booster Station	99.60	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-006 - Madera Park Pump Station	95.20	98.70	99.70	99.90	99.90	99.90
Pump Station	PS-007 - Mariner Highlands Pump Station	97.40	99.40	99.80	99.90	99.90	99.90
Pump Station	PS-010 - Cascade Pump Station	98.90	99.70	99.90	99.90	99.90	99.90
Pump Station	PS-011 - Fairfax Manor 1st Pump Station	97.40	99.40	99.80	99.90	99.90	99.90
Pump Station	PS-012 - Fairfax Manor 2nd Lift Pump Station	97.40	99.40	99.80	99.90	99.90	99.90
Pump Station	PS-013 - Oak Manor 1st Lift Pump Station	98.90	99.70	99.90	99.90	99.90	99.90
Pump Station	PS-014 - Oak Manor 2nd Lift Pump Station	98.90	99.70	99.90	99.90	99.90	99.90
Pump Station	PS-016 - Scott Pump Station	99.60	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-017 - Smith Saddle Booster Station	98.90	99.70	99.90	99.90	99.90	99.90
Pump Station	PS-019 - Bret Harte Pump Station	97.40	99.40	99.80	99.90	99.90	99.90
Pump Station	PS-020 - Greenbrae Pump Station	97.40	99.40	99.80	99.90	99.90	99.90
Pump Station	PS-022 - Ignacio Boosters	78.60	90.50	95.00	96.90	99.10	99.90
Pump Station	PS-023 - Kent Fire Trail 1st Pump Station	98.90	99.70	99.90	99.90	99.90	99.90
Pump Station	PS-025 - Kent Woodlands 2nd Pump Station	98.90	99.70	99.90	99.90	99.90	99.90
Pump Station	PS-026 - Lagunitas Booster Station	99.60	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-029 - Phoenix Lake Barge Pump	99.90	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-030 - Phoenix Transfer Pump Station	99.30	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-031 - Soulajule Pump Station	99.70	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-032 - Elinor Avenue Pump Station	98.90	99.70	99.90	99.90	99.90	99.90
Pump Station	PS-033 - Fern Canyon Pump Station	99.60	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-034 - Lapachet Pump Station	99.60	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-035 - Mine Ridge Pump Station	99.60	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-036 - Scott Highlands Pump (OUT OF SERVICE)	98.90	99.70	99.90	99.90	99.90	99.90
Pump Station	PS-040 - Summit Avenue Upper Pump Station	99.60	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-042 - Del Mesa Pump Station	97.40	99.40	99.80	99.90	99.90	99.90
Pump Station	PS-043 - Fawn Drive Pump Station	97.40	99.40	99.80	99.90	99.90	99.90
Pump Station	PS-044 - Mann Pump Station	95.10	98.70	99.70	99.90	99.90	99.90
Pump Station	PS-046 - Scenic Avenue Pump Station	96.60	99.40	99.90	99.90	99.90	99.90
Pump Station	PS-047 - Sequoia Park Pump Station	97.40	99.40	99.80	99.90	99.90	99.90
Pump Station	PS-050 - Chula Vista Pump Station	95.20	98.70	99.70	99.90	99.90	99.90
Pump Station	PS-052 - Elda Drive Pump Station	95.20	98.70	99.70	99.90	99.90	99.90
Pump Station	PS-053 - Fairhills 1st Lift Pump Station	97.40	99.40	99.80	99.90	99.90	99.90
Pump Station	PS-054 - Fairhills 2nd Lift Pump Station	97.40	99.40	99.80	99.90	99.90	99.90
Pump Station	PS-055 - Grove Hill Pump Station	97.40	99.40	99.80	99.90	99.90	99.90
Pump Station	PS-056 - Rafael Highlands Pump Station	98.20	99.70	99.90	99.90	99.90	99.90
Pump Station	PS-057 - Hind Pump Station	97.40	99.40	99.80	99.90	99.90	99.90
Pump Station	PS-058 - Knight Drive Pump Station	95.20	98.70	99.70	99.90	99.90	99.90
Pump Station	PS-060 - Lockwood Drive Pump Station	95.20	98.70	99.70	99.90	99.90	99.90
Pump Station	PS-061 - Lucas Valley Pump Station	98.20	99.70	99.90	99.90	99.90	99.90
Pump Station	PS-062 - Manderly Pump Station	97.40	99.40	99.80	99.90	99.90	99.90
Pump Station	PS-064 - Marinwood Pump Station (NOT IN USE)	96.60	99.40	99.80	99.90	99.90	99.90
Pump Station	PS-065 - McNear Drive Pump Station	95.20	98.70	99.70	99.90	99.90	99.90
Pump Station	PS-066 - Mesa Vista Pump Station	97.40	99.40	99.80	99.90	99.90	99.90
Pump Station	PS-069 - San Quentin Pump Station	87.00	93.30	95.20	96.70	99.00	99.90
Pump Station	PS-070 - Santa Margarita Pump Station	98.20	99.70	99.90	99.90	99.90	99.90
Pump Station	PS-071 - Sky View Terrace Pump Station	95.10	98.70	99.70	99.90	99.90	99.90
Pump Station	PS-073 - Swig Pump Station	97.40	99.40	99.80	99.90	99.90	99.90
Pump Station	PS-074 - Via Montebello Pump Station	86.10	95.20	99.00	99.70	99.90	99.90

Type	Facility Name	Structure Replacement Cost	Structural - Probability of Damage				
			No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Pump Station	PS-077 - Beacon Hill Pump Station	\$1,000,000	97.55%	2.04%	0.38%	0.01%	0.00%
Pump Station	PS-078 - Crescent Avenue Pump Station	\$1,000,000	99.16%	0.72%	0.11%	0.00%	0.00%
Pump Station	PS-079 - Marin City Pump Station	\$1,000,000	97.55%	2.04%	0.38%	0.01%	0.00%
Pump Station	PS-080 - Monte Mar Vista Pump Station	\$1,000,000	94.46%	4.45%	1.05%	0.02%	0.00%
Pump Station	PS-081 - Sausalito Pumphouse Pump Station	\$1,000,000	99.20%	0.77%	0.01%	0.00%	0.00%
Pump Station	PS-082 - Sausalito Boulevard Pump Station	\$1,000,000	99.16%	0.72%	0.11%	0.00%	0.00%
Pump Station	PS-083 - Richardson Drive Pump Station	\$1,000,000	97.55%	2.04%	0.38%	0.01%	0.00%
Pump Station	PS-084 - Eastwood Way Pump Station	\$1,000,000	99.50%	0.46%	0.03%	0.00%	0.00%
Pump Station	PS-085 - Fairview Park Pump Station	\$1,000,000	99.50%	0.46%	0.03%	0.00%	0.00%
Pump Station	PS-087 - Marinview Pump Station	\$1,000,000	97.55%	2.04%	0.38%	0.01%	0.00%
Pump Station	PS-088 - Tam Woods 1st Lift Pump Station	\$1,000,000	99.16%	0.72%	0.11%	0.00%	0.00%
Pump Station	PS-089 - Tam Woods 2nd Lift Pump Station	\$1,000,000	99.16%	0.72%	0.11%	0.00%	0.00%
Pump Station	PS-090 - Hill Haven Pump Station	\$1,000,000	97.55%	2.04%	0.38%	0.01%	0.00%
Pump Station	PS-091 - Sugarloaf Pump Station	\$1,000,000	97.55%	2.04%	0.38%	0.01%	0.00%
Pump Station	PS-092 - Tiburon Belvedere Pump Station	\$1,000,000	97.55%	2.04%	0.38%	0.01%	0.00%
Pump Station	PS-093 - Tiburon Booster Pump Station	\$1,000,000	94.46%	4.45%	1.05%	0.02%	0.00%
Pump Station	PS-095 - Pine Mountain Tunnel Pump Station	\$1,000,000	99.50%	0.46%	0.03%	0.00%	0.00%
Pump Station	PS-097 - Tocaloma Booster Pump Station	\$1,000,000	99.26%	0.63%	0.09%	0.00%	0.00%
Pump Station	PS-101 - Redwood Drive Lower Pump	\$1,000,000	97.55%	2.04%	0.38%	0.01%	0.00%
Pump Station	PS-102 - North Marin Line Boosters	\$1,000,000	99.95%	0.04%	0.00%	0.00%	0.00%
Pump Station	PS-103 - San Geronimo Valley Pump Station	\$1,000,000	99.95%	0.04%	0.00%	0.00%	0.00%
Pump Station	PS-104 - Conifer Way Pump Station	\$1,000,000	99.50%	0.46%	0.03%	0.00%	0.00%
Pump Station	PS-106 - Los Altos Pump Station	\$1,000,000	98.31%	1.55%	0.12%	0.00%	0.00%
Pump Station	PS-108 - Indian Rock Pump Station	\$1,000,000	95.81%	3.77%	0.40%	0.00%	0.00%
Pump Station	PS-109 - Cibrian Pump Station	\$1,000,000	95.82%	3.77%	0.40%	0.00%	0.00%
Pump Station	PS-113 - Lag Picnic Grounds Pump Station	\$1,000,000	99.50%	0.46%	0.03%	0.00%	0.00%
Pump Station	PS-114 - Cortez Avenue Pump Station	\$1,000,000	99.76%	0.22%	0.01%	0.00%	0.00%
Pump Station	PS-115 - Redwood Drive Upper Pump Station	\$1,000,000	99.78%	0.21%	0.00%	0.00%	0.00%
Pump Station	PS-116 - North Redwood Drive Boosters	\$1,000,000	89.40%	9.80%	0.79%	0.00%	0.00%
Pump Station	PS-117 - Wolfback Ridge Pump Station	\$1,000,000	99.76%	0.22%	0.01%	0.00%	0.00%
Pump Station	PS-118 - Fire Road Pump Station	\$1,000,000	99.78%	0.21%	0.00%	0.00%	0.00%
Pump Station	PS-122 - Upper Road Pump Station	\$1,000,000	99.20%	0.77%	0.01%	0.00%	0.00%
Pump Station	PS-123 - Southern Marin Line Syphon	\$1,000,000	99.95%	0.04%	0.00%	0.00%	0.00%
Pump Station	PS-124 - Throckmorton Booster New Pumpstat	\$1,000,000	99.95%	0.04%	0.00%	0.00%	0.00%
Pump Station	PS-125 - Kent Fire Trail 2nd Lift Pump Station	\$1,000,000	99.78%	0.21%	0.00%	0.00%	0.00%
Pump Station	PS-126 - Oak woodlands Pump Station	\$1,000,000	97.97%	1.96%	0.04%	0.00%	0.00%
Pump Station	PS-127 - Marin Terrace Pump Station	\$1,000,000	99.78%	0.21%	0.00%	0.00%	0.00%
Pump Station	PS-128 - Alpine Bon-Tempe Pump Station	\$1,000,000	99.95%	0.04%	0.00%	0.00%	0.00%
Pump Station	PS-129 - Slide Gulch Pump Station	\$1,000,000	99.95%	0.04%	0.00%	0.00%	0.00%
Pump Station	PS-130 - Smith Conifer Pump Station	\$1,000,000	99.78%	0.21%	0.00%	0.00%	0.00%
Building	San Geronimo Treatment Plant - Boat Barn		99.95%	0.04%	0.00%	0.00%	0.00%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Chemical Stor	\$100,000,000	99.16%	0.72%	0.11%	0.00%	0.00%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #1		99.16%	0.72%	0.11%	0.00%	0.00%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #2		99.50%	0.46%	0.03%	0.00%	0.00%
Building	San Geronimo Treatment Plant - Facilities Shed		99.91%	0.08%	0.00%	0.00%	0.00%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Flash Mixer		99.50%	0.46%	0.03%	0.00%	0.00%
Building	San Geronimo Treatment Plant - Gardeners Shed		99.95%	0.04%	0.00%	0.00%	0.00%
Facility - Pump Station	San Geronimo Treatment Plant - North Marin L	\$5,000,000	99.16%	0.72%	0.11%	0.00%	0.00%
Facility - Pump Station	Southern Marin Line - Pump Station	\$2,000,000	99.73%	0.23%	0.02%	0.00%	0.00%
Water Tank	TK-006 - MADERA PARK TANK #1	\$200,000	97.57%	2.38%	0.02%	0.00%	0.00%
Water Tank	TK-009 - SAN CLEMENTE TANK	\$3,000,000	84.88%	11.67%	3.37%	0.06%	0.00%
Water Tank	TK-011 - CANON VILLAGE TANK	\$3,000,000	95.21%	4.25%	0.52%	0.00%	0.00%
Water Tank	TK-012 - FAIRFAX GRADE TANK	\$1,000,000	93.28%	5.59%	1.09%	0.01%	0.00%
Water Tank	TK-015 - MEADOW CLUB UPPER TANK	\$600,000	95.81%	3.60%	0.57%	0.01%	0.00%
Water Tank	TK-019 - OAK MANOR TOP TANK	\$500,000	95.21%	4.25%	0.52%	0.00%	0.00%
Water Tank	TK-025 - BRET HARTE TANK	\$1,000,000	84.87%	11.67%	3.37%	0.06%	0.00%
Water Tank	TK-027 - GREENBRAE TANK	\$3,000,000	84.88%	11.67%	3.37%	0.06%	0.00%
Water Tank	TK-030 - ESCALLE TANK	\$2,000,000	69.54%	20.77%	9.38%	0.29%	0.00%
Water Tank	TK-033 - INDIAN FIRE TRAIL TANK	\$500,000	93.28%	5.59%	1.09%	0.01%	0.00%
Water Tank	TK-046 - ALTO TANK #1	\$6,000,000	93.28%	5.59%	1.09%	0.01%	0.00%
Water Tank	TK-047 - BOLSA TANK	\$400,000	99.68%	0.31%	0.00%	0.00%	0.00%

