WWW.SWEETWATERSPRINGS.COM

BOARD OF DIRECTORS MEETING

AGENDA

March 21, 2021, SPECIAL Meeting
10 a.m.

VIRTUAL MEETING LINK:
https://sweetwaterspringswaterdistrict.my.webex.com/sweetwaterspringswaterdistrict.my/j.php?MTID=ma42ca5ca9a429c4ecd00e3449e71a772
Meeting number: 182 657 9110
Password: BJtekZWC833

JOIN BY PHONE:
1-415-655-0001
Access Code: 182 657 9110
Password: BJtekZWC833

All guests that join the virtual meeting will be muted with the camera/video turned off. Guests will be unmuted and video turned on when they are speaking. Proper decorum, including appearance, is required.

NOTICE TO PERSONS WITH DISABILITIES: It is the policy of the Sweetwater Springs Water District to offer its public programs, services and meetings in a manner that is readily accessible to everyone, including those with disabilities. Upon request made at least 48 hours in advance of the need for assistance, this Agenda will be made available in appropriate alternative formats to persons with disabilities. This notice is in compliance with the Americans with Disabilities Act (28 CFR, 35.102-35.104 ADA Title II).

Any person who has any questions concerning any agenda item may call the General Manager or Assistant Clerk of the Board to make inquiry concerning the nature of the item described on the agenda; copies of staff reports or other written documentation for each item of business are on file in the District Office and available for public inspection. All items listed are for Board discussion and action except for public comment items. In accordance with Section 5020.40 et seq. of the District Policies & Procedures, each speaker should limit their comments on any Agenda item to five (5) minutes or less. A maximum of twenty (20) minutes of public comment is allowed for each subject matter on the Agenda unless the Board President allows additional time.

I. CALL TO ORDER ***(Est. time: 2 min.)***

A. Board members Present
B. Board members Absent
C. Others in Attendance

II. PUBLIC COMMENT: The District invites public participation regarding the affairs of the District. This time is made available for members of the public to address the Board regarding matters which are listed on this Special Meeting Agenda. Board members may ask questions of a speaker for purposes of clarification.

III. ADMINISTRATIVE

A. Discussion/Action re Solicit public input on Public Review Draft of Local Hazard Mitigation Plan. Consultant: Harris & Associates *(Est time: 4 hours)*

ADJOURN

MEETING AGENDA

Public Review Meeting

Sweetwater Springs Water District – Hazard Mitigation Plan

Lead Agency: Sweetwater Springs Water District

March 21, 2021
10:00 a.m. to 12:00 p.m.

Purpose of Meeting: The purpose of the meeting is to provide an overview of the plan and solicit feedback from the community

i. **Welcome & Introductions**
   - **Introduce Planning Committee**
   - **Zoom logistics (How to Ask Questions)**

ii. **Plan Overview**
   - **Planning Process**
   - **Hazard Identification**
   - **Mitigation Actions**
   - **Updating the Plan**

iii. **How Will the Plan Benefit the Community**

iv. **How the Public Provided Feedback on the Plan**
   - **Draft Plan posted on website**
   - **Feedback via email at**

v. **Questions/Public Comment**

vi. **Adjourn**

SWEETWATER SPRINGS WATER DISTRICT

TO: Board of Directors **AGENDA NO. V-A**

FROM: Ed Fortner, General Manager

Meeting Date: March 21, 2021

SUBJECT: Local Hazard Mitigation Plan (LHMP) Update

RECOMMENDED ACTION: Receive report from the General Manager. Update of the Local Hazard Mitigation Plan.

FISCAL IMPACT: $30,074

DISCUSSION:

At the August 6th Board meeting, the Board approved Harris and Associates to undertake and complete a Local Hazard Mitigation (LHMP) to help the District qualify for FEMA grants. Eric Vaughan, with Harris and Associates, Jack Bushgen, Julie Kenny, and I participated in the first Planning Committee meeting on September 4th.

The Committee and the public's second meeting were conducted as a special called Board meeting on October 22nd.

The fourth Committee meeting was held on January 13, 2021. Jack Bushgen and I attended with Harris and Associates and finalized the mitigation spreadsheet.

The Committee has reviewed final mitigation measures and the draft Hazard Mitigation Report as of February 22nd. On March 4th Harris will submit the Public Review draft to the District. The draft is posted on our website and we will encourage public input.

Today's Special Board meeting is the last Public Workshop for final feedback from the public and the Board on the draft Final Report. After today's Public Workshop, the final draft of the plan will go to CalOES and FEMA for final approval. The Sweetwater Board will give final approval of the plan at the June 3rd Board meeting. The revised work schedule is attached.

HARRIS AND ASSOCIATES

LOCAL HAZARD MITIGATION PLAN

PROJECT SCHEDULE

Months	Key Tasks	Meetings & Workshops	Key Milestones/ Deliverable
July 2020	-Pre-Meeting with Project Manager -Existing Document Review -Identify Required Participants -Invite Plan Participants -Establish Planning Committee -Document the Planning Process -Identify and Review District Assets	Pre-Meeting	Fully Executed Professional Services Agreement
September 2020	Assess and Select Hazards of Concern	Planning Committee Meeting #1: Kickoff and Select Hazards of Concern (September 4th)	Draft Element A: Planning Process
October 2020	Conduct Risk Assessment for Selected Hazards	Planning Committee Meeting #2: Solicit Feedback on Risk Assessment (October 22nd)	Draft Element B: Risk Assessment
December 2020	-Develop Mitigation Goals -Develop and Launch Online Survey -Prioritize Mitigation Actions -Develop Action Plan	-Planning Committee Meeting #3: Solicit input on Mitigation Actions (December 10th) -Public Workshop #1: Solicit Public Input on Risk Assessment & Mitigation Actions (December 10th)	-Public Survey -List of Mitigation Strategies from Planning Committee
January 2020	-Draft Element C	-Planning Committee Meeting #4: Plan Maintenance, Evaluation and Updates (January 13th)	-Draft Element C: Mitigation Strategies
February 2021	-First Draft Plan submitted to Planning Committee -Integrate feedback from Planning Committee and Board	February 11th Draft Report to Committee; February 25th Draft Report comments to Harris	-Submit first draft Plan to Planning Committee

March 2021	-Public Review Draft -Revise Public Review Draft as necessary to include public input	Harris submits Public Review version of the Plan (March 4th) Public Workshop #2: Solicit Public Input on Public Review Draft (March 21st)	- Post Public Review Draft
April 2021	Cal OES Review	March 25th (submitted)	Cal OES Review Draft
May 2021	FEMA Review		FEMA Review Draft
June 2021	SSWD Board Adoption	SSWD Board Meeting June 3rd	Approved and Adopted LHMP

Draft

Sweetwater Springs Water District Hazard Mitigation Plan

March 2021

Point of Contact

To request information or provide comments regarding this mitigation plan, please contact:

Name and Position Title	Ed Fortner, General Manager
Email	efortner@sweetwatersprings.com

Prepared By:

Harris & Associates
1401 Willow Pass Road, No. 500
Concord, California 94520
Phone: (925) 827-4900
www.weareharris.com

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Appendices

Appendix A. Plan Approval and Adoption Attachments

Appendix B. Public Engagement Attachments

Appendix C. Economic Losses Attachments

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Introduction and District Profile

The Hazard Mitigation Plan (HMP) was prepared in response to the Disaster Mitigation Act of 2000 (DMA 2000). DMA 2000 (also known as Public Law 106-390) requires state and local governments to prepare mitigation plans to document their mitigation planning process, and identify hazards, potential losses, mitigation needs, goals, and actions. DMA 2000 was designed to establish a national program for pre-disaster mitigation, streamline disaster relief at the federal and state levels, and reduce federal disaster assistance costs.

Geography and History

The District formed in 1988 for purposes of purchasing the water supply and distribution system from a private utility (Citizens Utilities, Inc.). Water service is provided to all residential, commercial, and industrial customers, and for environmental and fire protection uses. The District serves a two thousand-acre area, which includes two separate water supply and distribution systems. The southern system serves the Monte Rio, Villa Grande, Monte Rio Terraces and River Meadows areas (Figure 1, Regional Location). The northern system serves the Guerneville, Guernewood Park, Vacation Beach, and Rio Nido areas, as shown on Figure 2, Sweetwater Springs Water District.

Climate

The Sweetwater Springs Water District is located approximately seventy-five miles north of San Francisco and are characterized as a northern coastal climate. Summers are generally warm and rain-free and winters are cool, with an annual average of fifty-five inches of precipitation. Over 90 percent of the annual precipitation normally falls during the wet season (October to May), with a large percentage of rainfall typically occurring during three to five major winter storms. Average temperatures in the City of Santa Rosa range from 45.4ºF in the winter months to 62.5ºF in the summer months. A significant part of the region is subject to marine influence and fog intrusion.

Service Area Demographics, Demand, and Statistics

Demographics	
Population Served (2020 Projected)	8,026
Demands for Potable and Raw Water (2020 Projected)	
Single Family	411
Multifamily	126
Commercial	95
Institutional Governmental	12
Service Area Statistics	
# Water Connections	4,169 (2021)
Average Daily Demand	
# Treatment Plants	2 (1 for Guerneville System, 1 for Monte Rio System)
# Pump Stations	17 (13 in Guerneville System, 4 in Monte Rio System)
# Storage Tanks	25 (500,000 gallons of storage)
# Wells	5 wells (3 in Guerneville System, 2 in Monte Rio System)
# Miles of Water Pipeline	66
# Recycled Water Customers	0

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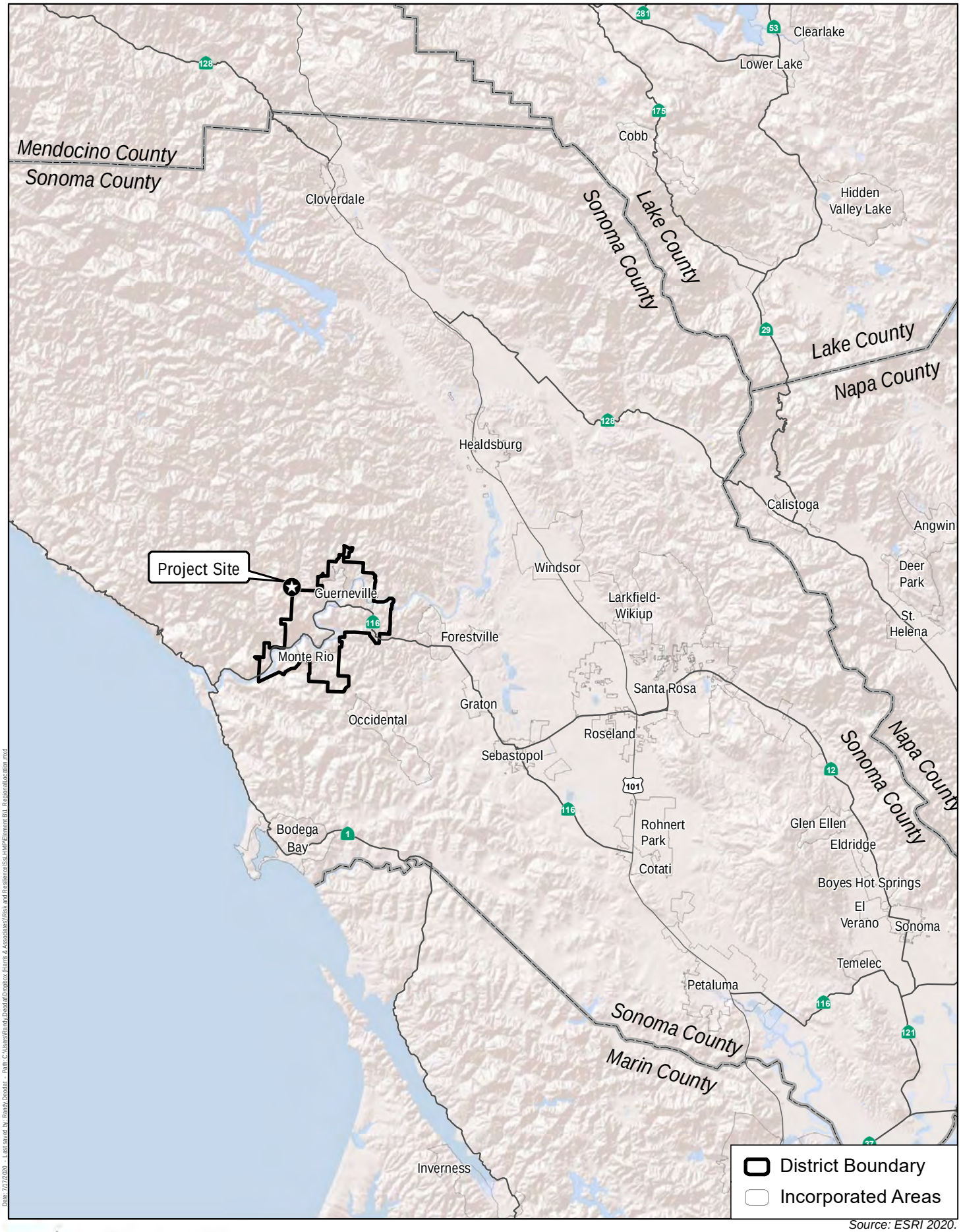

Source: ESRI 2020.

Harris & Associates

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Regional Location

Sweetwater Springs Water District

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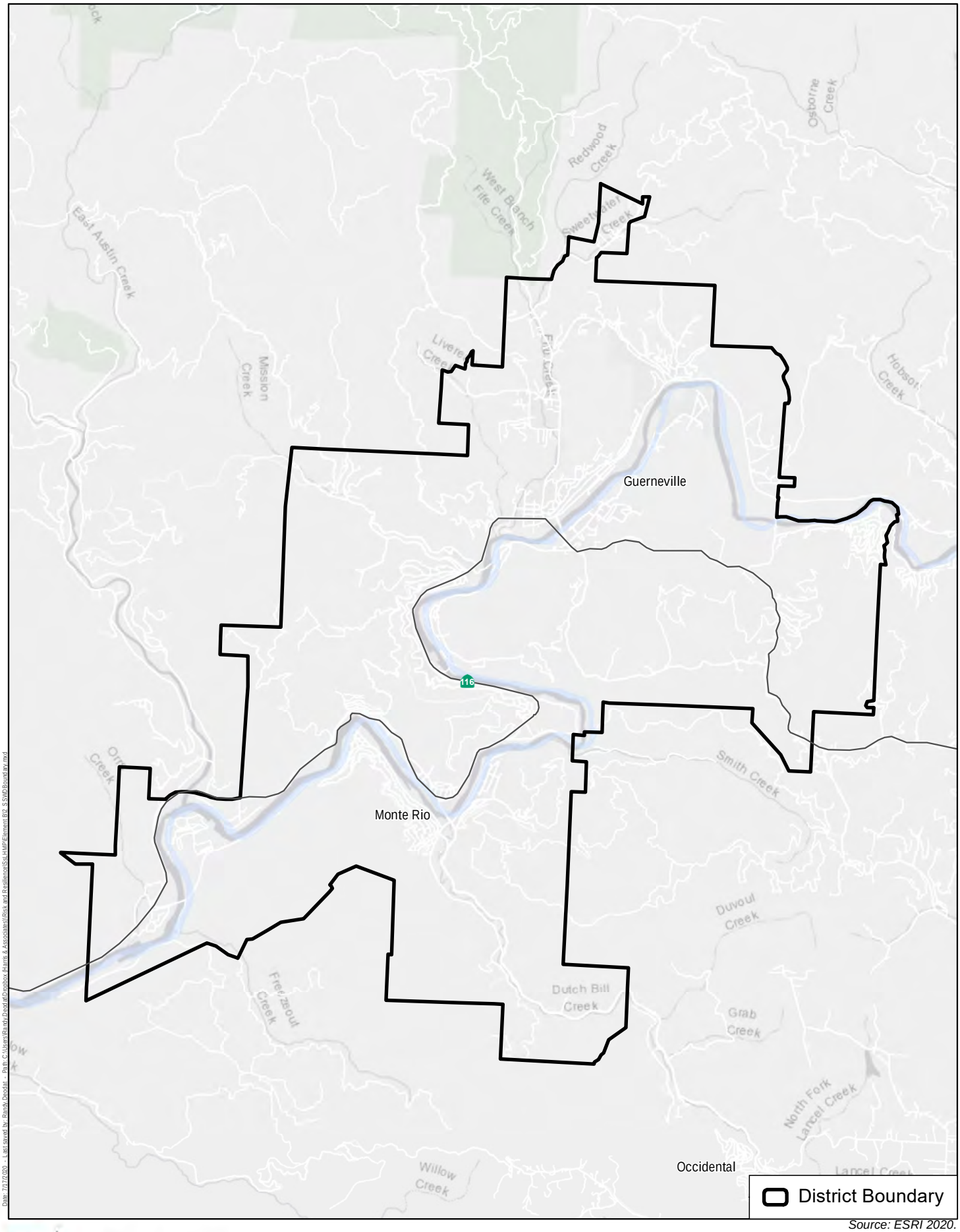

Source: ESRI 2020.

Harris & Associates

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Sweetwater Springs Water District

Sweetwater Springs Water District

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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 implement 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 Cal OES.

Pre-Disaster Mitigation Program

The Pre-Disaster Mitigation Program (PDM) 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) authorizes 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;
- incentivize projects that mitigate risk to one or more lifelines;
- incentivize projects that incorporate nature-based solutions; and,
- incentivize adoption and enforcement of modern building codes.

(Sources: FEMA 2020, 2021)

Flood Mitigation Assistance Program

The Flood Mitigation Assistance (FMA) Program was created as part of the National Flood Insurance Reform Act (NFIRA) 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 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 HMP 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 mitigation planning process including stakeholders and integration of existing data and plans.

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 Approval and Adoption Attachments
  - FEMA Letter of Approval
  - Board of Directors Resolution
- **Appendix B:** Public Engagement Attachments
  - Planning Committee Meeting sign-in sheets, agendas, and minutes
  - General Public web postings and Notices
  - External Agency email invitation
- **Appendix C:** Economic Losses Attachments

Plan Adoption and Approval

As per DMA 2000 and supporting Federal regulations, the Mitigation Plan is required to be adopted by the SSWD Board of Directors and approved by FEMA.

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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.

Plan Preparation and Engagement

The HMP was developed by and for the Sweetwater Springs Water District. A Hazard Mitigation Planning Committee (Planning Committee), consisting of staff from Sweetwater Springs Water District, worked with Harris & Associates to create the Plan. The Planning Committee served as the primary stakeholders throughout the planning process. Table 1 identifies the members of the HMP's Planning Committee.

The Planning Committee made a good faith effort to invite neighboring jurisdictions and representatives of the public. External agencies, including representatives from Sonoma County, Sonoma Water Agency, Santa Rosa Water Department were mailed an invitation to participate in Planning Committee Meetings. The District also invited group that represent the public, including the Lower Russian River Municipal Advisory Committee and Monte Rio and Guerneville Chambers of Commerce. However, no external agencies or jurisdictions elected to participate. The intense 2020 wildfire season amid the COVID-19 pandemic may have contributed to a lack of participation from neighboring jurisdictions. In addition, the external agencies were invited to provide input to the Public Review Draft Plan with an electronic link to the District's website. See Appendix B for the email invitation along with solicitation for input.

Table 1. Planning Committee Members

Name	Agency	Title
Ed Fortner	Sweetwater Springs Water District	General Manager
Jack Bushgen	Sweetwater Springs Water District	Field Manager
Julie Kenny	Sweetwater Springs Water District	Administration Manager

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 online to provide the public an opportunity to provide feedback. An overview to the hazard mitigation planning process was provided to stakeholders (external agencies and general public) on September 4, 2020 at a 1.5-hour presentation. Planning Committee meetings are described in detail below under "Planning Committee Involvement." Planning Committee meetings 2 through 5 were open to the public and posted on the District's website in advance of the meeting. See Appendix B for sign-in sheets and invitations.

The First Draft Plan was presented to the Planning Committee for internal review in February, 2021. 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 from March 3 - March 26, 2021. Members of the public were invited to participate in a public workshop held on Month 21, 2021 wherein the public was invited to ask questions and provide feedback on the Public Review Draft. 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 completed amendments to the Plan to reflect mandated input by Cal OES and FEMA. The Final Draft Plan was posted on the District's website. Any comments gathered during the posting period were included in the staff report to the Board of Directors. Following adoption by the Board, proof of adoption was forwarded to FEMA along with a request for final approval. The planning process described above is also illustrated below by phase (Table 2).

Table 2. Planning Phases

Plan Writing Phase	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 HMP planning process and soliciting input • Planning Committee input-research, meetings, writing, review of First Draft Plan • Incorporate input from the Planning Committee into Public Review Draft Plan	• Incorporate input into the Final Draft Plan • Final Draft Plan sent to Cal OES and FEMA for Approval Pending Adoption • Address any mandated revisions identified by Cal OES and FEMA into Final Draft Plan •	• Incorporate input into the Board of Directors staff report • Post public notice of Board of Directors Meeting • Final Draft Plan distributed to Board of Directors in advance of meeting • Present Final Draft Plan to Board of Directors for Adoption	• Submit proof of Board adoption to FEMA along with request for final approval • Incorporate FEMA Final Letter of Approval into Final Plan	• Conduct annual Planning Committee meetings • Integrate mitigation action items into budget and other funding and strategic documents • Implement Mitigation Actions

Table 2. Planning Phases

Plan Writing Phase	Plan Review Phase	Plan Adoption Phase	Plan Approval Phase	Plan Implementation Phase
• Present Public Review Draft at public workshop and invite public and stakeholders to provide input on the Public Review Draft				

Planning Committee Involvement

The Planning Committee consisted of representatives from Sweetwater Springs Water District 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

The public was invited to participate in Planning Committee meetings 2 through 5. Meeting agendas and notes are provided in Appendix B. The following is a brief description of each of the Planning Committee meetings.

Meeting #1: September 4, 2020 – Kick-Off and Hazard Identification Meeting

The Planning Committee, made up of key departmental representatives, 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 SSWD.

Name	Role	Input Provided
Ed Fortner	General Manager, SSWD	Suggested that the HMP include identified hazards with either a high probability of occurrence or severity.
Julie Kenny	Administration Manager, SSWD	Suggested Eric Vaughan tour the District's key assets and service area to better understand the hazard context and state of infrastructure.
Jack Bushgen	Field Manager	Noted recent vulnerabilities of the District as a result of the LNU Lightning Complex Fires.

Meeting #2: October 22, 2020 – Risk Assessment

Planning Meeting #2 was a special meeting of the SSWD Board of Directors. As a meeting of the board, it was open for public participation and there was an opportunity for public comment. The Planning Committee reviewed the hazards of concern, provided feedback on the results of the risk assessment including impacts and mapping, discussed long term goals for mitigation actions, and requested additional critical infrastructure be evaluated.

Name	Role	Input Provided
Steve Mack	Board Member, SSWD	Recommended Panning Committee not use Sonoma County's information on water rights because there is conflicting understanding of water rights. Also recommended pollution be added to the list of hazards.
Ed Fortner	General Manager, SSWD	Mentioned some smaller landslides have occurred in the District in addition to those listed in the presentation.
Rich Holmer	Board Member, SSWD	Noted the link between wildfires and landslides and the difference between slow-moving and fast-moving landslides.
Eric Vaughan	Project Manager, Harris & Associates	Suggested for Planning Committee to provide Harris Team with Emergency Response Plan.

Meeting #3: December 10, 2020 – Mitigation Goals and Actions

Planning Meeting #3 was a special meeting of the SSWD Board of Directors. As a meeting of the board, it was open to the public and there was an opportunity for public comment during the meeting. The Planning Committee and Board Members provided feedback on draft goals and mitigation actions, reviewed the mitigation framework, discussed the relevance of the National Flood Insurance Program, discussed which mitigation actions to prioritize, and discussed plan integration. The Planning Committee prioritized the selected list of mitigation actions based on general estimates of cost, benefit, and timeframe.

Name	Role	Input Provided
Ed Fortner	General Manager, SSWD	Suggested the impact designation for drought be changed to "medium" to account for fiscal impacts of drought. Also suggested a mitigation action to elevate generators.
Larry Spillane	Board Member, SSWD	Goals should reflect commitment to mitigate costs of doing repairs (fiscal goals). Also suggested working with CAL FIRE to assess individual locations for fire risk.
Eric Vaughan	Project Manager, Harris & Associates	Recommended incorporating liquefaction mitigation into other seismic mitigation
Gaylord Schaap	Board Member, SSWD	Suggested mitigation actions could focus on sealing other infrastructure (i.e. valves)

Meeting #4: January 13, 2021 – Plan Implementation, Monitoring, Evaluation and Update

This meeting reviewed the process for implementing, monitoring, evaluating, and updating the HMP. Specifically, the Planning Committee discussed how they would continue public participation after the development of the HMP, monitor and evaluate the HMP over the 5-year cycle, and integrate the plan into other plans, policies, and programs.

