OCTOBER 2017

Local Hazard Mitigation Plan

Santa Clara Valley Water District

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CHAPTER 1—INTRODUCTION

Natural hazards can severely affect human health and safety, public and private property, infrastructure, key services, and ecosystems. The impacts of natural hazards also vary across landscapes and time. In time, a cyclical pattern of disaster events and recoveries becomes evident. This pattern can be identified and analyzed in order to best initiate each phase of emergency management: preparedness, response, recovery, and mitigation. At the peak of an event, natural hazards have the potential to severely impact life and property.

Optimization of each phase of emergency management is essential to protect a community from the worst impacts of natural hazards and disasters. A clear understanding of potential hazards and a coordinated plan to address these risks is essential to an effective emergency management regime. No community can be fully protected against all potential impacts from natural hazards, although communities can reduce potential impacts by taking action to become more resilient. This Local Hazard Mitigation Plan (LHMP, or Plan) is a blueprint for how the Santa Clara Valley Water District (SCVWD, or District) may reduce the threats posed by natural hazards that might impact SCVWD property or facilities.

PURPOSE AND BACKGROUND

The District provides vital flood protection, groundwater recharge and treated/recycled water services to the residents and businesses of Santa Clara County, and recognizes the importance of making its critical infrastructure and operations less vulnerable to natural hazards. The District could face widespread devastation, interruption to vital services, and other challenges if a severe disaster occurs within Santa Clara County. This Plan expands on the District's previous LHMP, which was adopted in 2011.

High recovery costs, rising variability in hazard severity and frequency, and the potential for devastating impacts to infrastructure and human life are all significant challenges facing the District in the event of a disaster. This LHMP identifies capabilities, resources, information, and strategies for building resilience and reducing physical and social vulnerabilities to disasters. It also coordinates mitigation actions, providing essential guidance for the District to reduce its vulnerability to disasters. The District has developed this Plan to be consistent with and reflect current legislation, conditions, and best available science. This ensures that hazards are accurately profiled, that policies are consistent with current District standards and/or other relevant federal, state, or regional regulations, and that the District has an updated LHMP consistent with Federal Emergency Management Agency (FEMA) requirements. This plan was revised to reflect the system upgrades, improvements and mitigations SCVWD completed since 2012. The LHMP includes strategies to reduce vulnerability to disaster through education and

outreach programs, foster the development of partnerships, and implement risk reduction activities.

This LHMP provides the District and its partners with information and mitigation measures to decrease the threat from natural hazards, by advancing the following key goals:

- Establish a basis for continued coordination with key stakeholders and other agencies.
- Provide a flexible and engaging public outreach campaign.
- Help to foster better communication and coordination within the District and surrounding communities.
- Address aging infrastructure to reduce the impacts of future hazards and disasters.

To achieve the goals of the Plan, the LHMP identifies critical facilities; discusses the District's capabilities and resources; provides an overview of potential hazards that may affect the District; lists strategies to reduce risks; and discusses guidance and coordination of mitigation actions between the District and other government agencies.

PLAN AUTHORITY

FEDERAL

The Robert T. Stafford Disaster Relief and Emergency Assistance Act, as modified by the Federal Disaster Mitigation Act of 2000 (DMA 2000), requires local, state, and tribal governments to develop hazard mitigation plans and submit them to FEMA if the government wishes to receive federal hazard mitigation grant funding. Jurisdictions are not federally required to prepare a hazard mitigation plan, but ones that elect not to do so are not eligible for these grants.

Title 44 of the Code of Federal Regulations, Parts 201 and 206, contains the regulations governing the hazard mitigation plan process, required plan content, and the process for obtaining FEMA's approval of the plan. The planning requirements set forth, including plan revision requirements, are identified through the FEMA Regulation Checklist in the Local Mitigation Plan Review Tool. The District's LHMP is in compliance with the Stafford Act, DMA 2000, and all appropriate sections of the Code of Federal Regulations.

STATE

The state of California passed Assembly Bill (AB) 2140 in 2006, establishing Section 8685.9 of the California Government Code. This section limits the state's share of disaster relief funds for local jurisdictions to 75 percent of the costs not paid for by federal disaster relief efforts. However, if the jurisdiction has a valid hazard mitigation plan consistent with DMA 2000, the state may cover more than 75 percent of the remaining costs.

PLAN ADOPTION

The Santa Clara Valley Water District will adopt this LHMP through a resolution of the District's Board of Directors, after the Plan is approved by FEMA. **Appendix A** contains the Board of Directors resolution of adoption.

PLAN USE

Each Plan section provides information and resources to assist plan users in understanding the hazard-related issues facing residents, businesses, and critical facilities in SCVWD's boundaries. The structure of the Plan enables users to review each section as needed and allows the District to review and update sections as new data becomes available. This increases the ease of new data entry and can help keep the Plan current.

The LHMP is composed of the following chapters:

- **Chapter 1: Introduction.** The introduction describes the background and purpose of developing the Plan, and introduces the mitigation priorities and scope.
- **Chapter 2: Planning Process.** The planning process describes the procedure and approach for the Plan update, including documentation of the community engagement process.
- **Chapter 3: Capability Assessment.** The capability assessment identifies the District's existing plans and programs related to hazard mitigation. This includes background for planning proposals, hazard mitigation strategies, and SCVWD's technical, fiscal, administrative, and political capacity to implement the identified mitigation strategies.
- **Chapter 4: District Profile.** This chapter provides an overview of SCVWD's service area, including demographics, critical assets (both services and facilities), and past disasters.
- **Chapter 5: Hazard Identification, Analysis, and Assessment.** This chapter provides information on the background, location, extent, past occurrences, probability of future occurrences, and climate change considerations associated with the hazards of concern identified by the District. This chapter also identifies the critical facilities vulnerable to these hazards, which become the basis for the proposed mitigation actions identified in Chapter 6.
- **Chapter 6: Mitigation and Adaptation Strategy.** This chapter establishes mitigation goals and actions to guide the District's implementation efforts.
- **Chapter 7: Plan Maintenance.** This chapter contains a schedule for Plan monitoring, evaluation, and revision. It describes how the District will incorporate mitigation actions in the Plan into existing policies and programs, including the Capital Improvement Program and the District's Water Utility Enterprise Funds.

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CHAPTER 2—PLANNING PROCESS

State and federal laws and regulations do not require that the District follow an established process to develop its LHMP. Instead, FEMA allows jurisdictions to develop and implement a planning process that best reflects local values, objectives, and conditions. A collaboration of District staff members internally developed the planning process.

PROCESS OBJECTIVES

In accordance with FEMA suggestions, the planning process has nine objectives:

1. Determine the planning area and resources
2. Build the planning team
3. Create an outreach strategy
4. Review community capabilities
5. Conduct a risk assessment
6. Develop a mitigation strategy
7. Review and adopt the plan
8. Keep the plan current
9. Create a safe and resilient community

FEMA does not require that the planning process follow any defined structure or be conducted in a particular way. Individual jurisdictions are allowed to develop and implement a planning process that is best suited for local conditions.

Similarly, there is no template for hazard mitigation planning documents, and individual jurisdictions have a great deal of latitude to draft a plan that represents community conditions and values. This Plan was prepared in accordance with the recommended guidance in FEMA's Local Mitigation Planning Handbook (2013) and the Association of Bay Area Government's (ABAG) Resilience Program guidance for mitigation and adaptation plans (2015b).

PLANNING TEAM

In keeping with the recommended approaches by FEMA and ABAG, the development of this Plan was overseen by a Local Hazard Mitigation Planning Team, made up of representatives from different departments in the District and other stakeholder agencies.

The following members comprised the Planning Team:

- Afshin Rouhani: SCVWD, Water Resources Planning and Policy
- Bob Teeter: SCVWD, District Librarian
- Chad Grande: SCVWD, Watershed Field Operations
- Cindy Martinez: SCVWD, Office of Emergency Services
- Cris Tulloch: SCVWD, Climate Change Conservation and Water Supply Planning
- Dale Jacques: SCVWD, Office of Emergency Services
- Debra Caldon: SCVWD, Water Resources Planning
- Donna Germany: SCVWD, Office of Emergency Services
- Jill Bernhard: SCVWD, Geographic Information Systems
- Gary Nagaoka: SCVWD, Raw Water Field Operations and Pipeline Maintenance
- Jose Villarreal: SCVWD, Office of Communications
- Karen Uyeda: SCVWD, East Side Project Delivery
- Mark Wander: SCVWD, Vegetation Manager
- Paul Burnett: SCVWD, Environmental Health and Safety
- Paul Thomas: SCVWD, Environmental Health and Safety
- Ray Fields: SCVWD, Office of Emergency Services
- Sara Duckler: SCVWD, Water Resources Planning
- Shree Dharasker: SCVWD, Office of the CEO
- Tammy Dunbar: Santa Clara County, Office of Emergency Services

The effort to update the LHMP and mitigation strategies was accomplished by: formal meetings; email and phone discussions. The Planning Team members identified the objectives of the Plan, discussed and prioritized the relevant hazards to the District, conducted a review and incorporation of existing information and prepared and reviewed mitigation strategies to address vulnerabilities. The review and incorporation of existing information and the updating of the plan sections involved consideration of the prior efforts, the hazard and risk information developed in 2010, the work that the District has completed or currently has in progress from 2010 to present, and planned work for the next five years.

Three formal meetings were held on the following dates:

- LHMP Meeting #1 (Kickoff meeting)—November 18, 2015
- LHMP Meeting #2—December 17, 2015
- LHMP Meeting #3—February 15, 2017

The specific discussion topics of the meetings are given in **Table 2-1**. Materials from the meetings are provided in **Appendix B**.

The lead in updating this LHMP was taken by OES staff and a consultant who collected feedback obtained from the staff who participated in the review and mitigation priority setting process**.** Subject matter experts (SMEs) reviewed information contained within the prior 2010 LHMP and provided specific input on sections pertaining to their expertise. The Hazard and Risk section has been updated to incorporate new mapping and experience data and the Mitigation Goals and Priorities section has been updated to indicate completed, and ongoing activities.

The plan will be monitored over the next five years to ensure the plan maintains alignment and coordination with other internal plans, including the Capital Improvement Plan, Stream Maintenance Program, the Water Supply and Infrastructure and other Master Plans.

Table 2-1: Planning Team Meeting Topics

Meeting	Date	Discussion Topics
LHMP Meeting 1	November 18, 2015	Project goals and objectives, requirements for the Plan, structure and function of Planning Team, review, update and incorporation of existing data, public outreach strategies, critical facilities, and relevant hazards.
LHMP Meeting 2	December 17, 2015	Details of each hazard (location and extent, past occurrences, risk of future occurrences, and climate change considerations), hazard mapping, hazard prioritization
LHMP Meeting 3	February 15, 2017	Meeting focused on discussion of hazard mitigation actions and determination of potential relative cost, responsible department, and action priority.

COMMUNITY ENGAGEMENT PROCESS

The Planning Team prepared and carried out a public engagement process to give community members in the District's service territory the opportunity to learn about hazard mitigation activities and contribute to the development of the Plan. The key component of this engagement process was an online survey. The survey asked respondents about their past experiences with disasters and steps that they have taken to reduce their vulnerability. The survey was made available on the District's website and included information on the Plan background and appropriate staff contact information from whom interested individuals could learn more from District staff. The survey was open from December 23, 2015 to March 14, 2016. Information on

the availability of the survey was sent via our eNewsletter in December, January and February. The eNews is sent countywide to 22,000 subscribers.
A total of 39 individuals responded to the survey. The key concerns expressed by the responders are as discussed below. A full copy of the survey is included in **Appendix C**.

- Earthquakes were the hazard of greatest concern among survey respondents, followed by flooding and heavy rains. Many respondents were also concerned about localized ponding in their neighborhoods during heavy rains.

- Among the respondents who own their home, only approximately 40 percent felt that their insurance coverage was sufficient to protect them from future hazard events. Approximately 31 percent felt that their insurance was inadequate, and approximately 29 percent were unsure if their coverage was sufficient.

- Approximately 62 percent of respondents have already taken action to make their homes less vulnerable, and a further nine percent plan to take action in the future.

- The most common actions that respondents have taken to increase emergency resilience include having a can opener and canned food, keeping a first aid kid, keeping a flashlight with batteries, and maintaining essential toiletries. Less than half of respondents kept important documents in a durable container or maintained an extra source of fuel or heat.

- A third of respondents are aware of any special needs of their neighbors in the event of an emergency.

- Respondents felt that providing effective emergency notification and communications in a disaster is the most useful action the District can take to help people be more prepared.

In addition to the online outreach, the District also conducted two meetings to engage stakeholders within the area and inform them of the LHMP update underway. The first opportunity was the SCVWD One Water Plan Stakeholder Workgroup Meeting on September 2, 2015. This meeting focused on a variety of topics associated with the District's One Water Plan. Attendees ranged from District staff, surrounding City/County and Special District staff, environmental groups, and civic and public policy groups. The second meeting conducted was the Collaborating Agencies Disaster Relief Effort (CADRE) County Flood Preparedness Workshop on February 23, 2016, where the District highlighted many of the initiatives underway, including the LHMP. Attendees to this workshop ranged from City/County personnel, emergency support organizations (i.e. Red Cross), and other NGOs that support disaster and emergency response needs in the County. **Appendix C** contains the materials from these two workshops, along with sign in sheets of the attendees.

On October 16, the District released a public review draft of this LHMP to the general public for review and comment, for a period of 15 days. A notice in the local newspaper, a twitter posting, and a Facebook posting which reached 246 individuals, were published on October 13, 2017. An on-line survey was also available for the review and comment period. Comments were received from the public review process and changes to the LHMP were made as necessary to address the public comments. **Appendix C** contains copies of these publications and postings.

SUPPORTIVE RESOURCES

The Planning Team relied on several plans, studies, technical reports, maps, data tables, and other resources to prepare the hazard profiles and vulnerability assessments in this LHMP. **Table 2-2** shows the key resources used to prepare information about the different hazard profiles and vulnerability assessments. **Appendix E** contains a complete list of sources used in this Plan.

Table 2-2: Supportive Resources

Section	Key Resources
Multiple hazards	• Association of Bay Area Governments Resilience Program • California State Hazard Mitigation Plan • County of Santa Clara Local Hazard Mitigation Plan • Santa Clara Valley Water District Infrastructure Reliability Project (Public version)
Dam failure	• California Department of Water Resources • Santa Clara Valley Water District Capital Improvement Program
Drought	• Cal-Adapt • Santa Clara Valley Water District Water Supply and Infrastructure Master Plan • US Drought Monitor
Flood	• California Adaptation Planning Guide • FEMA Flood Map Service Center • US Geologic Survey ARkStorm Scenario
Sea level rise	• NOAA Sea Level Rise Viewer
Seismic activity	• US Geologic Survey ShakeMap Archive • US Geologic Survey Third Uniform California Earthquake Rupture Forecast
Wildfires	• Cal Fire • Santa Clara County Community Wildfire Prevention Plan
Note: All major supportive resources used for the geologic hazards, land subsidence, and severe winds sections are listed in the multiple hazards row of this table.	

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CHAPTER 3—CAPABILITY ASSESSMENT

The SCVWD has a unique and essential set of capabilities, providing clean wholesale water, flood protection, and stream stewardship to over two million people across Santa Clara County (SCVWD 2016a). The District's work is shaped by a set of authorities, policies, programs, and funding that allows SCVWD to operate as necessary. This section takes stock of available resources, policies, and programs that will shape the District's ability to accomplish the mitigation strategies put forth in this Plan.

RELEVANT PLANS AND PROGRAMS

This section identifies existing local planning tools, public policy, and programs that are capable of supporting hazard mitigation activities and strategies outlined in this Plan. To create this capability assessment, the LHMP team collaborated to identify current local capabilities and mechanisms available to the District for reducing damage from future natural hazard events. These plans and resources were reviewed while developing the LHMP and are summarized below.

Table 3-1: District Resources to Support Hazard Mitigation Activities

Type of Resource	Resource Name	Ability to Support Mitigation	Web Address
Plan Resource	2012 Water Supply and Infrastructure Master Plan	This plan establishes a long-range plan (through 2035) for the District's water supply development program.	http://www.valleywater.org/WorkArea/linkit.aspx?LinkIdentifier=id&ItemID=8618
Plan Resource	South Bay Water Recycling Strategic and Master Planning 2015	This plan evaluates recycled water produced from the San Jose/Santa Clara Regional Wastewater Facility and includes a 20-year planning horizon. By identifying the potential for increased recycled water delivery in future years, this Plan supports the District's preparedness for drought.	http://www.valleywater.org/Services/Clean_Reliable_Water/Where_Does_Your_Water_Come_From/Recycled_Water/South_Bay_Water_Recycling_-_Final_Report_2015.aspx

Type of Resource	Resource Name	Ability to Support Mitigation	Web Address
Plan Resource	2015 South County Recycled Water Master Plan (update finalized May 2016)	This 2015 report presents a strategy for expanding use of recycled water in South Santa Clara County over a 20-year planning horizon. It provides a long-range plan for the expansion of recycled water treatment facilities to increase the reliability of long-term water supplies. This can help support and implement mitigation strategies that seek to implement recycled water expansions as a method of reducing dependence on and vulnerability to both imported water and ground water supplies.	http://www.valleywater.org/Services/Clean_Reliable_Water/Where_Does_Your_Water_Come_From/Recycled_Water/2015_South_County_Recycled_Water_Master_Plan_update.aspx
Program Resource	Fiscal Year 2018–2022 Capital Improvement Program	The Santa Clara Valley Water District's (District) Fiscal Year 2018–22 Five-Year Capital Improvement Program (CIP) is a projection of the District's capital expenditures and required funding for planned capital projects from Fiscal Year 2017 to 2018 through completion of the projects. The purpose of the CIP is to document planned District projects to help integrate District work with the larger community by aligning District planning with other local agency planning efforts. The District's rolling 5-year CIP is developed following the guidelines of Government Code (GC) §65403 which governs the development and annual review of Capital Improvement Programs developed by special districts in the State of California. Capital improvement projects in the CIP include: new construction or rehabilitation or repair of flood protection facilities, water utility facilities, or buildings.	http://www.valleywater.org/cip.aspx

Type of Resource	Resource Name	Ability to Support Mitigation	Web Address
Program Resource	Dam Safety Program	The District's Dam Safety Program recognizes the catastrophic nature of potential dam failure and operates a comprehensive program to protect the public. This program includes periodic special engineering studies, surveillance and monitoring programs, routine inspections and maintenance activities, and maintenance of emergency response and preparedness plans.	http://www.valleywater.org/damsafety.aspx
Program Resource	Water Conservation Program	The District has a long-term goal of 98,800 acre-feet per year of water conservation program savings, which is on top of any water use reductions call for by the Board in response to drought. Water conservation programs to achieve this goal include rebates in the residential, commercial, industrial, institutional, and agricultural sectors.	http://www.valleywater.org/programs/waterconservation.aspx
Plan Resource	San Francisco Bay Area Integrated Regional Water Management Plan (IRWMP)	One of two IRWMP processes the District participates in, the Bay Area IRWMP is a nine-county effort, which includes northern Santa Clara County, to coordinate and improve water supply reliability, protect water quality, manage flood protection, maintain public health standards, protect habitat and watershed resources, and enhance the overall health of the Bay. This plan integrates with the SCVWD LHMP to ensure consistent delivery of safe water for the entire service area.	http://bayareairwmp.org/

Type of Resource	Resource Name	Ability to Support Mitigation	Web Address
Plan Resource	One Water Plan	A framework for long-term management of Santa Clara County water resources. One Water aims to plan and prioritize integrated multi- objective projects on a watershed scale, including environmental stewardship, flood protection and water supply. One of the ten One Water objectives, Objective I, is focused on Emergency Preparedness.	http://www.onewaterplan.wordpress.com
Plan Resource	Pajaro River Watershed Integrated Regional Water Management Plan	The Pajaro River Watershed IRWMP, which includes southern Santa Clara County, is a collaborative effort led by the District, San Benito County Water District, and Pajaro Valley Water Management Agency to improve water supply reliability, protect water quality, provide flood protection, and encourage environmental protection and enhancement. In future updates of this IRWMP, mitigation strategies identified in this LHMP can be incorporated to support risk prevention and implementation of the Plan.	http://www.valleywater.org/Services/IntegratedRegionalWaterManagement/2014_Pajaro_IRWM_Plan_Update.aspx

STRATEGY IMPLEMENTATION CAPACITIES

PLANNING AND REGULATORY

The state legislature created the District in its current form through the Santa Clara Valley Water District Act (the District Act), which is found in California Water Code Appendix, Chapter 60. Under the provisions of the District Act, the District is governed by a seven-member board of directors, each of whom represents one of seven electoral districts within the District's service territory and is elected by the voters who reside in that district. The District is allowed to draw its own electoral district boundaries and is required to make them about as equal in population as possible, as well as considering other factors such as topography, compactness, and community of interests. Elections are held every two years and directors serve for four years; directors from districts 1, 4, 6, and 7 are elected every midterm election (2014, 2018, 2022, etc.), and directors from districts 2, 3, and 5 are elected every presidential election (2016, 2020, 2024, etc.). While the District is allowed to issue its own ordinances and regulations, any modification to the District Act must come from the state legislature and be signed by the governor (SCVWD 2015f).

