Pajaro/ Sunny Mesa Community Services District

# Local Hazard Mitigation Plan

PAJARO / SUNNY MESA
COMMUNITY SERVICES DISTRICT

Rincon Consultants, Inc.

September 2022

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# 1 Introduction and District Profile

Pajaro/ Sunny Mesa Community Services District's Local Hazard Mitigation Plan (LHMP) was prepared in response to the Disaster Mitigation Act of 2000 (DMA 2000) with the intention of assessing the risks from hazards associated with the District's assets and community. DMA 2000, also known as Public Law 106-390, requires that state and local governments develop mitigation plans in order initiate a mitigation planning process, and identify hazards, potential losses, mitigation needs, goals, and actions. DMA 2000 was established in an effort for the Federal government instate a national program for disaster preparedness and pre-disaster mitigation, streamline disaster relief at the federal and state levels, and reduce the increasing cost of disasters.

## 1.1 Geography and History

The Pajaro/Sunny Mesa Community Services District (PSMCSD) water system was founded and has continuously operated since 1986. The District was established by the Monterey County Local Agency Formation Commission through the merging of Pajaro Community Services District, the Sunny Mesa Water District, and Monterey County Service Areas No. 73. The District is a public agency governed by five Board of Director members. Whilst its primary service is to provide water, it also provides park, streetlight, fire flow, and residential development services to thousands of northern residents of Monterey County. Around 6,800 people and 1,374 accounts are served by the District. PSMCSD owns and operates nine water systems. The District is the only public agency that provides public water services to Elkhorn, Prunedale, and Pajaro communities. The District owns two parks and provides maintenance to 200 streetlights in its service area. The District's water systems service areas are shown in Figure 1.

The PSMCSD is located approximately ninety-five miles south of San Francisco. The District's service area stretches from the Pajaro River in the north, to Moss Landing in the west, to Prunedale and the Highway 101 corridor in the east. The District includes the unincorporated community of Pajaro, the Sunny Mesa and Hillcrest subdivisions, areas east of Pajaro and Sunny mesa to San Miguel Canyon Road, areas served by the Vega Water System, and residential areas on Struve Road in the northern area of Moss Landing.

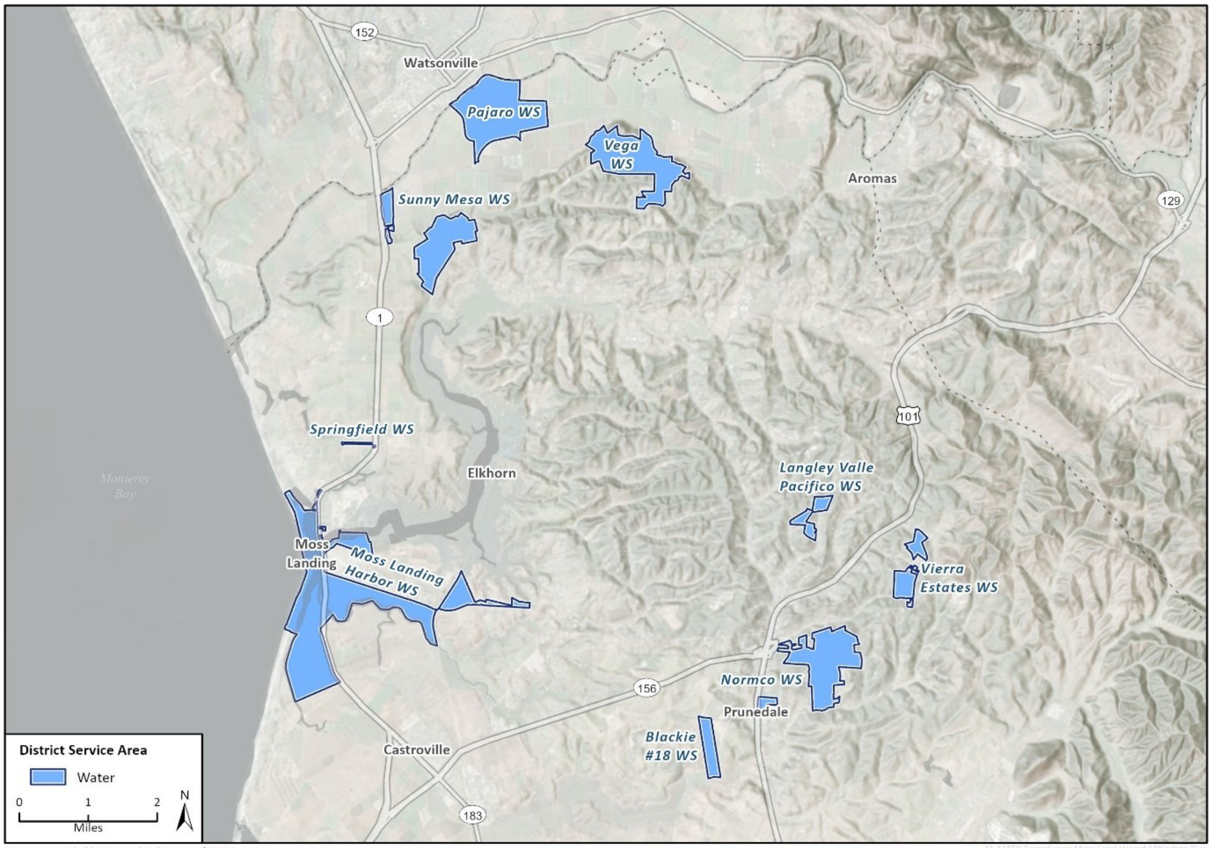
## 1.2 Climate

The District benefits from a mild, temperate climate with cool, relatively wet winters and mild, dry summers. Fog intrusion is common especially in the summer months and during the night and morning hours. Temperatures rarely exceed 90 degrees Fahrenheit in the summer and rarely dip below 32 degrees Fahrenheit in the winter. Rainfall in the District averages 22.42 inches, and precipitation falls on an average of 61 days per year.

## 1.3 Service Area Demographics, Demand and, Statistics

District demographic, demand, and service areas statistics are presented in Table 1.

**Figure 1 Pajaro/Sunny Mesa Community Services District Area**

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## Table 1 Service Demographics, Demand, and Statistics

| | |
|---|---|
| **Demographics** | |
| Population Served | 6,800 |
| **Demands for Potable and Raw Water - Accounts** | |
| Single Family | 1,067 |
| Multifamily | 103 |
| Commercial | 173 |
| Irrigation | 18 |
| Institutional Governmental | 12 |
| Industrial | 1 |
| **Infrastructure** | |
| Number of Treatment Facilities | 2 |
| Number of Pump Stations | 17 |
| Number of Storage Tanks | 32 |
| Number of Wells | 15 |
| Number of Feet of Water Pipeline | 185,420 |

# 1.4 Hazard Mitigation Legislation

## Hazard Mitigation Grant Program

In 1974, Congress enacted the Robert T. Stafford Disaster Relief and Emergency Act, commonly referred to as the Stafford Act. In 1988, Congress established the Hazard Mitigation Grant Program (HMGP) via Section 404 of the Stafford Act. Regulations regarding HMGP implementation based on the DMA 2000 were initially changed by an Interim Final Rule (44 CFR Part 206, Subpart N) published in the Federal Register on February 26, 2002. A second Interim Final Rule was issued on October 1, 2002.

The HMGP assists states and local governments in implementing long-term hazard mitigation measures for natural hazards by providing federal funding following a federal disaster declaration. Eligible applicants include state and local agencies, Indian tribes or other tribal organizations, and certain nonprofit organizations. In California, the HMGP is administered by the California Governor's Office of Emergency Services (Cal OES)

## Pre-Disaster Mitigation Program

The Pre-Disaster Mitigation Program was authorized by §203 of the Stafford Act, 42 United States Code, as amended by §102 of the DMA 2000. Funding is provided through the National Pre-Disaster Mitigation Fund to help state and local governments (including tribal governments) implement cost-effective hazard mitigation activities that complement a comprehensive mitigation program. As a result of amendments by the Disaster Relief and Recovery Act of 2018, the Pre-Disaster Mitigation program is being replaced with the new Building Resilient Infrastructure and Communities (BRIC) program.

## Building Resilient Infrastructure and Communities Program

The Disaster Recovery Reform Act, Section 1234; amended Section 203 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act (Stafford Act) to authorize BRIC. The BRIC program guiding principles are supporting communities through capability- and capacity-building; encouraging and enabling innovation; promoting partnerships; enabling large projects; maintaining flexibility; and providing consistency. The BRIC priorities are to incentivize:

- Public infrastructure projects;
- Projects that mitigate risk to one or more lifelines;
- Projects that incorporate nature-based solutions; and,
- Adoption and enforcement of modern building codes.

## Flood Mitigation Assistance Program

The Flood Mitigation Assistance (FMA) Program was created as part of the National Flood Insurance Reform Act of 1994 (42 U.S.C. 4101). Financial support is provided through the National Flood Insurance Fund to help states and communities implement measures to reduce or eliminate the long-term risk of flood damage to buildings, manufactured homes, and other structures insurable under the National Flood Insurance Program (NFIP).

Three types of grants are available under FMA: planning, project, and technical assistance. Planning grants are available to states and communities to prepare Flood Mitigation Plans. NFIP participating communities with approved Flood Mitigation Plans can apply for project grants to implement measures to reduce flood losses. Technical assistance grants in the amount of 10 percent of the project grant are available to the state for program administration. Communities that receive planning and/or project grants must participate in the NFIP. Examples of eligible projects include elevation, acquisition, and relocation of NFIP-insured structures.

## Required Content

To assist the readers and reviewers of this document, the District has inserted the following "marker" throughout the document to indicate where required content, as identified in the Disaster Mitigation Act of 2000, is being covered in the Plan.

### *Example*

**Q&A | ELEMENT A: PLANNING PROCESS | A1**

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

### *Plan Organization*

The following provides a brief description of each section of the plan:

### *Introduction*

Describes the background and purpose of developing a mitigation plan.

### *Planning Process*

Describes the background and purpose of developing a mitigation plan.

### *District Profile*

Summarizes the history, geography, demographics, and socioeconomics of the service area.

### *Hazard Assessment*

This section describes the process for selecting hazards considered in this Plan. It also provides general descriptions, location and extent, previous occurrences, and probability of future occurrence for each hazard.

### *Risk Assessment*

This section details the vulnerability and impacts associated with hazards in the service area.

### *Mitigation Strategy*

Documents the goals, community capabilities, and priority setting methods supporting the Plan. Also highlights the Mitigation Actions Matrix: 1) goals met; 2) identification, assignment, timing, and funding of mitigation activities; 3) benefit/cost/priorities; 4) plan implementation method; and 5) activity status.

### *Plan Maintenance*

Establishes tools and guidelines for maintaining and implementing the Mitigation Plan.

## APPENDICES

The plan appendices include the following:

- **Appendix A:** Plan Process
    - 11/01/21 Pre-Kickoff Meeting
- Meeting minutes
    - 12/09/21 Planning Committee Meeting #1
- Invitations
- Agenda
- Meeting minutes
- Sign-in sheet
    - 2/22/22 Planning Committee Meeting #2
- Agenda
- Meeting minutes
- Sign-in sheet
    - 3/23/22 Public Review Workshop #1
- Workshop flyer
- Survey flyer
- Survey results
- Website posting
- Agenda
- Meeting minutes
- Sign-in sheet
    - 5/17/22 Planning Committee Meeting #3
- Agenda
- Meeting minutes
- Sign-in sheet
    - 8/11/22 Planning Committee Meeting #4
- Agenda
- Meeting minutes
- Sign-in sheet
    - 9/15/22 Public Review Workshop #2
- Website posting
- Workshop flyer
- Agenda
- Meeting minutes
- Sign-in sheet
- **Appendix B:** Mitigation Strategy

  - Mitigation Actions Matrix
- **Appendix C:** Plan Review, Evaluation, and Implementation
  - Screenshot of the LHMP posted on the District's website
- **Appendix D:** Plan Adoption
  - Placeholder for documentation that the plan has been formally adopted

### *Plan Adoption and Approval*

As per DMA 2000 and supporting Federal regulations, the Mitigation Plan is required to be adopted by the PSMCSD Board of Directors and approved by the Federal Emergency Management Agency (FEMA).

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# 2 Planning Process

| **Q&A \| ELEMENT A: PLANNING PROCESS \| A1.a-d** |
|---|
| **Q:** Does the plan document the planning process, including how it was prepared (with a narrative description, meeting minutes, sign-in sheets, or another method)? (Requirement §201.6(c)(1)) |
| **A:** See **Plan Preparation and Engagement** below. |

| **Q&A \| ELEMENT A: PLANNING PROCESS \| A2.a-c** |
|---|
| **Q:** Does the plan document an opportunity for neighboring communities, local, and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development, as well as other interested parties to be involved in the planning process? (Requirement §201.6(b)(2)) |
| **A:** See **Plan Preparation and Engagement** below. |

| **Q&A \| ELEMENT A: PLANNING PROCESS \| A3. a-b** |
|---|
| **Q:** Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1)) |
| **A:** See **Plan Preparation and Engagement** below. |

## 2.1 Plan Preparation and Engagement

The LHMP was developed by and for the PSMCSD. A Local Hazard Mitigation Planning Committee (Planning Committee), consisting of staff from the District, external stakeholders, and a member of the public worked in collaboration with Rincon Consultants to develop the Plan. The Planning Committee served as the primary stakeholders throughout the planning process. The Planning Committee member list can be found in Table 2.

The District made a good faith effort to invite neighboring jurisdictions and representatives of the public to be committee members (See invitations in Appendix B). External agencies, jurisdictions, and public groups including representatives from Monterey County, Monterey One Water, City of Watsonville, North County Fire Protection District, Castro Community Service District, Community Action Committee, Water Resource Agency, and Moss Landing Chamber of Commerce, and Pajaro Community Advisory Committee were mailed an invitation to participate in Planning Committee meetings. External agencies were also invited to provide input to the Public Review Draft Plan with an electronic link to the District's website. See Appendix A for the email invitation along with solicitation for input.

**Table 2 Planning Committee Members**

| Name | Agency | Title |
|---|---|---|
| Don Rosa | PSMCSD | General Manager |
| Judy Vazquez | PSMCSD | Operations Manager |
| Tom Yeager | PSMCSD | District Engineer |
| Jackie McCloud | City of Watsonville | Environmental Sustainability Manager |
| Eric Tynan | Castro Community Service District | General Manager |
| Laura Emmons | Monterey County | Emergency Services Planner |
| Randell Ishii | Monterey County | Director of Public Works |
| Sarah Stevens | Monterey One Water | Analyst |
| Rocio Fernandez | Pajaro/Sunny Mesa Community Services District | Customer Service Representative |
| Jesus "Chuy" Martinez | Pajaro/Sunny Mesa Community Services District | Water Systems Supervisor |
| Sandy Coplin | Pajaro/Sunny Mesa Community Services District | President of Board of Directors |
| Tom Simmons | Community Action Committee | Member if Community Action Committee |
| Jonathan Mungcal | Monterey One Water | Utilities and Maintenance Manager |
| Shaunna Murray | Monterey County Water Resource Agency | Water Resources Engineer |

As required by DMA 2000, the Planning Committee made significant attempts to involve the public in a variety of forums. The general public and external agencies were invited to contribute to the Plan during the plan writing phase.

- A survey was developed and administered both in an online and paper format in both Spanish and English. The survey was distributed through a mailer to District customers which provided the public an opportunity to provide input. The District received 95 responses. A total of 35% of respondents report having been impacted by a natural disaster at their current residence. The primary types of disasters experienced were earthquake (35%), flood (28%), and drought (19%), which also corresponded with respondents'' primary hazards concern. Respondents were most interested in the District investing in infrastructure improvements (38%) and backup energy systems (26%). See Appendix B for the survey and full survey results.
- The Planning Committee held a public workshop on March 23, 2022. The public was invited to participate via a mailer sent to District customers with their January bill. The workshop included an overview the LHMP development process, including how the community can benefit from the plan. The workshop also included an overview of the hazards of concern and potential long-term hazards mitigation goals. The public was invited to provide input and comments on the LHMP. Spanish translation was available to workshop participants. Feedback from the public was utilized to prioritize mitigation goals and actions in the LHMP. See Appendix B for the mailer, sign-in sheets, and meeting materials.
- The Planning Committee invited the public to review the draft Plan and attend a public review meeting on September 15th. The public was invited to both review the plan and participate via a mailer sent to District customers with their August bill and on the District's website landing page. The workshop included an overview of the LHMP development process, how the community can benefit from the Plan and an overview of the Plan, including the hazards of concern, vulnerabilities, and mitigation actions. The public was invited to provide input and comment on the LHMP. Spanish translation was available to workshop participants. Feedback

from the public was utilized to revise the LHMP. See Appendix B for the mailer, webpage communication, sign-in sheets, and meeting materials.

Planning Committee meetings are described in detail below under "Planning Committee Involvement." See Appendix B for sign-in sheets and invitations.

The First Draft Plan was presented to the Planning Committee for internal review on August 15, 2022. Following necessary updates, a Public Review Draft was shared with the general public and external agencies (special districts and adjoining jurisdictions) via the District's website and a printed insert sent to District Customers with their August bill from September 1 to 15th. Members of the public were invited to participate in a public workshop held on September 15, 2022, wherein the public was invited to ask questions and provide feedback on the Public Review Draft. See Appendix B for the mailer, sign-in sheets, and meeting materials. The comments gathered from the Public Review Draft were incorporated into a Final Draft Plan which was submitted to Cal OES and FEMA for review and "Approval Pending Adoption."

Next, the Planning Committee will complete amendments to the Plan to reflect mandated input by CalOES and FEMA. The Final Plan will be posted on the District's website. Following adoption by the Board, proof of adoption will be forwarded to FEMA along with a request for final approval. The planning process is shown in Table 3.

**Table 3 Planning Phases**

| Plan Writing | Plan Review Phase | Plan Adoption Phase | Plan Approval Phase | Plan Implementation Phase |
|---|---|---|---|---|
| ▪ Conduct Public Meetings for external agencies and general public, providing hazard overview and information about the LHMP planning process and soliciting input<br>▪ Planning Committee input-research, meetings writing review of First Draft Plan<br>▪ Incorporate input from the Planning Committee into Public Review Draft Plan<br>▪ Present Public Review Draft at public workshop and invite public and stakeholders to provide input on the Public Review Draft | ▪ Incorporate input into the Final Draft Plan<br>▪ Final Draft Plan sent to Cal OES and FEMA for Approval Pending Adoption<br>▪ Address any mandated revisions identified by Cal OES and FEMA into Final Draft Plan | ▪ Incorporate input into the Board of Directors staff report<br>▪ Post public note of Board of Directors Meeting<br>▪ Final Draft Plan distributed to Board of Directors in advance of meeting<br>▪ Present Final Draft Plan to Board of Directors for Adoption | ▪ Submit proof of Board adaption to FEMA along with request for final approval<br>▪ Incorporate FEMA Final Letter of Approval into Final Plan | ▪ Conduct annual Planning Committee meetings<br>▪ Integrate mitigation action items into budget<br>▪ Implement Mitigation Actions |

## 2.2 Planning Committee Involvement

The Planning Committee consisted of representatives from the PSMCSD departments related to hazard mitigation processes. The Planning Committee was responsible for the following tasks:

- Providing existing resources including plans and data
- Organizing and soliciting involvement from the public and stakeholders (external agencies)

- Reviewing existing data and reports
- Assessing hazard information
- Reviewing HAZUS loss projection estimates
- Confirming goals and creating mitigation action items
- Hosting a public review workshop
- Participating in Planning Committee meetings and Board of Directors public meeting

Members of the public participated in the Planning Committing. Meeting agendas and notes are provided in Appendix A. The following is a brief description of each of the Planning Committee meetings.

## Meeting #1: December 9, 2021 – Kick-Off and Hazard Identification Meeting

The Planning Committee, made up of key departmental representatives as well as stakeholders from external agencies and jurisdictions, convened a Kick-Off meeting. The purpose of the Kick-Off Meeting was to review the planning process, stakeholder and public involvement, how the plan will benefit the community, roles and responsibilities of the planning committee, hazards of concern selection a review of updates to DMA 2000 regulations, and availability of mapping resources. The meeting included a presentation on the purpose and history of DMA 2000 and the major disasters impacting the United States. Also, the Planning Committee reviewed hazard information pertaining to PSMCSD. Meeting #1 minutes are summarized in Table 4.

**Table 4 Meeting #1 Minutes**

| Name | Role | Input Provided |
|---|---|---|
| Don Rosa | General Manager, PSMCSD | ▪ Suggest Eric consider including Moss Landing power plant<br>▪ Shared details of damage caused by 2017 severe storm<br>▪ Shared impact details around 1989 earthquake<br>▪ Suggest LHMP include concern of contamination and electrical systems concern during flood event |
| Tom Yeager | District Engineer, PSMCSD | ▪ Suggested differing sea water intrusion risk in varying areas<br>▪ Noted missing park and subdivisions on map<br>▪ Noted district relies entirely on groundwater |
| Jackie McCloud | Environmental Sustainability Manager, City of Watsonville | ▪ Shared impacts of 1995 and 1998 floods on Watsonville<br>▪ Suggested that the LHMP consider hazard and impact in relation to ammonia refrigeration<br>▪ Shared that Pajaro train junction is recognized as a critical facility<br>▪ Suggested prolonger power failure be considered secondary to wildfire in LHMP |
| Judy Vasquez | Operations Manager, PSMCSD | ▪ Noted Vega Canyon and Prunedale have wildfire risk |
| Jesus “Chuy” Martinez | Water Systems Supervisor, PSMCSD | ▪ Suggested that the LHMP include sea water intrusion |

## Meeting #2: February 22, 2022 – Risk Assessment

Planning Meeting #2 was a meeting held with the Planning Committee. The Planning Committee reviewed the hazards of concern, provided feedback on the results of the risk assessment, discussed long term goals for mitigation actions, and overviewed and provided feedback on the public outreach process. Meeting #2 minutes are summarized in Table 5.

**Table 5 Meeting #2 Minutes**

| Name | Role | Input Provided |
|---|---|---|
| Don Rosa | General Manager, PSMCSD | ▪ District wants to focus the survey on hazards impacts to water services<br>▪ There looks to be opportunity to further staff training to prepare for potential hazard events. |
| Sandy Coplin | President of Board of Supervisors, PSMCSD | ▪ Interested in increasing water storage in subdivisions in the District. Eric Vaughan suggested Sandy look to get involved in Fire Safe Council organization to spearhead local wildfire mitigation planning. |
| Laura Emmons | Monterey County, Emergency Services Planner | ▪ Monterey County utilized the previous county's mitigation goals as a starting place for developing goals in their updated LHMP. |
| Jackie McCloud | City of Watsonville, Environmental Sustainability Manager | ▪ Watsonville wanted to focus goals on vulnerable populations. |

## Meeting #3: May 17, 2022 – Mitigation Goals and Actions

Planning Meeting #3 was a meeting held with the Planning Committee. The Planning Committee overviewed the hazard mitigation framework and provided feedback on mitigation goals and action. The Planning Committee also discussed mitigation action prioritization and plan integration. The Planning Committee prioritized mitigation actions based on estimated costs, benefits, and timeframe. Meeting #3 minutes are summarized in Table 6.

**Table 6 Meeting #3 Minutes**

| Name | Role | Input Provided |
|---|---|---|
| Sandy Coplin | President of Board of Directors, PSMCSD | ▪ The District's scenic easements has fire risk. |
| Don Rosa | General Manager, PSMCSD | ▪ Mutual aid agreements is a high priority including with Castroville Community Services District, Aromas Water District, and Cal OES.<br>▪ Prioritize controlling corrosion and degradation of the tanks. It is difficult to add larger tanks, so need to stabilize the smaller tanks.<br>▪ Retrofitting or elevating infrastructure to decrease flood risk is costly. Electrical panels in the District are vulnerable. Sunny Mesa well is a concern for flooding inundation: high priority<br>▪ Incorporate hazard mitigation into the CIP and Strategic Plan to guide implementation.<br>▪ Emergency preparedness and training is important to prepare for hazardous material spill. |
| Judy Vasquez | Operations Manager, PSMCSD | ▪ Coordinating with CAL FIRE to control brush<br>▪ Increasing storage capacity is a high priority |
| Jesus "Chuy" Martinez | Water Systems Supervisor, PSMCSD | ▪ Increasing storage capacity is a high priority<br>▪ Ensure that operators have tools stockpiled for emergency situations<br>▪ Recommends incorporating radio back-up system into the SCADA system |

| Name | Role | Input Provided |
|---|---|---|
| Tom Yeager | District Engineer, PSMCSD | ▪ The District's Capital Improvement Plan should consider a component of risk analysis.<br>▪ May want to consider moving the pump control panels out of the flood inundation zone |

## Meeting #4: August 10, 2022 – Plan Implementation, Monitoring, Evaluation and Update

Planning Meeting #4 was a meeting held with the Planning Committee. The Planning Committee reviewed and provided feedback on mitigation, discussed how they would continue public participation after the development of the LHMP, monitor and evaluate the Plan over the 5-year cycle, and integrate the plan's findings and mitigation actions into District plans, policies, and programs. Meeting #4 minutes are summarized in Table 7.

### Table 7 Meeting #4 Minutes

| Name | Role | Input Provided |
|---|---|---|
| Judy Vasquez | Operations Manager, PSMCSD | ▪ The District already has mutual aid agreements with Castroville Water District and Aromas Water District |
| Laura Emmons | Monterey County, Emergency Services Planner | ▪ Monterey County will review mitigation action matrix and reach out with comments and feedback to the District. |
| Randell Ishii | Monterey County, Director of Public Works | ▪ Monterey County will review mitigation action matrix and reach out with comments and feedback to the District. |

## Public Review Workshop #1: March 23, 2022

Public Review Workshop #1 was centered around public participation and engagement and focused on the hazards of concern and hazard mitigation goals. The workshop included an overview of the hazard mitigation plan, review of the hazard of concern risk assessment, a polling of public community hazards of concern, a discussion and brainstorm around long-term goals for the District's hazard mitigation activities, and a discussion of next steps in the hazard mitigation planning process. Public Review Workshop #1 minutes are summarized in Table 8.

### Table 8 Public Review Workshop #1 Minutes

| Name | Role | Input Provided |
|---|---|---|
| Lois DeVogalere | Customer/Resident | ▪ Lois was evacuated during the '95 flood. She is concerned about keeping access to water. She is wondering if the pipes are resilient to hazards. She is concerned about sea level rise impacting water availability<br>▪ Lois supports the adoption of the four proposed draft goals<br>▪ Lois feels like these are hard questions for a homeowner to answer<br>▪ Lois feels positive about how the CSD is engaging with local jurisdiction, agencies, and organizations |

## Public Review Workshop #2: September 15th, 2022

Public Review Workshop #2 provided an opportunity for the Planning Committee to present the LHMP to the public and collect feedback on it, and the proposed mitigation actions. Public Review Workshop #2 minutes are summarized in Table 9.

**Table 9 Public Review Workshop #2 Minutes**

| Name | Role | Input Provided |
|---|---|---|
| Eric Vaughan | Project Manager, Rincon Consultants | ▪ Provided overview of plan, mitigation actions, and next steps for Plan approval and adoption . The Plan overview included a summary of the planning process & timeline, the plan participants, plan stakeholders and public engagement, hazard identification and assessment, goal development, mitigation strategy and action development, and how the plan will be updated. The community benefits from the Plan were also presented along with the next steps for Plan approval. |
| Don Rosa | General Manager, PSMCSD | ▪ Confirmed that the Plan should be presented to the District's Board in October before moving on to Cal OES review. |

### Table 10 Plan Development Timeline

| Task Description | Nov - Dec 2021 | Feb - Mar 2022 | Apr - May 2022 | Jun - Aug 2022 | Sep - Oct 2022 | Nov - Jan 2023 | Feb-Mar 2023 |
|---|---|---|---|---|---|---|---|
| Establishing Planning Committee | X | | | | | | |
| Kick-off Meeting | X | | | | | | |
| Establish Planning Development Process | X | | | | | | |
| Establish Public Outreach Process | | X | | | | | |
| Assess Hazards of Concern | | X | | | | | |
| Identify and Review District Assets | | X | | | | | |
| Draft Element A | | X | | | | | |
| Public Workshop | | X | | | | | |
| Conduct Risk Assessment | | | X | | | | |
| Draft Element B | | | X | | | | |
| Planning Meeting #2 | | | X | | | | |
| Develop Mitigation Measures | | | | X | | | |
| Develop Online Survey | | | | X | | | |
| Develop Action Plan | | | | X | | | |
| Draft Element C | | | | X | | | |
| Public Review of draft Plan | | | | | X | | |
| Public Review Workshop | | | | | X | | |
| Board Review and Approval of Plan | | | | | X | | |
| Submit to Cal OES/FEMA for Approval | | | | | X | | |
| Receive Cal OES/FEMA Approval Pending Adoption | | | | | | X | |
| Post Final Draft Plan for review by public and stakeholders along with posting of Board of Directors meeting | | | | | | X | |
| Present Final Draft Plan to Board of Directors at Public Meeting | | | | | | X | |
| Submit Proof of Adoption to FEMA | | | | | | | X |
| Incorporate FEMA Approval into Final Plan | | | | | | | X |

| **Q&A \| ELEMENT A: PLANNING PROCESS \| A4. a-b** |
|---|
| **Q:** Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3)) |
| **A:** See **Use of Existing Data** below |

## Use of Existing Data

The Planning Committee gathered and reviewed existing data and plans during plan writing.

### *City of Watsonville Local Hazard Mitigation Plan (2020)*

https://cityofwatsonville.org

Applicable Incorporation: District Profile section – history, geography, environmental, population, and demographic data.

### *Draft County of Monterey Multi-jurisdictional Hazard mitigation Plan (2021)*

https://www.co.monterey.ca.us/government/departments-a-h/administrative-office/office-of-emergency-services

### *California State Hazard Mitigation Plan (2018)*

http://www.caloes.ca.gov/

### *Declared Disasters (Federal and California)*

https://www.fema.gov/disaster/declarations

https://www.ftb.ca.gov/file/business/deductions/disaster-codes.html

### *HAZUS Maps and Reports*

Developed by Rincon

Applicable Incorporation: Numerous HAZUS results have been included for earthquake and flood scenarios to determine specific risk to Pajaro/ Sunny Mesa Community Services District.

### *Local Flood Insurance Rate Maps*

www.msc.fema.gov

Applicable Incorporation: Provided by FEMA and included in Flood Hazard section.

### *California Department of Water Resources*

https://water.ca.gov/programs/all-programs/division-of-safety-of-dams/inundation-maps

### *National Levee Database*

https://levees.sec.usace.army.mil/#/

*California Department om Conservation*

www.conservation.ca.gov/cgs

Applicable Incorporation: Deep-Seated Landslide Risk.

*U.S. Drought Monitor*

https://droughtmonitor.unl.edu/CurrentMap/StateDroughtMonitor.aspx?CA

Applicable Incorporation: Area in U.S. Drought Monitor Categories.

*California Office of the State Fire Marshal*

https://osfm.fire.ca.gov/divisions/community-wildfire-preparedness-and-mitigation/wildland-hazards-building-codes/fire-hazard-severity-zones-maps

Applicable Incorporation: Fire Hazard Area Map.

*U.S. Geological Survey (USGS)*

www.usgs.gov

Applicable Incorporation: Earthquake records and statistics. Landslide historical events.

**Q&A | ELEMENT A: PLANNING PROCESS | A5.a**

**Q:** Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))

**A:** See **Continued Public Involvement** below

## Continued Public Involvement

The District is dedicated to involving the public directly in the continual review and updates to the Local Hazard Mitigation Plan. Copies of the plan will be catalogued and made available at District Headquarters and on the District's website. This site will also contain an email address and phone number where people can direct their comments and concerns.

The Local Mitigation Officer will be responsible for using District resources to publicize the annual public meetings and maintain public involvement through the website mail-in notices. The public will have an opportunity to provide comment on the implementation or progress of the plan during the public comment portion of the board meeting that serves as the annual plan review meeting.

**Q&A | ELEMENT A: PLANNING PROCESS | A6.a**

**Q:** Does the plan identify how, when, and by whom the plan will be monitored over time? (Requirement §201.6(c)(4)(i))

**A:** See **Plan Monitoring** below

## Plan Monitoring

The Chair of the Planning Committee, Judy Vazquez, hereafter referred to as the Local Mitigation Officer, will continue to lead the Planning Committee through the monitoring, evaluation, and update of the Plan. Plan implementation and maintenance will be a shared responsibility among the

Planning Committee members. The Local Mitigation Officer is authorized to make changes in assignments to the current Planning Committee during the five–year plan cycle. The Local Mitigation Officer will be responsible for contacting the Planning Committee members and organizing the annual meeting, which will take place during a standing Board Meeting. The Planning Committee will also be responsible for participating in the formal update to the Plan every fifth year of the planning cycle.

Ultimately, the success of the 2022 LHMP will be dependent on the following:

- Active participation and involvement of Planning Committee members
- Integration of Mitigation Actions into existing plans and programs
- Quarterly monitoring and reporting

The Planning Committee will evaluate the Plan by preparing an Implementation Report at each annual monitoring meeting, which will be held annually in February. The Implementation Report is the same as the Mitigation Action Matrix, but with a column added to track the status of each action item. Upon formal approval and adoption of the Plan, the Implementation Report will be added as an appendix of the Plan. The District will monitor and evaluate the Plan annually and produce a plan update every five years according to the five-year planning cycle schedule as seen in Table 11.

**Table 11 LHMP 5-Year Planning Cycle**

| 5-Year Planning Cycle | 2023 | 2024 | 2025 | 2025 | 2026 |
|---|---|---|---|---|---|
| Monitoring | X | X | X | X | X |
| Evaluating | | | | | X |
| Internal Planning Committee Evaluation | X | X | X | X | X |
| Cal OES and FEMA Evaluation | | | | | X |
| Updating | | | | | X |

**Q&A | ELEMENT A: PLANNING PROCESS | A6.b**

**Q:** Does the plan identify how, when, and by whom the plan will be evaluated over time? (Requirement §201.6(c)(4)(i))

**A:** See **Plan Monitoring Evaluation and Formal Update** below

**Q&A | ELEMENT A: PLANNING PROCESS | A6.c**

**Q:** Does the plan identify how, when, and by whom the plan will be updated during the 5-year cycle (Requirement §201.6(c)(4)(i))

**A:** See **Plan Monitoring Evaluation and Formal Update** below

## Plan Evaluation and Formal Update

On the third year of the five-year planning cycle (2025), the Local Mitigation Officer will coordinate with the Board of Directors to reform the planning team and begin applying for grants to update the plan. This will allow the District time to obtain a grant and have a completed plan by the end of the fifth year. The update process will be triggered at the time of the 2025 Plan evaluation process. At this time, the Planning Committee will convene to evaluate the effectiveness of the planning process and to update the overall content of the Plan.

Rather than develop a completely new Plan, the current Plan will be reviewed by the planning team in order to determine whether there have been any significant changes that may, in turn, necessitate changes in the types of mitigation actions proposed. New development or District infrastructure in identified hazard areas, an increased exposure to hazards, the increase or decrease in capability to address hazards, and changes to federal or state legislation are examples of factors that may affect the necessary content of the Plan. The plan review will provide the Planning Team with an opportunity to evaluate those actions that have been successful and to explore the possibility of documenting potential losses avoided due to the implementation of specific mitigation measures.

The plan review will also provide the opportunity to address mitigation actions that may not have been successfully implemented as assigned. During the five-year plan review process, the following questions will be considered as criteria for assessing the effectiveness and appropriateness of the Plan:

- Do the goals address current and expected conditions?
- Has the nature or magnitude of risks changed?
- Are the current resources appropriate for implementing the Plan?
- Are there implementation problems, such as technical, political, legal, or coordination issues with other agencies?
- Have the outcomes occurred as expected?
- Did the jurisdictions, agencies, and other partners participate in the plan implementation process as proposed?