Type	Facility Name	Nonstructural Acceleration-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Pump Station	PS-077 - Beacon Hill Pump Station					
Pump Station	PS-078 - Crescent Avenue Pump Station					
Pump Station	PS-079 - Marin City Pump Station					
Pump Station	PS-080 - Monte Mar Vista Pump Station					
Pump Station	PS-081 - Sausalito Pumphouse Pump Station					
Pump Station	PS-082 - Sausalito Boulevard Pump Station					
Pump Station	PS-083 - Richardson Drive Pump Station					
Pump Station	PS-084 - Eastwood Way Pump Station					
Pump Station	PS-085 - Fairview Park Pump Station					
Pump Station	PS-087 - Marinview Pump Station					
Pump Station	PS-088 - Tam Woods 1st Lift Pump Station					
Pump Station	PS-089 - Tam Woods 2nd Lift Pump Station					
Pump Station	PS-090 - Hill Haven Pump Station					
Pump Station	PS-091 - Sugarloaf Pump Station					
Pump Station	PS-092 - Tiburon Belvedere Pump Station					
Pump Station	PS-093 - Tiburon Booster Pump Station					
Pump Station	PS-095 - Pine Mountain Tunnel Pump Station					
Pump Station	PS-097 - Tocaloma Booster Pump Station					
Pump Station	PS-101 - Redwood Drive Lower Pump					
Pump Station	PS-102 - North Marin Line Boosters					
Pump Station	PS-103 - San Geronimo Valley Pump Station					
Pump Station	PS-104 - Conifer Way Pump Station					
Pump Station	PS-106 - Los Altos Pump Station					
Pump Station	PS-108 - Indian Rock Pump Station					
Pump Station	PS-109 - Cibrian Pump Station					
Pump Station	PS-113 - Lag Picnic Grounds Pump Station					
Pump Station	PS-114 - Cortez Avenue Pump Station					
Pump Station	PS-115 - Redwood Drive Upper Pump Station					
Pump Station	PS-116 - North Redwood Drive Boosters					
Pump Station	PS-117 - Wolfback Ridge Pump Station					
Pump Station	PS-118 - Fire Road Pump Station					
Pump Station	PS-122 - Upper Road Pump Station					
Pump Station	PS-123 - Southern Marin Line Syphon					
Pump Station	PS-124 - Throckmorton Booster New Pumpstat					
Pump Station	PS-125 - Kent Fire Trail 2nd Lift Pump Station					
Pump Station	PS-126 - Oak woodlands Pump Station					
Pump Station	PS-127 - Marin Terrace Pump Station					
Pump Station	PS-128 - Alpine Bon-Tempe Pump Station					
Pump Station	PS-129 - Slide Gulch Pump Station					
Pump Station	PS-130 - Smith Conifer Pump Station					
Building	San Geronimo Treatment Plant - Boat Barn	96.91%	2.95%	0.13%	0.00%	0.00%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Chemical Stor					
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #1					
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #2					
Building	San Geronimo Treatment Plant - Facilities Shed	93.29%	6.29%	0.39%	0.01%	0.00%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Flash Mixer					
Building	San Geronimo Treatment Plant - Gardeners She	96.91%	2.95%	0.13%	0.00%	0.00%
Facility - Pump Station	San Geronimo Treatment Plant - North Marin L					
Facility - Pump Station	Southern Marin Line - Pump Station					
Water Tank	TK-006 - MADERA PARK TANK #1					
Water Tank	TK-009 - SAN CLEMENTE TANK					
Water Tank	TK-011 - CANON VILLAGE TANK					
Water Tank	TK-012 - FAIRFAX GRADE TANK					
Water Tank	TK-015 - MEADOW CLUB UPPER TANK					
Water Tank	TK-019 - OAK MANOR TOP TANK					
Water Tank	TK-025 - BRET HARTE TANK					
Water Tank	TK-027 - GREENBRAE TANK					
Water Tank	TK-030 - ESCALLE TANK					
Water Tank	TK-033 - INDIAN FIRE TRAIL TANK					
Water Tank	TK-046 - ALTO TANK #1					
Water Tank	TK-047 - BOLSA TANK					

Type	Facility Name	Nonstructural Drift-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Pump Station	PS-077 - Beacon Hill Pump Station					
Pump Station	PS-078 - Crescent Avenue Pump Station					
Pump Station	PS-079 - Marin City Pump Station					
Pump Station	PS-080 - Monte Mar Vista Pump Station					
Pump Station	PS-081 - Sausalito Pumphouse Pump Station					
Pump Station	PS-082 - Sausalito Boulevard Pump Station					
Pump Station	PS-083 - Richardson Drive Pump Station					
Pump Station	PS-084 - Eastwood Way Pump Station					
Pump Station	PS-085 - Fairview Park Pump Station					
Pump Station	PS-087 - Marinview Pump Station					
Pump Station	PS-088 - Tam Woods 1st Lift Pump Station					
Pump Station	PS-089 - Tam Woods 2nd Lift Pump Station					
Pump Station	PS-090 - Hill Haven Pump Station					
Pump Station	PS-091 - Sugarloaf Pump Station					
Pump Station	PS-092 - Tiburon Belvedere Pump Station					
Pump Station	PS-093 - Tiburon Booster Pump Station					
Pump Station	PS-095 - Pine Mountain Tunnel Pump Station					
Pump Station	PS-097 - Tocaloma Booster Pump Station					
Pump Station	PS-101 - Redwood Drive Lower Pump					
Pump Station	PS-102 - North Marin Line Boosters					
Pump Station	PS-103 - San Geronimo Valley Pump Station					
Pump Station	PS-104 - Conifer Way Pump Station					
Pump Station	PS-106 - Los Altos Pump Station					
Pump Station	PS-108 - Indian Rock Pump Station					
Pump Station	PS-109 - Cibirian Pump Station					
Pump Station	PS-113 - Lag Picnic Grounds Pump Station					
Pump Station	PS-114 - Cortez Avenue Pump Station					
Pump Station	PS-115 - Redwood Drive Upper Pump Station					
Pump Station	PS-116 - North Redwood Drive Boosters					
Pump Station	PS-117 - Wolfback Ridge Pump Station					
Pump Station	PS-118 - Fire Road Pump Station					
Pump Station	PS-122 - Upper Road Pump Station					
Pump Station	PS-123 - Southern Marin Line Syphon					
Pump Station	PS-124 - Throckmorton Booster New Pumpstat					
Pump Station	PS-125 - Kent Fire Trail 2nd Lift Pump Station					
Pump Station	PS-126 - Oak woodlands Pump Station					
Pump Station	PS-127 - Marin Terrace Pump Station					
Pump Station	PS-128 - Alpine Bon-Tempe Pump Station					
Pump Station	PS-129 - Slide Gulch Pump Station					
Pump Station	PS-130 - Smith Conifer Pump Station					
Building	San Geronimo Treatment Plant - Boat Barn	99.83%	0.15%	0.01%	0.00%	0.00%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Chemical Stor					
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #1					
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #2					
Building	San Geronimo Treatment Plant - Facilities Shed	99.76%	0.22%	0.01%	0.00%	0.00%
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Flash Mixer					
Building	San Geronimo Treatment Plant - Gardeners She	99.83%	0.15%	0.01%	0.00%	0.00%
Facility - Pump Station	San Geronimo Treatment Plant - North Marin L					
Facility - Pump Station	Southern Marin Line - Pump Station					
Water Tank	TK-006 - MADERA PARK TANK #1					
Water Tank	TK-009 - SAN CLEMENTE TANK					
Water Tank	TK-011 - CANON VILLAGE TANK					
Water Tank	TK-012 - FAIRFAX GRADE TANK					
Water Tank	TK-015 - MEADOW CLUB UPPER TANK					
Water Tank	TK-019 - OAK MANOR TOP TANK					
Water Tank	TK-025 - BRET HARTE TANK					
Water Tank	TK-027 - GREENBRAE TANK					
Water Tank	TK-030 - ESCALLE TANK					
Water Tank	TK-033 - INDIAN FIRE TRAIL TANK					
Water Tank	TK-046 - ALTO TANK #1					
Water Tank	TK-047 - BOLSA TANK					