ADMINISTRATIVE AND TECHNICAL

As of 2017, the District employed 765 full-time positions (SCVWD 2017b). The District is organized as shown in **Figure 3-1**.

Hazard mitigation activities can be implemented by staff throughout the District's organization, as different types of mitigation strategies require skills and capabilities from different groups. The Planning Team and other key staff responsible for implementation will coordinate efforts to avoid unnecessary redundancies and ensure that reduction strategies are being implemented efficiently.

FINANCIAL

The District Act grants the District a number of authorities, including the ability to issue bonds, levy taxes, and charge people for pumping groundwater. The District's 2017–2018 budget identifies anticipated revenues and financing of approximately $654.6 million. Financing totals $210.5 million, or 32 percent of total revenue and financing. Large sources of revenue include charges for water service ($215 million or 33 percent of total revenues and financing) and property taxes ($113 million or 17 percent of total revenues and financing). (SCVWD 2016c).

EDUCATION AND OUTREACH

The District's School Program offers age-appropriate presentations and tours for students of all ages. Curriculum centers on the water cycle, conservation, regional issues, and climate. Materials for teachers encourage engagement of the community from a young age, and provide community members, from preschool on, opportunities to learn about and participate in conversations about water use. The District's Office of External Affairs, which operates all communications and engagement programs, responds to all opportunities to engage customers across Santa Clara County in important discussions about preparedness, mitigation, and hazards as well as other pertinent issues affecting individuals, the region, and the state. The

District's Office of Emergency Services holds an annual Winter Preparedness Workshop (Workshop) and invites staff from other agencies and members of the public. This Workshop is held in order to engage the public agencies and the community in inclement weather preparation.

PREVIOUSLY IMPLEMENTED MITIGATION MEASURES

The District has used, and will continue to use, a variety of project-specific mechanisms and plans to ensure that the projects and mitigation strategies identified as existing or having relatively high priorities in this 2017 LHMP are implemented. As the individual plans are updated, the recommendations from this 2017 LHMP will be incorporated into the plans including the identified goals, objectives, and strategies. Among these plans and process are:

- SCWVD Capital Improvement Program
- SCVWD Water Supply and Infrastructure Master Plans
- Dam Safety Program
- Water Conservation Program
- Emergency response plans
- Training and exercise of emergency response plans
- Debris Management Plans
- Recovery Plans
- Flood Hazard Management Plans
- Resiliency Plans
- Public information/Education plans

The District has continued to implement mitigation actions and programs from prior LHMPs. This Plan recognizes the accomplishments the District has made in preparing for hazards, and where appropriate, seeks to continue actions that require ongoing attention to mitigate risk. Previously implemented actions are identified in **Appendix D**. New mitigation actions, some of which build off actions detailed in **Appendix D**, can be found in **Chapter 6.**

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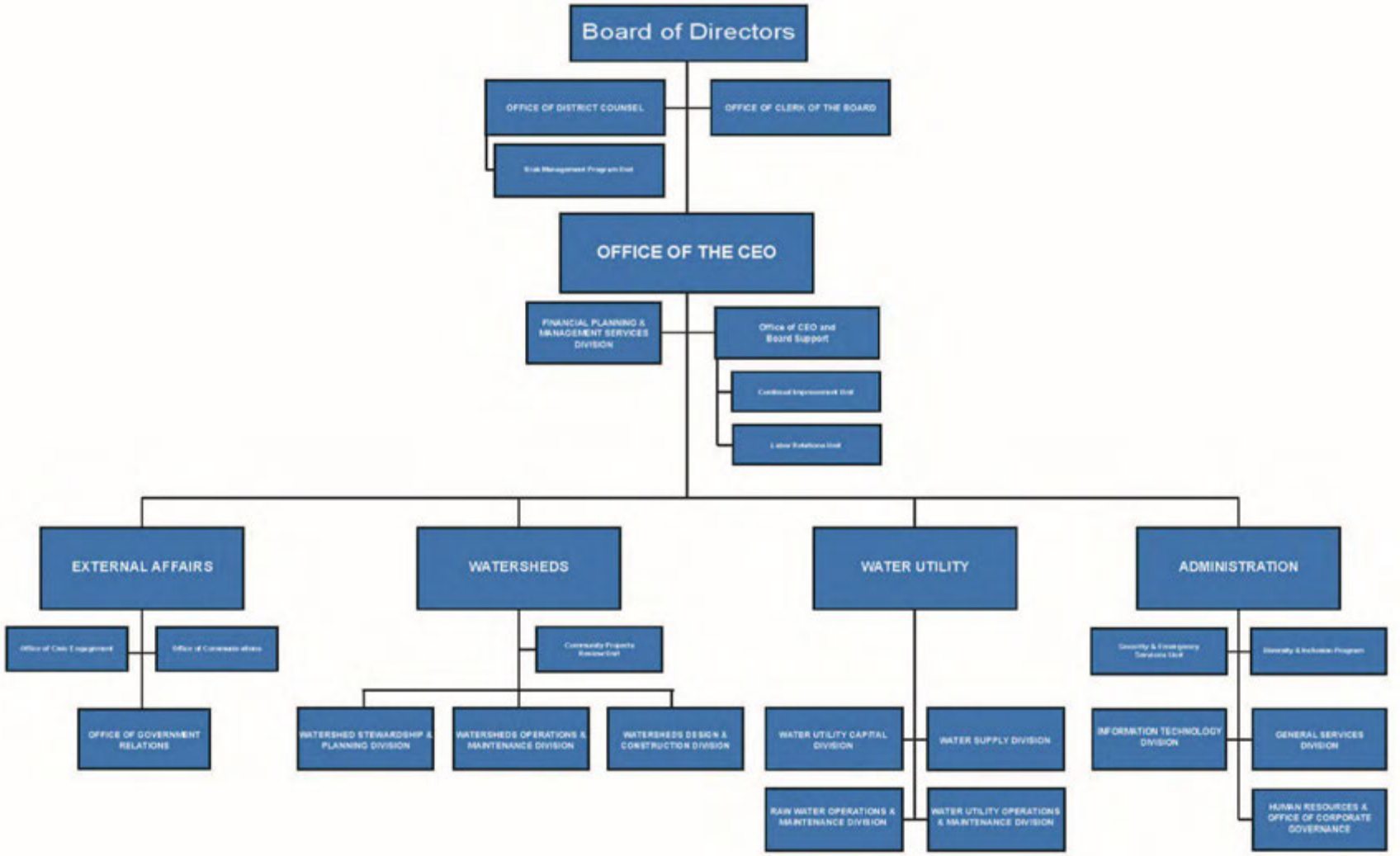
Figure 3-1: Santa Clara Valley Water District Organization Chart



Source: SCVWD 2017b

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DISTRICT ASSETS

The District provides three key services in its service territory: wholesale water supply, flood protection, and stream stewardship.

As a wholesale water supplier, the District generally does not provide water directly to residential and non-residential customers. Instead, the District sells water to 13 private organizations and municipal agencies and water retailers, which in turn provide water to individual customers (SCVWD 2015b), although the District does provide some water directly to agricultural customers. The District's customers and the projected 2020 water demand for these customers are given in **Table 3-2.**

The District obtains water through three types of sources: local water from groundwater and water bodies within the District's service territory, imported water from sources outside of the District's service territory, and recycled water. The District's local supply comes from groundwater basins and local reservoirs and streams, including a small amount from local surface water managed by the San Jose Water Company and Stanford University. A majority of the District's water is imported water and consists of water brought in from the State Water Project (SWP), the Central Valley Project (CVP), and the Hetch Hetchy system (SCVWD 2012). SWP water originates at the Upper Feather River watershed and flows to Lake Oroville in the foothills of the northern Sierra Nevada and is conveyed through the Sacramento-San Joaquin River Delta to the South Bay Aqueduct, which provides water to the District and water providers in the East Bay region (DWR 2001). Water from the federal CVP comes from a variety of sources throughout the Sierra Nevada and is conveyed through the Delta region to the San Luis Reservoir in Merced County, where it is provided to the District through the Pacheco Conduit (USBR 2011). The remaining imported water comes from the Hetch Hetchy system owned by the City of San Francisco, which brings water from the Tuolumne River in Yosemite National Park. The District also operates an advanced water treatment plant (Silicon Valley Advanced Water Purification Center) that currently supplies purified water to South Bay Water Recycling for blending with their tertiary treated recycled water for non-drinking uses (SCVWD 2012). The total amount of water from these sources is given in **Table 3-3**.

Another responsibility component of the District's water supply service is to manage Santa Clara County's groundwater (SCVWD 2015d). The abundant groundwater resources in the area, particularly in the Santa Clara Valley, led to much of the area's early growth and helped establish Santa Clara County as a major agricultural provider. However, over pumping of groundwater resources in the early 1900s led to ground subsidence and increased risk of depleting the region's groundwater. To avoid this, the District conducts extensive groundwater management activities, including managed aquifer recharge to help replenish groundwater supplies.

The District serves as the primary flood protection agency for Santa Clara County, through a combination of flood protection infrastructure and operating practices. There are over 800 miles of creeks and rivers in Santa Clara county. Of this amount, the District manages approximately 279 miles. The District builds and maintains an extensive series of levees (approximately 100 miles) and drainage channels throughout its service territory, primarily in the urbanized Santa Clara Valley, sometimes in partnership with the US Army Corps of Engineers (SCVWD 2010, 2015c). As part of its operations, the District monitors stream flows throughout its service territory. (SCVWD 2010).

The District is also responsible for stream stewardship. State legislation authorizes the district "to enhance, protect, and restore streams, riparian corridors, and natural resources." The water district's environmental work protects and restores habitats and encourages the return of endangered species such as the red-legged frog, steelhead trout and salt marsh harvest mouse.

Table 3-2: Santa Clara Valley Water District Projected 2020 Demand by Customer

Water Supplier	Area Served	2020 Water Demand * Acre-Feet	Percent of Total
Cal Water Service Company	City of Cupertino (partial), City of Los Altos, City of Los Altos Hills (partial), City of Mountain View (partial), City of Sunnyvale (partial)	14.376	4.0%
City of Gilroy	City of Gilroy	11,776	3.3%
Great Oaks Water Company	City of San Jose (partial)	9,452	2.6%
City of Milpitas	City of Milpitas	12,347	43.4%
City of Morgan Hill	City of Morgan Hill	8,549	2.4%
City of Mountain View	City of Mountain View (partial)	12,307	3.4%
City of Palo Alto	City of Palo Alto	12,733	3.5%
Purisima Hills Water District	City of Los Altos Hills (partial)	2,106	0.6%
San Jose Municipal Water	City of San Jose (partial)	28,268	7.8%
San Jose Water Company	City of Campbell, City of Cupertino (partial), City of Los Gatos, Monte Sereno, City of San Jose (partial), Saratoga	144,679	40.0%
City of Santa Clara	City of Santa Clara	28,232	7.8%
Stanford University	Stanford University	3,400	0.9%
City of Sunnyvale	City of Sunnyvale (partial)	25,002	6.9%
Independent groundwater pumping †	-	17,567	4.9%
Agricultural customers ‡	-	25,980	7.2%
Raw water	-	1,650	0.5%
Losses	-	3,005	0.8%
Total	**-**	**361,429**	**100.0%**

Source: SCVWD 2016d
*** These figures reflect 2020 demand by supplier, as projected in 2016. Actual demand may differ.**
† Customers with private groundwater wells who are not serviced by the District or a retail supplier.
‡ Agricultural customers receive water directly from the District or groundwater and not a retail supplier. Note: Due to rounding, totals may not equal the sum of individual entries.

Table 3-3: Santa Clara Valley Water District Water Supplies

Source		2015 Supply	
		Acre-Feet	Percent of Total
Local	Natural Groundwater Recharge	41,000	15.6%
	Surface water	40,000	15.3%
Imported	Delta-conveyed *	119,000	45.4%
	San Francisco Public Utilities Commission (SFPUC)	42,000	16.0%
Recycled		20,000	7.6%
Total		**Total**	**262,000**

Source: SCVWD 2016d, SCVWD 2017a.
*** Includes water from both the SWP and the CVP contract allocation, carryover, Semitropic Water Bank takes, and water transfers and exchanges.**
Note: Due to rounding, totals may not equal the sum of individual entries.

The District manages the Santa Clara Subbasin and the Llagas Subbasin (defined by the California Department of Water Resources as Basins 2-9.002 and 3-3.01 respectively). The District further subdivides the Santa Clara Subbasin into the Santa Clara Plain and Coyote Valley areas. The Santa Clara Plain area takes up the same general area as the urbanized Santa Clara Valley area in the northwestern part of the District's service territory, while the Coyote Valley area stretches along the Highway 101 corridor from Morgan Hill north to the southeastern neighborhoods of San Jose. The Llagas Subbasin runs along the Highway 101 corridor south from Morgan Hill to the southern border of the District's service territory (SCVWD 2013).

Groundwater supplies are increased through the District's managed recharge activities, as well as natural recharge, in which groundwater is replenished as part of the natural hydrologic cycle. A smaller amount of recharge also occurs through subsurface inflow, in which groundwater flows into the Santa Clara Valley Groundwater Basin from other areas. Most groundwater leaves the basin through pumping, although some flows out naturally into other groundwater basins (subsurface outflow). Municipal and industrial users pump the overwhelming majority of groundwater from the Santa Clara Plain area, as well as a majority of water from the Coyote Valley area. Groundwater pumping in the Llagas Subbasin is split roughly between municipal/ industrial and agricultural users (SCVWD 2016e). **Table 3-4** shows the changes in groundwater inflows and outflows for the three areas for 2015. It should be noted that 2015 was a dry year, and that the values presented are not representative of long-term conditions where groundwater inflows and outflows are in balance.

The District also helps to manage the surface water in its service territory to protect the biological integrity of the riparian, wetland and aquatic ecosystems. This work includes restoring degraded habitat, keeping trash and pollutants out of waterways, reducing erosion, and increasing the populations of endangered riparian species (SCVWD 2015d). The District manages five different watersheds, discussed in **Table 3-5**.

Table 3-4: 2015 Groundwater Inflow and Outflow in the Santa Clara Valley Water District in Acre-Feet (AF)

Area	Inflow		Outflow		
	Managed Recharge	Natural Recharge	Groundwater Pumping	Subsurface Outflow	Net Change
Santa Clara Subbasin, Santa Clara Plain	+28,200	+18,400	-66,300	-100	-19,800
Santa Clara Subbasin, Coyote Valley	+7,400	+1,500	-9,900	-4,000	-5,000
Llagas Subbasin	+19,300	+21,500	-42,200	-100	-1,500
Total	**+54,900**	**+41,400**	**-118,400**	**-4,200**	**-26,300**

Source: SCVWD 2016e
Note: CY 2015 was a dry year following an extended drought period, therefore, these inflows and outflows are not typical. Due to rounding, totals may not equal the sum of individual entries.

Table 3-5: Watersheds in the Santa Clara Valley Water District

Watershed	Size (sq. miles)	Description
Coyote	322	Centered on Coyote Creek, but includes 16 major creeks and numerous smaller ones. Drains to areas of Milpitas, Morgan Hill, San Jose, and unincorporated areas of southern Santa Clara County.
Guadalupe	170	Centered on the Guadalupe River and its tributaries. Drains parts of Campbell, Los Gatos, Monte Sereno, San Jose, and Santa Clara.
Lower Peninsula	98	Made up of multiple small creeks which run into the tidal wetlands of the San Francisco Bay. Drains areas of Cupertino, Los Altos, Los Altos Hills, Mountain View, Palo Alto, and Sunnyvale.
Uvas-Llagas	104	Made up of numerous small creeks that are part of the wider Pajaro River watershed, which flows into Monterey Bay. Drains parts of Gilroy, Morgan Hill, and San Jose, and unincorporated areas of southern Santa Clara County.
West Valley	85	Made up of several small channels and natural creeks. Drains parts of Campbell, Cupertino, Los Gatos, Monte Sereno, San Jose, Santa Clara, Saratoga, and Sunnyvale.

Source: SCVWD 2015e

The District operates an extensive set of water treatment, recharge, and conveyance infrastructure throughout its service territory. These facilities include pipelines and canals, pump stations, water treatment plants, tunnels, and groundwater recharge operations. A list of the facilities operated by the District is given in **Table 3-6**.

Table 3-6: Santa Clara Valley Water District Supply Facilities

Type	Number	Description
Raw water pipelines	16	Conveys untreated water between District facilities or from imported water sources to District facilities. Raw water pipelines total 94.3 miles in length.
Treated water pipelines	10	Carries treated water from District treatment plants to treated water customers, including retail suppliers. Treated water pipelines total 39.8 miles in length.
Water treatment plants	3	Includes the Penitencia, Rinconada, and Santa Teresa treatment plants, which take in raw water, treat it, and distribute it through treated water facilities to customers.
Advanced recycled water treatment plant	1	The Silicon Valley Advanced Water Purification Center (SVAWPC) purifies secondary-treated effluent from the neighboring San José-Santa Clara Regional Wastewater Facility using microfiltration, reverse osmosis and ultraviolet disinfection.
Raw water pump stations	3	Pumps untreated water from the SWP, the CVP, or local sources into pipelines or treatment plants.
Treated water pump stations	3	Two pumps convey water from the District's water treatment plants to the San Jose Water Company. A third is used in emergencies to pump water from SFPUC system into the District's treated water pipelines.
Raw water reservoirs	10	Stores untreated water from local surface sources for environmental uses, groundwater recharge, or for water supplies.
Treated water reservoirs	1	Holds treated water from the Rinconada treatment plant for distribution to treated water facilities.
Groundwater recharge ponds	102	Includes 400 acres of recharge ponds, where water percolates into the soil, and their pre-treatment facilities.
Raw water canals	5	Transports untreated water between District facilities. They total 17.3 miles in length.
Tunnels	3	Part of larger pipeline systems.
Hydroelectric facilities	1	Anderson Dam includes a hydroelectric facility capable of generating a maximum of 900 kilowatts (kW).
Diversion dams	9	Small dams that move water from creeks into canals or recharge ponds.
Natural recharge channels	24	90 miles of unlined channels where the District manages water releases to replenish groundwater basins.

Sources: SCVWD 2005, 2014a

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CHAPTER 4—DISTRICT PROFILE

The District is a special government district that provides wholesale water, flood protection, and stream stewardship services throughout the entirety of Santa Clara County. The District's service territory encompasses an area of approximately 1,300 square miles and forms the southern end of the San Francisco Bay Area. The service territory is bordered by Alameda County to the north, Stanislaus and Merced counties to the east, San Benito County to the south, and Santa Cruz and San Mateo counties to the west.

AREA AT A GLANCE

The Santa Clara Valley, located in the northwestern part of the District's service territory, is highly urbanized and home to most of the District's customers. This area includes the City of San Jose, the largest city in the District's service territory and the third most populous city in California. The Santa Clara Valley also contains 12 other cities, including well-known communities such as Palo Alto, Mountain View, and Cupertino. The high concentration of technology jobs and major technology companies in the Santa Clara Valley has led to the area being nicknamed Silicon Valley. The area south of the Santa Clara Valley includes agricultural land, along with the cities of Morgan Hill and Gilroy and some smaller unincorporated communities, all located along the corridor of US Highway 101. Outside of the Highway 101 corridor and the Santa Clara Valley, the District's service territory is rural and mountainous.

Highway 101 is the main freeway through the District's service territory. Other major roadways include Highway 17, and Interstates 280, 680, and 880, which extend north from San Jose to other Bay Area communities and points beyond. Multiple rail lines extend north from San Jose to San Francisco, the East Bay region and beyond, and out to the Central Valley. Other rail lines run south from San Jose, roughly parallel to Highway 101, toward Salinas and other communities south of the District's service territory.

The Ohlone Native Americans were the first known people to settle in this general region, as early as 8,000 BCE, although other peoples may have inhabited the area earlier. The Ohlone eventually occupied an area from the tip of the San Francisco Peninsula and the northern parts of the East Bay (near what is now Martinez) down to southern Monterey County (NPS n.d.).

Although the English privateer Sir Francis Drake arrived in the San Francisco Bay in 1579 and claimed the area for England, Europeans did not settle the area until the arrival of the Spanish in the 1770s. The Franciscan priest Junipero Serra established the Mission Santa Clara de Asis in the area in 1777, giving the Santa Clara Valley its name. That same year, a small group of Spanish soldiers and settlers founded the town of San Jose a few miles from Mission Santa Clara (NPS n.d.).