# 3 Hazard Assessment

| |
|---|
| **Q&A \| ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT \| B1a** |
| **Q:** Does the plan include a general **description** of all natural hazards that can affect each jurisdiction? (Requirement §201.6(c)(2)(i)) |
| **A:** See **Hazard Description** below each hazard heading |

| |
|---|
| **Q&A \| ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT \| B1b** |
| **Q:** Does the plan provide rationale for the omission of any natural hazards that are commonly recognized to affect the jurisdiction(s) in the planning area? (Requirement §201.6(c)(2)(i)) |
| **A:** See **Hazard Selection Process** below |

| |
|---|
| **Q&A \| ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT \| B1c** |
| **Q:** Does the description, or profile, include information of the **location, extent, previous occurrences, and probability of future occurrence** for each hazard? (Requirement §201.6(c)(2)(i)) |
| **A:** See **Hazard Description, Location and Extent, Previous Occurrences, and Probability of Future Occurrence** below each hazard heading |

| |
|---|
| **Q&A \| ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT \| B2a-b. Q:** Does the plan include information on **previous occurrence** of hazard events and **probability of future** hazard events for each jurisdiction? (Requirement §201.6(c)(2)(i)) |
| **A:** See **Previous Occurrences, and Probability of Future Occurrence** below each hazard heading |

The Hazard Assessment identifies relevant hazards to include in this Plan. This section provides a description, geographic extent or magnitude, previous occurrences, and the probability of future occurrence of a given hazard. Maps are used in this Plan to describe the geographic extent of a hazard when applicable. The Hazard Assessment is comprised of five components:

1. Hazard Selection Process

And for each selected hazard:

2. Hazard Description
3. Location and Extent
4. Previous Occurrences
5. Probability of Future Occurrence

## 3.1 Hazard Selection

The PSMCD utilized the categorization of hazards as identified in California's 2018 State LHMP, including: Earthquakes, Floods, Levee Failures, Wildfires, Landslides and Earth Movements, Tsunami, Climate-related Hazards (including Drought), Volcanoes, and Other Hazards. The District also considered the hazards identified in the draft Monterey County Multi-Jurisdictional Mitigation Plan (2021), which addresses Agricultural Emergencies, Coastal Erosion, Dam and Levee Failure, Drought, Earthquakes, Flooding, Hazardous Materials Incident, Human-Caused Hazards, Public Health Hazards, Severe Weather, Slope Failure, Tsunami, Utility Interruption, Wildfire, and Climate Change.

The LHMPC identified the geographic extent of each of the identified hazards utilizing maps and data contained in the above referenced plans. It also reviewed previous disaster declarations. Table 12 and Table 13 identify the federal- and state-designated hazards that have occurred previously in the Monterey County.

The Stafford Disaster Relief and Emergency Act provides for two types of federal disaster declarations: emergency declarations (ED) and major disaster declarations. Both declarations authorize the President of the United States to provide supplemental federal disaster assistance. However, the two declaration types differ as follows.

- **Emergency declarations (ED)** can be declared by the President for any occasion or instance in which federal assistance is needed. ED supplement state, local, and Native American tribal government efforts to provide emergency services, such as the protection of lives and property, provision of public health and safety, and decrease or prevention of the threat of a catastrophe in any part of the United States. The total amount of assistance provided for a single emergency may not exceed $5 million without congressional approval.
- **Major disaster declarations (MDD)** can be declared by the President for any major disaster associated with a natural event, including hurricanes, tornados, storms, high water, wind-driven water, tidal waves, tsunamis, earthquakes, volcanic eruptions, landslides, mudslides, snowstorms, or droughts, or regardless of cause, a fire, flood, or explosion that the President determines has caused damage of such severity that it is beyond the combined capabilities of state and local governments to respond. An MDD provides a range of federal assistance programs for individuals and public infrastructure.

In addition to the previously mentioned federal disaster declarations, a **fire management assistance declaration** (FMAD) can be declared by the President when a state submits a request for assistance to the FEMA regional director at the time a "threat of major disaster" exists. Eligible firefighting costs may include expenses for field camps; equipment use, repair, and replacement; tools, materials, and supplies; and mobilization and demobilization activities.

**Table 12 Federal Disaster Declarations – Monterey County**

| Year of Declaration Date | Declaration Title | FEMA Disaster Number |
|---|---|---|
| 2020 | Wildfires | 4558 |
| 2020 | River Fire | 5329 |
| 2020 | COVID-19 Pandemic | 4482 |
| 2020 | Carmel Fire | 5333 |
| 2019 | Severe Winter Storms, Flooding, Landslides, and Mudslides (Late February 2019 Storms) | 4434 |
| 2017 | Severe Winter Storms, Flooding, and Mudslides (January 2017 Severe Winter Storms) | 4301 |
| 2017 | Severe Winter Storms, Flooding, and Mudslides (February 2017 Severe Winter Storms) | 4308 |
| 2016 | Soberanes Fire | 5137 |
| 2011 | Tsunami Waves (March 2011 California Tsunami) | 1968 |
| 2008 | Indians and Basin Fire Complex | 2781 |
| 2007 | Severe Freeze | 16892 |
| 1999 | Severe Freeze | 1267 |
| 1998 | Severe Winter Storms and Flooding (El Nino ’98 Winter Storms) | 1203 |
| 1997 | Severe Storms, Flooding, Mud Flow, and Landslides | 1155 |
| 1995 | Severe Winter Storms, Flooding, Landslides, Mud Flow | 1044 |
| 1995 | Severe Winter Storms, Flooding, Landslides, Mud Flow | 1046 |
| 1993 | Severe Winter Storm, Mud, & Land Slides, & Flooding | 979 |
| 1991 | Severe Freeze | 894 |
| 1989 | Loma Prieta Earthquake | 845 |
| 1985 | Grass, Wildlands, & Forest Fires | 739 |
| 1983 | Coastal Storms, Floods, Slides, & Tornadoes | 677 |
| 1978 | Coastal Storms, Mudslides & Flooding | 547 |
| 1977 | Drought | 3023 |
| 1969 | Severe Storms & Flooding | 253 |
| 1967 | Severe Storms & Flooding | 223 |

Sources: Monterey LHMP and FEMA 2021

At the state level, the California Disaster Assistance Act authorizes the director of the Cal OES to administer a disaster assistance program that provides financial assistance from the state for costs incurred by local governments because of a disaster event. The program also provides for the reimbursement of local government costs associated with certain emergency activities taken in response to a state of emergency proclaimed by the governor.

**Table 13 California Disaster Declarations – Monterey County**

| Year of Declaration | Declaration Title | CBAA Number | Local Number |
|---|---|---|---|
| 2021 | Drought | 2021 | 21-189 |
| 2021 | Severe Storms | 2021 | 21-033 |
| 2019 | Flood | 2020-05 | 19-943 |
| 2019 | Severe Storms (Mid-February 2019 Atmosphere) | 2019-02 | 19-077 |
| 2009 | Wildfire (Gloria Wildfire) | 2009-06 | 09-376 |

Source: Monterey LHMP

Utilizing a hazard ranking system, the Planning Committee deliberated and concluded the following hazards pose a significant threat to the District, and are included in the hazard and risk assessment of this LHMP: earthquake hazards, tsunami, flood, dam failure, levee failure, wildfire, landslide, extreme heat, drought, windstorm, sea-level rise, and hazardous spill. The Planning Committee did not choose to omit any natural hazards that are commonly recognized to affect it in its planning area.

## 3.2 Hazard Characterization

The District considered the impact of climate change by integrating the climate analysis into the hazard assessments of relevant hazards, including flooding, landslides, wildfire, and heat. Climate change primarily affects the intensity and frequency of existing hazards. Future changes in climate are based on global climate models developed from State guidance. The Intergovernmental Panel on Climate Change provides several greenhouse gas (GHG) emissions scenarios to describe possible future GHG emissions level and associated climate outcomes. Two of these Representative Concentration Pathways (RCPs) are commonly used to explore future climate conditions. In this Plan, climate change was assessed under RCP 4.5 and RCP 8.5. RCP 4.5 represents a “medium emissions” scenario in which collective action at the global scale results in the successful implementation of GHG reduction strategies. In this scenario, global emissions peak around 2040 and decline by the end of the century. RCP 8.5 represents a “high emissions” scenario in which emissions continue to rise unmitigated throughout the 21st century. This was considered to be the worst-case climate change scenario.

The hazard ranking system used to determine whether a given hazard should be included in this LHMP considered the history of the hazard, probability of future occurrence, and associated potential impact, as described in Table 14. As a result of these three attributes and the availability of data and/or well-established assessment parameters, hazards were assigned a priority ranking of “Low”, “Medium”, or “High”. The hazards assigned “High” rankings included:

- Ground Shaking
- Liquefaction
- Flood
- Wildfire
- Sea-Level-Rise
- Hazardous Material Spill

Hazard rankings were developed collaboratively by the Planning Committee members based on each representative’s subject matter expertise and experience. The selected hazards are inclusive of all hazards that the LHMPC understand to be commonly recognized to the affect the District’s service area.

## Table 14 Hazard Selection Justification

| Hazard Name | History | Probability | Impact | Priority | Comments |
|---|---|---|---|---|---|
| Ground Shaking | Yes | High | High | High | ▪ The region features active tectonic movement between the Pacific Plate, North American Plate, and the San Andreas Fault. The Loma Prieta Earthquake is an example (1989)<br>▪ Earthquake events could cause cascading impacts to local populations – fire, cold storage ammonia leak, etc.<br>▪ May cause injury and/or loss of life to District employees or customers |
| Liquefaction | Yes | High | High | High | ▪ Secondary hazard from earthquake<br>▪ Risk to specific people and areas along levees, and the Moss Landing area<br>▪ May cause injury and/or loss of life to District employees or customers |
| Tsunami | Yes | Low | High | Medium | ▪ Concern about risk to the pump stations, wells, and storage tanks wells and storage tanks in the hazard area<br>▪ May cause injury and/or loss of life to District employees or customers |
| Flood | Yes | High | High | High | ▪ Cascading impacts could include cold storage ammonia leak<br>▪ Climate Change could amplify risk to populations<br>▪ May cause injury and/or loss of life to District employees or customers |
| Dam Failure | No | Low | High | Medium | ▪ Two dams pose risk to the District<br>▪ Impacts would be catastrophic to District assets, employees, and customers |
| Levee Failure | Yes | Medium | High | Medium | ▪ Pajaro River extremely prone to flooding and has experienced levee failure in the past<br>▪ May cause injury and/or loss of life to District employees or customers |
| Wildfire | Yes | Medium | High | High | ▪ Concern with fire risk in the southern and eastern areas of the District, specifically near Prunedale and Vega<br>▪ Climate Change could amplify risk to populations<br>▪ May cause injury and/or loss of life to District employees or customers |
| Landslide | Yes | Medium | Medium | Medium | ▪ Secondary hazards from severe storms and earthquakes<br>▪ Concern with Prunedale area, specifically, Lewis Road, Langley Canyon, Meyer, Access limits<br>▪ May cause injury and/or loss of life to District employees or customers |
| Extreme Heat | No | High | Low | Low | ▪ Climate Change could amplify risk to populations<br>▪ May cause heat-related illnesses, such as heat stress and dehydration |
| Drought | Yes | High | Low | Medium | ▪ The District relies on groundwater<br>▪ Risk is elevated for populations on the smaller systems<br>▪ Salt-water intrusion at Moss Landing and Springfield may be exacerbated by drought. This has happened before in Moro Cojo Slough (2014 and 2016)<br>▪ Climate Change could amplify risk to populations<br>▪ Increased water rates may impact the District and customers. |
| Windstorm | Yes | Medium | Medium | Medium | ▪ Staff notes that burned areas were impacted by strong windstorms<br>▪ Climate change could amplify risk to populations<br>▪ May cause injury and/or loss of life to District employees or customers |
| Sea-Level Rise | Yes | High | High | High | ▪ Concerns regarding pump stations and salt intrusion posing threats towards wells and storage tanks in the hazard area<br>▪ Climate Change could amplify risk to populations<br>▪ May cause injury and/or loss of life to District employees or customers |
| Hazardous Material Spill | No | Low | High | High | ▪ Risk to specific areas and populations including Pajaro Junction and Moss Landing<br>▪ May cause injury and/or loss of life to District employees or customers |

## Seismic Hazards

### *Hazard Description*

An earthquake is a motion or trembling following a release of energy resulting from a sudden dislocation along the Earth's crust. This most often happens along a fault line or at the edge of the Earth's tectonic plates. The effects of an earthquake can be felt far beyond the site of occurrence. They often happen without any warning and cause major damage and casualties in a matter of seconds. The most common effects of earthquakes include surface fault ruptures, ground motion and shaking, and ground failure. Ground motion is the vibration or shaking of the ground during an earthquake. In the process of the crust breaking, vibrations called "seismic waves" are created and radiate out. The severity of the seismic waves is correlated with the amount of energy released. The severity of vibrations decreases as the distance from the site of occurrence or the epicenter. Soft soils can further amplify vibrations. Aftershocks frequently occur after a large earthquake. Reliving stress in the Earth's crust can often increase stress in other areas of the affected fault or other faults in the crust.

Ground shaking, landslides, liquefaction, and amplification are the specific hazards that can be associated with earthquakes. The severity of these hazards is dependent on the severity of factors including soil and slope conditions, proximity to the fault, earthquake magnitude and the type of earthquake. This section includes a characterization of ground shaking and liquefaction.

Ground shaking is the motion felt on the Earth's surface caused by seismic waves generated by the earthquake. It is the hazard that causes the most damage to assets, infrastructure, and people during an earthquake. The severity of ground shaking is dependent on the magnitude of the earthquake, the type of fault, and the distance from the site of occurrence or epicenter. Structures that are built on poorly consolidated and thick soils often see more damage than those built on bedrock and consolidated soils. Seismic activity along both nearby and more distant fault zones is likely to cause ground shaking within the District's service areas.

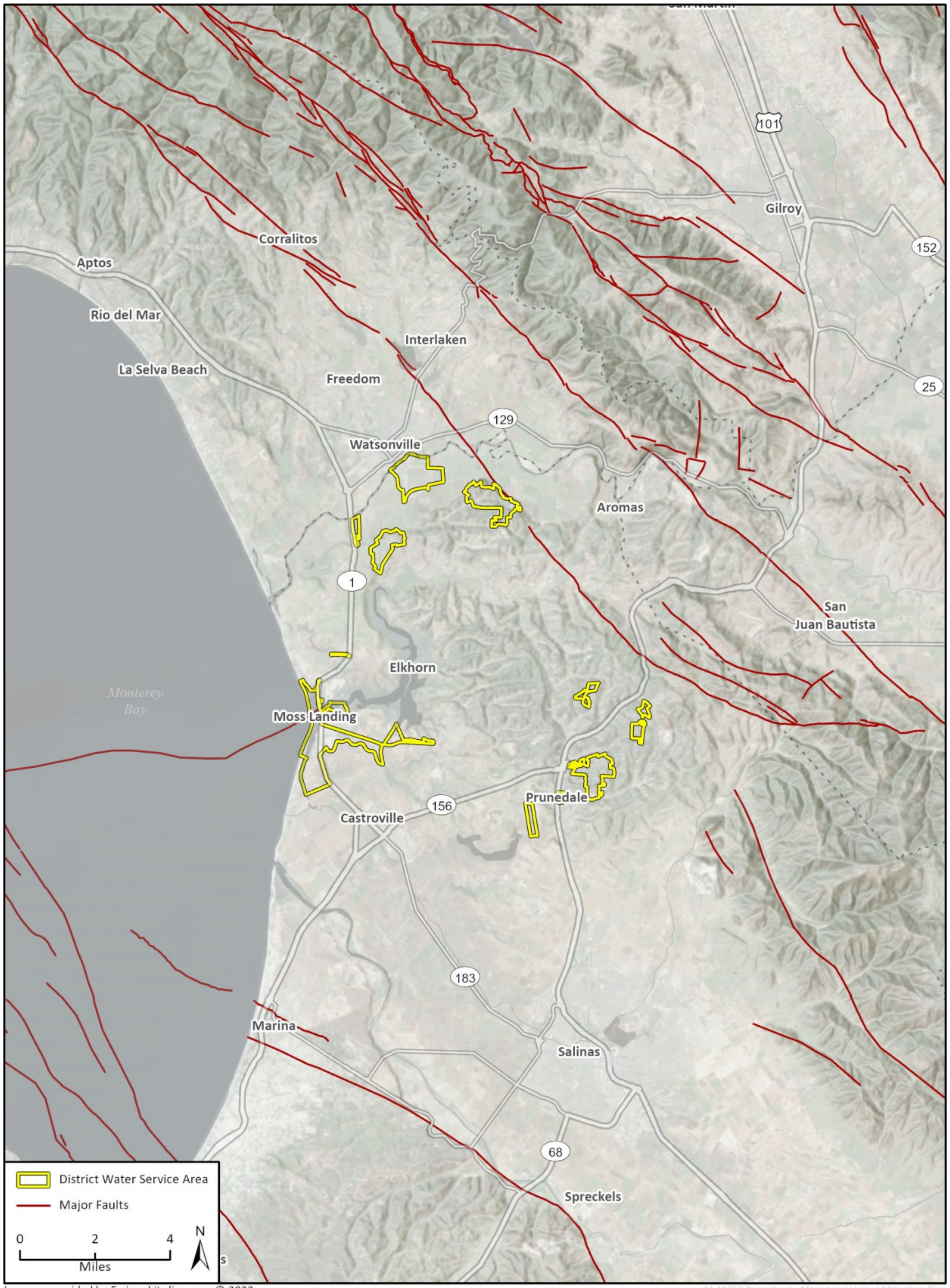
Liquefaction occurs when seismic waves pass through saturated granular soil, distorting the soil's granular structure and causing areas of empty space between granules to collapse. Liquefaction causes lateral spreads (horizontal movements of commonly 10 to 15 feet, but up to 100 feet), flow failures (massive flows of soil, often hundreds of feet and up to 12 miles), and loss of bearing strength (soil deformations) causing structures to settle or tip. Liquefaction poses severe risk to buildings and their occupants as it causes the ground to no longer be able to support structures.

### *Location and Extent*

#### GROUND SHAKING

The severity of an earthquake is dependent on the amount of energy released from the fault or epicenter. Major faults near the District's service area are shown in Figure 2. One way to express an earthquake's severity is to compare its acceleration to the normal acceleration due to gravity. The peak ground acceleration (PGA) is the biggest increase in velocity recorded during an earthquake. PGA is measured in g, the acceleration due to gravity. PGA is used to assess the severity of an earthquake by measuring the strength of ground motion. PGA is used to project the risk of damage from future earthquakes by showing earthquake ground motions that have a specified probability (10%, 5%, or 2%) of being exceeded in 50 years. These ground motion values are used for reference

**Figure 2 Major Faults**

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*Additional data provided by CGS, 2022.*

in construction design for earthquake resistance. The ground motion values can also be used to assess relative hazard between sites, when making economic and safety decisions.

The Magnitude Scale, also known as the Richter Scale, is a well-known tool used to measure the intensity of an earthquake. It was created to measure the strength based off the amplitude of the largest energy wave released by the earthquake. The Magnitude Scale is logarithmic, with each one-point increase corresponding to a 10-fold increase in the amplitude of the seismic shock waves generated by the earthquake. Therefore, a Magnitude 7 (M7) earthquake is 100 times more powerful than a M5 earthquake.

The Modified Mercalli Intensity Scale is a tool focused on measuring the intensity of an earthquake and the effects experienced at the location. An earthquakes intensity decreases with increasing distance from the origin of the earthquake. The Scale rates the levels of severity of an earthquake by the amount of damage and perceived shaking, as seen in Table 15.

**Table 15 Modified Mercalli Intensity Scale**

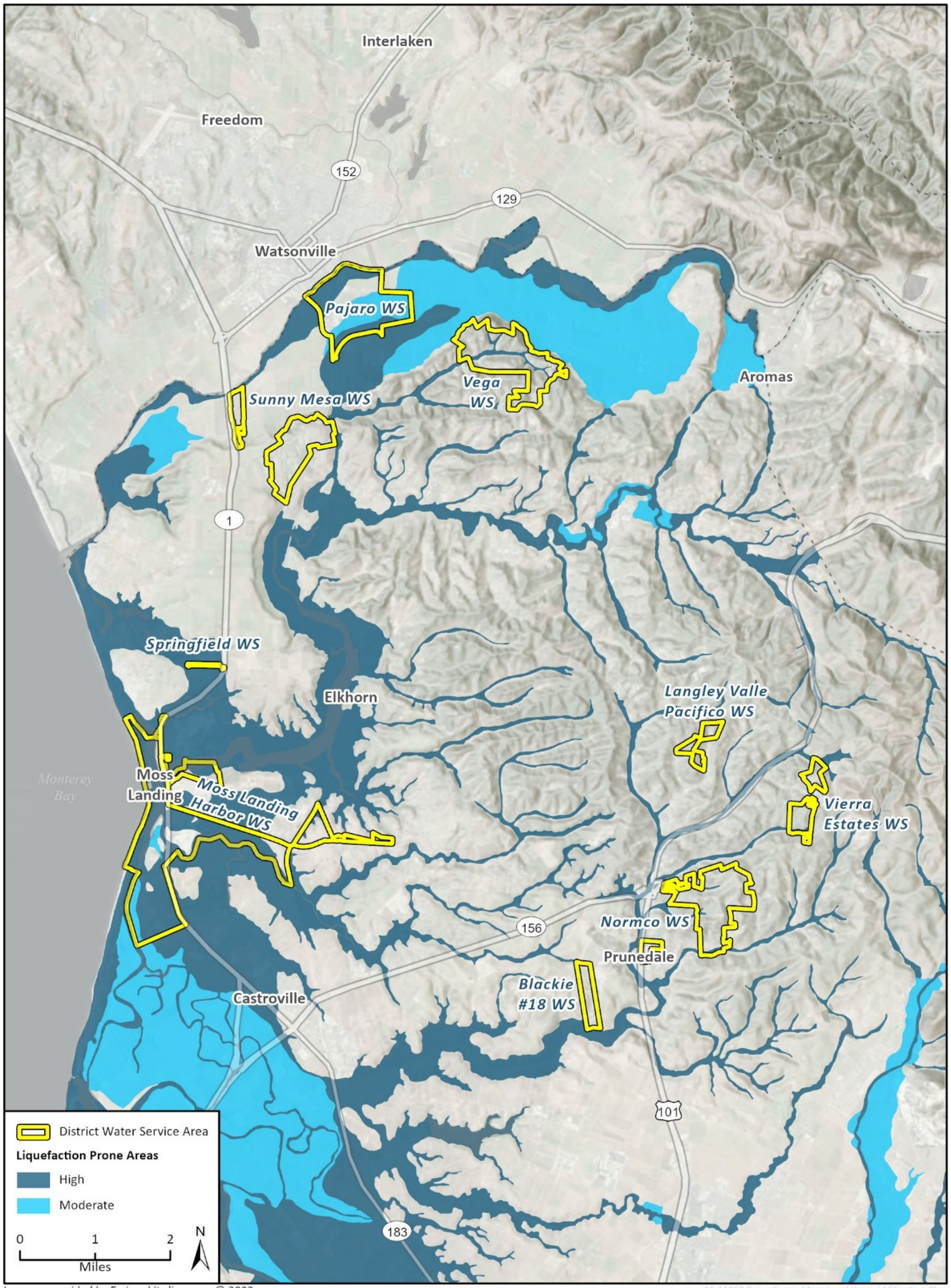
| Intensity | Shaking | Description |
|---|---|---|
| I | Not Felt | Not felt except by a very few under especially favorable conditions |
| II | Weak | Felt only by a few persons at rest, especially on upper floors of buildings |
| III | Weak | Felt quite noticeably by persons indoors, especially on upper floors of buildings. Many people do not recognize it as an earthquake. Standing motor cars may rock slightly. Vibrations like the passing of a truck. Duration estimated. |
| IV | Light | Felt indoors by many, outdoors by few during the day. At night, some people awakened. Dishes, windows, doors, disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars ricked noticeably. |
| V | Moderate | Felt by nearly everyone, many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop. |
| VI | Strong | Felt by all, many frightened. Some heavy furniture moved; a few instances of fallen plaster. Damage slight |
| VII | Very Strong | Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly built or badly designed structures; some chimneys broken |
| VIII | Severe | Slight damage in well-built buildings, considerable damage and partial collapse in ordinary buildings, and great damage in poorly built buildings |

Source: USGS 2022

### LIQUEFACTION

Liquefaction is an effect of an earthquake in which soils act as a liquid and lose their strength, resulting in damage to structures that rely on soil for support. Often, areas that were originally marshlands, lakes, or bays and were filled with artificial, poorly compacted material such as sediment, are most vulnerable to liquefaction. There are areas in the District that have the soil characteristics associated with those that are prone to liquefaction. Typically, liquefaction effects generally occur in the upper 40 feet of the soil column. The duration of ground sharking during an earthquake is also correlated to the severity of liquefaction. The longer an earthquake goes on, the greater potential there is for liquefaction to occur. The Moss Landing service area is highly at risk to liquefaction and severe damage to infrastructure and structures is likely. Figure 3 shows liquefaction prone areas in relation to the District's service areas.

**Figure 3 Liquefaction Prone Areas**

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*Liquefaction data provided by Monterey County, 2015.*

### *Previous Occurrences*

Monterey County and the surrounding region have a history of damaging and well-documented earthquakes, as seen in Table 16, most often associated with the San Andreas Fault, which runs through the southeastern portion of Monterey County, about 30 miles away from the District. There have been several other significant and severe earthquakes stemming from other faults in the region such as the Monterey Bay-Tularcitos Fault.

The most recent 6.0 plus magnitude earthquake to impact the District originated in Parkfield, California, in 2004 and was registered as a magnitude 6.0. This earthquake caused only minor damage in the Monterey County and no major damage to the District. The Loma Prieta earthquake occurred in 1989, registered as 6.9, and originated in Santa Cruz County. The earthquake caused significant damage in the Moss Landing area, where liquefaction damaged a bridge that connected the mainland to Moss Landing, wrecked a causeway and ruptured a road on Paul’s Island. There was significant damage to sections of Highway 1 in Monterey County and the Salinas River Rail bridge. Overall, the Loma Prieta earthquake resulted in 3,757 injured persons and 63 deaths throughout Northern California.

**Table 16 Significant Earthquakes (6.0+ Magnitude) within 100 Miles of the District (1850-Present)**

| Originating Location | Date | Magnitude |
|---|---|---|
| Parkfield | 2004 | 6.0 |
| San Simeon | 2003 | 6.5 |
| Loma Prieta | 1989 | 6.9 |
| Morgan Hill | 1984 | 6.1 |
| Coalinga | 1983 | 6.5 |
| Monterey Bay | 1952 | 6.2 |
| Parkfield | 1966 | 6.6 |
| Parkfield | 1934 | 6.0 |
| Monterey Bay | 1926 | 6.3 |
| Parkfield | 1922 | 6.5 |
| San Francisco | 1906 | 7.8 |
| Parkfield | 1901 | 6.4 |

Source: USGS 2022

### *Probability of Future Occurrence*

Due to the high seismic activity in and surrounding the District, it is very likely that an earthquake will occur in the future. According to the USGS, there is about a 72 percent probability of at least one earthquake of magnitude 6.7 or greater striking somewhere in the greater San Francisco Bay region before 2043. The Uniform California Earthquake Rupture Forecast (UCERF3) was developed by the USGS to provide a 30-year outlook from 2015 to 2045. Table 17 shows the probabilities for future earthquakes of 6.7+ magnitude originating from faults near the District.

**Table 17 UCERF3 Fault Rupture Probability**

| Fault | Probability (6.7+Magnitude) |
|---|---|
| Monterey Bay – Tularcitos Subsection 9 | 0.85% |
| San Andreas (Santa Cruz Mountains) | 13.99% |
| San Gregorio (South) Subsection 12 | 1.38% |
| Zayante-Vergeles Subsection 5 | 0.08% |

Source: WGCEP 2020.

The presence of liquefaction-prone soils means that future earthquakes could trigger liquefaction within the District's service area. Therefore, the probably of liquefaction events are associated with the probability of future earthquake events shown in Table 17. Earthquakes at nearby Monterey Bay, Zayante-Vergeles, and San Gregorio Faults could cause sufficient ground shaking to trigger liquefaction, although the chance of an earthquake on these faults is relatively low. Larger, more distant faults, including the San Andreas Fault, are more likely to cause significant earthquakes, although the shaking from these earthquakes may not be strong enough to trigger liquefaction.

## Tsunami

### *Hazard Description*

A tsunami is a wave or series of waves that are triggered by a displacement of the ocean floor. Tsunamis most often occur because of earthquakes, but they can also be caused by landslides, volcanic activity, or certain types of weather. The speed of a tsunami is dependent on the depth of the ocean. Tsunamis can travel as fast as 600 miles per hour. Tsunamis tend to grow in speed as they approach the shore. When they land, they are capable of causing extensive damage to coastal structures, ecosystems, infrastructure, and human lives. The outflow of water back to the sea often carries out large amounts of debris which can lead to further damage.

### *Location and Extent*

The areas of the District along or adjacent to the shore, such as the Moss Landing service area, are most likely to experience inundation and incur damages from a tsunami, as seen in Figure 4. A near-shore tsunami event is most likely to be caused by seismic activity along the San Gregorio Fault which runs parallel to the District and is about 25 miles away from the Moss Landing.

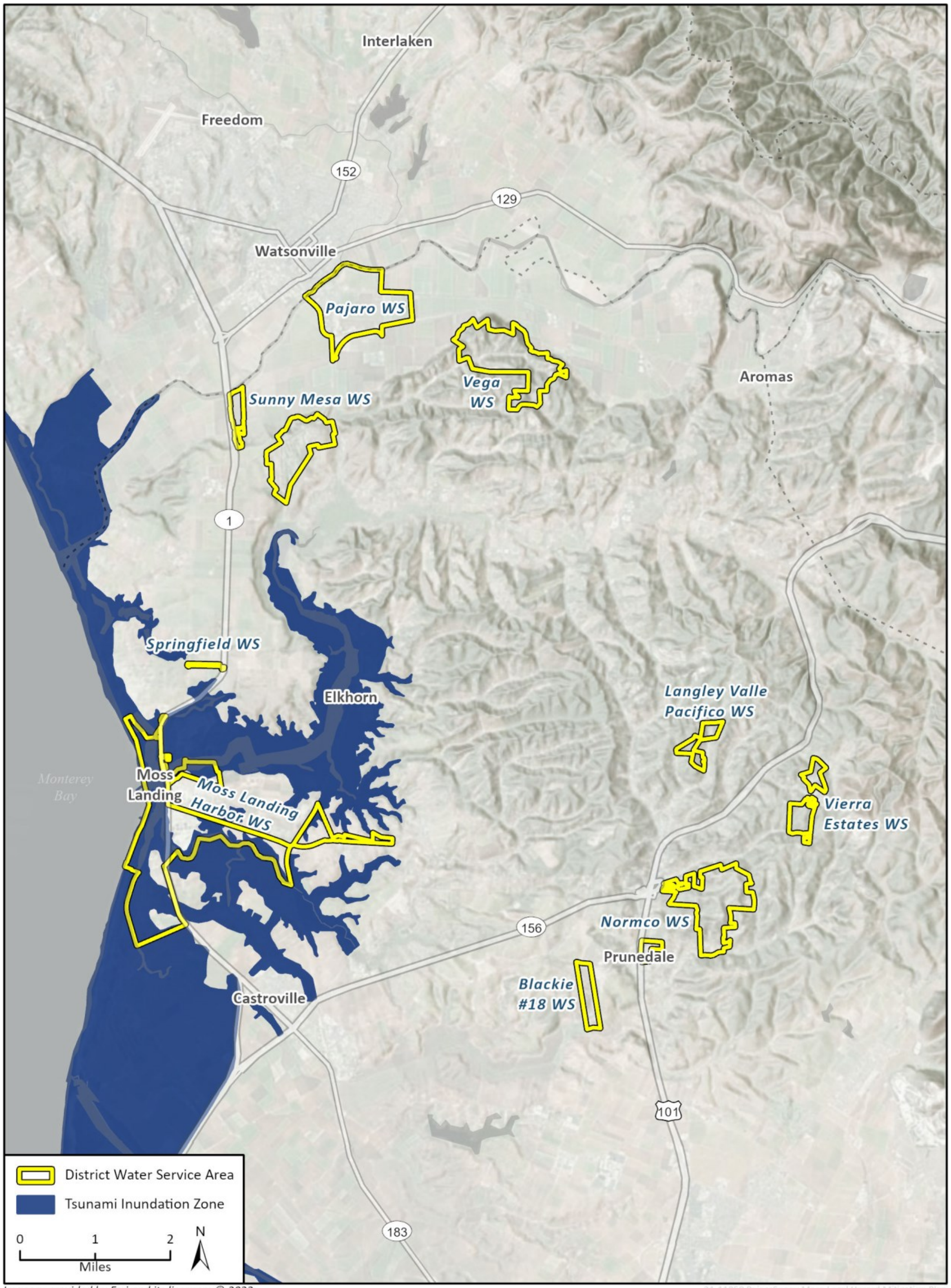
### *Previous Occurrences*

The 1989 Loma Prieta earthquake caused a small landslide offshore in Monterey Canyon which triggered a 1-foot tsunami in the Monterey Bay. In 2011, an earthquake in Japan triggered a tsunami wave (up to 7 feet) that caused large amounts of water to move through the Moss Landing Harbor. The Harbor's older docks are piles were heavily damage and large volumes of sediment was displaced, leading to an estimated $2.5 million in damaged to timber piles. In January 2022, a tsunami surge triggered by a volcanic eruption near the Southwestern Pacific Island nation of Tonga, hit the shores of Moss Landing with a peak wave of about 8 feet. The tsunami caused damage to pilings and a floating dock in Moss Landing, leading to about $300,000 in damage costs.

### *Probability of Future Occurrences*

Tsunamis are infrequent and unpredictable. There have been two tsunami events that have impacted the District's service area in the past 12 years. If a large tsunami were to occur, its impact on the District could be significant.

**Figure 4 Tsunami Inundation Zones**

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*Additional data provided by CGS, 2009.*

## Flood

### *Hazard Description*

There are four types of flooding that can potentially affect the District's service areas, including flash flooding, coastal flooding, riverine flooding, and localized stormwater flooding. In addition, the District looked at

- **Flash floods** occur when an extreme flow of water rapidly enters an area at a rate and volume where it cannot be absorbed, or a stream cannot carry it in its normal channel. Flash floods can last from anywhere between a few minutes in small streams to a few days in larger streams.
- **Coastal flooding** occurs when normally dry land near coastline or bay water is inundated by water most often from high tide events and storms. Strong storms in conjunction with high tides and strong winds, lead to flood prone conditions. Coastal flooding is assessed in the sea level rise hazard section of this LHMP.
- **Riverine flooding** is the overbank flooding of rivers and streams. Riverine flooding often comes from heavy rainfall from large weather systems leading to flooding in tributaries that empty into larger river systems. The total amount of water in a floodplain is a function of the size and topography of the contributing watershed, the regional and local climate, and the land use characteristics. A floodplain is an area adjacent to a river that is often subject to flooding and was over time is formed of primarily river sediments.
- **Stormwater flooding** can often occur in urban and residential areas when urban drainage systems have either reached their capacity or have been compromised in some way. In urban areas, debris can cause street drains to become clogged and lead to localized flooding in storms with heavy downpour. Severe storms can lead to power outages that shut down drainage pumps, resulting in increased flood risks in residential areas. A combination of heavy precipitation, insufficient drainage and conveyance facilities, and increased surface runoff can lead to lead to stormwater flooding propagating beyond drainage channels and delineated floodplains.

**Q&A | ELEMENT C. MITIGATION STRATEGY | B4**

**Q:** Does the Plan address NFIP insured structures within each jurisdiction that have been repetitively damaged by floods? 44 CFR 201.6(c)(2)(ii)

**A:** See **National Flood Insurance Program** below

**Q&A | ELEMENT C. MITIGATION STRATEGY | C2**

**Q:** Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement §201.6(c)(3)(ii))

**A:** See **National Flood Insurance Program** below

#### NATIONAL FLOOD INSURANCE PROGRAM

National Flood Insurance Program (NFIP) is managed by FEMA and provides insurance to aid in reducing the socio-economic impacts of floods. Since 1968, NFIP has been providing flood insurance to renters, homeowners, and businesses in communities that adopt and enforce floodplain management ordinances to reduce future flood damage.

The District does not control land use, so it has no floodplain management ordinances nor a floodplain administrator. Therefore, the District is not responsible for complying with the National Flood Insurance Program (NFIP) requirements.

### FLOOD DEFINITIONS

- **Floodplain.** A floodplain is a flat area of land adjacent to a river, stream, or other watercourse. It consists of the main channel of the river, the floodway, as well as the flood fringe, which extends from the outer banks of the floodway to the bluff lines of the valley surround the watercourse. The floodplain acts as a natural buffer to the river that stores excess flood waters.
- **100-Year Flood.** The 100-year is a flood that has a 1 in 100 or 1% probability of being equaled or exceed in magnitude in any given year. The 100-year floodplain is the area adjacent to a river, stream or other watercourse covered by excess water from a 100-year flood.
- **Floodway.** The floodway is defined by FEMA as the channel of a river, stream, or watercourse and the overbanks areas adjacent to the channel. The floodway carries most of the excess water from flood events downstream and is where there is the highest velocity and strength of flow. NFIP regulations require that all floodways are kept free from developments or structures that would decrease the natural abilities of the floodway or divert flood flows onto other properties.
- **Base Flood Elevation.** FEMA defines Base Flood Elevation (BFE) as the elevation of surface water resulting from a 100-year flood, that is a flood that has a 1% or 1 in 100 chance of equaling or exceeding that level in any given year. However, some communities use varying frequency flood events (e.g., 25-year flood or 500-year flood) as their base flood elevation for certain purposes such developing storm water management plans or planning the stabilization of mobile homes.
- **Floodzones.** Geographic areas that have been defined according to varying levels of flood risk. These zones can be depicted on a community's FEMA Flood Insurance Rate Map (FIRM) or Flood Hazard Boundary Map. Each zone reflects the severity or type of flooding in the area.