Type	Facility Name	Losses (in dollars)			
		Structure	Nonstructural Drift Sensitive	Nonstructural Acceleration-Sensitive	Total Building Loss
Pump Station	PS-077 - Beacon Hill Pump Station	\$1,650			\$1,650
Pump Station	PS-078 - Crescent Avenue Pump Station	\$525			\$525
Pump Station	PS-079 - Marin City Pump Station	\$1,650			\$1,650
Pump Station	PS-080 - Monte Mar Vista Pump Station	\$3,920			\$3,920
Pump Station	PS-081 - Sausalito Pumphouse Pump Station	\$400			\$400
Pump Station	PS-082 - Sausalito Boulevard Pump Station	\$525			\$525
Pump Station	PS-083 - Richardson Drive Pump Station	\$1,650			\$1,650
Pump Station	PS-084 - Eastwood Way Pump Station	\$275			\$275
Pump Station	PS-085 - Fairview Park Pump Station	\$275			\$275
Pump Station	PS-087 - Marinview Pump Station	\$1,650			\$1,650
Pump Station	PS-088 - Tam Woods 1st Lift Pump Station	\$525			\$525
Pump Station	PS-089 - Tam Woods 2nd Lift Pump Station	\$525			\$525
Pump Station	PS-090 - Hill Haven Pump Station	\$1,650			\$1,650
Pump Station	PS-091 - Sugarloaf Pump Station	\$1,650			\$1,650
Pump Station	PS-092 - Tiburon Belvedere Pump Station	\$1,650			\$1,650
Pump Station	PS-093 - Tiburon Booster Pump Station	\$3,920			\$3,920
Pump Station	PS-095 - Pine Mountain Tunnel Pump Station	\$275			\$275
Pump Station	PS-097 - Tocaloma Booster Pump Station	\$450			\$450
Pump Station	PS-101 - Redwood Drive Lower Pump	\$1,650			\$1,650
Pump Station	PS-102 - North Marin Line Boosters	\$20			\$20
Pump Station	PS-103 - San Geronimo Valley Pump Station	\$20			\$20
Pump Station	PS-104 - Conifer Way Pump Station	\$275			\$275
Pump Station	PS-106 - Los Altos Pump Station	\$955			\$955
Pump Station	PS-108 - Indian Rock Pump Station	\$2,485			\$2,485
Pump Station	PS-109 - Cibirian Pump Station	\$2,485			\$2,485
Pump Station	PS-113 - Lag Picnic Grounds Pump Station	\$275			\$275
Pump Station	PS-114 - Cortez Avenue Pump Station	\$125			\$125
Pump Station	PS-115 - Redwood Drive Upper Pump Station	\$105			\$105
Pump Station	PS-116 - North Redwood Drive Boosters	\$6,085			\$6,085
Pump Station	PS-117 - Wolfback Ridge Pump Station	\$125			\$125
Pump Station	PS-118 - Fire Road Pump Station	\$105			\$105
Pump Station	PS-122 - Upper Road Pump Station	\$400			\$400
Pump Station	PS-123 - Southern Marin Line Syphon	\$20			\$20
Pump Station	PS-124 - Throckmorton Booster New Pumpstat	\$20			\$20
Pump Station	PS-125 - Kent Fire Trail 2nd Lift Pump Station	\$105			\$105
Pump Station	PS-126 - Oak woodlands Pump Station	\$1,040			\$1,040
Pump Station	PS-127 - Marin Terrace Pump Station	\$105			\$105
Pump Station	PS-128 - Alpine Bon-Tempe Pump Station	\$20			\$20
Pump Station	PS-129 - Slide Gulch Pump Station	\$20			\$20
Pump Station	PS-130 - Smith Conifer Pump Station	\$105			\$105
Building	San Geronimo Treatment Plant - Boat Barn				
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Chemical Stor	\$52,500			\$52,500
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #1				
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #2				
Building	San Geronimo Treatment Plant - Facilities Shed				
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Flash Mixer				
Building	San Geronimo Treatment Plant - Gardeners She				
Facility - Pump Station	San Geronimo Treatment Plant - North Marin L	\$2,625			\$2,625
Facility - Pump Station	Southern Marin Line - Pump Station	\$290			\$290
Water Tank	TK-006 - MADERA PARK TANK #1	\$244			\$244
Water Tank	TK-009 - SAN CLEMENTE TANK	\$33,750			\$33,750
Water Tank	TK-011 - CANON VILLAGE TANK	\$8,715			\$8,715
Water Tank	TK-012 - FAIRFAX GRADE TANK	\$4,490			\$4,490
Water Tank	TK-015 - MEADOW CLUB UPPER TANK	\$1,629			\$1,629
Water Tank	TK-019 - OAK MANOR TOP TANK	\$1,453			\$1,453
Water Tank	TK-025 - BRET HARTE TANK	\$11,250			\$11,250
Water Tank	TK-027 - GREENBRAE TANK	\$33,750			\$33,750
Water Tank	TK-030 - ESCALLE TANK	\$52,390			\$52,390
Water Tank	TK-033 - INDIAN FIRE TRAIL TANK	\$2,245			\$2,245
Water Tank	TK-046 - ALTO TANK #1	\$26,940			\$26,940
Water Tank	TK-047 - BOLSA TANK	\$62			\$62

Type	Facility Name	Functionality (%)					
		At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Pump Station	PS-077 - Beacon Hill Pump Station	98.90	99.70	99.90	99.90	99.90	99.90
Pump Station	PS-078 - Crescent Avenue Pump Station	99.60	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-079 - Marin City Pump Station	98.90	99.70	99.90	99.90	99.90	99.90
Pump Station	PS-080 - Monte Mar Vista Pump Station	97.40	99.40	99.80	99.90	99.90	99.90
Pump Station	PS-081 - Sausalito Pumphouse Pump Station	99.60	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-082 - Sausalito Boulevard Pump Station	99.60	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-083 - Richardson Drive Pump Station	98.90	99.70	99.90	99.90	99.90	99.90
Pump Station	PS-084 - Eastwood Way Pump Station	99.70	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-085 - Fairview Park Pump Station	99.70	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-087 - Marinview Pump Station	98.90	99.70	99.90	99.90	99.90	99.90
Pump Station	PS-088 - Tam Woods 1st Lift Pump Station	99.60	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-089 - Tam Woods 2nd Lift Pump Station	99.60	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-090 - Hill Haven Pump Station	98.90	99.70	99.90	99.90	99.90	99.90
Pump Station	PS-091 - Sugarloaf Pump Station	98.90	99.70	99.90	99.90	99.90	99.90
Pump Station	PS-092 - Tiburon Belvedere Pump Station	98.90	99.70	99.90	99.90	99.90	99.90
Pump Station	PS-093 - Tiburon Booster Pump Station	97.40	99.40	99.80	99.90	99.90	99.90
Pump Station	PS-095 - Pine Mountain Tunnel Pump Station	99.70	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-097 - Tocaloma Booster Pump Station	99.60	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-101 - Redwood Drive Lower Pump	98.90	99.70	99.90	99.90	99.90	99.90
Pump Station	PS-102 - North Marin Line Boosters	99.90	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-103 - San Geronimo Valley Pump Station	99.90	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-104 - Conifer Way Pump Station	99.70	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-106 - Los Altos Pump Station	99.30	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-108 - Indian Rock Pump Station	98.20	99.70	99.90	99.90	99.90	99.90
Pump Station	PS-109 - Cibiria Pump Station	98.20	99.70	99.90	99.90	99.90	99.90
Pump Station	PS-113 - Lag Picnic Grounds Pump Station	99.70	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-114 - Cortez Avenue Pump Station	99.90	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-115 - Redwood Drive Upper Pump Station	99.90	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-116 - North Redwood Drive Boosters	95.70	99.50	99.90	99.90	99.90	99.90
Pump Station	PS-117 - Wolfback Ridge Pump Station	99.90	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-118 - Fire Road Pump Station	99.90	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-122 - Upper Road Pump Station	99.60	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-123 - Southern Marin Line Syphon	99.90	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-124 - Throckmorton Booster New Pumpstat	99.90	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-125 - Kent Fire Trail 2nd Lift Pump Station	99.90	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-126 - Oak woodlands Pump Station	99.20	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-127 - Marin Terrace Pump Station	99.90	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-128 - Alpine Bon-Tempe Pump Station	99.90	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-129 - Slide Gulch Pump Station	99.90	99.90	99.90	99.90	99.90	99.90
Pump Station	PS-130 - Smith Conifer Pump Station	99.90	99.90	99.90	99.90	99.90	99.90
Building	San Geronimo Treatment Plant - Boat Barn	99.90	99.90	99.90	99.90	99.90	99.90
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Chemical Stor	99.60	99.90	99.90	99.90	99.90	99.90
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #1	99.60	99.90	99.90	99.90	99.90	99.90
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Clarifier #2	99.70	99.90	99.90	99.90	99.90	99.90
Building	San Geronimo Treatment Plant - Facilities Shed	99.90	99.90	99.90	99.90	99.90	99.90
Facility - Water Treatment Plant	San Geronimo Treatment Plant - Flash Mixer	99.70	99.90	99.90	99.90	99.90	99.90
Building	San Geronimo Treatment Plant - Gardeners She	99.90	99.90	99.90	99.90	99.90	99.90
Facility - Pump Station	San Geronimo Treatment Plant - North Marin L	99.60	99.90	99.90	99.90	99.90	99.90
Facility - Pump Station	Southern Marin Line - Pump Station	99.80	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-006 - MADERA PARK TANK #1	98.30	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-009 - SAN CLEMENTE TANK	89.20	98.10	99.60	99.90	99.90	99.90
Water Tank	TK-011 - CANON VILLAGE TANK	96.60	99.70	99.90	99.90	99.90	99.90
Water Tank	TK-012 - FAIRFAX GRADE TANK	95.20	99.40	99.80	99.90	99.90	99.90
Water Tank	TK-015 - MEADOW CLUB UPPER TANK	97.00	99.60	99.90	99.90	99.90	99.90
Water Tank	TK-019 - OAK MANOR TOP TANK	96.60	99.70	99.90	99.90	99.90	99.90
Water Tank	TK-025 - BRET HARTE TANK	89.20	98.10	99.60	99.90	99.90	99.90
Water Tank	TK-027 - GREENBRAE TANK	89.20	98.10	99.60	99.90	99.90	99.90
Water Tank	TK-030 - ESCALLE TANK	78.00	94.90	99.00	99.70	99.70	99.80
Water Tank	TK-033 - INDIAN FIRE TRAIL TANK	95.20	99.40	99.80	99.90	99.90	99.90
Water Tank	TK-046 - ALTO TANK #1	95.20	99.40	99.80	99.90	99.90	99.90
Water Tank	TK-047 - BOLSA TANK	99.70	99.90	99.90	99.90	99.90	99.90