Name	Role	Input Provided
Eric Vaughan	Project Manager, Harris & Associates	Provided strategies for continuing public participation, including posting plan and having an annual review of plan.
Ed Fortner	General Manager, SSWD	Suggested public hearing requirements and annual review would be addressed through regular Board meetings.

Meeting #5: March 21, 2021 – Public Review Workshop

Table 3. Plan Development Timeline

Task Description	July 2020	August 2020	September 2020	October 2020	November 2020	December 2020	January 2020	February 2021	March 2021	April 2021	May 2021
• Establish Planning Committee • Kick-off Meeting	X										
• Assess Hazards of Concern • Identify and Review District Assets • Draft Element A		X									
• Conduct Risk Assessment • Draft Element B • Planning Meeting #2			X	X	X						
• Develop Mitigation Measures • Develop Online Survey • Planning Meeting #3						X					
• Develop Action Plan • Draft Element C • Public Workshop							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 • 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.

SSWD 2015 Urban Water Management Plan
www.sweetwatersprings.com
Applicable Incorporation: District Profile section – history, geography, environmental, population, and demographic data.

Sonoma County Hazard Mitigation Plan (2017)
www.cms.sbcounty.gov
Applicable Incorporation: Information about hazards in the County contributed to the hazard-specific sections in the District's Mitigation Plan.

California State Hazard Mitigation Plan (2018)
http://www.caloes.ca.gov/
Applicable Incorporation: Used to identify hazards posing greatest hazard to State.

HAZUS maps and reports
Created by Harris & Associates
Applicable Incorporation: Numerous HAZUS results have been included for earthquake scenarios to determine specific risk to Sweetwater Springs Water District.

National Flood Insurance Program
www.fema.gov/national-flood-insurance-program
Applicable Incorporation: Used to confirm there are no repetitive loss properties[1] within the District

Local Flood Insurance Rate Maps
www.msc.fema.gov
Applicable Incorporation: Provided by FEMA and included in Flood Hazard section.

California Department of Conservation
www.conservation.ca.gov/cgs
Applicable Incorporation: Seismic hazards mapping

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 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.

[1] B4. Does the Plan address NFIP insured structures within each jurisdiction that have been repetitively damaged by floods? 44 CFR 201.6(c)(2)(ii

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.
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 **Continued Public Involvement** below.

Plan Monitoring

The Chair of the Planning Committee, Ed Fortner, 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 2021 HMP 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

This District will monitor and evaluate the Plan annually and produce a plan update every five years according to the five-year planning cycle schedule below:

5 Year Planning Cycle	2022	2023	2024	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

The Planning Committee will be responsible for coordinating implementation of plan by monitoring the progress of the mitigation action items and documenting progress notes for each item. The Local Mitigation Officer will hold quarterly meetings with the Planning Committee to review the status of each mitigation action item. The monitoring meetings will take place no less than quarterly. These meetings will provide an opportunity to discuss the progress of the mitigation actions and maintain the partnerships that are essential for the successful implementation of the mitigation plan.

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 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 Evaluation and Formal Update** below.

Plan Evaluation and Formal Update

The Planning Committee will evaluate the Plan by preparing an Implementation Report at each annual monitoring meeting. 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.

On the third year of the five-year planning cycle, the District will 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. On the fifth year of the planning cycle, the Planning Committee will convene to evaluate the effectiveness of the planning process and to update the overall content of the Plan. The Local Mitigation Officer will coordinate with the Board of Directors two to three years in advance of the expiration of this HMP to ensure funding for 5-year updates to Plan as required by FEMA. During the plan update, the Planning Committee will review the goals and mitigation action items to determine their relevance to changing situations in the District, as well as changes in State or Federal policy, and to ensure they are addressing current and expected conditions. The Planning Committee will also review the Plan's Risk Assessment portion of the Plan to determine if this information should be updated or modified, given any new available data. Amendments to the Mitigation Actions Matrix and other sections in the Plan will be made as deemed necessary by the Planning Committee.

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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 includes 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

Hazard Selection Process

The Sweetwater Springs Water District utilized the categorization of hazards as identified in California's 2018 State Hazard Mitigation Plan, 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 Sonoma County Multi-Jurisdictional Mitigation Plan (2017), which addressed Earthquakes, Floods, Wildland Fires, Landslides, and Climate Change.

The geographic extent of each of the identified hazards was identified by the Planning Committee utilizing maps and data contained in the above referenced plans. Previous disaster declarations were reviewed. Tables 4 and 5 list the federal- and state-designated hazards that have occurred previously in the County.

The Stafford Disaster Relief and Emergency Act provides for two types of federal disaster declarations: emergency declarations 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. Emergency declarations 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. A major disaster declaration 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 4. Federal Disaster Declarations—Sonoma County

Declaration Type	Federal Declaration Date	Disaster Type
MDD	12/24/1964	Flood
MDD	1/26/1969	Flood
ED	1/20/1977	Drought
MDD	1/7/1982	Flood
MDD	2/9/1983	Coastal Storm
MDD	2/21/1986	Flood
MDD	2/11/1991	Severe Freeze

Table 4. Federal Disaster Declarations—Sonoma County

Declaration Type	Federal Declaration Date	Disaster Type
MDD	2/3/1993	Flood
MDD	1/10/1995	Severe Storm
MDD	3/12/1995	Severe Storm
MDD	1/4/1997	Severe Storm
MDD	2/9/1998	Severe Storm
FMAD	9/4/2004	Fire
ED	9/13/2005	Hurricane (evacuation)
MDD	2/3/2006	Severe Storm
MDD	6/5/2006	Severe Storm
FMAD	9/13/2015	Fire
MDD	2/14/2017	Severe Storm
MDD	4/1/2017	Flood
FMAD	10/9/2017	Fire
FMAD	10/9/2017	Fire
FMAD	10/9/2017	Fire
MDD	10/10/2017	Fire
MDD	5/17/2019	Severe Storm
FMAD	10/24/2019	Fire
MDD	8/14,2020	Fire

Source: Sonoma County 2017.

At the state level, the California Disaster Assistance Act authorizes the director of the California Governor's Office of Emergency Services to administer a disaster assistance program that provides financial assistance from the state for costs incurred by local governments as a result 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 5. California Disaster Declarations—Sonoma County

Declaration Date	Disaster Type
01/2017	Severe Storm
03/2017	Severe Storm
03/2017	Severe Storm
06/2017	Fire
01/2020	Health

Source: Sonoma County 2017.

Utilizing a hazard ranking system, the Planning Committee concluded the following hazards pose a significant threat to the District, and are included in the hazard and risk assessment of this HMP:

Earthquake Hazards | Flooding | Landslides | Wildfire | Heat

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.

The hazard ranking system used to determine whether a given hazard should be included in this HMP considered history of hazard, probability of future occurrence, and potential impact, as described in Table 6. Hazards identified in bold were assigned "High" probability of occurrence or impact, and therefore were included in the hazard and risk assessment of this HMP.

Table 6. Hazard Selection Justification

Hazard Name	History	Probability	Impact	Comment
Wildfire	Yes	High	High	Probability and impact are likely to increase as a result of climate change. Staff noted that vegetation removal is needed in the service area to reduce wildfire risk. Staff also noted that wind events are increasingly relevant to wildfire risk as well as PG&E Public Safety Power Shutoff events and how the District can deal with them.
Landslide	Yes	High	Medium	Occurrences are frequent but limited in overall scale. In the wrong location, could disrupt water distribution. Staff noted that there are many aged roadways across the service area that are susceptible to landslides and could limit staff access to infrastructure.
Flood	Yes	High	High	Probability and impact are likely to increase as a result of climate and land use changes. There are two treatment sites with high flood exposure. Staff noted that increasing siltation of the river is contributing to flooding.
Earthquake	Yes	Low	High	No major faults yet identified within service area, but are located in the region (Figure 3, Major Faults). The impact of a major event would be severe if mains were damaged, related to bridge crossings for example.
Drought	Yes	Medium	Low	Water supply could be potentially disrupted by severe drought conditions, but this is currently unlikely.
Heat	Yes	High	Medium	Probability and impact are likely to increase as a result of climate change. This relates to days in which the maximum daytime temperature exceeds the 98th percentile annual average.
Levee Failure	No	Low	High	SSWD does not maintain a levee system.
Tsunami	No	Low	Low	There is no history and low probability of future occurrence due to District's inland location.
Volcano	No	Low	Low	There are no active volcanoes in the vicinity of the District boundary that would impact District assets.

Earthquake

Hazard Description

An earthquake is a sudden motion or trembling that is caused by a release of strain accumulated within or along the edge of the Earth's tectonic plates. The effects of an earthquake can be felt far beyond the site of its occurrence. They usually occur without warning and, after just a few seconds, can cause massive damage and extensive casualties. Common effects of earthquakes are ground motion and shaking, surface fault ruptures, and ground failure. Ground motion is the vibration or shaking of the ground during an earthquake. When a fault ruptures, seismic waves radiate, causing the ground to vibrate. The severity of the vibration increases with the amount of energy released and decreases with distance from the causative fault or epicenter. Soft soils can further amplify ground motions.

Ground shaking, landslides, liquefaction, and amplification are the specific hazards associated with earthquakes. The severity of these hazards depends on several factors, including soil and slope conditions, proximity to the fault, earthquake magnitude, and the type of earthquake.

Ground shaking is the motion felt on the earth's surface caused by seismic waves generated by the earthquake. It is the primary cause of earthquake damage. The strength of ground shaking depends on the magnitude of the earthquake, the type of fault, and distance from the epicenter (where the earthquake originates). Buildings on poorly consolidated and thick soils will typically see more damage than buildings on consolidated soils and bedrock. Seismic activity along nearby or more distant fault zones are likely to cause ground shaking within the District limits.

Liquefaction occurs when ground shaking causes wet granular soils to change from a solid state to a liquid state. This results in the loss of soil strength and the soil's ability to support weight. Buildings and their occupants are at risk when the ground can no longer support these structures. Liquefaction generally occurs during significant earthquake activity, and structures located on soils such as silt or sand may experience significant damage during an earthquake due to the instability of structural foundations and the moving earth. Many communities in The region are built on ancient river bottoms and have sandy soil. In some cases, the soil may be subject to liquefaction, depending on the depth of the water table.

Location and Extent

Ground Shaking

The severity of an earthquake is dependent on the amount of energy released from the fault or epicenter. One way to express an earthquake's severity is to compare its acceleration to the normal acceleration due to gravity. The acceleration due to gravity is often called "g". A ground motion with a peak ground acceleration of 100% g is very severe. Peak Ground Acceleration (PGA) is a measure of 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 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.

Another tool used to describe earthquake intensity is the Magnitude Scale. The Magnitude Scale was devised as a means of rating earthquake strength and is an indirect measure of seismic energy released. The 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 Scale (MMI) is another means for rating earthquakes, but one that attempts to quantify intensity of ground shaking. Intensity under this scale is a function of distance from the epicenter (the closer to the epicenter the greater the intensity), ground acceleration, duration of ground shaking, and degree of structural damage. The Modified Mercalli Intensity Scale below rates the level of severity of an earthquake by the amount of damage and perceived shaking (Table 7).

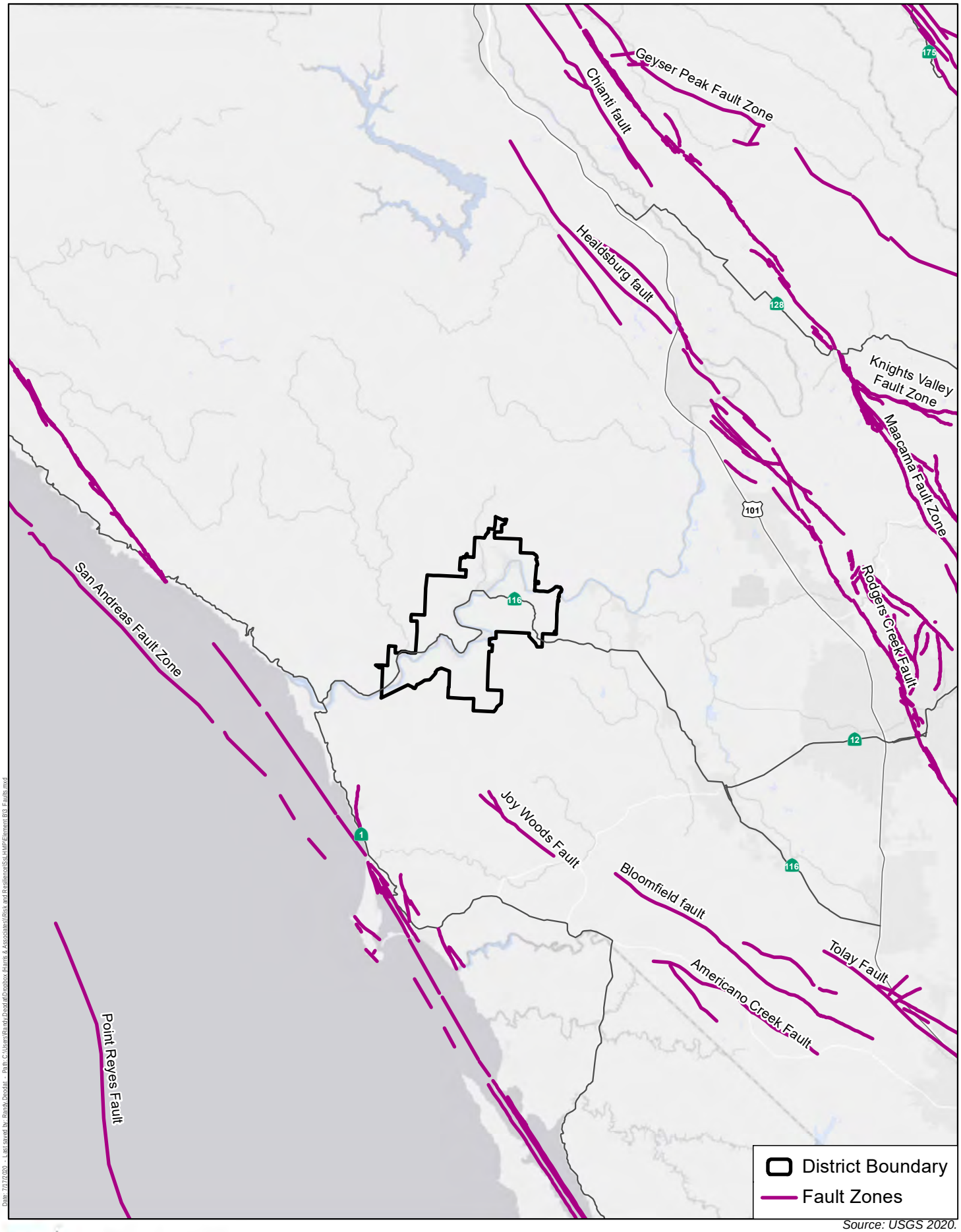
Table 7. Modified Mercalli Intensity Scale

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 similar to the passing of a truck. Duration estimated.
IV	Light	Felt indoors by many, outdoors by few during the day. At night, some awakened. Dishes, windows, doors disturbed; walls make cracking sound. Sensation like heavy truck striking building. Standing motor cars rocked 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.
IX	Violent	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
X	Extreme	Some well-built wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.

Source: USGS 2020a.

Liquefaction

The most vulnerable areas to liquefaction are areas that were originally lakes, bays, or marshlands and were subsequently filled with artificial, poorly compacted material such as sediment. Some soil types in the District are porous and prone to liquefaction. Areas where the height of the water table is less than 30 feet from the ground surface are vulnerable to liquefaction. Land subsidence is the gradual or sudden sinking of the ground as a result of underground mining, oil and gas extraction, sinkholes, or drainage and decomposition of organic soils. Areas where there is ground subsidence could be at risk of liquefaction because sinking ground will bring the surface of the ground closer to the groundwater table (Figure 4, Liquefaction Prone Areas).



Source: USGS 2020.

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Miles

Major Faults

Sweetwater Springs Water District

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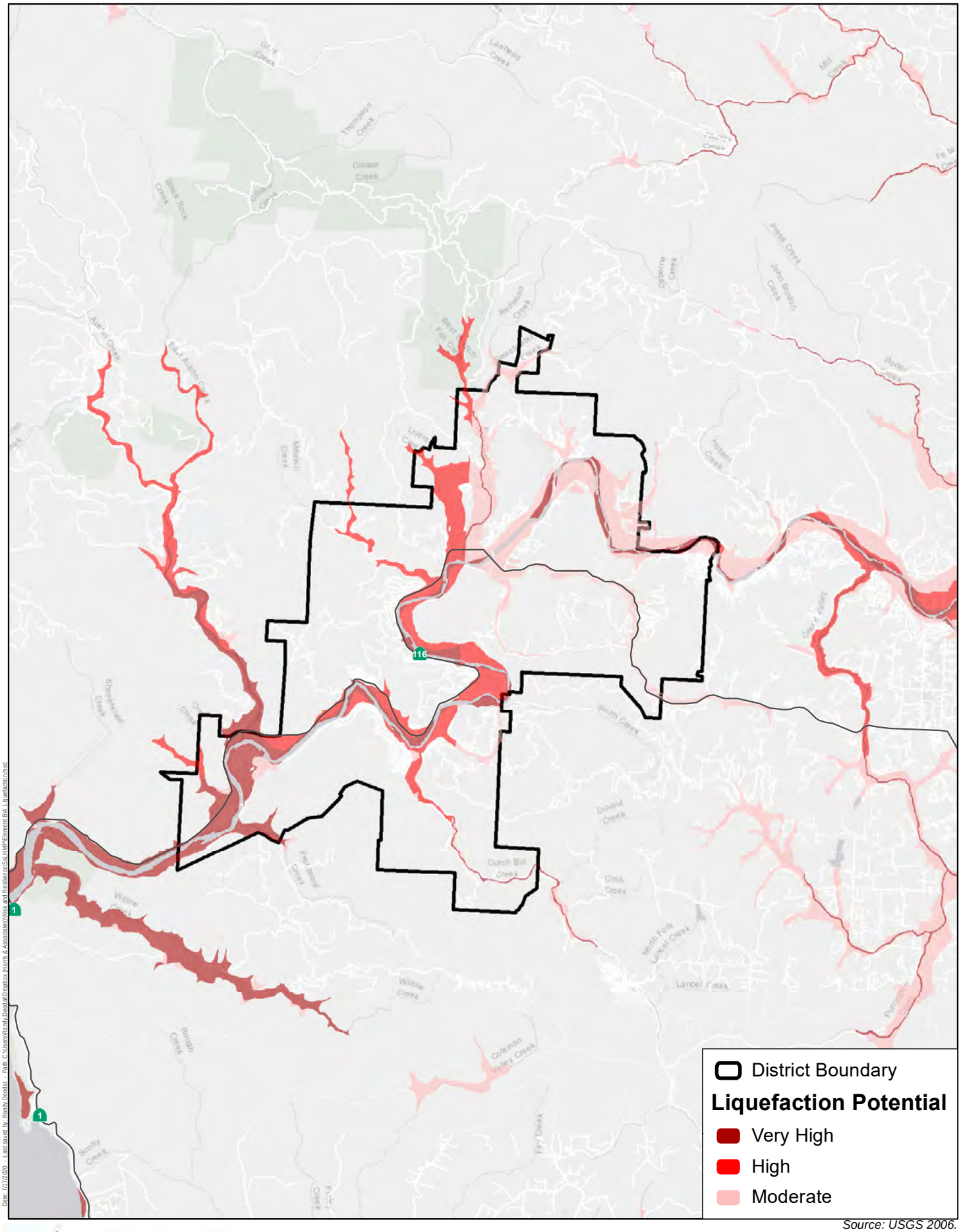

Source: USGS 2006.

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Liquefaction Prone Areas

Sweetwater Springs Water District

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Previous Occurrences

While the region has experienced significant, well-documented earthquakes (Table 8) have experienced numerous earthquakes, the 2014 South Napa earthquake is the most recent notable earthquake, resulting in a major disaster declaration for Sonoma County. It struck the County and the greater San Francisco Bay region on August 14, 2014 registering as 6.0 magnitude. The epicenter was located about 4.2 miles northwest of American Canyon, six miles southwest of the City of Napa and nine miles southeast of the City of Sonoma (USGS). The earthquake lasted 10 to 26 seconds, depending on location, and caused 8 miles of surface rupture. The earthquake resulted in 257 injuries and one death, and $400 million worth of damage and business interruption.

Other significant earthquakes include the 1989 Loma Prieta Earthquake (M6.9) along the San Andreas Fault. Although the damage in Sonoma County was minor, the earthquake resulted in 3,757 injuries and 63 deaths throughout Northern California. The 1969 Rodgers Creek/Healdsburg Fault Earthquake was the last major earthquake epicentered in Sonoma County. Two earthquakes of Magnitude 5.6 and 5.7 originated near the juncture of the Rodgers Creek and Healdsburg Fault, approximately two miles north of Santa Rosa. Damage was concentrated in the City of Santa Rosa—ninety-nine structures were significantly damages, resulting in losses of $7.25 million. Electric power and telephone communications were disrupted for a short period of time.

Table 8. Significant Earthquakes (6.0 + Magnitude) within 100 Miles of the SSWD (Pre-1900)

Originating Location	Date	Magnitude
San Francisco Bay Area	11/26/1858	6.1
Alameda County	03/05/1864	6.1
Southwest of Stockton	07/15/1866	6.0
Hayward	10/21/1868	6.8
San Francisco Bay Area	05/19/1889	6.0
Northern California	04/19/1892	6.4
Northern California	04/21/1889	6.2
San Francisco Bay Area	04/24/1890	6.2
Offshore Northern California	04/15/1898	6.2

Source: USGS 2020b.

Probability of Future Occurrence

This section addresses ground shaking and liquefaction together, since they are both induced by an earthquake hazard. While less frequent than other hazards, earthquake has a high probability of future occurrence in the District. The USGS concludes that there is a 63 percent probability of at least one magnitude 6.7 or greater earthquake striking somewhere in the San Francisco Bay region before 2032. An earthquake on the Northern San Andreas Fault has a 21 percent probability of occurrence by 3032 (Sonoma County 2017). An earthquake occurring on either the Rodgers Creek or Northern San Andreas fault system could potentially affect large numbers of people and result in serious damage to buildings, facilities, and infrastructure in the SSWD service area.

Flood

Hazard Description

Two types of flooding primarily affect the Sweetwater Springs Water District: slow-rise or flash flooding. Slow-rise floods in the District may be preceded by a warning period of hours or days. Evacuation and sandbagging for slow-rise floods have often effectively lessened flood related damage. Conversely, flash floods are most difficult to prepare for, due to extremely limited, if any, advance warning and preparation time. Unlike most of California, the areas of San Bernardino County that are subject to slow-rise flooding are not associated with overflowing rivers, aqueducts, canals or lakes. Slow-rise flooding is usually the result of one or a combination of the following factors: extremely heavy rainfall, saturated soil, area recently burned in wild fires with inadequate new ground cover growth, or heavy rainfall with runoff from melting mountain snow.

Urban Flooding

As land is converted from fields or woodlands to roads and parking lots, it loses its ability to absorb rainfall. Urbanization of a watershed can also change the hydrologic systems of a basin. Heavy rainfall collects and flows faster on impervious concrete and asphalt surfaces. The water moves from the clouds, to the ground, and into streams at a much faster rate in urban areas. Adding these elements to the hydrological systems can result in flood waters that rise very rapidly and peak with violent force.

The SSWD service area contains areas with high concentrations of impermeable surfaces that either collect water, or concentrate the flow of water in unnatural channels. During periods of urban flooding, streets can become swift moving rivers and basements can fill with water. Storm drains often back up with vegetative debris causing additional, localized flooding.

Riverine Flooding

Riverine flooding is the overbank flooding of rivers and streams. The natural processes of riverine flooding add sediment and nutrients to fertile floodplain areas. Flooding in large river systems typically results from large-scale weather systems that generate prolonged rainfall over a wide geographic area, causing flooding in hundreds of smaller streams, which then drain into the major rivers. Shallow area flooding is a special type of riverine flooding. FEMA defines shallow flood hazards as areas that are inundated by the 100-year flood with flood depths of only one to three feet. These areas are generally flooded by low velocity sheet flows of water.