### *Location and Extent*

The unincorporated areas of Monterey County within the District participate in the NFIP through the County's NFIP. The NFIP provides flood insurance to communities that enact minimum floodplain management rules in compliance with the Code of Federal Regulations §60.3.

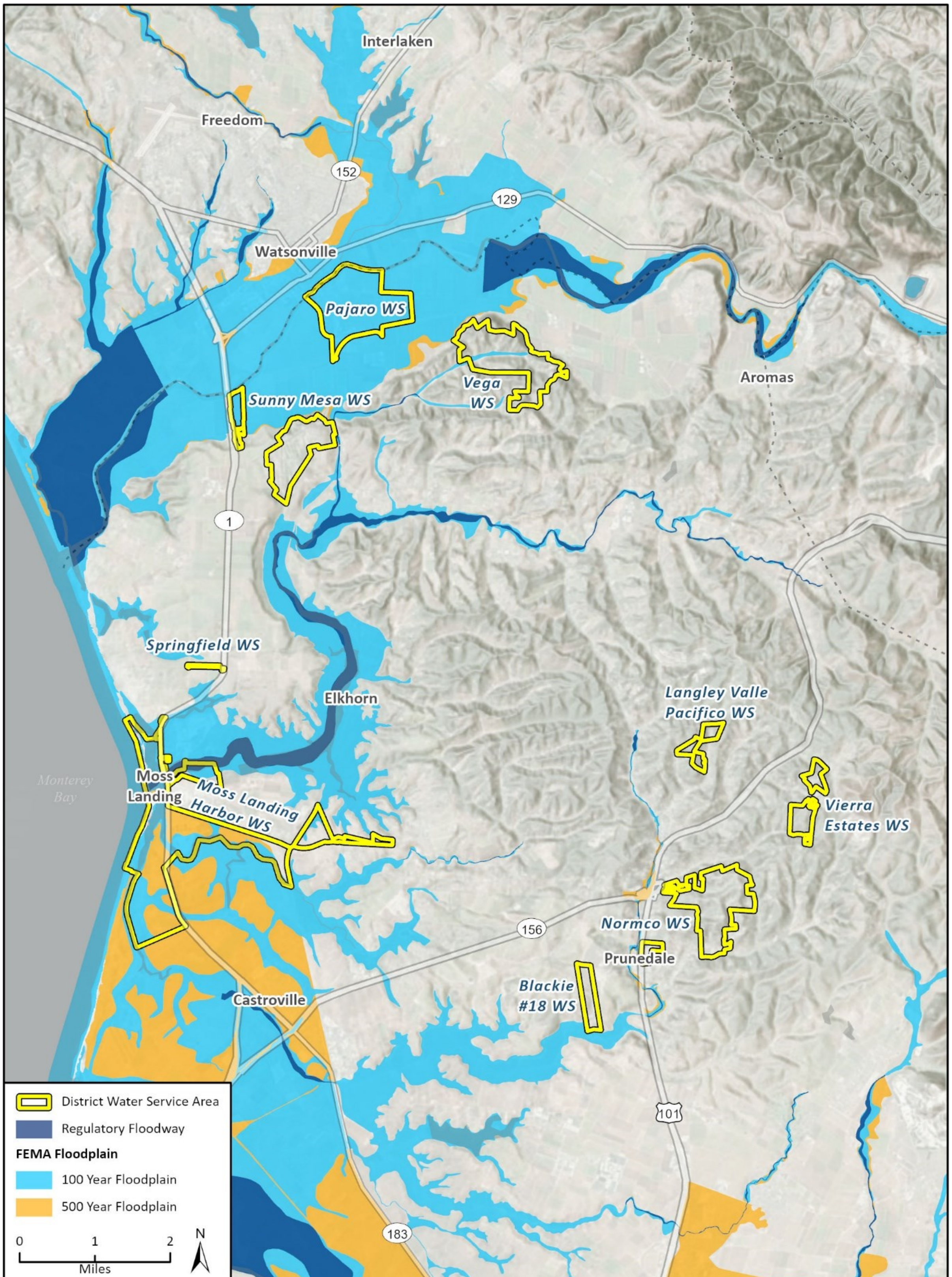
The floodplains around the Pajaro River, Elkhorn Slough, and Moro Cojo Slough are particularly prone to flooding. According to Figure 5, most flood hazard areas in the District near the Pajaro River are classified as areas subject to inundation by 1-percent-annual-chance flood event (100-Yr Floodzone) and the majority of hazard in the Moss Landing area are classified as areas subject to inundation by 0.2-percent-chance flood event (500-Yr Floodzone).

Coastal flooding around Moss Landing and the surrounding areas may occur during from November to February due to large waves and swells from winter storms. Strong storms, in conjunction with high tides and strong winds, lead to flood prone conditions, particularly at the mouth of the Pajaro River and Elkhorn Slough.

### *Previous Occurrences*

Major floods have occurred on the Pajaro River and its tributaries in 1955, 1958, 1995, 1998. The 1955 and 1958 storms led to the largest flood events on record on the Pajaro River. At the Chittenden Road gauge, the discharges for these events were 24,000 cubic feet per second and 23,500 cubic feet per second, respectively. The estimated recurrence intervals for floods of these

**Figure 5 FEMA Flood Zones**

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*Additional data provided by FEMA, 2021.*

magnitudes are 27 years and 26 years, respectively. The 1995 flood event breached the Pajaro River levees, flooding the Town of Pajaro, and causing an estimated $95 million in damage. In 1998, a series of "El Niño" winter storms hit the District. Intense flooding led to the evacuation of the Town of Pajaro's entire population, after the Pajaro River levee was breached in several places. Across Monterey County, the flood caused an estimated $38 million in damages.

Other District service areas also have histories of intense flood events. In 2014, a winter atmospheric river brough heavy precipitation and strong winds to Monterey and Santa Cruz Counties. The Moro Cojo Slough was inundated, causing nearby homes and roadways to flood. The slough flap gates were damaged and excess water was not able to drain into Moss Landing Harbor.

### *Probability of Future Occurrence*

In the near term, the probably of future flood occurrence is expressed according to defined floodzones (i.e., the 100-year or 500-year flood zone). The intensity and duration of precipitation events are expected to increase under future climate projections, which are likely to increase the probability of flood risk in the District's service area. There is also projected increase of year-to-year variability in the District's service area with fewer total days of precipitation but wetter days during periods of precipitation. Average annual precipitation under RCP 8.5 (high emissions scenario) is projected to increase significantly by the end of the century, as seen in Table 18. Overall, the climate is likely to yield drier conditions year-round, with a few more intense and severe storm events producing a large portion of the total annual volume of precipitation.

**Table 18 Projecting Annual Total Precipitation**

| | Change from baseline (inches) | 30yr Average (inches) |
|---|---|---|
| Baseline (1961-1990) | NA | 20.7 |
| 2035-2064 (RCP 4.5) | -0.2 | 20.5 |
| 2035-2064 (RCP 8.5) | +0.2 | 20.9 |
| 2070-2099 (RCP 4.5) | +0.3 | 21.0 |
| 2070-2099 (RCP 8.5) | +0.9 | 21.6 |
| Source: CEC 2020 | | |

Additionally, extreme precipitation events are expected to increase the frequency and intensity of flooding in the District due to climate change. In this assessment, an extreme precipitation event is defined by 2-day rainfall totals during a water year (October – September) exceeding the 95$^{th}$ percentile of maximum rainfall based on precipitation data between 1961 and 1990. The Pajaro service area's extreme precipitation event threshold is 1 inch. Historically (1961-1990), Pajaro has experienced 3 extreme precipitation events and can expect 4 extreme precipitation events by mid-century and 5 extreme precipitation events by end-century, under RCP 8.55.

## Dam Failure

### *Hazard Description*

According to FEMA, a dam is an artificial barrier that is designed to impound water, wastewater, or any liquid-borne material, for the purpose of storage or control of water. Dams often lead to the confirmation of reservoirs that are used to store water, generate electricity, control flooding, and create recreational opportunities. Dams are often built of any combination of rock, soil, tailings, concrete, timber, rubber, masonry, or plastic. Dam failure released an immense amount of energy and water which can cause catastrophic damage for hundreds of miles, destroying structures and loss of lives.

Dams can fail in a variety of ways including:

- Earthquake (cascading impacts of liquefaction or landslides)
- Structural failure
- Neglected maintenance and deterioration
- Overtopping caused by water spilling over the dam once capacity has been reached
- Deformation of the dam's foundation
- Other dam failure upstream

Table 19 outlines the California's Division of Safety of Dams hazard potential classification system.

**Table 19 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 | Probably (one or more expected) | Yes, but not necessary for this classification |
| Extremely High | Considerable | Yes, major impacts to critical infrastructure or property |

Source: California Office of Emergency Services 2018

### *Location and Extent*

Two dam facilities pose a threat to the District's service areas. The Nacimiento Dam facility is located about 100 miles southeast of the District in southern Monterey County. When full, the reservoir has a maximum storage capacity of 377,900 acre-feet. The San Antonio Dam facility is also located about 100 miles southeast of the District, in southern Monterey County. When full, the reservoir has a maximum storage capacity of 350,000 acre-feet.

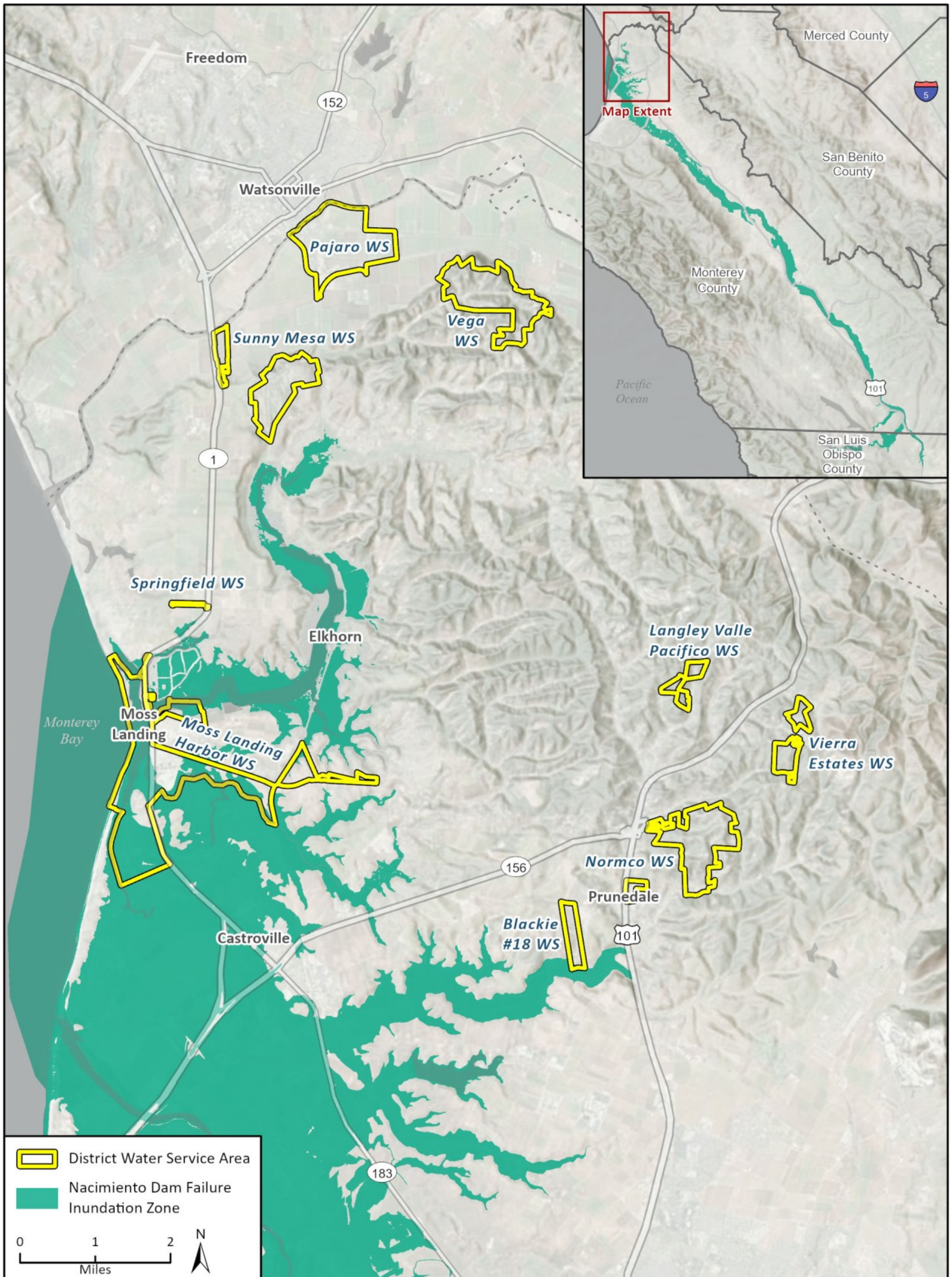
The failure of either dam could potentially have severe downstream impacts on parts of the District's service area. Released water would cause extreme flooding and could inundate areas within the Moss Landing service area, as seen in Figure 6 and Figure 7. Dam failure inundation could damage homes, structure, infrastructure, and District assets. Inundation may also contaminate the District's water supply. Dams in or owned by Monterey County that pose risk the District are summarized in Table 20.

**Table 20 Dams in or Owned by Monterey County that Pose Risk to the District**

| Facility Name | Water Course | Owner | Dam Type | Downstream Hazard | Condition |
|---|---|---|---|---|---|
| San Antonio | San Antonio River | Monterey County Water Resources Agency | Earthen Embankment | Extremely High | Fair |
| Nacimiento | Nacimiento River | Monterey County Water Resources Agency | Earthen Embankment | Extremely High | Satisfactory |

Source: Monterey County LHMP 2022

**Figure 6 Nacimiento Dam Failure Inundation Zone**

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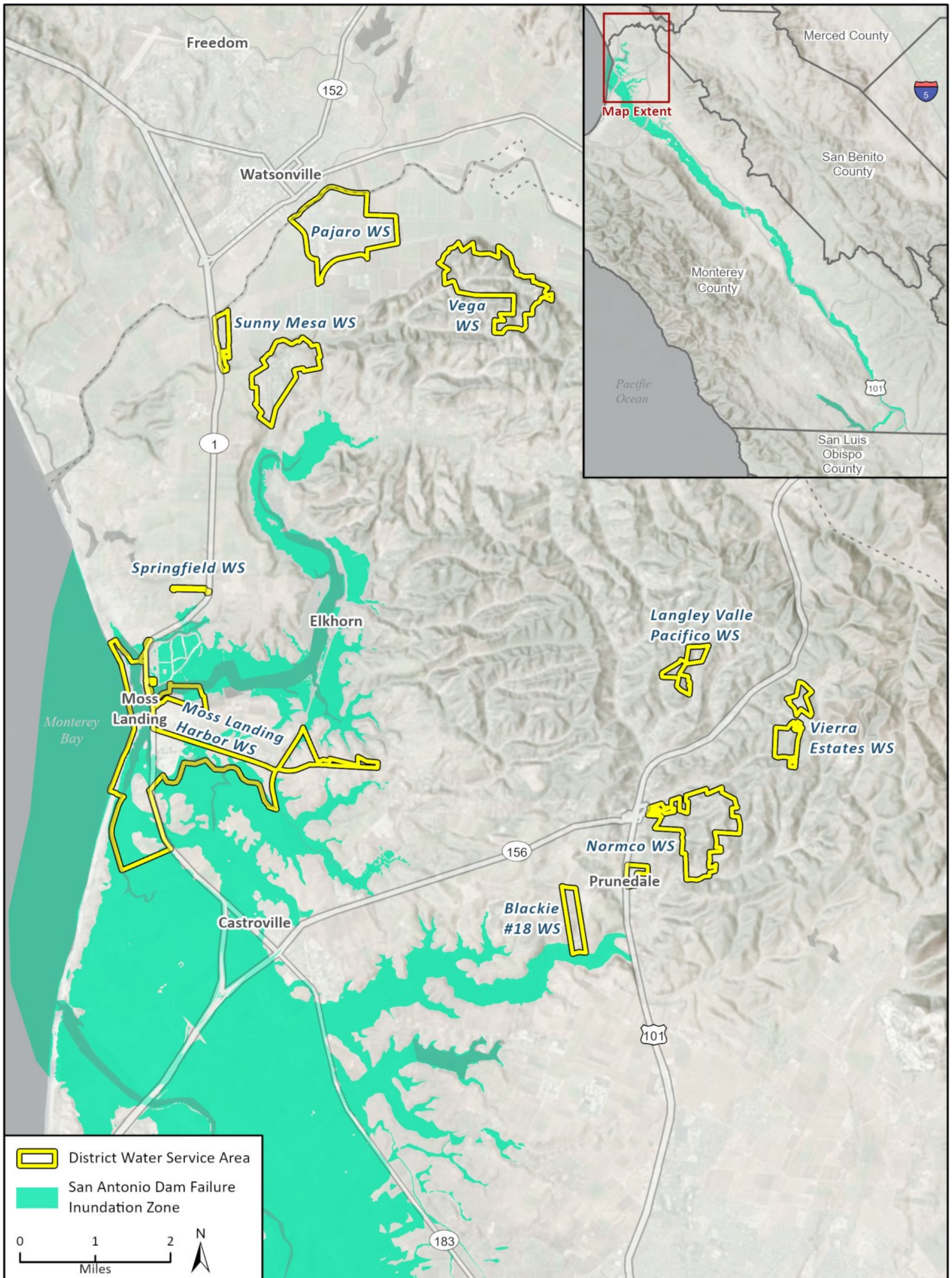
*Additional data provided by Department of Water Resources, DSOD, 2022.*

**Figure 7 San Antonio Dam Failure Inundation Zone**




Imagery provided by Esri and its licensors © 2022.
Additional data provided by Department of Water Resources, DSOD, 2022.

### *Previous Occurrences*

A dam failure has not affected the District's service area to date.

### *Probability of Future Occurrence*

The San Antonio Dam spillway is currently in fair condition; however, California's Division of Dam Safety requires that the dam spillway be restored to full function by November 1, 2024. Dam failures are infrequent and are usually triggered by strong earthquakes, landslides, and heavy precipitation.

## Levee Failure

### *Hazard Description*

A levee is an earthen embankment or low ridge built along the edges of a river, stream or other water channel to prevent flooding in the area adjacent. Levees are constructed to reduce flood risk from flooding events. According to FEMA, levees can be overtopped or fail during flood events that exceed the level for which they were designed for. Levees can experience structural failure from inadequate foundations, improper maintenance, seismic activity, seepage, erosion, and/or burrowing animals. Levee failures often occur very quickly and can have significant impacts on the land, assets, and communities adjacent to the water levees.

### *Location and Extent*

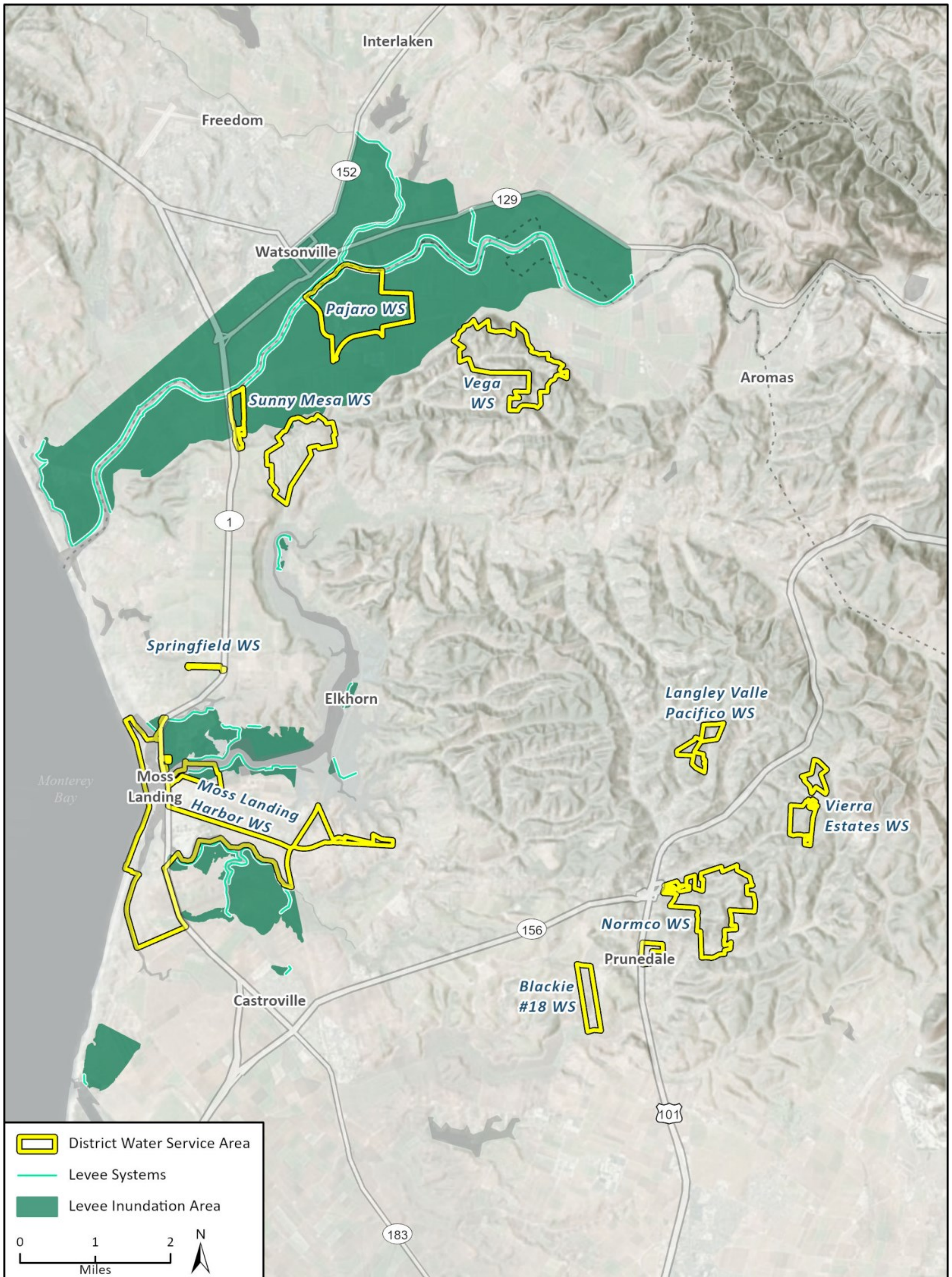
A levee system on the Pajaro River was constructed in 1949 to lessen the impact of major flooding events. If it fails, the Pajaro levee could pose a significant risk to the District's assets, customers, and employees. As seen in Figure 8, the failure of the Pajaro levee would inundate the entire Pajaro service area and part of the Sunny Mesa service area. Inundation may also contaminate the District's water supplies.

In March 1995, a strong storm event caused a breach in the Pajaro levee about 3 miles upstream of the Town of Pajaro, causing flooding that impacted nearly all structures, businesses, and residents in the Pajaro. The Town's drainage system did not have the capacity to drain incoming stormwater. A mass evacuation was executed and 2500 people were evacuated from the Pajaro area.

### *Probability of Future Occurrence*

Levee failure is more common than dam failure because levees usually have higher exposer to conditions and hazards such as strong flood flows and erosion which may cause overtopping or deterioration. Levee may experience increased probabilities of failure in the future as climate change increases the likelihood of heavy precipitation events.

**Figure 8 Levee Failure Inundation Area**




*Imagery provided by Esri and its licensors © 2022.*
*Additional data provided by National Levee Database, 2022.*

## Wildfire

### *Hazard Description*

A wildfire is an uncontrolled fire occurring on undeveloped land that requires fire suppression. Wildfires are often ignited by lighting or human activity such as campfires, arson, smoking, and equipment use. Wildfire behavior is dependent on fuel type (i.e., brush, grass, trees), topography (i.e., slope) and weather (i.e., wind, humidity, temperature). Wildfires is often elevated when conditions include low humidity, high temperature, and/or strong winds.

Wildfires cause destruction to natural and human built systems. Short-term, wildfire hazards present negative impacts to habitats, timber, scenic vistas, and watersheds. Long-term, wildfires impact access to recreational areas, timber harvests, economic and cultural resource, and community infrastructure. Damage to human built systems increases in areas where development is adjacent to vegetation and mostly undeveloped land, known as the wildland urban interface (WUI) areas. WUI's are zones of transition between open space and residential or commercial development. WUI's are extremely at risk to wildfire because they often have significant quantities of vegetative fuels for fire in close proximity to assets and facilities that are vulnerable to fire damage.

### *Location and Extent*

A significant portion of the District's service area is designated by CAL FIRE as moderate and high fire hazard severity zones (FHSZ). Specifically, the Vega Water System, Langley Valle Pacifico Water System, Vierra Estates Water System, and Normco Water System each are located in moderate and high fire hazard severity zones as seen in Figure 9. These are areas where wildfire hazards could be more probable and severe based on factors such as slope, fuel, and fire weather. WUI areas account for a significant area in the District's service area. Properties, structures, and developments in these areas are particularly of concern for future fires which could cause severe damage. In developed areas, the effectiveness of fire protection strategies is determined by factors including response times, availability of water resources, and age and condition of structures. North County Fire Protection District of Monterey County is responsible for managing fire risk in the unincorporated areas of the county, including the District's service areas. The extent of a wildfire is measured in acreage burned as well as number of losses associated with damaged assets and injures/loss of life.

### *Previous Occurrences*

The District has been threatened by wildfires originating in Monterey County and Santa Cruz County. In 1984, the Rocha VMP Escape #2 Fire, which burned 1,240 acres, came within less than 15 miles of the Districts service area boundary. In 2008, the Trabing Fire came less than 10 miles to the northern service areas of the District, destroying 75 structures. During the 2020 fire season, over 179,000 acres were burned in three major fires in Monterey County. Historic wildfires in the District are shown in Figure 10.

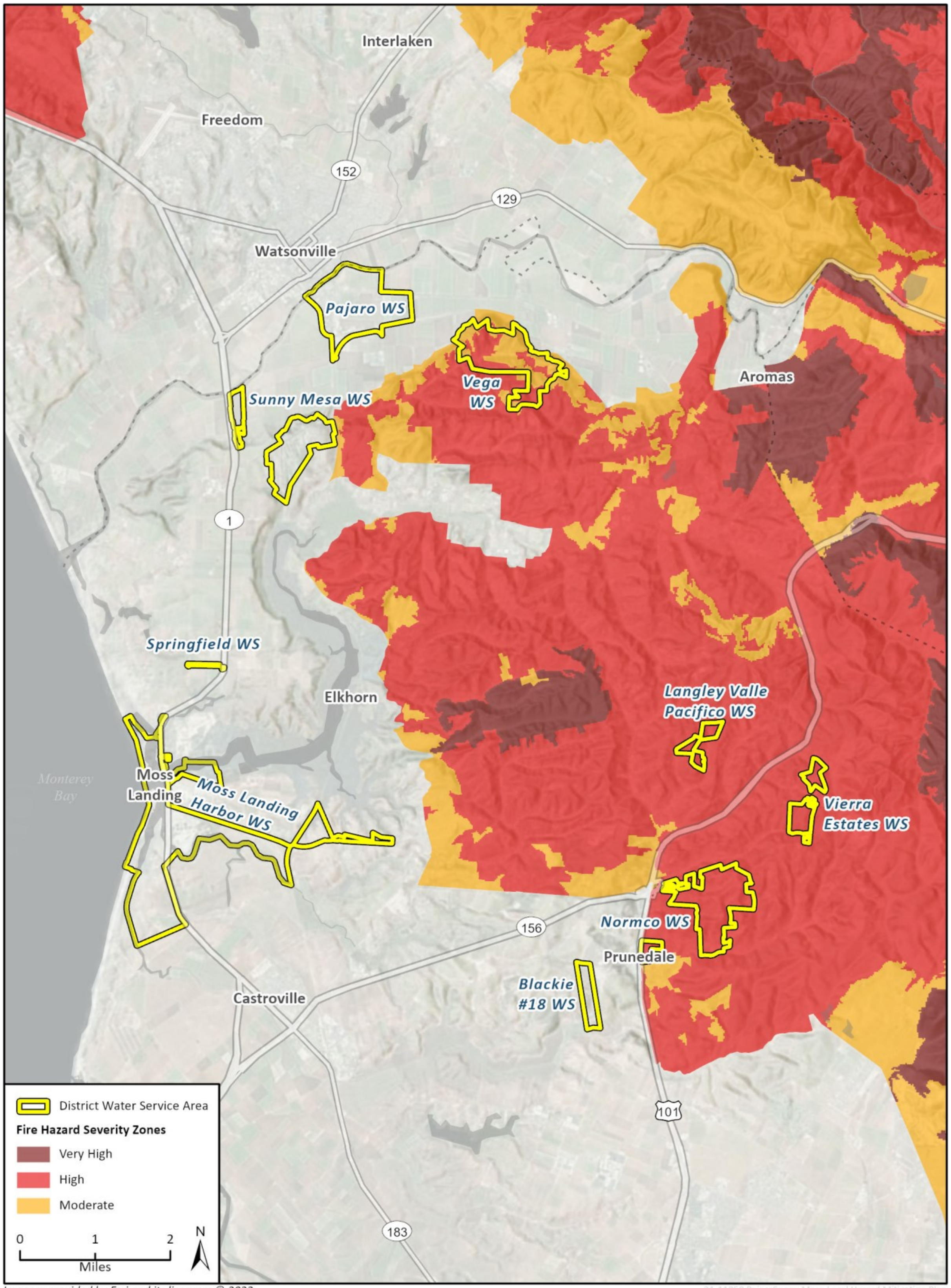
Recent or significant wildfires in Monterey County are listed in Table 21.

**Table 21 Historic Wildfires in Monterey County**

| Year | First Name | Acres Burned | Cause |
|---|---|---|---|
| 2020 | Carmel | 6,905 | Lightning |
| 2020 | River | 48,088 | Vehicle |
| 2020 | Dolan | 124,924 | Arson |
| 2019 | Lonoak | 2,546 | Powerline |
| 2018 | Turkey | 2,225 | Miscellaneous |
| 2017 | Garza | 48.887 | Vehicle |
| 2017 | Park | 1,649 | Equipment Use |
| 2017 | Parkfield | 1,816 | Powerline |
| 2016 | Chimney | 46,235 | Vehicle |
| 2016 | Metz | 3,876 | Debris |
| 2016 | Soberanes | 132,127 | Campfire |
| 2016 | Coleman | 2,520 | Debris |
| 2015 | Tassajara | 1,100 | Arson |
| 2013 | Pfeiffer | 917 | Powerline |
| 2012 | Turkey | 2,700 | Equipment Use |
| 2009 | Bryson | 2,257 | Structure |
| 2008 | Gloria | 6,436 | Miscellaneous |
| 2008 | Chalk | 11,200 | Miscellaneous |
| 2008 | Indians | 81,378 | Campfire |
| 2007 | Basin Complex | 162,818 | Lightning |
| 2006 | Tar | 5,670 | Unknown |
| 2005 | Rico | 14,507 | Lightning |
| 2000 | Johnson Fire | 1,393 | Equipment Use |
| 2000 | Plaskett 2 | 5,856 | Miscellaneous |
| 2000 | North Fork | 1,732 | Equipment Use |
| 2000 | Unnamed | 2,073 | Non-Firefighter Training |
| 1999 | Kirk | 86,700 | Lightning |
| 1998 | Unnamed | 8,702 | Non-Firefighter Training |
| 1996 | Sur | 4,410 | Miscellaneous |
| 1996 | Wild | 25,620 | Arson |
| 1994 | Pinnacles | 939 | Unknown |
| 1994 | Basham | 1,098 | Unknown |
| 1993 | Metz | 1,359 | Unknown |
| 1993 | Rancho | 5,415 | Unknown |
| 1992 | Unnamed | 3,738 | Miscellaneous |
| 1992 | Seco | 2,559 | Miscellaneous |
| 1992 | Jolon | 1,625 | Arson |

Source: Monterey Multi-Jurisdictional Hazard Mitigation Plan 2021

**Figure 9 Fire Hazard Severity Zones**

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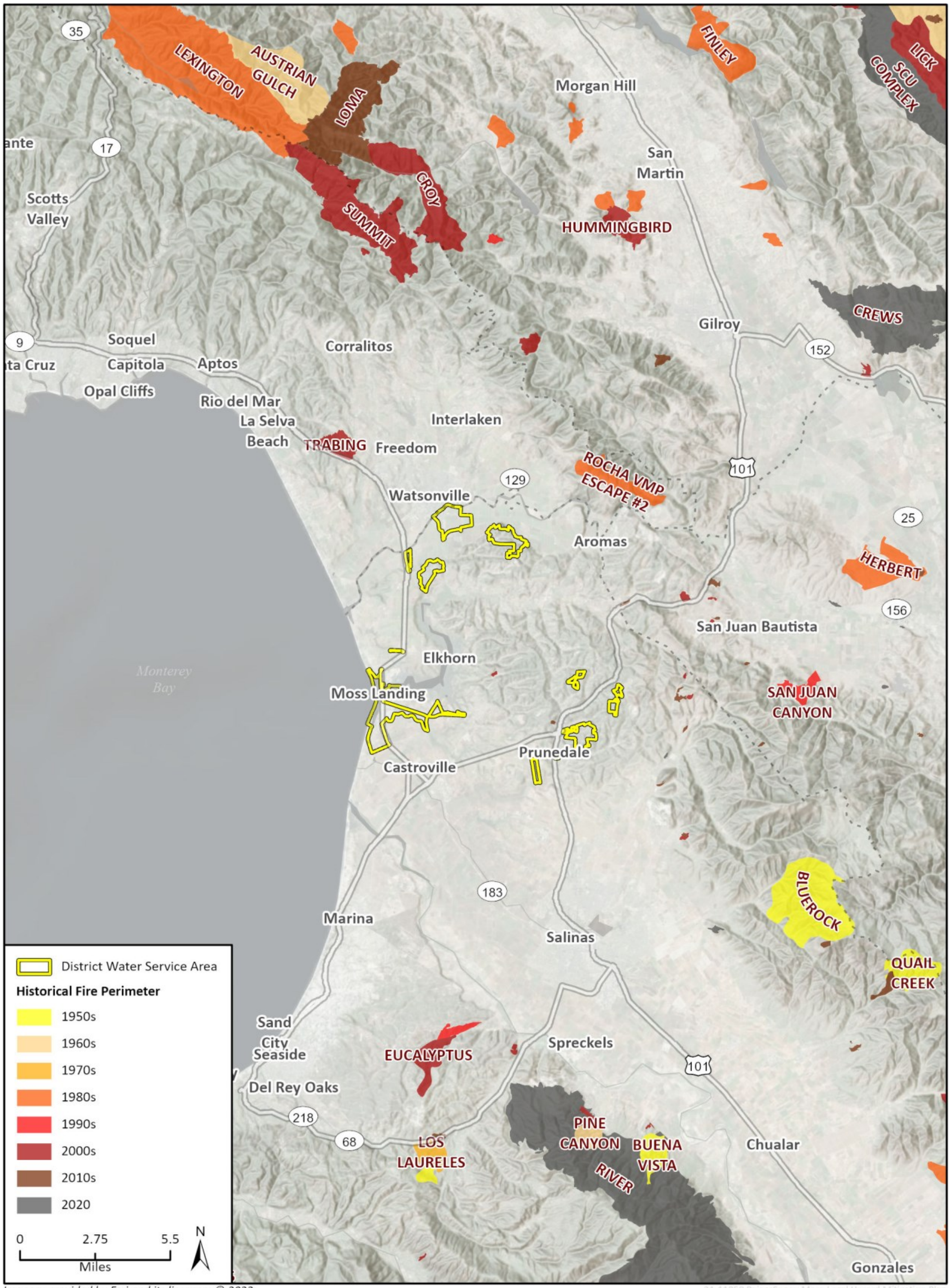
*Additional data provided by CAL FIRE, 2022.*

**Figure 10 Historic Fires**

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*Additional data provided by CAL FIRE, FRAP 2021.*

### *Probability of Future Occurrence*

Climate change is projected to exacerbate wildfire risk by creating hotter and dryer landscapes with increased variability in precipitation. In the District, future wildfire risk will be influenced by compounding factors including expansion of the wildland urban interface, drought events, periodic episodes of strong winds, fire suppression, human activities, and type and spatial distribution of vegetation. Wildfires may increase in severity and frequency in and near the Districts service areas as average temperatures increase and periods with little to no precipitation increase The probability and severity of wildfires are generally expected to increase in the area of the District through the end of the century, as seen in Table 22. Over recent history, there is an average of 66.1 acres burned annually in the area. The average annual acres burned is projected to increase by up to 15 acres per year by mid-century under RCP 4.5.