Type	Facility Name	Structure Replacement Cost	Structural - Probability of Damage				
			No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Water Tank	TK-055 - MILL VALLEY TANK	\$10,000,000	98.56%	1.28%	0.15%	0.00%	0.00%
Water Tank	TK-060 - SCOTT HIGHLANDS TANK	\$500,000	93.28%	5.59%	1.09%	0.01%	0.00%
Water Tank	TK-064 - STRAWBERRY TANK	\$3,000,000	93.28%	5.59%	1.09%	0.01%	0.00%
Water Tank	TK-068 - ELDA DRIVE TANK	\$300,000	84.88%	11.67%	3.37%	0.06%	0.00%
Water Tank	TK-069 - HAWTHORNE HILLS UPPER TANK	\$4,000,000	70.53%	19.99%	9.13%	0.33%	0.00%
Water Tank	TK-074 - SCENIC AVENUE TANK	\$40,000	99.03%	0.95%	0.01%	0.00%	0.00%
Water Tank	TK-078 - CHULA VISTA TANK	\$500,000	84.88%	11.67%	3.37%	0.06%	0.00%
Water Tank	TK-081 - FAIRHILLS TOP TANK #1	\$120,000	89.76%	8.76%	1.44%	0.01%	0.00%
Water Tank	TK-083 - GLENWOOD TANK	\$3,000,000	69.55%	20.77%	9.38%	0.28%	0.00%
Water Tank	TK-085 - HIND TANK #1	\$200,000	98.20%	1.77%	0.01%	0.00%	0.00%
Water Tank	TK-086 - HIND TANK #2	\$400,000	99.02%	0.95%	0.01%	0.00%	0.00%
Water Tank	TK-087 - LOCH LOMOND TANK	\$2,000,000	84.88%	11.67%	3.37%	0.06%	0.00%
Water Tank	TK-089 - LOS RANCHITOS TANK	\$2,000,000	84.88%	11.67%	3.37%	0.06%	0.00%
Water Tank	TK-090 - MARINWOOD TANK	\$1,000,000	84.88%	11.67%	3.37%	0.06%	0.00%
Water Tank	TK-091 - MARIN PROFESSIONAL CENTER TANK	\$500,000	59.15%	25.46%	14.73%	0.63%	0.00%
Water Tank	TK-094 - MILLER CREEK TANK	\$1,000,000	84.88%	11.67%	3.37%	0.06%	0.00%
Water Tank	TK-096 - PUERTO SUELLO TANK	\$3,000,000	84.87%	11.67%	3.37%	0.06%	0.00%
Water Tank	TK-097 - RAFAEL HIGHLANDS TANK	\$1,000,000	84.88%	11.67%	3.37%	0.06%	0.00%
Water Tank	TK-098 - SANTA MARGARITA TANK	\$3,000,000	84.88%	11.67%	3.37%	0.06%	0.00%
Water Tank	TK-100 - SKYVIEW TERRACE TANK	\$300,000	69.55%	20.77%	9.38%	0.28%	0.00%
Water Tank	TK-105 - COURTRIGHT TANK	\$100,000	98.21%	1.77%	0.01%	0.00%	0.00%
Water Tank	TK-106 - LUCAS VALLEY TANK	\$3,000,000	84.87%	11.67%	3.37%	0.06%	0.00%
Water Tank	TK-108 - CLOUDVIEW TANK	\$440,000	84.00%	12.20%	3.70%	0.08%	0.00%
Water Tank	TK-113 - SAUSALITO PUMP HOUSE TANK #1	\$620,000	70.53%	19.99%	9.13%	0.33%	0.00%
Water Tank	TK-114 - SAUSALITO PUMP HOUSE TANK #2	\$620,000	70.53%	19.99%	9.13%	0.33%	0.00%
Water Tank	TK-115 - ROMER TANK	\$620,000	70.53%	19.99%	9.13%	0.33%	0.00%
Water Tank	TK-116 - SAUSALITO BLVD. TANK	\$460,000	95.81%	3.60%	0.57%	0.01%	0.00%
Water Tank	TK-117 - MESA VISTA TANK #1	\$1,000,000	84.88%	11.67%	3.37%	0.06%	0.00%
Water Tank	TK-118 - COUNTYVIEW DRIVE TANK	\$300,000	98.56%	1.28%	0.15%	0.00%	0.00%
Water Tank	TK-119 - LATTIE LANE TANK	\$500,000	98.56%	1.28%	0.15%	0.00%	0.00%
Water Tank	TK-125 - TENNESSEE VALLEY TANK	\$2,000,000	93.28%	5.59%	1.09%	0.01%	0.00%
Water Tank	TK-126 - HILL HAVEN TANK	\$330,000	95.21%	4.25%	0.52%	0.00%	0.00%
Water Tank	TK-127 - PARADISE DRIVE TANK	\$2,000,000	95.21%	4.25%	0.52%	0.00%	0.00%
Water Tank	TK-128 - MOUNT TIBURON TANK #1	\$1,000,000	93.28%	5.59%	1.09%	0.01%	0.00%
Water Tank	TK-130 - SPRING LANE TANK #1	\$3,000,000	84.00%	12.20%	3.70%	0.08%	0.00%
Water Tank	TK-131 - CONIFER WAY TANK	\$1,000,000	98.56%	1.28%	0.15%	0.00%	0.00%
Water Tank	TK-139 - BUCKEYE CIRCLE TANK	\$60,000	95.21%	4.25%	0.52%	0.00%	0.00%
Water Tank	TK-145 - ROSS RESERVOIR	\$2,000,000	97.55%	2.04%	0.38%	0.01%	0.00%
Water Tank	TK-146 - FORBES HILL RESERVOIR	\$8,000,000	86.41%	10.05%	3.43%	0.09%	0.00%
Water Tank	TK-147 - SMITH SADDLE TANK #1	\$10,000,000	93.28%	5.59%	1.09%	0.01%	0.00%
Water Tank	TK-148 - SMITH SADDLE TANK #2	\$10,000,000	93.28%	5.59%	1.09%	0.01%	0.00%
Water Tank	TK-150 - LOS ALTOS TANK	\$120,000	95.21%	4.25%	0.52%	0.00%	0.00%
Water Tank	TK-152 - MADERA PARK (H/P) TANK	\$3,000	84.87%	11.67%	3.37%	0.06%	0.00%
Water Tank	TK-153 - RAFAEL HIGHLANDS (H/P) TANK	\$5,000	84.88%	11.67%	3.37%	0.06%	0.00%
Water Tank	TK-155 - PINE MOUNTAIN TUNNEL TANK	\$6,000,000	96.72%	2.72%	0.52%	0.01%	0.00%
Water Tank	TK-156 - BON TEMPE CLEARWELL TANK	\$4,000,000	99.16%	0.72%	0.11%	0.00%	0.00%
Water Tank	TK-157 - SAN GERONIMO CLEARWELL TANK #1	\$4,000,000	99.16%	0.72%	0.11%	0.00%	0.00%
Water Tank	TK-158 - FAWN DRIVE TANK	\$180,000	89.76%	8.76%	1.44%	0.01%	0.00%
Water Tank	TK-159 - PEACOCK GAP TANK	\$1,000,000	92.02%	6.99%	0.95%	0.02%	0.00%
Water Tank	TK-160 - MARIN BAY TANK	\$240,000	75.15%	19.49%	5.28%	0.07%	0.00%
Water Tank	TK-164 - TOMAHAWK DRIVE TANK	\$80,000	89.76%	8.76%	1.44%	0.01%	0.00%
Water Tank	TK-165 - ALTO TANK #2	\$6,000,000	95.21%	4.25%	0.52%	0.00%	0.00%
Water Tank	TK-166 - RING MOUNTAIN TANK	\$300,000	89.76%	8.76%	1.44%	0.01%	0.00%
Water Tank	TK-167 - CREEKSIDE DRIVE TANK	\$360,000	89.76%	8.76%	1.44%	0.01%	0.00%
Water Tank	TK-168 - MCNEAR DRIVE #1 (H/P) TANK	\$2,000	84.87%	11.67%	3.37%	0.06%	0.00%
Water Tank	TK-169 - MCNEAR DRIVE #2 (H/P) TANK	\$3,000	84.87%	11.67%	3.37%	0.06%	0.00%
Water Tank	TK-174 - VIA MONTEBELLO (H/P) TANK	\$7,000	67.56%	24.29%	8.00%	0.13%	0.00%
Water Tank	TK-175 - MARINSHIP TANK	\$3,000,000	95.82%	3.77%	0.40%	0.00%	0.00%
Water Tank	TK-181 - REDWOOD DRIVE UPPER TANK	\$120,000	96.01%	3.84%	0.14%	0.00%	0.00%
Water Tank	TK-182 - ALTA AVENUE TANK	\$1,000,000	99.34%	0.63%	0.01%	0.00%	0.00%
Water Tank	TK-183 - MINE RIDGE TANK	\$440,000	99.34%	0.63%	0.01%	0.00%	0.00%

Type	Facility Name	Nonstructural Acceleration-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Water Tank	TK-055 - MILL VALLEY TANK					
Water Tank	TK-060 - SCOTT HIGHLANDS TANK					
Water Tank	TK-064 - STRAWBERRY TANK					
Water Tank	TK-068 - ELDA DRIVE TANK					
Water Tank	TK-069 - HAWTHORNE HILLS UPPER TANK					
Water Tank	TK-074 - SCENIC AVENUE TANK					
Water Tank	TK-078 - CHULA VISTA TANK					
Water Tank	TK-081 - FAIRHILLS TOP TANK #1					
Water Tank	TK-083 - GLENWOOD TANK					
Water Tank	TK-085 - HIND TANK #1					
Water Tank	TK-086 - HIND TANK #2					
Water Tank	TK-087 - LOCH LOMOND TANK					
Water Tank	TK-089 - LOS RANCHITOS TANK					
Water Tank	TK-090 - MARINWOOD TANK					
Water Tank	TK-091 - MARIN PROFESSIONAL CENTER TANK					
Water Tank	TK-094 - MILLER CREEK TANK					
Water Tank	TK-096 - PUERTO SUELLO TANK					
Water Tank	TK-097 - RAFAEL HIGHLANDS TANK					
Water Tank	TK-098 - SANTA MARGARITA TANK					
Water Tank	TK-100 - SKYVIEW TERRACE TANK					
Water Tank	TK-105 - COURTRIGHT TANK					
Water Tank	TK-106 - LUCAS VALLEY TANK					
Water Tank	TK-108 - CLOUDVIEW TANK					
Water Tank	TK-113 - SAUSALITO PUMP HOUSE TANK #1					
Water Tank	TK-114 - SAUSALITO PUMP HOUSE TANK #2					
Water Tank	TK-115 - ROMER TANK					
Water Tank	TK-116 - SAUSALITO BLVD. TANK					
Water Tank	TK-117 - MESA VISTA TANK #1					
Water Tank	TK-118 - COUNTYVIEW DRIVE TANK					
Water Tank	TK-119 - LATTIE LANE TANK					
Water Tank	TK-125 - TENNESSEE VALLEY TANK					
Water Tank	TK-126 - HILL HAVEN TANK					
Water Tank	TK-127 - PARADISE DRIVE TANK					
Water Tank	TK-128 - MOUNT TIBURON TANK #1					
Water Tank	TK-130 - SPRING LANE TANK #1					
Water Tank	TK-131 - CONIFER WAY TANK					
Water Tank	TK-139 - BUCKEYE CIRCLE TANK					
Water Tank	TK-145 - ROSS RESERVOIR					
Water Tank	TK-146 - FORBES HILL RESERVOIR					
Water Tank	TK-147 - SMITH SADDLE TANK #1					
Water Tank	TK-148 - SMITH SADDLE TANK #2					
Water Tank	TK-150 - LOS ALTOS TANK					
Water Tank	TK-152 - MADERA PARK (H/P) TANK					
Water Tank	TK-153 - RAFAEL HIGHLANDS (H/P) TANK					
Water Tank	TK-155 - PINE MOUNTAIN TUNNEL TANK					
Water Tank	TK-156 - BON TEMPE CLEARWELL TANK					
Water Tank	TK-157 - SAN GERONIMO CLEARWELL TANK #1					
Water Tank	TK-158 - FAWN DRIVE TANK					
Water Tank	TK-159 - PEACOCK GAP TANK					
Water Tank	TK-160 - MARIN BAY TANK					
Water Tank	TK-164 - TOMAHAWK DRIVE TANK					
Water Tank	TK-165 - ALTO TANK #2					
Water Tank	TK-166 - RING MOUNTAIN TANK					
Water Tank	TK-167 - CREEKSIDE DRIVE TANK					
Water Tank	TK-168 - MCNEAR DRIVE #1 (H/P) TANK					
Water Tank	TK-169 - MCNEAR DRIVE #2 (H/P) TANK					
Water Tank	TK-174 - VIA MONTEBELLO (H/P) TANK					
Water Tank	TK-175 - MARINSHIP TANK					
Water Tank	TK-181 - REDWOOD DRIVE UPPER TANK					
Water Tank	TK-182 - ALTA AVENUE TANK					
Water Tank	TK-183 - MINE RIDGE TANK					

Type	Facility Name	Nonstructural Drift-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Water Tank	TK-055 - MILL VALLEY TANK					
Water Tank	TK-060 - SCOTT HIGHLANDS TANK					
Water Tank	TK-064 - STRAWBERRY TANK					
Water Tank	TK-068 - ELDA DRIVE TANK					
Water Tank	TK-069 - HAWTHORNE HILLS UPPER TANK					
Water Tank	TK-074 - SCENIC AVENUE TANK					
Water Tank	TK-078 - CHULA VISTA TANK					
Water Tank	TK-081 - FAIRHILLS TOP TANK #1					
Water Tank	TK-083 - GLENWOOD TANK					
Water Tank	TK-085 - HIND TANK #1					
Water Tank	TK-086 - HIND TANK #2					
Water Tank	TK-087 - LOCH LOMOND TANK					
Water Tank	TK-089 - LOS RANCHITOS TANK					
Water Tank	TK-090 - MARINWOOD TANK					
Water Tank	TK-091 - MARIN PROFESSIONAL CENTER TANK					
Water Tank	TK-094 - MILLER CREEK TANK					
Water Tank	TK-096 - PUERTO SUELLO TANK					
Water Tank	TK-097 - RAFAEL HIGHLANDS TANK					
Water Tank	TK-098 - SANTA MARGARITA TANK					
Water Tank	TK-100 - SKYVIEW TERRACE TANK					
Water Tank	TK-105 - COURTRIGHT TANK					
Water Tank	TK-106 - LUCAS VALLEY TANK					
Water Tank	TK-108 - CLOUDVIEW TANK					
Water Tank	TK-113 - SAUSALITO PUMP HOUSE TANK #1					
Water Tank	TK-114 - SAUSALITO PUMP HOUSE TANK #2					
Water Tank	TK-115 - ROMER TANK					
Water Tank	TK-116 - SAUSALITO BLVD. TANK					
Water Tank	TK-117 - MESA VISTA TANK #1					
Water Tank	TK-118 - COUNTYVIEW DRIVE TANK					
Water Tank	TK-119 - LATTIE LANE TANK					
Water Tank	TK-125 - TENNESSEE VALLEY TANK					
Water Tank	TK-126 - HILL HAVEN TANK					
Water Tank	TK-127 - PARADISE DRIVE TANK					
Water Tank	TK-128 - MOUNT TIBURON TANK #1					
Water Tank	TK-130 - SPRING LANE TANK #1					
Water Tank	TK-131 - CONIFER WAY TANK					
Water Tank	TK-139 - BUCKEYE CIRCLE TANK					
Water Tank	TK-145 - ROSS RESERVOIR					
Water Tank	TK-146 - FORBES HILL RESERVOIR					
Water Tank	TK-147 - SMITH SADDLE TANK #1					
Water Tank	TK-148 - SMITH SADDLE TANK #2					
Water Tank	TK-150 - LOS ALTOS TANK					
Water Tank	TK-152 - MADERA PARK (H/P) TANK					
Water Tank	TK-153 - RAFAEL HIGHLANDS (H/P) TANK					
Water Tank	TK-155 - PINE MOUNTAIN TUNNEL TANK					
Water Tank	TK-156 - BON TEMPE CLEARWELL TANK					
Water Tank	TK-157 - SAN GERONIMO CLEARWELL TANK #1					
Water Tank	TK-158 - FAWN DRIVE TANK					
Water Tank	TK-159 - PEACOCK GAP TANK					
Water Tank	TK-160 - MARIN BAY TANK					
Water Tank	TK-164 - TOMAHAWK DRIVE TANK					
Water Tank	TK-165 - ALTO TANK #2					
Water Tank	TK-166 - RING MOUNTAIN TANK					
Water Tank	TK-167 - CREEKSIDE DRIVE TANK					
Water Tank	TK-168 - MCNEAR DRIVE #1 (H/P) TANK					
Water Tank	TK-169 - MCNEAR DRIVE #2 (H/P) TANK					
Water Tank	TK-174 - VIA MONTEBELLO (H/P) TANK					
Water Tank	TK-175 - MARINSHIP TANK					
Water Tank	TK-181 - REDWOOD DRIVE UPPER TANK					
Water Tank	TK-182 - ALTA AVENUE TANK					
Water Tank	TK-183 - MINE RIDGE TANK					