After the United States acquired California from Mexico following the Mexican-American War and California became a state, settlement in the Santa Clara Valley increased as a consequence of the California Gold Rush. The area's fertile soil and extensive groundwater resources made it a prime location for agriculture, although the forests of Santa Clara County were also used for lumber. The region stayed largely agricultural until the post-World War II boom, when rapid urbanization and the establishment of technology companies converted the Santa Clara Valley from farmland to the urbanized land uses of today (NPS n.d.).

The Santa Clara Valley Water District itself dates back to the early 1900s. Beginning in this time, the growing communities of the Santa Clara Valley faced periodic flood threats from the region's rivers and creeks. At the same time, the farms in the area were pumping increased amounts of groundwater, causing land subsidence, where the underground aquifers holding the ground up are depleted and the unsupported land falls in on itself. Local residents formed the Santa Clara Valley Water Conservation District in 1929 with the goals of managing groundwater and promoting groundwater recharge. As the area urbanized, the District's mission shifted from providing water for agriculture to serving the needs of residential and business customers. In 1968, the District merged with the Santa Clara County Flood protection and Water Conservation District, which had been established in 1952 to control flooding in the area. This merger created the modern Santa Clara Valley Water District, combining the region's water supply, groundwater management, and flood protection activities into a single agency (SCVWD 2015a).

DEMOGRAPHICS

According to the US Census, Santa Clara County is home to approximately 1.9 million people, making it the most populous county in the Bay Area and the sixth most populous in the state. **Table 4-1** summarizes the key demographics of the District's service territory.

Table 4-1: Key Demographics, Santa Clara County (2015)

	Santa Clara County
Total population	1,868,149
Median age	36.8
Elderly population (65+ years)	222,863 (11.9%)
Foreign-born population	730,830 (39.1%)
Number of households	621,463
Average household size	2.95
Median household income	$96,310
Number of rental households	268,627 (43.2%)

Source: US Census Bureau 2015a, 2015b, 2015c, 2015d, 2015e

The District's service territory has a majority of non-white residents, although whites make up the single-largest racial or ethnic group. Asian and Hispanic/Latino residents comprise the other large racial and ethnic groups in Santa Clara County. **Table 4-2** details this racial and ethnic composition.

Table 4-2: Racial and Ethnic Composition of Residents, Santa Clara County (2015)

Race or Ethnicity	Population	Percentage
White	902,404	48.3%
Black or African-American	48,310	2.6%
American Indian and Alaska Native	8,961	0.5%
Asian	630,704	33.8%
Native Hawaiian and Other Pacific Islander	7,163	0.4%
Other race	183,719	9.8%
Two or more races	86,888	4.7%
Hispanic or Latino (of any race)*	497,074	26.6%
Total	**1,868,149**	**100.0%**

Source: US Census Bureau 2015f, 2015g
*** The US Census Bureau does not count Hispanic or Latino as a separate racial or ethnic category. Persons who identify as Hispanic or Latino are also included in the other racial or ethnic categories.**
Note: Due to rounding, totals may not equal the sum of individual entries.

Residents in the District's service territory demonstrate a high degree of educational attainment. Close to half (48%) of residents at least 25 years of age have a bachelor's degree or above, and 71.8 percent of residents at least 25 years of age have attended at least some college. However, a sizeable portion of residents at least 25 years of age (13%) lack a high school diploma or equivalent. **Table 4-3** summarizes educational attainment.

More than half of residents at least 5 years old in the District's service territory speak a language other than English at home. The most common languages other than English are Spanish, Chinese, and Vietnamese. Many people who speak other languages speak English less than "very well," including a majority of Vietnamese and Korean speakers, and more than 40 percent of Spanish and Chinese speakers. **Table 4-4** shows the language proficiency of residents in the District's service territory.

Table 4-3: Educational Attainment of Residents 25+ Years of Age, Santa Clara County (2015)

Education Level	Population	Percentage
Less than 9th grade	89,994	7.1%
9th grade to 12th grade (no diploma)	75,235	5.9%
High school graduate or equivalent	192,414	15.2%
Some college (no degree)	212,282	16.7%
Associate's degree	90,475	7.1%
Bachelor's degree	330,869	26.1%
Graduate or professional degree	277,360	21.9%
Total	**1,268,629**	**100.0%**

Source: US Census Bureau 2015h
Note: Due to rounding, totals may not equal the sum of individual entries.

Table 4-4: Language Proficiency of Residents 5+ Years of Age, Santa Clara County (2015)

Language spoken at home	Number of Speakers	Percent speaking English less than "very well"
English	840,627	-
Spanish	325,446	41.0%
Chinese	137,761	49.2%
Vietnamese	117,650	61.5%
Tagalog	56,848	36.7%
Hindi	38,100	13.0%
Korean	22,604	50.8%
Persian	13,903	39.6%
Russian	13,774	38.4%
All other languages	179,039	26.0%
Total	**1,745,752**	**100.0%**

Source: US Census Bureau 2015i
Note: Due to rounding, totals may not equal the sum of individual entries.

ECONOMIC TRENDS

The District's service territory of Santa Clara County is home to approximately 996,800 jobs (SCVWD 2016b). Top economic sectors in the District include manufacturing (15.4%), professional/ scientific/ technical services (13.7%), and health care and social services (11.4%) (US Census Bureau 2016). The county is known as a global center of the technology industry, which is reflected in the list of major employers in the District. **Table 4-5** shows the major employers in Santa Clara County.

Table 4-5: Top Ten Santa Clara County Employers (2016)

Employer	Industry	Number of Employees	Percent of Total Employees
Google	Technology	20,000	2.0%
Apple	Technology	19,000	1.9%
County of Santa Clara	Government	16,837	1.7%
Stanford University	Education	13,500	1.4%
Kaiser Permanente	Healthcare	12,500	1.3%
Intel	Technology	10,801	1.1%
Stanford Health Care	Healthcare	10,034	1.0%
University of California Santa Cruz	Education	8,182	0.8%
Facebook	Technology	6,799	0.7%
Oracle	Technology	6,750	0.7%
Total (top 10)		124,403	12.5%
All others		872,397	87.5%
Total Employment		**996,800**	**100.0%**

Source: SCVWD 2016b
Note: Due to rounding, totals may not equal the sum of individual entries.

Most people who live within the District's service territory also work there, as approximately 69.2 percent of Santa Clara County residents are employed in the county. Among those who do commute elsewhere, approximately 17.2 percent travel to San Francisco, Alameda, or San Mateo counties. However, 10.9 percent of residents travel outside of the San Francisco Bay Area, primarily to the Los Angeles/Orange County, Sacramento, or Santa Cruz/Monterey Bay areas (US Census Bureau 2016).

Similarly, a majority of persons working in the District's service territory (60.1 persons) live in Santa Clara County. Among those who commute from other counties, the largest numbers come from Alameda, San Mateo, San Francisco, and Contra Costa counties. Commuters from

these counties make up approximately 22.6 percent of all employees in the District's service territory. A sizeable number of commuters (approximately 15.6 percent of employees) travel from outside the San Francisco Bay Area, primarily from the Sacramento, San Joaquin Valley, or Santa Cruz/Monterey Bay areas (US Census Bureau 2016).

ENERGY INFRASTRUCTURE

Energy infrastructure is the generation and delivery systems for electricity and natural gas. These systems are critical for the District's operations, such as pumping and treating water. They can help ensure public health and safety during an emergency event, as well as a rapid and effective recovery after an emergency occurs. Damages to energy infrastructure may lead to additional risks, such as the risk of electrocution from a downed power line or an explosion and fire from a ruptured gas pipe.

ELECTRICITY INFRASTRUCTURE

Most of the District's service territory receives electricity from the Pacific Gas & Electric Company (PG&E), a privately-owned utility. Since 2005, the District has received electricity for major facilities through the Power and Water Resources Pooling Authority (PWRPA), a joint powers authority using PG&E's transmission and distribution network. Two cities in the District's service territory, Santa Clara and Palo Alto, operate their own municipal electric utilities (CEC 2016a). Starting spring of 2017, Silicon Valley Clean Energy (SVCE) began operating in all parts of the District's service territory except for Palo Alto, San Jose, and Santa Clara. It will be the default electricity provider for all customers in its service area. Recently, the City of San Jose is developing a community choice aggregation similar to other bay area cities and counties.

All electricity providers in the District's service territory (PG&E, SVCE, PWRPA, and the municipal utilities) purchase electricity from power plants throughout California, the western United States, and British Columbia. Additionally, some electricity may come from within the District's service territory, as there are 28 power plants in Santa Clara County and most of these power plants are small, intended to provide supplemental electricity or backup energy to a single facility such as a factory or corporate headquarters. However, there are a few large power plants in the District's service territory, including the 605-Megawatt Metcalf Energy Center (Calpine) in southern San Jose and the 147-Megawatt Donald Von Raesfeld Power Plant in Santa Clara (USEPA 2017). Through PWRPA, the district participates in 1.15MW of utility-scale solar projects throughout California.

Regardless of the source of the electricity, it is all delivered through a network of power lines and hub facilities called substations. Most of these facilities are located in the Santa Clara Valley and along the Highway 101 corridor, although a few run through more mountainous terrain. There are 92 operational substations in the District's service territory, including 45 owned by PG&E, 23 owned by Silicon Valley Power (the City of Santa Clara's municipal utility), and 13 owned by private operators such as major industrial facilities (CEC 2016b). The interconnected nature of the electricity transmission and distribution network, particularly in the more urbanized areas of the county, decreases the odds that large sections of the District's service territory would lose electric service if a single power line or substation was disrupted. A sufficiently large event could be capable of damaging or overwhelming large number of power lines or substations, potentially causing widespread power outages. However, stationary standby generators installed at treatment plants and critical turnouts can mitigate power

outages. Also, the District owns multiple portable generators to further respond to electrical emergencies.

NATURAL GAS

PG&E supplies natural gas service to almost all of the District's service territory. The one exception is the City of Palo Alto, which operates a municipal natural gas utility and provides service to customers within the city limits. Natural gas pipelines in the District's service territory run along the Highway 101 corridor and throughout the Santa Clara Valley. There are also a large number of other natural gas installations such as compressors and meter stations in the District's service territory. These facilities help to maintain a consistent pressure in the pipelines and let the natural gas flow smoothly (CEC 2016c).

Damage to these natural gas pipelines or to the facilities that help regulate natural gas flow could cause a reduction or outage in natural gas service. There is also a risk that a rupture to a pipeline could cause a fire or explosion, as natural gas is highly flammable.

EVACUATION ROUTES

Four major freeways in the District's service territory can serve as primary evacuation routes. Highway 101 runs south from the District's service territory to Salinas and north to San Francisco, and to points beyond. It is easily accessible to evacuees from Gilroy, Morgan Hill, Mountain View, Palo Alto, San Jose, Santa Clara, and Sunnyvale. Interstate 280 runs from San Jose north to San Francisco, and is a key evacuation route for Los Altos, Los Altos Hills, the northern neighborhoods of San Jose, and Santa Clara. Interstate 680, running from San Jose north to Solano County, is an important evacuation route for Milpitas and northern San Jose. Interstate 880, which runs from San Jose north to Oakland, serves as an evacuation route for Milpitas, northern San Jose, and Santa Clara.

A handful of lower-capacity freeways can also serve as evacuation routes. For some communities, these freeways are the primary evacuation route, while for others they provide an important backup. State Route 17 runs between San Jose and Santa Cruz, and serves as an evacuation route for Campbell, Los Gatos, and Monte Sereno. State Route 85, which connects Mountain View to southern San Jose, is an evacuation route for several communities, including Campbell, Cupertino, Los Altos, Los Gatos, Saratoga, and Sunnyvale. In the unincorporated eastern part of the District's service territory, State Routes 130 and 152 are the primary evacuation routes. State Routes 9, 17, 35, and 152 are key evacuation routes for the western unincorporated areas.

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CHAPTER 5—HAZARD IDENTIFICATION, ANALYSIS, AND ASSESSMENT

This chapter provides an overview of the types of hazards that are present or may be present in the District's service territory. This includes hazard events that have occurred in the past and hazard conditions that may emerge in the future. This chapter also discusses how the members of the Planning Team identified and prioritized the hazards in this Plan.

HAZARD ANALYSIS

HAZARD IDENTIFICATION

FEMA identifies 21 different hazards that communities should evaluate when preparing a hazard mitigation plan. Some of these hazards are not included in this Plan because they do not pose a foreseeable risk to the District's service territory (volcanoes, for example). A jurisdiction may also include hazards in its Plan that are not on the FEMA list. The Planning Team discussed a comprehensive list of potential hazards at its meetings, both hazards on the FEMA list and others. **Table 5-1** lists the hazards considered by the Planning Team, and why each hazard was or was not included in this Plan.

Table 5-1: Santa Clara Valley Water District LHMP Hazard Evaluation

Hazard	Included in LHMP?	Rationale for Decision
Avalanche	No	Snowfall in the District's service territory is rare. It is extremely unlikely that enough snow could accumulate to pose a threat of an avalanche.
Climate change	Yes, as a factor of other hazards	Climate change is not a stand-alone hazard, but it may exacerbate the intensity and/or frequency of other hazards. It is therefore considered as a factor in discussing the future risks of hazard events.
Coastal erosion	No	The Bay shoreline in the District's service territory does not see substantive erosion.
Dam failure	Yes	The District's service territory lies within the risk zone for dam failure, and the District operates multiple dams.
Disease/pest management	No	Disease/pest management hazards are present within the District's service territory, but these hazards are unlikely to affect the District's infrastructure or operations.
Drought	Yes	Droughts are a recurring and potentially severe issue in the District's service territory and are highly relevant to the District's operations.

Hazard	Included in LHMP?	Rationale for Decision
Earthquake fault rupture	Yes	There are mapped fault lines in the District's service territory, which could damage District infrastructure or disrupt District operations.
Expansive soil	No	The Planning Team did not consider expansive soils to be a notable threat to the District's infrastructure or operations.
Extreme heat	No	Extreme heat events may occur in the District's service territory, but they are unlikely to affect District infrastructure or operations.
Flood	Yes	Floods are a recurring hazard event in the District's service territory, and may affect District infrastructure or operations.
Geologic hazard	No	Specific geologic hazards are addressed as separate items.
Hailstorm	No	Hail events severe enough to cause damage are extremely rare in the District's service territory, and so are not deemed an important threat.
Hazardous materials	No	The Planning Team did not consider hazardous materials an important threat to the District's infrastructure or operations.
Human-caused hazards	No	The Planning Team did not consider human-caused hazards an important threat to the District's infrastructure or operations.
Hurricane	No	Hurricanes do not occur in the District's service territory.
Land subsidence	Yes	Substantial land subsidence has occurred in the District's service territory, and it is a highly relevant hazard to the District's history and services.
Landslide and mudflow	Yes	Landslide and mudflow events have occurred in the District's service territory, and may affect the District's infrastructure and operations.
Liquefaction	Yes	Parts of the District's service territory are within areas of elevated liquefaction risk.
Sea level rise	Yes	Parts of the District's service territory fall inside of sea level rise hazard zones.
Seismic hazard	Yes	Seismic hazard events have occurred in the District's service territory, and such events may substantially affect the District's infrastructure and operations.

Hazard	Included in LHMP?	Rationale for Decision
Severe wind	Yes	Severe wind events have previously occurred in the District's service territory.
Severe winter weather	Yes (indirectly)	This hazard normally refers to blizzards, ice storms, and similar conditions. In the District's service territory, severe winter weather generally involves intense precipitation and high winds. These hazards are included in the flood and severe wind categories.
Tornado	No	The Planning Team did not consider tornadoes to be a hazard of sufficient concern.
Tsunami	No	The District does not include any areas considered to be at risk of a tsunami event.
Volcano	No	There are no volcanoes in the District's service territory or near enough to pose a sufficient risk.
Wildfire	Yes	The District includes areas that face elevated wildfire risks.

To reduce redundant discussions and streamline the hazard profiles, the Planning Team consolidated some hazards, as follows:

- Combine earthquake fault rupture, liquefaction, ground shaking and seiche into a single "seismic activity" category.
- Combine landslides/mudflows and expansive soils into a single "geologic hazards" category.

The following hazards are discussed in this LHMP:

- Dam failure
- Drought
- Floods
- Geologic hazards
- Land subsidence
- Sea level rise
- Seismic activity
- Severe winds
- Wildfire

HAZARD PRIORITIZATION

After determining which hazards to include in the LHMP, the Planning Team ranked each hazard using a process recommended by FEMA. Under this system, there are four individual criteria for each hazard, and each criteria is assigned a ranking of 1 to 4 (one being the lowest priority, 4 being the highest). The four criteria are:

- Probability: The likelihood that the hazard will occur in the District's service area in the future.
- Location: The size of the affected area from any occurrence of the hazard.
- Maximum probable extent (primary impact): The severity of direct damage (e.g., physical destruction or injuries) from the hazard.
- Secondary impacts: The severity of indirect damage (e.g., economic harm) from the hazard.

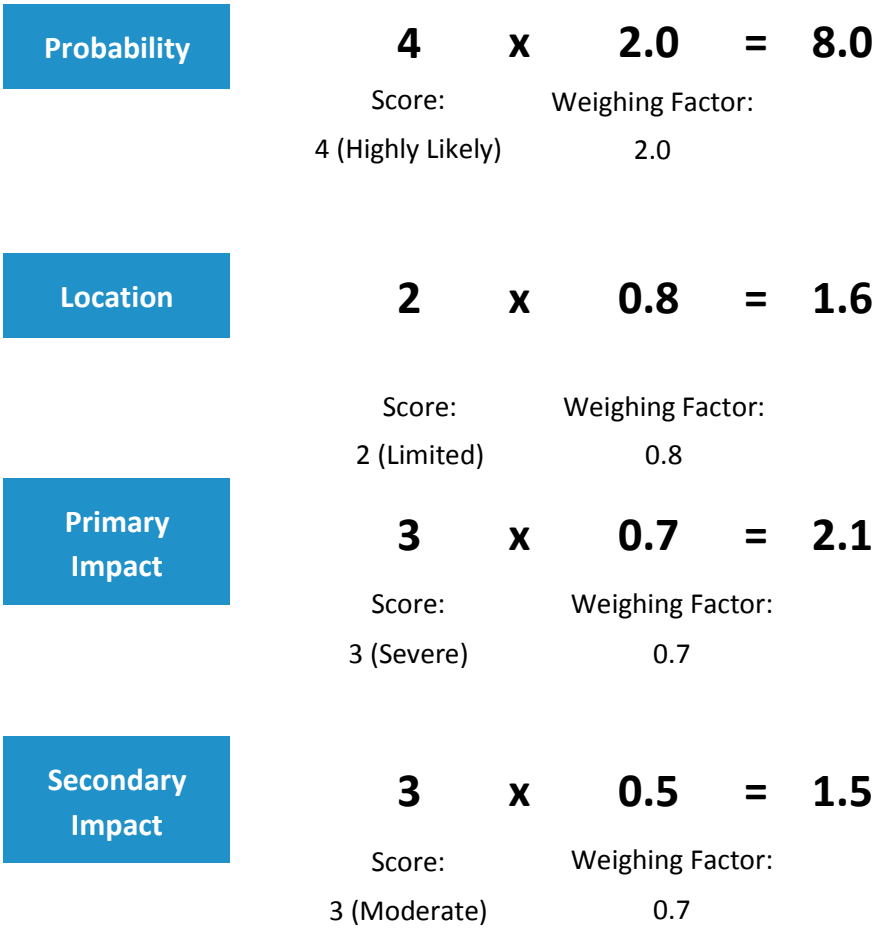
Using the approach recommended by FEMA, the Planning Team assigned a weighing value to each of the four criteria, giving a higher weight to the criteria deemed more important. The Planning Team then took the value of the four criteria and multiplied them by their weighing values to determine the score of each criteria for each hazard. **Table 5-2** shows the scoring rubric used by the Planning Team.