**Table 22 Historical and Projected Annual Average Area Burned in the PSMCSD**

| | Change from Baseline (acres) | 30yr Average (acres) |
|---|---|---|
| Baseline (1961-1990) | NA | 66.1 |
| 2035-2064 (RCP 4.5) | +15.4 | 81.0 |
| 2035-2064 (RCP 8.5) | +13.3 | 79.9 |
| 2070-2099 (RCP 4.5) | +14.9 | 80.5 |
| 2070-2099 (RCP 8.5) | +11.9 | 78.5 |

Source: CEC 2020

## Landslide

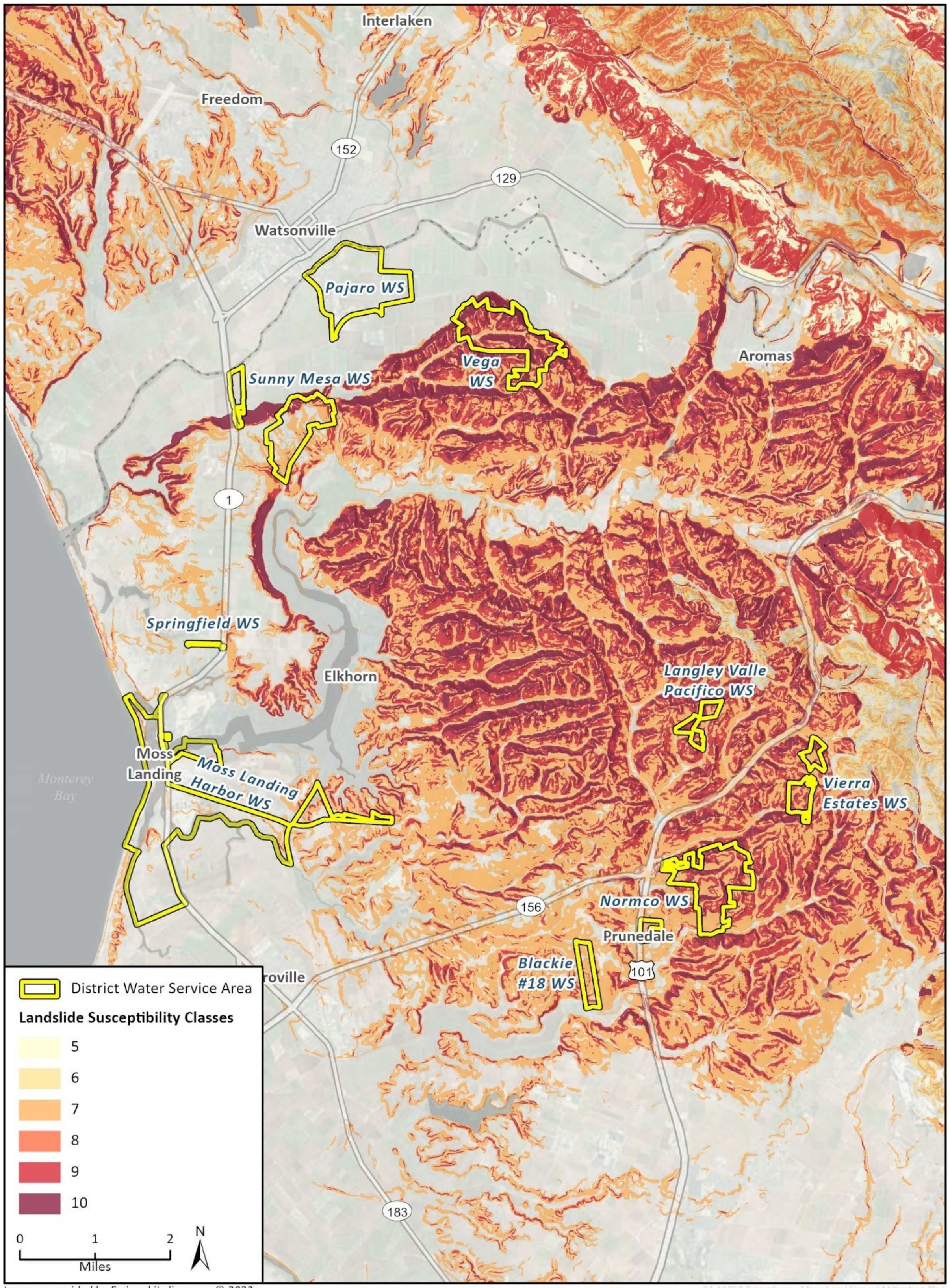
### *Hazard Description*

A landslide is the movement of a mass of debris, rock or earth down a slope. Five variations of slope movement are considered landslides: falls, flows, slides, topples, and spreads. The type of landslide is further characteristic by the type of geologic material moving (i.e., bedrock, debris, or earth). Landslides are more likely to occur in areas where they have already previously occurred or where the locations topographic, geological, geotechnical, and subsurface water condition create an environment susceptible to ground movement. Landslides are initiated by a variation or combination of movement from precipitation, snowmelt, stream erosion, changes in water level, changes in ground water, volcanic activity, earthquakes, and human disturbances. In California, landslides are often triggered by flooding, earthquakes, and wildfires (post-wildfire debris flow). Deep seated landslides are typically those greater than 10-15 feet in depth. These landslides are often initiated by heavy and prolonged rainfall which can occur during El Nino years.

### *Location and Extent*

Landslides are most probable in areas with unstable soils and sediment, weak rocks and steep slopes. Such conditions exist in and near the Vega Water System, Langley Valle Pacifico Water System, Vierra Estates Water System, Normco Water System, and Blackie No. 18 Water System Service areas. Figure 11 shows likelihood of deep-seated landslides based on regional estimates of rock strength. Landslide susceptibility areas (classified 0-10, low to high) in the District's service areas are classified using detailed information on location of past landslides, the location and relative strength of rock units, and steepness of slope.

**Figure 11 Landslide Susceptibility Areas**




*Imagery provided by Esri and its licensors © 2022.*
*Additional data provided by CGS, Map Sheet 58, 2015.*

### *Previous Occurrences*

Previous landslides in the District's service areas have been minor. Within Monterey County, most landslides have historically been initiated from strong storm systems that saturate steep and instable soils.

### *Probability of Future Occurrences*

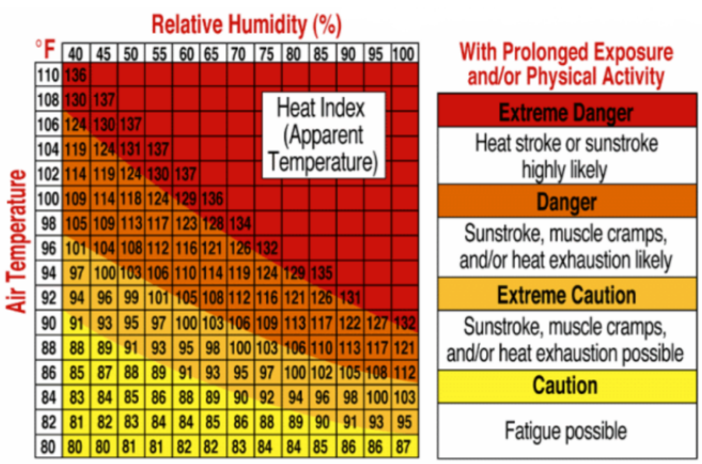
The FEMA National Risk Index estimates that the annualized frequency of landslide events in Monterey County is 0.43 distinct events per year. The District can expect so landslide events to occur in association with other natural hazard occurrence, including earthquakes, large atmospheric rivers, or strong El Nino years. In areas recently burned during a wildfire, landslides have an increased probability of occurring especially during rain events. Climate change is projected to increase wildfire risks and increase heavy precipitation events, therefore creating conditions associated with landslide hazard risk.

## Extreme Heat

### *Hazard Description*

Extreme heat can be defined by average, minimum, and maximum daily temperatures. There is no standard method for defining an extreme heat event. Rather than providing an absolute temperature threshold, extreme heat days can be defined by reference to local average temperatures. The severity of an extreme heat event is typically measured by how temperature and humidity combine to impact human health, as shown in the heat index chart developed by the National Weather Service (Figure 12). An extreme heat day is defined in this report by temperatures exceeding the 98th percentile of maximum temperatures based on daily temperature maximum data between 1961 and 1990.

**Figure 12 NOAA National Weater Service Heath Index**



Relative Humidity (%) / Air Temperature — Heat Index (Apparent Temperature)

| °F | 40 | 45 | 50 | 55 | 60 | 65 | 70 | 75 | 80 | 85 | 90 | 95 | 100 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 110 | 136 | | | | | | | | | | | | |
| 108 | 130 | 137 | | | | | | | | | | | |
| 106 | 124 | 130 | 137 | | | | | | | | | | |
| 104 | 119 | 124 | 131 | 137 | | | | | | | | | |
| 102 | 114 | 119 | 124 | 130 | 137 | | | | | | | | |
| 100 | 109 | 114 | 118 | 124 | 129 | 136 | | | | | | | |
| 98 | 105 | 109 | 113 | 117 | 123 | 128 | 134 | | | | | | |
| 96 | 101 | 104 | 108 | 112 | 116 | 121 | 126 | 132 | | | | | |
| 94 | 97 | 100 | 103 | 106 | 110 | 114 | 119 | 124 | 129 | 135 | | | |
| 92 | 94 | 96 | 99 | 101 | 105 | 108 | 112 | 116 | 121 | 126 | 131 | | |
| 90 | 91 | 93 | 95 | 97 | 100 | 103 | 106 | 109 | 113 | 117 | 122 | 127 | 132 |
| 88 | 88 | 89 | 91 | 93 | 95 | 98 | 100 | 103 | 106 | 110 | 113 | 117 | 121 |
| 86 | 85 | 87 | 88 | 89 | 91 | 93 | 95 | 97 | 100 | 102 | 105 | 108 | 112 |
| 84 | 83 | 84 | 85 | 86 | 88 | 89 | 90 | 92 | 94 | 96 | 98 | 100 | 103 |
| 82 | 81 | 82 | 83 | 84 | 84 | 85 | 86 | 88 | 89 | 90 | 91 | 93 | 95 |
| 80 | 80 | 80 | 81 | 81 | 82 | 82 | 83 | 84 | 84 | 85 | 86 | 86 | 87 |

| With Prolonged Exposure and/or Physical Activity |
|---|
| **Extreme Danger** |
| Heat stroke or sunstroke highly likely |
| **Danger** |
| Sunstroke, muscle cramps, and/or heat exhaustion likely |
| **Extreme Caution** |
| Sunstroke, muscle cramps, and/or heat exhaustion possible |
| **Caution** |
| Fatigue possible |

### *Location and Extent*

Extreme heat has not previously posed a risk to the District, but climate change is projected to foster climate conditions where extreme heat evets will be more probable and hazardous. The inland service areas of the District (i.e., Vega Water System, Langley Valle Pacifico Water System, Vierra Estates Water System, and Normco Water System) are more prone to extreme heat than areas in closer proximity to the coast, such as Moss Landing, because they have higher land surface temperatures during extreme heat days. Extreme heat days in the District are characterized as the number of days in a year when daily maximum temperature is above a threshold temperature of 90.5°F.

### *Previous Occurrences*

The District has historically experienced 4 extreme heat days per year on average. Extreme heat days to date have had minimal impact on District staff and operations. However, staff and the public who work outdoors may suffer from heat-related illness.

### *Probability of Future Occurrence*

Extreme heat events are likely to become more frequent in the future due to climate change, as seen in Table 23.

**Table 23 Projected Number of Extreme Heat Days by Year in PSMCSD**

| | Change from Baseline (days) | 30yr Average (days) |
|---|---|---|
| Baseline (1961-1990) | NA | 3 |
| 2035-2064 (RCP 4.5) | +3 | 6 |
| 2035-2064 (RCP 8.5) | +4 | 7 |
| 2070-2099 (RCP 4.5) | +5 | 8 |
| 2070-2099 (RCP 8.5) | +11 | 14 |

Source: CEC 2020

## Drought

### *Hazard Description*

Drought is a period of unusually dry weather that can lead to a significant decrease in water supply relative to what is typically available to a given location. Periods of drought are historically a normal phase in the climate cycle of many geographic locations. They can often lead to severe water shortages and crop damage. Droughts can be extremely unpredictable and variable. They can be measures by a lack of precipitation over time, low soil moisture levels, and/or low groundwater levels. Droughts can be worsened by climatic conditions of high temperature, high winds, and low humidity, which can also increase likelihood of wildfires. Droughts can impact water supplies, reduce groundwater recharge, and may exacerbate extreme heat concerns particularly to vulnerable populations such as outdoor workers, the elderly, and those with chronic health conditions.

#### SALTWATER INTRUSION

Saltwater intrusion is the movement of salt water into freshwater aquifers due to density and pressure gradients. Saltwater intrusion can occur naturally from extreme weather events such as hurricanes, storm surges, and sea level rise or because of human activities such as over-pumping of often coastal aquifers. Over pumping of groundwater may lead to saltwater being drawn towards freshwater zones of an aquifer, leading to intrusion of salt water. Drought can initiate or exacerbate saltwater intrusion. Extreme droughts dimmish the natural recharge of groundwater aquifers which leads to increased risk of over-pumping of aquifers and potential saltwater intrusion. Saltwater intrusion can be very problematic ecologically and economically to communities and entities such as the Pajaro Sunny Mesa Community Services District.

### *Location and Extent*

Because droughts are regional in nature, all parts of the District experience the same level of risk of experiencing a drought. There are several ways to measure drought conditions, although the most common is the U.S. Drought Monitor Classification Scheme. This scheme's rating system is a synthesis of multiple different scales into a descriptive index, as seen in Table 24.

In the District and surrounding area, freshwater supplies are scarce during non-drought years. Droughts can lessen the groundwater recharge which the District's water systems rely on. In periods of drought, the over pumping of these groundwater wells can initiative or exacerbate sea water intrusion into freshwater aquifers, increasing water contamination and land subsidence risks.

**Table 24 U.S. Drought Monitor Classification Scheme Rating System**

| Category | Description | Possible Impacts |
|---|---|---|
| D0[1] | Abnormally dry | Slower growth of crops and pastures |
| D1 | Moderate drought | Some damage to crops and pastures. Some water shortages may occur or may be imminent. Voluntary water use restrictions can be requested |
| D2 | Severe drought | Likely crop and pasture losses. Water shortages are common, and water restrictions can be imposed |
| D3 | Extreme drought | Major crop and pasture losses. Widespread water shortages and restrictions. |
| D4 | Exceptional drought | Exceptional and widespread crop and pasture losses. Emergency water shortages develop. |

[1] DO areas are those under "drought" watch but not technically in a drought. They are potentially heading into drought conditions or recovering but not yet back to normal.

Source: NDMC et al. 2019

### *Previous Occurrences*

Hydrologic data shows multi-year droughts from 1912 to 1913, 1918 to 1920, 1922 to 1924, and 1928 to 1934. The region has experienced three drought periods in recent history: from 1987 to 1992, 2007 to 2009, and most recently from 2014 to 2016. The District's Springfield Water System has been experiencing saltwater intrusion for since before the District became responsible for the system in 2006. Saltwater intrusion has been exacerbated in the past decade by drought conditions and seawater encroachment. The Springfield Water System's water supply is currently non-potable and the District has been providing bottled water to customers in the Springfield service area since 2013.

### *Probability of Future Occurrences*

While drought is a natural climatic condition, climate change is expected to increase the risk of drought. Over the past 30 years, there have been 12 drought years. In the near term, this indicates the risk of drought is approximately 40%. Climate research suggests that with increased variability in the timing and intensity of precipitation, the District will most likely experience more severe and or extended periods of drought. It is also likely that future sea level rise will increase the threat of saltwater intrusion in groundwater supplies, leading to more severe impacts from droughts.

## Windstorms

### *Hazard Description*

Severe windstorms can pose significant risk to infrastructure, property, assets, and human lives. Windstorms usually are short-duration events with gusts or straight-line winds over 50 mph. Severity of wind damage is dependent on the structural condition of buildings, tree limbs, roofs, and other infrastructure. Windstorms often have the strength to take down power lines and trees, cause damage to building and critical facilities, and leave debris in their wake.

Wind is air that is in motion relative to Earth. The Beaufort scale is used to measure the effect that varying wind speeds can have on sea swells and structures, as seen in Table 25.

**Table 25 Beaufort Wind Scale**

| Scale | Speed (mph) | Description |
|---|---|---|
| 0 | 0-1 | Calm: Smoke rises vertically, and the sea is flat |
| 1 | 1-3 | Light air: The direction of wind is shown by smoke drift but not wind vanes |
| 2 | 4-7 | Light breeze: Wind is felt on the face, leaves rustle, and wind vanes are moved. Small wavelets appear on the ocean but do not break |
| 3 | 8-12 | Gentle breeze: Leaves and small twigs are in motion, and light flags are extended. Large wavelets appear on the ocean, and crests begin to break |
| 4 | 13-18 | Moderate breeze: Dust and loose paper become airborne, and small branches are moved. Small waves appear on the ocean. |
| 5 | 19-24 | Fresh breeze: Small trees begin to sway, and moderate waves form |
| 6 | 25-31 | Strong breeze: Large branches are in motion, and using an umbrella becomes difficult. Large waves begin to form |
| 7 | 32-38 | Near gale: Whole trees are in motion and walking against the wind can be difficult. Foam from breaking waves is blown ins streaks. |
| 8 | 39-46 | Gale: Walking is difficult, and twigs break off trees |
| 9 | 47-54 | Severe gale: Slight structural damage. Crests of waves begin to topple. |
| 10 | 55-63 | Storm: Trees are uprooted and considerable damage to structures occurs. Very high waves form in long, overhanging crests. |
| 11 | 64-72 | Violent storm: Widespread damage occurs. Exceptionally high waves form, and the ocean is completely covered in foam |
| 12 | 73+ | Hurricane: Devastating damage occurs. On the ocean, the air is filled with foam and spray |

mph = miles per hour

Source: NOAA and NWS 2020

### *Location and Extent*

Windstorms most often move through the District in the winter months, from November to February. The District is subject to strong southeasterly winds associated with powerful cold fronts. Sea breeze winds move through the District with average wind speeds of 10-15 mph from March through October.

### *Previous Occurrences*

Strong windstorms have a history of causing damage to the District. In February 2017, a windstorm with 60-mile per hour winds and heavy rain damaged one of the District's water tanks in the Blackie No. 18 Water System. The windstorm toppled over hundreds of trees in north Monterey County and caused some damage to residential and commercial buildings in the area.

### *Probability of Future Occurrence*

Along the coastal areas of the Monterey Bay, University of California Santa Cruz researchers are projecting that wind speeds are likely to increase along the cost due to regional climate changes. Specifically, the difference in rates of increasing land temperatures versus ocean temperatures is projected to increase wind speeds.

## Sea Level Rise

### *Hazard Description*

Global sea levels have been rising over the last century are projected to continue rising through the 21st century. Sea level rise is primarily driven by thermal expansion caused by the warming of oceans and the addition of freshwater from the melting of land-based ice such as glaciers and polar ice caps. Sea level rise contributes to increased coastal flooding, more severe and frequent tidal inundation, storm surge inundation, wetland loss, coastal erosion, and shoreline retreat.

- **Tidal Inundation.** Sea level rise is the increase in height of the ocean surface. As sea levels rise due to climate change, daily tides along coastlines heighten and threaten ecosystems, assets, structures, and communities. Daily tidal inundation is the average daily highest tide over normally dry ground.
- **Coastal Storm.** Coastal storms can cause strong winds, coastal erosion, debris flow, tidal elevations (i.e., storm surge), and severe flooding. Coastal storms can cause significant damage to urban developments, agricultural areas, and infrastructure along coastlines.

### *Location and Extent*

The Moss Landing service area is proximal to the Pacific Ocean and some of its services areas are near to the Elkhorn Slough, Moro Cojo Slough, and the Salinas River. The District's facilities and two pipe crossings in the Moss Landing service area are vulnerable to damage from rising tides, saltwater intrusion, coastal storm flooding and waves impacts, and coastal dune erosion, which due to climate change, will most likely increase in frequency and severity in the future. Coastal storms most likely will impact the District's service areas in and adjacent to Moss Landing during the winter months.

As seen in Figure 13, rising sea levels pose risk to the District's service areas adjacent to the Monterey Bay. As seen in Figure 14, Sea-level rise in conjunction with a 1-percent coastal storm will pose even greater risks to the District's coastal service areas and Moss Landing Harbor Water System.

### *Previous Occurrences*

Historically, rising sea levels have not posed significant risk to the District's service areas.

### *Probability of Future Occurrences*

#### TIDAL INUNDATION

Rising sea levels pose significant risk along the Moss Landing coastline and the District's Moss Land service area. This report relies on the California Coastal Commission's 2018 Sea Level Rise Policy Guidance to assess sea level rise risks to the District's service areas. As recommended by the California Coastal Commission, the District utilized the medium-high risk aversion scenario to evaluate the impacts of sea level rise. The District also considered the extreme risk aversion scenario to assess the vulnerability of assets "with little to no adaptive capacity that would be irreversibly destroyed or significantly costly to repair, and/or would have considerable public health, public safety, or environmental impacts should that level of sea rise occur."

Table 26 shows the sea level rise projections for the Monterey Tide Gauge, which is located approximately 20 miles south of the District's service areas in Moss Landing.

**Figure 13 Sea Level Rise with Daily Tidal Inundation**

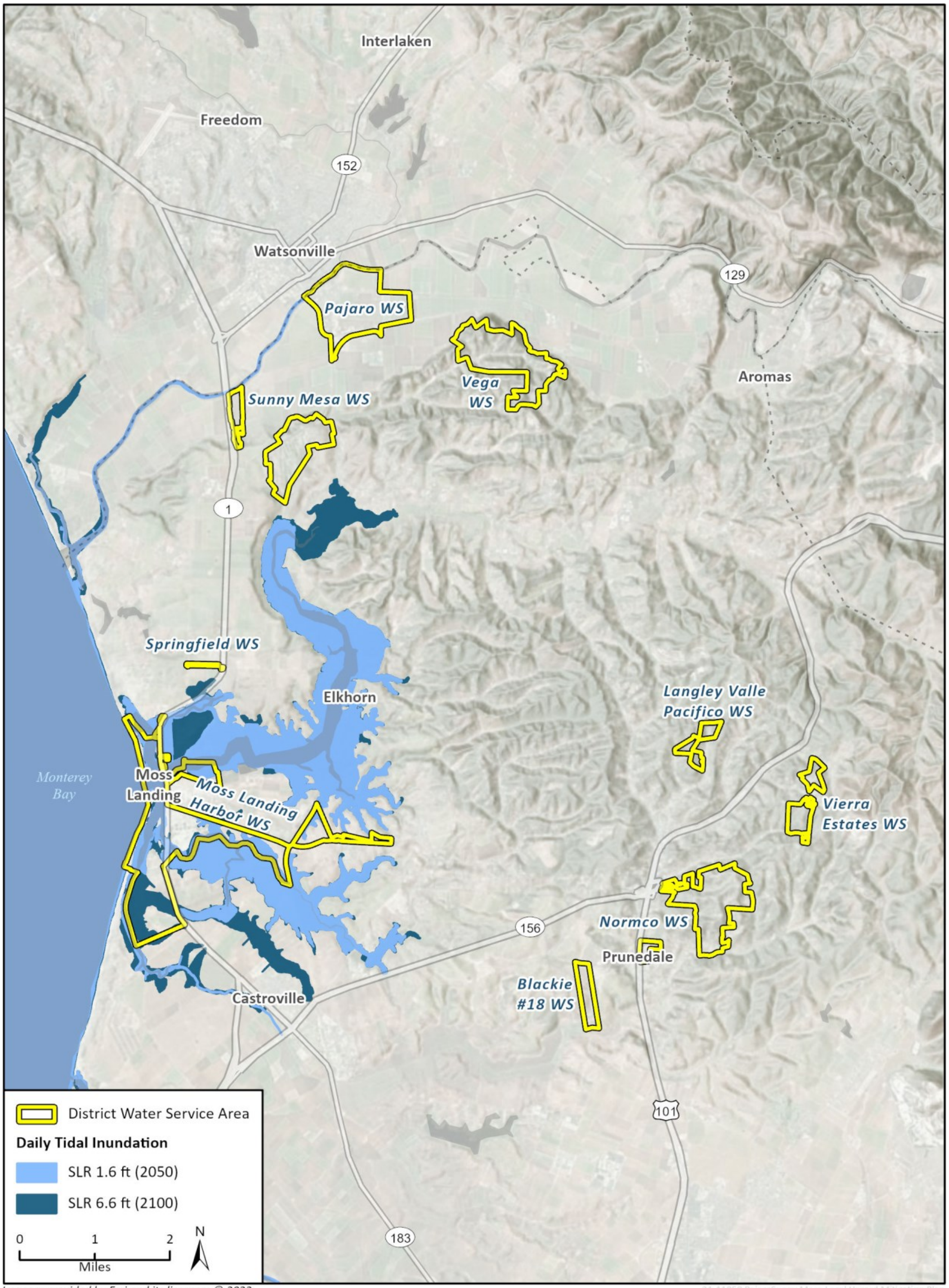



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**Figure 14 Sea Level Rise with a 1% Storm Event**

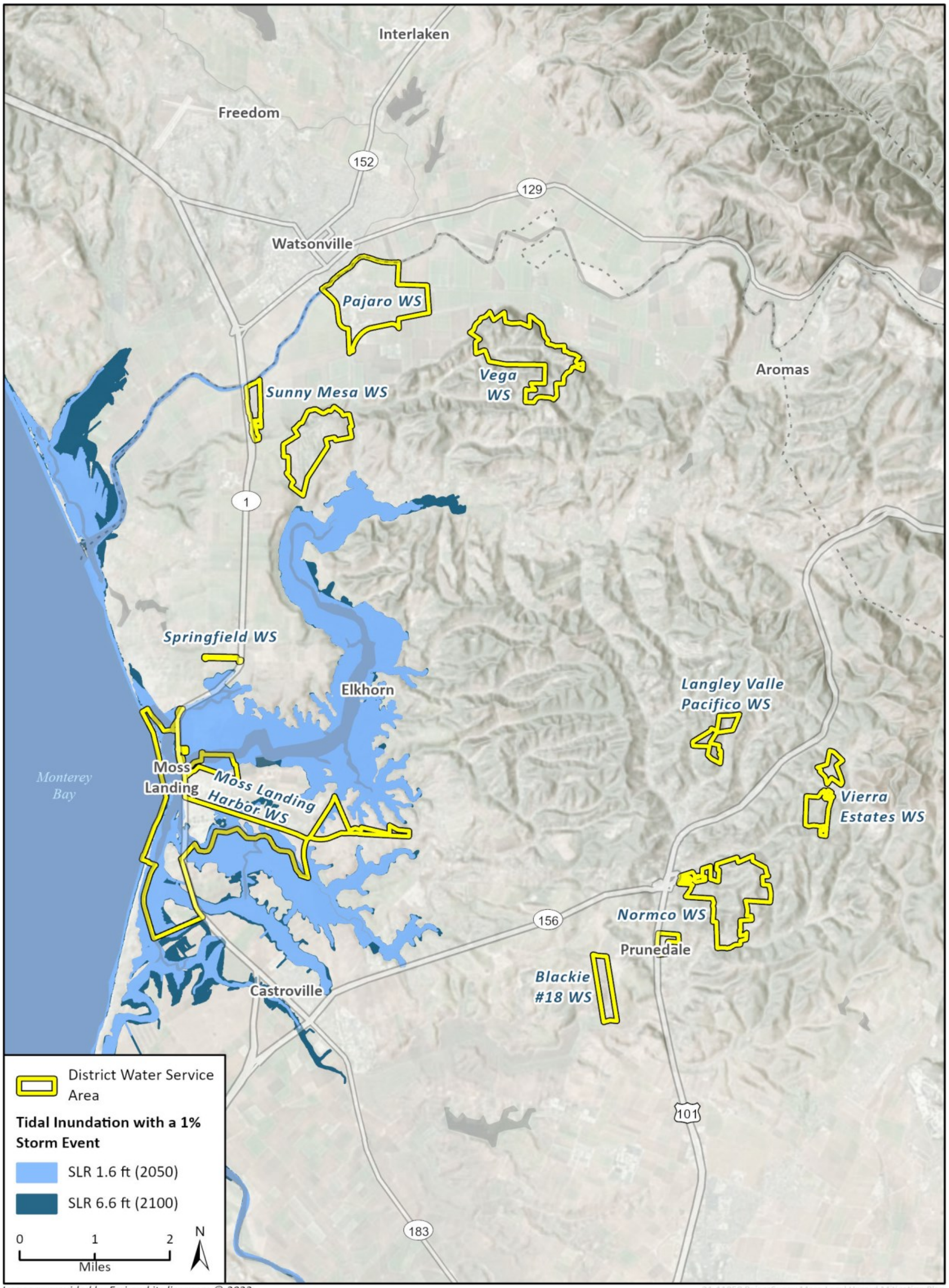


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**Table 26 Sea-Level Rise Projections for the Monterey Tide Gauge**

| | Probabilistic Projections (in feet) (based on Kopp et al. 2014) | H++ Scenario (Sweet et a. 2017) |
|---|---|---|
| | Medium-High Risk Aversion 1-200 Chance (0.5% Probability SLR exceeds…) | Extreme Risk Aversion Single Scenario (No Associated Probability) |
| 2030 | 0.8 | 1.0 |
| 2040 | 1.2 | 1.7 |
| 2050 | 1.9 | 2.7 |
| 2060 | 2.6 | 3.8 |
| 2070 | 3.4 | 5.1 |
| 2080 | 4.4 | 6.6 |
| 2090 | 5.5 | 8.2 |
| 2100 | 6.9 | 10.1 |
| 2110 | 7.2 | 11.8 |
| 2120 | 8.5 | 14.0 |
| 2130 | 9.9 | 16.4 |
| 2140 | 11.3 | 18.9 |
| 2150 | 12.9 | 21.8 |

Source: California Coastal Commission 2018

Sea level rise will increase the likelihood and extremity of coastal erosion, fluvial flooding, tidal inundation, coastal inundation, tsunami inundation, and storm surges. Sea level rise, in combination with over-pumping of groundwater, can increase saltwater intrusion in coastal aquifers. The encroachment of sea water can be exacerpated by drought, which is expected to increase in severity, length, and frequency in the future due to climate change.

#### COASTAL STORM FLOODING AND WAVE IMPACTS

Due to climate change, coastal storms will post increasing risks to the dunes, infrastructure, and developments near Moss Landing Harbor. Specifically, by 2030, Moss Landing Island will see more frequent and severe damage from storm surges and coastal flooding. By 2060, coastal flooding is projected to cause damage to the Moro Cojo tidal structure leading to risk of salt intrusion, impacts on water quality, and damage to developments.

## Hazardous Materials

### *Hazard Description*

Hazardous materials include substances that are poisonous, corrosive, radioactive, flammable or explosive. These substances pose potential harm to humans, animals, or the environment either by themselves or through interaction with other factors. Hazardous materials can pose greater danger if exposed to certain environmental and atmospheric conditions. If spilled or released, hazardous materials may cause an explosion, toxic cloud, fire, or contamination of people, property, or water. Natural hazard events such as earthquakes may result in the spill or release of hazardous materials. Hazardous materials may be released during a transportation accident. Business and industrial facilities, agricultural areas, harbors, illegal drug operations, illegal dumping sites, transportation routes, pipelines, and oil fields are locations where the potential of hazardous materials release is high. The impact of a hazardous material disaster may lead to the evacuation of facilities or neighborhoods. Often time, the release of hazardous materials requires immediate response to mitigate long-term public health and environmental impacts.

### *Location and Extent*

There are several locations in and adjacent to the District's boundaries that have the potential of hazardous materials release incidents, as seen in Figure 15 . Trucks and trains that use major transportation routes such as the Highway 1, Highway 101, and the Pajaro/Watsonville Junction, which run through the District's service areas, often carry hazardous substances such as gasoline, crude oil, and other chemicals that, if spilled, pose significant risk to public health and the environment. The Pajaro Valley has a robust agricultural industry. Much of these agricultural operations utilize pesticide, fertilizers, and other agricultural chemicals. If a spill incident were to occur, these substances may contaminate the District's soil, air, and water resources or result in a fire or explosion. Moss Landing Harbor is a possible location for hazardous material accidents because marine tank vessels and refined petroleum products such as gasoline and bunker fuel may be sources of spills. The Moss Landing Power Plant, which used to generate electricity using natural gas, was recently converted into the world's biggest energy storage facility.

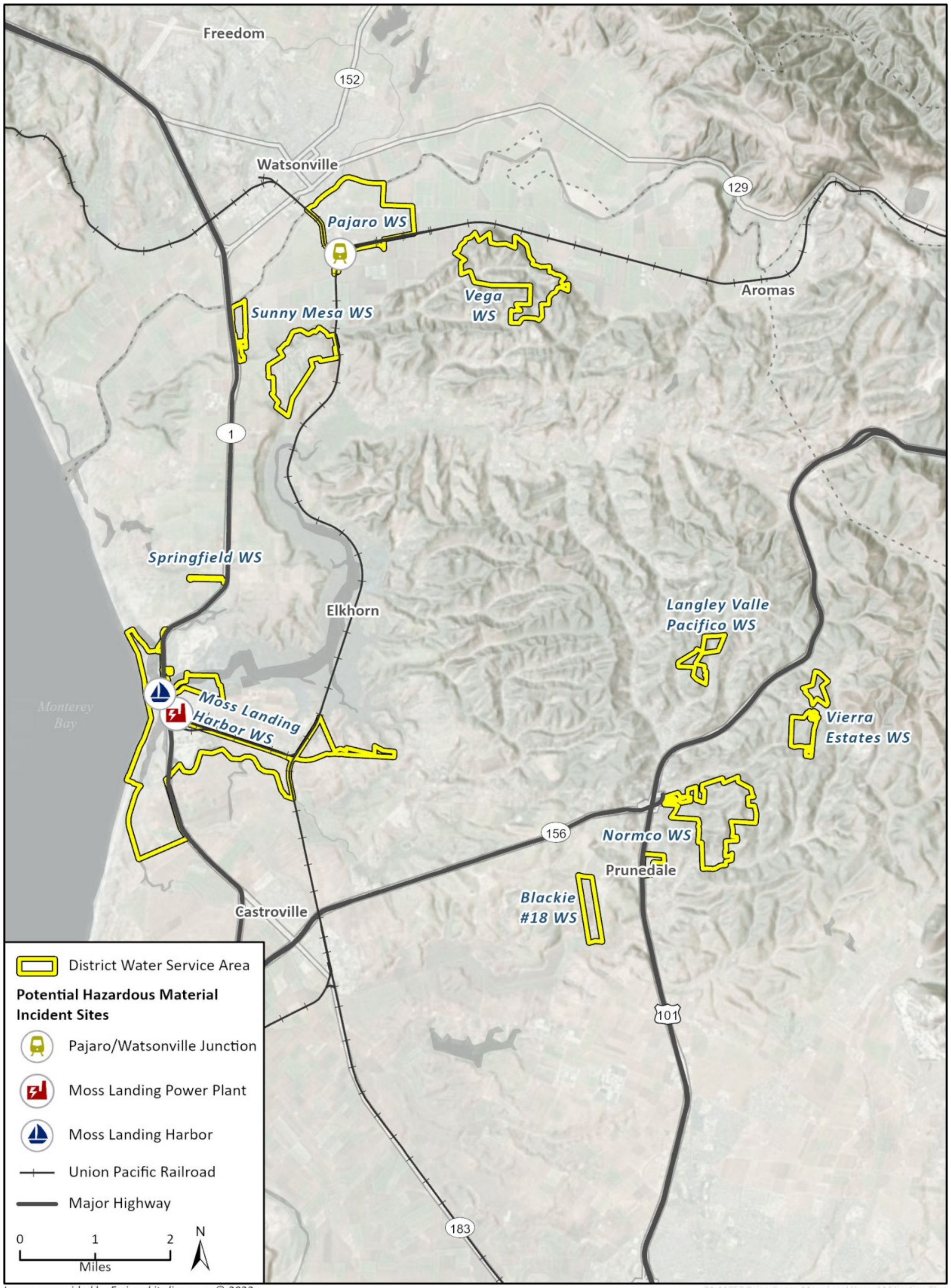
### *Previous Occurrences*

No previous occurrences of hazardous material incident have occurred in the District.