Type	Facility Name	Losses (in dollars)			
		Structure	Nonstructural Drift Sensitive	Nonstructural Acceleration-Sensitive	Total Building Loss
Water Tank	TK-055 - MILL VALLEY TANK	\$8,650			\$8,650
Water Tank	TK-060 - SCOTT HIGHLANDS TANK	\$2,245			\$2,245
Water Tank	TK-064 - STRAWBERRY TANK	\$13,470			\$13,470
Water Tank	TK-068 - ELDA DRIVE TANK	\$3,375			\$3,375
Water Tank	TK-069 - HAWTHORNE HILLS UPPER TANK	\$102,680			\$102,680
Water Tank	TK-074 - SCENIC AVENUE TANK	\$20			\$20
Water Tank	TK-078 - CHULA VISTA TANK	\$5,625			\$5,625
Water Tank	TK-081 - FAIRHILLS TOP TANK #1	\$792			\$792
Water Tank	TK-083 - GLENWOOD TANK	\$78,405			\$78,405
Water Tank	TK-085 - HIND TANK #1	\$180			\$180
Water Tank	TK-086 - HIND TANK #2	\$196			\$196
Water Tank	TK-087 - LOCH LOMOND TANK	\$22,500			\$22,500
Water Tank	TK-089 - LOS RANCHITOS TANK	\$22,500			\$22,500
Water Tank	TK-090 - MARINWOOD TANK	\$11,250			\$11,250
Water Tank	TK-091 - MARIN PROFESSIONAL CENTER TANK	\$19,303			\$19,303
Water Tank	TK-094 - MILLER CREEK TANK	\$11,250			\$11,250
Water Tank	TK-096 - PUERTO SUELLO TANK	\$33,750			\$33,750
Water Tank	TK-097 - RAFAEL HIGHLANDS TANK	\$11,250			\$11,250
Water Tank	TK-098 - SANTA MARGARITA TANK	\$33,750			\$33,750
Water Tank	TK-100 - SKYVIEW TERRACE TANK	\$7,841			\$7,841
Water Tank	TK-105 - COURTRIGHT TANK	\$90			\$90
Water Tank	TK-106 - LUCAS VALLEY TANK	\$33,750			\$33,750
Water Tank	TK-108 - CLOUDVIEW TANK	\$5,337			\$5,337
Water Tank	TK-113 - SAUSALITO PUMP HOUSE TANK #1	\$15,915			\$15,915
Water Tank	TK-114 - SAUSALITO PUMP HOUSE TANK #2	\$15,915			\$15,915
Water Tank	TK-115 - ROMER TANK	\$15,915			\$15,915
Water Tank	TK-116 - SAUSALITO BLVD. TANK	\$1,249			\$1,249
Water Tank	TK-117 - MESA VISTA TANK #1	\$11,250			\$11,250
Water Tank	TK-118 - COUNTYVIEW DRIVE TANK	\$260			\$260
Water Tank	TK-119 - LATTIE LANE TANK	\$433			\$433
Water Tank	TK-125 - TENNESSEE VALLEY TANK	\$8,980			\$8,980
Water Tank	TK-126 - HILL HAVEN TANK	\$959			\$959
Water Tank	TK-127 - PARADISE DRIVE TANK	\$5,810			\$5,810
Water Tank	TK-128 - MOUNT TIBURON TANK #1	\$4,490			\$4,490
Water Tank	TK-130 - SPRING LANE TANK #1	\$36,390			\$36,390
Water Tank	TK-131 - CONIFER WAY TANK	\$865			\$865
Water Tank	TK-139 - BUCKEYE CIRCLE TANK	\$174			\$174
Water Tank	TK-145 - ROSS RESERVOIR	\$3,300			\$3,300
Water Tank	TK-146 - FORBES HILL RESERVOIR	\$85,680			\$85,680
Water Tank	TK-147 - SMITH SADDLE TANK #1	\$44,900			\$44,900
Water Tank	TK-148 - SMITH SADDLE TANK #2	\$44,900			\$44,900
Water Tank	TK-150 - LOS ALTOS TANK	\$349			\$349
Water Tank	TK-152 - MADERA PARK (H/P) TANK	\$34			\$34
Water Tank	TK-153 - RAFAEL HIGHLANDS (H/P) TANK	\$56			\$56
Water Tank	TK-155 - PINE MOUNTAIN TUNNEL TANK	\$13,200			\$13,200
Water Tank	TK-156 - BON TEMPE CLEARWELL TANK	\$2,100			\$2,100
Water Tank	TK-157 - SAN GERONIMO CLEARWELL TANK #1	\$2,100			\$2,100
Water Tank	TK-158 - FAWN DRIVE TANK	\$1,188			\$1,188
Water Tank	TK-159 - PEACOCK GAP TANK	\$5,040			\$5,040
Water Tank	TK-160 - MARIN BAY TANK	\$4,340			\$4,340
Water Tank	TK-164 - TOMAHAWK DRIVE TANK	\$528			\$528
Water Tank	TK-165 - ALTO TANK #2	\$17,430			\$17,430
Water Tank	TK-166 - RING MOUNTAIN TANK	\$1,980			\$1,980
Water Tank	TK-167 - CREEKSIDE DRIVE TANK	\$2,376			\$2,376
Water Tank	TK-168 - MCNEAR DRIVE #1 (H/P) TANK	\$23			\$23
Water Tank	TK-169 - MCNEAR DRIVE #2 (H/P) TANK	\$34			\$34
Water Tank	TK-174 - VIA MONTEBELLO (H/P) TANK	\$174			\$174
Water Tank	TK-175 - MARINSHIP TANK	\$7,455			\$7,455
Water Tank	TK-181 - REDWOOD DRIVE UPPER TANK	\$256			\$256
Water Tank	TK-182 - ALTA AVENUE TANK	\$330			\$330
Water Tank	TK-183 - MINE RIDGE TANK	\$145			\$145

Type	Facility Name	Functionality (%)					
		At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Water Tank	TK-055 - MILL VALLEY TANK	98.90	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-060 - SCOTT HIGHLANDS TANK	95.20	99.40	99.80	99.90	99.90	99.90
Water Tank	TK-064 - STRAWBERRY TANK	95.20	99.40	99.80	99.90	99.90	99.90
Water Tank	TK-068 - ELDA DRIVE TANK	89.20	98.10	99.60	99.90	99.90	99.90
Water Tank	TK-069 - HAWTHORNE HILLS UPPER TANK	78.70	94.90	99.00	99.70	99.70	99.80
Water Tank	TK-074 - SCENIC AVENUE TANK	99.30	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-078 - CHULA VISTA TANK	89.20	98.10	99.60	99.90	99.90	99.90
Water Tank	TK-081 - FAIRHILLS TOP TANK #1	92.70	99.20	99.80	99.90	99.90	99.90
Water Tank	TK-083 - GLENWOOD TANK	78.00	94.90	99.00	99.70	99.70	99.80
Water Tank	TK-085 - HIND TANK #1	98.70	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-086 - HIND TANK #2	99.30	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-087 - LOCH LOMOND TANK	89.20	98.10	99.60	99.90	99.90	99.90
Water Tank	TK-089 - LOS RANCHITOS TANK	89.20	98.10	99.60	99.90	99.90	99.90
Water Tank	TK-090 - MARINWOOD TANK	89.20	98.10	99.60	99.90	99.90	99.90
Water Tank	TK-091 - MARIN PROFESSIONAL CENTER TANK	70.30	91.80	98.30	99.40	99.40	99.60
Water Tank	TK-094 - MILLER CREEK TANK	89.20	98.10	99.60	99.90	99.90	99.90
Water Tank	TK-096 - PUERTO SUELLO TANK	89.20	98.10	99.60	99.90	99.90	99.90
Water Tank	TK-097 - RAFAEL HIGHLANDS TANK	89.20	98.10	99.60	99.90	99.90	99.90
Water Tank	TK-098 - SANTA MARGARITA TANK	89.20	98.10	99.60	99.90	99.90	99.90
Water Tank	TK-100 - SKYVIEW TERRACE TANK	78.00	94.90	99.00	99.70	99.70	99.80
Water Tank	TK-105 - COURTRIGHT TANK	98.70	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-106 - LUCAS VALLEY TANK	89.20	98.10	99.60	99.90	99.90	99.90
Water Tank	TK-108 - CLOUDVIEW TANK	88.50	98.00	99.60	99.90	99.90	99.90
Water Tank	TK-113 - SAUSALITO PUMP HOUSE TANK #1	78.70	94.90	99.00	99.70	99.70	99.80
Water Tank	TK-114 - SAUSALITO PUMP HOUSE TANK #2	78.70	94.90	99.00	99.70	99.70	99.80
Water Tank	TK-115 - ROMER TANK	78.70	94.90	99.00	99.70	99.70	99.80
Water Tank	TK-116 - SAUSALITO BLVD. TANK	97.00	99.60	99.90	99.90	99.90	99.90
Water Tank	TK-117 - MESA VISTA TANK #1	89.20	98.10	99.60	99.90	99.90	99.90
Water Tank	TK-118 - COUNTYVIEW DRIVE TANK	98.90	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-119 - LATTIE LANE TANK	98.90	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-125 - TENNESSEE VALLEY TANK	95.20	99.40	99.80	99.90	99.90	99.90
Water Tank	TK-126 - HILL HAVEN TANK	96.60	99.70	99.90	99.90	99.90	99.90
Water Tank	TK-127 - PARADISE DRIVE TANK	96.60	99.70	99.90	99.90	99.90	99.90
Water Tank	TK-128 - MOUNT TIBURON TANK #1	95.20	99.40	99.80	99.90	99.90	99.90
Water Tank	TK-130 - SPRING LANE TANK #1	88.50	98.00	99.60	99.90	99.90	99.90
Water Tank	TK-131 - CONIFER WAY TANK	98.90	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-139 - BUCKEYE CIRCLE TANK	96.60	99.70	99.90	99.90	99.90	99.90
Water Tank	TK-145 - ROSS RESERVOIR	98.20	99.70	99.90	99.90	99.90	99.90
Water Tank	TK-146 - FORBES HILL RESERVOIR	90.20	98.10	99.60	99.90	99.90	99.90
Water Tank	TK-147 - SMITH SADDLE TANK #1	95.20	99.40	99.80	99.90	99.90	99.90
Water Tank	TK-148 - SMITH SADDLE TANK #2	95.20	99.40	99.80	99.90	99.90	99.90
Water Tank	TK-150 - LOS ALTOS TANK	96.60	99.70	99.90	99.90	99.90	99.90
Water Tank	TK-152 - MADERA PARK (H/P) TANK	89.20	98.10	99.60	99.90	99.90	99.90
Water Tank	TK-153 - RAFAEL HIGHLANDS (H/P) TANK	89.20	98.10	99.60	99.90	99.90	99.90
Water Tank	TK-155 - PINE MOUNTAIN TUNNEL TANK	97.60	99.60	99.90	99.90	99.90	99.90
Water Tank	TK-156 - BON TEMPE CLEARWELL TANK	99.40	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-157 - SAN GERONIMO CLEARWELL TANK #1	99.40	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-158 - FAWN DRIVE TANK	92.70	99.20	99.80	99.90	99.90	99.90
Water Tank	TK-159 - PEACOCK GAP TANK	94.30	99.40	99.80	99.90	99.90	99.90
Water Tank	TK-160 - MARIN BAY TANK	82.30	97.20	99.50	99.90	99.90	99.90
Water Tank	TK-164 - TOMAHAWK DRIVE TANK	92.70	99.20	99.80	99.90	99.90	99.90
Water Tank	TK-165 - ALTO TANK #2	96.60	99.70	99.90	99.90	99.90	99.90
Water Tank	TK-166 - RING MOUNTAIN TANK	92.70	99.20	99.80	99.90	99.90	99.90
Water Tank	TK-167 - CREEKSIDE DRIVE TANK	92.70	99.20	99.80	99.90	99.90	99.90
Water Tank	TK-168 - MCNEAR DRIVE #1 (H/P) TANK	89.20	98.10	99.60	99.90	99.90	99.90
Water Tank	TK-169 - MCNEAR DRIVE #2 (H/P) TANK	89.20	98.10	99.60	99.90	99.90	99.90
Water Tank	TK-174 - VIA MONTEBELLO (H/P) TANK	76.80	95.70	99.20	99.80	99.80	99.90
Water Tank	TK-175 - MARINSHIP TANK	97.00	99.70	99.90	99.90	99.90	99.90
Water Tank	TK-181 - REDWOOD DRIVE UPPER TANK	97.20	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-182 - ALTA AVENUE TANK	99.50	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-183 - MINE RIDGE TANK	99.50	99.90	99.90	99.90	99.90	99.90