Table 5-2: Hazard Ranking Scores and Weighing Factors

Probability		**Maximum Probable Extent (Primary Impact)**	
Based on estimated likelihood of occurrence from historical data	*Weighing Factor: 2.0*	*Based on percentage of damage to typical facility in community*	*Weighing Factor: 0.7*
Probability	**Score**	**Impact**	**Score**
Unlikely (less than a 1 percent chance in a given year)	1	Weak—little to no damage	1
Occasional (a 1 to 10 percent chance in a given year)	2	Moderate—some damage, loss of service for days	2
Likely (a 10 to 90 percent chance in a given year)	3	Severe—devastating damage, loss of service for months	3
Highly likely (more than a 90 percent chance in a given year)	4	Extreme—catastrophic damage, uninhabitable conditions	4
Location		**Secondary Impacts**	
Based on size of geographical area of community affected by hazard	*Weighing Factor: 0.8*	*Based on estimated secondary impacts to community at large*	*Weighing Factor: 0.5*
Affected Area	**Score**	**Impact**	**Score**
Negligible (affects less than 10 percent of the planning area)	1	Negligible—no loss of function, downtime, and/or evacuations	1
Limited (affects 10 to 25 percent of the planning area)	2	Limited—minimal loss of function, downtime, and/or evacuations	2
Significant (affects 25 to 75 percent of the planning area)	3	Moderate—some loss of function, downtime, and/or evacuations	3
Extensive (affects more than 75 percent of the planning area)	4	High—major loss of function, downtime, and/or evacuations	4

The Planning Team, in accordance with FEMA guidance, summed the scores for each hazard's location, primary impact, and secondary impact to determine the total impact score. The team then multiplied this sum by the score for each hazard's probability to determine the total score. **Figure 5-1** illustrates this process for sea level rise.

Figure 5-1: Sample Scoring Process (Sea Level Rise)



1.6 + 2.1 + 1.5 = 5.2

Location + primary impact + secondary impact = impact score

5.2 x 8.0 = 41.6

Impact score x probability = total score

Hazards with a total score of 12.0 or lower are considered low-threat hazards, those that score 12.1 to 42.0 are considered medium-threat hazards, and those scoring 42.1 or higher are considered high-threat hazards. **Table 5-3** shows the criteria scores, total scores, and threat levels for each hazard.

Table 5-3: Scores and Threat Levels by Hazard

Hazard	Probability	Location	Impact		Total Score	Threat Level
			Primary Impact	Secondary Impact		
Dam failure	3 (Likely)	4 (Extensive)	4 (Extreme)	4 (High)	48.0	High
Drought	4 (Highly likely)	4 (Extensive)	4 (Extreme)	4 (High)	64.0	High
Floods	4 (Highly likely)	4 (Extensive)	4 (Extreme)	4 (High)	64.0	High
Geologic hazards	4 (Highly likely)	2 (Limited)	3 (Severe)	3 (Moderate)	41.6	Medium
Land subsidence	2 (Occasional)	2 (Limited)	4 (Extreme)	4 (High)	25.6	Medium
Sea level rise	4 (Highly likely)	2 (Limited)	3 (Severe)	3 (Moderate)	41.6	Medium
Seismic activity	4 (Highly likely)	4 (Extensive)	4 (Extreme)	4 (High)	64.0	High
Severe winds	3 (Likely)	4 (Extensive)	2 (Moderate)	2 (Limited)	33.6	Medium
Wildfire	2 (Occasional)	3 (Significant)	3 (Severe)	3 (Moderate)	48.0	High

SUMMARY OF PAST DISASTERS

The most frequent type of disaster in the District's service area is flooding. Several major flood events have occurred in Santa Clara County, including in 1964, 1967, 1978, 1980, 1982, 1983, 1986, 1995, 1997, 1998, 2000, 2012 and 2017. These floods have affected different parts of the District's service territory, although Morgan Hill, Gilroy, and the communities in the eastern parts of the Santa Clara Valley are generally subject to greater impacts. Flood events have caused creek bank failures and overtopping, storm drain backups, and fallen trees, with damages exceeding $70 million in 2017 dollars for some individual events (County of Santa Clara 2011).

Fires occur occasionally in the District's service area, such as the 2002 Croy Fire, which burned over 3,000 acres in the mountains west of Morgan Hill and destroyed 31 homes (CalFire 2002), and the 2008 Summit Fire, which forced the evacuation of 1,200 people and destroyed 42 homes along the border of Santa Clara and Santa Cruz Counties (CalFire 2008a) and the 2016 Loma Fire which burned 4,474 acres of the mountains west of Morgan Hill and destroyed 12 residences and 16 outbuildings. Other past events have included the 1989 Loma Prieta

earthquake, the 1984 Morgan Hill earthquake, and various agricultural emergencies such as freezes and insect pests (Cal OES 2013).

HAZARD PROFILES

DAM FAILURE

HAZARD DESCRIPTION

Dam failure occurs when a dam is damaged severely enough that it partially or completely loses its ability to hold back water. In these events, some or all of the water impounded by the dam is suddenly released, causing a very fast-moving flood downstream of the dam. These floodwaters can damage or destroy property, cause injury or loss of life, and displace large numbers of people in the flood's path. Dam failure can also damage regional infrastructure such as transportation and energy networks. If the failed dam is part of a water supply network, there may also be local and regional disruptions to water service if an alternative source of water is not available.

There are multiple scenarios that may result in dam failure. Earthquakes or landslides may damage the dam structure or its foundations, intense rainfall can erode away the dam or the surrounding rock, or the dam itself may be poorly sited, designed, or maintained. These factors may work in concert; a design flaw in the spillways of Glen Canyon Dam on the Colorado River nearly caused the dam to fail during heavy flooding in 1983. Due to prior floods and high flows, the North Fork Pacheco Creek Reservoir, in San Benito County, was further damaged by heavy rain events during the 2016-2017 winter.

LOCATION AND EXTENT

There are 42 dams in the District's service territory according to state records: 12 owned by the District, 16 owned by other public agencies (e.g., the San Jose Water Company or the City of Palo Alto), and 14 owned by private organizations. **Table 5-4** lists these facilities.

Table 5-4: Dams in Santa Clara County

Dam Name	Owner	Year Built	Capacity (acre-feet)	Dam Height (feet)
Almaden	Santa Clara Valley Water District	1935	1,586	105
Almaden Valley	San Jose Water Company	1965	27	38
Austrian	San Jose Water Company	1950	6,200	185
Calero	Santa Clara Valley Water District	1935	9,934	98
Cherry Flat	City of San Jose	1936	500	60
Coit	California Department of Parks and Recreation	1956	275	54
Columbine	San Jose Water Company	1963	60	24
Coyote	Santa Clara Valley Water District	1936	23,244	120
Coyote Percolation	Santa Clara Valley Water District	1934	259	8
DeBell	Private	1952	8	53
Ed R. Levin	Santa Clara County	1968	150	38
Elmer J. Chesbro	Santa Clara Valley Water District	1955	7,945	95
Felt Lake	Private	1930	900	67
Fisher Creek	Private	2008	1,573	14
Foothill Park	City of Palo Alto	1988	67	86
Grant Company 2	Santa Clara County	1927	400	27
Guadalupe	Santa Clara Valley Water District	1935	3,415	129
Higuera	Private	1953	65	44
Isabel Lake 1	Private	1948	435	23
Isabel Lake 2	Private	Unknown	95	18
James J. Lenihan	Santa Clara Valley Water District	1952	19,044	195
Kelly Cabin Can	California Department of Parks and Recreation	1955	70	32
Khun	Private	1947	85	67
Lagunita	Private	1900	280	16
Lake Ranch	San Jose Water Company	1877	215	38
Laurel Springs Club	Private	1968	250	28
Leroy Anderson	Santa Clara Valley Water District	1950	90,373	240
Lower Howell	San Jose Water Company	1877	153	39

Dam Name	Owner	Year Built	Capacity (acre-feet)	Dam Height (feet)
Murray	California Department of Parks and Recreation	1957	715	54
North Fork	Pacheco Pass Water District	1939	6,150	100
Peabody	Private	1950	76	63
R. Simoni Irrigation	Private	1961	152	44
Rinconada Reservoir	Santa Clara Valley Water District	1967	46	40
San Filipe Ranch	Private	1959	64	49
Selvage 2	Private	1948	24	42
Stevens Creek	Santa Clara Valley Water District	1935	3,138	120
Upper Howell	San Jose Water Company	1878	243	36
Upper Settling Basin	Private	Unknown	Unknown	Unknown
Uvas	Santa Clara Valley Water District	1957	9,835	118
Vasona Percolating	Santa Clara Valley Water District	1935	495	30
Vilas	Santa Clara Valley Open Space Authority	Unknown	39	39
Williams	San Jose Water Company	1895	160	69

Source: DWR 2016a, 2016b

Most of the dams in the District's service territory are located in the mountainous areas east and west of the Highway 101 corridor, and along the southern and eastern border of the Santa Clara Valley. There are three dams in the District's service territory with a capacity of at least 10,000 acre-feet (approximately 3.2 billion gallons), all of which are owned by the District:

- Coyote Dam is located on Coyote Creek, approximately 5 miles east of downtown Morgan Hill.
- James J. Lenihan Dam is located on Los Gatos Creek, approximately 2 miles south of downtown Los Gatos.
- Leroy Anderson Dam is located on Los Gatos Creek downstream of Coyote Dam, approximately 3 miles northeast of downtown Morgan Hill.

Overall, the dam hazard area in the District's service territory covers much of the Highway 101 corridor, as well as large sections of San Jose and neighboring cities near Los Gatos Creek, the Guadalupe River, San Thomas Aquinas Creek, and Coyote Creek. Southwest Sunnyvale, northern Palo Alto, and various canyon areas are also within the dam inundation hazard area. **Figure 5-2** shows the dam failure area in the District's service territory. Note that there are other dams near but not within the District's service territory whose failure could inundate part of the District's service territory, including Searsville Dam in San Mateo County. In addition, failure of

many water supply dams in the state could impact water supply and service deliveries within the District's service territory.

HAZARD HISTORY

As dams perform critical services and are engineered to hold back massive quantities of water, dam failure events are quite rare. There have been no dam failure events in the District's service territory (County of Santa Clara 2011), although the state has seen two historic dam failures in the Los Angeles region: the 1928 failure of the St. Francis Dam and the 1963 collapse of the Baldwin Hills Dam.

Additionally, heavy rainfall events in 1916 caused multiple dam failure events in San Diego County that killed 30 people (Association of State Dam Safety Officials 2008). More recently, in February 2017, heavy rain from winter storms caused damage to the main spillway of Oroville Dam approximately 70 miles north of Sacramento. Approximately 200,000 people were evacuated as a precaution (Sabalow and Kasler 2017).

RISK OF FUTURE HAZARDS

The risk of a dam failure event in the District's service territory is likely to persist, although such events are expected to remain rare. While the failure of any dam could cause significant inundation to downstream areas, the potential threat is greater from dams holding back larger amounts of water. The major dams in the District's service territory are used for water storage, meaning that they are usually partially or completely full, and so there is a greater risk that a failure would result in a substantial flood. According to ABAG, the greatest risk to dams in the San Francisco Bay Area, in terms of contributing to or initiating dam failure, is from an earthquake (2015b).

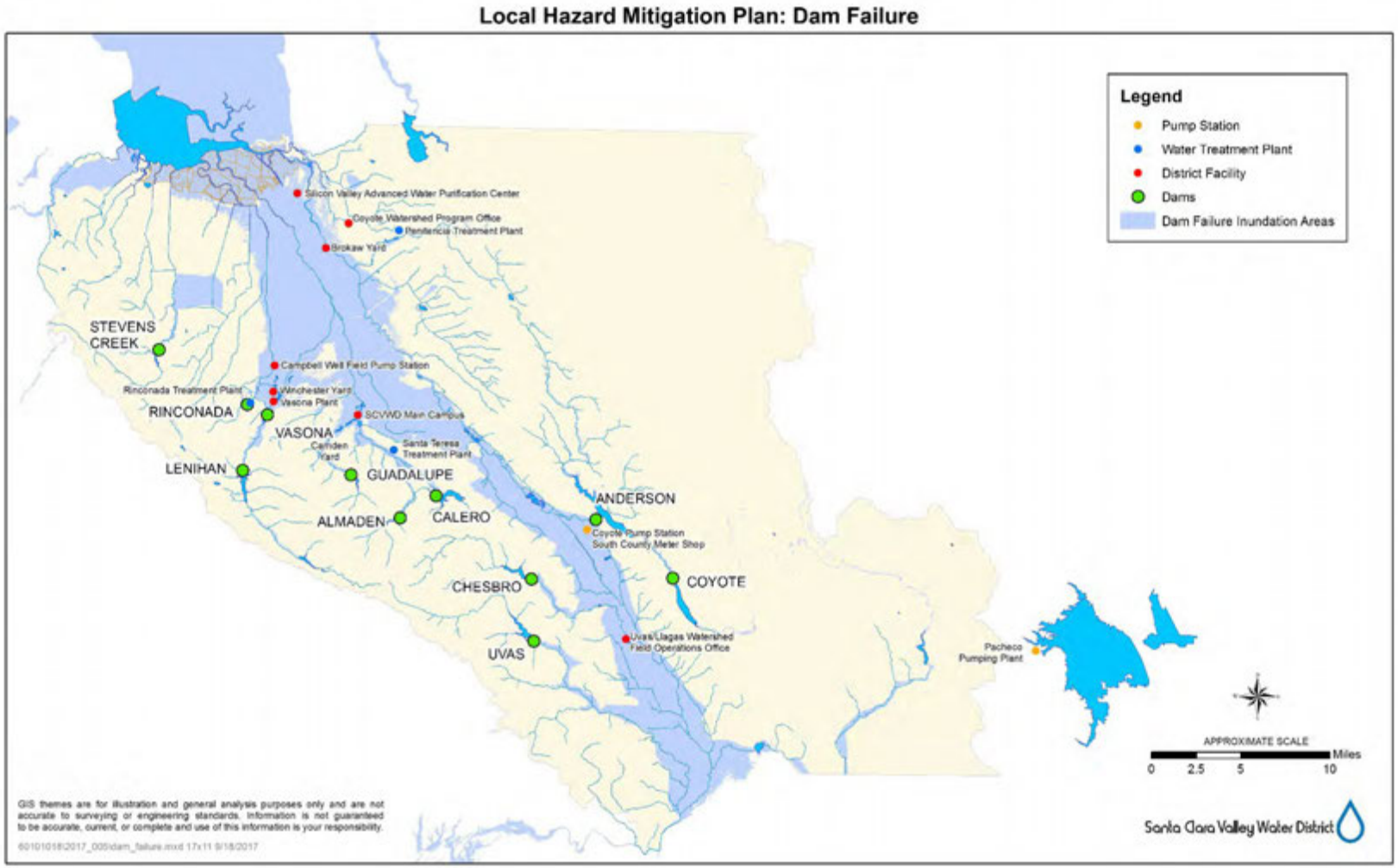
Of particular concern is the failure of a dam located upstream of one or more dams. If the downstream dam or dams are unable to effectively hold back the flood from the initial failure, there could be a cascading effect that results in multiple failures and creates a flood substantially larger than would result from a single failure event. It should be noted that the threat from a dam failure event does not necessarily diminish with distance. Depending on the topography of the area downstream of a dam failure event, the floodwaters could remain constrained in a narrow canyon area, preventing them from slowing down before they reach urbanized flatter terrain. Furthermore, while floodwaters will slow down and absorb into the ground in flat areas, the water will also pick up sediment and debris as it travels. Therefore, although communities farther from the dam failure event will likely face a smaller volume of slower-moving water, the sediment and debris in the water may pose additional risks.

In recent years, the District has taken action to reduce the risk of dam failure, including conducting seismic evaluations of Anderson, Almaden, Calero, Guadalupe, Lenihan, Stevens Creek, Coyote, Chesbro, and Uvas Dams, upgrading dam monitoring equipment, and improving dam inspection protocols (SCVWD 2014a). Seismic retrofit and improvement projects are currently underway at Anderson, Almaden, Calero, and Guadalupe. The District has also identified a number of high-priority seismic retrofits and other improvements to its raw water and diversion dams, most of which are fully funded in the District's current Capital Improvements Plan (SCVWD 2015h).

CLIMATE CHANGE CONSIDERATIONS

The primary threat to dam structural integrity in the District is from earthquakes, which are not linked to climate change. There is a possibility that climate change may affect liquefaction hazards in the District, which may in turn have an effect on the risk of dam failure (see the Seismic Activity section for additional discussion), but evidence on this subject remains limited and further study is likely needed. As discussed in the Floods section, climate change may cause an increase in the number of intense rainfall events. The increase in water inflow, combined with a higher risk of erosion or landslides from storm activity, may affect the risk of dam failure. At this time, the District does not expect any failure to raw water or diversion dams from flood events or any other climate change-related hazards (SCVWD 2015i), although the District will continue to evaluate this risk as climate change occurs and will make adjustments to its risk assessments in future plans as warranted. There is some vulnerability to raw water canals & ditches, since flooding impacts can be sudden and result in immediate failure, however most flooding incidents may have hours of notice prior to occurring (SCVWD 2015i).

Figure 5-2: Dam Failure Hazard Zones



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DROUGHT

HAZARD DESCRIPTION

Droughts are long-term water shortages, often the result of extended periods with little or no precipitation. Droughts can cause declines in available water supplies, which may lead to increases in water rates or restrictions to water use. In extreme cases, some communities may not have enough water to meet demand or may have to seek alternative water supplies. Agricultural activities may suffer, particularly in areas that grow water-intensive crops. In urban areas, vegetation such as street trees and landscaped areas can become water stressed, increasing the risk of disease or plant death. Aquatic species may also be affected as streams, rivers and reservoirs have less water available to support biological health.

Droughts may also cause secondary impacts. Soil often hardens and becomes less permeable during drought conditions, which can lead to increased flooding when precipitation does occur because the soil cannot absorb water as easily. Droughts can also dry out wildland vegetation, which may increase fire risks. In severe water shortages over extended droughts, significant local hazards could develop such as, reduced reliability of water supplies to meet basic human health and safety needs, land subsidence (which could affect basic infrastructure such as roads and underground utilities and buildings), and the potential for saltwater intrusion if the groundwater basin cannot be managed to prevent it.

Droughts, unlike most other hazards, develop over a long period of time. It often takes multiple dry years to cause drought conditions, and drought conditions may last for years. Droughts are rarely only a local hazard and often occur across the region, and at times may extend statewide. However, the impacts of drought conditions are often more localized based on the local water supply systems, soil types, land uses, and climate conditions. Communities that rely on imported water may also be subject to drought conditions if the source of the imported water faces a drought, even if precipitation levels in the community itself are normal.

There are multiple classification systems that describe the severity of different drought conditions. The US Drought Monitor Classification Scheme, shown in **Table 5-5**, combines many of these systems into a single index.

Table 5-5: US Drought Monitor Classification Scheme

Category	Description	Possible Impacts
D0	Abnormally dry	Slower growth of crops and pastures compared to normal activities.
D1	Moderate drought	Some damage to crops and pastures. Streams, reservoirs, or wells low. Some water shortages may be developing or imminent.
D2	Severe drought	Likely crop and pasture losses. Water shortages are common, leading to restrictions.
D3	Extreme drought	Major crop and pasture losses. Widespread water shortages.
D4	Exceptional drought	Exceptional and widespread crop and pasture losses. Emergency shortages develop.

Source: US Drought Monitor 2017a

LOCATION AND EXTENT

Droughts are usually large-scale regional events. Due to the large size of the District's service territory, different areas of Santa Clara County may be under different drought conditions, although it is unlikely that one part of the service territory will be free of drought while another area is experiencing significant drought conditions. However, it does mean that some areas of the State can be affected while others are not. As noted in Chapter 2, the major sources of the District's water are local groundwater, local surface water, and water imported from the Sierra Nevada (via San Francisco Public Utility Commission Hetch Hetchy system and Delta-conveyed water from the SWP and CVP). While this means, the District is not reliant on any single source (reliance on single water supply sources can be highly vulnerable to drought conditions that may affect that source), it does mean that a drought in any location that provides water to the District may decrease water availability.

Different sectors of the District's service territory are likely to experience drought events in different ways. Generally, droughts are most harmful for industries that rely heavily on large sources of water and do not have access to alternative water supplies. Agricultural operations are typically the most vulnerable, although some manufacturing activities may be curtailed if water supplies are not sufficient.