### *Probability of Future Occurrences*

Given the presence of transportation routes and facilities that use hazardous materials, a hazardous material incident may occur in the future within or adjacent to the District's service areas. The probability of a significant hazardous material incident occurring in or next to the District is difficult to predict.

**Figure 15 Hazardous Materials Sites**

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*Additional data provided by Monterey County, 2022, and Homeland Infrastructure Foundation-Level Data (HIFLD), 2021.*

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# 4 Risk Assessment

## 4.1 What is a Risk Assessment?

Conducting a risk assessment can provide information regarding the location of hazards, the value of existing land and property in hazard locations, and an analysis of risk to life, property, and the environment that may result from natural hazard events. Specifically, the three components of a risk assessment are as follows:

### Inventory of Existing Assets

Assets that provide critical and essential services following a major emergency are of particular concern because these locations house staff and equipment necessary to provide important public safety, emergency response, and/or disaster recovery functions. The District inventoried critical assets to consider in the Risk Assessment.

### Vulnerability Assessment

The Vulnerability Assessment provide an evaluation of the potential impacts of identified hazards of concern on District assets, its ability to provide services, and the land uses (populations, structures, etc.) across its service area. This step provides a general description of District assets in relation to the identified hazards so that mitigation strategies can be considered in land use planning and future land use decisions. Vulnerability assessments are subject to the availability of hazard-specific data. Each hazard specific section of this Plan includes a section on hazard identification using data and information from District, County, state, or federal sources.

Regardless of the data available for hazard assessments, there are numerous strategies the District can take to reduce risk. These strategies are described in the action items detailed in the Mitigation Strategy section. Mitigation actions can reduce disruption to critical services, human life, and personal and public property and infrastructure.

### Impact Analysis

The impact analysis involves assessing the damage, injuries, and economic losses likely to be sustained in a geographic area over a given period of time. This level of analysis involves using mathematical models that consider the magnitude or severity of a given hazard. Describing impact in terms of dollar losses provides the community and the state with a common framework in which to measure the effects of hazards on assets. For each hazard where data was available, quantitative estimates for potential losses have been included in the impact analysis. In addition to estimating losses, the impact analysis includes a brief discussion of secondary hazards. Secondary hazards are significant hazards that may occur because of a primary hazard. For each hazard considered in this LHMP, the Impact Analysis summarizes losses and secondary hazards. FEMA's HAZUS, a nationally standardized risk modeling methodology, is employed for the earthquake and flood impact analyses. HAZUS identifies areas with high hazard risk and estimates physical, economic, and social impacts. The HAZUS Program, managed by FEMA's Natural Hazards Risk Assessment Program, partners with other federal agencies, research institutions, and regional planning authorities to ensure HAZUS resources incorporate the latest scientific and technological approaches and meet the needs of the emergency management community.

## 4.2 Inventory of Existing PSMCSD Assets

For this LHMP, the Vulnerability Assessment for each hazard solely considers risks to assets owned and operated by the District. The estimates used in this section to demonstrate the total value at-risk to each hazard are based on depreciated asset values prepared in 2019. These values represent the most recent information but do not represent the future replacement cost, which would be inclusive of additional depreciation, inflation, the cost of construction, and other factors. The key assets that constitute the District's water system are summarized below.

### Water Storage Facilities (Tanks)

The District has a total of 16 water storage facilities and 32 tanks. The District's tanks are made of a variety of materials including steel, polyethylene (plastic), and concrete. Approximately half of the District's tanks are anchored, and the other half are unanchored. The tanks range in size from 150 gallons to 600,000 gallons.

### Pumping Stations

The District has two pumping stations in the Blackie No.18 Water System, three pumping stations in the Moss Landing Water System, two pumping stations in the Pajaro Water System, three pumping stations in the Sunny Mesa Water System, five pumping stations in the Vega Water System, and two pumping stations in the Vierra Estates Water System.

### Treatment Facilities

The District operates one water treatment facility in the Langley Valle Pacifico Water System and one water treatment facility in the Vierra Estates Water System. Water is disinfected and treated to remove arsenic, iron, and manganese. Other assets in the 'Facility' category represent structures used to store materials and support operations.

### Transmission Pipelines

The District's distribution systems consist of a variety of pipe sizes and materials. The District's pipes are made of a variety of materials including Polyvinyl Chloride (PVC), asbestos-cement (AC) and steel. Total feet of pipeline in each water system are summarized in Table 27.

**Table 27 PSMCSD Transmission Pipelines**

| Water System | Total Feet of Pipeline |
|---|---|
| Blackie No. 18 | 3,480 |
| Langley Valle Pacifico | 5,935 |
| Moss Landing | 27,790 |
| Springfield | 1,500 |
| Normco | 46,430 |
| Vierra Estates | 12,905 |
| Pajaro | 30,470 |
| Sunny Mesa | 27,810 |
| Vega | 29,100 |

## Wells

The District has one well site for the Langley Valle Pacifico Water System, one well site for the Blackie No.18 System, two well sites for the Moss Landing Water System, one well site for the Springfield Water System, two well sites for the Normco Water System, two well sites for the Pajaro Water System, two well sites for the Sunny Mesa Water System, two well site for the Vega Water System, and two well sites for the Vierra Estates Water System. The District relies on 100% local groundwater sources that draw from the Salinas Valley Basin and Pajaro Valley Basin.

## Other District Facilities

District facilities include the buildings that are integral to the day-to-day operations of PSMCSD, including the District Office Headquarters and storage facilities located throughout the District's service areas.

## Emergency Generators

The District relies on emergency generators for back-up power during hazard events. The District has one emergency generator at the Moss Landing System, two emergency generators at the Pajaro Water System, six emergency generators at the Vega Water System, and one emergency generator at the Vierra Estates Water System. All of the District's generations are stationary. The District is currently planning on procuring additional emergency generators to have back-up power for each water system.

**Q&A | ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B3a**

**Q:** Is there a description of each hazard's **impacts** on each jurisdiction (what happens to structures, infrastructure, people, environment, etc.)? (Requirement §201.6(c)(2)(ii))

**A:** See **Impacts** below for each hazard

**Q&A | ELEMENT B: HAZARD IDENTIFICATION AND RISK ASSESSMENT | B3b**

**Q:** Is there a description of each identified hazard's overall **vulnerability** (structures, systems, populations, or other community assets defined by the community that are identified as being susceptible to damage and loss from hazard events) for each jurisdiction? (Requirement §201.6(c)(2)(ii))

**A:** See **Vulnerability** below for each hazard

# 4.3 Seismic Hazards

## Vulnerability Assessment

### *Ground Shaking*

Earthquakes can cause widespread damage to structures, infrastructure, and assets throughout the District. All District critical assets are at risk to damage from ground shaking during an earthquake. However, the risk associated with ground shaking is variable and depends on the magnitude and location of the fault line at which the earthquake originates from.

### *Liquefaction*

Earthquakes often trigger liquefaction events, where soils act fluidlike and lose their strength. Liquefaction can damage structures that rely on soil for support. As seen in Table 28, there are 17 critical assets in high liquefaction risk areas. Table 29 summarizes the value of critical assets in high liquefaction areas. High liquefaction zones are located throughout the District. Two pipe crossings and a District facility in the Moss Landing Water System are located in high liquefaction zones. A District facility in the Springfield Water System is located in a high liquefaction zone. A well site, District facility, yard, pump and well in the Sunny Mesa Water System are in a high liquefaction zone. A District facility and station in the Pajaro Water System are in a high liquefaction zone. A tank and pump station in the Vega Water System are in a high liquefaction zone. A tank and District facility in the Vierra Estates Water System are in a high liquefaction zone. Two wells in the Normco Water System are in a high liquefaction zone. Figure 16 shows the geographic distribution of the critical assets and infrastructure relative to liquefaction risk areas.

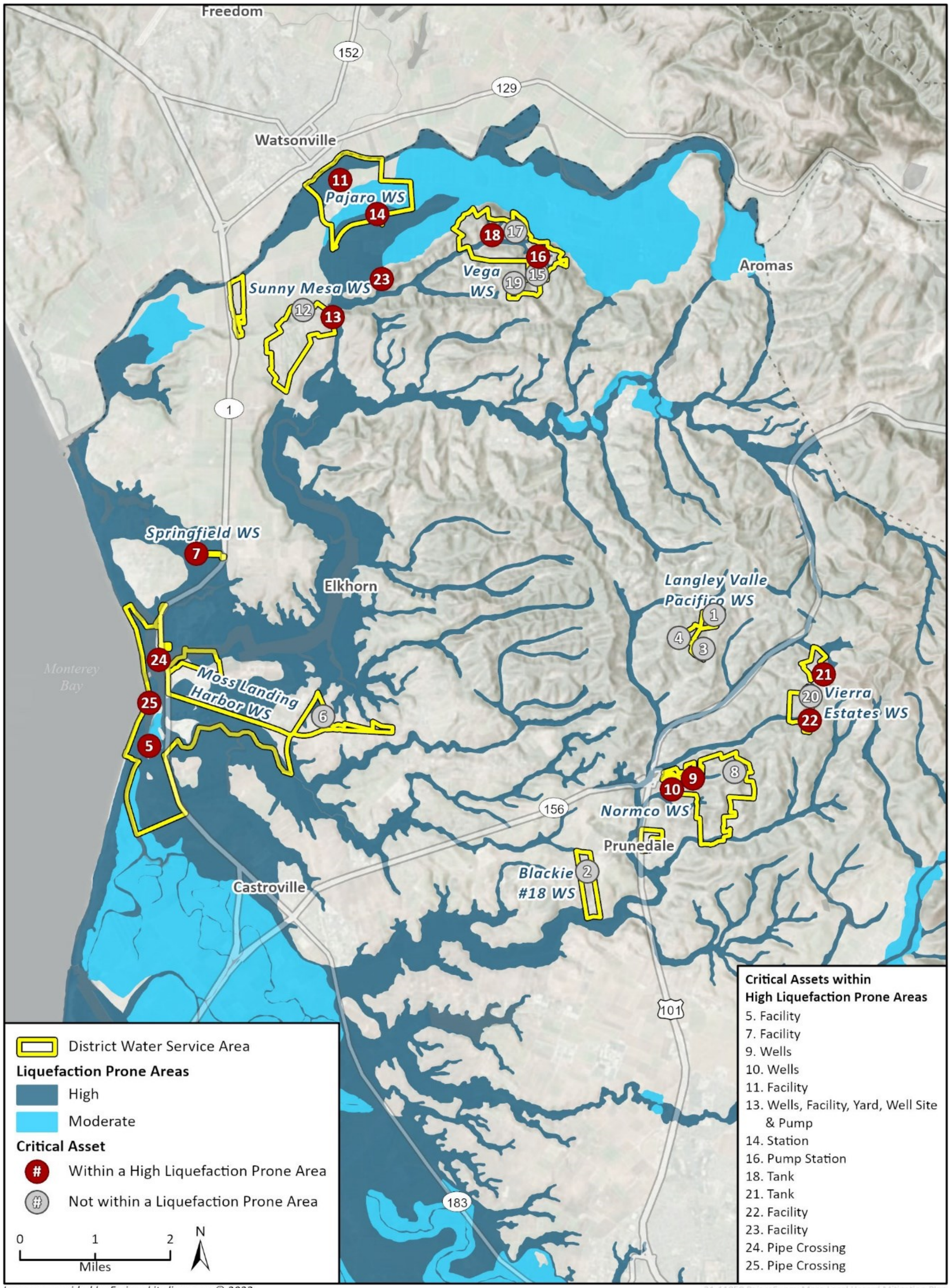
**Table 28 Number of Critical Assets in High Liquefaction Risk Areas**

| Category | Number of Critical Assets |
|---|---|
| District Facility | 5 |
| Pipe Crossing | 2 |
| Wells | 3 |
| Yard | 1 |
| Well Site | 1 |
| Pump | 1 |
| Pump Station | 1 |
| Tank | 2 |
| Station | 1 |

**Table 29 Values of Critical Assets in High Liquefaction Risk Areas**

| Category | Value |
|---|---|
| District Facility | $577,184 |
| District Facility | $63,715 |
| Wells | $167,745 |
| Wells | $232,787 |
| District Facility | $835,365 |
| Wells, Facility, Yard, Well Site & Pump | $116,839 |
| Station | $675,229 |
| Pump Station | $195,965 |
| Tank | $476,373 |
| Tank | $166,201 |
| District Facility | $109,903 |
| District Facility | $178,615 |
| Pipe Crossing | $150,000 |
| Pipe Crossing | $215,000 |

**Figure 16 Critical Assets in High Risk Liquefaction Areas**

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*Liquefaction data provided by Monterey County, 2015.*

### *Impact Analysis*

The data in this section was generated using the HAZUS program for earthquakes. Location and magnitude of a hypothetical earthquake are identified for the two earthquake scenarios included in this assessment. For each scenario, HAZUS estimated the peak ground acceleration by census tract, the estimated total structure loss (in U.S. dollars) by census tract, and the resulting cumulative direct economic losses due to building damage. Storage facilities, pump stations, treatment facilities, and other District facilities were assessed in the impact analysis.

Two earthquake scenarios were assessed in this vulnerability assessment:

- **Earthquake Scenario 1** shows a possible repeat of the Loma Prieta earthquake of 1989 (magnitude 6.89)
- **Earthquake Scenario 2** shows a potential rupture along the Zayante-Vergels Fault line (magnitude 7.0)

### *Earthquake Scenario 1: A Repeat of the Loma Prieta Earthquake of 1989*

#### BUILDING DAMAGE

The building damage counts are estimated number of buildings damaged by the earthquake scenario, as seen in Table 30. These include estimated of all buildings, not just District owned, damaged within census tracts that intersect the PSMCD boundary, not just those within the boundary. Therefore, this analysis likely overestimates the number of buildings damaged in PSMCD.

**Table 30 Expected Building Damage – Loma Prieta**

| Damage Extent | None | Slight | Moderate | Extensive | Complete |
|---|---|---|---|---|---|
| Total | 6,775 | 2,350 | 856 | 194 | 27 |

#### WATER SYSTEM DAMAGE

HAZUS estimated District water facility functionality estimated in a repeat Loma Prieta earthquake of 1989 scenario are presented in Table 31.

**Table 31 Water Facility (%) Functionality – Loma Prieta**

| Name | System Name | At Day 1 | At Day 3 | At Day 7 | At Day 14 | At Day 30 | At Day 90 |
|---|---|---|---|---|---|---|---|
| Fire Storage Tank | Langley Valle Pacifico | 58.0 | 59.0 | 79.9 | 79.9 | 95.0 | 99.2 |
| Wells | Blackie #18 | 56.5 | 57.6 | 78.9 | 78.9 | 94.7 | 99.2 |
| Wells | Langley Valle Pacifico | 57.8 | 58.9 | 79.8 | 79.8 | 95.0 | 99.2 |
| Tank & Well Site | Langley Valle Pacifico | 56.7 | 57.7 | 79.0 | 79.0 | 94.7 | 99.2 |
| Facility | Moss Landing Harbor | 30.5 | 31.8 | 56.4 | 56.5 | 84.1 | 96.3 |
| Wells | Moss Landing Harbor | 39.5 | 40.7 | 65.3 | 65.3 | 88.9 | 97.8 |
| Facility | Springfield | 25.9 | 27.1 | 51.2 | 51.3 | 80.9 | 95.2 |
| Facility | Normco | 60.8 | 61.8 | 81.8 | 81.9 | 95.7 | 99.4 |

| Name | System Name | At Day 1 | At Day 3 | At Day 7 | At Day 14 | At Day 30 | At Day 90 |
|---|---|---|---|---|---|---|---|
| Wells | Normco | 59.3 | 60.3 | 80.7 | 80.8 | 95.3 | 99.3 |
| Wells | Normco | 58.7 | 59.7 | 80.4 | 80.4 | 95.2 | 99.3 |
| Facility | Pajaro | 32.6 | 33.8 | 58.6 | 58.6 | 85.4 | 96.7 |
| Tank & Pump Station | Sunny Mesa | 29.9 | 31.1 | 55.7 | 55.8 | 83.7 | 96.1 |
| Wells, Facility, Yard, Well Site & Pump | Sunny Mesa | 32.3 | 33.5 | 58.2 | 58.3 | 85.2 | 96.6 |
| Station | Pajaro | 35.5 | 36.7 | 61.5 | 61.6 | 87.0 | 97.2 |
| Tank | Vega | 46.4 | 47.6 | 71.2 | 71.3 | 91.7 | 98.5 |
| Pump Station | Vega | 46.7 | 47.9 | 71.5 | 71.5 | 91.8 | 98.5 |
| Pump Station | Vega | 45.0 | 46.2 | 70.1 | 70.2 | 91.2 | 98.4 |
| Tank | Vega | 43.6 | 44.8 | 68.9 | 69.0 | 90.6 | 98.2 |
| Pump Station | Vega | 45.0 | 46.2 | 70.1 | 70.2 | 91.2 | 98.4 |
| Tank | Vierra Estates | 62.8 | 63.7 | 83.0 | 83.1 | 96.1 | 99.4 |
| Tank | Vierra Estates | 63.1 | 64 | 83.2 | 83.3 | 96.1 | 99.4 |
| Facility | Vierra Estates | 62.9 | 63.9 | 83.1 | 83.2 | 96.1 | 99.4 |
| Facility | District | 36.1 | 37.4 | 62.1 | 62.2 | 87.3 | 97.3 |
| Pipe Crossing | Moss Landing Harbor | 27.1 | 28.3 | 52.6 | 52.7 | 81.8 | 95.5 |
| Pipe Crossing | Moss Landing Harbor | 28.6 | 29.9 | 54.3 | 54.4 | 82.9 | 95.9 |

### CASUALTIES

HAZUS was utilized to estimate the number of people that will be injured and killed by a repeat of the Loma Prieta earthquake of 1989. There are four casualty severity levels the describe the extent of injuries from the earthquake, as seen below:

- **Severity Level 1:** Injuries will require medical attention, but hospitalization is not needed.
- **Severity Level 2:** Injuries will require hospitalization but are not considered life-threatening.
- **Severity Level 3:** Injuries will require hospitalization and can become life threatening if not promptly treated.
- **Severity Level 4:** Victims are killed by the earthquake.

The casualty estimated are provided for three times of day 2:00 AM, 2:00 PM, and 5:00 PM. These times represent the periods of the day that different sectors of the community are at their peak occupancy loads. The casualty estimates below consider sector loads hotel, educational, industrial, commercial, single family, other residential sectors and commuting. Casualty estimates for a repeat of the Loma Prieta earthquake of 1989 scenario are summarized in Table 32.

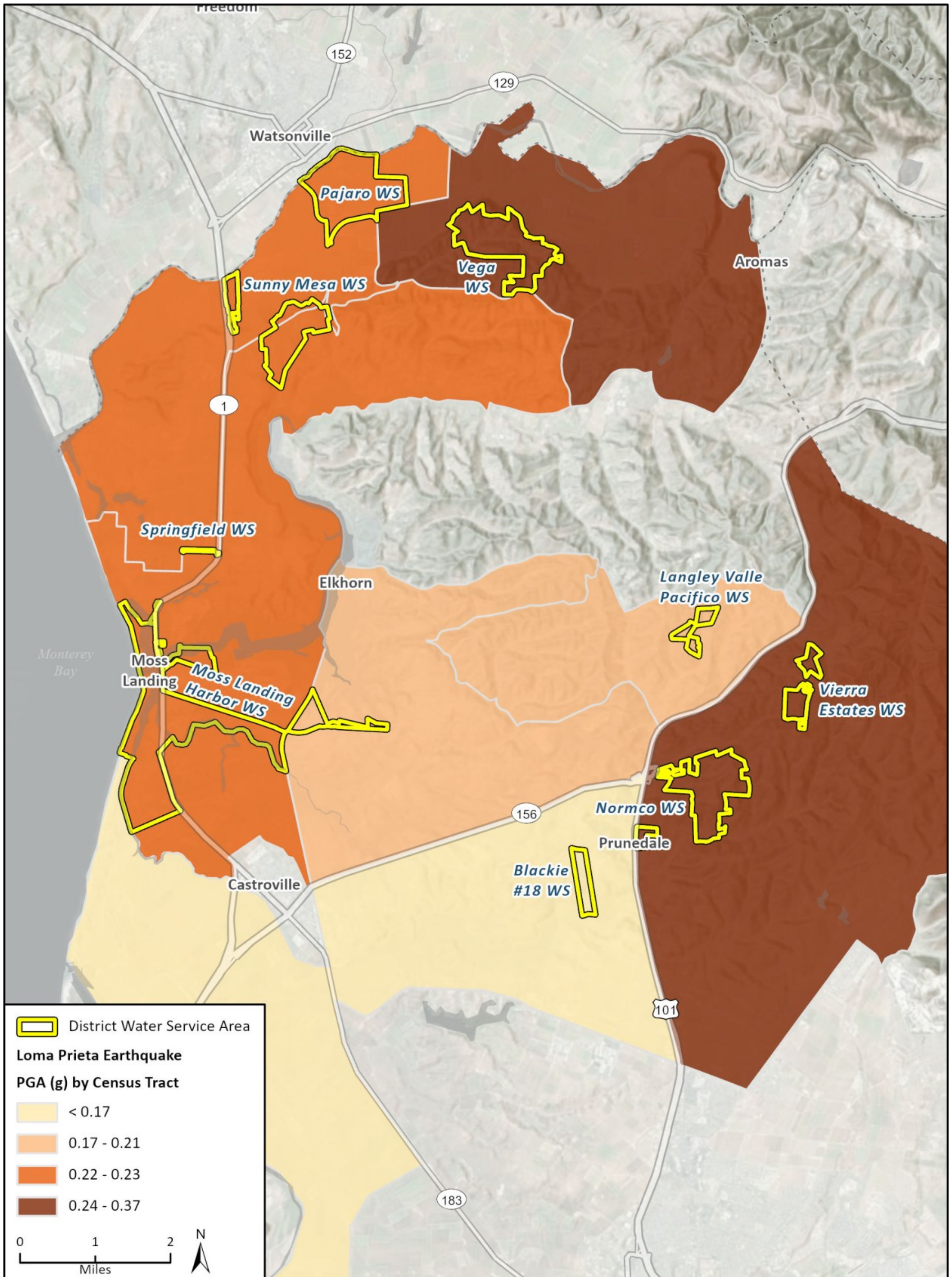
**Table 32 Casualty Estimated – Loma Prieta**

| Time | Severity 1 | Severity 2 | Severity 3 | Severity 4 | Total |
|---|---|---|---|---|---|
| 2 AM | 19.81 | 2.68 | 0.15 | 0.26 | 22.90 |
| 2 PM | 32.37 | 5.75 | 0.67 | 1.23 | 40.02 |
| 5 PM | 24.75 | 4.50 | 1.12 | 0.93 | 31.30 |

### Economic Losses

Under this scenario, the northwestern area of the District, specifically the Pajaro Water System, Sunny Mesa Water System, and Moss Landing Water System would experience the greatest economic losses. Although the northwestern part of the District is projected to experience less intense ground shaking, there are more buildings located in this area compared to the eastern part of the District, resulting in greater economic losses. Peak ground acceleration in the District under 1989 Loma Prieta earthquake scenario is shown in Figure 17. The economic losses from building damage and business interruption were estimated using HAZUS (FEMA 2022), and the results are summarized in Table 33. Estimates of buildings damaged within census tracts that intersect the District's service areas include buildings not owned by the District. Therefore, the analysis likely overestimates the number of buildings damaged in the District. Total structure economic loss estimates under a repeat Loma Prieta earthquake of 1989 scenario are shown in Figure 18.

**Figure 17 Peak Ground Acceleration (PGA) by Census Tract (Loma Prieta)**

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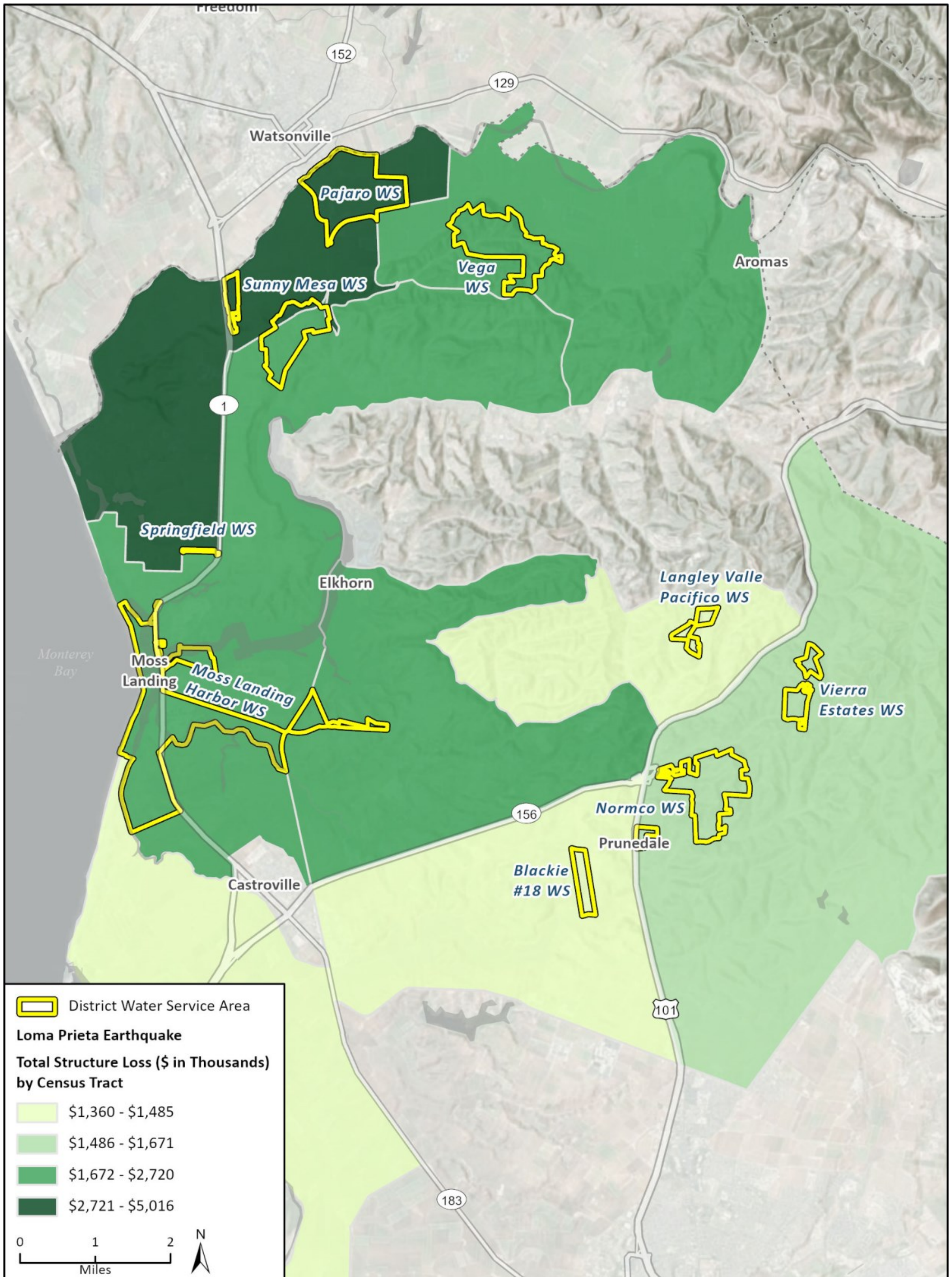
*Additional data provided by FEMA Hazus, 2022.*

**Figure 18 Total Structure (Economic) Loss by Census Tract (Loma Prieta)**

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*Additional data provided by FEMA Hazus, 2022.*

### Table 33 Loma Prieta Building Related Economic Loss Estimates

| Category | Area | Estimate Loss Total |
|---|---|---|
| Building Loss | Structure | $17,217 |
| | Non-Structure | $63,855 |
| | Content | $25,765 |
| | Inventory | $1,197 |
| | **Subtotal** | **$108,033** |
| Business Interruption | Relocation | $6,765 |
| | Income | $1,483 |
| | Rental Income | $2,453 |
| | Wage | $1,877 |
| | **Subtotal** | **$12,579** |
| **Total** | | **$120,612** |

## *Earthquake Scenario 2: Zayante-Vergeles*

### BUILDING DAMAGE

The building damage counts are estimated number of buildings damaged by the earthquake scenario, as seen in Table 34. These include estimates of all buildings, not just District owned, damaged within census tracts that intersect the PSMCD boundary, not just those within the boundary. Therefore, this analysis likely overestimates the number of buildings damaged in PSMCD.

### Table 34 Expected Building Damage – Zayante-Vergeles

| Damage Extent | None | Slight | Moderate | Extensive | Complete |
|---|---|---|---|---|---|
| Total | 3,002 | 3,683 | 2,262 | 816 | 439 |

### WATER SYSTEM DAMAGE

HAZUS estimated District water facility functionality estimated in a Zayante-Vergeles scenario are presented in Table 35.

### Table 35 Water Facility (%) Functionality – Zayante-Vergeles

| Name | System Name | At Day 1 | At Day 3 | At Day 7 | At Day 14 | At Day 30 | At Day 90 |
|---|---|---|---|---|---|---|---|
| Fire Storage Tank | Langley Valle Pacifico | 0.5 | 0.6 | 3.5 | 3.5 | 18.6 | 45.3 |
| Wells | Blackie #18 | 7.4 | 8.1 | 23.2 | 23.2 | 55.5 | 82.2 |
| Wells | Langley Valle Pacifico | 0.6 | 0.8 | 4.4 | 4.4 | 21.3 | 49.2 |
| Tank & Well Site | Langley Valle Pacifico | 0.7 | 0.9 | 4.8 | 4.8 | 22.4 | 50.8 |
| Facility | Moss Landing Harbor | 22.9 | 24.1 | 47.7 | 47.7 | 78.4 | 94.2 |
| Wells | Moss Landing Harbor | 13.5 | 14.5 | 34.4 | 34.4 | 67.6 | 89.3 |
| Facility | Springfield | 13.3 | 14.3 | 34 | 34.1 | 67.3 | 89.1 |

| Name | System Name | At Day 1 | At Day 3 | At Day 7 | At Day 14 | At Day 30 | At Day 90 |
|---|---|---|---|---|---|---|---|
| Facility | Normco | 1.1 | 1.4 | 6.6 | 6.6 | 27.2 | 56.8 |
| Wells | Normco | 1.5 | 1.8 | 7.9 | 7.9 | 30.3 | 60.3 |
| Wells | Normco | 1.8 | 2.2 | 9.1 | 9.1 | 32.9 | 63.2 |
| Facility | Pajaro | 0.5 | 0.7 | 4 | 4 | 20 | 47.4 |
| Tank & Pump Station | Sunny Mesa | 1.6 | 2 | 8.4 | 8.5 | 31.6 | 61.8 |
| Wells, Facility, Yard, Well Site & Pump | Sunny Mesa | 1.4 | 1.7 | 7.4 | 7.5 | 29.3 | 59.2 |
| Station | Pajaro | 0.5 | 0.7 | 3.9 | 3.9 | 19.7 | 47 |
| Tank | Vega | 0.3 | 0.5 | 2.9 | 2.9 | 16.4 | 42 |
| Pump Station | Vega | 0.3 | 0.5 | 2.9 | 2.9 | 16.4 | 42 |
| Pump Station | Vega | 0.3 | 0.5 | 2.9 | 2.9 | 16.4 | 42 |
| Tank | Vega | 0.3 | 0.5 | 2.9 | 2.9 | 16.4 | 42 |
| Pump Station | Vega | 0.3 | 0.5 | 2.9 | 2.9 | 16.4 | 42 |
| Tank | Vierra Estates | 0.3 | 0.5 | 2.9 | 2.9 | 16.4 | 42 |
| Tank | Vierra Estates | 0.3 | 0.5 | 2.9 | 2.9 | 16.4 | 42 |
| Facility | Vierra Estates | 0.4 | 0.5 | 3.3 | 3.3 | 17.8 | 44.2 |
| Facility | District | 0.8 | 1 | 5.1 | 5.1 | 23.3 | 52 |
| Pipe Crossing | Moss Landing Harbor | 19 | 20.2 | 42.5 | 42.6 | 74.6 | 92.6 |
| Pipe Crossing | Moss Landing Harbor | 21.1 | 22.2 | 45.3 | 45.3 | 76.7 | 93.5 |

### CASUALTIES

HAZUS was also utilized to estimate the number of people that will be injured and killed by a Zayante-Vergeles earthquake. Casualty estimates for the Zayante-Vergeles earthquake scenario are summarized in Table 36.

**Table 36 Casualty Estimates – Zayante-Vergeles**

| Time | Severity 1 | Severity 2 | Severity 3 | Severity 4 | Total |
|---|---|---|---|---|---|
| 2 AM | 95.434 | 19.016 | 1.414 | 2.421 | 118.289 |
| 2 PM | 312.306 | 86.562 | 13.485 | 25.602 | 437.956 |
| 5 PM | 221.644 | 62.714 | 15.804 | 17.694 | 317.854 |

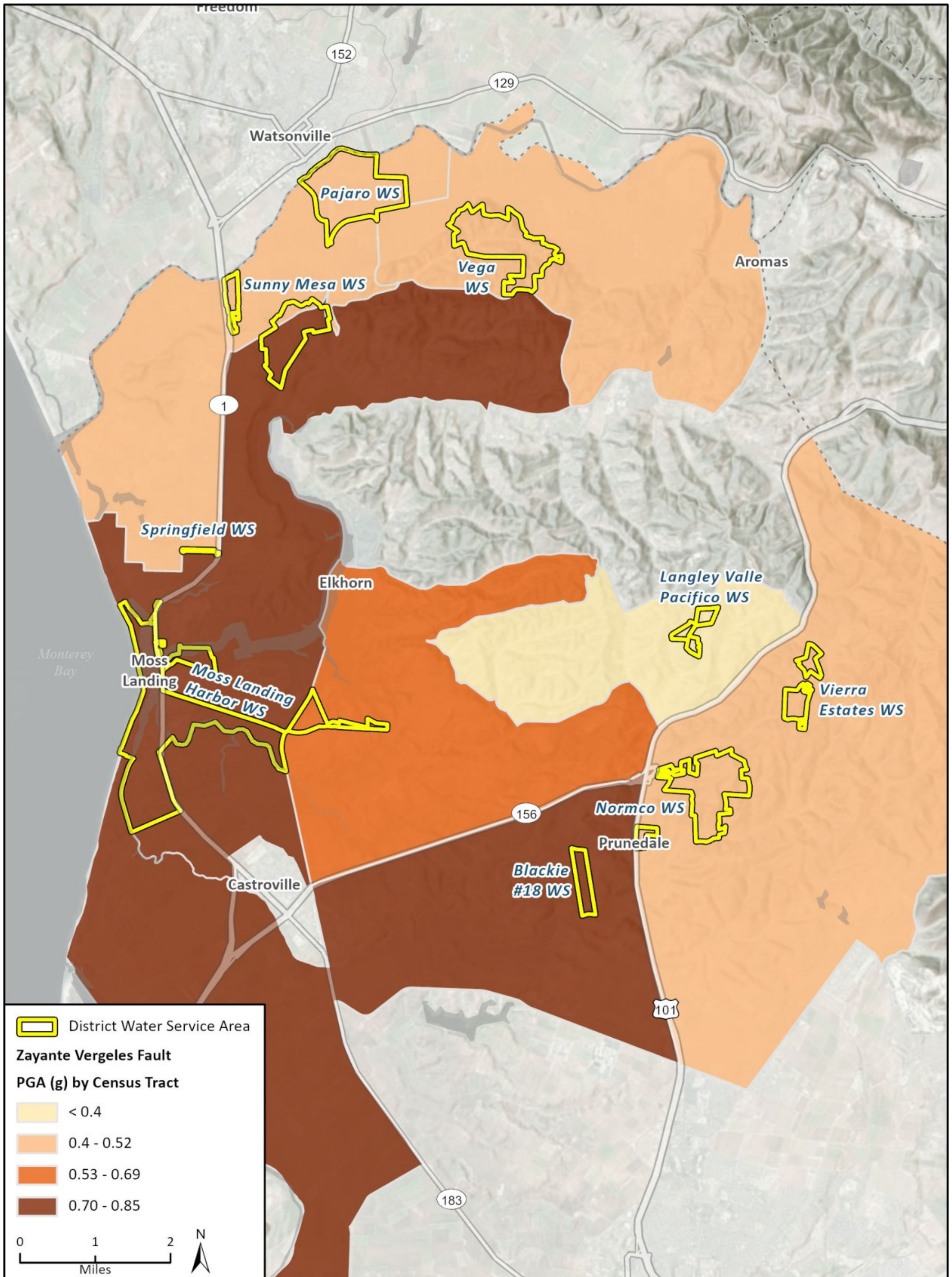
### ECONOMIC LOSSES

Under Scenario 2, the eastern portion of the District and specifically, Prunedale Water System, Normco Water System, Vierra Estates Water System, and Vega Water System would experience the greatest economic losses. Although the northwestern part of the District is projected to experience less intense ground shaking, there are more buildings located in this area compared to the eastern part of the District, resulting in greater economic losses. Peak ground acceleration in the District under 1989 Loma Prieta earthquake scenario is shown in Figure 19. The economic losses from building damage and business interruption were estimated using HAZUS-MH (FEMA 2022), and the results are summarized in Table 37. Estimates of buildings damaged within census tracts that intersect the District's service areas include buildings not owned by the District. Therefore, the analysis likely overestimates the number of buildings damaged in the District. Total structure economic loss estimates under a repeat Loma Prieta earthquake of 1989 scenario are shown in Figure 20.