Type	Facility Name	Structure Replacement Cost	Structural - Probability of Damage				
			No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Water Tank	TK-184 - PACHECO RIDGE TANK #1	\$6,000,000	88.21%	11.05%	0.72%	0.00%	0.00%
Water Tank	TK-185 - PACHECO RIDGE TANK #2	\$6,000,000	88.21%	11.05%	0.72%	0.00%	0.00%
Water Tank	TK-186 - SAN GERONIMO CLEARWELL TANK #2	\$6,000,000	99.76%	0.22%	0.01%	0.00%	0.00%
Water Tank	TK-187 - MANZANITA TANK	\$120,000	99.34%	0.63%	0.01%	0.00%	0.00%
Water Tank	TK-188 - WOLFBACK RIDGE TANK #1	\$50,000	99.34%	0.63%	0.01%	0.00%	0.00%
Water Tank	TK-189 - WOLFBACK RIDGE TANK #2	\$50,000	99.34%	0.63%	0.01%	0.00%	0.00%
Water Tank	TK-190 - INVERNESS DRIVE TANK	\$280,000	90.89%	8.62%	0.47%	0.00%	0.00%
Water Tank	TK-191 - LONE TREE AVENUE TANK	\$200,000	99.34%	0.63%	0.01%	0.00%	0.00%
Water Tank	TK-192 - VERNAL AVE TANK	\$600,000	99.34%	0.63%	0.01%	0.00%	0.00%
Water Tank	TK-193 - H-LINE ROAD TANK	\$1,000,000	99.34%	0.63%	0.01%	0.00%	0.00%
Water Tank	TK-195 - Fire Road Pressure Tank	\$2,000	96.01%	3.84%	0.14%	0.00%	0.00%
Water Tank	TK-196 - WILSON WAY TANK	\$200,000	98.99%	0.98%	0.02%	0.00%	0.00%
Water Tank	TK-197 - SUMMIT TRAIL TANK	\$260,000	98.99%	0.98%	0.02%	0.00%	0.00%
Water Tank	TK-198 - SCOTT TANKS	\$120,000	99.89%	0.10%	0.00%	0.00%	0.00%
Water Tank	TK-199 - SCOTT TANKS	\$120,000	99.89%	0.10%	0.00%	0.00%	0.00%
Water Tank	TK-200 - OAK WOODLANDS TANK #1	\$230,000	96.99%	2.92%	0.06%	0.00%	0.00%
Water Tank	TK-201 - OAK WOODLANDS TANK #2	\$230,000	97.00%	2.92%	0.06%	0.00%	0.00%
Water Tank	TK-202 - Fairfax Manor 1st Lift Tank	\$40,000	97.00%	2.92%	0.06%	0.00%	0.00%
Water Tank	TK-203 - MONTE MAR VISTA TANK	\$120,000	98.99%	0.98%	0.02%	0.00%	0.00%
Water Tank	TK-204 - Bay Road Tank	\$240,000	84.88%	11.67%	3.37%	0.06%	0.00%
Water Tank	TK-205 - RICHARDSON DRIVE (H/P) TANK	\$2,000	98.99%	0.98%	0.02%	0.00%	0.00%
Water Tank	TK-206 - SANTA VENETIA TANK	\$620,000	82.71%	16.24%	1.04%	0.00%	0.00%
Water Tank	TK-207 - GOODHILL ROAD TANK	\$120,000	98.99%	0.98%	0.02%	0.00%	0.00%
Water Tank	TK-208 - SPRING LANE TANK #2	\$3,000,000	98.99%	0.98%	0.02%	0.00%	0.00%
Water Tank	TK-209 - FAIRHILLS TOP TANK #2	\$120,000	97.00%	2.92%	0.06%	0.00%	0.00%
Water Tank	TK-210 - BEACON HILL TANK	\$200,000	99.89%	0.10%	0.00%	0.00%	0.00%
Water Tank	TK-211 - Kent Fire Trail Tank #1	\$200,000	98.99%	0.98%	0.02%	0.00%	0.00%
Water Tank	TK-212 - Kent Fire Trail Tank #2	\$200,000	98.99%	0.98%	0.02%	0.00%	0.00%
Water Tank	TK-213 - MARIN CITY TANK	\$400,000	99.89%	0.10%	0.00%	0.00%	0.00%
Water Tank	TK-214 - SLIDE GULCH TANK	\$194,348	99.89%	0.10%	0.00%	0.00%	0.00%
Water Tank	TK-215 - SEQUOIA PARK TANK #1	\$220,000	97.00%	2.92%	0.06%	0.00%	0.00%
Water Tank	TK-216 - SEQUOIA PARK TANK #2	\$100,000	97.00%	2.92%	0.06%	0.00%	0.00%
Water Tank	TK-217 - KENT WOODLANDS 1ST LIFT TANK	\$200,000	98.99%	0.98%	0.02%	0.00%	0.00%
Water Tank	TK-218 - MOUNT TIBURON TANK #2	\$1,180,000	98.99%	0.98%	0.02%	0.00%	0.00%
Water Tank	TK-219 - OAK MANOR FIRST LIFT TANK	\$200,000	98.99%	0.98%	0.02%	0.00%	0.00%
Water Tank	TK-220 - TAM WOODS TOP TANK	\$160,000	99.89%	0.10%	0.00%	0.00%	0.00%
Water Tank	TK-221 - SUMMIT AVENUE LOWER TANK	\$200,000	99.89%	0.10%	0.00%	0.00%	0.00%
Water Tank	TK-222 - FRIAR TUCK LANE TANK	\$250,000	95.76%	4.12%	0.10%	0.00%	0.00%
Water Tank	TK-223 - CASCADE TANK #1	\$120,000	98.99%	0.98%	0.02%	0.00%	0.00%
Water Tank	TK-224 - CASCADE TANK #2	\$120,000	98.99%	0.98%	0.02%	0.00%	0.00%
Water Tank	TK-225 - SUGARLOAF TANK #1	\$254,000	98.99%	0.98%	0.02%	0.00%	0.00%
Water Tank	TK-226 - SUGARLOAF TANK #2	\$254,000	98.99%	0.98%	0.02%	0.00%	0.00%
Water Tank	TK-228 - GLENWOOD FOREST TANK	\$180,000	95.75%	4.12%	0.10%	0.00%	0.00%
Water Tank	TK-229 - KENT FIRE TRAIL TOP TANK	\$20,000	98.99%	0.98%	0.02%	0.00%	0.00%
Water Tank	TK-230 - SWIG TANK	\$100,000	97.00%	2.92%	0.06%	0.00%	0.00%
Water Tank	TK-232 - SKY RANCH TANK	\$240,000	97.00%	2.92%	0.06%	0.00%	0.00%
Water Tank	TK-233 - FAIRFAX MANOR TOP TANK	\$216,000	98.99%	0.98%	0.02%	0.00%	0.00%
Water Tank	TK-234 - TAM WOODS FIRST LIFT TANK	\$170,000	99.89%	0.10%	0.00%	0.00%	0.00%
Water Tank	TK-235 - FAIRVIEW PARK TANK	\$200,000	99.89%	0.10%	0.00%	0.00%	0.00%
Water Tank	TK-236 - FERN CANYON TANK	\$60,000	99.89%	0.10%	0.00%	0.00%	0.00%
Water Tank	TK-237 - CONIFER WAY UPPER TANK	\$200,000	98.99%	0.98%	0.02%	0.00%	0.00%
Water Tank	TK-238 - OAK AVENUE TANK	\$200,000	98.99%	0.98%	0.02%	0.00%	0.00%
Water Tank	TK-239 - ELINOR AVE TANK	\$226,000	98.99%	0.98%	0.02%	0.00%	0.00%
Water Tank	TK-240 - Summit Ave Upper Tank	\$240,000	99.89%	0.10%	0.00%	0.00%	0.00%
Water Tank	TK-241 - LAGUNITAS PICNIC GROUNDS TANK	\$1,100	100.00%	0.00%	0.00%	0.00%	0.00%
Water Tank	TK-243 - MARINER HIGHLANDS TANK	\$120,000	97.00%	2.92%	0.06%	0.00%	0.00%
Water Tank	TK-244 - UPPER ROAD TANK	\$80,000	98.99%	0.98%	0.02%	0.00%	0.00%
<b>AVERAGE</b>			<b>93.42%</b>	<b>5.13%</b>	<b>1.26%</b>	<b>0.15%</b>	<b>0.03%</b>