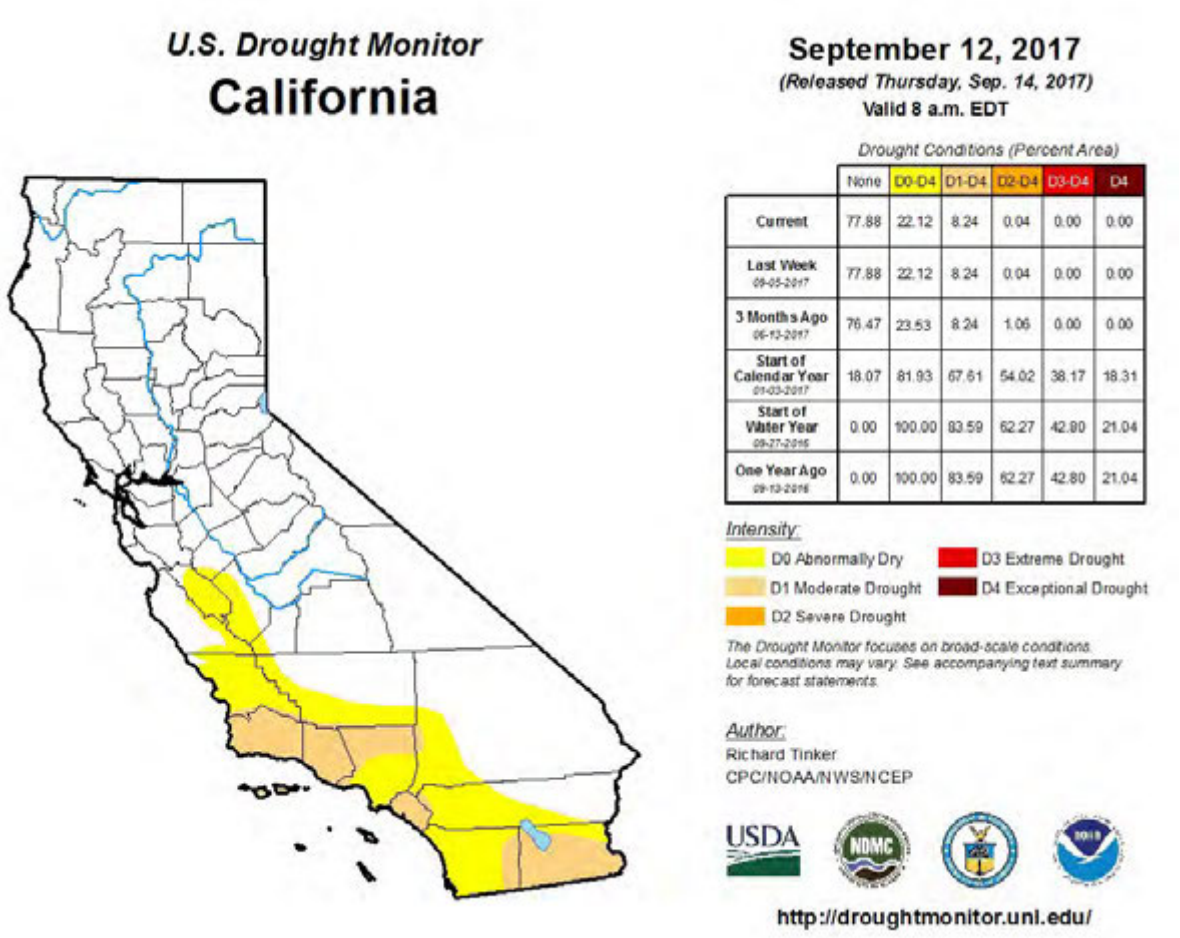
HAZARD HISTORY

Droughts are a common feature of the climate throughout most of the state, and many native plants and animals have developed survival strategies to address these water shortages. California's water supply system helps to reduce the impacts of droughts with the assistance of large storage reservoirs and networks of pipes that transport water throughout the state, including moving water from regions with available supplies to locations facing drought conditions. On occasion, California may face widespread droughts that have significant impacts for residents and businesses. Past severe droughts occurred in 1973, 1976–1977, 1987–1991, and 2007–2009 (ABAG 2015a). The 1973 drought caused significant damage in the District's service territory, mainly in agricultural losses (County of Santa Clara 2011).

California has been experiencing varying degrees of drought conditions since 2012. This is the most severe drought in California's recorded history (ABAG 2015a) and is believed to be the most severe in at least 1,200 years (Griffin and Anchukaitis 2014). Governor Brown declared a state of emergency as a result of the drought in January 2014 (Office of the Governor 2014a), and the District quickly put water shortage contingency plans into effect (SCVWD 2014b). Average to above-average levels of rainfall in the winters of 2015–2016 and 2016–2017 have helped to remove drought conditions in large sections of the state and decrease the severity of the drought in many others.

As of September 12, 2017, approximately 22 percent of California (predominantly the coastal plains and Coast Ranges of central and southern California) is facing some level of drought, and less than one-half of 1 percent of the state is facing severe drought conditions. The District's service territory is entirely out of drought conditions, as are the sources of the District's imported water, although some drought conditions are present in neighboring counties (US Drought Monitor 2017b). **Figure 5-3** shows statewide drought conditions. **Figure 5-4** shows drought conditions within the District's service territory.

Figure 5-3: California Drought Conditions – September 12, 2017



Source: US Drought Monitor 2017b

RISK OF FUTURE HAZARDS

Given that droughts are a regular feature of California's climate, all indications are that drought hazards will continue to occur in the future. In the District's service territory, drought conditions may significantly affect water supplies for both urban and rural areas. In recent years, 40 percent of the District's water has come from local groundwater and reservoirs, 55 percent has been imported from the Sierra Nevada through the State Water Project, the Central Valley Project, and San Francisco's Hetch Hetchy system, and the remaining 5 percent has come from local recycled water (SCVWD 2015g).

In general, surface water (both local and imported) is more vulnerable to drought conditions, as only a few years of below-average precipitation may cause substantive water shortages. During drought conditions, the District often relies more on local groundwater supplies and less on water from the SWP or CVP (SCVWD 2012). The District's groundwater recharge activities also help to ensure a sufficient groundwater supply. However, a lengthy drought will likely result in reduced recharge activities and reduce the availability of groundwater resources.

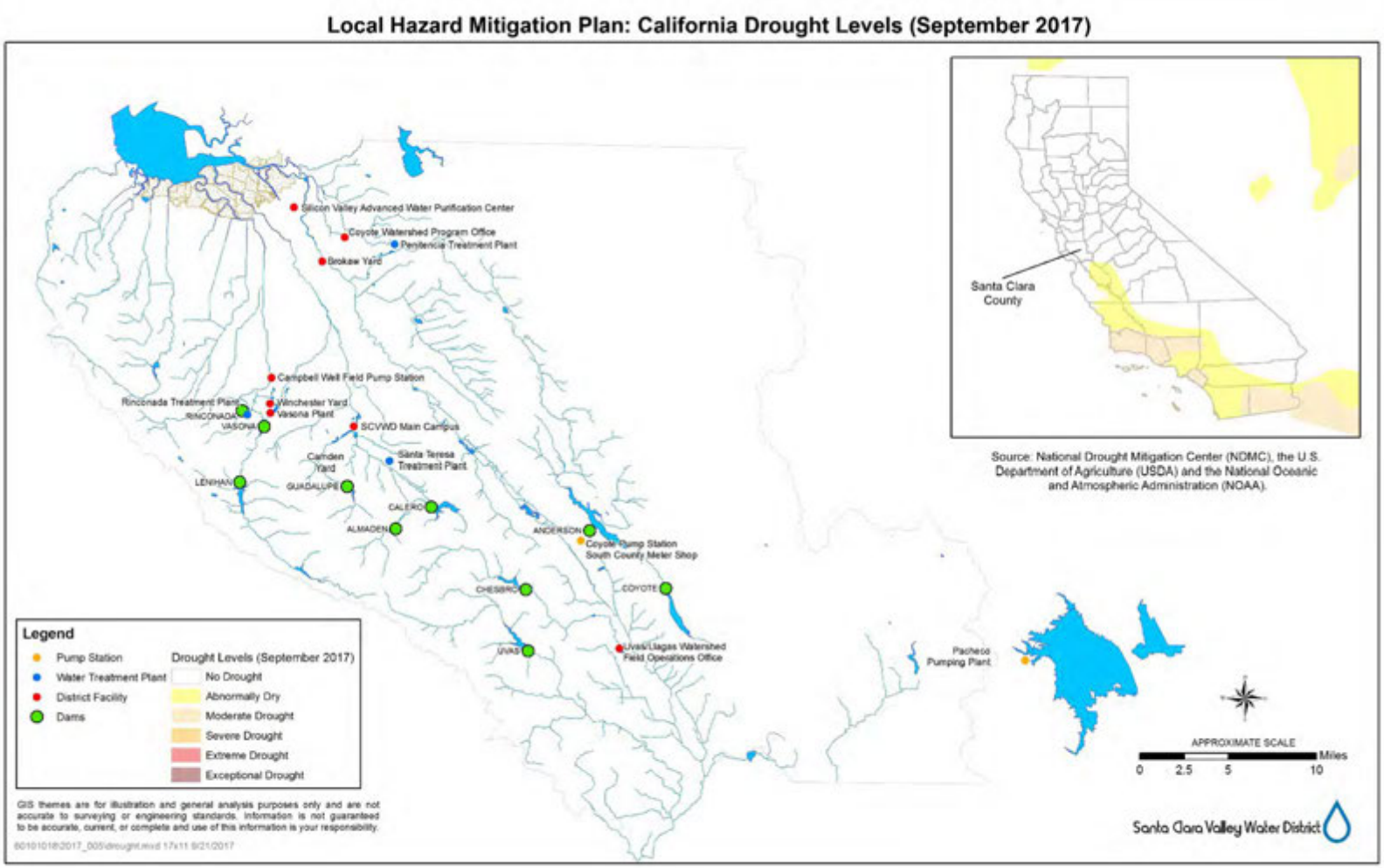
The diversity of the District's water supply and its interconnections to other state and regional water supply networks may make the District and its customers somewhat less vulnerable to drought than water service providers and customers elsewhere in the state. However, long-term drought conditions both in Santa Clara County and the Sierra Nevada pose a potential substantial risk, as a lack of precipitation in either location may reduce the amount of water available to the District. The District estimates that in times of extended drought or in critically dry years, there is a risk of water demand substantially exceeding supply (SCVWD 2012).

CLIMATE CHANGE CONSIDERATIONS

Scientific evidence suggests that precipitation levels in California, including locally in Santa Clara County and in the Sierra Nevada, will decline as a result of climate change. Santa Clara County is expected to see up to a 3- to 5-inch decline in precipitation levels. In the Sierra Nevada, declines of up to 8 to 15 inches in precipitation levels may occur (CEC 2017).

Additionally, climate change is expected to affect the accumulated snow (the snowpack) in the Sierra Nevada. In normal conditions, this snow melts slowly and provides a consistent supply of water during the summer and early autumn months before the arrival of California's rainy season. Decreases in precipitation are expected to reduce the overall volume of the snowpack, and warmer temperatures may cause it to melt faster than normal. By the end of the twenty-first century, snowpack levels in the southern Sierra Nevada may fall up by to 50 percent, and up to 60 percent in the northern Sierra Nevada (CNRA and Cal OES 2012). Recent scientific studies have found that the drought that most recently began was exacerbated by climate change, and that the overall likelihood of extreme drought is likely to increase as a result (Williams et al. 2015).

Figure 5-4: Drought Conditions



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FLOODS

HAZARD DESCRIPTION

Flooding is a temporary condition in which dry land is partially or completely inundated. There are a number of ways in which flooding can happen. The water levels in bodies such as streams, rivers, lakes, and reservoirs can exceed the water body's banks, causing water to overflow into nearby areas. Heavy precipitation can overwhelm the ability of soil to absorb water or local storm drains to carry it away, causing water to build up on the surface. Water from oceans and bays can inundate shoreline areas during exceptionally high tides or be pushed ashore by the winds of an intense storm, a condition called coastal flooding. Flooding may also occur from infrastructure failure, such as a burst water tank or pipe. Dam inundation, a specific type of infrastructure failure flood that occurs when a dam partially or completely collapses, is discussed separately under Dam Failure. Sea level rise, which may exacerbate the risk of flooding in shore areas, is also discussed in a separate entry.

Regardless of the type of flood, a flood event can damage buildings and infrastructure both by debris carried along in the water and/or by the pressure of the water itself. Floods can weaken foundations and wash away soils, increasing the risk of damage or destruction. According to California's Multi-Hazard Mitigation Plan, floods are the second most common disaster type in California, second only to fires (CNRA and Cal OES 2012).

LOCATION AND EXTENT

Floods are a fairly frequent event in California, primarily in low-lying areas adjacent to water bodies such as creeks, lakes, and bays. Floods are usually described in years, such as a 100-year or 500-year flood. A 100-year flood event (sometimes called a "base flood") is one that has a one percent chance of occurring in any given year. Similarly, a 500-year flood event has a 0.2 percent (1 in 500) chance of occurring in any given year. [1]Areas at risk from a given flood event are said to be in a floodplain (e.g., an area that may be flooded during a 100-year flood is in the 100-year floodplain).

FEMA defines areas at elevated flood risk, including areas in the 100-year and 500-year floodplains. Areas within a 100-year floodplain are said to be "special flood hazard areas." An area outside of the 100-year floodplain but inside the 500-year floodplain is a "moderate flood hazard area." An area outside of the 500-year floodplain is called a "minimum flood hazard area." Within each of these three designations there are typically multiple sub-categories, related to the height of the flood and the presence (or lack) of flood protection systems.

In the District's service territory, the 100-year floodplain areas are limited to the shores of the San Francisco Bay, near stream channels, and in the area east and southeast of Gilroy. Several other areas in the District's service territory lie within the 500-year floodplain, mostly in the urbanized areas of Santa Clara County. **Figure 5-5** shows the 100-year flood hazard map for the District's service territory.

[1]Areas within the 100-year floodplain have a 1% (1 in 100) chance of being subjected to flooding in any given year, while areas within the 500-year floodplain have a 0.2% (1 in 500) chance of being flooded in any single year. This designation does not mean that a flood will only occur once every 100 or 500 years. It is possible to have multiple 100-year or 500-year floods in a relatively short time frame.

HAZARD HISTORY

Between 1950 and 2017, there were 28 instances of flooding in the District's service territory (County of Santa Clara 2011), including 16 declared flood disasters (Cal OES 2013). Four of these flood events (in 1982, 1983, 1986, and 1995) caused at least $5 million in damage each. Most floods in the District's territory were linked to intense rainfall; some of these events were severe enough to cause levees to fail. Several storms in recent history have damaged District infrastructure, including events in the winters of 1982–1983, 1983–1984, 1985–1986, 2005–2006, 2009–2010 (ABAG 2010), and 2017.

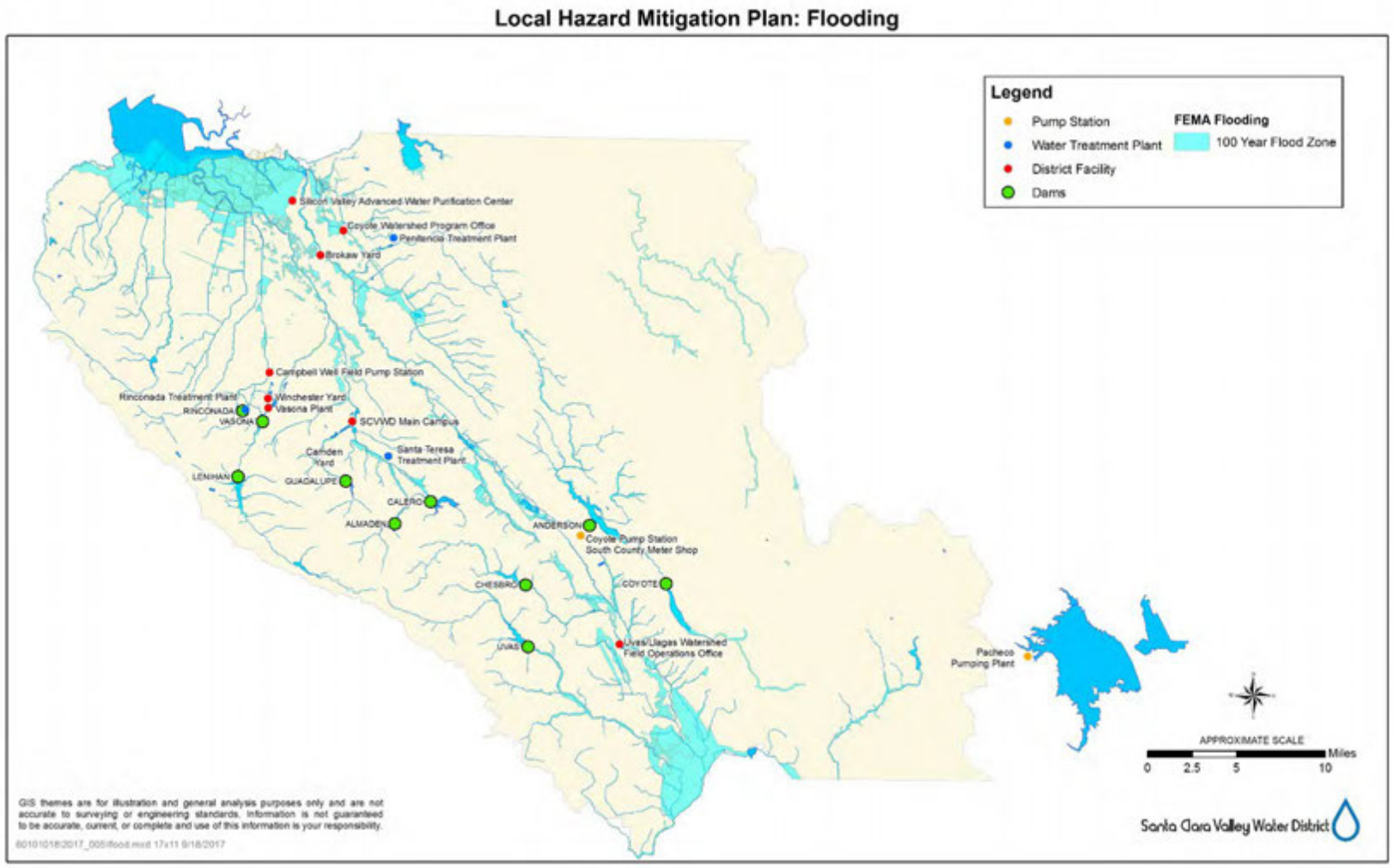
RISK OF FUTURE HAZARDS

Flood protection is a key component of the District's mission, and a number of flood protection actions and various pieces of flood protection infrastructure have helped to reduce the risk of flooding throughout the District's service territory. However, as indicated by recent flood events, the risk of flooding is still present. While additional flood protection actions may help to further reduce the frequency or intensity of future flood events, the overall flood risk is expected to persist.

Most floods in the District's service territory have been the result of severe winter storms, and this is expected to continue. The flood events of particular concern to the District are brought on by atmospheric rivers (ARs), narrow corridors of very moist air. The Pineapple Express, a phenomenon that brings warm moist air from near Hawaii to California and often causes heavy precipitation, is an example of an AR. A relatively small number of ARs cause around 30 to 50 percent of all precipitation in the western US (NOAA 2015a). The January 1997, February 1998, and October 2009 storms, which resulted in damage and significant rainfall in the District's service territory and surrounding areas, were all linked to AR events (NOAA 2015b). Significant storms may also be driven by the El Niño Southern Oscillation (ENSO, often simply called El Niño). During the warm phase of the ENSO cycle (the El Niño event itself), California often experiences an increased number of severe storms. Many winters known for high precipitation levels and flooding, including the winters of 1982 to 1983, 1994 to 1995, and 1997 to 1998, occurred during the warm phase of the ENSO cycle.[2]

[2]The ENSO cycle has three phases: the warm phase (an El Niño event), the cold phase (a La Niña event), and a neutral phase. The warm phase usually causes an increase in precipitation in California, while the cold phase often results in decreased precipitation levels.

Figure 5-5: Flood Hazard Areas



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One of the most severe yet realistically possible scenarios is the hypothetical Atmospheric River 1,000 Storm (ARkStorm), a repeat of the extreme storms that affected California in December 1861 and January 1862. During these two months, San Francisco saw close to 34 inches of rain, broken levees caused flooding of the entire Central Valley, and the state lost as much as 30 percent of its taxable real estate (Null and Hulbert 2007). If the ARkStorm occurred in the present, scientists anticipate widespread flooding in northern Santa Clara County. All of the District's water treatment plants would be temporarily inundated by 3–10 feet of water and as many as 89 percent of county residents could be without sewer service. In the District's service territory, total damage to public and private property from an ARkStorm could exceed $40 billion (USGS 2011a).

CLIMATE CHANGE CONSIDERATIONS

Although climate change is expected to decrease overall precipitation in the San Francisco Bay Area (CNRA and Cal OES 2012), there is some evidence that climate change may also result in more frequent intense storms. While the intensity of a typical AR storm is not expected to significantly change, some studies suggest that the average year will have more AR events as a result of climate change (Dettinger 2012). By 2100, Northern California may see twice as many AR events in an average year as it currently does (Oskin 2014). This is expected to increase the frequency of flood events, as a greater number of storms means that precipitation may accumulate faster than it can drain away or be absorbed into the ground, making flooding more likely. It is also possible, though not certain, that individual flood events may also become more severe as a result of this cumulative effect.