### Table 37 Zayante-Vergeles Building Related Economic Loss Estimates

| Category | Area | Total |
|---|---|---|
| Building Loss | Structure | $82,977 |
| | Non-Structure | $279,024 |
| | Content | $112,550 |
| | Inventory | $4,328 |
| | **Subtotal** | **$478,879** |
| Business Interruption | Relocation | $31,008 |
| | Income | $8,378 |
| | Rental Income | $10,464 |
| | Wage | $9,458 |
| | **Subtotal** | **$59,308** |
| **Total** | | **$538,187** |

**Figure 19 Peak Ground Acceleration (PGA) by Census Tract (Zayante-Vergeles)**

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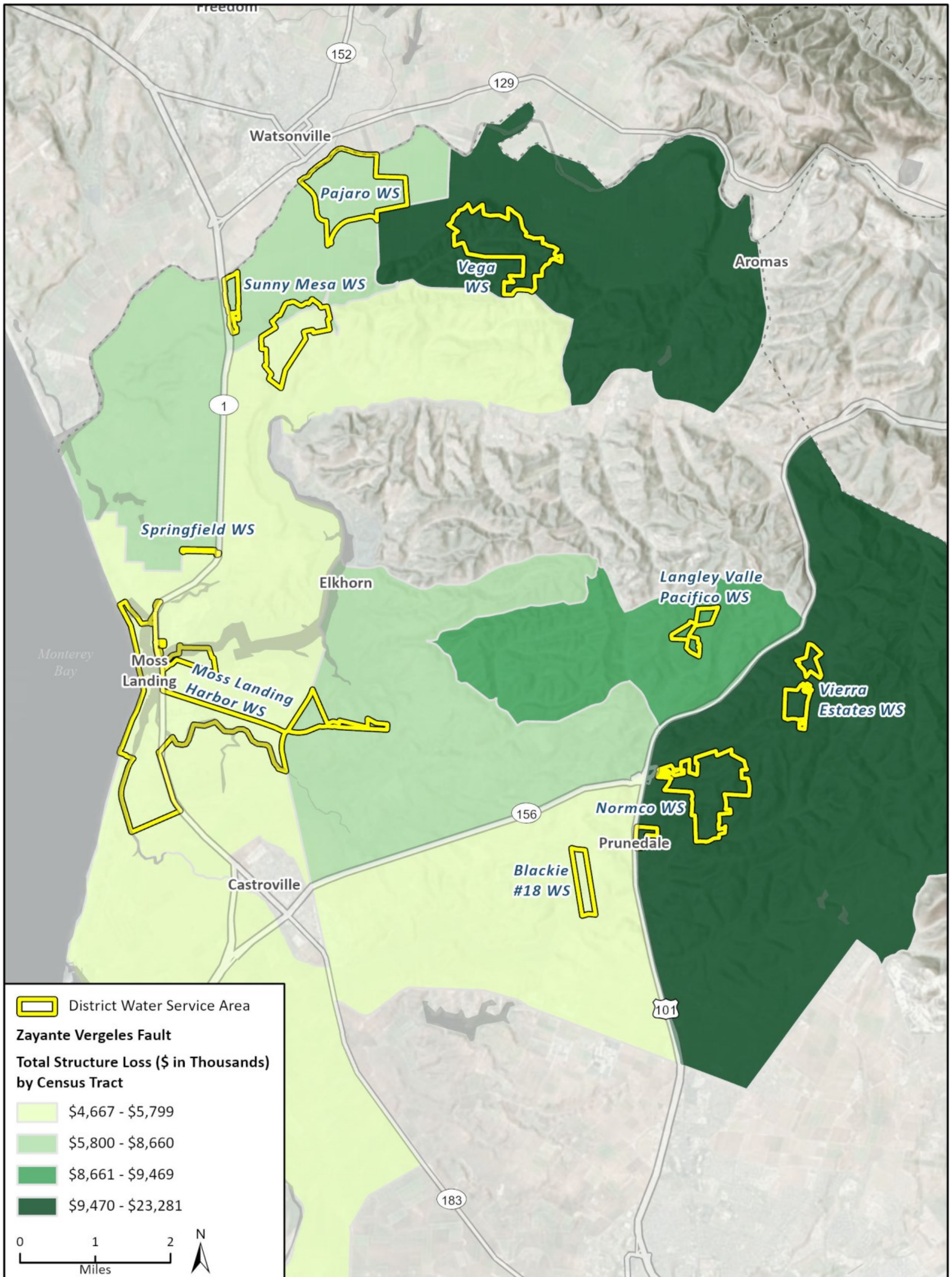
Additional data provided by FEMA Hazus, 2022.

**Figure 20 Total Structure (Economic) Loss by Census Tract (Zayante-Vergeles)**

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*Additional data provided by FEMA Hazus, 2022.*

### Impact Summary and Secondary Hazards

During an earthquake, ground shaking may cause structural failure of water treatment plants and wells. Breaks in piping, including water mains and laterals, could cause physical damage and disrupt the system as pressure is lost. Older iron pipes are particularly susceptible to breaking during an earthquake. Pipes have a higher risk of breaking at connections to above-ground structures, such as treatment plants, tanks, resevours, and pumping stations. The District has several old tanks (4 in the Vierra Estates Water System, 2 in the Blackie No.18 Water System and 2 in the Langley Valle Pacifico Water System) that do not have freeboard for seismic sloshing waves and may be easily overturned during an earthquake. The District also has one 200,000 gallon unanchored tank in the Sunny Mesa Water System that was damaged severly in the 1989 Loma Prieta earthquake. In general, the District’s tanks that are unanchored and/or lack freeboard are at risk to damage during an earthquake. A repeat of the Loma Prieta earthquake (magnitude 6.9) would likely cause service disruptions and the District may not be able to provide all it’s customers with water.

Based on the risk assessment, it is evident that future earthquakes will pose significant and widespread economic impacts to certain area of the Direct. Earthquakes are likely to cause secondary hazards such as liquefaction, landslides, dam failure, levee failure, and hazardous material spills. Anticipated impacts from future earthquakes in the District include:

- Injury and/or loss of life
- Water quality degradation and supply disruption
- Structure and/or equipment damage
- Disruption to infrastructure
- Power outage
- Damage to roads and bridges
- Hazardous material spills
- Significant economic impacts

Ground shaking may cause structural failure of above ground assets and wells. Breaks in piping (water mains, laterals) could cause physical damage to pipes and cause loss of pressure needed to keep the system functioning. Pipes are most prone to breaking at connections to above-ground structures, such as water tanks, treatment plants, or booster stations.

Both an M7.0 earthquake along the Zayante-Vergeles Fault and a M 6.89 earthquake along the Loma Prieta fault would likely cause significant service disruptions, requiring the District to rely on mutual aid agreements to meet demand of customers. It would take significant time, between 1-3 months for the system to regain operations.

## 4.4 Tsunami

### Vulnerability Assessment

A tsunami of sufficient magnitude may have severe impacts on the District’s service areas and critical assets that are in close proximity to the Pacific Ocean. Tsunamis often occur unpredictably, with little warning timing, and are usually triggered by earthquakes. There are two pipe crossings and one facility within the Tsunami Inundation Zone. A District facility in the Moss Landing Harbor Water System is located in the tsunami inundation zone. Two pipe crossings Moss Landing Harbor

Water System are located in the tsunami inundation zone. Table 38 summarizes the value of critical assets located in the tsunami inundation zone. Figure 21 shows the geographic distribution of the critical assets and infrastructure relative to the tsunami inundation zone.

**Table 38 Critical Assets in Tsunami Inundation Zone**

| Category | Number of Critical Assets |
|---|---|
| Facility | 1 |
| Pipe Crossing | 2 |

## Impact Analysis

The District's Moss Landing service area is at potential inundation risk from a tsunami event of moderate to severe magnitude. Tsunami inundation and high velocity waves may damage the infrastructure and assets located in the Moss Landing Water System. If critical assets are damaged from a tsunami, the District may experience increased economic losses associated with the cost to repair or replace an asset and/or the costs associated with water service disruption. District assets with electrical parts or motors are most likely to incur damage if submerged and may require repair or replacement. The outflow of water back to the ocean often carries out large amount of debris which can lead to further damage of infrastructure, facilities, and equipment in the Moss Landing service area. Inundation from a tsunami may inhibit access to District assets and facilities and may decrease overall mobility within the District's Moss Landing service areas. A tsunami may threaten the safety of District employees and District customers who are located in the tsunami inundation zone.

### *Water System Damage*

Values of critical assets located in the tsunami inundation zone are summarized in Table 39.

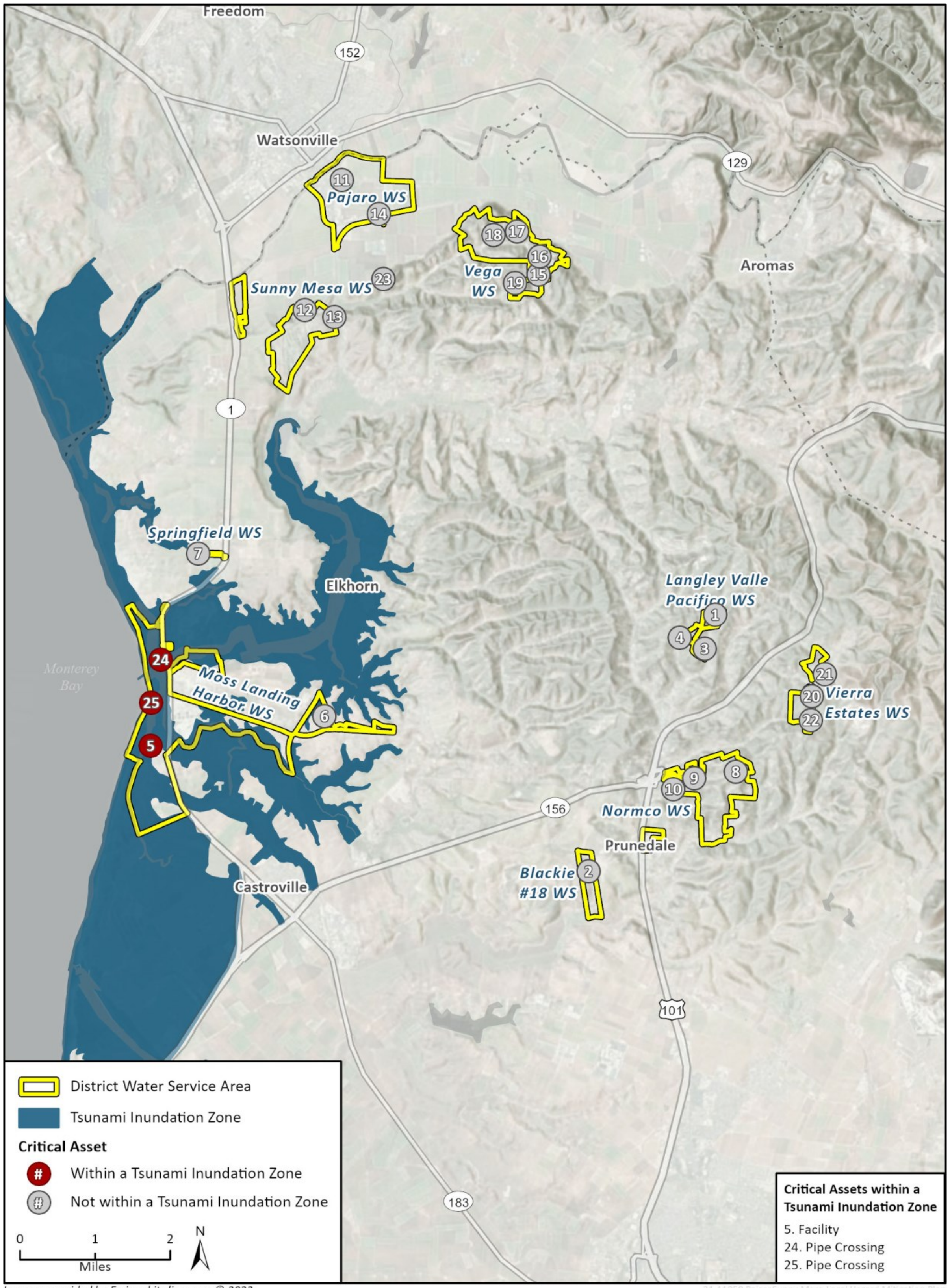
**Table 39 Values of Critical Assets in Tsunami Inundation Zone**

| Category | Value |
|---|---|
| Facility | $577,184 |
| Pipe Crossing | $150,000 |
| Pipe Crossing | $215,000 |

## Impact Summary and Secondary Hazards

Tsunami inundation may exacerbate or trigger saltwater intrusion into coastal aquifers, leading to water contamination and increased water treatment costs. High velocity and high-pressure tsunami waves may trigger a hazardous material release accident if certain facilities or pipelines are impacted. A hazardous material release accident may contaminate local water supplies and/or the environment, threatening the health of the communities within the District's service areas.

**Figure 21 Critical Assets in Tsunami Inundation Zone**

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*Additional data provided by CGS, 2009.*

Anticipated impacts from future tsunami's include:

- Injury and/or loss of life
- Structure and/or equipment damage
- Water quality degradation and supply disruption
- Disruption to infrastructure
- Damage to roads and bridges
- Significant economic impacts
- Hazardous material spill

# 4.5 Flood

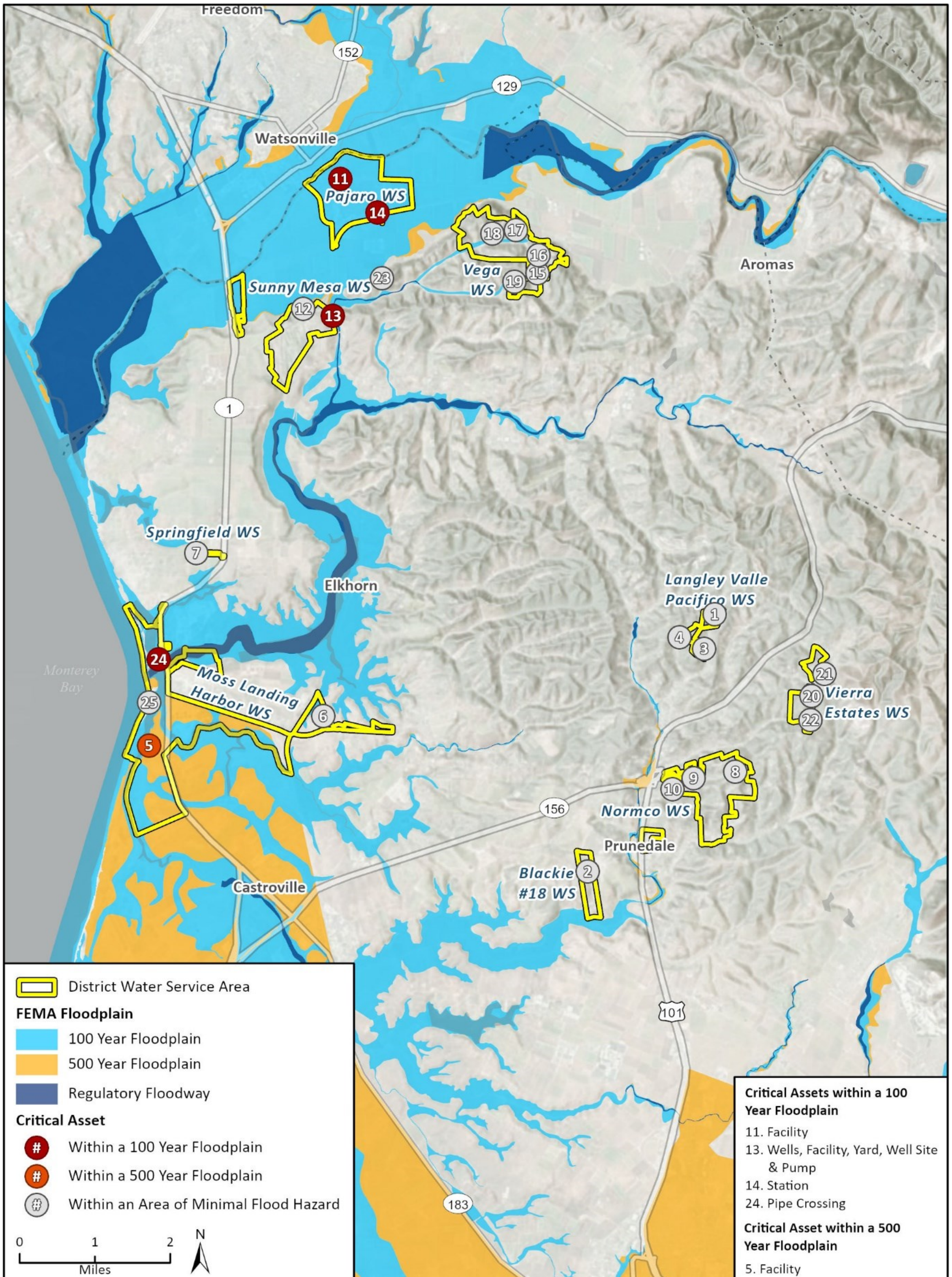
## Vulnerability Assessment

The following section describes risk exposure and vulnerability of critical assets, infrastructure, and the general building stock in the District's mapped regulatory floodplain. Table 40 summarizes the category and number of the District's critical assets within the FEMA Flood Zone. A pipe crossing in the Moss Landing Harbor Water System is located in a 100-year flood zone. A District facility in the Moss Landing Harbor Water System is located in a 500-year flood zone. A District facility and station in the Pajaro Water System are located in a 100-year flood zone. Wells, a facility, yard, well site, and pump in the Sunny Mesa Water System are located in a 100-year flood zone. Critical assets located in flood hazards zones are shown in Figure 22.

**Table 40 Critical Assets in FEMA Flood Zone**

| Category | Number of Critical Assets in the 100-Year Flood Hazard Area | Number of Critical Assets in the 500-Year Flood Hazard Area |
|---|---|---|
| Pipe Crossing | 1 | |
| Wells | 1 | |
| Yard | 1 | |
| Well Site | 1 | |
| Pump | 1 | |
| Facility | 2 | 1 |
| Station | 1 | |

**Figure 22 Critical Assets in FEMA Flood Hazard Areas**

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*Additional data provided by FEMA, 2021.*

### *Impact Analysis*

#### BUILDING DAMAGE

The building damage counts are the estimated number of buildings damaged by the HAZUS flood scenario. Estimation of buildings damaged within census tract that intersect the District's service areas include buildings not owned by the District. Therefore, the analysis likely overestimates the number of buildings damaged in the District. Table 41 shows the estimated number of structures in the FEMA Special Flood Hazard Area within the District. 91 total structures were estimated in the District's FEMA Special Flood Hazard Areas.

**Table 41  Number of Structures in the FEMA Special Flood Hazard Area**

| Residential | Commercial | Industrial | Religious | Government | Education | Total |
|---|---|---|---|---|---|---|
| 9,536 | 371 | 130 | 48 | 5 | 22 | 10,112 |

The values of exposed buildings in the District's Special Flood Hazard Area were generated using HAZUS and are shown in Table 42. HAZUS estimated approximately $3.7 million worth of building exposure in the FEMA Special Flood Hazard Area.

**Table 42  Value of Exposed Buildings in the FEMA Special Flood Hazard Area**

| Buildings | Value |
|---|---|
| Commercial | $361,159 |
| Education | $31,709 |
| Government | $1,566 |
| Industrial | $150,610 |
| Religion | $45,752 |
| Residential | $2,902,815 |
| Agriculture | $188,328 |
| Total | $3,681,939 |

HAZUS estimates approximately $86 million in building-related economic losses from a 100-year event (FEMA 2022).

#### WATER SYSTEM DAMAGE

Table 43 and Table 44 summarize the value of critical assets located in FEMA 100-year flood and 500-year flood zones.

**Table 43  Values of Critical Assets in FEMA 100-Year Flood Zone**

| Category | Value |
|---|---|
| District Facility | $835,365 |
| Wells, Facility, Yard, Well Site & Pump | $116,839 |
| Station | $675,229 |
| Pipe Crossing | $150,000 |

### Table 44 Values of Additional Critical Assets in FEMA 500-Year Flood Zone

| Category | Value |
|---|---|
| District Facility | $577,184 |

#### ECONOMIC LOSSES

Building-related economic loss estimates for a 100-yr flood event are summarized in Table 45.

### Table 45 Building-Related Economic Loss Estimates for a 100-Year Flood Event (millions of dollars)

| Category | Area | Residential | Commercial | Industrial | Other | Total |
|---|---|---|---|---|---|---|
| Building Loss | Structure | 69,133 | 10,221 | 3,587 | 2,997 | 85,938 |
| | Non-Structure | 36,304 | 18,092 | 10,491 | 5,602 | 70,489 |
| | Content | 0 | 583 | 1,429 | 131 | 2,143 |
| | Inventory | 105,437 | 28,896 | 15,507 | 8,730 | 158,570 |
| | **Subtotal** | **8** | **2,805** | **311** | **676** | **3,800** |
| Business Interruption | Income | 10,067 | 5,921 | 273 | 1,421 | 17,682 |
| | Relocation | 3,463 | 2,121 | 77 | 39 | 5,700 |
| | Rental Income | 19 | 8,105 | 470 | 3,306 | 11,900 |
| | Wage | 13,557 | 18,952 | 1,131 | 5,442 | 39,082 |
| | **Subtotal** | **118,994** | **47,848** | **16,638** | **14,172** | **197,652** |
| | **Total** | **69,133** | **10,221** | **3,587** | **2,997** | **85,938** |

During a severe flood event, facilities may experience structure damage due to flowing debris, saturation of building materials, and collapse of water-logged structures. High water velocities and pressures may also cause structures to wash away. In the event of a 100-yr flood, District assets may be damaged. Most District Water Systems would not suffer severe damage that may disrupt service continuity. However, the two wells for the Sunny Mesa Water Sytsem are at risk for a long-term outage if damaged because there is no alternative source of supply to the Sunny Mesa Water System.

Floodwaters may inhibit access to District assets and facilities and decrease overall mobility within the District's service areas. Strong floodwater and debris may damage or block bridges, roads, culverts and other infrastructure. Therefore, if a District asset is damaged, access needed to assess or repair damage may take days or as long as it takes for the flood waters to recede. District assets with electrical parts or motors are most likely to incur damage if submerged and may require repair or replacement. There are a number of areas with residential populations that are served by the District that have historically been isolated when roads were inundated. These areas include the Moss Landing service area and Pajaro service area.

## Impact Summary and Secondary Hazard

High velocity and high-pressure flows can lead to hazardous material release accidents. If wastewater treatment plants are inundated or pipelines severed, hazardous materials or toxic waste may contaminate water and/or the environment, threatening the health of the communities within the District's service areas. Flooding may also cause stream bank erosion and landslides.

Damage from floods is dependent on location, severity and length of a given flood event and will most likely impact certain District service areas during specific times. Based on this vulnerability assessment, it is likely that future floods will likely have a significant economic impact to the District and may disrupt business continuity.

Anticipated impacts from future flood events include:

- Injury and/or loss of life
- Structure and/or equipment damage
- Water quality degradation and supply disruption
- Disruption to infrastructure
- Damage to roads and bridges
- Hazardous material spill
- Significant economic impacts

# 4.6 Dam Failure

## Vulnerability Assessment

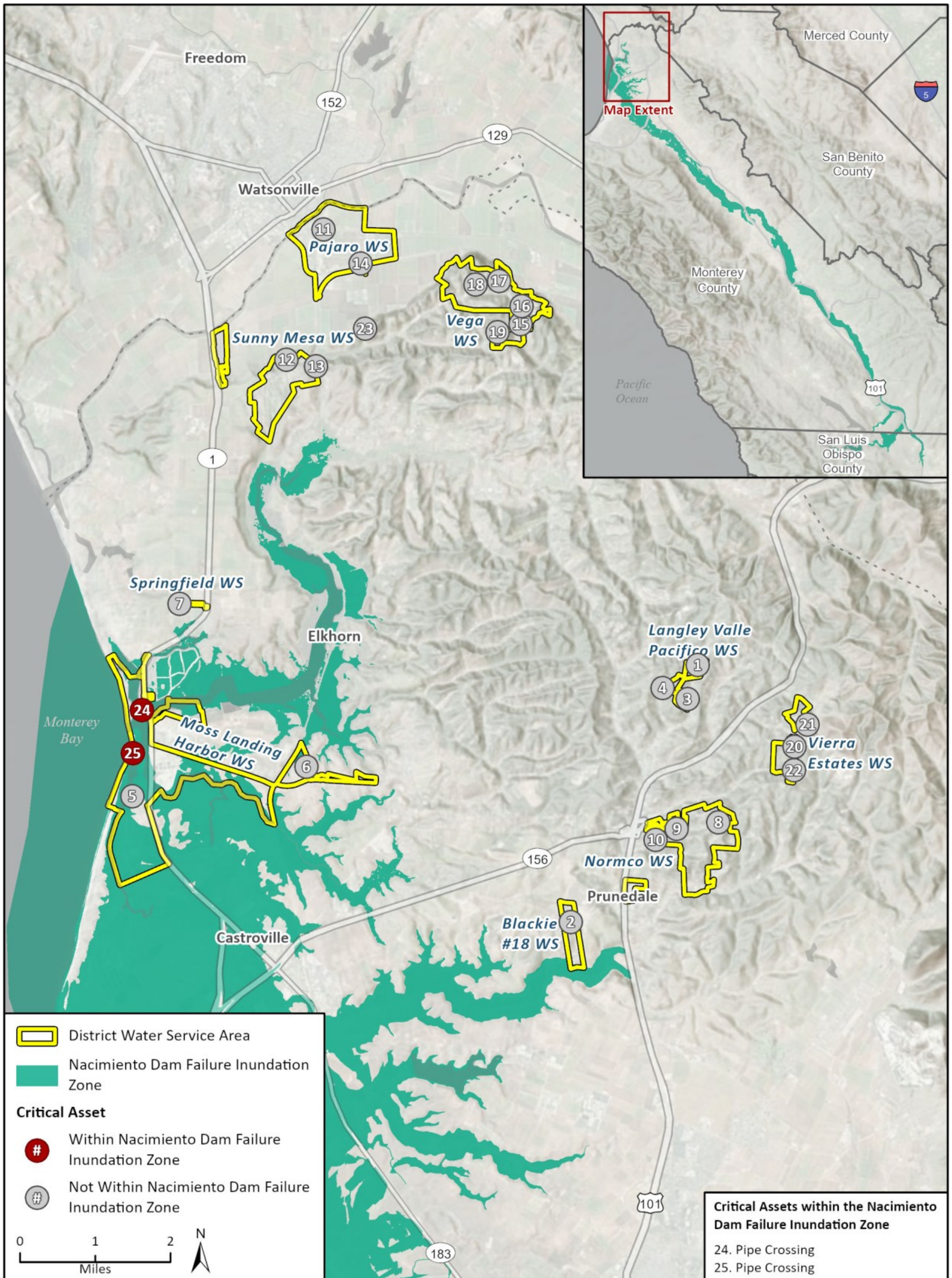
Dam failure may have severe impacts on the District's service areas and critical assets. Dam failures are uncommon but can cause catastrophic damage as energy and water are released. Table 46 summarizes the category and number of the District's critical assets located within the Nacimiento Dam failure inundation zone and San Antonio Dam failure inundation zone. There are two pipe crossings located in the Nacimiento Dam failure inundation zone and one pipe crossing located in the San Antonio Dam failure inundation zone.

Figure 23 and Figure 24 show the geographic distribution of the critical assets and infrastructure relative to Nacimiento Dam failure inundation zone and the San Antonio Dam failure inundation zone, respectively.

**Table 46 Critical Assets in Dam Failure Inundation Zone**

| Category | Number of Critical Assets: Nacimiento Dam Failure Inundation Zone | Number of Critical Assets: San Antonio Dam Failure Inundation Zone |
|---|---|---|
| Pipe Crossing | 2 | 1 |

## Figure 23 Critical Assets in Nacimiento Dam Failure Inundation Zone

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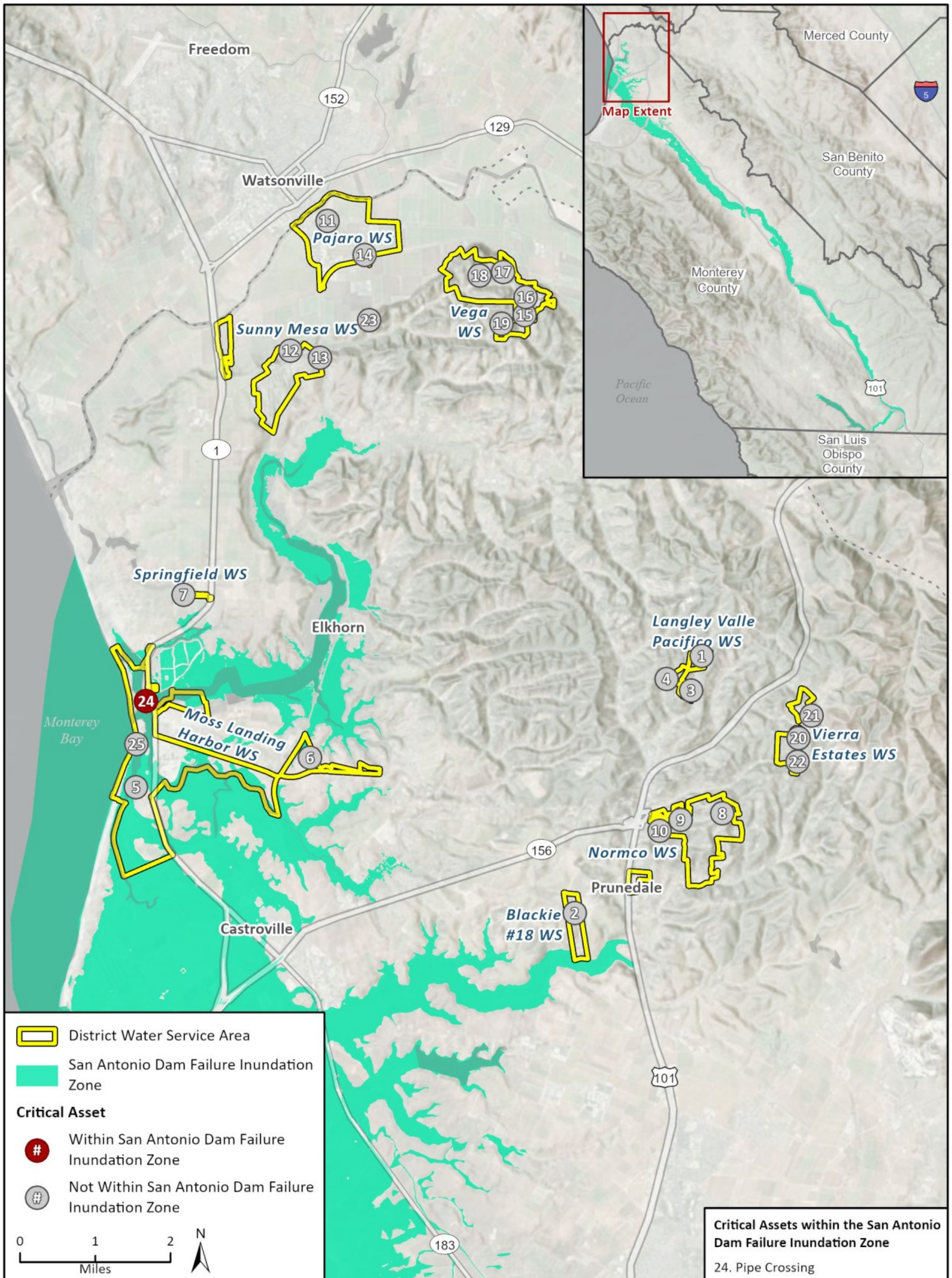
*Additional data provided by Department of Water Resources, DSOD, 2022.*

## Figure 24 Critical Assets in San Antonio Dam Failure Inundation Zone

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*Additional data provided by Department of Water Resources, DSOD, 2022.*

### Impact Analysis

The impacts of a Nacimiento Dam failure or a San Antonio Dam failure will impact the District's Moss Landing service area. In the event that a dam failure occurs, facilities may experience structure damage due to flowing debris, saturation of building materials, and collapse of water-logged structures. District assets with electrical parts or motors are most likely to incur damage if submerged. Water supply may be contaminated and electric equipment and equipment with motors may need repair or replacement. The treatment and cleaning of water supplies and replacement of equipment with generate costs to the District. If critical assets are unable to be repaired or replaced and if water remains contaminated for several days, service continuity may be disrupted, and the District may not be able to provide all of its customers with water. Dam failure event may require evacuation and threaten the health and safety of District employees and District customers.

#### *Water System Damage*

Table 47 summarizes the value of critical assets located in the dam failure inundation area.

**Table 47 Values of Critical Assets in Dam Failure Inundation Zone**

| Category | Value |
|---|---|
| Pipe Crossing | $150,000 |
| Pipe Crossing | $215,000 |

### Impact Summary and Secondary Hazard

Damage from dam failure is dependent on location, severity and length of a given hazard event.

A dam failure may trigger a hazardous material release accident if certain facilities or pipelines are impacted. A hazardous material release accident may contaminate local water supplies and/or the environment, threatening the health of the communities within the District's service areas. A dam failure may also trigger a landslide if water velocities are high, and soil deteriorates.

Anticipated impacts from future dam failure include:

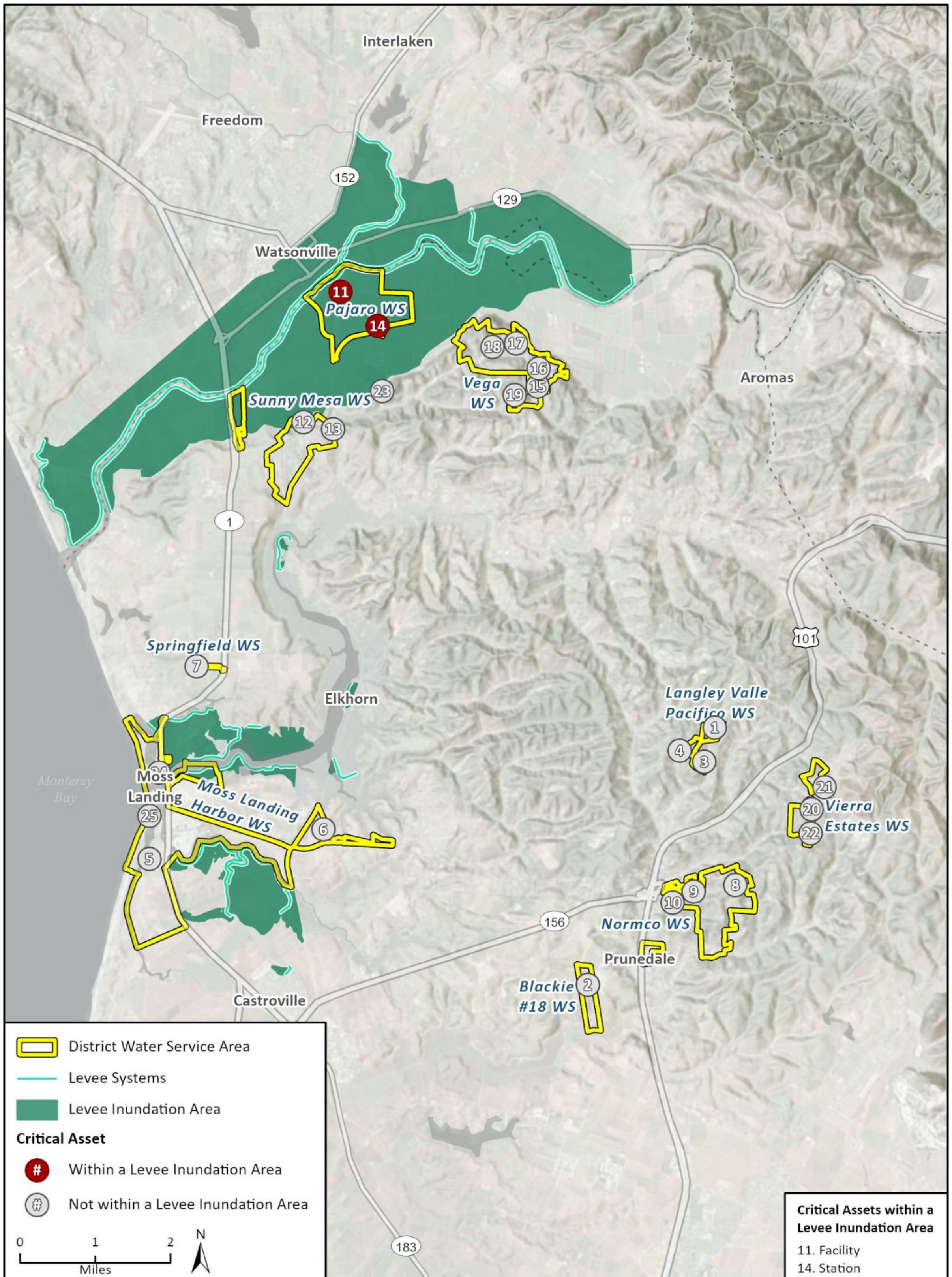
- Injury and/or loss of life
- Structure and/or equipment damage
- Water quality degradation and supply disruption
- Disruption to infrastructure
- Damage to roads and bridges

## 4.7 Levee Failure

### Vulnerability Assessment

Levee failure may have severe impacts on the District's service areas and critical asset. Levee failures can cause severe flooding and damage as floodwaters inundate areas with structures and equipment. Table 48 summarizes the category and number of the District's assets located within the Pajaro Levee failure inundation area. There is one District facility and one station located in the Pajaro Levee failure inundation area. Figure 25 shows the geographic distribution of the critical assets and infrastructure relative to the Pajaro Levee failure inundation zone.