Type	Facility Name	Nonstructural Acceleration-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Water Tank	TK-184 - PACHECO RIDGE TANK #1					
Water Tank	TK-185 - PACHECO RIDGE TANK #2					
Water Tank	TK-186 - SAN GERONIMO CLEARWELL TANK #2					
Water Tank	TK-187 - MANZANITA TANK					
Water Tank	TK-188 - WOLFBACK RIDGE TANK #1					
Water Tank	TK-189 - WOLFBACK RIDGE TANK #2					
Water Tank	TK-190 - INVERNESS DRIVE TANK					
Water Tank	TK-191 - LONE TREE AVENUE TANK					
Water Tank	TK-192 - VERNAL AVE TANK					
Water Tank	TK-193 - H-LINE ROAD TANK					
Water Tank	TK-195 - Fire Road Pressure Tank					
Water Tank	TK-196 - WILSON WAY TANK					
Water Tank	TK-197 - SUMMIT TRAIL TANK					
Water Tank	TK-198 - SCOTT TANKS					
Water Tank	TK-199 - SCOTT TANKS					
Water Tank	TK-200 - OAK WOODLANDS TANK #1					
Water Tank	TK-201 - OAK WOODLANDS TANK #2					
Water Tank	TK-202 - Fairfax Manor 1st Lift Tank					
Water Tank	TK-203 - MONTE MAR VISTA TANK					
Water Tank	TK-204 - Bay Road Tank					
Water Tank	TK-205 - RICHARDSON DRIVE (H/P) TANK					
Water Tank	TK-206 - SANTA VENETIA TANK					
Water Tank	TK-207 - GOODHILL ROAD TANK					
Water Tank	TK-208 - SPRING LANE TANK #2					
Water Tank	TK-209 - FAIRHILLS TOP TANK #2					
Water Tank	TK-210 - BEACON HILL TANK					
Water Tank	TK-211 - Kent Fire Trail Tank #1					
Water Tank	TK-212 - Kent Fire Trail Tank #2					
Water Tank	TK-213 - MARIN CITY TANK					
Water Tank	TK-214 - SLIDE GULCH TANK					
Water Tank	TK-215 - SEQUOIA PARK TANK #1					
Water Tank	TK-216 - SEQUOIA PARK TANK #2					
Water Tank	TK-217 - KENT WOODLANDS 1ST LIFT TANK					
Water Tank	TK-218 - MOUNT TIBURON TANK #2					
Water Tank	TK-219 - OAK MANOR FIRST LIFT TANK					
Water Tank	TK-220 - TAM WOODS TOP TANK					
Water Tank	TK-221 - SUMMIT AVENUE LOWER TANK					
Water Tank	TK-222 - FRIAR TUCK LANE TANK					
Water Tank	TK-223 - CASCADE TANK #1					
Water Tank	TK-224 - CASCADE TANK #2					
Water Tank	TK-225 - SUGARLOAF TANK #1					
Water Tank	TK-226 - SUGARLOAF TANK #2					
Water Tank	TK-228 - GLENWOOD FOREST TANK					
Water Tank	TK-229 - KENT FIRE TRAIL TOP TANK					
Water Tank	TK-230 - SWIG TANK					
Water Tank	TK-232 - SKY RANCH TANK					
Water Tank	TK-233 - FAIRFAX MANOR TOP TANK					
Water Tank	TK-234 - TAM WOODS FIRST LIFT TANK					
Water Tank	TK-235 - FAIRVIEW PARK TANK					
Water Tank	TK-236 - FERN CANYON TANK					
Water Tank	TK-237 - CONIFER WAY UPPER TANK					
Water Tank	TK-238 - OAK AVENUE TANK					
Water Tank	TK-239 - ELINOR AVE TANK					
Water Tank	TK-240 - Summit Ave Upper Tank					
Water Tank	TK-241 - LAGUNITAS PICNIC GROUNDS TANK					
Water Tank	TK-243 - MARINER HIGHLANDS TANK					
Water Tank	TK-244 - UPPER ROAD TANK					
<b>AVERAGE</b>		<b>93.93%</b>	<b>5.67%</b>	<b>0.38%</b>	<b>0.01%</b>	<b>0.00%</b>

Type	Facility Name	Nonstructural Drift-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Water Tank	TK-184 - PACHECO RIDGE TANK #1					
Water Tank	TK-185 - PACHECO RIDGE TANK #2					
Water Tank	TK-186 - SAN GERONIMO CLEARWELL TANK #2					
Water Tank	TK-187 - MANZANITA TANK					
Water Tank	TK-188 - WOLFBACK RIDGE TANK #1					
Water Tank	TK-189 - WOLFBACK RIDGE TANK #2					
Water Tank	TK-190 - INVERNESS DRIVE TANK					
Water Tank	TK-191 - LONE TREE AVENUE TANK					
Water Tank	TK-192 - VERNAL AVE TANK					
Water Tank	TK-193 - H-LINE ROAD TANK					
Water Tank	TK-195 - Fire Road Pressure Tank					
Water Tank	TK-196 - WILSON WAY TANK					
Water Tank	TK-197 - SUMMIT TRAIL TANK					
Water Tank	TK-198 - SCOTT TANKS					
Water Tank	TK-199 - SCOTT TANKS					
Water Tank	TK-200 - OAK WOODLANDS TANK #1					
Water Tank	TK-201 - OAK WOODLANDS TANK #2					
Water Tank	TK-202 - Fairfax Manor 1st Lift Tank					
Water Tank	TK-203 - MONTE MAR VISTA TANK					
Water Tank	TK-204 - Bay Road Tank					
Water Tank	TK-205 - RICHARDSON DRIVE (H/P) TANK					
Water Tank	TK-206 - SANTA VENETIA TANK					
Water Tank	TK-207 - GOODHILL ROAD TANK					
Water Tank	TK-208 - SPRING LANE TANK #2					
Water Tank	TK-209 - FAIRHILLS TOP TANK #2					
Water Tank	TK-210 - BEACON HILL TANK					
Water Tank	TK-211 - Kent Fire Trail Tank #1					
Water Tank	TK-212 - Kent Fire Trail Tank #2					
Water Tank	TK-213 - MARIN CITY TANK					
Water Tank	TK-214 - SLIDE GULCH TANK					
Water Tank	TK-215 - SEQUOIA PARK TANK #1					
Water Tank	TK-216 - SEQUOIA PARK TANK #2					
Water Tank	TK-217 - KENT WOODLANDS 1ST LIFT TANK					
Water Tank	TK-218 - MOUNT TIBURON TANK #2					
Water Tank	TK-219 - OAK MANOR FIRST LIFT TANK					
Water Tank	TK-220 - TAM WOODS TOP TANK					
Water Tank	TK-221 - SUMMIT AVENUE LOWER TANK					
Water Tank	TK-222 - FRIAR TUCK LANE TANK					
Water Tank	TK-223 - CASCADE TANK #1					
Water Tank	TK-224 - CASCADE TANK #2					
Water Tank	TK-225 - SUGARLOAF TANK #1					
Water Tank	TK-226 - SUGARLOAF TANK #2					
Water Tank	TK-228 - GLENWOOD FOREST TANK					
Water Tank	TK-229 - KENT FIRE TRAIL TOP TANK					
Water Tank	TK-230 - SWIG TANK					
Water Tank	TK-232 - SKY RANCH TANK					
Water Tank	TK-233 - FAIRFAX MANOR TOP TANK					
Water Tank	TK-234 - TAM WOODS FIRST LIFT TANK					
Water Tank	TK-235 - FAIRVIEW PARK TANK					
Water Tank	TK-236 - FERN CANYON TANK					
Water Tank	TK-237 - CONIFER WAY UPPER TANK					
Water Tank	TK-238 - OAK AVENUE TANK					
Water Tank	TK-239 - ELINOR AVE TANK					
Water Tank	TK-240 - Summit Ave Upper Tank					
Water Tank	TK-241 - LAGUNITAS PICNIC GROUNDS TANK					
Water Tank	TK-243 - MARINER HIGHLANDS TANK					
Water Tank	TK-244 - UPPER ROAD TANK					
<b>AVERAGE</b>		<b>99.58%</b>	<b>0.39%</b>	<b>0.02%</b>	<b>0.00%</b>	<b>0.00%</b>



Type	Facility Name	Losses (in dollars)			
		Structure	Nonstructural Drift Sensitive	Nonstructural Acceleration-Sensitive	Total Building Loss
Water Tank	TK-184 - PACHECO RIDGE TANK #1	\$39,630			\$39,630
Water Tank	TK-185 - PACHECO RIDGE TANK #2	\$39,630			\$39,630
Water Tank	TK-186 - SAN GERONIMO CLEARWELL TANK #2	\$750			\$750
Water Tank	TK-187 - MANZANITA TANK	\$40			\$40
Water Tank	TK-188 - WOLFBACK RIDGE TANK #1	\$17			\$17
Water Tank	TK-189 - WOLFBACK RIDGE TANK #2	\$17			\$17
Water Tank	TK-190 - INVERNESS DRIVE TANK	\$1,404			\$1,404
Water Tank	TK-191 - LONE TREE AVENUE TANK	\$66			\$66
Water Tank	TK-192 - VERNAL AVE TANK	\$198			\$198
Water Tank	TK-193 - H-LINE ROAD TANK	\$330			\$330
Water Tank	TK-195 - Fire Road Pressure Tank	\$4			\$4
Water Tank	TK-196 - WILSON WAY TANK	\$104			\$104
Water Tank	TK-197 - SUMMIT TRAIL TANK	\$135			\$135
Water Tank	TK-198 - SCOTT TANKS	\$6			\$6
Water Tank	TK-199 - SCOTT TANKS	\$6			\$6
Water Tank	TK-200 - OAK WOODLANDS TANK #1	\$357			\$357
Water Tank	TK-201 - OAK WOODLANDS TANK #2	\$357			\$357
Water Tank	TK-202 - Fairfax Manor 1st Lift Tank	\$62			\$62
Water Tank	TK-203 - MONTE MAR VISTA TANK	\$62			\$62
Water Tank	TK-204 - Bay Road Tank	\$2,700			\$2,700
Water Tank	TK-205 - RICHARDSON DRIVE (H/P) TANK	\$1			\$1
Water Tank	TK-206 - SANTA VENETIA TANK	\$6,002			\$6,002
Water Tank	TK-207 - GOODHILL ROAD TANK	\$62			\$62
Water Tank	TK-208 - SPRING LANE TANK #2	\$1,560			\$1,560
Water Tank	TK-209 - FAIRHILLS TOP TANK #2	\$186			\$186
Water Tank	TK-210 - BEACON HILL TANK	\$10			\$10
Water Tank	TK-211 - Kent Fire Trail Tank #1	\$104			\$104
Water Tank	TK-212 - Kent Fire Trail Tank #2	\$104			\$104
Water Tank	TK-213 - MARIN CITY TANK	\$20			\$20
Water Tank	TK-214 - SLIDE GULCH TANK	\$10			\$10
Water Tank	TK-215 - SEQUOIA PARK TANK #1	\$341			\$341
Water Tank	TK-216 - SEQUOIA PARK TANK #2	\$155			\$155
Water Tank	TK-217 - KENT WOODLANDS 1ST LIFT TANK	\$104			\$104
Water Tank	TK-218 - MOUNT TIBURON TANK #2	\$614			\$614
Water Tank	TK-219 - OAK MANOR FIRST LIFT TANK	\$104			\$104
Water Tank	TK-220 - TAM WOODS TOP TANK	\$8			\$8
Water Tank	TK-221 - SUMMIT AVENUE LOWER TANK	\$10			\$10
Water Tank	TK-222 - FRIAR TUCK LANE TANK	\$553			\$553
Water Tank	TK-223 - CASCADE TANK #1	\$62			\$62
Water Tank	TK-224 - CASCADE TANK #2	\$62			\$62
Water Tank	TK-225 - SUGARLOAF TANK #1	\$132			\$132
Water Tank	TK-226 - SUGARLOAF TANK #2	\$132			\$132
Water Tank	TK-228 - GLENWOOD FOREST TANK	\$398			\$398
Water Tank	TK-229 - KENT FIRE TRAIL TOP TANK	\$10			\$10
Water Tank	TK-230 - SWIG TANK	\$155			\$155
Water Tank	TK-232 - SKY RANCH TANK	\$372			\$372
Water Tank	TK-233 - FAIRFAX MANOR TOP TANK	\$112			\$112
Water Tank	TK-234 - TAM WOODS FIRST LIFT TANK	\$9			\$9
Water Tank	TK-235 - FAIRVIEW PARK TANK	\$10			\$10
Water Tank	TK-236 - FERN CANYON TANK	\$3			\$3
Water Tank	TK-237 - CONIFER WAY UPPER TANK	\$104			\$104
Water Tank	TK-238 - OAK AVENUE TANK	\$104			\$104
Water Tank	TK-239 - ELINOR AVE TANK	\$118			\$118
Water Tank	TK-240 - Summit Ave Upper Tank	\$12			\$12
Water Tank	TK-241 - LAGUNITAS PICNIC GROUNDS TANK	\$0			\$0
Water Tank	TK-243 - MARINER HIGHLANDS TANK	\$186			\$186
Water Tank	TK-244 - UPPER ROAD TANK	\$42			\$42
<b>AVERAGE</b>		<b>\$5,223,161</b>	<b>\$28</b>	<b>\$477</b>	<b>\$5,223,667</b>