As noted in the Drought section, dry conditions cause soil to harden, making it less absorbent to precipitation and increasing the risk of flooding, particularly at the beginning of the rainy season. Since drought conditions are expected to increase as a result of climate change, there is also a greater risk of flooding from these drought-induced changes in soil characteristics. These impacts may already be felt; in July 2015 Lieutenant Governor Gavin Newsom, acting temporarily as governor, issued a disaster proclamation for large parts of Southern California due to flooding and related hazards as a result of severe storms. In the proclamation, Lieutenant Governor Newsom noted the drought's impact of drying out soil and increasing the risk of flash floods (Office of the Governor 2015a).

GEOLOGIC HAZARDS

Geologic hazards, for the purposes of this LHMP, refer to landslides. Hazards linked to seismic activity, such as earthquakes and liquefaction, are discussed in the Seismic Activity section of this Plan.

Subsidence is discussed in the Land Subsidence section of this Plan.

HAZARD DESCRIPTION

Landslides occur when soils and bedrock of a hillside or other slope become unstable, causing the soil to slide toward the base of the slope. This movement can damage or destroy structures built on or in the soil, as well as damage structures in its path. Landslides are often thought of as fast events, somewhat like an avalanche, but they may unfold slowly over the course of days, weeks, months, or even years depending on the conditions of the slope and the factors causing the slide. Although slow-moving landslides give ample time for evacuation, they can still be extremely damaging.

The susceptibility of a slope to a landslide is a factor of the slope's steepness and the types of materials that compose it. Generally, steeper slopes are more likely to slide than shallow ones, and slopes made up of loose or fractured material are more likely to slide than well-anchored rocks. However, any slope may be capable of sliding under the right conditions.

Landslides can be caused by many types of events, but the most common triggers for landslides are earthquakes and moisture. Earthquake-induced landslides occur when ground shaking and/or liquefaction causes the soil to become loose, or when ground shaking or fault rupture fractures the rocks in the slope. In either case, the earthquake may create enough instability in the slope to cause it to slide. In a moisture-induced landslide, soils soak up enough water from precipitation, irrigation, or another source, causing the slope to become waterlogged enough to lose its stability. In some instances, the sliding soils may be so soaked that they turn into mud, creating what is called a mudslide. Water may also erode the base of a slope, causing material higher up on the slope to slide.

LOCATION AND EXTENT

The landslide risk area in the District's service territory is predominantly the hillier, more rural areas. The slopes throughout these areas are at risk of rainfall-induced landslides. These at-risk areas include slopes along District-owned reservoirs and near several urban areas. The low-lying developed areas along the Highway 101 corridor and in most of the Santa Clara Valley are generally not at a direct risk of landslides. **Figure 5-6** shows the landslide risk zones in the District's service territory.

There is also a risk of a landslide-related phenomenon called lateral spreading. This risk is present along shallow slopes in areas that are subject to liquefaction. Lateral spreading occurs when soil has undergone liquefaction and becomes fluid enough to slide down very minor inclines, similar to a low-angle landslide. Liquefaction-prone areas of the District's service territory may be vulnerable to lateral spreading during future seismic events. There is additional discussion of liquefaction in the Seismic Activity section.

HAZARD HISTORY

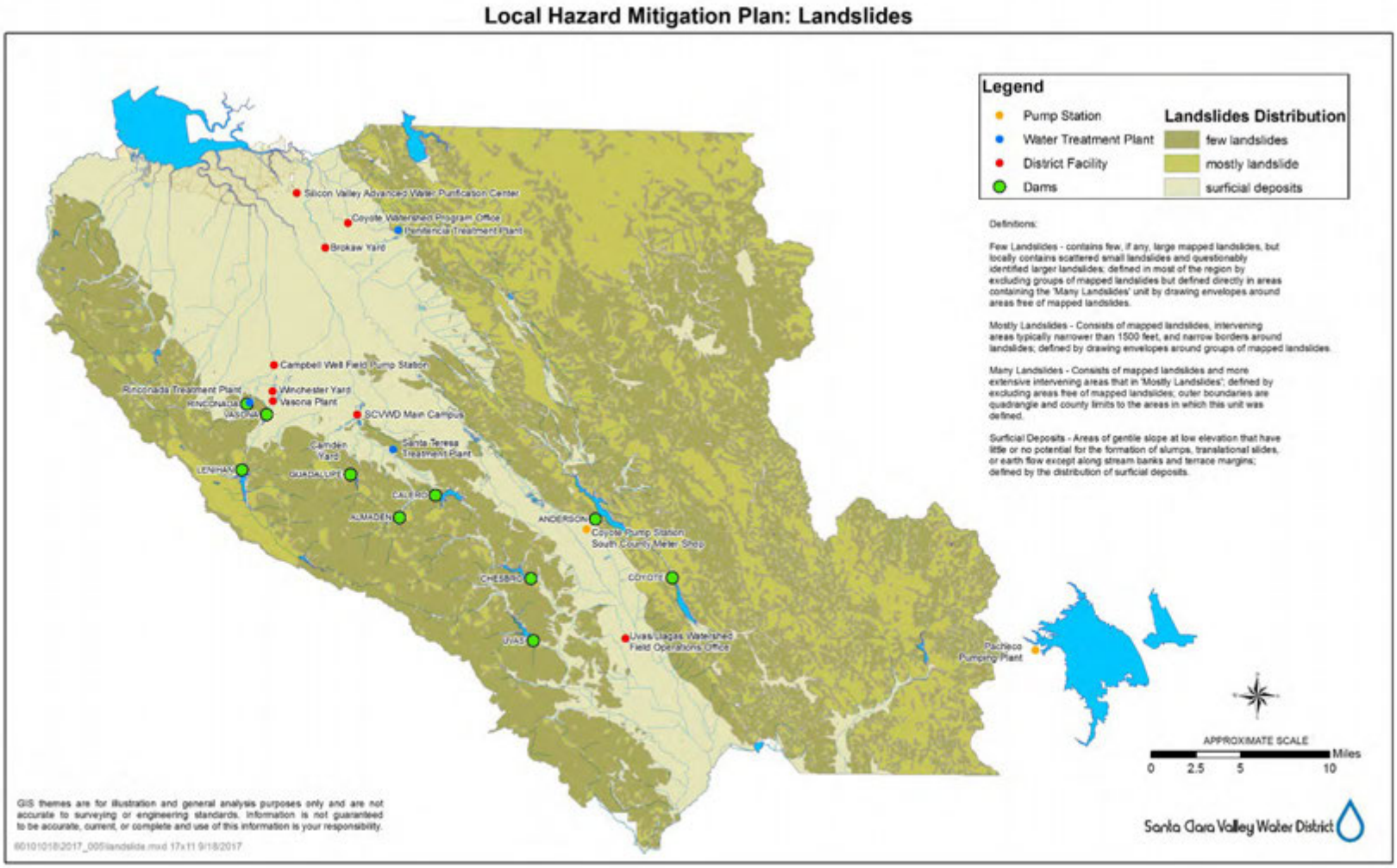
Landslides have occurred in conjunction with earthquakes and heavy rains events in Santa Clara County. There is a history of major landslides in the District's service territory, generally linked to intense rainfall. During the El Niño storms of early 1998, the USGS documented $150 million in losses due to approximately 300 landslides in the Bay Area and Santa Clara County. The slides ranged from a 25-cubic-meter failure of engineered material to reactivation of the 13 million-cubic-meter Mission Peak earth flow complex in neighboring Alameda County. Damage from the El Niño rainstorm event in 1998 was mainly attributed to reactivation of landslide locations and because of sequential severe storms that saturated steep, vulnerable soils. Heavy rain in October 2009 near Morgan Hill caused two landslides and a combined $400,000 of damage (County of Santa Clara 2011). Landslides have also occurred in the hillier parts of the District's service territory. There have been no declared disasters in Santa Clara County from landslides, although two other landslides outside of Santa Clara County, have been declared as state or federal disasters. One occurred in 2012 and the other in 1970 both were about an hour's drive away, in neighboring San Mateo and Alameda Counties (Cal OES 2013). **Table 5-6** lists known landslide events that affected Santa Clara County between 1980 and 2016.

Table 5-6: Landslide Events in Santa Clara County

Dates of Event	Event Type	FEMA Declaration	Location	Losses/Impacts
12/19/1981 to 1/08/1982	Severe storms, flood, mudslides, high tide	651	San Francisco Bay area	Prolonged heavy rains and saturated soils caused numerous slope failures and mud flows on steep and unstable slopes throughout the San Francisco Bay area.
1/21/1983 to 3/30/1983	Coastal storms, floods, slides, tornadoes	677	San Francisco Bay area	A landslide restricted Clayton Road to one lane just east of the community of Alum Rock. Another, on the east side of Milpitas, resulted in vertical and horizontal offset of a roadway.
4/24/1984	Morgan Hill Earthquake		Calaveras fault east of San Jose.	This 6.2 magnitude earthquake caused minor landslides throughout the region.
10/17/1989	Loma Prieta Earthquake	845	San Andreas fault near Loma Prieta.	Landslides and rockslides in Santa Clara County on steep slopes in the Santa Cruz Mountains blocked roads, damaged structures, and caused at least two deaths.
1/03/1995 to 2/10/1995	Severe winter storms, flooding, landslides, mud flows	1044	San Francisco Bay area	Minor landslide damage in Santa Clara County was attributed to heavy rains and saturated soils.
2/13/1995 to 4/19/1995	Severe winter storms, flooding, landslides, mud flows	1046	San Francisco Bay area	Minor landslide damage in Santa Clara County was attributed to heavy rains and saturated soils.
2/02/1998 to 4/30/1998	Severe Winter Storms and El Nino Rainstorm	1203	San Francisco Bay region	$7.6 million in Santa Clara County landslide damage occurred mostly in the northern county, along the range front of the Santa Clara Valley. $6.1 million in damage was attributed to reactivation of three local landslides. The rest was attributed to small debris flows along road cuts or narrow canyon walls. In Alum Rock, the Penitencia Creek landslide caused extensive damage to water and sewer lines and closed roads. Another landslide closed Clayton Road east of Alum Rock area. The third, near Old Piedmont Road on the east side of Milpitas, had a displacement near the toe of about 20 cm.

Sources: ABAG, 2010; USGS 1984, 1987, 1989 and 1998; NOAA, 2017

Landslide Hazard Zones



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RISK OF FUTURE HAZARDS

There are over 75,000 active and dormant landslides mapped in the Bay Area, Earthquakes and heavy storms are likely to trigger landslides on an annual basis. Landslide risk can be elevated on slopes that have experienced previous landslides, as such slopes have already shown the characteristics necessary for a landslide and so may be susceptible to future events. Large areas of eastern Santa Clara County have experienced substantial landslides, with a smaller but still elevated number of historical landslides in the soils of the District's western service territory.

Historical landslides have been least prevalent on slopes bordering the eastern and western Highway 101 corridor and in the developed communities in northern Santa Clara County. Landslides will continue to occur in the vulnerable areas of the District's service territory. There is no expectation that the area at risk of landslide events will substantially expand, although some locations outside of the vulnerable areas may experience lateral spreading during a liquefaction event.

CLIMATE CHANGE CONSIDERATIONS

There is no known link between climate change and seismic activity, as discussed in greater detail in the Seismic Activity section. Therefore, climate change is not expected to have an effect on earthquake- induced landslides, although there may be a relationship between climate change and liquefaction risk, which could affect landslides on liquefaction-prone soils. Climate change is expected to increase the number of intense rainstorms, as discussed in the Floods section, which may increase the risk of moisture-induced landslides.

LAND SUBSIDENCE

HAZARD DESCRIPTION

Subsidence is the sinking of the surface of the ground as a result of underground soils collapsing or compacting. It can be caused by a number of factors, including mining, fossil fuel extraction, earthquakes, and cave collapses. The most common cause of subsidence in California occurs as a result of excessive groundwater extraction, which is to blame for historical subsidence in the District's service territory and active subsidence in other parts of California. In some soils, the water itself helps to support the soil particles. Long-term over-pumping can dewater and compact clays and silts, causing the surface of the ground above to sink. In some parts of California, land subsided over 28 feet in 50 years due to groundwater extraction (California Water Foundation 2014), and other places in the state experienced subsidence rates of nearly 2 inches per month, or close to 2 feet per year (NASA 2015).

Subsidence poses a risk to structures built on or in the subsiding soil. This process of compaction can cause building walls, floors, and foundations to crack, jeopardizing the building's structural integrity. It can also break underground pipes and cause cracks to appear in roads and railways. Since it changes the elevation of the land surface, subsidence can cause problems with underground infrastructure that relies on gravity flow. Subsidence is often a slow process, although in some places it can occur quickly if soil rapidly collapses into an empty space. Sinkholes are a localized and often dramatic form of subsidence.

LOCATION AND EXTENT

Subsidence is primarily a problem in the northern Santa Clara Valley, as the mountain areas and the Highway 101 corridor have seen little to no subsidence. Soils in parts of Mountain View, San Jose, Santa Clara, and Sunnyvale are particularly vulnerable to subsidence, although virtually all of the northern valley faces some risk. **Figure 5-7** shows the land subsidence in the District's service territory.

HAZARD HISTORY

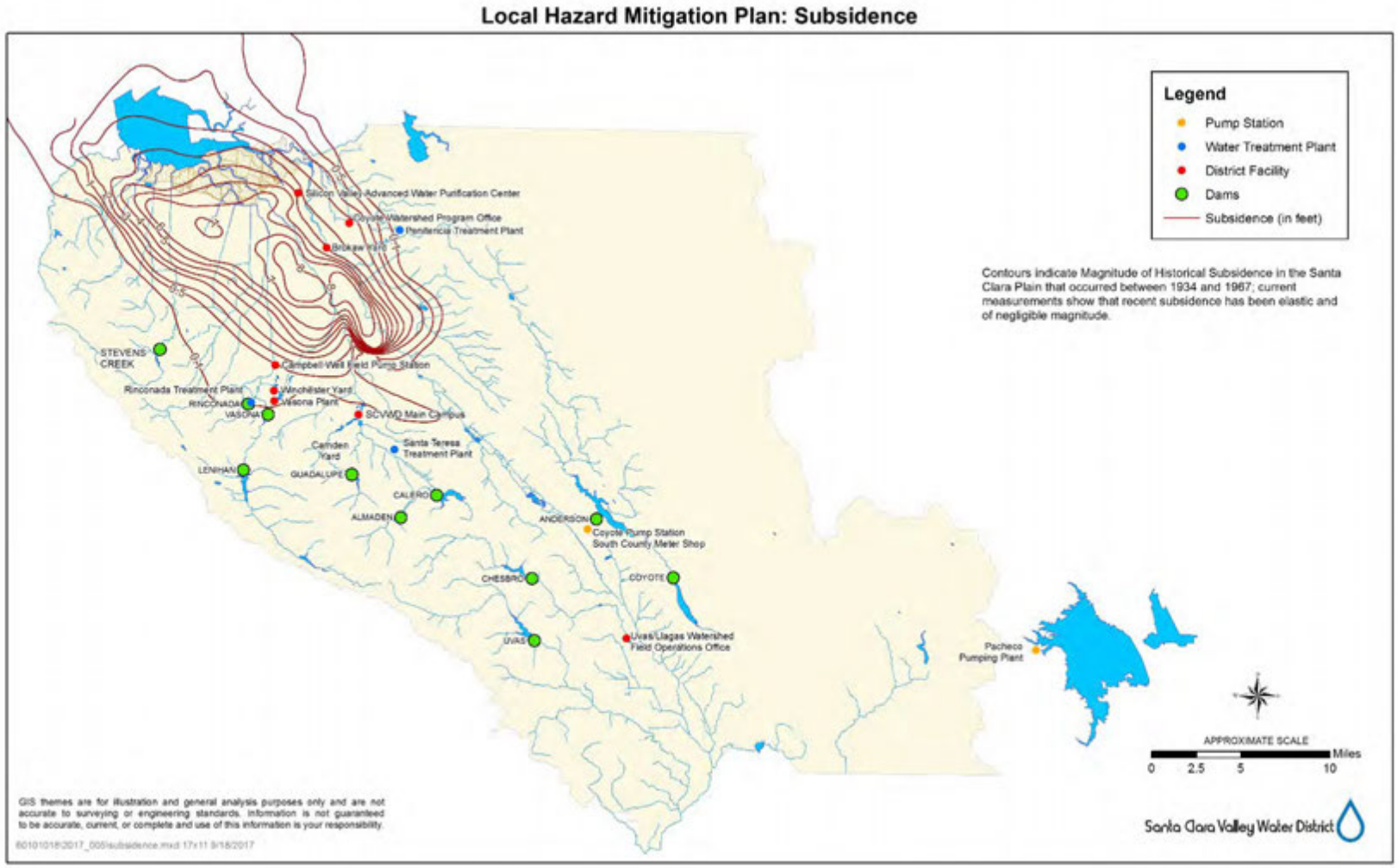
Subsidence has been a recurring issue in the Santa Clara Valley region of the District's service territory due to extensive groundwater pumping. Beginning early in the 1900s, and continuing through about 1970, over-pumping caused land near the Alviso Marina to subside by at least 6 feet (SCVWD 2015j), and parts of downtown San Jose subsided by over 13 feet. Nearly 100 square miles of the region has subsided by at least 1 foot during this period (California Water Foundation 2014).

Partly in response to subsidence in the region, voters formed the Santa Clara Valley Water Conservation District in 1929 (SCVWD 2015j), which quickly took measures to recharge groundwater supplies by capturing water from storms, helping to keep groundwater levels stable and controlling subsidence. These strategies worked temporarily, although subsidence resumed after 1950. Beginning in 1965, the District significantly expanded its groundwater recharge program, causing groundwater levels to substantially recover. Subsidence in the District's service territory has been largely halted since 1969 (USGS 2005b).

RISK OF FUTURE HAZARDS

Due to an extensive groundwater recharge program and more sustainable groundwater management, permanent subsidence has generally stopped in the District's service territory. However, the District does conduct extensive monitoring to check that its programs remain effective (California Water Foundation 2014). The soil conditions and hydrology of the Santa Clara Valley remain susceptible to subsidence, and the risk of subsidence may return if the District's programs are scaled back or if conditions change enough to render them ineffective.

Figure 5-7: Land Subsidence Hazard Zones



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CLIMATE CHANGE CONSIDERATIONS

Climate change may cause a decline in groundwater levels, which could cause subsidence to resume. Decreased precipitation in the District's service territory will likely result in less available surface water, which may make less water available for groundwater recharge activities. This decrease in local precipitation, combined with less precipitation and warmer temperatures in the Sierra Nevada, is also expected to cause an increase in drought conditions. Less available surface and imported water may result in an increased demand for groundwater. This could cause an increase in groundwater pumping, potentially leading to subsidence, if groundwater management activities do not maintain groundwater use at sustainable levels.

SEA LEVEL RISE

HAZARD DESCRIPTION

Sea level rise is caused primarily by ice on the surface of the earth melting due to warmer temperatures. This meltwater runs into the oceans and causes them to rise. Some sea level rise is also the result of a process called thermal expansion; like most substances, water expands as its temperature increases, causing an increase in sea level rise.[3] All discussions of sea level rise in this Plan refer to global warming- induced sea level rise, although sea level rise can also occur naturally. Sea level rise is a slow process, but nevertheless capable of having significant impacts. Some low-level areas near the shoreline may eventually be permanently inundated as a result. Even areas that are not permanently inundated may be temporarily flooded during intense rainfall or high tides.

LOCATION AND EXTENT

In the District's service territory, sea level rise poses a risk to areas along the shores of the San Francisco Bay. This includes northern sections of Mountain View, Palo Alto, San Jose, Santa Clara, and Sunnyvale. The specific locations at risk depend on the amount of sea level rise expected in the future. The level of the San Francisco Bay is expected to increase 16 inches by 2050 and up to 55 inches by 2100 (SPUR 2009), although increases in melting land ice may cause higher levels of sea level rise. **Figure 5-8** shows the areas in the District's service territory at risk from sea level rise at different height increases few decades than other coastal areas in the globe, scientists believe this is due to a cycle in the Pacific Ocean that is expected to reverse itself in the coming years, causing sea level rise in the Pacific to increase faster than the global average (Ghose 2015). Sea level rise has not yet had any substantial impact in the District's service territory or in California generally, although low-lying Pacific islands are already shrinking and facing further inundation as ocean levels continue to increase.

HAZARD HISTORY

The closest sea level gauge to the District's service territory, located in Redwood City, has measured an increase in sea level of approximately 1.78 millimeters per year, comparable to an increase of 0.58 feet (approximately 7 inches) over the past 100 years (NOAA 2013). While California and other Pacific coast states have seen a lower level of sea level rise over the past few decades than other coastal areas in the globe, scientists believe this is due to a cycle in the

[3] Historically, thermal expansion has been a smaller contributor to sea level rise than melting land ice, being responsible for about 34% of the observed sea level rise between 1993 and 2010, although it may be a larger factor in future sea level rise (IPCC 2013).