**Figure 25 Critical Assets in Levee Failure Inundation Area**




*Imagery provided by Esri and its licensors © 2022.*
*Additional data provided by National Levee Database, 2022.*

**Table 48 Critical Assets in Levee Failure Inundation Area**

| Category | Number of Critical Assets |
|---|---|
| District Facility | 1 |
| Station | 1 |

## Impact Analysis

The impacts of levee failure will primarily be felt in the District's Pajaro service area. If a levee fails, floodwaters will inundate the land area protected by the levee. In the event that a levee failure occurs, facilities may experience structure damage due to flowing debris, saturation of building materials, and collapse of water-logged structures. District assets with electrical parts or motors are most likely to incur damage if submerged. Water supply may be contaminated and electric equipment and equipment with motors may need repair or replacement. The treatment and cleaning of water supplies and replacement of equipment with generate costs to the District. If critical assets are unable to be repaired or replaced and if water remains contaminated for several days, service continuity may be disrupted, and the District may not be able to provide all of its customers with water. A levee failure event may require evacuation and threaten the health and safety of District employees and District customers.

### *Water System Damage*

Table 49 summarizes the value of critical assets located in the levee failure inundation area.

**Table 49 Values of Critical Assets in the Levee Failure Inundation Area**

| Category | Value |
|---|---|
| District Facility | $835,365 |
| Station | $675,229 |

## Impact Summary and Secondary Hazard

Damage from a levee failure is dependent on location, severity and length of a given hazard event.

A levee failure may trigger a hazardous material release accident if certain facilities or pipelines are impacted. A hazardous material release accident may contaminate local water supplies and/or the environment, threatening the health of the communities within the District's service areas. A dam failure or levee failure may also trigger a landslide if water velocities are high, and soil deteriorates.

Anticipated impacts from future a levee failure include:

- Injury and/or loss of life
- Structure and/or equipment damage
- Water quality degradation and supply disruption
- Disruption to infrastructure
- Damage to roads and bridges
- Hazardous materials spill
- Significant economic impacts

# 4.8 Wildfire

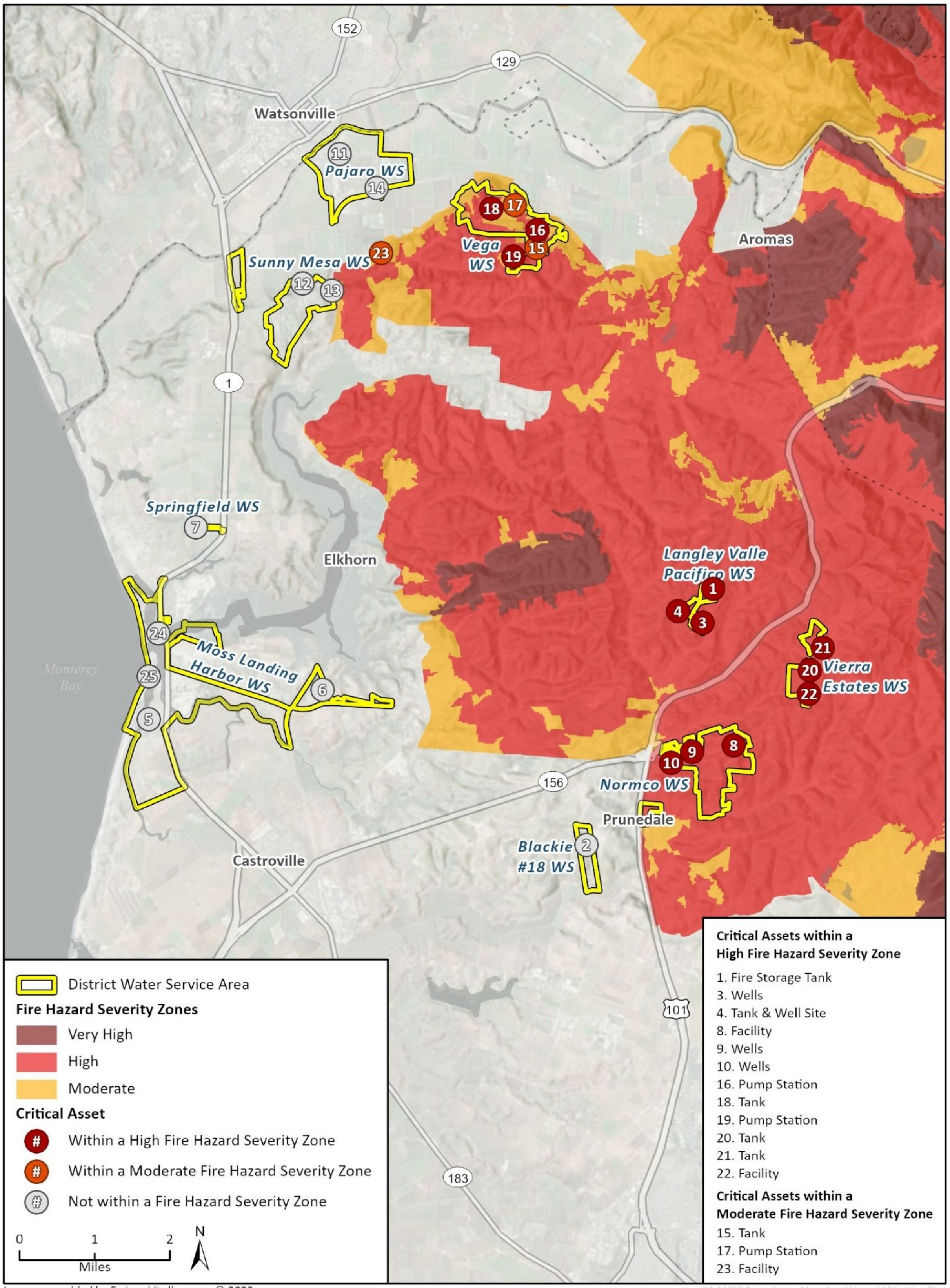
## Vulnerability Assessment

Wildfires can cause extreme destruction and damage to District assets, community properties and life. District service areas within the wildland urban interface (WUI) are particularly vulnerable during wildfires. The WUI is a zone of transition between open space and urban development. WUI areas are particularly at risk to wildfire because they often have significant quantities of vegetative fuels located near residential and commercial areas. Fire protection services are provided to the District by the North County Fire Protection District of Monterey County, which is partially dependent on part-time and volunteer fire-fighting personnel. This assessment assesses the District's critical assets in proximity to CAL FIRE's Fire Hazard Severity Zones. The zones were developed using a field-tested model that assigns a hazard score on a variety of factors that influence fire behavior and risk, including natural vegetation, fire history, flame length, blowing embers, terrain, and local climate conditions. Fire hazard severity zones are classified as moderate, high, and very high. As seen in Figure 26, 12 critical District assets and 3 critical assets are in the high fire hazard severity zone and moderate fire hazard severity zone, respectively. A fire storage tan, wells, and tank site in Langley Valle Pacifico Water System are located in the fire hazard severity zone. A District facility and two wells facilities in Normco Water System are located in the fire hazard severity zone. Two tanks and three pump stations in the Vega Water System are located in the fire hazard severity zone. A tank and District facility in the Vierra Estates Water System is located in the fire hazard severity zone. Table 50 summarizes the category and number of the District's critical assets within the high and moderate fire hazard severity zones.

**Table 50 Critical Assets in Fire Hazard Severity Zones**

| Category | Number of Critical Assets in the High FHSZ | Number of Critical Assets in the Moderate FHSZ |
|---|---|---|
| District Facility | 2 | 1 |
| Wells | 3 | |
| Yard | 1 | |
| Well Site | 1 | |
| Pump Station | 2 | 1 |
| Tank | 4 | 1 |
| Fire Storage Tank | 1 | |

## Figure 26 Critical Assets in Fire Hazard Severity Areas

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*Additional data provided by CAL FIRE, 2022.*

21-11850 PajaroSunny Mesa Local Hazard Mitigation Plan

## Impact Analysis

Wildfire impact in the District will vary based on the severity and location of a wildfire event. Eastern areas of the District and the Vega Water System, Vierra Estates Water System, Normco Water System, Blackie No.18 Water System, and Langley Valley Pacifico Water System are located within the high and moderate fire hazard severity zones and include WUI areas that are particularly at risk to wildfires. During a wildfire event, the District's water pipes, both underground and above-ground, may burn during due to the heat from a wildfire. Recent experiences associated with the Tubbs Fire (2017) and Camp Fire (2018) have associated chemical drinking water contamination with wildfires. If this occurs, local public health will be threatened and the District's service continuity will be disrupted. Wildfire may threaten the safety of District employees and District customers and impede access to assets in need of repair or maintenance. Water supply availability may be disturbed if the District supplies water for fighting fires.

Wildfire may directly damage or destroy District assets, leading to economic and service continuity impacts. The District's buildings, equipment, and pipes are susceptible to wildfire risk. Additionally, the District's water supply may be relied on for local firefighting efforts which may deplete the ability of the District to provide water to its customers. Utility providers may temporarily shut off power to the District' service areas when wildfire risk is particularly high; this is referred to as a Public Safety Power Shutoff (PSPS). If a PSPS event lasts several days and involves the entire grid serving the District's water systems, service continuity may be disrupted and the District may not be able to provide all its customers with water.

### *Water System Damage*

Table 51 summarizes the value of critical assets located in the fire hazard severity zones.

**Table 51 Values of Critical Assets in Fire Hazard Severity Zones**

| Category | Value |
|---|---|
| Fire Storage Tank | $89,372 |
| Wells | $107,721 |
| Tank & Well Site | $332,074 |
| District Facility | $565,192 |
| Wells | $167,745 |
| Wells | $232,787 |
| Tank | $147,592 |
| Pump Station | $195,965 |
| Pump Station | $97,857 |
| Tank | $476,373 |
| Pump Station | $12,478 |
| Tank | $175,438 |
| Tank | $166,201 |
| District Facility | $109,903 |
| District Facility | $178,615 |

### Impact Summary and Secondary Hazards

Secondary hazard including post-fire erosion, landslides, poor air quality, and contamination of water may also impact the District's service areas and may remain hazardous for a greater period of time than the wildfire itself.

Damage from wildfires is dependent on location, severity and length of a given wildfire event and will most likely impact certain District service areas during specific times.

Anticipated impacts from future wildfires include:

- Injury and/or loss of life
- Structure and/or equipment damage
- Water quality degradation and supply disruption
- Disruption to infrastructure
- Damage to roads and bridges
- Hazardous materials spill
- Significant economic impacts

## 4.9 Landslide

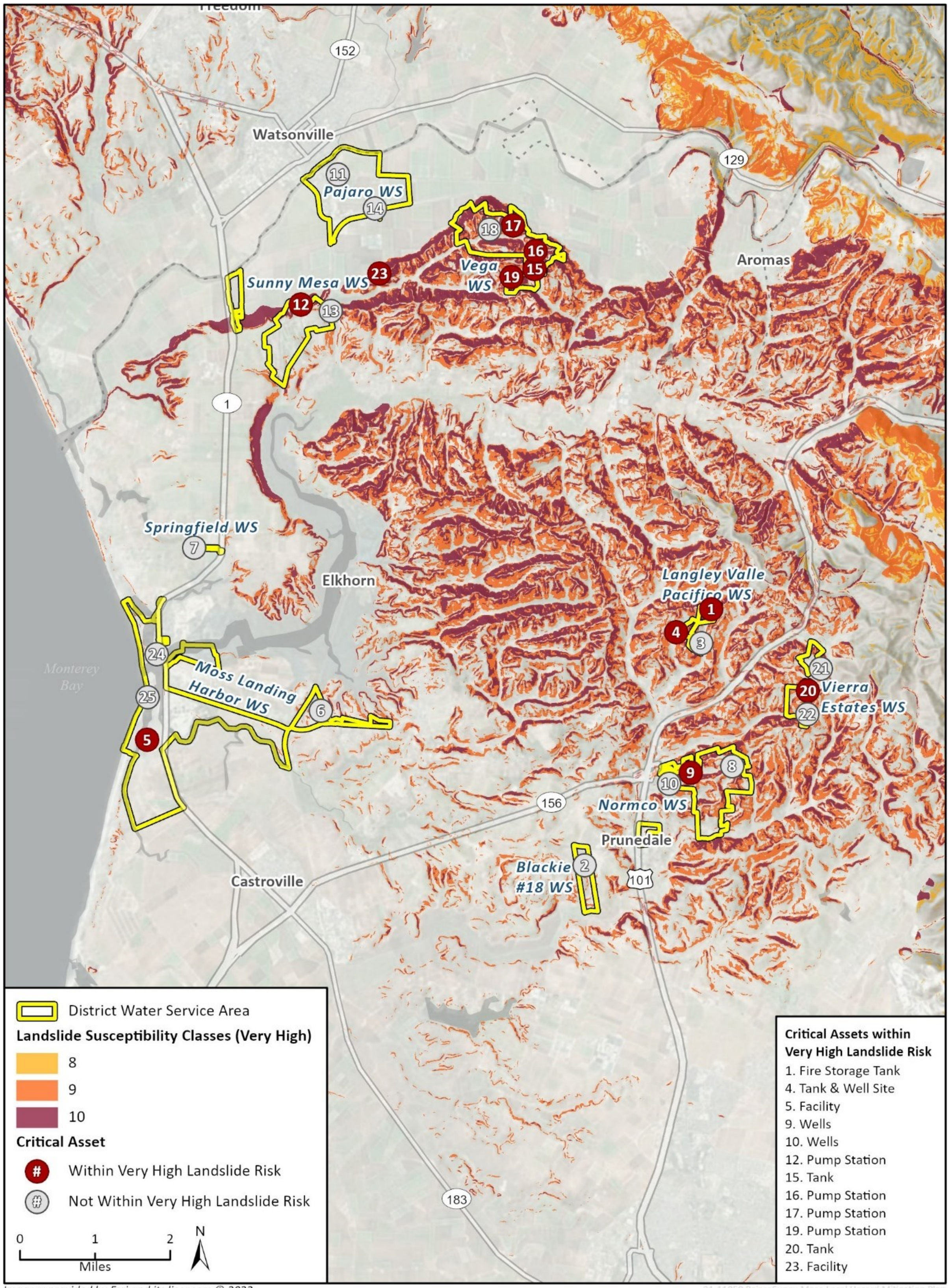
### Vulnerability Assessment

Landslides are most likely to occur in areas with unstable soils and sediment, weak rocks and steep slopes. Such conditions exist in and near the District's Vega Water System, Langley Valle Pacifico Water System, Vierra Estates Water System, Normco Water System, and Blackie No. 18 Water System. A fire storage tank and tank & well site in the Langley Valle Pacifico Water System are located in the very high landslide hazard area. A District facility in the Moss Landing Water System is located in the very high landslide hazard area. A well site in Normco Water System is located in the very high landslide hazard area. A tank and pump station facility in the Sunny Mesa Water System are located in the very high landslide hazard area. A tank and three pump stations in the Vega Water System are located in the very high landslide hazard area. A tank in the Vierra Water System are located in the very high landslide risk area. Figure 27 shows the critical assets in the very high landslide risk area in the District's service areas. Table 52 summarizes the category and number of the District's critical assets within the very high landslide risk area.

**Table 52 Critical Assets Located in Very-High Landslide Hazard Area**

| Category | Number of Assets |
|---|---|
| Fire Storage Tank | 1 |
| Tank | 3 |
| Well Site | 1 |
| Facility | 2 |
| Wells | 2 |
| Pump Station | 4 |
| District Facility | 2 |

## Figure 27 Critical Assets in Landslide Susceptibility Areas

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*Additional data provided by CGS, Map Sheet 58, 2015.*

21-11850 PajaroSunny Mesa Local Hazard Mitigation Plan

## Impact Analysis

The District may experience a landslide event during an intense earthquake, an atmospheric river event, a storm with heavy precipitation, or in areas that have been recently burned during a wildfire. The eastern portion of the District's service areas is most at risk to landslides.

Landslides can directly damage the District's infrastructure, facilities, and equipment by disrupting structural foundation either by deforming the ground on which an assets is located on or by physically impacting an asset. Landslides may move tanks, lift stations, or pumps off their bases. The District's underground pumping may break or become detached if the ground around or underneath becomes deformed. If the Vega Water System, Langley Valle Pacifico, or Vierra Estates Water System tanks, which are located in very high landslide risk areas, were significantly damaged, State Water Board regulations might require potential "do not use" or "boil water "notices for down pipe customers depending on the degree of damage and pressure loss. Damaged water tanks and other critical water system assets could lead to service disruptions and compromised water services to customers.

### *Water System Damage*

Table 53 summarizes the value of critical assets located in the very high landslide hazard area.

**Table 53  Values of Critical Assets in Very-High Landslide Hazard Area**

| Category | Value |
|---|---|
| Fire Storage Tank | $332,074 |
| Tank & Well Site | $577,184 |
| District Facility | $167,745 |
| Wells | $513,438 |
| Tank & Pump Station | $147,592 |
| Tank | $195,965 |
| Pump Station | $97,857 |
| Pump Station | $12,478 |
| Pump Station | $175,438 |
| Tank | $178,615 |
| District Facility | $332,074 23 |

## Impact Summary and Secondary Hazards

Damage from landslides is dependent on location, severity and length of a given landslide and will most likely impact certain District service areas during specific times.

Landslides events don't cause secondary hazards, on the contrary, they are often triggered by other hazards such as earthquakes, flooding, or wildfires.

Anticipated impacts from future flood events include:

- Injury and/or loss of life
- Structure and/or equipment damage
- Disruption to infrastructure
- Damage to roads and/or bridges

- Water quality degradation and water supply disruption
- Significant economic impacts

# 4.10 Extreme Heat

## Vulnerability Assessment

Climate change is projected to increase the frequency and severity of extreme heat events in the District's service areas. Extreme heat events lead to increased period of high ambient operating temperature which may negatively impact the District critical assets. The District's service areas which are located inland, Vega Water System, Langley Valle Pacifico Water System, Vierra Estates Water System, Blackie No.18 Water System, and Normco Water System, may be more prone to extreme heat than the other Water Systems which are located in closer proximity to the coast.

## Impact Analysis and Summary

With increased frequency and severity of extreme heat events, the District's critical assets and equipment may face long-term impacts. The ambient operating temperature within which the District's equipment operates is a significant factor in the equipment's lifespan. High ambient operating temperatures may lead to a reduction of the lifespan for motors and related equipment within the District's Water Systems The District may face increased costs associated with the additional cooling required for certain District facilities and assets. Additionally, during an extreme heat event, electricity utilities may turn off power in a PSPS in order to mitigate wildfire risk. If a PSPS event lasts several days and involves the entire grid serving the District's Water Systems, service continuity may be disrupted, and the District may not be able to provide all its customers. Extreme heat events pose significant health risk to District employees and District customers who may suffer from heat stroke, heat exhaustion, or dehydration.

Damage from extreme heat is dependent on location, severity and length of a given extreme heat event and will most likely impact certain District service areas during specific times.

Extreme heat event can exacerbate drought conditions and can create circumstances in which wildfire risk is high.

Anticipated impacts from future extreme heat events include:

- Injury and/or loss of life
- Equipment damage
- Power interruption
- Service disruption
- Significant economic impacts

# 4.11 Drought

## Vulnerability Assessment

Droughts occur at a regional scale, meaning that all of the District's service areas will be similarly impacted during a period of drought, particularly at the groundwater basin scale. Prolonged drought conditions may decrease the District's water supply which relies on local groundwater resources. Future droughts will impact all District Water Systems. The District's Pajaro Water System, Sunny-

Mesa Water System, and Vega Water System draw water supplies from the Pajaro Valley Basin while the Langley Valle Pacifico Water System, Normco Water System, Vierra Estates Water System, Blackie No. 18 Water System, and Springfield Water System draw from the Salinas Valley Basin.

### Impact Analysis

While drought does not pose a risk to the District's asset's, it does threaten water supply and quality. Prolonged droughts may require that the District extract groundwater from deeper wells or non-local sources which will have financial implications; both the District and its customers may both experience increased costs. Increased water rates will disproportionately impact customers who are economically disadvantaged. Groundwater overdraft bas been a concern in the Pajaro Valley Basin and the Salinas Valley Bason for the past few decades. Specifically, since 1980, the California Department of Water Resources named the Pajaro Valley as 1 of 11 basins in the state with critical conditions of groundwater. Over-pumping of groundwater resources in both basins can threaten the long-term quality and reliability of groundwater supplies and induce saltwater intrusion.

### Impact Summary and Secondary Hazards

Droughts can lessen the groundwater recharge which the District's water systems rely on. In periods of drought, groundwater over-pumping can initiate or exacerbate sea water intrusion into freshwater aquifers, increasing water contamination. Saltwater intrusion can either be exacerbated or triggered by groundwater overdraft. Saltwater intrusion within local freshwater aquifer may require extra filtration, treatment, and mitigation efforts which will increase costs to the District. Additionally, drought conditions increase the threat of wildfire in the District's service areas. Prolonged periods of drought can lead to dried out vegetation which has a high risk of wildfire ignition.

Damage from drought is dependent on location, severity and length of a given drought and will most likely impact certain District service areas during specific times.

Anticipated impacts from future droughts include:

- Injury and/or loss of life
- Equipment damage
- Power interruption
- Service disruption
- Significant economic impacts

## 4.12 Windstorms

### Vulnerability Assessment

Windstorms pose a threat to the critical assets in and the service continuity of the District. They can cause damage to facilities, equipment, power lines, roofs, trees, and other infrastructure in the District's service areas. Strong windstorms often move through the District during the winter months and a 2017 windstorm damaged one of the District's water tanks in the Blackie No. 18 Water System.

### Impact Analysis

During a strong windstorm, electricity utility providers may temporarily turn off power to the District's service areas to mitigate wildfire risk. If a PSPS event lasts several days and involves the entire grid serving the District's water systems, service continuity may be disrupted, and the District may not be able to provide all its customers. The District's assets and facilities may be physically damaged from strong winds or flying debris during a windstorm. This may lead to economic losses and potentially the disruption of water services to customers if critical water system assets are damaged and need to be repaired or replaced. Strong windstorms pose a risk to District's employees and District customers who may be injured by strong winds or flying debris.

### Impact Summary and Secondary Hazards

Damage from windstorms is dependent on location, severity and length of a given windstorm and will most likely impact certain District service areas during specific times.

High winds from a windstorm in conjunction with dry and hot conditions may trigger a wildfire in the District's service areas.

Anticipated impacts from future windstorms include:

- Injury and/or loss of life
- Structure and/or equipment damage
- Disruption to infrastructure
- Service disruption
- Power interruption
- Significant economic impacts

## 4.13 Sea Level Rise

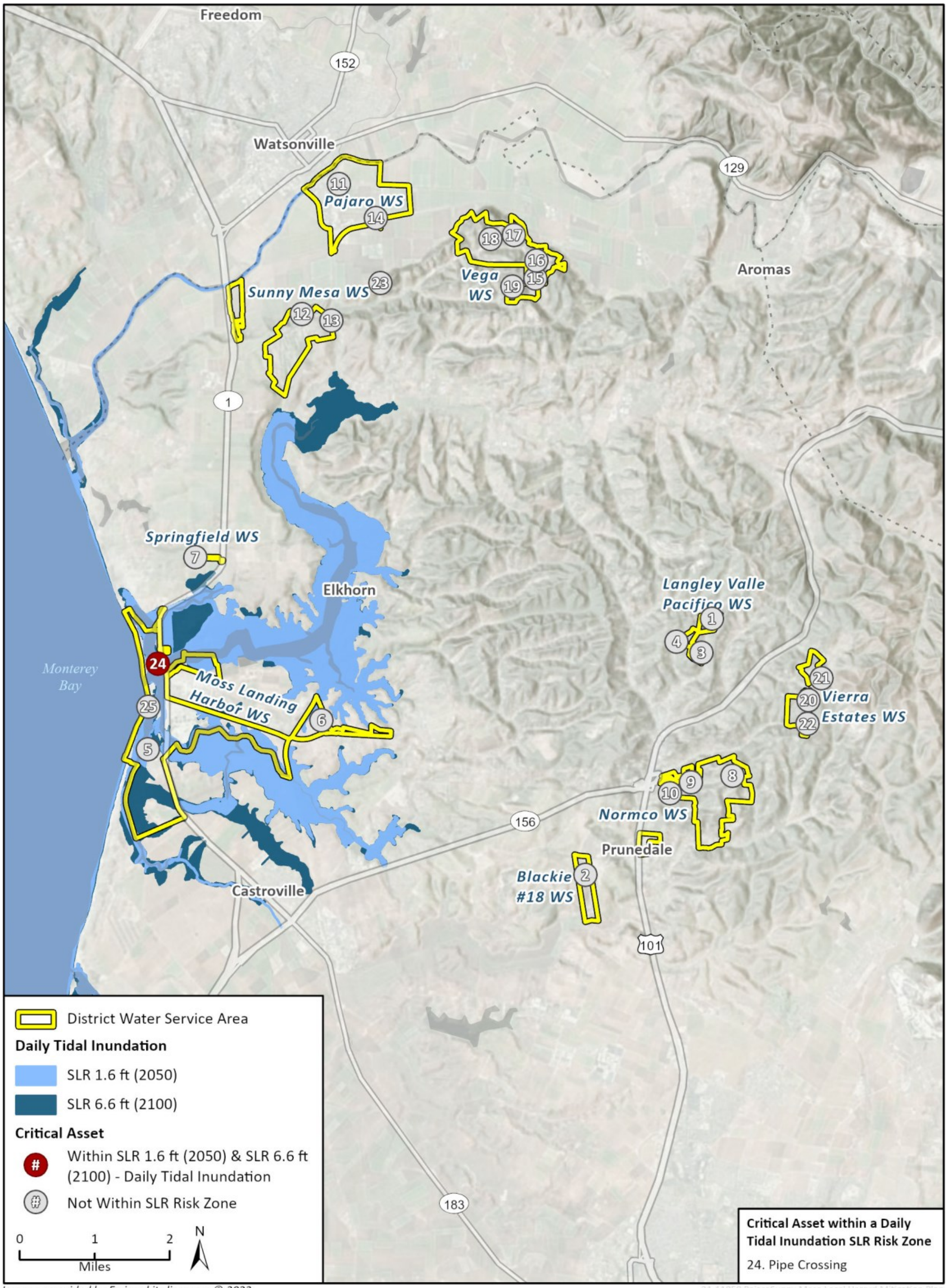
### Vulnerability Assessment

Sea level rise can cause damage and destruction to the District's critical assets and disrupt water services. The Moss landing service area is particularly at risk to sea-level rise and related coastal hazards because of its proximity to the Pacific Ocean, Elkorn Slough, Moro Cojo Slough, and the Salinas River. A pipe crossing along the Highway 1 bridge crossing in the Moss Landing Harbor Water System is located in the 2050 and 2100 sea level rise hazard area. Two pipe crossing, one along the Highway 1 bridge crossing and one along Sanholdt Road in the Moss Landing water system are located in the 2050 sea level risk with a 1% storm event hazard area and in the 2010 sea level rise with a 1% storm event hazard area, as seen in Figure 28and Figure 29. Table 54 summarizes the category and number of the District's critical assets within 1.6 feet and 6.6 feet of sea level rise. There is one pipe crossing within the Moss Landing Water System that is critical and located within the 1.6 feet and 6.6 feet sea level rise hazard areas.

**Table 54 Critical Assets within a Sea Level Rise Hazard Area**

| Category | 1.6 Feet (2050) | 6.6 Feet (2100) |
|---|---|---|
| Pipe Crossing | 1 | 1 |

**Figure 28 Critical Assets within a Daily Tidal Inundation Sea Level Rise Risk Zone**

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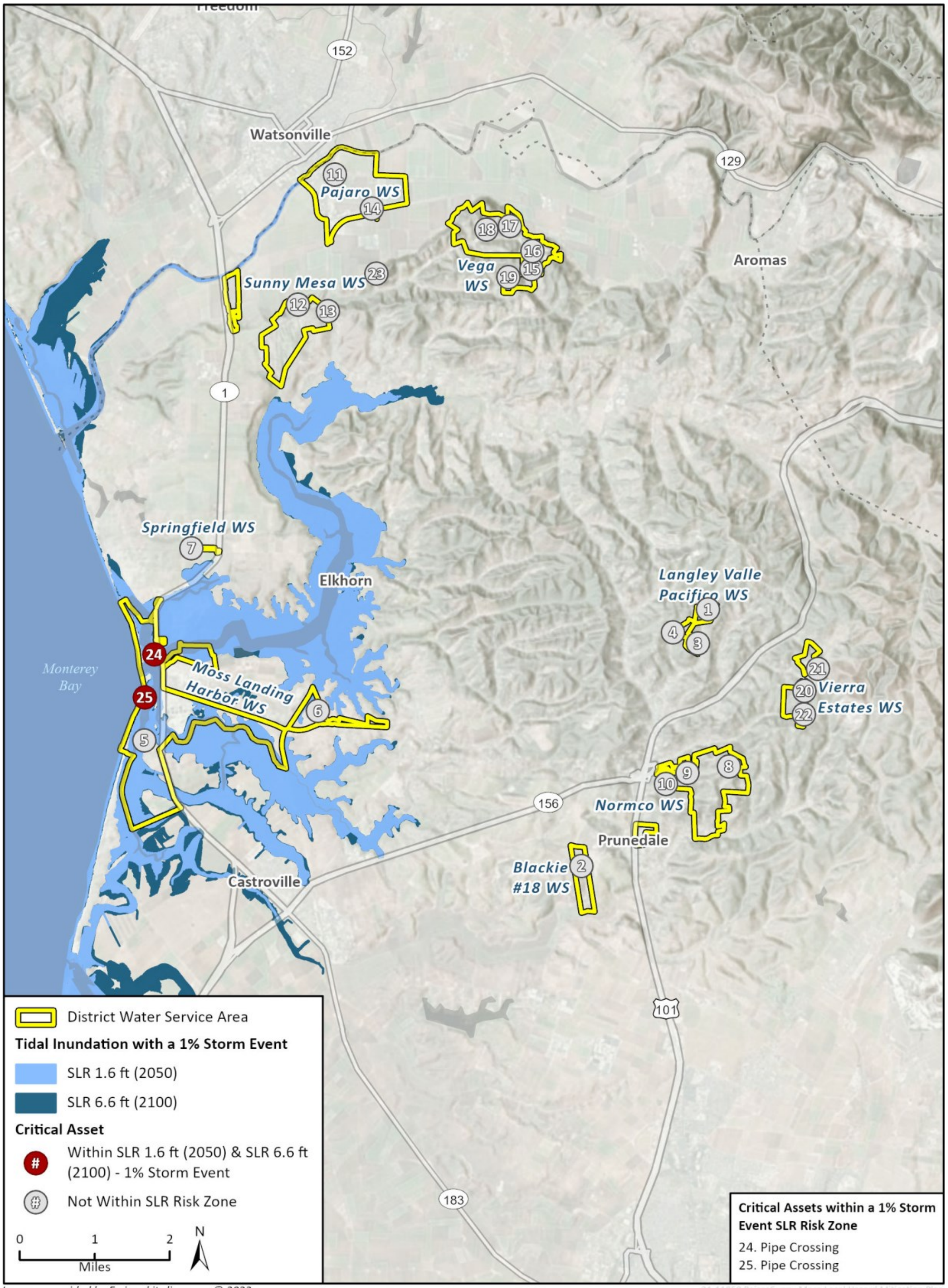
*Additional data provided by Our Coast Our Future, 2022.*

**Figure 29 Critical Assets within a Daily Tidal Inundation Sea Level Rise and 1% Storm Risk Zone**

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*Additional data provided by Our Coast Our Future, 2022.*

Table 55 summarizes the category and number of the District's critical assets within 1.6 feet and 6.6 feet of sea level rise with a 1% storm event. There are two pipe crossings within the Moss Landing Water System that are critical and located within 1.6 feet and 6.6 feet sea level rise with a 1% storm event hazard areas.

### Table 55 Critical Assets within a Sea Level Rise with a 1% Storm Event Hazard Area

| Category | 1.6 Feet (2050) | 6.6 Feet (2100) |
|---|---|---|
| Pipe Crossing | 2 | 2 |

## Impact Analysis

Climate change induced sea level rise will increase the likelihood and severity of hazards including coastal erosion, fluvial flooding, tidal inundation, coastal inundation, tsunami inundation, and storm surges. Sea level rise may worsen coastal storm surges and threaten to inundate infrastructure and assets located in the Moss Landing service areas. Coastal erosion is projected to increase in the future in the Moss Landing area. If erosion rates are high, District facilities and assets that are in close proximity to the coastline may become more likely to be damaged from coastal storms and tidal inundation. Inundation from rising tides and coastal flooding may inhibit access to District assets and facilities and may decrease overall mobility within the District's Moss Landing service areas.

If critical assets are damaged from sea level rise or related coastal hazards, the District may experience increased economic losses associated with the cost to repair or replace an asset and/or the costs associated with water service disruption. District assets with electrical parts or motors are most likely to incur damage if submerged that may require repair or replacement.

### *Water System Damage*

Table 56, Table 57, Table 58, and Table 59 summarize values of critical assets local in the sea level rise hazard area and in the sea level rise with a 1% storm event hazard area.

### Table 56 Values of Critical Assets Sea Level Rise Hazard Area (2050)

| Category | Value |
|---|---|
| Pipe Crossing | $150,000 |

### Table 57 Values of Critical Assets Sea Level Rise Hazard Areas (2100)

| Category | Value |
|---|---|
| Pipe Crossing | $150,000 |

### Table 58 Values of Critical Assets in Sea Level Rise with a 1% Storm Event Hazard Area (2050)

| Category | Value |
|---|---|
| Pipe Crossing | $150,000 |
| Pipe Crossing | $215,000 |

**Table 59 Values of Critical Assets in Sea Level Rise with a 1% Storm Event Hazard Area (2100)**

| Category | Value |
|---|---|
| Pipe Crossing | $150,000 |
| Pipe Crossing | $215,000 |

### Impact Summary and Secondary Hazards

Sea level rise may exacerbate or trigger saltwater intrusion into coastal aquifers, leading to water contamination and increased water treatment costs. High velocity and high-pressure coastal flooding may lead to a hazardous material release accident if certain facilities or pipelines are impacted. A hazardous material release accident may contaminate local water supplies and/or the environment, threatening the health of the communities within the District's service areas.

Damage from sea level rise and related coastal hazards is dependent on location, severity and length of a given hazard and will most likely impact certain District service areas during specific times.