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

Established in 1968, the NFIP provides federally-backed flood insurance to homeowners, renters, and businesses in communities that adopt and enforce floodplain management ordinances to reduce future flood damage. CVWD does not control land use so has no floodplain management ordinance" or a floodplain administrator. Furthermore, the SSWD service area and its facilities rely on infrastructure (roads, bridges, etc.) throughout an expansive area included in many Flood Insurance Rate Maps (FIRM) that show floodways, 100-year flood zones, and 500-year flood zones.

As a water district; however, SSWD does not participate in the NFIP. Therefore, this Plan does not address repetitive loss properties.

Flood Definitions

Floodplain

A floodplain is a land area adjacent to a river, stream, lake, estuary, or other water body that is subject to flooding. This area, if left undisturbed, acts to store excess flood water. The floodplain is made up of two sections: the floodway and the flood fringe.

100-Year Flood

The 100-year flooding event is the flood having a one percent chance of being equaled or exceeded in magnitude in any given year. Contrary to popular belief, it is not a flood occurring once every 100 years. The 100-year floodplain is the area adjoining a river, stream, or watercourse covered by water in the event of a 100-year flood. The 100-year flooding event is not a flood occurring once every 100 years, but rather a flood having a 1% chance of being equaled or exceeded in magnitude in any given year.

Floodway

The floodway is one of two main sections that make up the floodplain. Floodways are defined for regulatory purposes. Unlike floodplains, floodways do not reflect a recognizable geologic feature. For NFIP purposes, floodways are defined as the channel of a river or stream, and the overbank areas adjacent to the channel. The floodway carries the bulk of the flood water downstream and is usually the area where water velocities and forces are the greatest. NFIP regulations require that the floodway be kept open and free from development or other structures that would obstruct or divert flood flows onto other properties.

Base Flood Elevation

The term "Base Flood Elevation" refers to the elevation (normally measured in feet above sea level) that the base flood is expected to reach. Base flood elevations can be set at levels other than the 100-year flood. Some communities use higher frequency flood events as their base flood elevation for certain activities, while using lower frequency events for others. For example, for the purpose of storm water management, a 25-year flood event might serve as the base flood elevation; while the 500-year flood event serves as base flood elevation for the tie down of mobile homes. The regulations of the NFIP focus on development in the 100-year floodplain.

Flood zones are geographic areas that the FEMA has defined according to varying levels of flood risk. These zones are depicted on a community's Flood Insurance Rate Map (FIRM) or Flood Hazard Boundary Map. Each zone reflects the severity or type of flooding in the area.

Floodzones

The District does not participate in the NFIP; therefore, FIRMs are not applicable to the service area.

Location and Extent

The unincorporated areas of the County within Sweetwater Springs Water District participate in the National Flood Insurance Program (NFIP) via Sonoma County NFIP. Created by Congress in 1968, the NFIP makes flood insurance available in communities that enact minimum floodplain management rules consistent with the Code of Federal Regulations §60.3.

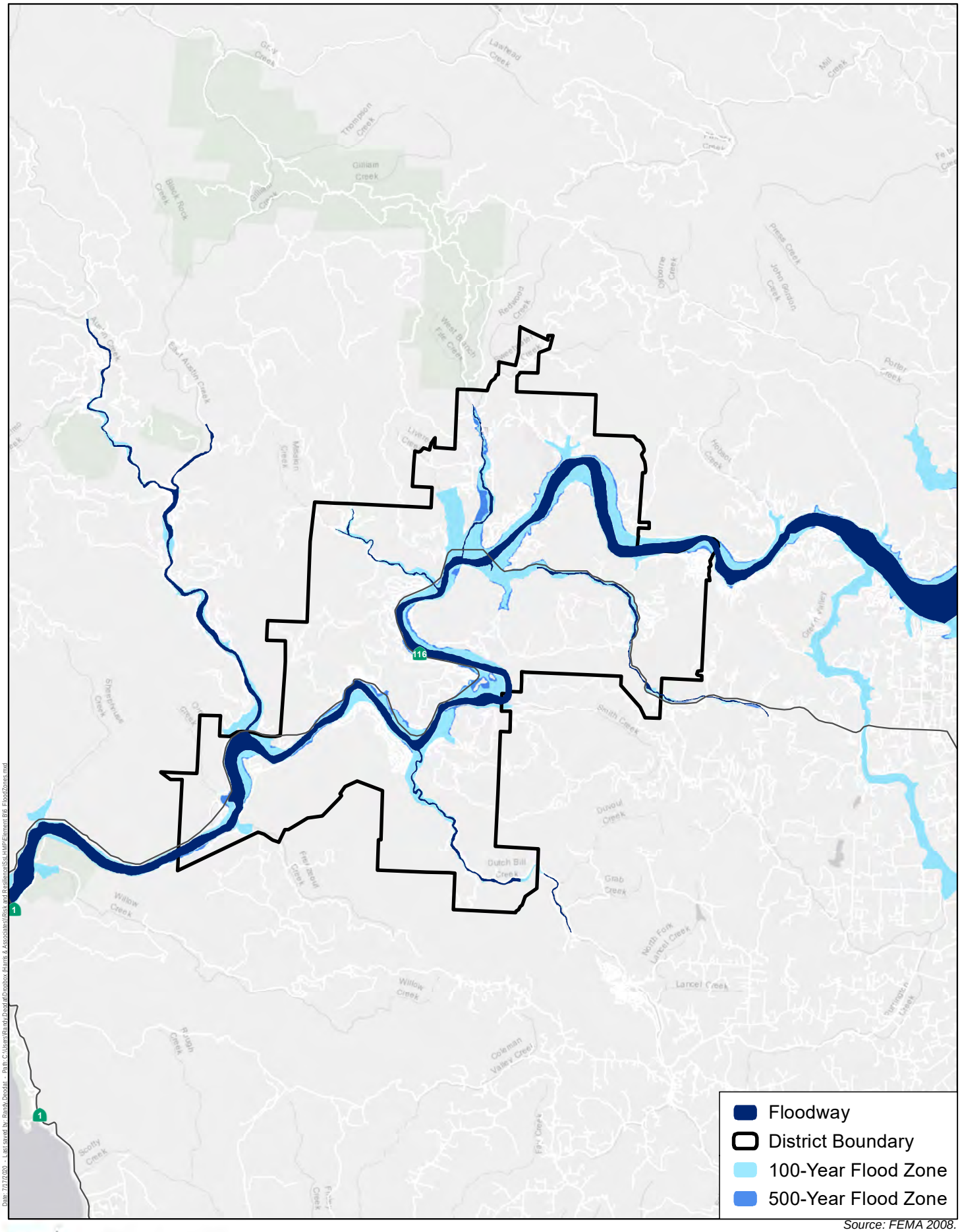
According to Figure 5, FEMA Flood Hazard Areas, the majority of hazard areas within the District are classified as areas subject to inundation by the 1-percent-annual-chance flood event (100-Yr Floodzone).

The National Weather Service considers the Russian River at flood stage when it reaches a height of 32 feet at the Guerneville Bridge. Floods reaching a gauge height of less than 34 feet at the Guerneville Bridge are considered an inconvenience that commonly occur during a typical winter. High water less than 34 feet does not usually present a significant problem for the community or emergency service organizations (Table 9).

Table 9. Russian River Flood Elevations at the Guerneville Bridge Gauge

Recurrence Interval	Elevation (feet)	Equivalent Staff Gauge Height (feet)
Water Surface	11.53	0.00
Monitor Level	40.86	29.00
Flood Level	43.86	32.00
10-Year Flood	49.86	38.00
50-Year Flood	57.36	45.50
100-Year Flood	59.86	48.50
500-Year Flood	62.89	51.60

Source: Sonoma County 2017.



Source: FEMA 2008.

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FEMA Flood Hazard Areas

Sweetwater Springs Water District

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Previous Occurrences

Significant historic floods have occurred on the Russian River in 1955, 1964, 1986, 1995, 1997, and most recently in January of 2006. The largest flood in recent history occurred between February 14 and 18, 1986, when a peak discharge of 102,000 cubic feet per second was recorded and the flood reached a gauge height of 48.6 feet at Guerneville. From December 26, 2005 to January 3, 2006, heavy rains resulted in the river cresting at 41.6 feet at Guerneville. The President declared this flood a major disaster, and more than 100 roadways were blocked due to flooding or landslides (Sonoma County 2017).

Table 10 provides annual peak gauge heights and discharges for the Russian River at the USGS Guerneville gauge from 1990 to 2019. It indicates that peak flow exceeded flood stage at Guerneville in 34 of 59 years. The number of floods experienced may be greater as some years had more than one high flow event.

Table 10. Annual Peak Stream Flow and Gauge Height on Russian River near Guerneville (1990-2019)

Year	Gauge Height (feet)	Streamflow (cfs)	Flood Designation[2]
2000	31.89	37,900	Flood Level
2001	24.15	24,700	No Flood
2002	33.43	44,000	Flood Level
2003	36.48	57,600	10-yr Flood
2004	38.17	63,400	10-yr Flood
2005	22.78	21,900	No Flood
2006	42.0	86,000	50-yr Flood
2007	26.42	29,800	No Flood
2008	29.22	36,600	No Flood
2009	22.99	22,400	No Flood
2010	29.62	37,900	No Flood
2011	29.39	37,300	No Flood
2012	24.99	26,800	No Flood
2013	32.79	38,400	Flood Level
2014	21.10	18,900	10-yr Flood
2015	36.10	42,900	50-yr Flood
2016	28.47	27,500	No Flood
2017	40.23	55,100	10-yr Flood
2018	20.23	14,800	No Flood
2019	47.55	72,000	100-yr Flood

Source: USGS 2021.

Probability of Future Occurrence

The future potential for flood frequency and intensity in the near term is expected to be similar to the observed historic probabilities. In the longer term; however, climate change will likely increase the

[2] Closest flood designation

intensity and frequency of flooding. There is projected increase of year-to-year variability with wetter days during periods of precipitation but fewer total days with precipitation. Average annual precipitation under RCP 8.5 shows significant increases by 2100 (Table 11). These changes would likely create more serious flooding events alongside overall drier conditions as more intense storm events yield a larger overall percentage of the total annual volume of precipitation with fewer total storm events.

Table 11. Projected Annual Total Precipitation

Scenario		Historical		RCP 8.5		RCP 4.5	
Time Frame	1961–1990	2011–2040	2041–2070	2071–2100	2011–2040	2041–2070	2071–2100
Precipitation (inches)	54.8	62.9	62.7	71.3	NA	63.8	64.3

Source: CEC 2020.

Notes: NA = not applicable; RCP = Representative Concentration Pathway

A meteorological phenomena termed "atmospheric river" increases the intensity and frequency of rain events and flooding in the District. Atmospheric rivers are narrow bands, two hundred miles wide and twelve hundred miles or more long, that transport water vapor from the tropics toward the poles. The region's wintertime precipitation comes from atmospheric rivers, and these events have been found to cause 87% of the floods in the Russian River from 1948 to 2011. Extreme atmospheric river events are expected to increase in California under projected climate change.

An extreme precipitation event is defined in this assessment by 2-day rainfall totals during a water year (October-September) exceeding the 95th percentile of maximum rainfall based on precipitation data between 1961 and 1990. The City of Guerneville's extreme precipitation event threshold is 2.08 inches. Only 5 percent of historical precipitation events have exceeded this threshold. The City can expect a nominal increase in frequency of these events through mid-century, and an increase of up to 8 extreme precipitation events by the end of century under RCP 8.5 (Table 12).

Table 12. Average Number of Extreme Precipitation Events by Water Year

Scenario		Historical		RCP 8.5		RCP 4.5	
Time Frame	1961–1990	2011–2040	2041–2070	2071–2100	2011–2040	2041–2070	2071–2100
Events (No.)	6	7	8	10	NA	8	8

Source: CEC 2020.

Notes: NA = not applicable; RCP = Representative Concentration Pathway

In addition to increasing in frequency, precipitation events are projected to increase in intensity. Table 13 summarizes the projected intensity of extreme precipitation events—those exceeded on average once every 20 years—for the late twenty-first century under the RCP 8.5 scenario for the 10 Global Climate Models (GCM) selected by California's Climate Action Team for performance in California. The first 4 models listed represent priority models for California.

Table 13. Projected Intensity of Extreme Precipitation Events, 2070–2099, RCP 8.5

Model Name	Simulation Type	Precipitation (inches)	95 Percent Confidence Interval (inches)
CanESM2	Average	15.11	13.13–19.11
CNRM-CM5	Cooler/wetter	17.72	14.55–24.67
HadGEM2-ES	Warm/drier	19.01	5.80–11.5
MIROC5	Complement	10.48	9.2–13.72

Table 13. Projected Intensity of Extreme Precipitation Events, 2070–2099, RCP 8.5

Model Name	Simulation Type	Precipitation (inches)	95 Percent Confidence Interval (inches)
ACCESS1-0	–	14.93	11.91–21.62
CCSM4	–	13.6	11.35–18.65
CESM1-BGC	–	12.16	10.55–15.34
CMCC-CMS	–	NA	NA
GFDL-CM3	–	12.25	10.0–17.49
HadGEM2-CC	–	NA	NA
GCM Average	–	14.41	–

Source: CEC 2020.
Notes: RCP = Representative Concentration Pathway

Wildfire

Hazard Description

A wildfire is an uncontrolled fire spreading through vegetative fuels and exposing or possibly consuming structures. They often begin unnoticed and spread quickly. Naturally occurring and non-native species of grasses, brush, and trees fuel wildfires. Wildfires normally occur in areas in which development is essentially nonexistent, except for roads and utilities.

People start more than 80 percent of wildfires, usually as debris burns, arson, or carelessness. Lightning strikes are the next leading cause of wildfires. Wildfire behavior is dependent on three primary factors: fuel, topography, and weather. The type, and amount of fuel, as well as its burning qualities and level of moisture affect wildfire potential and behavior. Topography is important because it affects the movement of air (and thus the fire) over the ground surface. The slope and shape of terrain can change the speed at which the fire travels, and the ability of firefighters to reach and extinguish the fire. Weather affects the probability of wildfire and has a significant effect on its behavior. Temperature, humidity and wind (both short and long term) affect the severity and duration of wildfires. Extreme weather conditions such as high temperature, low humidity, and/or winds of extraordinary force may cause an ordinary fire to expand into one of massive proportions.

Such “fire weather” is characterized by several days of hot dry weather and high winds, resulting in low fuel moisture in vegetation. California experiences large, destructive wildland fires almost every year, and Sonoma County is no exception. Wildland fires have occurred within the County, particularly in the fall of the year, ranging from small, localized fires to disastrous fires covering thousands of acres.

Location and Extent

Wildfires present a substantial hazard to life and property in communities built within or adjacent to hillsides and mountainous areas. There is a huge potential for losses due to wildland/urban interface fires in Sonoma County. In urban areas, the effectiveness of fire protection efforts is based upon several factors, including the age of structures, response times, and availability of water resources to combat fires (Figure 6, Fire Hazard Severity Areas).

Previous Occurrences

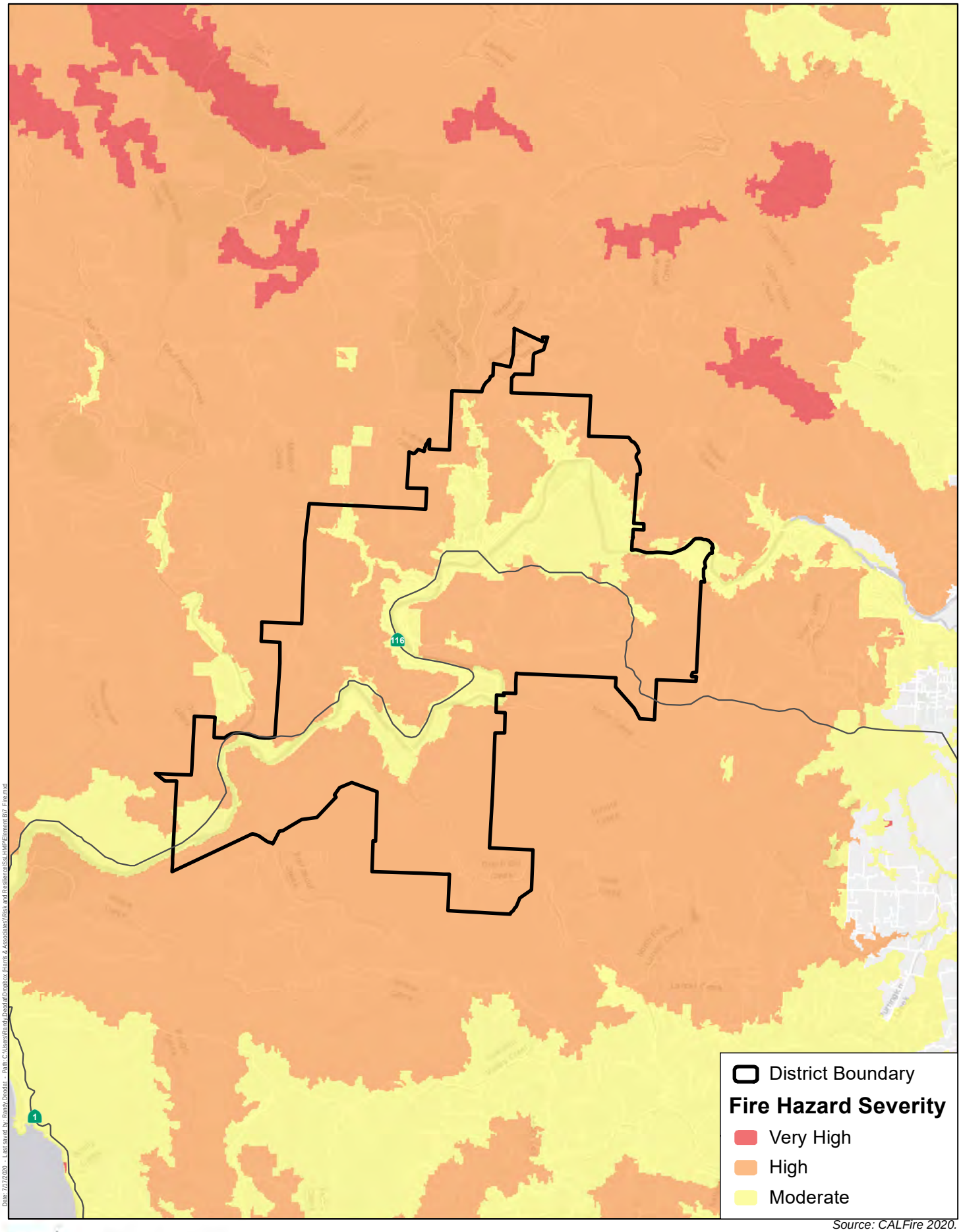
Wildland fires, particularly wildland/urban interface fires, have historically occurred in the region. CAL FIRE has identified the Guerneville/Cazadero area as a "historic wildland fire corridor." The area experienced historic fires in 1923, 1951, and 1978. The large and destructive fires in the Bay Area and North Coast, particularly in 2015 and 2017, have rapidly shifted attention to the ongoing risks in the region. Prior to 2017, the peak year was 1964, due to the large Hanley fire and the smaller Nuns and Roadside #42 fires; the perimeters of these three fires were eerily similar or contained within the 2017 Tubbs, Nuns and Atlas fires, respectively. The North Bay fires of October 2017 burned more than twice the area of any previous year. As of 2018, six of the top 20 most destructive fires in California history (in terms of buildings lost) have occurred in the Bay Area (Figure 7, Historic Fires).

Recent or significant wildland fires in Sonoma County are listed in Table 14.

Table 14. Wildfire History Sonoma County

Year	Fire Name	Acres Burned
1964	Hanley	52,700
	Nuns Canyon	10,400
1965	Knight's Valley	6,000
	Pocket Ranch	4,000
1972	Bradford	1,760
1978	Creighton Ridge	11,405
1988	Geysers	9,000
1996	Cavedale	2,100
1999	Geyser Road	1,300
2000	Berryesssa	5,731
2004	Geysers	12,000
2008	Pine	989
2013	McCabe	3,505
2015	Valley	76,067
2017	Tubbs	36,807
	Nuns	56,566
2019	Kincade	77,758
2020	Walbridge	55,209
	Myers	2,360
	Glass	67,484

Source: CAL FIRE 2020.



Source: CALFire 2020.

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Fire Hazard Severity Areas

Sweetwater Springs Water District

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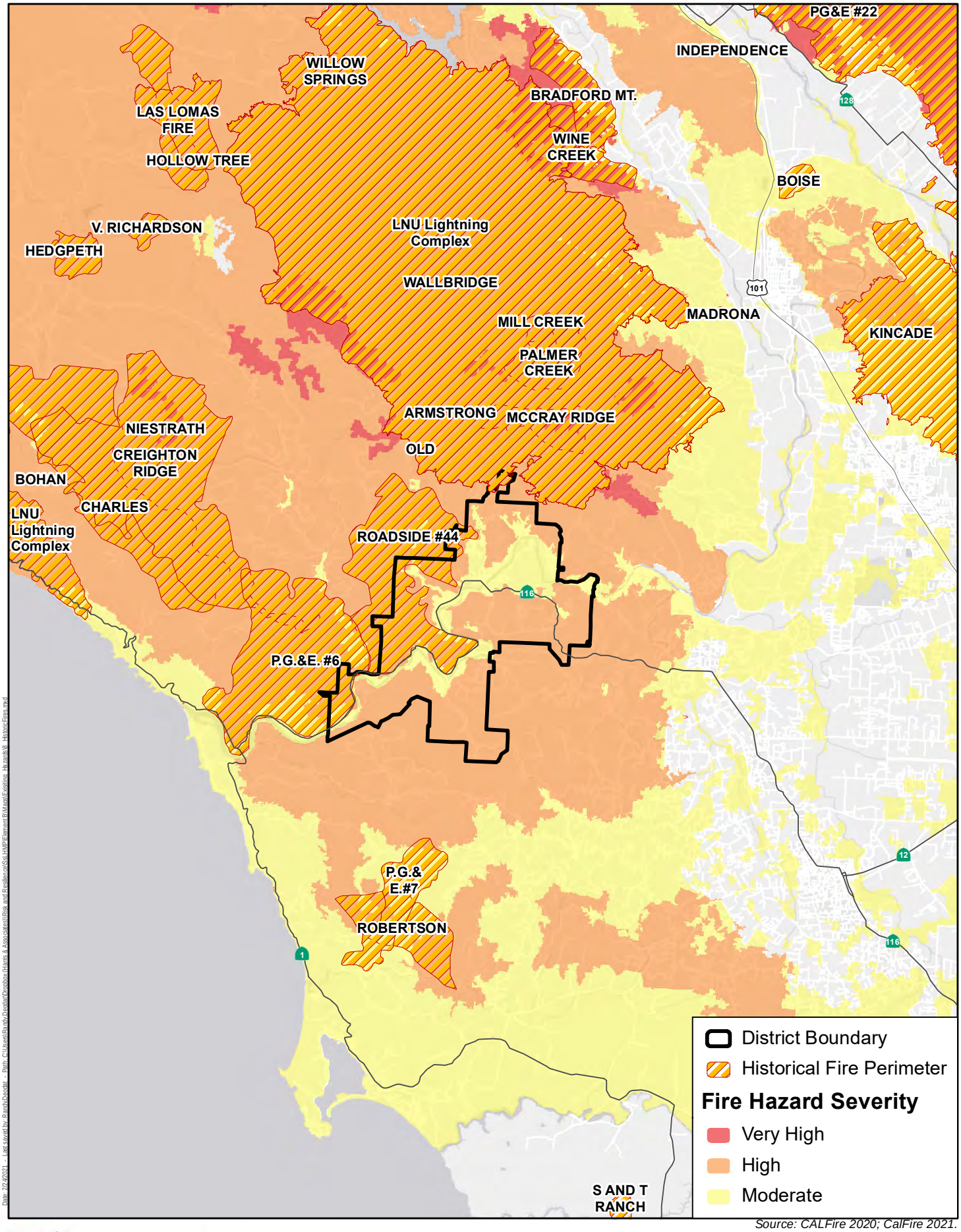

Source: CALFire 2020; CalFire 2021.

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Historic Fires

Sweetwater Springs Water District

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Probability of Future Occurrence

In general, climate change is expected to increase wildfire frequency, size, and severity beyond the historical range of natural wildfire variability due to increasing length of the fire season and drier fuels. These changes are being driven by changes in temperature and precipitation regimes from a cooler and wetter condition to a warmer and drier condition. However, the accuracy of projections of future fire activity depend on variables that have contributed to wildfire activity historically in the region, how those variables may change in the future, and the ranges of uncertainty associated with key variables. At relatively broad scales, climate affects fire regimes in two different ways, either by altering vegetation growth rates (e.g., fuel accumulation) or through changes in fire season length and severity (e.g., fuel flammability and fire weather) (Krawchuk & Moritz 2014). Although there is a strong moisture gradient in the region from the coast inland, fire is not generally fuel limited. As a result, there are more consistent projections of increased fire activity (i.e., more frequent or greater area burned), due to a warmer climate.