Type	Facility Name	Functionality (%)					
		At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Water Tank	TK-184 - PACHECO RIDGE TANK #1	91.70	99.60	99.90	99.90	99.90	99.90
Water Tank	TK-185 - PACHECO RIDGE TANK #2	91.70	99.60	99.90	99.90	99.90	99.90
Water Tank	TK-186 - SAN GERONIMO CLEARWELL TANK #2	99.80	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-187 - MANZANITA TANK	99.50	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-188 - WOLFBACK RIDGE TANK #1	99.50	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-189 - WOLFBACK RIDGE TANK #2	99.50	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-190 - INVERNESS DRIVE TANK	93.60	99.70	99.90	99.90	99.90	99.90
Water Tank	TK-191 - LONE TREE AVENUE TANK	99.50	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-192 - VERNAL AVE TANK	99.50	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-193 - H-LINE ROAD TANK	99.50	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-195 - Fire Road Pressure Tank	97.20	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-196 - WILSON WAY TANK	99.20	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-197 - SUMMIT TRAIL TANK	99.20	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-198 - SCOTT TANKS	99.90	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-199 - SCOTT TANKS	99.90	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-200 - OAK WOODLANDS TANK #1	97.90	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-201 - OAK WOODLANDS TANK #2	97.90	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-202 - Fairfax Manor 1st Lift Tank	97.90	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-203 - MONTE MAR VISTA TANK	99.20	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-204 - Bay Road Tank	89.20	98.10	99.60	99.90	99.90	99.90
Water Tank	TK-205 - RICHARDSON DRIVE (H/P) TANK	99.20	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-206 - SANTA VENETIA TANK	87.90	99.40	99.90	99.90	99.90	99.90
Water Tank	TK-207 - GOODHILL ROAD TANK	99.20	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-208 - SPRING LANE TANK #2	99.20	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-209 - FAIRHILLS TOP TANK #2	97.90	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-210 - BEACON HILL TANK	99.90	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-211 - Kent Fire Trail Tank #1	99.20	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-212 - Kent Fire Trail Tank #2	99.20	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-213 - MARIN CITY TANK	99.90	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-214 - SLIDE GULCH TANK	99.90	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-215 - SEQUOIA PARK TANK #1	97.90	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-216 - SEQUOIA PARK TANK #2	97.90	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-217 - KENT WOODLANDS 1ST LIFT TANK	99.20	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-218 - MOUNT TIBURON TANK #2	99.20	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-219 - OAK MANOR FIRST LIFT TANK	99.20	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-220 - TAM WOODS TOP TANK	99.90	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-221 - SUMMIT AVENUE LOWER TANK	99.90	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-222 - FRIAR TUCK LANE TANK	97.00	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-223 - CASCADE TANK #1	99.20	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-224 - CASCADE TANK #2	99.20	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-225 - SUGARLOAF TANK #1	99.20	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-226 - SUGARLOAF TANK #2	99.20	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-228 - GLENWOOD FOREST TANK	97.00	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-229 - KENT FIRE TRAIL TOP TANK	99.20	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-230 - SWIG TANK	97.90	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-232 - SKY RANCH TANK	97.90	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-233 - FAIRFAX MANOR TOP TANK	99.20	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-234 - TAM WOODS FIRST LIFT TANK	99.90	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-235 - FAIRVIEW PARK TANK	99.90	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-236 - FERN CANYON TANK	99.90	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-237 - CONIFER WAY UPPER TANK	99.20	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-238 - OAK AVENUE TANK	99.20	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-239 - ELINOR AVE TANK	99.20	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-240 - Summit Ave Upper Tank	99.90	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-241 - LAGUNITAS PICNIC GROUNDS TANK	100.00	100.00	100.00	100.00	100.00	100.00
Water Tank	TK-243 - MARINER HIGHLANDS TANK	97.90	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-244 - UPPER ROAD TANK	99.20	99.90	99.90	99.90	99.90	99.90
<b>AVERAGE</b>		<b>95.90</b>	<b>99.16</b>	<b>99.68</b>	<b>99.78</b>	<b>99.82</b>	<b>99.88</b>

			Structural - Probability of Damage				
Type	Facility Name	Structure Replacement Cost	No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Pump Station	PS-049 - Channing Way Pump Station	\$1,000,000	72.65%	18.33%	8.60%	0.39%	0.00%
Pump Station	PS-111 - Quail Hill Pump Station	\$1,000,000	92.03%	6.99%	0.95%	0.01%	0.00%
Pump Station	PS-112 - Freitas Parkway Pump Station	\$1,000,000	97.98%	1.96%	0.04%	0.00%	0.00%
Water Tank	TK-103 - TERRA LINDA TANK #1	\$1,000,000	84.87%	11.67%	3.37%	0.06%	0.00%
Water Tank	TK-170 - TERRA LINDA TANK #2	\$1,000,000	87.01%	10.92%	2.02%	0.03%	0.00%
Water Tank	TK-227 - LGWRP Clearwell	\$1,800,000	47.63%	32.84%	5.69%	11.06%	2.75%
<b>AVERAGE</b>			<b>80.36%</b>	<b>13.79%</b>	<b>3.45%</b>	<b>1.93%</b>	<b>0.46%</b>

Type	Facility Name	Nonstructural Acceleration-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Pump Station	PS-049 - Channing Way Pump Station					
Pump Station	PS-111 - Quail Hill Pump Station					
Pump Station	PS-112 - Freitas Parkway Pump Station					
Water Tank	TK-103 - TERRA LINDA TANK #1					
Water Tank	TK-170 - TERRA LINDA TANK #2					
Water Tank	TK-227 - LGWRP Clearwell					
<b>AVERAGE</b>		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Type	Facility Name	Nonstructural Drift-Sensitive - Probability of Damage				
		No Damage	Slight Damage	Moderate Damage	Extensive Damage	Complete Damage
Pump Station	PS-049 - Channing Way Pump Station					
Pump Station	PS-111 - Quail Hill Pump Station					
Pump Station	PS-112 - Freitas Parkway Pump Station					
Water Tank	TK-103 - TERRA LINDA TANK #1					
Water Tank	TK-170 - TERRA LINDA TANK #2					
Water Tank	TK-227 - LGWRP Clearwell					
<b>AVERAGE</b>		#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!	#DIV/0!

Type	Facility Name	Losses (in dollars)			
		Structure	Nonstructural Drift-Sensitive	Nonstructural Acceleration- Sensitive	Total Building Loss
Pump Station	PS-049 - Channing Way Pump Station	\$24,405			\$24,405
Pump Station	PS-111 - Quail Hill Pump Station	\$4,980			\$4,980
Pump Station	PS-112 - Freitas Parkway Pump Station	\$1,040			\$1,040
Water Tank	TK-103 - TERRA LINDA TANK #1	\$11,250			\$11,250
Water Tank	TK-170 - TERRA LINDA TANK #2	\$8,670			\$8,670
Water Tank	TK-227 - LGWRP Clearwell	\$213,867			\$213,867
<b>AVERAGE</b>		<b>\$264,212</b>	<b>\$0</b>	<b>\$0</b>	<b>\$264,212</b>

Type	Facility Name	Functionality (%)					
		At Day 1	At Day 3	At Day 7	At Day 14	At Day 30	At Day 90
Pump Station	PS-049 - Channing Way Pump Station	79.50	95.10	99.50	99.60	99.80	99.90
Pump Station	PS-111 - Quail Hill Pump Station	94.40	99.40	99.90	99.90	99.90	99.90
Pump Station	PS-112 - Freitas Parkway Pump Station	98.60	99.90	99.90	99.90	99.90	99.90
Water Tank	TK-103 - TERRA LINDA TANK #1	89.20	98.10	99.60	99.90	99.90	99.90
Water Tank	TK-170 - TERRA LINDA TANK #2	90.80	98.90	99.80	99.90	99.90	99.90
Water Tank	TK-227 - LGWRP Clearwell	60.80	85.10	87.70	88.40	89.10	92.30
<b>AVERAGE</b>		<b>85.55</b>	<b>96.08</b>	<b>97.73</b>	<b>97.93</b>	<b>98.08</b>	<b>98.63</b>

Replacement Cost	Total Number of Leaks	Total Number of Breaks	Total Number of Repairs	Days to Repair Leaks	Days to Repair Breaks	Total Days of Repairs	Economic Loss
\$3,215,180,970	12.4	3.1	15.5	1.8	0.4	2.2	\$77,677



Replacement Cost	Total Number of Leaks	Total Number of Breaks	Total Number of Repairs	Days to Repair Leaks	Days to Repair Breaks	Total Days of Repairs	Economic Loss
\$90,567,746	0.3	0.1	0.4	0.0	0.0	0.1	\$2,110

Category	Type	Facility Name	Structure Replacement Cost	Contents Replacement Cost	% Damage to Structure	% Damage to Contents	Structure Loss	Contents Loss
Potable Water System	Pump Station	PS-026 - Lagunitas Booster Station	\$1,000,000		65.0		\$650,000	
Potable Water System	Pump Station	PS-029 - Phoenix Lake Barge Pump	\$1,000,000		65.0		\$650,000	
Potable Water System	Pump Station	PS-031 - Soulajule Pump Station	\$1,000,000		65.0		\$650,000	
Potable Water System	Pump Station	PS-097 - Tocaloma Booster Pump Station	\$1,000,000		65.0		\$650,000	
Potable Water System	Pump Station	PS-128 - Alpine Bon-Tempe Pump Station	\$1,000,000		65.0		\$650,000	
RAW Water Facility	Building	Alpine Dam Facility - Alum House	\$326,237	\$326,237	79.0	72.0	\$257,727	\$234,891
RAW Water Facility	Facility - Pump Station	Alpine Lake Facility - Aerator House			9.7			
RAW Water Facility	Facility - Pump Station	Alpine Lake Facility - Pump House	\$1,000,000		15.7		\$157,479	
RAW Water Facility	Facility - Pump Station	Kent Pump Facility - Pump Station	\$2,000,000		40.0		\$800,000	
			<b>\$8,326,237</b>	<b>\$326,237</b>	<b>53.6%</b>	<b>72.0%</b>	<b>\$4,465,207</b>	<b>\$234,891</b>

Category	Type	Facility Name	Structure Replacement Cost	Contents Replacement Cost	% Damage to Structure	% Damage to Contents	Structure Loss	Contents Loss
Administrative	Building	Pelican Yard - Vehicle Storage	\$500,000		1.5		\$7,359	
Administrative	Building	Pelican Yard - Vehicle Storage	\$750,000		2.7		\$20,470	
Potable Water System	Pump Station	PS-026 - Lagunitas Booster Station	\$1,000,000		0.7		\$6,585	
Potable Water System	Pump Station	PS-029 - Phoenix Lake Barge Pump	\$1,000,000		22.6		\$225,501	
Potable Water System	Pump Station	PS-031 - Soulajule Pump Station	\$1,000,000		20.1		\$201,404	
Potable Water System	Pump Station	PS-069 - San Quentin Pump Station	\$1,000,000		14.1		\$141,414	
Potable Water System	Pump Station	PS-128 - Alpine Bon-Tempe Pump Station	\$1,000,000		64.3		\$642,573	
			\$6,250,000		19.9%		\$1,245,306	

Category	Type	Facility Name	Structure Replacement Cost	Contents Replacement Cost	% Damage to Structure	% Damage to Contents	Structure Loss	Contents Loss
Administrative	Building	Pelican Yard - Vehicle Storage	\$500,000		1.5		\$7,359	
Administrative	Building	Pelican Yard - Vehicle Storage	\$750,000		2.7		\$20,470	
Potable Water System	Pump Station	PS-026 - Lagunitas Booster Station	\$1,000,000		0.7		\$6,585	
Potable Water System	Pump Station	PS-029 - Phoenix Lake Barge Pump	\$1,000,000		22.6		\$225,501	
Potable Water System	Pump Station	PS-031 - Soulajule Pump Station	\$1,000,000		20.1		\$201,404	
Potable Water System	Pump Station	PS-069 - San Quentin Pump Station	\$1,000,000		14.1		\$141,414	
Potable Water System	Pump Station	PS-093 - Tiburon Booster Pump Station	\$1,000,000		5.5		\$55,117	
Potable Water System	Pump Station	PS-128 - Alpine Bon-Tempe Pump Station	\$1,000,000		64.3		\$642,573	
			<b>\$7,250,000</b>		<b>17.9%</b>		<b>\$1,300,423</b>	

Category	Type	Facility Name	Structure Replacement Cost	Contents Replacement Cost	% Damage to Structure	% Damage to Contents	Structure Loss	Contents Loss
Potable Water System	Pump Station	PS-093 - Tiburon Booster Pump Station	\$1,000,000		15.1		\$150,641	



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**Marin Municipal Water District Hazard Mitigation Plan**

## **Appendix D. Hazard Mitigation Plan Approval and Adoption**

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## **D. HAZARD MITIGATION PLAN APPROVAL AND ADOPTION**

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To Be Provided with Final Draft