Pacific Ocean that is expected to reverse itself in the coming years, causing sea level rise in the Pacific to increase faster than the global average (Ghose 2015). Sea level rise has not yet had any substantial impact in the District's service territory or in California generally, although low-lying Pacific islands are already shrinking and facing further inundation as ocean levels continue to increase.

RISK OF FUTURE HAZARDS

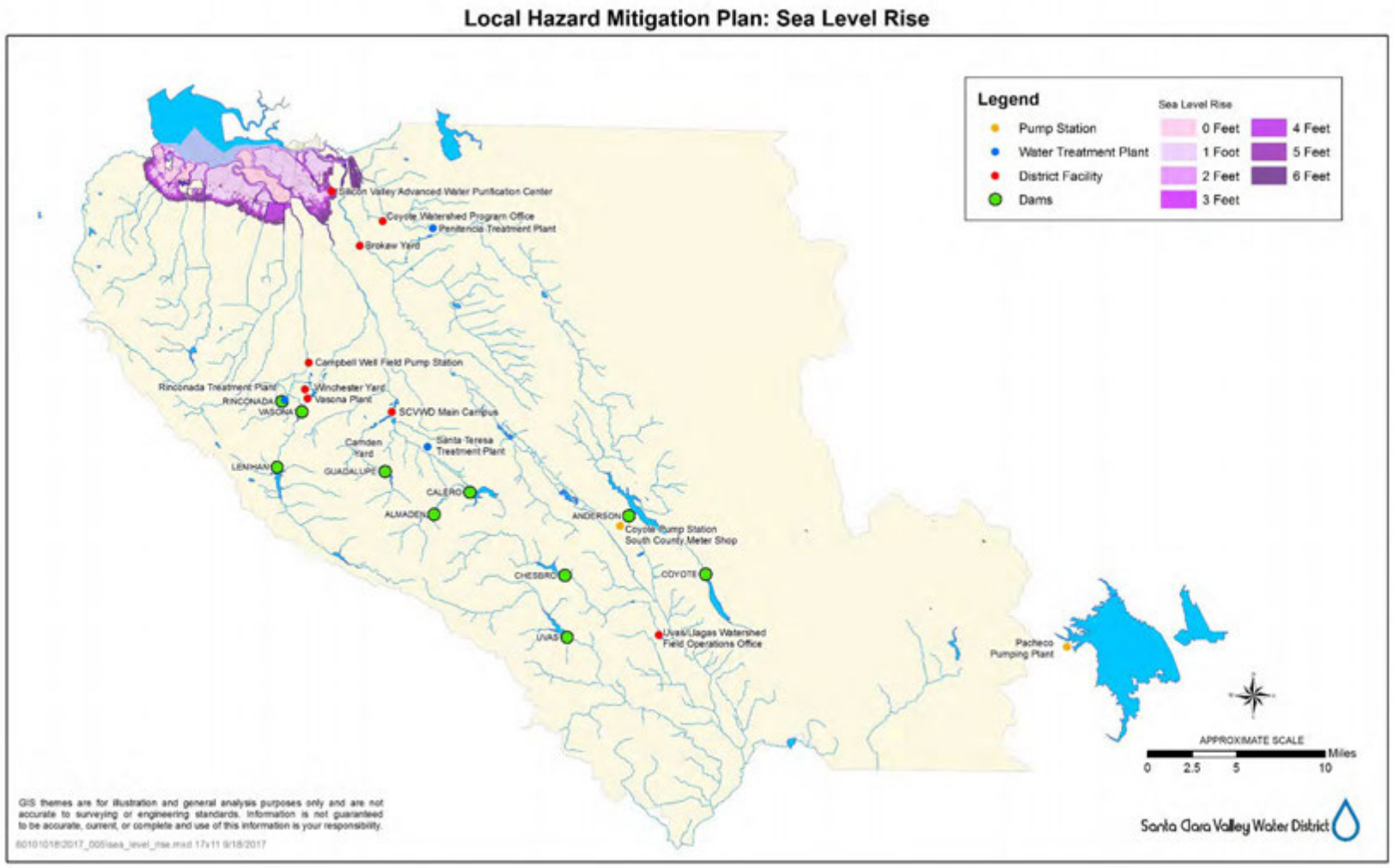
The degree of future sea level rise depends on the severity of climate change. The more that human activities resulting in increased GHG's impact Earth's climate system, the greater the expected sea level rise. The parts of the District's service territory closest to the San Francisco Bay are vulnerable to this hazard. At 16 inches of sea level rise, low-lying areas of Palo Alto near Highway 101, parts of Moffett Field and surrounding neighborhoods, and parts of the Alviso neighborhood of San Jose west of Zanker Road may be subject to permanent inundation if not protected by levees. Other parts of the Alviso neighborhood, as well as areas north of Tasman Drive west of the Guadalupe River channel, may be temporarily inundated during storms or particularly high tides (NOAA 2015c).

At 55 inches of sea level rise, the area of permanent inundation is expected to travel slightly inland compared to a 16-inch increase, although water levels within the permanent inundation area closest to the San Francisco Bay are expected to become substantially deeper. The one significant change between the two scenarios is that Bayland Park and surrounding neighborhoods in northern Sunnyvale, which were subject to temporary inundation at a 16-inch increase, would be permanently inundated with 55 inches of sea level rise (NOAA 2015c). Future increased temperatures and changes in precipitation patterns are projected for this region. These impacts could increase risks of severe drought.

CLIMATE CHANGE CONSIDERATIONS

As previously mentioned, sea level rise is directly linked to global warming (anthropogenic atmospheric warming), and this hazard would not exist without the presence of global warming. While this warming causes sea level rise as a result of melting ice and thermal expansion, resulting in permanent inundation of some areas, it may also contribute to temporary inundation of low-lying areas. As discussed in the Floods section, climate changes from global warming are expected to cause an increase in the number of intense storms that affect California. The atmospheric low-pressure and wind-driven waves of these storms can force water from the ocean or the San Francisco Bay onto normally dry land, an event known as a storm surge. Not only might climate change increase the number of storms that create a significant storm surge, but rising sea levels may increase the area of the District's service territory that is vulnerable to storm surges. Climate change is also projected to result in changes to precipitation patterns that could affect water supply reliability, including the potential for increased risk of severe drought. Changes in precipitation and increased temperatures also put native species at increased risk, which could impact district operations.

Figure 5-8: Sea Level Rise Hazard Zone



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SEISMIC ACTIVITY

Seismic activity are events linked to earthquakes and other tectonic activity. For the purposes of this Plan, the following hazard types are categorized as seismic activity: fault rupture, ground shaking, liquefaction, and seiches. Other hazards that pertain to geology but are not directly linked to tectonic activity are discussed in the Geologic Hazards and Land Subsidence sections.

HAZARD DESCRIPTION

Fault rupture: Earth's surface is broken up into large pieces called tectonic plates, which slowly move around due to various forces. As the plates grind against each other they often become stuck together, causing stress between the plates to build up until it overcomes the friction holding them together and the plates suddenly move along a boundary called a fault line. This rapid movement causes the ground shaking that we call an earthquake. This process of accumulated and released stress can also create fault lines between two sections of a single plate, allowing for seismic activity to occur in a wider area than the plate boundary itself. Fault ruptures are measured in many ways, including the length of the rupture (the length of the fault that moved) and the size of the displacement (how much the land on one side of the fault moved relative to the other).

Fault rupture is the actual movement of the ground's surface along a fault line. Faults known as dip-slip faults result in vertical displacement, strike-slip faults cause horizontal displacement, and oblique-slip faults cause diagonal displacement. The damage from fault rupture depends on the size of the displacement and may be severe, although it is limited to the area of the fault boundary itself. The physical shearing of land can tear buildings apart, break roads, and sever utility lines that cross the fault boundary.

Fault rupture occurs as a result of an earthquake. While all earthquakes involve movement along a fault, not all earthquakes cause a visible surface rupture. Some earthquakes may occur without causing visible surface displacement. Such earthquakes are known as "blind thrust" events. Fault rupture has still occurred in these cases, but because it does not manifest on the surface, there is no damage from the fault movement (although there may still be substantial damage from ground shaking). Some faults may experience very gradual movement over a long period of time, a phenomenon called "fault creep." While not technically a fault rupture event, fault creep can cause similar damage on a much slower scale.

Ground shaking: Ground shaking is the actual shaking from an earthquake and is often the primary cause of damage and injury. The shaking can damage or destroy buildings and infrastructure, which may result in injury or death. The shaking or resulting damage can also trigger many other types of hazard events, such as fires from broken natural gas pipelines, floods and sinkholes from broken dams and water pipes, and landslides.

The severity of the ground shaking is based on several factors, including the amount of energy released by the earthquake, the length of the fault rupture, the depth at which the rupture occurs (a rupture that occurs close to the surface is generally more damaging than one that occurs deeper in the earth), and the geology of the area (locations that sit on loose rocks and soil will generally experience more shaking than areas situated on bedrock). Typically, ground

shaking is most severe at the epicenter[4] and along the fault rupture length and diminishes with distance. Depending on the nature of the earthquake, the ground shaking maybe up and down, side to side, or a rolling motion. Ground shaking is measured in one of two ways: intensity and magnitude. Intensity is measured using the modified Mercalli intensity (MMI) scale, which looks at the damage caused by the earthquake and how people in the affected area perceive it. It uses Roman numerals and ranges from a scale of I (1, instrumental) to XII (12, catastrophic). **Table 5-7** shows the MMI scale.

Table 5-7: Modified Mercalli Intensity Scale

Scale	Intensity	Description
I	Instrumental	Not felt, except by a very few people under especially favorable conditions.
II	Feeble	Felt only by a few people at rest, especially on the upper floors of buildings.
III	Slight	Noticeable by people indoors, especially on the upper floors of buildings, although it is not widely recognized as an earthquake. Parked vehicles may move slightly.
IV	Moderate	Felt indoors by many and felt outdoors by some. May awaken sleeping people. Dishes, windows, and doors disturbed. Parked vehicles move noticeably.
V	Slightly Strong	Felt by almost everyone. Sleeping people awakened, and some dishes and windows broken. Unstable objects overturned, and pendulum clocks may stop.
VI	Strong	Felt by everyone. Some heavy furniture moved, and some instances of falling plaster. Damage slight, although many people may be frightened.
VII	Very Strong	Considerable damage in poorly built or badly designed structures, slight to moderate damage in well-built ordinary structures, and negligible damage in buildings of good design and construction. Some chimneys broken.
VIII	Destructive	Great damage in poorly built structures, considerable damage and partial collapse in well-built ordinary structures, and slight damage in specially designed structures. Chimneys, factory stacks, columns, monuments, and walls fall. Heavy furniture overturned.
IX	Ruinous	Well-designed structures thrown out of plum, considerable damage in specially designed structures. Substantial buildings suffer great damage and partial collapse. Buildings shifted off of foundations.
X	Disastrous	Some well-built wood structures destroyed. Most masonry and frame structures and foundations destroyed. Rails bent.

[4]The epicenter refers to the location on the surface above the point in the earth where the rupture began. The point within the earth where the rupture began is called the hypocenter.

Scale	Intensity	Description
XI	Very Disastrous	Few if any masonry structures remain standing. Bridges destroyed and rails greatly bent.
XII	Catastrophic	Total damage. Lines of slight and level are distorted. Objects thrown into the air.

Source: USGS 2014a

The magnitude of an earthquake is based on the amount of energy released by the fault rupture. It is measured on the moment magnitude scale (MMS, denoted as Mw or M).[5] The MMS starts at 1.0 and in theory has no upper limit, although there are limits to the size of the earthquake that is physically possible with Earth's geology.[6] The MMS is known as a logarithmic scale, meaning that the difference between two earthquakes is larger than the difference between the numbers of their measurement. For example, a 6.0 Mw earthquake is over 1,000 times stronger than a 4.0 Mw earthquake, not 1.5 times as might be imagined by looking at the numbers.

Liquefaction: Liquefaction occurs when loosely packed sandy, silty, and gravelly soils are saturated with water and shaken hard enough to temporarily behave like a fluid. When this happens, the soil loses its strength and any buildings or structures built on or in it may tilt, collapse, or otherwise be damaged. The liquefaction risk in an area is generally based on the height of the groundwater table and the composition of the soil.

Seiche: A seiche (pronounced "saysh") is a series of free or standing-wave oscillations (waves) created by the effects of seismic shaking on an enclosed or semi-enclosed basin. Seiches are typically caused when strong winds and rapid changes in atmospheric pressure or an earthquake push water from one end of a body of water to the other.

LOCATION AND EXTENT

Fault rupture: California sits at the boundary between the North American and Pacific tectonic plates. Most of the state lies on the North American plate, although the coastal areas south of San Francisco (including the Monterey Bay region, the Central Coast, and the Los Angeles and San Diego regions) are on the Pacific plate. Almost all of the District's service territory is on the North American plate, although a small section along the border with Santa Cruz County is on the Pacific Plate. The boundary between these two plates is the San Andreas Fault. Other faults in the District's service territory that may cause fault rupture are the Hayward fault along the eastern border of San Jose and Milpitas, the Calaveras fault east of the Highway 101 corridor and the Santa Clara Valley, the Sargent fault south of Gilroy, and the Greenville fault in the far northeast part of the County (County of Santa Clara 2011).

[5]Earthquakes are often said to be measured on the Richter scale, although the Richter scale is typically no longer used because it is not reliable when measuring large earthquakes. It has been replaced by the MMS (USGS 2017a).

[6]The strongest earthquake on record, the 1960 Valdivia earthquake in Chile, measured 9.5 M_W, and is likely near the upper limit for a maximum potential earthquake on Earth. There is no known fault system long enough to generate a 10.0 Mw or higher earthquake (USGS 2017b).

Ground shaking: The District's service territory is in a seismically active area and could be exposed to ground shaking from several different faults. The District may experience ground shaking from a fault located outside of the District's territory, although an earthquake within Santa Clara County is generally more likely to cause more intense shaking. **Table 5-8** shows the major faults in and near the District's service area.

Table 5-8: Major Faults in and Near Santa Clara County

Fault	Distance to District HQ (miles)	Length (miles)	Maximum Probable Earthquake (Mw)*	Interval Between Major Ruptures (years)
Calaveras Fault	11	190	7.8	610–620
Greenville Fault	22	80	7.3	Unknown
Hayward Fault	8	130	7.6	170–180
Monte Vista-Shannon Fault	2	60		Unknown
Ortigalita Fault	32	100	7.0	Unknown
San Andreas Fault †	8	160	8.3	110–160
San Gregorio Fault ‡	24	130	7.8	970–1,020
Sargent Fault	8	60		Unknown
Silver Creek Fault	5	50	<5.0	Unknown
Zayante-Vergeles Fault	12	60	<5.0	Unknown

Source: USGS 2015
*** The maximum probable earthquake is the greatest magnitude that has at least a 1 percent chance of occurring in the next 30 years.**
† Peninsula and Santa Cruz Mountains sections only, which are the sections closest to the District's service area. Ruptures on other sections may cause significant shaking in the District's service area.
‡ North section only, which is closest to the District's service area. A rupture on the other section may create a sizeable earthquake in the District's service territory.
Note that faults not listed in the above table may be capable of causing earthquakes that result in intense shaking in the District's service area. Additionally, there may be undiscovered faults that could cause substantial earthquakes. For example, the 1994 Northridge earthquake in Los Angeles occurred on a previously undiscovered fault.

Figure 5-9 shows the earthquake fault zones (where surface fault rupture may occur), as well as the likely level of ground shaking in the District's service territory. Note that the ground shaking shown on this map is the level of ground shaking that has a 10 percent chance of occurring in the next 50 years. It does not show the level of ground shaking that may be expected from any single earthquake event.

Liquefaction: The liquefaction risk in the District's service territory is concentrated along the Highway 101 corridor, the Santa Clara Valley, and in a few canyons and valleys in the more mountainous areas of Santa Clara County. The areas with the highest liquefaction risk are found along Coyote Creek north of Penitencia Creek, along the Guadalupe River north of downtown San Jose, along the San Francisquito Creek in Palo Alto, in the Alamitos neighborhood of San Jose, and in parts of Palo Alto and Mountain View nearest to the San Francisco Bay. Most of the Santa Clara Valley and large sections of the Highway 101

corridor have at least moderate susceptibility to liquefaction. **Figure 5-10** shows the liquefaction hazard zones in the District's service territory.

Seiche: Waterways originating from southern portion of San Francisco Bay would be exposed to the effects of a seiche; The South Bay salt ponds would be inundated, and any levee or embankment structures used for holding ponds for salt production would likely be compromised.

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Figure 5-9: Fault Rupture and Ground Shaking Hazard Zones