At finer scales, recent studies demonstrate that fire exhibits a "hump-shaped" response to human development, with fire activity peaking in the wildland-urban interface (WUI) due to increased ignitions and dropping off both in more urbanized areas and in less developed rural regions and open space (Mann et al. 2016). Thus, future patterns of land use together with climate change are crucial for assessing what fire regimes may emerge in the coming decades (Table 15).

Table 15. Historical and Projected Decadal Fire Probability for SSWD

Scenario		Historical		RCP 8.5		RCP 4.5	
Time Frame	1961–1990	2011–2040	2041–2070	2071–2100	2011–2040	2041–2070	2071–2100
Probability	10%	10%	20%	20%	NA	30%	40%

Source: CEC 2020 ("central" population scenario).

Notes: NA = not applicable; RCP = Representative Concentration Pathway

Landslides

Hazard Description

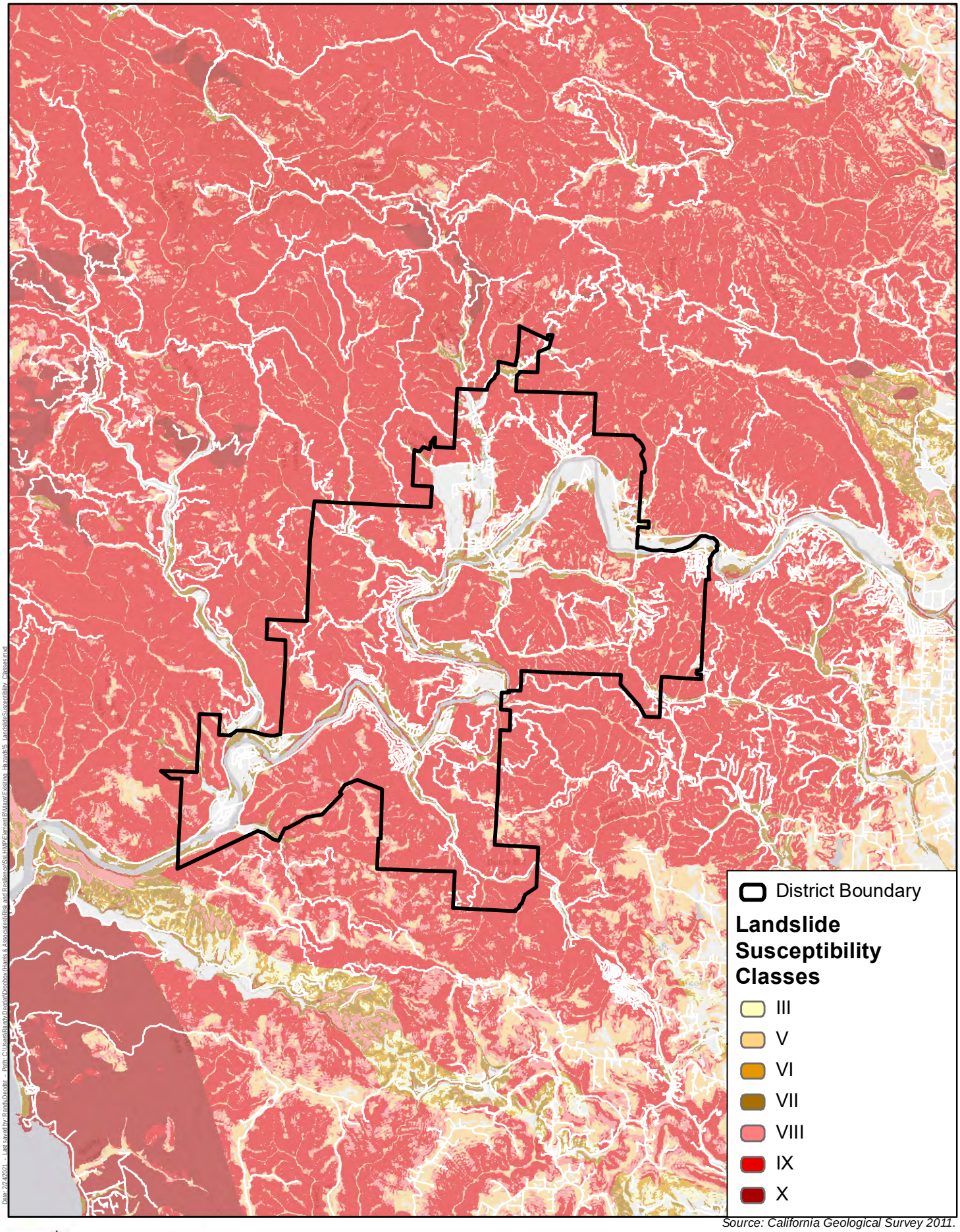
Landslides consist of rock falls, disrupted soil slides, rock slides, soil lateral spreads, soil slumps, soil block slides, and soil avalanches. Areas having the potential for earthquake-induced landslides generally occur in areas of previous landslide movement, or where local topographic, geological, geotechnical, and subsurface water conditions may result in ground movement. The most frequent and widespread landslides in the region, however, are induced by prolonged or heavy rainfall. The majority of rainfall-induced landslides are shallow, small and, fast-moving. Many rainfall-induced landslides transform into debris flows as they travel down steep slopes, especially those that enter stream channels where they may mix with additional water and sediment.

Deep seated landslides are generally those greater than 10-15 feet in depth. These landslides are often generated by prolonged above-average rainfall which can occur during El Nino years, although even "normal" precipitation years in northern California can lead to landslide initiation. Typically, deep-seated landslides occur towards the end of the winter season (March-May) due to the time it takes for seasonal rainfall to reach the bottom "slip surface" of the landslide.

In addition to earthquakes and floods, wildfires may induce landslides. Steep, recently burned areas are especially susceptible to debris flow. Even modest rain storms during normal, non-El Nino years can trigger post-wildfire debris flows.

Location and Extent

Landslides are more likely in areas with weak rocks and steep slopes. The map shown in Figure 8, Landslide Susceptibility Areas, uses detailed information on the location of past landslides, the location and relative strength of rock units, and steepness of slope to estimate susceptibility to deep-seated landsliding (0 to X, low to high).



Source: California Geological Survey 2011.

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Landslide Susceptibility Areas

Sweetwater Springs Water District

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Previous Occurrences

The winters of 1982, 1983, 1986, and 1998 produced significant landslides in Sonoma County. The 1997-98 El Nino rainstorms resulted in severe landslides throughout Sonoma County. Thee landslides caused an estimated $21 million in damages at seven major locations (Sonoma County 2017). The three most heavily damaged sites were Rio Nido, Hidden Acres, and Gold Ridge. Rio Nido is located just north of the Russian River in the west central part of the county, intersecting the District's service area. This small community is in and along the margins of several steep canyons. Following heavy rains of early February, the canyon liquefied, forming debris flows that crashed into homes along Upper Canyon Three Road. Three homes were destroyed and four more were severely damaged. The road and all underground and above-ground utilities were destroyed. The threat of slippage of the main slide and resulting debris-flow activity forced the evacuation of 140 homes downslope from the slide.

The widespread damage prompted FEMA and CalOES to initiate the first federally funded landslide acquisition program. The program was designed to permanently remove the properties destroyed, damaged, or still at risk from landslides. Sonoma County received funds for the acquisition of 45 properties in the four communities that suffered the greatest damage (Sonoma County 2017).

Erosion continues to threaten the District's assets. Table 16 describes ongoing erosion issues at key water facilities and roads.

Table 16. Erosion Damage and Repairs

Facility/Road	Description	Repair Timeline
Harrison Booster and Tank	Erosion on lower side of driveway	Repaired/Complete
Villa Grande Tank	Minor erosion on road	Repaired/Complete
Moscow Rd.	Road closed off 8" c-900 PVC water line	No time frame from County
Road to School House Tank and Booster	Road needs to be graded and more rock put down	Ongoing
Drake Rd.	Slide over 8" AC water main.	Repaired/Complete
Natoma Tank	Leaning (about 8") and may eventually fall. Work done on foundation.	Ongoing

Source: SSWD 2020.

Probability of Future Occurrence

Landslides may be induced by earthquakes, extreme precipitation, or wildfire events. Therefore, the probability of future occurrence of a landslide is a function of the probability of these hazards. Therefore, there is a greater probability of a landslide occurring than earthquake, extreme precipitation or wildfire events occurring individually. As discussed above, extreme precipitation and wildfire events are likely to occur with greater intensity and frequency under projected climate change conditions. As a result, the probability of landslide affecting the District over the planning period is high and growing.

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 events. Rather than providing an absolute temperature threshold, extreme heat days can be defined by reference to local average temperatures. An extreme heat day is defined in this assessment by temperatures exceeding the 98th percentile of maximum temperatures based on daily temperature maximum data between 1961 and 1990. For the District, the extreme heat day threshold is 93.4 degrees Fahrenheit (CEC 2020).

Location and Extent

Extreme heat events can occur anywhere in the District. However, some areas within the District experience higher land surface temperatures during extreme heat days. Figure 9, Extreme Heat Map, show annual land surface temperature across the District during the first week in August 2020.

Previous Occurrences

The District has historically experienced 4 extreme heat days per year on average.

Probability of Future Occurrence

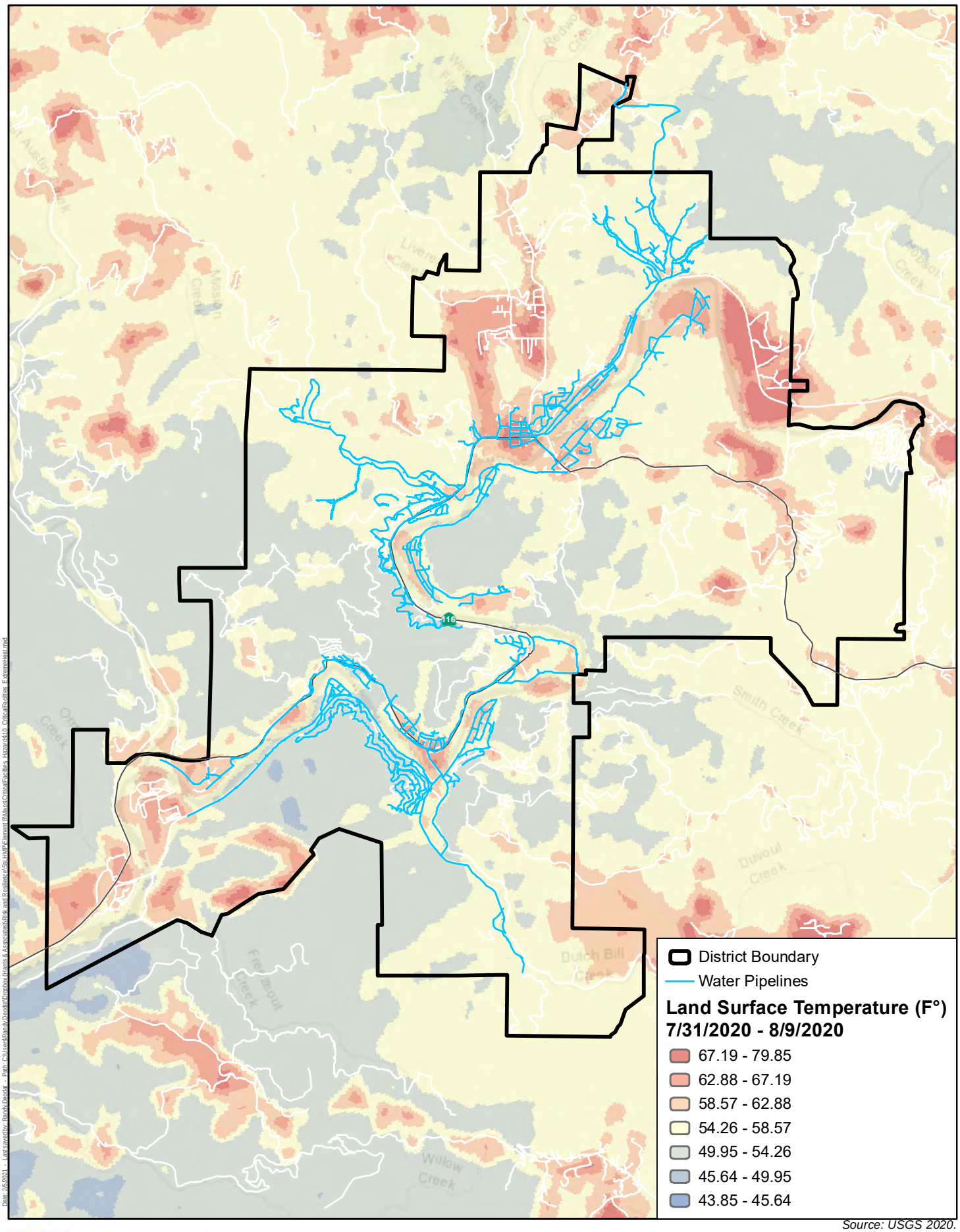
Extreme heat events are likely to become more frequent in the future due to climate change (Table 17).

Table 17. Historical and Projected Number of Extreme Heat Days per Year

Scenario	Historical	RCP 8.5			RCP 4.5		
Time Frame	1961–1990	2011–2040	2041–2070	2071–2100	2011–2040	2041–2070	2071–2100
Count (No.)	4	8	13	24	NA	10	13

Source: CEC 2020 ("central" population scenario).

Notes: NA = not applicable; RCP = Representative Concentration Pathway



Source: USGS 2020.

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Extreme Heat Map

Sweetwater Springs Water District

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Risk Assessment

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:

1. Inventory of Existing Assets

Facilities 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 facilities to consider in the Risk Assessment.

And for each hazard:

2. Vulnerability Assessment

A Vulnerability Assessment in its simplest form describes what is vulnerable to an identified hazard. Vulnerability Assessments provide is a simultaneous look at the geographical location of hazards and an inventory of the underlying land uses (populations, structures, etc.). This step provides a general description of District facilities and contents in relation to the identified hazards so that mitigation options 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 City, County, state, or federal sources.

The location (page number) of the vulnerability assessment for each hazard is listed below:

Hazard	Location in HMP
Earthquake (Groundshaking + Liquefaction)	63
Flood	77
Wildfire	83
Landslide	87
Extreme Heat	91

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 Actions Matrix in the Mitigation Strategy section. Mitigation actions can reduce disruption to critical services, human life, and personal and public property and infrastructure.

3. Impact Analysis

The impact analysis involves assessing the damage, injuries, and financial costs 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 as a result of a primary hazard. For each hazard considered in this HMP, the Impact Analysis summarizes losses and secondary hazards.

The location (page number) of the impact analysis for each hazard is listed below:

Hazard	Location in HMP
Earthquake (Groundshaking + Liquefaction)	63
Flood	77
Wildfire	83
Landslide	87
Extreme Heat	91

Inventory of Existing SSWD Assets

For this Hazard Mitigation Plan, the Vulnerability Assessment for each hazard only considers risks to assets owned and operated by SSWD. The key facilities that constitute the District's water system are summarized below.

Storage Facilities (Tanks)

SSWD has a total of 16 steel, 8 wood, 6 plastic, and 1 concrete tanks. Out of the 31 tanks, 15 are anchored while the other 16 are unanchored. The tanks range in size from 2,500 gallons to 378,000 gallons.

Pumping Stations

SSWD has 13 pumping stations in the Guerneville system and 4 pump stations in the Monte Rio system. The Highland Tank Pump Station is the most critical and is essential for water supply to a significant segment of the Water District's customers. The remaining stations are an important part of the system but not necessary for providing continuous supply of water.

Treatment Facilities

SSWD operates two water treatment facilities, one for each system. The Guerneville System's water treatment consists of chlorination disinfection, iron and manganese removal, and zinc metaphosphate injection for corrosion control. The Monte Rio system treatment plant consists of filtration through two manganese greensand pressure filters with pre and post-chlorination, and zinc metaphosphate injection for corrosion control.

Transmission Pipelines

SSWD's distribution systems consist of a variety of pipe sizes and materials with a total length of approximately 66 miles. The District is in the process of updating older pipes with new PVC or

HDPE pipe. The condition of the pipes varies from poor to good and older segments of the system are continually being replaced.

District Facilities (Miscellaneous)

District facilities include buildings that are integral to the day-to-day operation of the SSWD, including the Administration Building, Control Buildings, Storage Buildings, and Chlorine Generation Buildings. District facilities located within hazard zones were identified, but loss estimates were not generated in HAZUS.

Wells

Wells located in hazard zones are identified in this risk assessment. The District has a reliable water supply which is 100 percent supplied by groundwater which is underflow from the Russian River. The District has 3 wells for the Guerneville System and 2 wells for the Monte Rio System. The District has water rights for up to 1137 Acre-Feet with a maximum allowable pumping rate of 2 cubic feet per second.

Emergency Generators & Fire Hydrants

Emergency generators and fire hydrants are important assets to efficiently and adequately respond to hazard events. Emergency backup power is available at El Bonita, Monte Rio Filter Plant, Canyon 3 Booster, Park AV booster, the Highland Treatment Plant, and the general office, providing a total of 5 diesels and one propane generators providing between 10 and 250 KW of energy. Four of the six generators are mobile, and can be plugged in to the Harrison Tank and Booster, Lower Summit Tank and Booster, Wright Dr. Tank and Booster, Shoenman Tank and Booster, and the Upper Schoolhouse Tank and Booster. There are 308 fire hydrants within the SSWD service area that can be accessed to assist in fire suppression during a wildfire event.

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.

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Earthquake Hazards

Vulnerability Assessment

Ground Shaking

Earthquakes can cause widespread damage or destruction to structures throughout the District. All critical facilities are potentially threatened by ground shaking. The risk of harm from ground shaking varies widely, depending on the magnitude and the location of the fault line causing the earthquake.

Liquefaction

In total, there are 12 critical facilities and infrastructure are in high or very high liquefaction risk areas[3] (Table 18). However, two additional tanks (Monte Rosa and Northwood) sit within 50 feet of a high liquefaction risk area. Figure 10, Critical Facilities in Liquefaction Hazard Zone, show the geographic distribution of the critical facilities and infrastructure relative to liquefaction risk areas. There are 1.87 miles of transmission pipeline that lie within a very high liquefaction risk area.

Table 18. Critical Facilities in Liquefaction Risk Areas

Category	Very High	High	Moderate
Storage Facility (Tank)	0	1	1
Pump Station	0	1	0
Treatment Facility	0	1	0
District Facility	1	3	1
Fire Hydrant	6	91	54
Wells	3	2	0

Impact Analysis

The data in this section was generated using the HAZUS-MH program for earthquakes. Once the location and size of a hypothetical earthquake are identified, HAZUS-MH estimates the intensity of the ground shaking, the number of buildings damaged, the number of casualties, the amount of damage to transportation systems and utilities, the number of people displaced from their homes, and the estimated cost of repair and clean up. Storage facilities (tanks), pump station, treatment facilities and District facilities were assessed in the impact analysis.

Two earthquake scenarios were assessed in this vulnerability assessment.

- Earthquake Scenario 1 shows a San Andreas Fault M8.0 Earthquake Scenario (Figure 11, Shake Intensity – San Andreas Fault)
- Earthquake Scenario 2 shows a Rodgers Creek M7.29 Earthquake Scenario (Figure 12, Shake Intensity – Rodgers Creek Fault)

[3] This does not include fire hydrants.

San Andreas Fault M8.0 Earthquake Scenario

Building Damage

The building damage counts are the estimated number of buildings damaged by the earthquake scenario. These include estimates of *all* buildings (not just District owned) damaged within census tracts that intersect the SSWD boundary, not just those within the boundary. Therefore, this analysis likely overestimates the number of buildings damaged in the SSWD (Table 19).

Table 19. Expected Building Damage San Andreas M8.0[4]

Damage Extent	None	Slight	Moderate	Extensive	Complete
Total	4,914	3,329	1,187	256	109

Water System Damage

Table 20. Water Facility (%) Functionality – San Andreas M8.0

Name	@ Day 1	@ Day 3	@ Day 7	@ Day 14	@ Day 30	@ Day 90
10000 Gallon Tank	22.1	36.1	51	54.4	56.7	68.3
10000 Gallon Tank (Hay & Bay)	18.6	29.2	41.4	44.5	47.3	60.9
10000 Gallon Tank (Leppo)	14.6	20.2	27.5	29.9	33.2	49.2
10000 Gallon Tank (Shoeneman)	16.6	29.7	34.8	38.2	47.6	78.4
10000 Gallon Tank (Upper Schoolhouse)	14.3	19.4	26.3	28.6	31.9	48.1
10000 Gallon Tank, Pump and Shed	18.3	28.6	40.5	43.5	46.4	60.2
100000 Gallon Tank (Villa Grande)	14.3	19.6	26.5	28.8	32.1	48.3
120,000 Gallon Tank (Monte Rio 1)	17.5	26.8	37.8	40.7	43.6	58
125000 Gallon Tank (Harrison)	14.3	19.6	26.5	28.8	32.1	48.3
125000 Gallon Tank (Monte Rosa)	15.2	21.7	29.9	32.5	35.7	51.4
Pump and Shed	11.8	19.1	31.8	45.5	72.9	99.9
15000 Gallon Tank & Booster Station	18.3	28.6	40.5	43.5	46.4	60.2
15000 Gallon Tank (Natoma)	17.4	26.6	37.6	40.5	43.4	57.8
180000 Gallon Tank (Monte Rio 2)	17.8	27.5	39	41.9	44.8	58.9
20000 Gallon Tank & Booster Station (Park)	15.7	22.7	31.5	34.1	37.3	52.7
10000 Gallon Tank (Rio Nido)	19.7	37.1	43.3	46.5	55.3	83.1
26000 Gallon Tank, Pump & Shed	15.6	22.6	31.3	33.9	37.1	52.6
3-2500 Gallon Tanks (Crespo)	15.7	27.4	32.2	35.7	45.1	76.7
300000 Gallon Tank (Highland Park 1)	16.9	25.6	36	38.8	41.8	56.5
378,000 Gallon Tank (Highland Park 2)	16.9	25.6	36	38.8	41.8	56.5
45000 Gallon Backwash Tank & Filter Vessels	14.9	25.3	29.7	33.2	42.7	75
50000 Gallon Tank, Pump & Shed	18.4	28.8	40.8	43.8	46.6	60.4
60,000 Gallon Tank (Middle Schoolhouse)	14.3	19.4	26.3	28.6	31.9	48.1

[4] Sum of building damage in census tracts intersecting District Boundary

Table 20. Water Facility (%) Functionality – San Andreas M8.0

Name	@ Day 1	@ Day 3	@ Day 7	@ Day 14	@ Day 30	@ Day 90
6000 Gallon Hydropneumatic Tank (Lower Summit)	15.6	22.4	31.1	33.7	36.9	52.4
7000 Gallon Tank	15.6	22.6	31.4	34	37.2	52.7
70000 Gallon Tank (Gonfotti 1)	16.5	24.5	34.4	37.1	40.2	55.1
70000 Gallon Tank (Gonfotti 2)	17.4	31.8	37.2	40.6	49.9	79.9
Administration	16.7	29.9	35	38.4	47.8	78.5
Booster Pump/Control Station	14.4	24.1	28.3	31.8	41.3	74
Chlorine Generation & Pump Bldg	18.1	33.4	39	42.4	51.5	80.9
Edgehill Booster	18.5	34.3	40.1	43.4	52.4	81.4
El Bonita Well Field (Control Building)	19	35.4	41.3	44.6	53.6	82.1
Filter Vessels & 22,000 gal. backwash tank	16.9	25.6	36	38.8	41.8	56.5
Highland Treatment Plant Control Bldg.	18.1	33.4	39	42.4	51.5	80.9
Monte Rio Filter Plant Control Bldg	14.9	25.3	29.7	33.2	42.7	75
Monte Rosa Booster	12	19.5	32.5	46.3	73.5	99.9
Santa Rosa Booster Station	11.7	19	31.6	45.3	72.8	99.9
Schoenemann Booster Pumphouse	14.5	23.6	38.5	52.2	77.7	99.9
Storage	18.1	33.4	39	42.4	51.5	80.9
Sunshine Bypass Booster & Valve	13.7	22.3	36.5	50.3	76.4	99.9
Treatment Building, Chlorine Generation & Pump Building	14.9	25.3	29.7	33.2	42.7	75
15000 Gallon Tank	18.4	28.8	40.8	43.8	46.6	60.4
Canyon 3 Pump Station	20.5	38.8	45.2	48.3	57	84
Monte Rio Treatment Plant	14.9	25.3	29.7	33.2	42.7	75
Highland Treatment Plant	18.1	33.4	39	42.4	51.5	80.9
130000 Gallon Tank (Drake)	18.3	28.6	40.5	43.5	46.4	60.2

The Monte Rosa, Santa Rosa, and Sunshine Bypass Boosters would be the most impacted on the day of a San Andreas M 8.0 earthquake. Tanks, however, would take the longest time to resume functionality. The Upper Schoolhouse, Middle Schoolhouse, Harrison, Villa Grande and Leppo tanks would be less than 50% functional up to three months after the earthquake.