Anticipated impacts from future sea level rise and related costal hazards include:

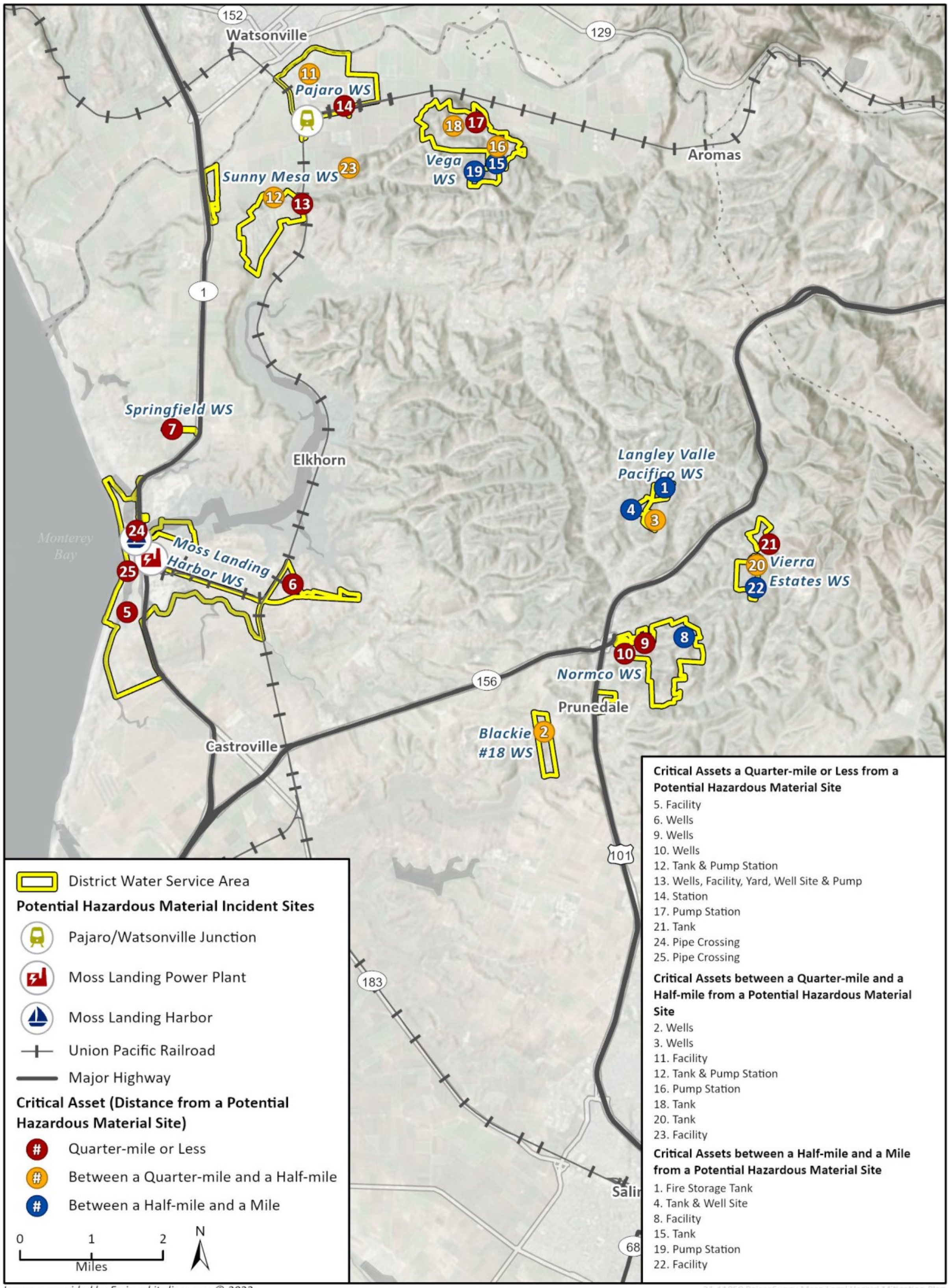
- Injury and/or loss of life
- Structure and/or equipment damage
- Water quality degradation and supply disruption
- Disruption to infrastructure
- Damage to roads and bridges
- Hazardous materials spill
- Significant economic impacts

## 4.14 Hazardous Materials

### Vulnerability Assessment

Hazardous materials release accidents can cause significant harm to District assets and water services. All areas of the District are vulnerable to a hazardous materials release incidents because there are several potential hazardous materials incident sites located throughout the District's service areas. Table 60 summarizes the category and numbers of the District's critical assets within a quarter-mile or less, between a quarter-mile and a half-mile and between a half-mile and a mile of a potential of hazardous material incident site. All critical assets in the District are located within 1 mile of a potential hazardous material incident site, as seen in Figure 30.

**Figure 30 Critical Facilities located near Hazardous Materials Release Site**

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*Additional data provided by Monterey County, 2022, and Homeland Infrastructure Foundation-Level Data (HIFLD), 2021.*

**Table 60 Critical Assets Near Hazardous Materials Incident Sites**

| | Distance from a Potential Hazardous Material Site | | |
|---|---|---|---|
| Category | Quarter-mile or Less | Between a Quarter-mile and a Half-mile | Between a Half-mile and a Mile From a Potential |
| Facility | 1 | | 2 |
| Wells | 4 | 2 | |
| Tank | 2 | 2 | 1 |
| Pump Station | 2 | 2 | 1 |
| Yard | 1 | | |
| Well Site | 1 | | 1 |
| Pump | 1 | | |
| Pipe Crossing | 2 | | |
| Fire Storage Tank | 1 | | 1 |

## Impact Analysis

Hazardous material release accidents can cause long-term impacts and contamination to nearby people, property, water resources, and the environment. A significant hazardous materials disaster may require immediate evacuation of facilities or neighborhoods in or near the District's service areas. A hazardous materials spill accident may negatively impact the health and safety of District employees and the District's customers. The District's water supply may become contaminated from a hazardous material release. Severity and spread of contamination are dependent on the extremity of the release as well as the soil type and groundwater depth. If water supplies are contaminated, the State Water Board regulations may require "do not use" notices for down pipe customers depending on the degree and spread of contaminated. Water system assets may need to be replaced and water supply resources may need to be cleaned and treated, which may compromise water services to customers and generate economic losses to the District.

### *Water System Damage*

Table 61 summarizes values of critical assets near hazardous materials incident sites.

**Table 61 Values of Critical Assets Near Hazardous Materials Incident Sites**

| Category | Value |
|---|---|
| Fire Storage Tank | $89,372 |
| Wells | $241,790 |
| Wells | $107,721 |
| Tank & Well Site | $332,074 |
| Facility | $577,184 |
| Wells | $168,323 |
| Facility | $63,715 |
| Facility | $565,192 |
| Wells | $167,745 |
| Wells | $232,787 |
| Facility | $835,365 |

| Category | Value |
|---|---|
| Tank & Pump Station | $513,438 |
| Wells, Facility, Yard, Well Site & Pump | $116,839 |
| Station | $675,229 |
| Tank | $147,592 |
| Pump Station | $195,965 |
| Pump Station | $97,857 |
| Tank | $476,373 |
| Pump Station | $12,478 |
| Tank | $175,438 |
| Tank | $166,201 |
| Facility | $109,903 |
| Facility | $178,615 |
| Pipe Crossing | $150,000 |
| Pipe Crossing | $215,000 |

## Impact Summary and Secondary Hazards

Hazardous material release accidents are often triggered by other hazards such as earthquakes, flooding, and tsunamis.

Damage from a hazardous materials release accident and related coastal hazards is dependent on location, severity and length of a given accident and will most likely impact certain District service areas during specific times.

Anticipated impacts from future sea level rise and related costal hazards include:

- Injury and/or loss of life
- Structure and/or equipment damage
- Water quality degradation and supply disruption
- Significant economic impacts

# 5 Mitigation Strategy

## 5.1 Overview of Mitigation Strategy

The District's mitigation strategy identifies actions that can reduce the potential losses identified in the Vulnerability Assessment. The Mitigation Strategy section of the District's LHMP includes mitigation goals, actions, action plan, and mitigation plan integration mechanisms. The District will utilize the content in this section to identify a path towards reducing risk from the hazards of concern.

| **Q&A \| ELEMENT C. MITIGATION STRATEGY \| C1.a** |
|---|
| **Q:** Does the plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3)) |
| **A:** See **Existing Policies and Programs** below |

## 5.2 Existing Authorities, Policies, Programs, and Resources

Moving forward, the District will actively integrate hazard mitigation strategies into daily operations and regular planning initiatives. Specifically, the General Manager, Operations Manager, and Planning Committee will incorporate mitigation strategies into existing policies and programs, funding sources, capital improvement planning, and employee duties that can support hazard mitigation activities in the District. The mitigation strategies outlined in this section leverage and build-upon the District's success and capabilities to further service reliability and operational resilience. Additionally, this section identifies existing authorities, policies, programs, and resources that the District should utilize for hazard mitigation planning. The District is equipped with several capabilities for implementing actions to reduce its long-term vulnerability to the identified hazards (Table 62). The District will integrate findings and strategies from this Plan into the Emergency Response Plan, which is updated on an as needed basis.

### Authorities

The District is an independent special district governed by a five-member Board of Directors, each of whom must be a registered voter residing in the District. Board Members are appointed by the County of Monterey Board of Supervisors and serve four-year terms in accordance with the resolution establishing the District (LAFCO Resolution 92-01), the Community Services District Law, California Uniform District Election Law and the District's adopted bylaws. Board officers include a President, Vice President, Secretary, Assistant Secretary, and Treasurer elected among the Board Members with rotating one-year duties or until a successor is elected. There are no standing Board committees, but the Board may establish committees from time to time.

The District has by-laws in place that describe the authority of the District and the State water code law that applies to the District. It provides for open governmental practices and is in general compliance with state requirements for Special Districts, including Board Member compliance with the Brown Act, Assembly Bill 1234 ethics training, financial transaction reporting to the State Controller's Office, conducting regular audits, and other requirements of law. Additionally, the District maintains a website for public access to share contact information, District services, meeting dates, water rates, conservation measures and notices.

**Table 62 Existing Capabilities Overview**

| Type of Capability | Resource | Responsible |
|---|---|---|
| **Planning and Regulatory** | Capital Improvement Plan (CIP) | General Manager |
| | Emergency Response Plan (ERP) | Operations Manager |
| | Operations Plan | Operations Manager |
| **Administrative and Technical** | Engineering | District Engineer |
| | Finance | General Manager |
| | Planning | General Manager |
| | Operations | Operations Manager |
| | Maintenance | Operations Manager |
| | Grant Management | Operations Manager |
| | Mutual Aid | General Manager |
| | Emergency Management | General Manager |
| **Fiscal** | General Fund | General Manager |
| | Special Purpose Taxes | General Manager |
| | CIP Project Funding | General Manager |
| | Water Fees | General Manager |
| **Education and Outreach** | Public Education Mailers | Operations Manager |
| | Website | Operations Manager |

## Policies and Programs

The District is enrolled in the Low Income Household Water Assistance Program (LHIWAP) through the California Department of Community Services & Development. The program provides financial assistance to low-income California residents to help manage their residential water utility costs.

## Resources – Funding Sources

The District's revenue comes from water usage and base fees as well as a 1% Special District tax. A portion of the District's revenue is directed to the Capital Improvement Program (CIP).

The District operates a Field Division and Administrative Division. The Field Division employees include managers, water maintenance operators, and supervisors. The Field Division is responsible for the operation, maintenance, and repair of the District's water systems and infrastructure. The District's Administrative Division is responsible for overseeing employee compensation and benefits, procedures, customer billing and other administrative tasks. The District is led by the General Manager and the Board of Directors. The General Manager is responsible for leading day-to-day operations and serving as a liaison to the Board of Directors. The District's Operations Managers is responsible for coordinating with the General Manager to manage day-to-day operations. The General Manager and Operations Manager are responsible for the implementation of this LHMP and accompanying mitigation goals and actions.

With this adoption of this LHMP, the District will look to obtain FEMA hazard mitigation grant funding and State of California funding for hazard mitigation projects, programs, and improvements.

There are several state and federal funding programs that the District can consider applying for to fund mitigation actions outlines in the LHMP.

### *Hazard Mitigation Grant Program (HMGP)*

FEMA's Hazard Mitigation Grant Program provides funding to governments and public entities to develop hazard mitigation plans and implement actions that mitigate or reduce losses from future disasters. Mitigation actions including retrofitting or upgrading vulnerable water district infrastructure to limit damage from seismic activity and implementing hardening upgrades to structures and facilities located in fire hazard severity zones are eligible for HMGP funding. Actions that increase system reliability during hazard events, such as constructing additional intertie connections between systems (and sub-systems), are also eligible for the HMGP program. HMGP funding is available after a presidentially declared disaster. All applicants must have developed and adopted a hazard mitigation plan to be eligible for funding that can support hazard mitigation projects. Applicants can apply to the program annually within 12 months of the date of a presidential major disaster declaration. The cost share is 75% federal/25% non-federal. The 25% non-federal can be provided by state or local government, an individual, construction labor, a Small Business Administration loans, or Increased Cost of Compliance (ICC) funds from a flood insurance policy. Cal OES programs may fund 75% of the 25% non-federal portion. FEMA will provide 100% federal funding for applicant management costs. Eligible applications must be shown as cost-efficient, meaning project benefits must be greater than costs, through a benefit cost analysis (BCA). FEMA provides a BCA Toolkit which can be used to as guidance for the analysis. Eligible projects must also be shown to be

- Cost effective
- Reduce or eliminate risk and damage from future hazards
- Meet either of the two latest International Building Codes (i.e., 2015 or 2018) if applicable
- Align with the applicable hazard mitigation plan
- Meet all environmental historic preservation requirements

HMGP Website: https://www.fema.gov/grants/mitigation/hazard-mitigation

### *Building Resilience Infrastructure and Communities (BRIC)*

FEMA's Building Resilience Infrastructure and Communities (BRIC) program provides states, local communities, tribes and territories with funding to support disaster and natural hazard mitigation projects. A State or Territory must have received a major disaster declaration in seven years prior to the annual application start date to be eligible for BRIC funding. Mitigation actions including procuring mobile back-up power generators for District water systems, upgrading assets to better withstand hazard events, and constructing interties between water system are eligible for BRIC funding. Generally, the cost share for BRIC is 75% federal/25% non-federal cost share funding. Cal OES programs may fund 75% of the 25% non-federal portion. FEMA will provide 100% federal funding for applicant management costs. BRIC program funding opens each year in September; BRIC funding can be used for mitigation projects, management costs, and capability and capacity building activities. Examples of capability and capacity building activities include building code, partnership, project scoping, and general hazard mitigation planning efforts. Eligible project be shown to be

- Cost effective (same methodology as described in the HMPG section)
- Reduce or eliminate risk and damage from natural hazards

- Meet either of the two latest published editions of relevant consensus-based codes, specifications, and standards
- Align with the applicable hazard mitigation plan
- Meet all environmental and historic preservation requirements

BRIC Website: https://www.fema.gov/grants/mitigation/building-resilient-infrastructure-communities

### *Flood Mitigation Assistance (FMA)*

FEMA's Flood Mitigation Assistance Program provides funding to states, local communities, tribes, and territories for projects the reduce or eliminate the risk of repetitive flood damage to buildings insured by the National Flood Insurance Program. Funding can be put towards project scoping, technical assistance, community flood mitigation projects, individual structure/property-level flood mitigation project, and management costs. Mitigation actions including elevating, armoring, or relocating critical water system assets from potential flooding and water damage are eligible for FMA funding. Generally, projects are eligible for 75% federal cost share. Cal OES programs may fund 75% of the 25% non-federal portion. FEMA will provide 100% federal funding for applicant management costs. FMA program funding opens each year in September. Eligible projects must be shown to be

- Cost effective (same methodology as described in the HMPG section)
- Located in participating NFIP Community. (In good standing)
- Align with the applicable hazard mitigation plan
- Meet all environmental and historic preservation requirements

FMA Website: https://www.fema.gov/grants/mitigation/floods#started

### *Pre-Disaster Mitigation (PDM)*

FEMA's Pre-Disaster Mitigation (PDM) grant provides funding to states, local communities, tribes, and territories for planning and implementing efforts designed to reduce the risk to individuals and property from future natural hazards. Mitigation actions including upgrading water system assets to be more corrosion resistant from sea level rise coastal hazard and procuring flex connectors for water system assets in order to mitigate damage from seismic activity are eligible for PDM funding. Generally, projects are eligible for 75% federal cost share. FEMA will provide 100% federal funding for applicant management costs. PDM program funding opens in May each year. Eligible projects must be shown to be

- Cost effective (same methodology as described in the HMPG section)
- Meet all technical feasibility and effectiveness requirements
- Align with the applicable hazard mitigation plan
- Meet all environmental and historic preservation requirements

PDM Website: https://www.fema.gov/grants/mitigation/pre-disaster

### *Prepare California*

Cal OES's Prepare California Initiative provides funding to California tribal government, local governments/communities/special districts, and private non-profit organizations to implement projects that reduce long-terms risks from natural disasters by investing in local capacity building and mitigation projects designed to protect vulnerable communities. Mitigation actions described in the above FEMA programs are eligible for match funding through Prepare California. Funding goes to projects in the following focus areas: local capacity buildings, whole community risk reduction, whole community approach, protection of life and property, public education and awareness, and nature-based solutions to hazard risk. Prepare California funding can be used to cover the required non-federal cost for eligible communities and projects applying for FEMA's HMPG, BRIC, and FMA programs. The Initiative's JumpStart program allocated funding to vulnerable communities to develop and implement resilience planning and activities. Prepare California FEMA match funding applications are due annually in September and JumpStart funding applications are due in October. Prepare California recommends applicants follow FEMA Hazard Mitigation Assistance Guidance in order to meet Prepare California Match program eligibility. Eligible projects must be shown to be

- Cost effective (same methodology as described in the HMPG section)
- Meet all technical feasibility and effectiveness requirements
- Align with the applicable hazard mitigation plan
- Meet all environmental and historic preservation requirements

Prepare California Website: https://www.caloes.ca.gov/office-of-the-director/operations/recovery-directorate/hazard-mitigation/prepare-california/

**Q&A | ELEMENT C. MITIGATION STRATEGY | C1.b**
**Q:** Does plan document each jurisdiction's ability to expand on and improve these existing policies and programs? (Requirement §201.6(c)(3))
**A:** See **Expansion of Existing Policies and Programs** below

# 5.3 Expansion of Existing Processes and Program

Following the completion of the LHMP, the District will work to integrate the findings and mitigation strategies into existing processes and programs as follows:

- **Planning and Policy** – The City plans to incorporate hazard mitigation criteria into its Capital Improvement Plan and Emergency Response Plan.
- **Administration and Technical** - The District plans to expand hazardous material and evacuation trainings for staff.
- **Financial and Outreach** – The District plans to expand hazard mitigation, emergency management and asset and infrastructure improvements projects by pursuing grant opportunities.
- **Education** – The District plans to expand its communications with the public, including through billing mailers and on its website to provide additional information on hazard mitigation and disaster preparedness.

**Q&A | ELEMENT C: MITIGATION STRATEGY | C3**
**Q:** Are there goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))
**A:** See **Mitigation Goals** below

# 5.4 Mitigation Goals

As defined by FEMA, goals are long-term policy statements and global visions that support the District's mitigation strategy. With input from the public, the planning committee identified four goals that align with the District's values and aim to guide the development of and implementation of hazard mitigation actions. The District's goals aspire to minimize or avoid vulnerabilities associated with the identified hazards of concern.

1. Increase water supply reliability to the public, including during and after a natural hazard.
2. Reduce the potential for loss of life, injury, and negative health impacts associated with natural hazards.
3. Improve the capacity of District staff and the community to prevent, protect against, respond to, mitigate, and recover from natural hazards.
4. Advance local, regional, state, federal, private and community partnerships for improved hazard mitigation.

**Q&A | ELEMENT C: MITIGATION STRATEGY | C4**

**Q:** Is there an identification and analysis of a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))

**A:** See **Table 30, Mitigation Actions,** below

# 5.5 Mitigation Actions

FEMA has developed six mitigation actions categories that help reduce hazards risks.

- Prevention
- Property protection
- Public education and awareness
- Natural resource protection
- Critical facilities protection
- Structural projects

## Prevention

Prevention actions mitigate the impact that future hazards will have on assets, people, and systems. Example prevention actions include planning and zoning, land development regulations, capital improvement planning, open space preservation and building codes.

## Property Protection

Property protection action protect building or structure from losses or damage from a hazard. Buildings or structures may be modified, relocated, or removed from hazard zones. Example property protection actions include: acquisition, relocation, rebuilding, floodproofing.

## Public Education and Awareness

Public education and awareness actions educate the public on ways to prepare for, cope with, and recover from a hazard event. Example public education and awareness actions include: public outreach campaigns, public notifications, mass mailings, hazard information centers, education programs.

## Natural Resource Protection

Natural resource protection actions mitigate risk from potential hazards events whilst restoring or protecting natural systems and resources. Example natural resource protection actions include: erosion and sediment control, wetlands protection, dune restoration, reforestation, and beach nourishment.

## Emergency Services

Emergency services actions aim to protect people and assets during and immediately following a hazard event. Example emergency services actions include: emergency response services, warning systems, protection of critical facilities.

## Structural Projects

Structural projects involve the construction or maintenance of manmade structures to reduce impacts during a hazard event. Example structural include: dams, levees, retaining walls, floodwalls, and storm sewers.

**Q&A | ELEMENT C: MITIGATION STRATEGY | C5a-c**

**Q:** Is there an action plan that describes how the actions identified will be prioritized, implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv))

**A:** See **Mitigation Action Prioritization** below

# 5.6 Mitigation Action Prioritization

This Plan's mitigation actions were prioritized based on estimated cost, benefit, and timeline to implement. Table 63, Table 64, Table 65, and Table 66include an estimated cost, benefit, timeline, and priority for each mitigation action. The District will contact a more technical assessment when pursuing funding through FEMA's Hazard Mitigation Grant Funding Program. FEMA's Benefit-Cost Analysis Guidelines are outlined below.

## Economic Analysis of Mitigation Projects

It is important that the District analyze the costs and benefits of proposed projects as a means to determine their economic feasibility. FEMA's Benefit-Cost Analysis (BCA) determines the future risk reduction benefits of a hazard mitigation projects and compares those benefits to its costs. Through the analysis, a Benefit-Cost Ratio is developed. When the Benefit-Cost Ratio is 1.0 or greater, a project is considered cost-effective. In order to qualify for FEMA's Hazard Mitigation Grant Funding, the District must use FEMA-approved methodologies and tools in order to show that potential projects are cost-effective. FEMA recommends entities utilize the BCA Toolkit, which is a calculator developed using FEMA-approached methodologies to determine the cost-effectiveness of projects and eligibility for funding. For projects that the District is not pursing FEMA funding for, the District will may use other approaches to understand the costs and benefits and priority of each action item.

**Q&A | ELEMENT C: MITIGATION STRATEGY | C5c**

**Q:** Does the plan identify the position, office, department, or agency responsible for implementing and administering the action, and identify potential funding sources and expected timeframes for completion (Requirement §201.6(c)(3)(iv))

**A:** See **Mitigation Action Implementation** below

# 5.7 Mitigation Action Implementation

The District's General Manager, Operations Manager, and Hazard Mitigation Planning Committee are responsible to implementing the mitigation actions listed in this LHMP. Priority, timeline, cost estimates, benefit, and potential funding source are outlined for each mitigation action in Table 64, Table 65, and Table 66.

- **Goal 1:** Increase water supply reliability to the public, including during and after a natural hazard
- **Goal 2:** Reduce the potential for loss of life, injury, and negative health impacts associated with natural hazard
- **Goal 3:** Improve the capacity of District staff and the community to prevent, protect against, respond to, mitigate, and recover from natural hazards
- **Goal 4:** Advance local, regional, state, federal, private, and community partnerships for improved hazard mitigation

**Table 63 Goal 1 Mitigation Actions**

| FEMA Category | Mitigation Actions | Hazard | Priority (Low, Med., High) | Timeline (1-5 years) | Cost (Low, Med., High) | Benefit | Funding Source | Responsible |
|---|---|---|---|---|---|---|---|---|
| Emergency Services | Engage in multi-hazard business/service continuity planning efforts, including through the District's Emergency Response Plan | All | Med | Ongoing | Low | Improve business/service continuity, reliability, and resilience | Staff Time, General Fund | General Manager |
| Property Protection | Procure mobile/non-stationary back-up power generators for the District's water system | All | High | 1 | Med | Increase service continuity and reliability | Hazard Mitigation Grant | General Manager |
| | Ensure that portable pumps and hydrants, repair materials, and other supplies are procured in advance of a hazard to ensure repair of critical water system assets | All | High | 1 | Med | Improved disaster response | Staff time, General fund | Operations Manager |
| Prevention | Create guidelines for considering hazard vulnerabilities when developing new infrastructure plans | All | High | Ongoing | Low | Reduced future disaster risk | General fund | District Engineer |
| | Adopt insurance mechanisms and other financial instruments to protect against financial losses associated with infrastructure losses | All | High | Ongoing | Low | Improved disaster response | General fund | General Manager |
| | Develop and construct interties between the Pajaro, Sunny-Mesa, and/or Vega systems | Ground Shaking, Liquefaction, Flood, Dam Inundation, Levee Failure, Windstorm | High | 5 | High | Increase water system reliability | Hazard Mitigation Grant | District Engineer |
| | Develop and construct interties between the Normco and Vierra systems | Wildfire, Ground Shaking, Liquefaction, Windstorm | High | 5 | High | Increase water system reliability | Hazard Mitigation Grant | District Engineer |
| | Conduct evaluations of critical District assets and facilities to determine seismic vulnerability. | Ground Shaking, Liquefaction | High | 3 | Med | Reduced earthquake risk | Hazard Mitigation Grant | District Engineer |

| FEMA Category | Mitigation Actions | Hazard | Priority (Low, Med., High) | Timeline (1-5 years) | Cost (Low, Med., High) | Benefit | Funding Source | Responsible |
|---|---|---|---|---|---|---|---|---|
| Property Protection | Install pipeline isolation valves to enable smaller geographic service outages and shorter recovery periods | All | High | Ongoing | Med | Reduced disaster impacts | Hazard Mitigation Grant | District Engineer |
| | Increase flood protection measures for water facilities and assets located in 100-year floodplain and levee failure, dam failure, tsunami, and sea level rise inundation zones | Flooding, Tsunami, Levee failure, Dam failure | High | Ongoing | Med | Reduce flood risk | Hazard Mitigation Grant | District Engineer |
| | Upgrade assets to be more corrosion resistant within sea level rise and coastal hazard zones | Tsunami, Sea-Level Rise | Low | 2 | Med | Reduce risks to District assets and continuity | Hazard Mitigation Grant | District Engineer |
| | Conduct hardening upgrades to structures and facilities (i.e., water tanks, pump structures, treatment facilities, and administrative offices) that are located in fire hazard severity zones | Wildfire | High | 5 | Med | Reduce wildfire risk | Hazard Mitigation Grant | District Engineer |
| Natural Resources Protection | Coordinate with local groundwater managers, including PCVWA and MCWRA, to monitor and manage saltwater intrusion | Sea Level Rise, Drought | High | 5 | Low | Increase the District's water supply reliability | Staff Time, Hazard Mitigation Grant | General Manager |
| Structural Projects | Increase the District's energy resilience by installing on site local distributed energy systems, micro-grids, and battery storage facilities. | All | Med | 5 | High | Increased energy resilience and reliability | State Grants (California Energy Commission) | General Manager |
| | Develop emergency water system interties with neighboring jurisdictions to ensure service continuity and reliability | All | Med | 5 | High | Increase water supply reliability | Hazard Mitigation Grant | General Manager |
| | Increase storage capacity at water systems facilities to prepare for drought periods and wildfires | Drought, Wildfire | Med | 5 | High | Increase water service reliability from drought and wildfires | Hazard Mitigation Grant | District Engineer |

| FEMA Category | Mitigation Actions | Hazard | Priority (Low, Med., High) | Timeline (1-5 years) | Cost (Low, Med., High) | Benefit | Funding Source | Responsible |
|---|---|---|---|---|---|---|---|---|
| | Install heat reflective or heat protective roofing or shelter over pumps, motors, and electrical equipment with the high potential exposure to extreme heat | Heat | Low | 5 | Med | Reduce the risk of overheating equipment | Hazard Mitigation Grant | District Engineer |
| | Retrofit or upgrade vulnerable water district infrastructure, including water tanks, to limit damage from earthquakes | Ground Shaking, Liquefaction | High | 4 | High | Reduce earthquake risk | Hazard Mitigation Grant | District Engineer |
| | Procure flex connectors in order to protect booster pumps, tanks, and water tanks to mitigate damage from earthquakes | Ground Shaking, Liquefaction | High | 1 | Med | Reduce earthquake risk | Hazard Mitigation Grant | District Engineer |

### Table 64 Goal 2 Mitigation Actions

| FEMA Category | Mitigation Actions | Hazard | Priority (Low, Med., High) | Timeline (1-5 years) | Cost (Low, Med., High) | Benefit | Funding Source | Responsible |
|---|---|---|---|---|---|---|---|---|
| Prevention | Adopt a mass notification system for District customers | All | Low | 5 | Low | Reduce risk of loss of life, injury or damage to property/assets | Hazard Mitigation Grant | Operations Manager |
| Property Protection | Protect (elevate, armor, or relocate) critical assets including pump stations, wells, tanks, and wastewater treatment facilities from flooding and water damage | Flooding, Dam Failure, Levee Failure, Sea-Level Rise | Med | 4 | Low | Reduce flooding risk | Hazard Mitigation Grant | District Engineer |
| Property Protection | Collaborate with Monterey County Fire Safe Councils to educate surrounding property owners on defensible space, vegetation management, and home-hardening techniques to mitigate wildfire risk | Wildfire | High | Ongoing | Med | Reduce wildfire risk | Hazard Mitigation Grants | General Manager |

## Table 65 Goal 3 Mitigation Actions

| FEMA Category | Mitigation Actions | Hazard | Priority (Low, Med., High) | Timeline (1-5 years) | Cost (Low, Med., High) | Benefit | Funding Source | Responsible |
|---|---|---|---|---|---|---|---|---|
| Prevention | Integrate climate change impact projections into District planning efforts | All | High | Ongoing | Low | Reduce risks associated with climate change impacts | Staff Time, General Fund, Hazard Mitigation Grants | General Manager |
| | Incorporate hazard mitigation projects and prioritization criteria into the District's Capital Improvement Program | All | High | 2 | High | Reduce risks associated with disasters and hazard events | Hazard Mitigation Grant | District Engineer |
| | Install a Supervisory control and data acquisition (SCADA) system to increase water system operational control and monitoring | All | Med | 5 | High | Increase efficiency of water system operational management | Hazard Mitigation Grant | General Manager |
| Public Education and Awareness | Distribute information to customers about disaster preparations and through mailings, printed notifications, and digital platforms. | All | Med | Ongoing | Low | Reduce risk of loss of life, injury or damage to property/assets | Staff Time | Operations Manager |
| | Conduct public outreach and engagement campaigns to provide customers with resources and information around water conservation and drought resistant landscaping | Drought, Sea Level Rise | Med | Ongoing | Low | Increase water supply resilience and reliability during periods of drought | Hazard Mitigation Grant | Operations Manager |
| Emergency Services | Develop internal guidelines for working under extreme heat conditions and air quality emergencies | Heat, Wildfire | Med | 2 | Low | Improved disaster response | Staff Time | Operations Manager |
| Structural Projects | Implement protective measures for District structures at elevated landslide risk | Ground Shaking, Liquefaction, Landslide | Med | 5 | High | Reduced landslide risk | Hazard Mitigation Grant | District Engineer |
| Property Protection | Prepare a wildfire risk reduction plan to schedule and monitor vegetative management and defensible space relative to District Assets | Wildfire | High | 2 | Low | Reduce wildfire risk | Staff Time, General Fund | Operations Manager |

| FEMA Category | Mitigation Actions | Hazard | Priority (Low, Med., High) | Timeline (1-5 years) | Cost (Low, Med., High) | Benefit | Funding Source | Responsible |
|---|---|---|---|---|---|---|---|---|
| Natural Resources Protection | Collaborate with CAL Fire to remove brush and vegetation at the Fairway scenic easement to mitigate wildfire risk and preserve the landscape and natural resources | Wildfire | Med | Ongoing | Low | Reduce wildfire risk | Staff Time, General Fund | Operations Manager |

## Table 66 Goal 4 Mitigation Actions

| FEMA Category | Mitigation Actions | Hazard | Priority (Low, Med., High) | Timeline (1-5 years) | Cost (Low, Med., High) | Benefit | Funding Source | Responsible |
|---|---|---|---|---|---|---|---|---|
| Emergency Services | Coordinate with Monterey County and local municipalities to streamline regional emergency response communications | All | Med | Ongoing | Low | Reduce regional loss of life, injury or damage to property/assets | Staff Time | General Manager |
| | Develop mutual-aid agreements and emergency response assistance protocols between the District and neighboring jurisdictions | All | Med | Ongoing | Low | Increase service continuity and reliability | Staff Time | General Manager |
| | Collaborate with surrounding property owners to ensure adequate fire road access to District facilities | Wildfire | Med | Ongoing | Low | Reduce wildfire risk | Staff Time, General Fund | General Manager |
| | Coordinate with Monterey County and neighboring jurisdictions to implement local wildfire mitigation efforts, including vegetation management and maintaining defensible space relative to District Assets | Wildfire | High | Ongoing | Low | Reduce wildfire risk | Hazard Mitigation Grants | General Manager |

# 6 Plan Integration & Adoption

**Q&A | ELEMENT C: MITIGATION STRATEGY | C5c**

**Q:** Does the plan identify the position, office, department, or agency responsible for implementing and administering the action, and identify potential funding sources and expected timeframes for completion (Requirement §201.6(c)(3)(iv))

**A:** See **Mitigation Action Implementation** below

## 6.1 Plan Integration

Upon FEMA approval, the Planning Committee will begin the process of incorporating mitigation goals and actions into existing plans and programs. Planning Committee meetings will provide an opportunity for members to report back on the progress made on the integration of mitigation planning elements into planning documents and procedures.

This LHMP provides a list of goals and actions- many of which are closely related to and aligned with goals and objectives of existing planning programs. The Pajaro Sunny Mesa Community Services District will implement recommended mitigation actions through existing programs and procedures. The District will integrate the findings and strategies of the LHMP into other existing planning processes, including the American Water Infrastructure Act (AWIA) of 2021 Risk and Resilience Assessment and Emergency Response Plan (ERP) and its Capital Improvement Program (CIP).

In particular, there will be overlap across the risk assessment of the LHMP and the risk assessment required through AWIA. The findings of the LHMP risk assessment will inform policies and operating procedures in the District's AWIA ERP. During the next AWIA Risk Assessment and update, which will be due by June 30, 2026, the District will review the key findings of the LHMP risk assessment and the most recent mitigation activities in the implementation report to inform its 2025 Risk and Resilience Assessment. It will also use the information in the implementation report to inform its next AWIA ERP update, which will be due by December 31, 2026.

Some of the goals and action items in the Mitigation Plan will be achieved through activities recommended in the CIP. The CIP is a 10-year program which is updated as needed. The CIP is reviewed by the Board on an annual basis. Moving forward, the General Manager will incorporate mitigation actions from the LHMP into the CIP and review progress on an annual basis when the Board considers how to best prioritize capital improvements. The General Manager will note which Capital Improvements address the Districts' hazard mitigation priorities. Conversely, the Planning Committee will review the CIP investments during its annual review of LHMP actions to see how they have supported the District's mitigation goals.

**Q&A | ELEMENT D1-D3**

**Q:** Was the plan revised to reflect changes in development? 44 CFR 201.6(d)(3)

**Q**: Was the plan revised to reflect progress in local mitigation efforts? 44 CFR 201.6(d)(3)

**Q:** Was the plan revised to reflect changes in priorities? 44 CFR 201.6(d)(3)

**A:** See Plan Update Process below.

## 6.2 Plan Update Process

This is the District's first LHMP. Upon the next update the District will look at changes in development, reflect changes in local mitigation efforts, and update priorities accordingly.

## 6.3 Plan Adoption Process

The Pajaro Sunny Mesa Community Services District's Board of Directors will be responsible for adopting the Mitigation Plan. This governing body has the authority to promote and adopt policy regarding hazard mitigation. The District's Board of Directors must adopt the Mitigation Plan before the Plan can receive final approval from FEMA. Once the plan has been adopted, the Local Mitigation Officer will be responsible for submitting it to the State Hazard Mitigation Officer at California Office of Emergency Services (Cal OES). Cal OES will then submit the plan to the Federal Emergency Management Agency (FEMA) for review and approval. This review will address the requirements set forth in 44 C.F.R. Section 201.6 (Local Mitigation Plans). Upon acceptance by FEMA, Pajaro Sunny Mesa Community Services District will gain eligibility for Hazard Mitigation Grant Program funds. The Pajaro Sunny Mesa Community Services District Board of Directors heard the item on __________. The Board voted unanimously to adopt the Mitigation Plan. The resolution of adoption by the Board of Directors is in Appendix B.

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