Casualties

HAZUS estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows:

- **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 estimates are provided for three (3) 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 2:00 AM estimate considers that the residential occupancy load is maximum, the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 21 represents a summary of casualties estimated for San Andreas M8.0 earthquake scenario.

Table 21. Casualty Estimates – San Andreas M8.0

Time	Severity 1	Severity 2	Severity 3	Severity 4	Total
2 AM	1.29	0.09	0.00	0.00	1.38
2 PM	2.52	0.29	0.02	0.04	2.86
5 PM	1.88	0.20	0.01	0.02	2.12

Notes: Level 1: Injuries will require medical attention but hospitalization is not needed.

Level 2: Will require hospitalization but are not considered life-threatening.

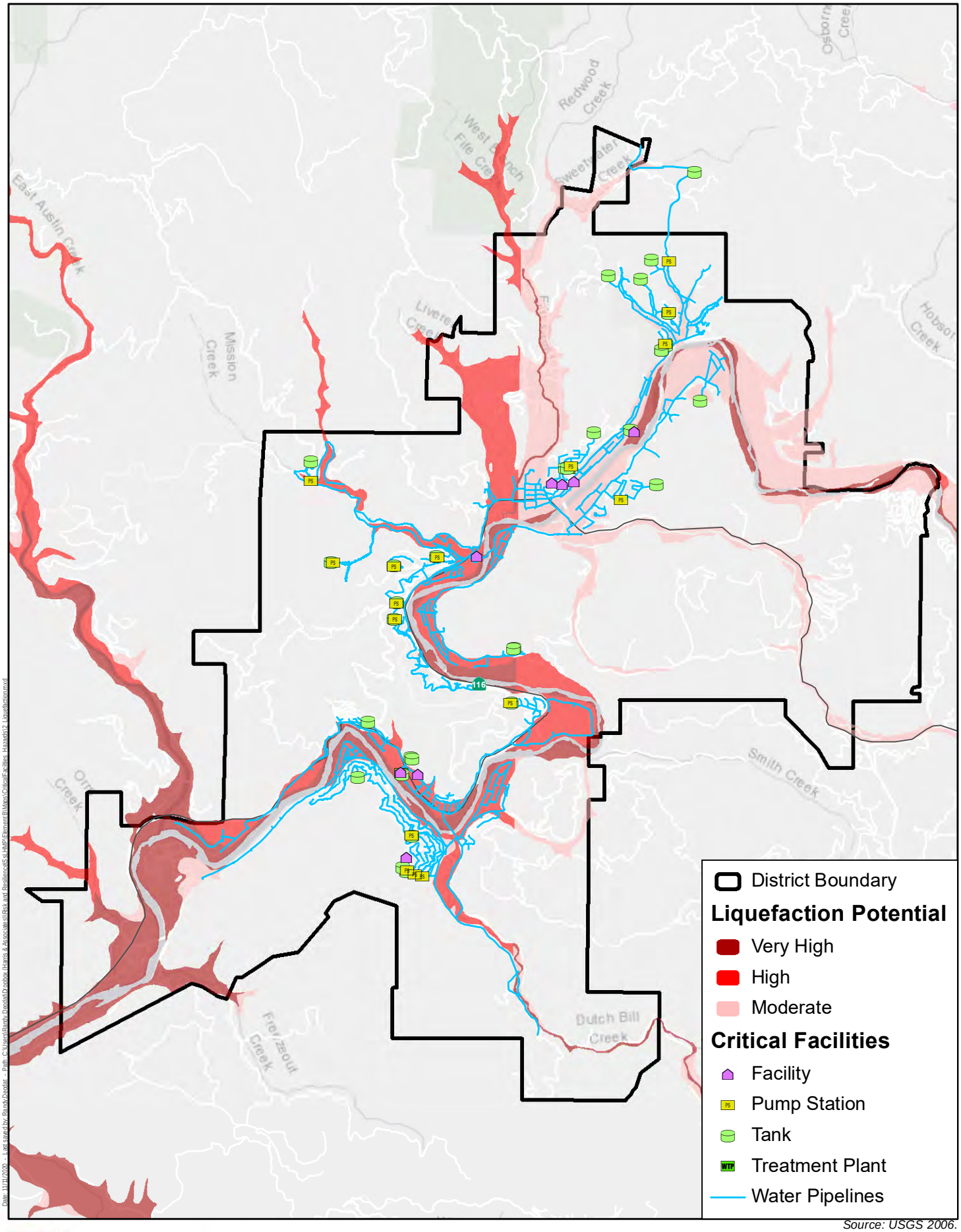
Level 3: Will require hospitalization and can become life threatening if not promptly treated.

Level 4: Victims are killed by earthquake

Economic Losses

The total economic loss[5] estimated for the San Andreas M8.0 earthquake scenario for water facilities is estimated to be approximately $2.4M. A breakdown of estimated repair cost by asset is included as an attachment in Appendix C.

[5] Direct economic losses for utilities resulting from the hazard in the scenario (water facilities)



Source: USGS 2006.

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Liquefaction Prone Areas

Sweetwater Springs Water District

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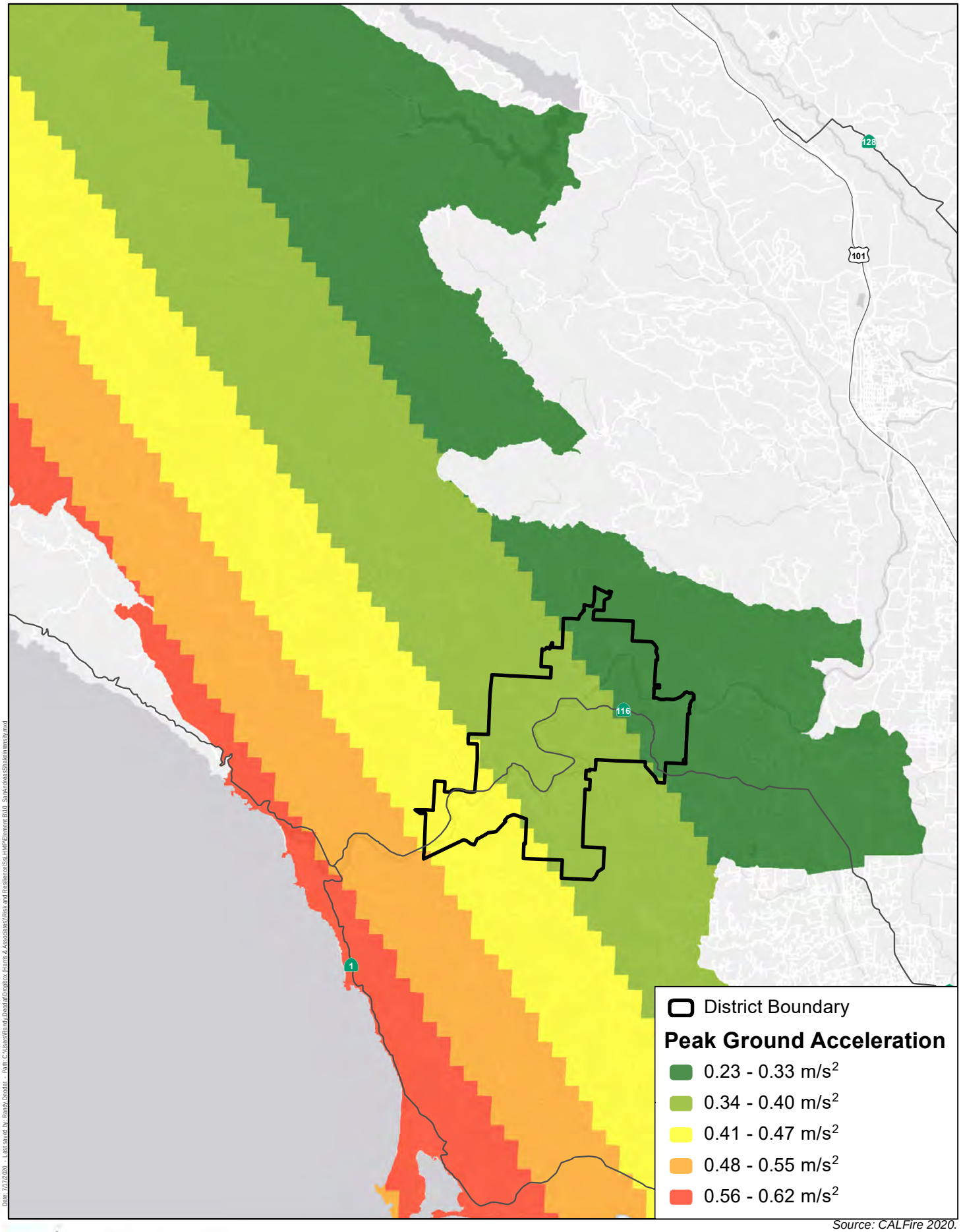

Source: CALFire 2020.

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Shake Intensity - San Andreas Fault

Sweetwater Springs Water District

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Rodgers Creek M7.29 Earthquake Scen*ario*

Building Damage

The building damage counts are the estimated number of buildings damaged by the earthquake scenario. These include estimates of *all* buildings (not just District owned) damaged within census tracts that intersect the SSWD boundary, not just those within the boundary. Therefore, this analysis likely overestimates the number of buildings damaged in the SSWD (Table 22).

Table 22. Expected Building Damage Rodgers Creek[6]

Damage Extent	None	Slight	Moderate	Extensive	Complete
Total	8,762	892	131	9	0

Water System Damage

Water facilities would experience damage that may affect their functionality. The HAZUS model estimates that most facilities would resume functionality seven days after the earthquake.

Name	@ Day 1	@ Day 3	@ Day 7	@ Day 14	@ Day 30	@ Day 90
10000 Gallon Tank	88	96.7	99.2	99.6	99.6	99.7
10000 Gallon Tank (Hay & Bay)	89.9	97.4	99.4	99.7	99.7	99.8
10000 Gallon Tank (Leppo)	90.4	97.6	99.4	99.7	99.7	99.8
10000 Gallon Tank (Shoeneman)	93.3	99	99.8	99.8	99.8	99.9
10000 Gallon Tank (Upper Schoolhouse)	89.9	97.4	99.4	99.7	99.7	99.8
10000 Gallon Tank, Pump and Shed	89.9	97.4	99.4	99.7	99.7	99.8
100000 Gallon Tank (Villa Grande)	90	97.4	99.4	99.7	99.7	99.8
120,000 Gallon Tank (Monte Rio 1)	89.9	97.4	99.4	99.7	99.7	99.8
125000 Gallon Tank (Harrison)	90.1	97.5	99.4	99.7	99.7	99.8
125000 Gallon Tank (Monte Rosa)	91.3	97.9	99.5	99.8	99.8	99.8
Pump and Shed	93.7	97.8	99.5	99.8	99.9	99.9
15000 Gallon Tank & Booster Station	89.3	97.2	99.3	99.7	99.7	99.8
15000 Gallon Tank (Natoma)	89.3	97.2	99.3	99.7	99.7	99.8
180000 Gallon Tank (Monte Rio 2)	89.5	97.3	99.3	99.7	99.7	99.8
20000 Gallon Tank & Booster Station (Park)	90.5	97.6	99.4	99.7	99.7	99.8
10000 Gallon Tank (Rio Nido)	92.9	98.9	99.7	99.8	99.8	99.9
26000 Gallon Tank, Pump & Shed	89.4	97.2	99.3	99.7	99.7	99.8
3-2500 Gallon Tanks (Crespo)	93.4	99	99.7	99.8	99.8	99.9
300000 Gallon Tank (Highland Park 1)	89.9	97.4	99.4	99.7	99.7	99.8
378,000 Gallon Tank (Highland Park 2)	89.9	97.4	99.4	99.7	99.7	99.8
45000 Gallon Backwash Tank & Filter Vessels	93	98.9	99.7	99.7	99.8	99.9
50000 Gallon Tank, Pump & Shed	89.8	97.4	99.4	99.7	99.7	99.8
60,000 Gallon Tank (Middle Schoolhouse)	89.9	97.4	99.4	99.7	99.7	99.8

[6] Sum of building damage for census tracts intersecting District Boundary

Name	@ Day 1	@ Day 3	@ Day 7	@ Day 14	@ Day 30	@ Day 90
6000 Gallon Hydropneumatic Tank (Lower Summit)	90.6	97.6	99.4	99.7	99.8	99.8
7000 Gallon Tank	90.5	97.6	99.4	99.7	99.8	99.8
70000 Gallon Tank (Gonfotti 1)	89.9	97.4	99.4	99.7	99.7	99.8
70000 Gallon Tank (Gonfotti 2)	92.9	98.9	99.7	99.7	99.8	99.9
Administration	93.2	99	99.7	99.7	99.8	99.9
Booster Pump/Control Station	92.9	98.9	99.7	99.8	99.8	99.9
Chlorine Generation & Pump Bldg	92.9	98.9	99.7	99.8	99.8	99.9
Edgehill Booster	92.5	98.8	99.7	99.7	99.8	99.9
El Bonita Well Field (Control Building)	92.5	98.8	99.7	99.7	99.8	99.9
Filter Vessels & 22,000 gal. backwash tank	89.9	97.4	99.4	99.7	99.7	99.8
Highland Treatment Plant Control Bldg.	92.9	98.9	99.7	99.8	99.8	99.9
Monte Rio Filter Plant Control Bldg	93	98.9	99.7	99.7	99.8	99.9
Monte Rosa Booster	93.9	97.9	99.5	99.8	99.9	99.9
Santa Rosa Booster Station	93.4	97.6	99.5	99.8	99.9	99.9
Schoenemann Booster Pumphouse	92.8	97.4	99.4	99.8	99.9	99.9
Storage	92.9	98.9	99.7	99.8	99.8	99.9
Sunshine Bypass Booster & Valve	92.8	97.4	99.4	99.8	99.9	99.9
Treatment Building, Chlorine Generation & Pump Building	93	98.9	99.7	99.7	99.8	99.9
15000 Gallon Tank	89.9	97.4	99.4	99.7	99.7	99.8
Canyon 3 Pump Station	92.9	98.9	99.7	99.7	99.8	99.9
Monte Rio Treatment Plant	93	98.9	99.7	99.7	99.8	99.9
Highland Treatment Plant	92.9	98.9	99.7	99.8	99.8	99.9
130000 Gallon Tank (Drake)	89.3	97.2	99.3	99.7	99.7	99.8

Overall, the District estimates that most of its facilities would resume functionality within 2-7 days of a Rodgers Creek M7.29 Earthquake.

Casualties

HAZUS estimates the number of people that will be injured and killed by the earthquake. The casualties are broken down into four (4) severity levels that describe the extent of the injuries. The levels are described as follows:

- 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 estimates are provided for three (3) 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 2:00 AM estimate considers that the residential occupancy load is maximum,

the 2:00 PM estimate considers that the educational, commercial and industrial sector loads are maximum and 5:00 PM represents peak commute time.

Table 23 represents a summary of casualties estimated for Rogers Creek M7.29 earthquake scenario.

Table 23. Casualty Estimates – Rodgers Creek

Time	Severity 1	Severity 2	Severity 3	Severity 4	Total
2 AM	1.38	0.09	0.00	0.00	1.82
2 PM	2.86	0.29	0.02	0.04	3.71
5 PM	1.88	0.20	0.01	0.02	2.12

Notes: Level 1: Injuries will require medical attention but hospitalization is not needed.

Level 2: Will require hospitalization but are not considered life-threatening.

Level 3: Will require hospitalization and can become life threatening if not promptly treated.

Level 4: Victims are killed by earthquake

Economic Losses

The total economic loss[7] estimated for the Rodgers Creek M7.29 earthquake scenario for water facilities is $48,150. A breakdown of estimated repair cost by asset is included as an attachment in Appendix C.

Impact Summary and Secondary Hazards

Based on the risk assessment, it is evident that earthquakes will continue to have potentially widespread and significant economic impacts to certain areas of the District. Earthquakes may result in secondary hazards including liquefaction and landslides. Impacts that are not quantified, but can be anticipated in future events, include:

- Injury and loss of life;
- Water quality degradation and supply disruption;
- Structure damage;
- Hazardous material spills;
- Disruption to infrastructure;
- Damage to roads/bridges;
- Significant economic impacts, including loss of tax revenues and property values;

Ground shaking may cause structural failure of water treatment plants 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. Older iron pipes in particular have a high susceptibility to breaking during earthquake events. Pipes are most prone to breaking at connections to above-ground structures, such as reservoirs, treatment plants, or booster stations. An M 8.0 earthquake along the San Andreas 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 remain operations. However, an M 7.29 earthquake along the Rogers Creek fault would not likely cause service disruptions.

[7] Direct economic losses for utilities resulting from the hazard in the scenario

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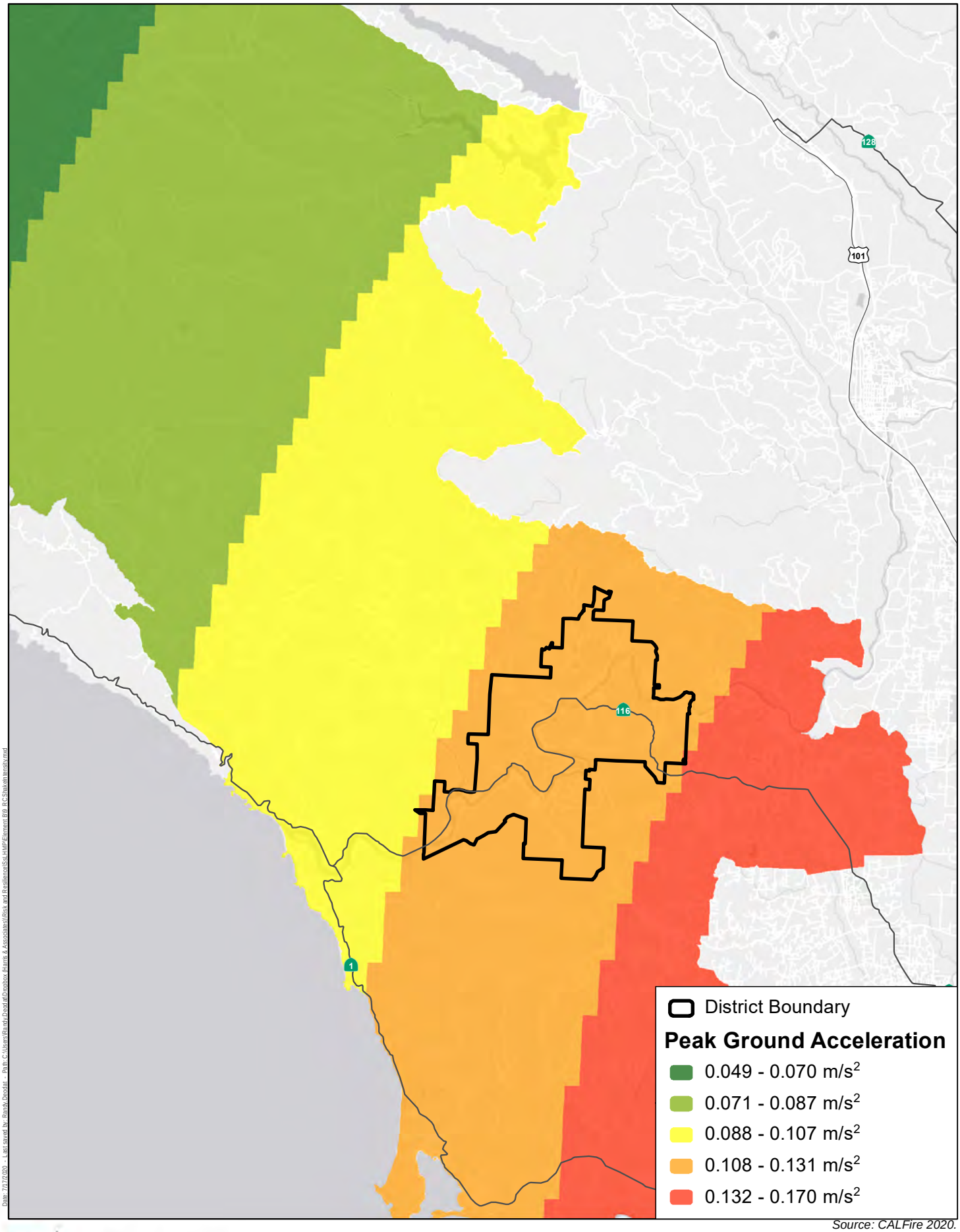

Source: CALFire 2020.

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Shake Intensity - Rodgers Creek Fault

Sweetwater Springs Water District

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Flood

Vulnerability Assessment

The following section describes risk exposure and vulnerability of critical facilities, infrastructure, and the general building stock in the District's mapped regulatory floodplain (Table 24; Figure 13, Critical Facilities in the FEMA Flood Hazard Areas). Approximately 25 miles of transmission pipeline sits within the 100-yr floodplain.

Table 24. Critical Facilities in Flood Zone

Facility Type	FEMA Flood Hazard Areas	
	100-Year	500-Year
Storage Facility (Tank)	5	0
Pump Station	2	0
Treatment Facility	1	0
District Facility	2	2
Fire Hydrant	123	20
Wells	5	0

Note: FEMA = Federal Emergency Management Agency

Impact Analysis

Building Damage

The building damage counts are the estimated number of buildings damaged by the earthquake scenario. These include estimates of *all* buildings (not just District owned) damaged within census tracts that intersect the SSWD boundary, not just those within the boundary. Therefore, this analysis likely overestimates the number of buildings damaged in the SSWD (Table 25).

Table 25. Building-Related Economic Loss Estimates for a 100-Year Flood Event (thousands of dollars)

Category	Area	Residential	Commercial	Industrial
Building Loss	Structure	29,890	1,501	176
	Content	16,217	2,781	382
	Inventory	0	22	41
	Subtotal	*46,107*	*4,304*	*599*
Business Interruption	Income	657	3,565	5
	Relocation	8,362	596	0
	Rental Income	3,547	451	0
	Wage	1,546	2,875	10
	Subtotal	*14,112*	*7,487*	*15*
	Total	60,219	11,791	614

HAZUS estimates approximately $72.6 million in building-related[8] economic losses[9] from a 100-year event (FEMA 2020). A breakdown of building-related economic losses by census tract are provided in Appendix C.

Water System Damage

HAZUS-MH was used to estimate the flood loss potential of critical facilities and infrastructure[10] exposed to the flood risk. The model uses depth and damage function curves to estimate the percent of damage to a structure and its contents and correlates that information with an estimate of functional downtime (i.e., the time it will take to restore a facility to 100 percent functionality) (FEMA 2020).

The HAZUS-MH analysis found that the Monte Rosa Booster Station is in the floodplain and would be impacted during a 100-year flood. The estimated damages to District facilities are summarized in Table 26. It is unlikely that damage to the Monte Rosa Booster Station would impede the District's ability to service customers. The HAZUS-MH analyses for the 100-year flood event is summarized in Table 26. As shown in Table 26, the only critical facility estimated to be significantly damaged is the Monte Rosa Booster Station, which has a replacement value of $31,386, is expected to suffer 40% in damages, resulting in an estimated economic loss of $12,554. It should be noted, however, that other infrastructure such as fire hydrants and wells may result in additional economic losses, but economic losses were not calculated for assets without a designated replacement value. Thus, while damages to buildings within the District and associated economic losses may be significant, the damage to water system infrastructure would be relatively minimal.

Table 26. Estimated Critical Facility Damage and Losses for a 100-Year Flood Event

Facility	Percent Damage (%)	Economic Loss ($)	Functional?
Monte Rosa Booster Station	40%	$12,554	No

Impact Summary and Secondary Hazards

Flood damage to buildings includes saturation of building materials, collapse of water-logged structures, and structure damage due to flowing debris. High water pressures and velocities may also result in a structure washing away. Impacts can range from unsightly water damage to structural collapse. While District assets have the potential to be damaged, and assets with electrical parts or motors may be damaged by flooding if submerged, it is unlikely that the water system would suffer severe damage from a 100-yr flood event.

However, floodwaters may also prevent or limit access to assets and facilities. High velocity flood flows and debris can damage roads, bridges, culverts, and other infrastructure. Thus, if a District asset is damaged, even minimally, it may take several days for the water to recede to a point where District staff may assess and repair the damage. There are a number of residential areas with significant populations that frequently become isolated when stretches of road become inundated. These areas include neighborhoods accessed by Neeley Road and Drake Road near Guerneville. If water depth on the Russian River exceed 42 feet, important bridges and stretches of road along Highway 116 and River Road may flood (Sonoma County 2017). These roads provide vital access to the communities of Guerneville and Monte Rio. This flood level has been exceeded four times between 1984 and 2010.

[8] Residential, commercial, and industrial
[9] Direct economic losses for utilities resulting from the hazard in the scenario
[10] Only critical facilities with a designated replacement value were considered in this analysis (treatment plants, facilities, pump stations, and tanks)

Hazardous materials may be released during high velocity flows. The most common type of hazardous material accident from flooding along the Russian River occurred when propane tanks were not properly anchored and floated away, and from household hazardous materials. After 1997 and 1998 floods, Sonoma County enhanced several codes requiring propane tanks to be seismically anchored (2013 California Fire code, California Plumbing Code and NFPA) (Sonoma County 2017). Other release of sewage, hazardous or toxic materials are the result of the inundation of wastewater treatment plants and severed pipelines. Contact with contaminated water can pose a risk to public health.

Floods and their impacts vary by location and severity of any given flood event, and likely only affect certain areas of the District during specific times. Based on the risk assessment, it is evident that floods will likely continue to have significant economic impact to the District.

Impact that are anticipated in future events include:

- Injury and loss of life;
- Water quality degradation and supply disruption;
- Structure damage;
- Disruption to infrastructure;
- Damage to roads/bridges;
- Significant economic impacts, including loss of tax revenues and property values.

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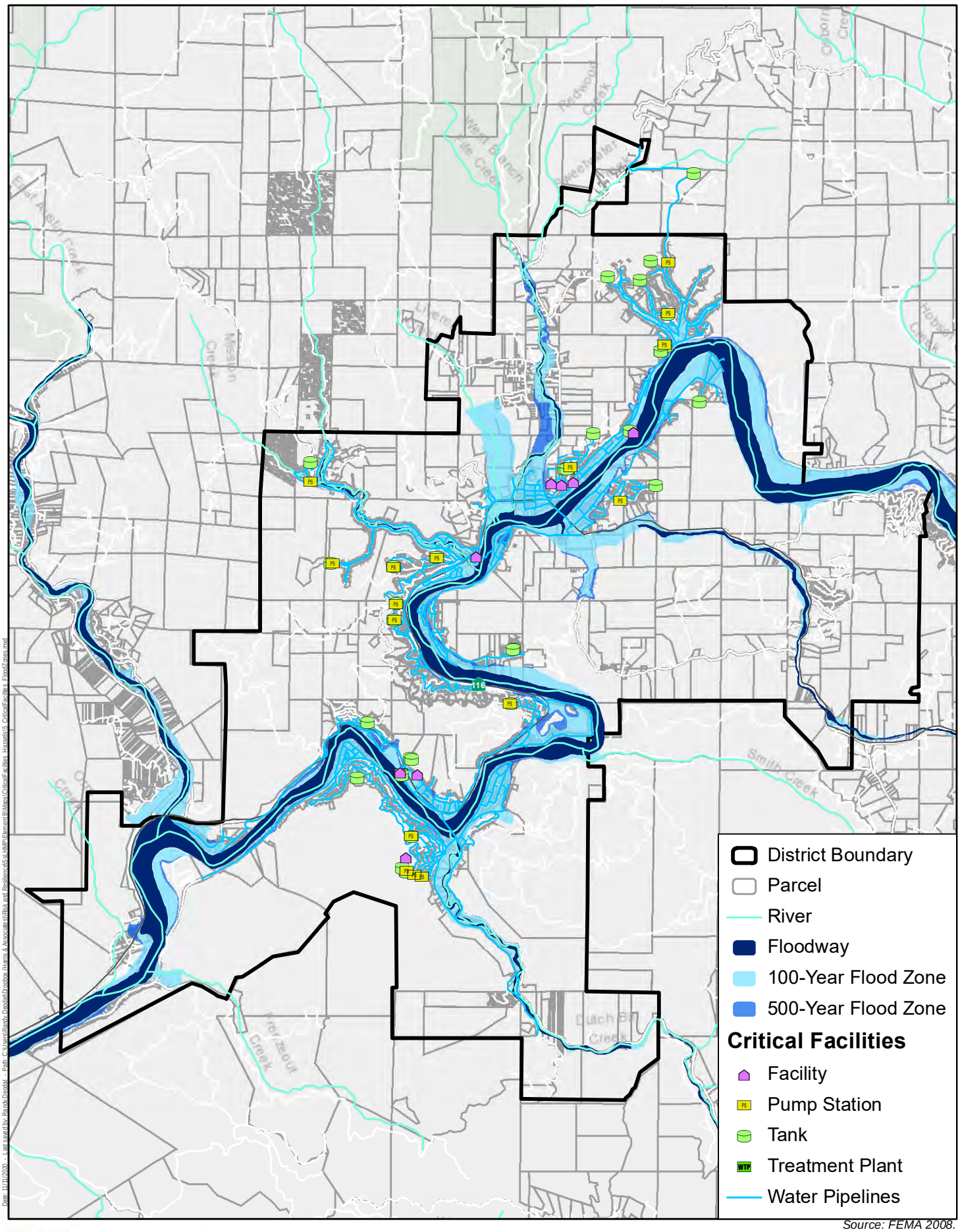

Source: FEMA 2008.

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FEMA Flood Hazard Areas

Sweetwater Springs Water District

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Wildfire

Vulnerability Assessment

There is potential for significant damage to life and property in areas designated as "wildland-urban interface areas," where development is adjacent to densely vegetated areas. The California Department of Forestry and Fire Protection's Fire Resource and Assessment Program (CDF-FRAP) has developed fire hazard severity zones. The zones were developed using a field-tested model that assigns a hazard score based on several factors that influence fire likelihood and fire behavior, including fire history, natural vegetation, flame length, blowing embers, terrain, and typical weather for the area. The hazard zones are moderate, high, and very high. Table 27 identifies the critical facilities, critical infrastructure, and loss estimates for parcels in these hazard zones (Figure 14, Critical Facilities in Fire Hazard Severity Areas). There are approximately 9 miles of transmission pipeline within the high fire severity zone.

Table 27. Critical Facilities in Fire Hazard Severity Zones

Category	Moderate	High	Very High
Storage Facility (Tank)	20	11	0
Pump Station	12	4	0
Treatment Plant	2	0	0
District Facility	7	1	0
Fire Hydrant	289	23	0
Wells	5	0	0

Impact Analysis

Wildfires and their impact vary by location and severity of any given wildfire event, and will likely only affect certain areas of the District during specific times. Based on the vulnerability assessment, it is evident that wildfires will have a potentially devastating impact to the District.

Wildfires could directly damage above-ground assets that are burned or melted by fires. The 10,000 Gallon Tank on Sweetwater Springs Rd., north of the District Boundary is uniquely exposed to wildfires. Other tanks in the northern portion of the District Boundary are also in a high fire severity zone. In addition, wildfires have the potential to cause damage to underground pipes in domestic water systems, as demonstrated in Santa Rosa, where heat from a wildfire melted underground pipes, causing benzene to leech into the water supply.

Wildfires may also impede access to assets that need maintenance or repair or pose life safety threats to employees. The District may also need to supply water for fighting fires, which could impact available supply.

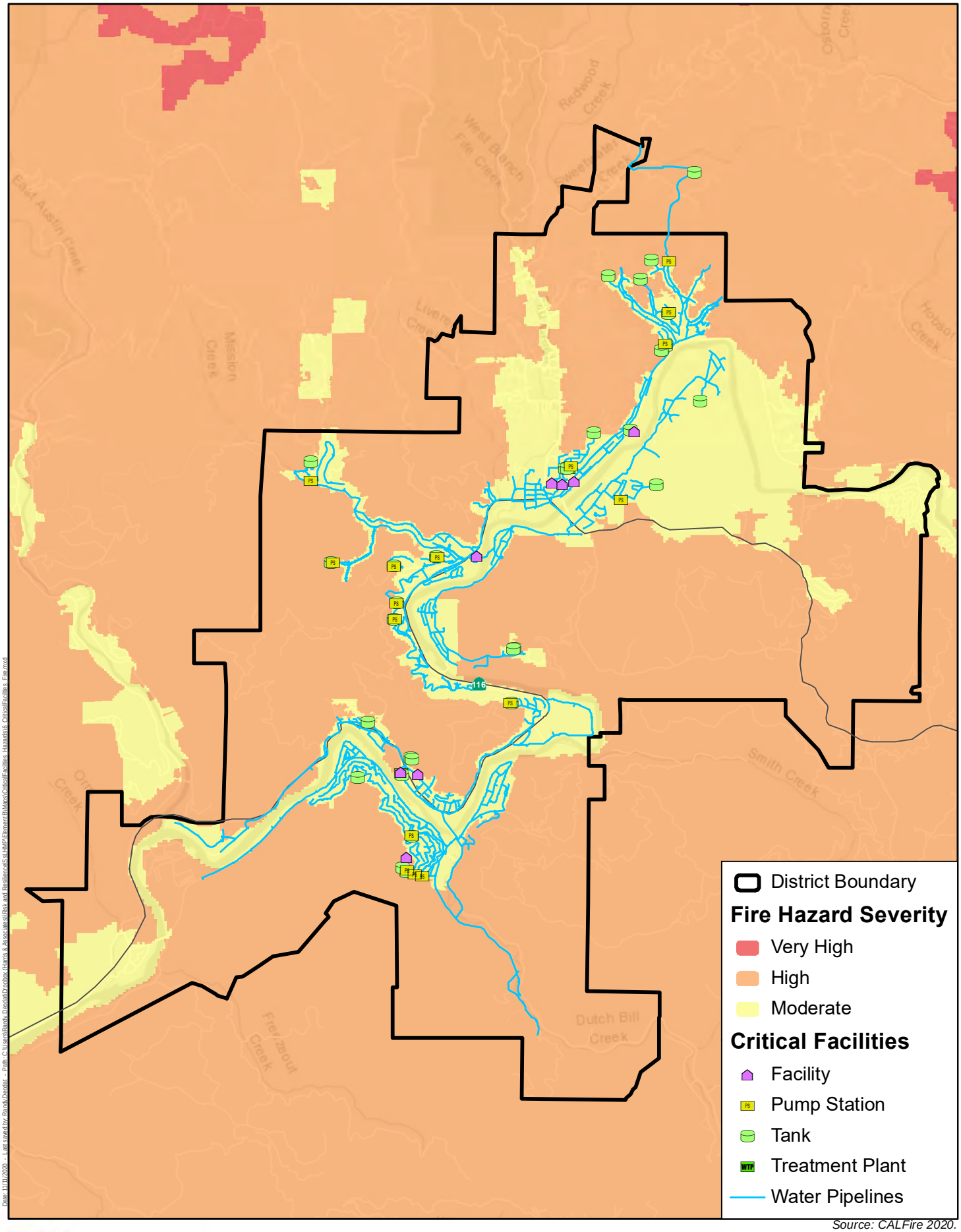
Impact Summary and Secondary Hazards

The impact of a wildfire event is largely defined by the speed and capacity of the initial emergency fire suppression response. Fire suppression services in the County are highly dependent on part time and volunteer fire-fighting personnel. Unfortunately, the number of volunteer fire fighters has decreased in recent years. Fire protection responsibilities in the unincorporated areas of the County (including SSWD) is shared by nearly 40 State, County, and local agencies.

Wildfires can impact the District's system in one of four ways. First, fires may directly cause damage to SSWD facilities. Most of the District's water system is in an area of moderate fire hazard, but several are located in a high hazard severity area, as shown on Figure 14. While underground water pipes are unlikely to be damaged by wildfires, buildings and equipment necessary to manage the water supply can be damaged. Secondly, fires impact firefighting demands on the District's system (the emergency water supply needs of fire departments who may be relying on the District to supply that water). Water supply is of critical importance to fight wildfires. Third, the risk of fires may result in power companies pre-emptively shutting off the power in what has become referred to as a Public Safety Power Shutoff. SSWD typically relies on storage tanks to provide water supply during short-term isolated power outages; however, a PSPS event can take out the entire power grid serving a water system and span multiple days before power is restored. Long term outages may compromise SSWD's ability to serve its customers. Lastly, secondary hazards including erosion/landslide within a post-fire watershed could also cause damage to facilities, and may take a longer time to recover from.

Impact that are anticipated in future events include:

- Injury and loss of life;
- Water quality degradation and supply disruption;
- Structure damage;
- Disruption to infrastructure;
- Damage to roads/bridges;
- Significant economic impacts, including loss of tax revenues and property values;



Source: CALFire 2020.

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Fire Hazard Severity Areas

Sweetwater Springs Water District

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Landslide

Vulnerability Assessment

In total, 35 critical facilities and infrastructure[11] are in a landslide hazard zone of class VI ("Strong") or higher. Figure 15, Landslide Susceptibility Areas, shows the critical facilities and infrastructure in the landslide hazard zones in the District. Additionally, structures on steep slopes with loose or water-saturated soil are vulnerable to landslides (Table 28).

Table 28. Critical Facility in Landslide Hazard Area

Category	Count in Susceptibility Class "Strong" (VI) and Above
Tank	29
Pump Station	13
Treatment Plant	1
Facility	7
Fire Hydrant	137
Wells	0

Impact Assessment

A strong earthquake or severe rainstorm could cause dozens of simultaneous slope failures, threatening buildings and infrastructure. The area of highest risk is Rio Nido. The Sonoma County Operational Area Emergency Operations Plan estimates that the costs of damage and emergency response to the Rio Nido landslides in 1998 at $28 million. Based on the vulnerability assessment, it is evident that landslides continue to have potentially devastating economic impact to the District.

Landslides directly damage structures by disrupting structural foundations caused by deformation of the ground upon which the structure sits, and by the physical impact of debris. Landslides may move reservoirs, lift stations, or booster stations off their bases. In addition, underground piping may break or become detached from the network if the ground beneath becomes unstable. The Leppo, Villa Grande, Crespo and Lower Summit Tanks all fall within a class 8 landslide susceptibility class, and are at greatest risk from a landslide event. The Harrison Tank Booster Station and the Booster Station on Summit McLane are also at high risk. If these tanks were compromised, State Water Board regulations might require potential "boil water" or "do not use" notices for down-pipe customers depending on the degree of damage and pressure loss. The water tanks referenced in this section serve isolated areas of the service area. If these reservoirs were damaged by landslides or mudflow events, it could lead to service disruptions for customers until temporary measures were implemented or repairs were made.

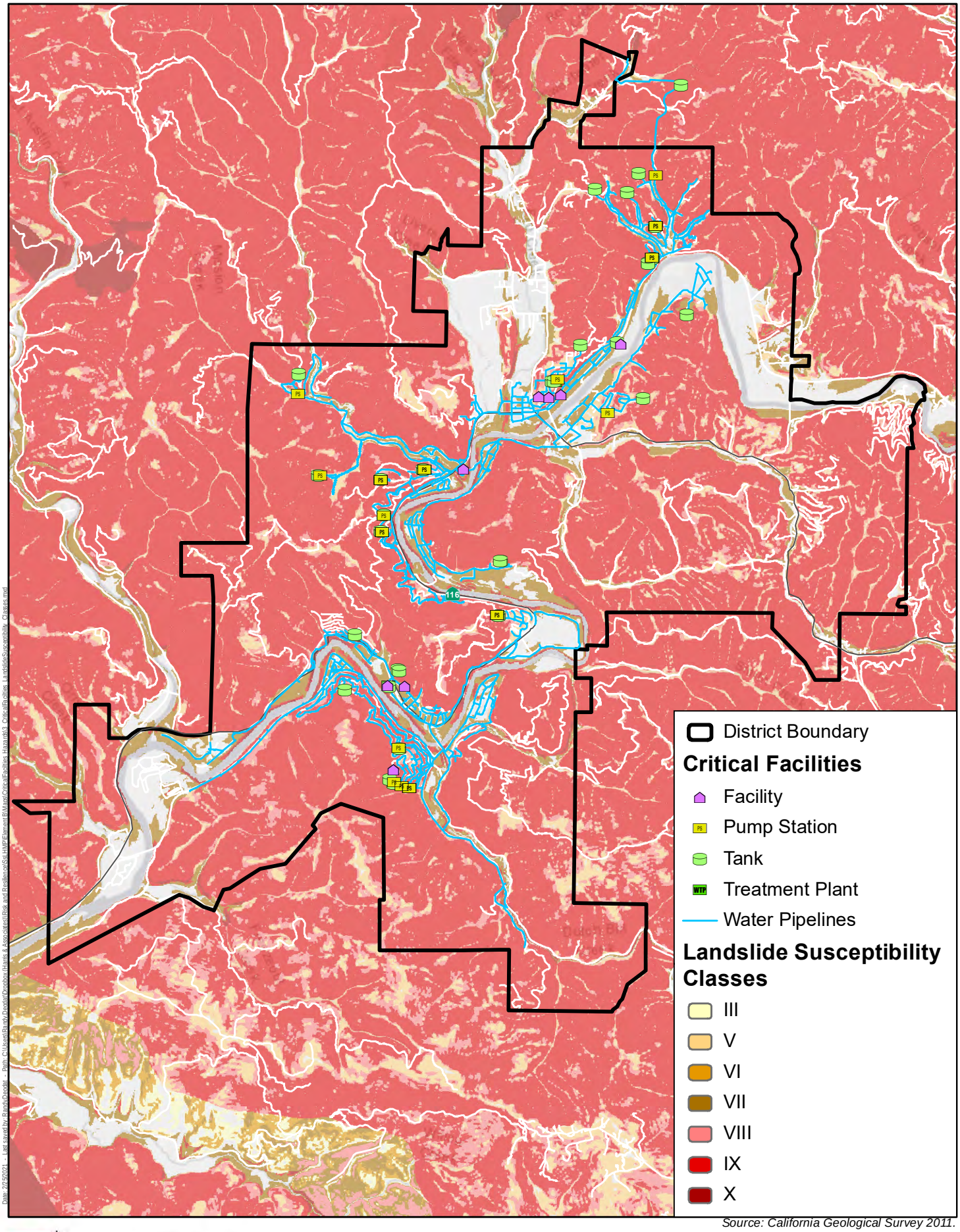
Impact Summary and Secondary Hazards

Landslides are usually considered a secondary hazard of earthquakes and/or flooding. Impacts that are anticipated in future events include:

- Injury and loss of life;
- Water quality degradation and water supply disruption;
- Structure damage;
- Disruption to infrastructure;

[11] Not including fire hydrants

- Damage to roads/bridges;
- Significant economic impacts, including loss of tax revenues and property values.



Source: California Geological Survey 2011.

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Landslide Susceptibility Areas

Sweetwater Springs Water District

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Extreme Heat

Vulnerability Assessment

Many types of infrastructure are affected by extreme heat, including power generation facilities. Higher temperatures may cause compromising effects on power plants and transformers and reduced capacity of substations and transmission and distribution lines.

Impact Assessment

Water providers like SSWD rely on electricity to power portions of their water infrastructure, including wells and pumping stations that are critical to deliver reliable water service to customers. SSWD's water system typically rely on water storage tanks to provide water supply during short-term isolated power outages; however, heat-induced power outage can take out the entire power grid serving a water system and span multiple days before power is restored.

A power outage has the potential to disrupt services provided by the District. SSWD relies on an adequate energy source to power many of its assets, including pump stations, treatment plants, and any other asset that requires an electrical component. The District has back-up power supplies located on many of its critical assets to minimize the impacts of power outages. Administrative functions including billing and communications also require electricity. However, long term outages may exceed fuel required to power back-up generators. This could compromise SSWD's ability to serve its customers. A loss of power resulting in the inability of the District to provide essential services could have direct impacts to the District in terms of revenue loss and reputational impacts, in addition to far-reaching community impacts. Permanent generators with automatic startup switches located at key facilities will enhance SSWD's ability to minimize water service impacts to the community during a power outage (Figures 16, Critical Facilities Relative to Extreme Heat Map).

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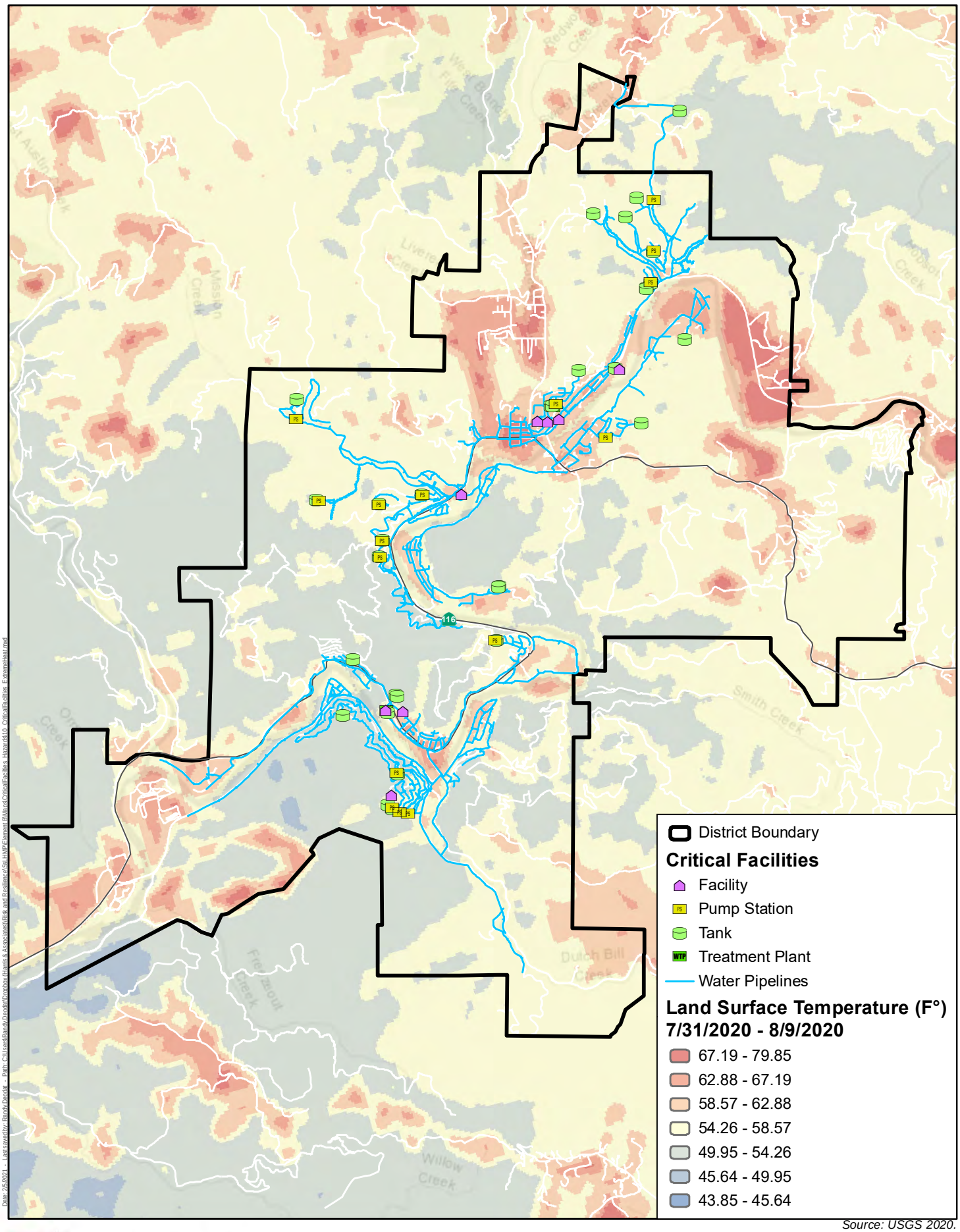

Source: USGS 2020.

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Extreme Heat Map

Sweetwater Springs Water District

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Mitigation Strategy

Overview of Mitigation Strategy

Sweetwater Springs Water District recognizes the importance of identifying effective ways to reduce vulnerability to natural hazards. The Mitigation Strategy is a blueprint for reducing the potential losses identified in the Risk Assessment section. This section encompasses the District's Mitigation Strategy, including mitigation goals, actions, action plan, and mitigation plan integration mechanisms. These subsections provide the framework for which the District will identify, prioritize, and implement actions to reduce risk from the identified hazards.

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.

Existing Policies and Programs

The District will incorporate mitigation planning as an integral component of daily operations. This will be accomplished by the Planning Committee members working to integrate mitigation strategies into existing local agencies, public policies, funding sources, individuals, and other resources that can support hazard mitigation activities in District. The hazard mitigation actions build from existing success of these resources and leverage their capabilities to support improved resiliency in the project area. This section identifies existing authorities, policies, programs, and resources that would help the District implement the HMP. The District will also incorporate findings and mitigation strategies into its America's Water Infrastructure Act (AWIA) Risk and Resilience Assessment and Emergency Response Plan Update. Since both its LHMP and AWIA documents will be on a 5-year update cycle, the District is well-positioned to operationalize key LHMP findings and actions through it Emergency Response Plan.

Authorities

The District is an independent authority; it works with, but is not overseen by the County.

The District has by-laws in place that describe the authority of the District and the water code law that applies to the District. The California Water Code (CA Water Code § 10632.5) requires water suppliers to prepare an urban water management plan includes a seismic risk assessment and mitigation plan to assess the vulnerability of each of the various facilities of a water system and mitigate those vulnerabilities. An urban water supplier may comply with this section by submitting, pursuant to Section 10644, a copy of the most recent adopted local hazard mitigation plan or multihazard mitigation plan under the federal Disaster Mitigation Act of 2000 (Public Law 106-390) if the local hazard mitigation plan or multihazard mitigation plan addresses seismic risk.

Policies and Programs

The District has participated in some community programs that provide incentives for water conservation (i.e. toilet replacement program). However, there is not much community

participation. Community programs are active when there is grant money to provide financial incentives. The District still encourages conservation when there is not grant funding to support direct financial incentives.

In addition, the District has a payment deferral program to help customer pay their bills through COVID by enrolling in a payment plan.

Resources – Funding Sources, Staff, and Training

A portion of the District's revenue comes from a flat assessment, and the rest comes from usage and base fees. The District does not tax usage. Service charges and fees are directed toward the Capital Improvement Program. Funding is also obtained through grant funding. This HMP will make the District eligible to apply for hazard mitigation funding through FEMA.

The District is governed by the Board of Directors. The General Manager is the liaison to the Board of Directors and oversees the day to day operations of the District. The General Manager will be instrumental in supporting the development, maintenance, and implementation of the Hazard Mitigation Plan, including the mitigation actions.

The District includes two Divisions: Field and Administrative. The Field Division includes all the water maintenance operators, supervisors, and managers. The Field Division includes staff who are responsible for the maintenance and repair of the District's water system infrastructure and implementation of preventative maintenance programs. The Division strives to provide prompt turnaround times on all customer requests, quality customer service, and responds to all water emergencies. The District outsources engineering services primarily to Coastland Engineering in Santa Rosa. The Administrative Division includes an Administrative Manager and one Accountant Clerk, who are responsible for overseeing employee compensation and benefits, policies and procedures, customer billing, and other administrative tasks.

The District also facilitates trainings in house to maintain and update the emergency response plan. The General Manager is primarily responsible for attending trainings. Some staff also participate in water treatment classes, which cover safety topics.

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.

Expansion of Existing Processes and Programs

Capabilities and abilities to expand or improve existing policies and programs will be re-evaluated during the next HMP update and annual plan review meetings. The District reviews and updates different types of plans on an annual basis. Staff will continue to participate in training, exercises, and drills, such as the Emergency Response Plan trainings. If budget allows, the District will have the ability to hire additional staff either permanently or temporarily, which will expand on and/or improve existing policies and programs. The City is continuously researching grant opportunities for emergency management, hazard mitigation, and infrastructure improvements.

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.

Mitigation Goals

FEMA defines **Goals** as general guidelines that explain what you want to achieve. They are usually broad policy-type statements, long-term, and represent global visions.

The planning committee, with input from stakeholders, and the public, identified the following goals to envision the District's future and guide the development and implementation of hazard mitigation actions. The goals are consistent with the hazards previously identified in the risk assessment. District goals to reduce or avoid long-term vulnerabilities to the identified hazards:

1. Increase reliability of water supply to the public, including during and after a natural hazard.
2. Identify cost-effective actions that minimize potential damage and reduce economic losses 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.

Pursuing these goals through HMP development and implementation will enable the District to access funding through state and federal grant programs.

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 29, Mitigation Actions,** below.

Mitigation Actions

There are many different hazard mitigation actions. FEMA has classified six mitigation categories, or types of mitigation actions, that help organize mitigation measures.

- **Prevention:** Government administrative or regulatory actions or processes that influence the way land and buildings are developed and built. These actions also include public activities to reduce hazard losses. Examples include planning and zoning, building codes, capital improvement programs, open space preservation, and storm water management regulations.
- **Property Protection:** Actions that involve modification of existing buildings or structures to protect them from a hazard, or removal from the hazard area. Examples include acquisition, elevation, relocation, structural retrofits, storm shutters, and shatter-resistant glass.
- **Public Education and Awareness:** Actions to inform and educate citizens, property owners, and elected officials about hazards and potential ways to mitigate them.
    - Such actions include outreach projects, real estate disclosure, hazard information centers, and school-age and adult education programs.

- **Natural Resource Protection:** Actions that, in addition to minimizing hazard losses preserve or restore the functions of natural systems. Examples include sediment and erosion control, stream corridor restoration, watershed management, forest and vegetation management, and wetland restoration and preservation.
- **Emergency Services:** Actions that protect people and property during and immediately following a disaster or hazard event. Services include warning systems, emergency response services, and protection of critical facilities.
- Structural Projects: Actions that involve the construction of structures to reduce the impact of a hazard. Such structures include dams, levees, floodwalls, retaining walls, and safe rooms.

Following are Tables 29 through 32, which identify the existing and future mitigation activities developed by the Planning Committee by goal.

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.

Mitigation Action Prioritization

Mitigation actions were prioritized based on estimated cost, benefit, and timeline to implement. An estimated "cost", "benefit", estimated "timeline", and overall "priority" of each mitigation action item is listed in Tables 29 through 32. A more technical assessment will be required in the event grant funding is pursued through the Hazard Mitigation Grant Program. FEMA's Benefit-Cost Analysis Guidelines are discussed below.

Economic Analysis of Mitigation Projects

FEMA's approach to identify the costs and benefits associated with hazard mitigation strategies, measures, or projects fall into two general categories: benefit/cost analysis and cost-effectiveness analysis. Conducting a benefit/cost analysis for a mitigation action can help the District in determining whether a project is worth undertaking now, in order to avoid disaster-related damages later. A cost-effectiveness analysis evaluates how best to spend a given amount of money to achieve a specific goal. Determining the economic feasibility of mitigating hazards can provide decision-makers with an understanding of the potential benefits and costs of an activity, as well as a basis upon which to compare alternative projects.

Given federal funding, the Planning Committee will use a FEMA-approved benefit/cost analysis approach to identify and prioritize mitigation action items. For other projects and funding sources, the Planning Committee will use other approaches to understand the costs and benefits of each action item and develop a prioritized list.

FEMA Benefit-Cost Analysis Guidelines

The Stafford Act authorizes the President to establish a program to provide technical and financial assistance to state and local governments to assist in the implementation of hazard mitigation measures that are cost effective and designed to substantially reduce injuries, loss of life,

hardship, or the risk of future damage and destruction of property. To evaluate proposed hazard mitigation projects prior to funding FEMA requires a Benefit-Cost Analysis (BCA) to validate cost effectiveness. BCA is the method by which the future benefits of a mitigation project are estimated and compared to its cost. The end result is a benefit-cost ratio (BCR), which is derived from a project's total net benefits divided by its total project cost. The BCR is a numerical expression of the cost effectiveness of a project. A project is considered to be cost effective when the BCR is 1.0 or greater, indicating the benefits of a prospective hazard mitigation project are sufficient to justify the costs.

Although the preparation of a BCA is a technical process, FEMA has developed software, written materials, and training to support the effort and assist with estimating the expected future benefits over the useful life of a retrofit project. It is imperative to conduct a BCA early in the project development process to ensure the likelihood of meeting the cost-effective eligibility requirement in the Stafford Act.

The BCA program provides up to date program data, up to date default and standard values, user manuals and training. Overall, the program makes it easier for users and evaluators to conduct and review BCAs and to address multiple buildings and hazards in a single BCA module run.

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.

Mitigation Action Implementation

Because of the District's small size, it is the responsibility of the General Manager, with support from the Planning Committee, to implement all mitigation actions listed in this Plan. Potential funding sources and timeline for implementation are listed in Tables 29 through 32. Due to the small size of the District, Planning Committee members are responsible for implementing and administering mitigation actions.

Goal 1: Increase reliability of water supply to the public, including during and after a natural hazard.

Table 29. Goal 1 Mitgation Actions

FEMA Category	Mitigation Action	Hazard	Priority (Low, Med, High)	Timeline (1-5 years)	Cost Estimate (Low, Med, High)	Benefit	Funding Source
Property Protection	Develop backup power options for District infrastructure and facilities including but not limited to wells, pump stations, reservoirs, booster tanks, and traffic control facilities	All	High	1	High	Reduce the impact of disasters	Hazard Mitigation Grant; BRIC; CDBG
Property Protection	Stockpile repair materials, portable pumps and hydrants, and other supplies to assist with rapid and functional repairs to water and watershed infrastructure	All	High	ongoing	Med	Reduce downtimes following disasters	Hazard Mitigation Grant, General Fund
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; BRIC; CDBG
Structural Projects	Improve the energy independence of the District's facilities and infrastructure through energy efficiency, on site local distributed energy systems, micro grids, and energy storage facilities.	All	Med	5	High	Increased power reliability	State Grants (California Energy Commission); BRIC

Goal 2: Identify cost-effective actions that minimize potential damage and reduce economic losses associated with natural hazards.

Table 30. Goal 2 Mitigation Actions

FEMA Category	Mitigation Action	Hazard	Priority (Low, Med, High)	Timeline (1-5 years)	Cost (Low, Med, High)	Benefit	Funding Source
Emergency Services	Purchase and install Emergency Response Notification and/or information system for EOC	All	Low	5	Low	Reduced risk of loss of life or property	Hazard Mitigation Grant
Emergency Services	Develop redundancy in communications systems for water, storm pump stations, sewer lift stations and other critical facilities	All	Med	5	Med	Improve response time of staff when disasters occur	Hazard Mitigation Grant
Prevention	Develop guidance/methods for including hazard vulnerability when developing new infrastructure siting & designs	All	High	ongoing	Low	Reduced future disaster risk	General Fund
Property Protection	Protect (elevate, armor, or relocate) critical infrastructure, facilities, and systems from flooding, including but not limited to pump stations, wells, and the wastewater treatment facility	Flood	High	ongoing	High	Reduce flood risk	Hazard Mitigation Grant; BRIC
Property Protection	Identify and implement effective flood protection measures around water supply facilities and pumping stations, prioritizing facilities located within the 100-yr floodplain.	Flood	High	ongoing	Med	Reduce flood risk	Hazard Mitigation Grant; BRIC; CDBG

Table 30. Goal 2 Mitigation Actions

FEMA Category	Mitigation Action	Hazard	Priority (Low, Med, High)	Timeline (1-5 years)	Cost (Low, Med, High)	Benefit	Funding Source
Property Protection	Relocate facilities currently in the floodplain to higher ground	Flood	High	ongoing	High	Reduced flood risk	Hazard Mitigation Grant
Natural Resources Protection	Retrofit hardscaped areas on District property (i.e. parking lots) to use permeable pavement, green infrastructure, or other low-impact development design features to allow for improved infiltration	Flood	Low	5	High	Reduced flood risk	Hazard Mitigation Grant,
Property Protection	Install protective/heat reflective roofing (or install building) over all exposed pumps and motors for reservoirs and wells	Heat	Low	5	Med	Reduce the risk of overheating and motor/pump failure	Hazard Mitigation Grant; BRIC
Property Protection	Design and construct seismic upgrades/retrofits for reservoirs	Seismic	Low	5	Med	Reduce risk of reservoir failures in earthquakes	State Revolving Fund grants and loans, Hazard Mitigation Grants
Property Protection	Install earthquake control valves at reservoirs	Seismic	Low	5	Med	Reduce potential magnitude of failures	Hazard Mitigation Grants
Property Protection	Install chlorine vacuum regulators to mitigate potential damage because of seismic activity	Seismic	Low	5	Med	Reduce potential impact of earthquakes	Hazard Mitigation Grants
Structural Projects	Implement protective measures for District structures and infrastructure to reduce mud flow, and debris flow risks (i.e. retainer wall)	Seismic	Med	5	High	Reduced landslide risk	Hazard Mitigation Grant; BRIC

Table 30. Goal 2 Mitigation Actions

FEMA Category	Mitigation Action	Hazard	Priority (Low, Med, High)	Timeline (1-5 years)	Cost (Low, Med, High)	Benefit	Funding Source
Prevention	Use erosion and sediment control features for all District construction activities.	Seismic	High	ongoing	Med	Reduced landslide risk	Hazard Mitigation Grant
Property Protection	Retrofit with fire-resistant roofs for District-owned structures & facilities (including but not limited to pump structures, reservoirs, treatment facilities, & administrative offices)	Wildfire	Low	5	Med	Reduce wildfire risk	Hazard Mitigation Grants; BRIC
Natural Resources Protection	Vegetation and Brush Removal (weed abatement) to areas surrounding District facilities within wildfire hazard zones.	Wildfire	High	1	High	Reduce wildfire risk	State Revolving Fund grants and loans, Hazard Mitigation Grants
Structural Projects	Water distribution infrastructure retrofits or improvements for reducing disaster risk	Seismic	High	5	High	Reduced earthquake risk	Hazard Mitigation Grants

Goal 3: Improve the capacity of District staff and the community to prevent, protect against, respond to, mitigate, and recover from natural hazards.

Table 31. Goal 3 Mitgation Actions

FEMA Category	Mitigation Action	Hazard	Priority (Low, Med, High)	Timeline (1-5 years)	Cost (Low, Med, High)	Benefit	Funding Source
Public Education and Awareness	Expand/upgrade mass notification system for customers	All	Low	5	Low	Reduce risk of loss of life or property	Hazard Mitigation Grant
Emergency Services	Purchase and install a system like WebEOC that allows employees to provide secured 2-way electronic communications and has an app to see existing situational status maps, and report and receive information.	All	Low	5	Low	Improve response time of staff when disasters occur	Hazard Mitigation Grant
Prevention	Participate in local disaster response preparations	All	Med	1	Low	Better prepare District staff to manage disasters	Staff Time
Public Education and Awareness	Distribute information about disaster preparations through mailings, printed notifications, and digital platforms.	All	High	ongoing	Low	Reduced risk of loss of life or property	Staff Time, General Fund
Prevention	Incorporate the influence of climate change into planning efforts or conduct a climate change vulnerability assessment	All	High	ongoing	Low	Reduce the effects of climate change	Staff Time, General Fund
Prevention	Incorporate hazard mitigation into the District's Capital Improvement Program	All	High	ongoing	Low	Reduced future disaster risk	Staff Time

Table 31. Goal 3 Mitgation Actions

FEMA Category	Mitigation Action	Hazard	Priority (Low, Med, High)	Timeline (1-5 years)	Cost (Low, Med, High)	Benefit	Funding Source
Prevention	Adopt insurance mechanisms and other financial instruments, such as catastrophe bonds, to protect against financial losses associated with infrastructure losses	All	High	ongoing	Low	Improved disaster response	General Fund
Prevention	Review and revise emergency response plans as necessary to address natural hazard risk, stakeholder engagement and communication	All	High	ongoing	Low	Improved disaster response	Staff Time
Prevention	Identify District-owned waterways and water sources adjacent to any high-fire risk areas, and prepare for increased turbidity as a result of vegetation loss and increased erosion. Conduct mitigation measures as appropriate to reduce turbidity.	Fire	Low	5	Med	Improved water quality and reduced landslide risk	Staff Time
Prevention	Conduct evaluations of District facilities (Offices, Ancillary Structures) to determine seismic vulnerability.	Seismic	Med	2	Med	Reduced earthquake risk	Hazard Mitigation Grant
Natural Resources Protection	Put in place monitoring procedures on the status of dry vegetation on District property and around District facilities in wildland and WUI zones, and conduct weed abatement and pesticide application activities as needed.	Wildfire	High	2	Med	Reduced wildfire risk	Hazard Mitigation Grants

Goal 4: Advance local, regional, state, federal, private, and community partnerships for improved hazard mitigation

Table 32. Goal 4 Mitgation Actions

FEMA Category	Mitigation Action	Hazard	Priority (Low, Med, High)	Timeline (1-5 years)	Cost Estimate (Low, Med, High)	Benefit	Funding Source
Emergency Services	Improve emergency communications protocols between the District and other Sonoma County jurisdictions	All	Med	ongoing	Low	Improve response time of staff when disasters occur	Staff Time
Emergency Services	Develop interagency mutual-aid agreements and emergency assistance protocols between the District and surrounding Jurisdictions	All	Med	ongoing	Low	Improve response time of staff when disasters occur	Staff Time
Public Education and Awareness	Put agreements in place with surrounding landowners for adequate fire road access to District facilities.	Wildfire	Low	ongoing	Low	Reduced wildfire risk	General Fund

Plan Integration & Adoption

Q&A | ELEMENT C: MITIGATION STRATEGY | C6a-e.
Q: Does the plan describe a process by which the local jurisdiction will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))
A: See **Plan Integration** below.

Plan Integration

This HMP 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 Sweetwater Springs Water District will implement recommended mitigation actions through existing programs and procedures. The Sweetwater Springs Water District will integrate the findings and strategies of the HMP into other planning processes, including the American Water Infrastructure Act (AWIA) of 2018 Risk Assessment and Emergency Response Plan, the Capital Improvement Program (CIP) and in updates to the Urban Water Management Plan.

In particular, there will be overlap across the risk assessment of the HMP and the risk assessment required through AWIA. The findings of the HMP risk assessment will also inform policies and operating procedures in the District's AWIA Emergency Response Plan.

Some of the goals and action items in the Mitigation Plan will be achieved through activities recommended in the CIP. The CIP is a 5-8 year program which is updated annually. The Planning Committee will consider risk assessment findings of the HMP in the prioritization criteria for the CIP. Additionally, the Planning Committee will identify HMP actions that are consistent with CIP goals and integrate them where appropriate. The Urban Water Management Plan will also provide an opportunity to incorporate information available in the HMP.

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.

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.

Plan Update Process

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

Plan Adoption Process

The Sweetwater Springs Water 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 Sweetwater Springs District 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, Sweetwater Springs Water District will gain eligibility for Hazard Mitigation Grant Program funds.

The Sweetwater Springs Water 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 are in Appendix A.

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Appendix A. Plan Approval and Adoption Attachments

FEMA Letter of Approval
Board of Directors Resolution

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Appendix B. Public Engagement Attachments

Planning Committee Sign-In Sheets
Planning Committee Agendas
Planning Committee Meeting Minutes
Public Meeting Web Postings and Notices
External Agency Email Invitation

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Appendix C. Economic Losses Attachments

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SWEETWATER SPRINGS WATER DISTRICT
HAZARD MITIGATION PLAN

MARCH 21, 2021

PUBLIC REVIEW MEETING

AGENDA

- Welcome & Introductions
- Plan Overview
- How Will the Plan Benefit the Community?
- How did the Public Provide Feedback On the Plan?
- Public Comment – **sws@monitor.net**

HOW TO PARTICIPATE IN TODAY'S MEETING

PLANNING PROCESS

AUGUST 2020 – MARCH 2021

HAZARD IDENTIFICATION

RISK ASSESSMENT

MITIGATION STRATEGY SELECTION

DRAFT ELEMENT & PUBLIC REVIEW

PLANNING PROCESS

- SSWD Staff Involved:
  - General Manager, Field Manager, Administration Manager
  - Members of the Board

- Key Stakeholders Invited to Participate
  - Sonoma County Office of Emergency Services
  - Sonoma Water Agency,
  - Santa Rosa Water Department
  - Lower Russian River Municipal Advisory Committee
  - Monte Rio and Guerneville Chambers of Commerce

PLANNING PROCESS

Meeting #1: September 4, 2020 – Kick-Off and Hazard Identification Meeting

The Planning Committee 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 SSWD.

PLANNING PROCESS

Meeting #2: October 22, 2020 – Risk Assessment

Planning Meeting #2 was a special meeting of the SSWD Board of Directors. As a meeting of the board, it was open for public participation and there was an opportunity for public comment.

The Planning Committee and Board of Directors reviewed the hazards of concern, provided feedback on the results of the risk assessment including impacts and mapping, discussed long term goals for mitigation actions, and requested additional critical infrastructure be evaluated.

PLANNING PROCESS

Meeting #3: December 10, 2020 – Mitigation Goals and Actions

Planning Meeting #3 was a special meeting of the SSWD Board of Directors. As a meeting of the board, it was open to the public and there was an opportunity for public comment during the meeting.

The Planning Committee and Board Members provided feedback on draft goals and mitigation actions, reviewed the mitigation framework, discussed the relevance of the National Flood Insurance Program, discussed which mitigation actions to prioritize, and discussed plan integration.

The Planning Committee prioritized the selected list of mitigation actions based on general estimates of cost, benefit, and timeframe.

PLANNING PROCESS

Meeting #4: January 13, 2021 – Plan Implementation, Monitoring, Evaluation and Update

The Planning Committee convened a meeting to discuss the process for implementing, monitoring, evaluating, and updating the HMP. Specifically, the Planning Committee discussed how they would continue public participation after the development of the HMP, monitor and evaluate the HMP over the 5-year cycle, and integrate the plan into other plans, policies, and programs.

HAZARD REVIEW

- Hazards identified in bold were assigned “High” probability of occurrence or impact and are addressed in the Risk Assessment of the HMP

Hazard Name	History	Probability	Impact
Wildfire	Yes	High	High
Landslide	Yes	High	Medium
Flood	Yes	High	High
Earthquake	No	Low	High
Drought	Yes	Medium	Low
Heat	Yes	High	Medium

CRITICAL ASSETS & FACILITIES

Inventory of Existing SSWD Assets - Risks to assets owned and operated by SSWD

Storage Facilities (Tanks) - SSWD has a total of 16 steel, 8 wood, 6 plastic, and 1 concrete tanks. Out of the 31 tanks, 15 are anchored while the other 16 are unanchored.

Pumping Stations - SSWD has 13 pumping stations in the Guerneville system and 4 pump stations in the Monte Rio system. The Highland Tank Pump Station is the most critical and is essential for water supply to a significant segment of the Water District's customers.

Treatment Facilities - SSWD operates two water treatment facilities, one for each system.

Transmission Pipelines - SSWD's distribution systems consist of a variety of pipe sizes and materials with a total length of approximately 66 miles.

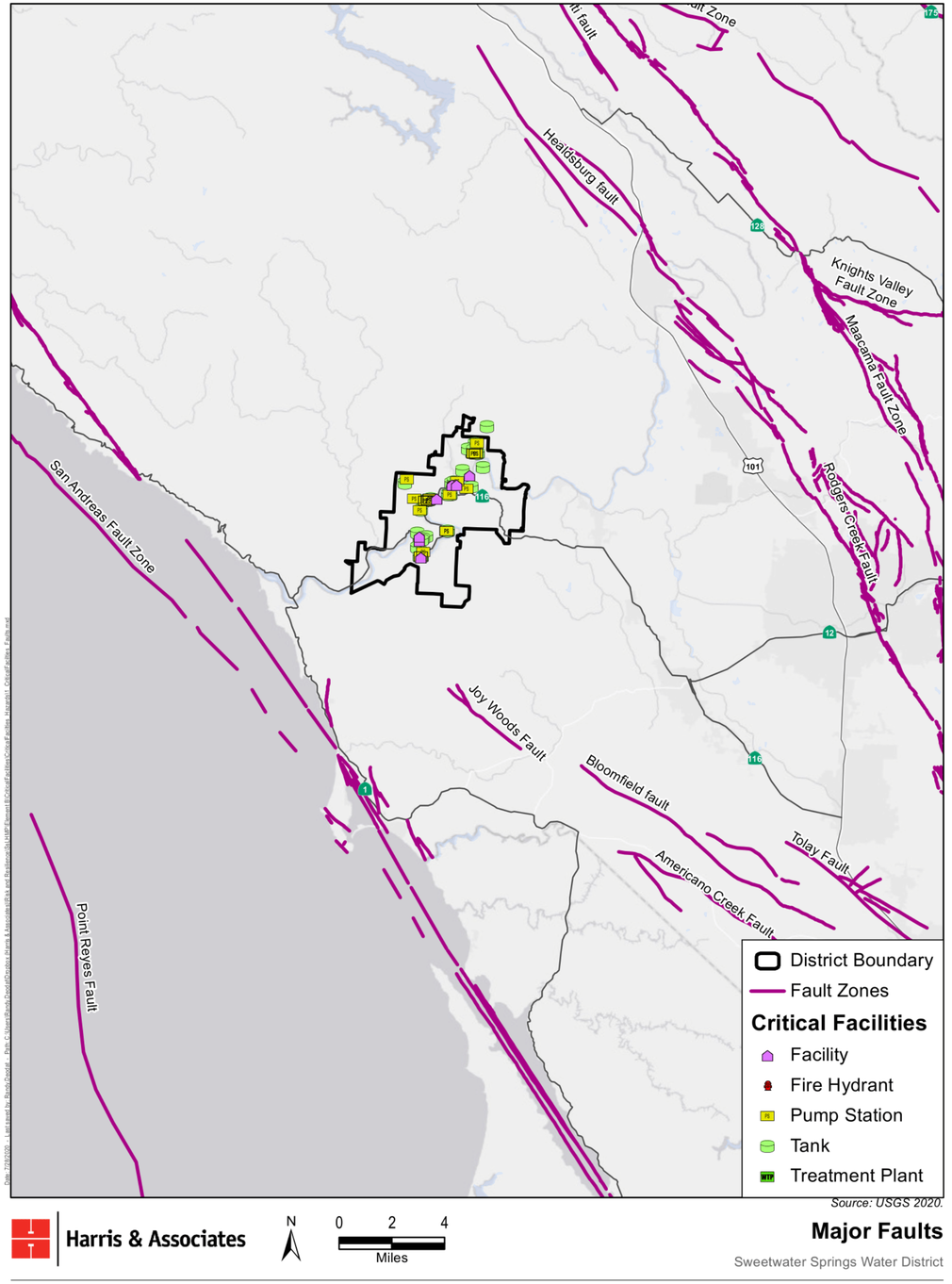
District Facilities (Miscellaneous) - District facilities include buildings that are integral to the day-to-day operation of the SSWD, including the Administration Building, Control Buildings, Storage Buildings, and Chlorine Generation Buildings.

Wells - The District has 3 wells for the Guerneville System and 2 wells for the Monte Rio System.

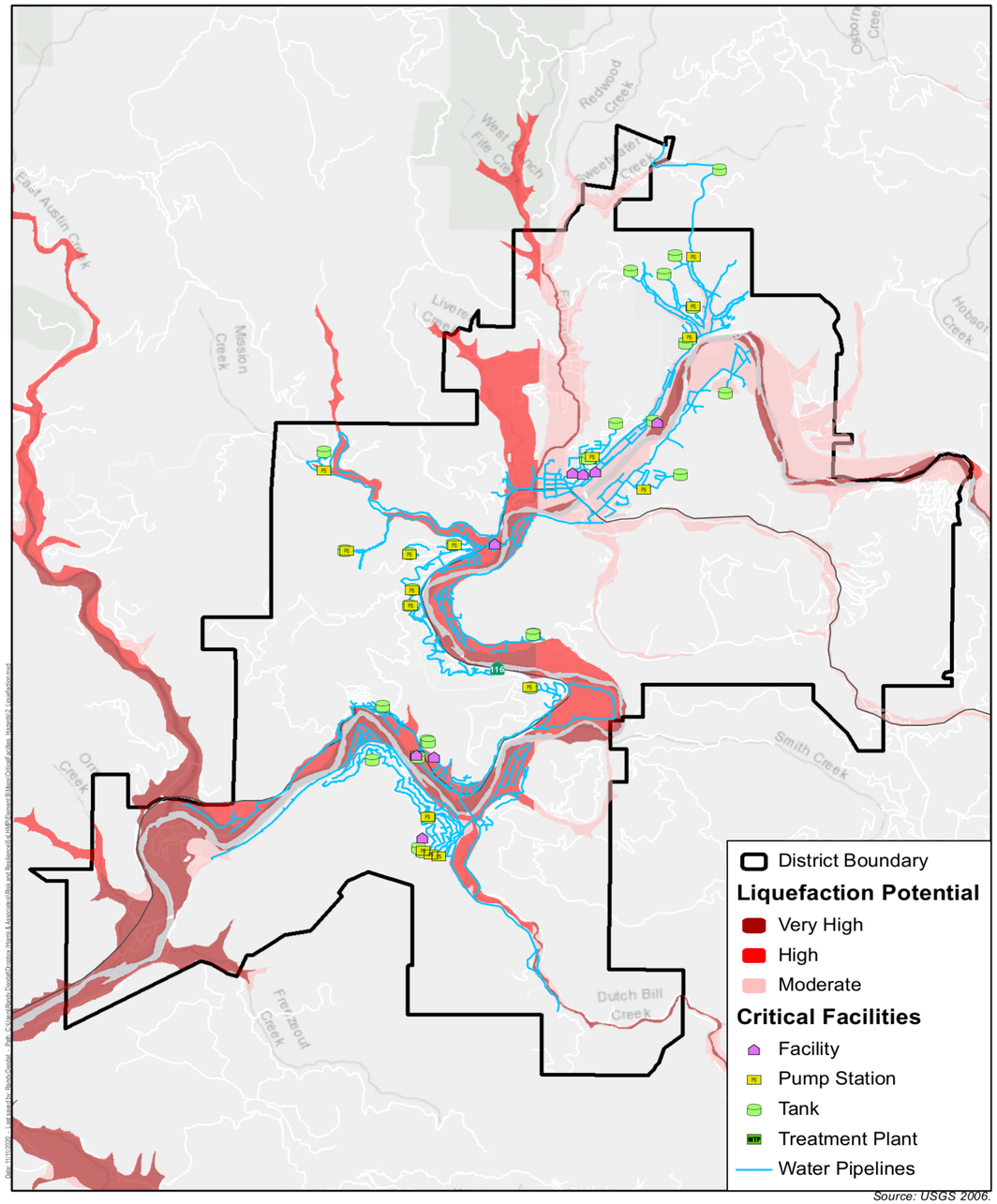
Emergency Generators & Fire Hydrants - Emergency backup power is available at El Bonita, Monte Rio Filter Plant, Canyon 3 Booster, Park AV booster, the Highland Treatment Plant, and the general office, providing a total of 5 diesels and one propane generators providing between 10 and 250 KW of energy. Four of the six generators are mobile, and can be plugged in to the Harrison Tank and Booster, Lower Summit Tank and Booster, Wright Dr. Tank and Booster, Shoenman Tank and Booster, and the Upper Schoolhouse Tank and Booster. There are 308 fire hydrants within the SSWD service area that can be accessed to assist in fire suppression during a wildfire event.

EARTHQUAKE

- Two earthquake scenarios to consider based on proximity and previous occurrence:
    1. San Andreas Fault M8.0 Earthquake Scenario
    2. Rodgers Creek M7.29 Earthquake Scenario

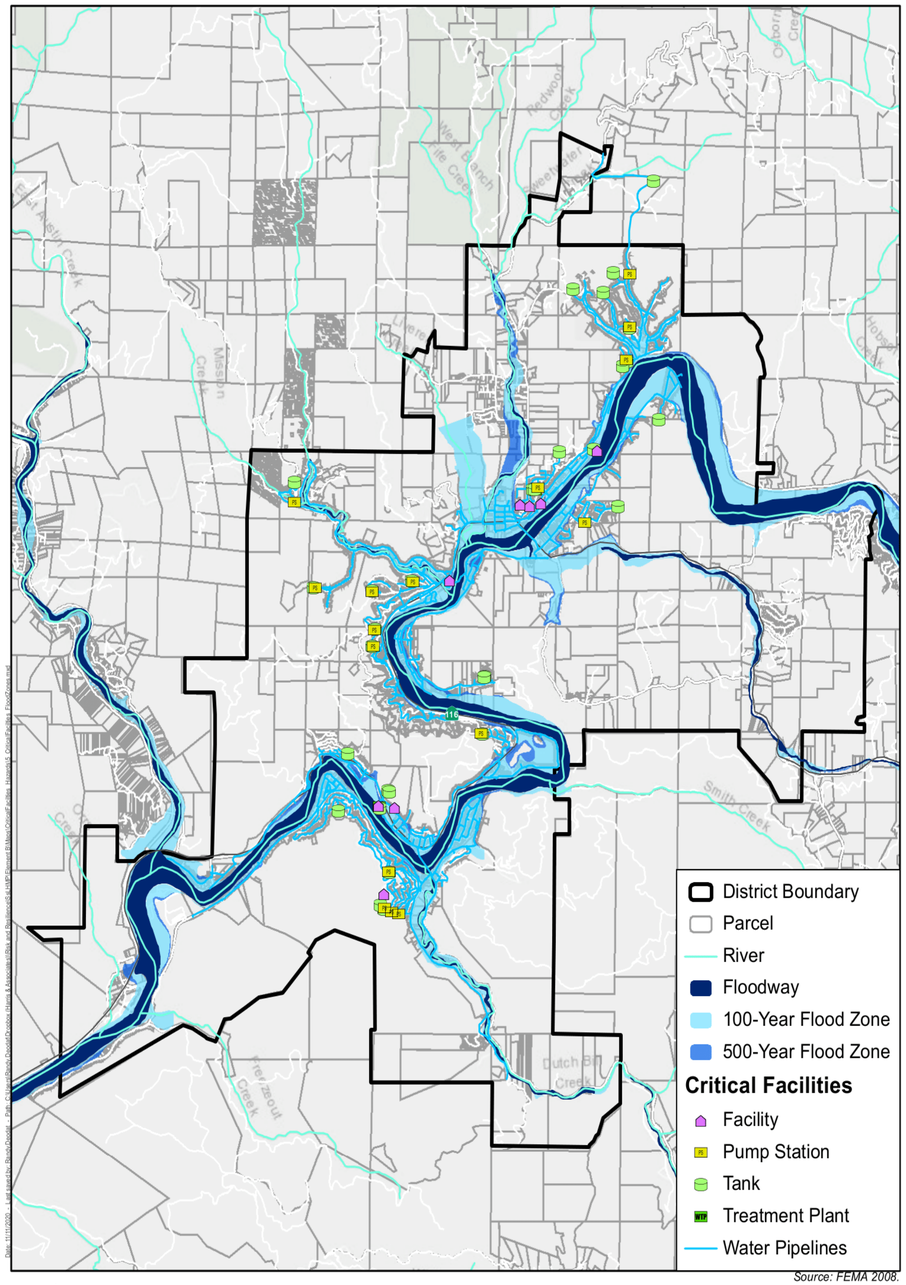


LIQUEFACTION



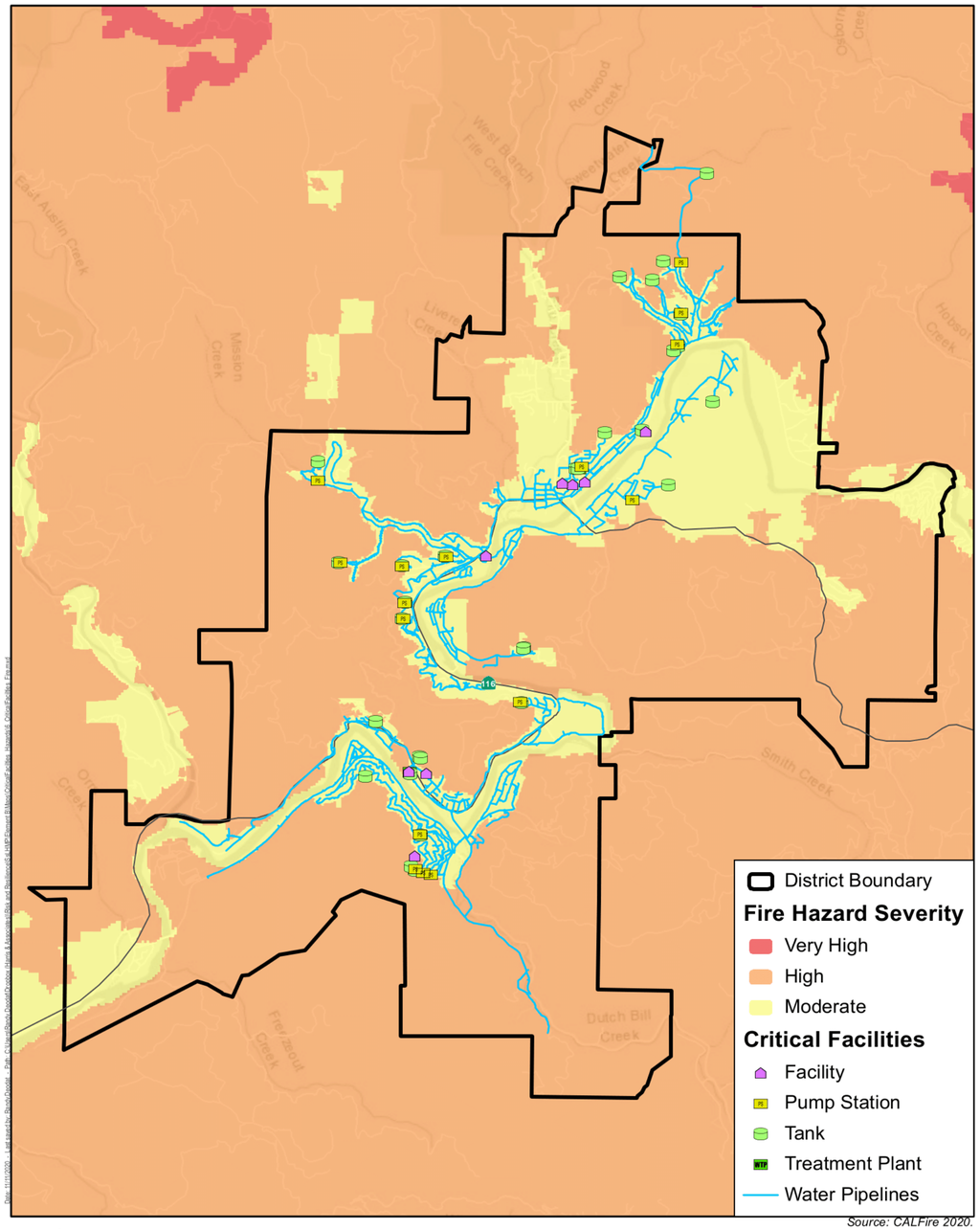
Critical Facilities in Liquefaction Risk Areas			
Category	Very High	High	Moderate
Storage Facility (Tank)	0	1	1
Pump Station	0	1	0
Treatment Facility	0	1	0
District Facility	1	3	1
Fire Hydrant	6	91	54
Wells	3	2	0

FLOOD



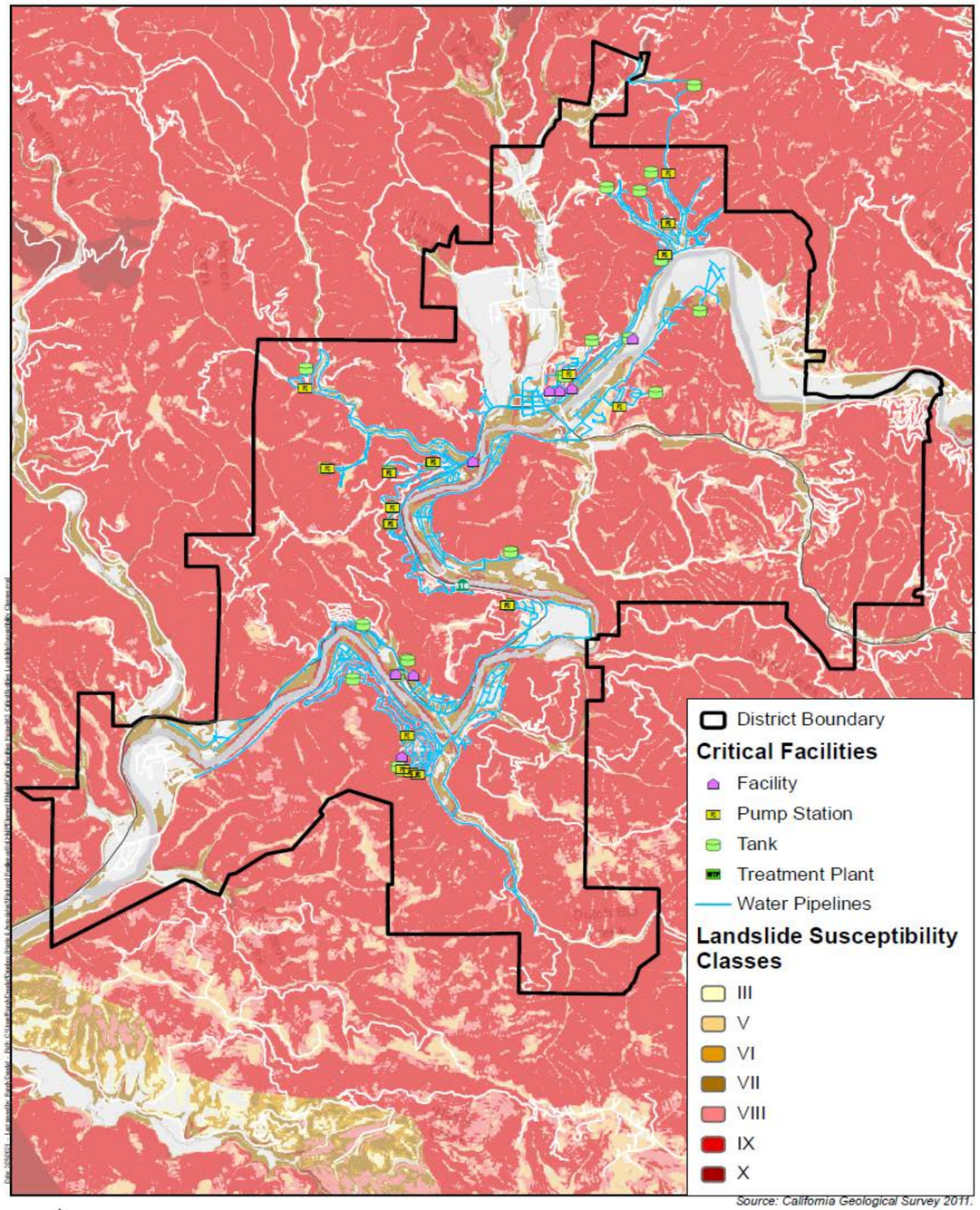
Critical Facilities in Flood Zone		
	FEMA Flood Hazard Areas	
Facility Type	100-Year	500-Year
Storage Facility (Tank)	5	0
Pump Station	2	0
Treatment Facility	1	0
District Facility	2	2
Fire Hydrant	123	20
Wells	5	0

WILDFIRE



Critical Facilities in Fire Hazard Severity Zones			
Category	Moderate	High	Very High
Storage Facility (Tank)	20	11	0
Pump Station	12	4	0
Treatment Plant	2	0	0
District Facility	7	1	0
Fire Hydrant	289	23	0
Wells	5	0	0

LANDSLIDE



Critical Facility in Landslide Hazard Area	
Category	Count in Susceptibility Class “Strong” (VI) and Above
Tank	29
Pump Station	13
Treatment Plant	1
Facility	7
Fire Hydrant	137
Wells	0

EXTREME HEAT

Higher temperatures may cause compromising effects on power plants and transformers and reduced capacity of substations and transmission and distribution lines. Heat-induced power outage can take out the entire power grid serving a water system and span multiple days before power is restored.

Historical and Projected Number of Extreme Heat Days per Year							
Scenario	Historical	RCP 8.5			RCP 4.5		
Time Frame	1961–1990	2011–2040	2041–2070	2071–2100	2011–2040	2041–2070	2071–2100
Count (No.)	4	8	13	24	NA	10	13

MITIGATION STRATEGIES - GOALS

What can be achieved

1. Increase reliability of water supply to the public, including during and after a natural hazard.
2. Identify cost-effective actions that minimize potential damage and reduce economic losses 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.

MITIGATION STRATEGIES – GOAL 1

FEMA Category	Mitigation Action	Hazard
Property Protection	Develop backup power options for District infrastructure and facilities including but not limited to wells, pump stations, reservoirs, booster tanks, and traffic control facilities	All
Property Protection	Stockpile repair materials, portable pumps and hydrants, and other supplies to assist with rapid and functional repairs to water and watershed infrastructure	All
Property Protection	Install pipeline isolation valves to enable smaller geographic service outages and shorter recovery periods	All
Structural Projects	Improve the energy independence of the District's facilities and infrastructure through energy efficiency, on site local distributed energy systems, micro grids, and energy storage facilities.	All

MITIGATION STRATEGIES – GOAL 2

FEMA Category	Mitigation Action	Hazard
Emergency Services	Purchase and install Emergency Response Notification and/or information system for EOC	All
Emergency Services	Develop redundancy in communications systems for water, storm pump stations, sewer lift stations and other critical facilities	All
Prevention	Develop guidance/methods for including hazard vulnerability when developing new infrastructure siting & designs	All
Property Protection	Protect (elevate, armor, or relocate) critical infrastructure, facilities, and systems from flooding, including but not limited to pump stations, wells, and the wastewater treatment facility	Flood
Property Protection	Identify and implement effective flood protection measures around water supply facilities and pumping stations, prioritizing facilities located within the 100-yr floodplain.	Flood
Prevention	Use erosion and sediment control features for all District construction activities.	Seismic
Property Protection	Retrofit with fire-resistant roofs for District-owned structures & facilities (including but not limited to pump structures, reservoirs, treatment facilities, & administrative offices)	Wildfire

MITIGATION STRATEGIES – GOAL 2

FEMA Category	Mitigation Action	Hazard
Property Protection	Relocate facilities currently in the floodplain to higher ground	Flood
Natural Resources Protection	Retrofit hardscaped areas on District property (i.e. parking lots) to use permeable pavement, green infrastructure, or other low-impact development design features to allow for improved infiltration	Flood
Property Protection	Install protective/heat reflective roofing (or install building) over all exposed pumps and motors for reservoirs and wells	Heat
Property Protection	Design and construct seismic upgrades/retrofits for reservoirs	Seismic
Property Protection	Install earthquake control valves at reservoirs	Seismic
Property Protection	Install chlorine vacuum regulators to mitigate potential damage because of seismic activity	Seismic
Structural Projects	Implement protective measures for District structures and infrastructure to reduce mud flow, and debris flow risks (i.e. retainer wall)	Seismic
Natural Resources Protection	Vegetation and Brush Removal (weed abatement) to areas surrounding District facilities within wildfire hazard zones.	Wildfire
Structural Projects	Water distribution infrastructure retrofits or improvements for reducing disaster risk	Seismic

MITIGATION STRATEGIES – GOAL 3

FEMA Category	Mitigation Action	Hazard
Public Education and Awareness	Expand/upgrade mass notification system for customers	All
Emergency Services	Purchase and install a system like WebEOC that allows employees to provide secured 2-way electronic communications and has an app to see existing situational status maps, and report and receive information.	All
Prevention	Participate in local disaster response preparations	All
Public Education and Awareness	Distribute information about disaster preparations through mailings, printed notifications, and digital platforms.	All
Prevention	Incorporate the influence of climate change into planning efforts or conduct a climate change vulnerability assessment	All
Prevention	Incorporate hazard mitigation into the District's Capital Improvement Program	All

MITIGATION STRATEGIES – GOAL 3

FEMA Category	Mitigation Action	Hazard
Prevention	Adopt insurance mechanisms and other financial instruments, such as catastrophe bonds, to protect against financial losses associated with infrastructure losses	All
Prevention	Review and revise emergency response plans as necessary to address natural hazard risk, stakeholder engagement and communication	All
Prevention	Identify District-owned waterways and water sources adjacent to any high-fire risk areas, and prepare for increased turbidity as a result of vegetation loss and increased erosion. Conduct mitigation measures as appropriate to reduce turbidity.	Fire
Prevention	Conduct evaluations of District facilities (Offices, Ancillary Structures) to determine seismic vulnerability.	Seismic
Natural Resources Protection	Put in place monitoring procedures on the status of dry vegetation on District property and around District facilities in wildland and WUI zones, and conduct weed abatement and pesticide application activities as needed.	Wildfire

MITIGATION STRATEGIES – GOAL 1

FEMA Category	Mitigation Action	Hazard
Emergency Services	Improve emergency communications protocols between the District and other Sonoma County jurisdictions	All
Emergency Services	Develop interagency mutual-aid agreements and emergency assistance protocols between the District and surrounding Jurisdictions	All
Public Education and Awareness	Put agreements in place with surrounding landowners for adequate fire road access to District facilities.	Wildfire

PUBLIC REVIEW PROCESS

- Review Draft posted on District website
- Feedback is welcome through end of day March 21, 2021.
- The District will continue the work of ensuring the community is prepared and protected from natural and climate change hazards in the years to come https://sweetwatersprings.com

sws@monitor.net

PUBLIC COMMENT