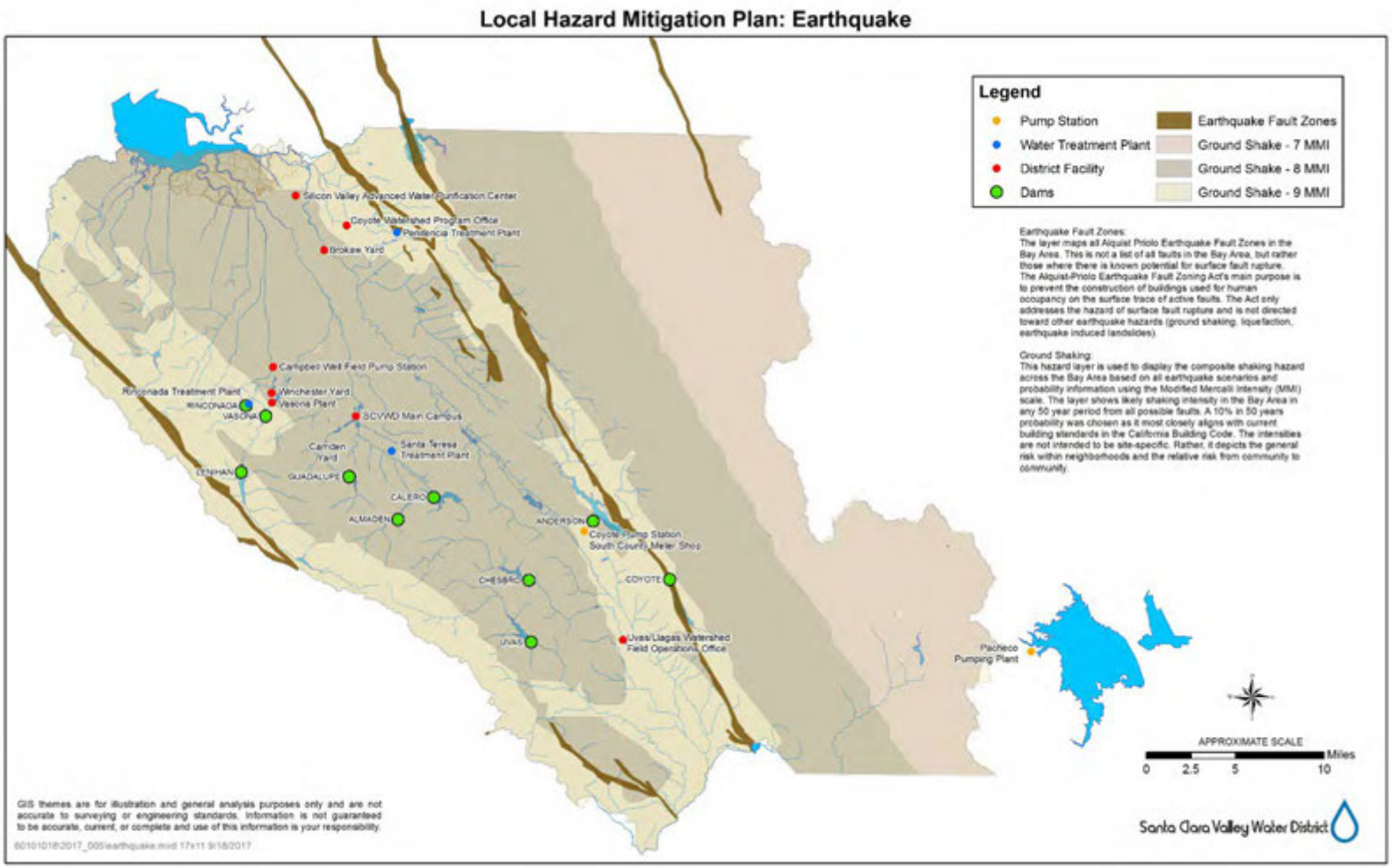

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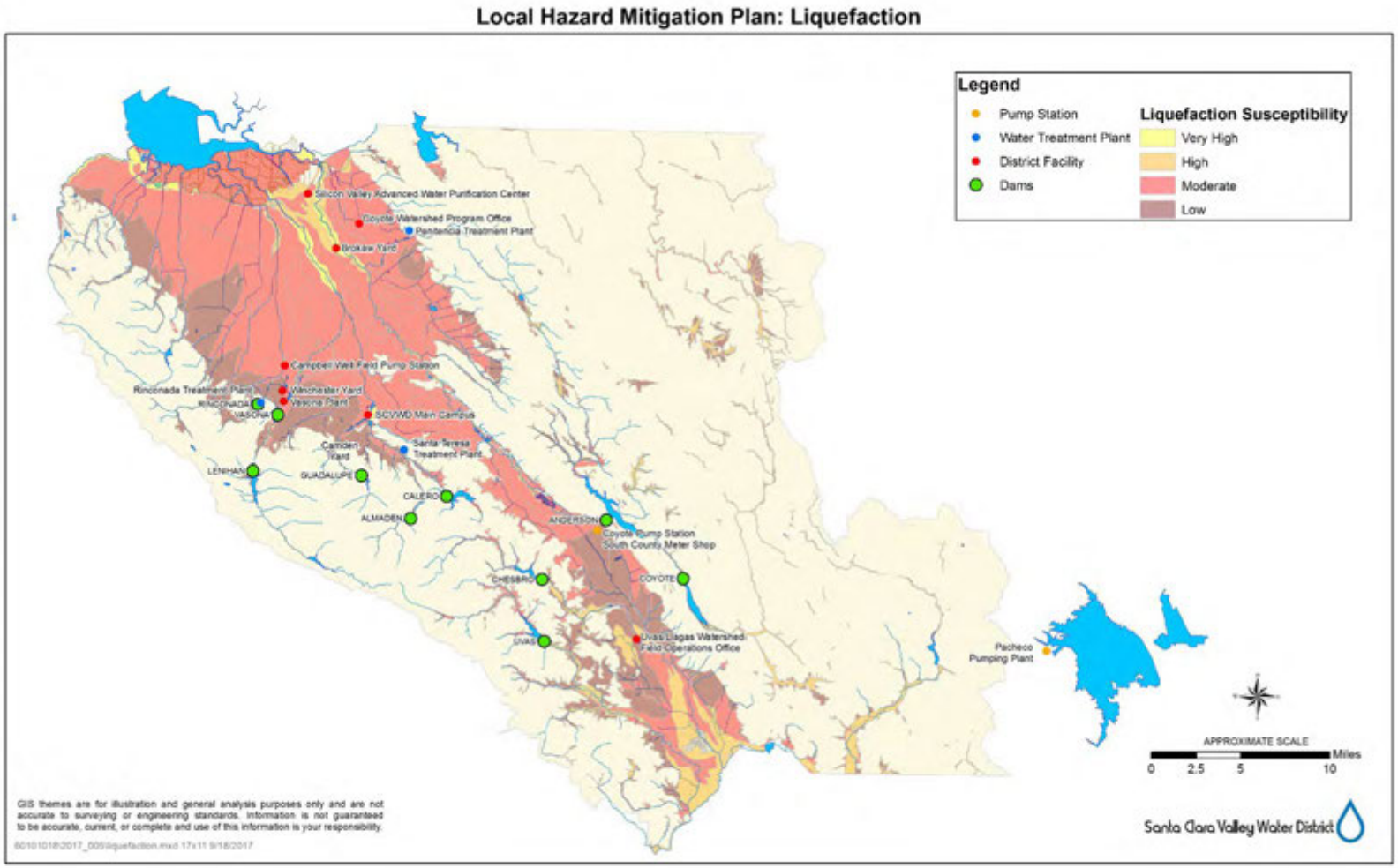
Figure 5-10: Liquefaction Hazard Zones



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HAZARD HISTORY

Fault rupture: Although the faults in the District's service territory are capable of causing surface fault rupture, this hazard has largely been absent in recent earthquake events. The 1984 Morgan Hill earthquake caused only minimum surface rupture, with a maximum observed displacement of approximately 8 inches (Toppozada 1984). The 1989 Loma Prieta earthquake caused no observed surface fault rupture. Large cracks did appear in the ground, but this was a consequence of the ground shaking (McNutt 1990).

Earlier earthquakes have caused substantial surface fault rupture in and around the District's service area. The 1906 San Francisco earthquake caused a maximum surface displacement of 28 feet near Shelter Cove in Humboldt County and 24 feet near Point Reyes, with approximately 10 feet of displacement in parts of the District's service territory (USGS 2017c). The 1868 Hayward fault caused no observed surface rupture in Santa Clara County, but surface displacement of up to approximately 3 feet was observed between the Cities of Fremont and Berkeley (Lienkaemper and Williams 1999).

Ground shaking: The District's service territory has experienced two major earthquakes in recent history. The Morgan Hill earthquake occurred along the Calaveras fault near Mount Hamilton in 1984, measured 6.2 M_W with a maximum Mercalli intensity of VIII (Destructive). Several masonry buildings on Main Avenue in Morgan Hill and five homes in the Jackson Oaks neighborhood were damaged enough to be condemned, although a total of 550 structures suffered some degree of damage (County of Santa Clara 2011).

The much more severe Loma Prieta earthquake of 1989 occurred along the San Andreas Fault in neighboring Santa Cruz County. It measured 6.9 M_W and reached an MMI of between IX (Ruinous) and X (Disastrous). The earthquake killed 63 people, injured over 3,700, and caused billions of dollars in damage (USGS 2005a; Allen 2011). While most attention was focused on damage in San Francisco and Oakland, there was significant damage at Stanford University, Los Gatos, Gilroy, and San Jose, including multiple instances of liquefaction (County of Santa Clara 2011). The Loma Prieta earthquake caused significant damage to the District's Rinconada Water Treatment Plant, greatly reducing the plant's capacity for five months while repairs were made, as well as damaging some of the District's water pipelines (ABAG 2010).

More minor earthquakes have occurred recently, including a 2002 event near Gilroy (5.2 M_W) and the 2007 Alum Rock earthquake (5.7 M_W). Neither event caused service interruptions, although the Alum Rock earthquake did cause minor cracking at the Uvas Dam (ABAG 2010).

The District service area also experienced two earlier major events. In 1906, approximately 300 miles of the San Andreas Fault ruptured between Gilroy and Shelter Cove, with an epicenter just offshore of San Francisco. The earthquake is currently estimated at 7.7 M_W to 7.9 M_W, with maximum shaking of IX (Ruinous) in a broad area around the fault. While the shaking from the earthquake destroyed large sections of San Francisco, most of the damage occurred from fires sparked by broken gas mains. Recent estimates suggest that the earthquake and fires killed more than 3,000 people, destroyed 28,000 buildings, and caused property damage of $400 million in 1906 dollars (approximately $10 billion currently) (USGS 2017c). In the District's service territory, the ground shaking and subsequent fires destroyed several buildings in downtown San Jose, killing 16 people and causing $3 million in damage ($76 million currently) (San Jose Public Library 2013).

In 1868, an earthquake with an estimated magnitude as high as 6.8 M_W occurred on the Hayward fault, with an epicenter in what is now the community of Castro Valley, approximately 28 miles north of downtown San Jose. Although the damage was most extensive in Hayward and San Leandro, damage was experienced as far away as Hollister and Santa Rosa. In San Jose, several buildings were damaged. The earthquake killed 30 people and caused $350,000 in damage, equal to approximately $5.7 million in current dollars (Stover and Coffman 1993).

Liquefaction: Although past earthquake events have caused liquefaction events in the region (most notably the 1989 Loma Prieta earthquake, in which liquefaction was responsible for extensive property damage and the collapse of a freeway in Oakland that killed 41 people), no sizeable historic liquefaction events have occurred within the District's service territory.

Seiche: Minor seiches occurred in Anderson Reservoir during the Morgan Hill (M6.2) earthquake of 1984 and were actually recorded by the reservoir elevation recording devices. The maximum wave height was estimated at about 4 inches. The largest seiche that was ever measured in the San Francisco Bay, following the 1906 earthquake, was 4 inches high. The Bay Area has not been adversely affected by seiches (U.S. Army Corps of Engineers, 2016).

RISK OF FUTURE HAZARDS

Fault rupture: It is possible that any fault within the District's service territory may cause significant fault rupture, although this has only been observed along the Hayward and San Andreas faults. Because several of the faults in the District's service territory have not ruptured in recent or recorded times, their potential to cause a surface fault rupture is unknown. There continues to be a chance that any fault rupture occurring in the District's service territory will cause surface displacement.

Ground shaking: The District's service territory's proximity to numerous faults, including several capable of causing significant earthquakes, means that the District's service territory will continue to experience ground shaking. The Third Uniform California Earthquake Rupture Forecast (UCERF3) estimates the odds of substantial earthquakes occurring between 2015 and 2044. Broadly speaking, the USGS estimates that, by 2043, the wider San Francisco region has a 51 percent chance of experiencing an earthquake of at least 7 M_W, a 20 percent of at least a 7.5 M_W earthquake, and a 4 percent chance of an 8 M_W or greater event (USGS 2015). **Table 5-9** shows the probabilities of substantial earthquakes occurring for individual major fault lines in and near the District's service territory.

In addition to the UCERF3, the USGS has prepared numerous scenarios showing the potential severity of different earthquake events. There are 23 different earthquake scenarios for faults in or near the District's service area that could result in substantive ground shaking. **Table 5-10** shows a sample of these scenarios that could result in shaking of at least VII on the MMI within parts of the District's service territory.

Table 5-9: Earthquake Probabilities Near Santa Clara County

Fault	Distance to District HQ (miles)	6.7+ M_W	7.0+ M_W	7.5+ M_W	8.0+ M_W
Calaveras Fault	11	17.74%	12.07%	3.37%	0.58%
Greenville Fault	22	5.24%	2.45%	0.43%	Negligible
Hayward Fault	8	21.93%	11.46%	3.65%	0.07%
Monte Vista-Shannon Fault	2	0.85%	0.40%	0.14%	0.03%
Ortigalita Fault	32	2.53%	0.75%	Negligible	Negligible
San Andreas Fault *	8	16.38%	16.15%	6.01%	3.03%
San Gregorio Fault †	24	3.92%	3.01%	1.98%	0.08%
Sargent Fault	8	1.02%	0.64%	0.43%	0.02%
Silver Creek Fault	5	0.13%	0.09%	0.03%	<0.01%
Zayante-Vergeles Fault	12	0.12%	0.08%	0.06%	0.02%

Source: USGS 2015

*** Peninsula and Santa Cruz Mountains sections only**

† North section only

Table 5-10: Selected Earthquake Scenarios

Fault	Magnitude (Mw)	Distance of Epicenter to District HQ (Miles)	MMI in District
Calaveras Fault	6.5	13	V – VII
	7.0	34	VI – VIII
Greenville Fault	7.0	25	V – VII
Hayward Fault	6.8	25	V – VIII
	7.0	49	V – VIII
	7.3	101	V – VIII
Monte Vista-Shannon Fault	6.5	16	V – VII
San Andreas Fault	7.2	13	VI – VII
	7.5	54	VI – IX
	7.8	235	VI – IX

Source: USGS 2011b

According to the UCERF3, the Calaveras, Hayward, and San Andreas faults are most likely to cause a substantial earthquake in the District's service territory within the next 30 years. All three faults are also capable of causing ground shaking of at least VIII (Destructive) within the District's service territory, and the San Andreas fault may cause ground shaking measuring IX (Ruinous). It is also worth noting that more distant earthquakes may still cause damage to the District's operations by disrupting regional infrastructure such as transportation networks, water pipelines, and power lines, even if District-owned operations remain undamaged.

Liquefaction: A strong earthquake could lead to secondary effects which include liquefaction of soils. The District's service territory is vulnerable to liquefaction, and the faults in and around Santa Clara County are capable of causing liquefaction. While there have been no observed liquefaction events in the District's service territory, the potential for liquefaction remains. The USGS estimated in 2016 that there is a 72-percent probability of at least one earthquake before 2043 with a magnitude of 6.7 or greater that could cause widespread damage in the San Francisco Bay Area (USGS, 2015). Out of the District's 88 facilities, 39 are in an area mapped as having "Very High" susceptibility to liquefactions, 5 facilities are in areas mapped as having "High" susceptibility to liquefaction, and 23 facilities are in areas mapped as having "Moderate" susceptibility to liquefaction. Additionally, though not indicated in the GIS analysis, recent seismic stability studies on 3 of the District's dams (Anderson, Calero, and Guadalupe) indicate that liquefaction could occur at those assets under large earthquake events. Thus, roughly 75-80% of the District's facilities could potentially be subject to liquefaction.

Seiche: The frequency of seiche is related to the frequency of the events that cause them. A local earthquake tsunami/seiche can occur at any time. Generally, four or five tsunamis occur every year in the Pacific Basin, and those that are most damaging are generated the Pacific waters off South America rather than in the northern Pacific. It is general consensus that the Santa Clara County would not likely see significant impacts from a seiche originating from a tsunami in the Pacific Ocean, given the area's inland location. However, the county would likely see minor seiche impacts on creeks from a local earthquake event. The presence of seiches will be more obvious on those dams with upstream concrete facing (Almaden, Calero Main and Auxiliary Dams, Guadalupe Dam, Vasona Dam, and Stevens Creek Dam), and much less obvious on those with rock faces. Seiches from a magnitude 7+ event on the Calaveras fault could produce waves up to 2 to 3 feet high at Coyote Dam. It is estimated that seiches from a magnitude 8+ event could produce waves up to 3 feet high. Seiches can carry destructive debris and pollutants that can have devastating impacts on all facets of the environment. Waterways discharging into the southern portion of San Francisco Bay would be exposed to the effects of a seiche. The south bay salt ponds would be inundated, and any levee or embankment structures would likely be compromised. The vulnerability of aquatic habit and associated ecosystems from inundation and introduction of foreign debris would be highest in low-lying areas close to the southern portion of the bay coastline and all wildlife inhabiting the area is exposed. Millions of dollars spent on habitat restoration and conservation could be wiped out.

CLIMATE CHANGE CONSIDERATIONS

Fault Rupture: Fault rupture is driven by geologic forces within the planet. While scientists have found some evidence that melting ice as a result of climate change may affect global seismic activity, there is no evidence that fault rupture events specifically in or around the District's service territory will be altered by climate change (Hampel, Hetzel, and Maniatis 2010).

Ground Shaking: There are no known or reasonably suspected links between climate change and ground shaking in the District's service territory. It is possible that changes in groundwater levels caused by altered precipitation patterns may affect the severity of ground shaking, but evidence for this remains uncertain and the effect of such changes (if any) are expected to be very minor. The District will review and summarize any new research that occurs on this topic as part of the next Hazard Mitigation Plan update.

Liquefaction: It is possible that changes to precipitation patterns as a result of climate change may alter groundwater levels in the District's service territory. As liquefaction occurs when ground shaking forces soil to become saturated, changes in groundwater levels may affect the susceptibility of soils to liquefaction. However, additional research is needed to determine any specific effects of climate change on liquefaction.

Seiche: There are no know or reasonably suspected links between climate change and seiches. The District will review and summarize any new research that occurs on this topic as part of the next Hazard Mitigation Plan update.

SEVERE WIND

HAZARD DESCRIPTION

Severe winds are typically those with speeds of at least 47 miles per hour, as this is generally the threshold above which structural damage occurs, although some property damage and minor injuries can happen at lower speeds. Severe winds often occur during an intense storm event, particularly systems that contain strong thunderstorms that may create downbursts or tornadoes. Alternatively, severe winds may happen independently of storm systems, such as the hot dry Diablo winds that sometimes affect the San Francisco Bay Area.

Intense winds can pose a direct risk by damaging structures, knocking down branches or trees, and creating airborne debris. Wind may also exacerbate other hazards, especially wildfires, fanning flames and helping them to spread. Between 1950 and 2012, California made three emergency declarations concerning wind not related to storms, tornadoes, fires, or other disasters (Cal OES 2013).

Wind intensity is sometimes measured using the Beaufort scale, shown in **Table 5-11**. Damage begins to occur from winds with a Beaufort number of at least 9.

Table 5-11: Beaufort Scale

Beaufort Number	Mph	Terminology	Description
0	0	Calm	Smoke rises vertically.
1	1-3	Light air	Wind motion visible in smoke.
2	4-7	Light breeze	Leaves rustle. Wind felt on exposed skin.
3	8-12	Gentle breeze	Leaves and smaller twigs in constant motion.
4	13-18	Moderate breeze	Dust and loose paper is raised. Small branches begin to move.
5	19-24	Fresh breeze	Small trees sway.

Beaufort Number	Mph	Terminology	Description
6	25-31	Strong breeze	Large branches in motion. Overhead wires whistle. Use of an umbrella becomes difficult.
7	32-38	Near gale	Whole trees in motion. Walking into the wind is difficult.
8	39-46	Gale	Twigs broken off trees. Cars veer on road.
9	47-54	Severe gale	Light structural damage.
10	55-63	Storm	Considerable structural damage. Trees uprooted.
11	64-73	Violent storm	Widespread structural damage.
12	74+	Hurricane	Considerable and widespread structural damage.

Source: NWS n.d.

LOCATION AND EXTENT

Windstorms may occur at any location on the District's service area. High wind events during the winter are often associated with intense storms, while winds in the spring and fall are more likely to come from farther inland and are known as offshore winds (the Diablo winds are an example of offshore winds) (County of Santa Clara 2011).

HAZARD HISTORY

There have been multiple cases of damages from severe winds throughout the District's service territory. Some wind events have exceeded hurricane force, including a 2004 wind gust measured at 87 mph in Los Gatos. The most damaging event occurred in December 1982, when winds caused over $1 million in damage throughout Santa Clara County. Other notable wind events include a December 2005 winter storm that brought wind gusts up to 74 miles per hour (mph); February 2006 winter storm with wind gusts up to 77 mph; December 2006 strong storm system with high winds knocking out power to thousands of homes and businesses; 2008 incident that knocked out power to 900 homes in San Jose; severe storms in February, April and October of 2009 which knocked down numerous trees, causing downed power lines and power outages, crushed cars, and clogging of major intersections; January 2010, strong winds brought a number of trees and limbs down across San Jose; November 2011 wind gusted up to 70 mph bringing down trees and power lines; May 2013, hot weather followed by increasingly strong northeast winds lead to critical fire conditions; October 2013, strong winds moved through the area causing downed trees, downed power lines, and several wildfires to ignite; February 2014 strong winds causing damage to power lines and trees; December 2014, Heavy rain and strong wind gusts reaching 83 mph led to power outage throughout the Bay Area; February and December 2015 strong wind events bringing down trees and power lines. (ABAG 2010, County of Santa Clara 2011, NOAA 2017, FEMA 2017)

RISK OF FUTURE HAZARDS

Predicting the frequency of severe weather events in a constantly changing climate is a difficult task. The districts service territory (county of Santa Clara), can expect to experience exposure to and adverse impacts from some type of severe weather event at least annually. Intense wind events are likely to persist in the future, both as a function of strong storms and from other meteorological events. The risk of severe winds is generally equal throughout the District's service territory, although locations at the bottom of mountain passes and canyons may see

more intensive wind gusts at times (County of Santa Clara 2011). As winds exacerbate some other hazards, the risks associated with winds can be higher in areas prone to these hazards (such as very high fire risk zones), even though the wind speed may not be substantially different than elsewhere in the District's service territory.

CLIMATE CHANGE CONSIDERATIONS

As discussed in the Floods section, climate change is expected to cause an increase in the frequency of intense storms. Since these storms may include intense winds, storm-related severe wind events may increase in the District's service territory as a result of climate change. The impacts of climate change on wind events not associated with storms are as yet unclear. Recent studies have found that the summer winds that blow down the coast of California and similar winds elsewhere on the earth are intensifying, but uncertainty remains as to the implications, and whether this change is linked to climate change or natural cycles (Barboza 2014). Some scientists have also noticed a possible link between climate change and the hot dry Santa Ana winds of Southern California, although the details of this link and whether the similar Diablo winds are also affected are not yet clear (CEC 2006).

WILDFIRE

HAZARD DESCRIPTION

Wildfires are a natural feature of California's ecosystem, and many native species have adapted to cycles of recurring fires. However, as human activities have changed the types of ground cover in the state, suppressed natural fires (allowing fuel to build up), and expanded development into forests and chaparral areas, wildfires have become an increasing concern. They are now the most common cause of disaster declarations in California, accounting for approximately 43 percent of all declared disasters in the state between 1950 and 2012 (Cal OES 2013). The risk of wildfires depends on the amount and type of vegetation, the local topography, and weather factors (including temperature, humidity, and wind).

Lightning, sparks from power lines, accidents, and arson are all common causes of wildfires in California.

There are two primary types of wildfires: wildland fires and wildland-urban interface (WUI) fires. Wildland fires are those that burn exclusively in natural environments and pose little threat to peoples' lives or property. Due to recent understandings about the natural role of fires and their importance in the state's ecology, wildland fires may sometimes be left alone to burn out naturally or may even be deliberately set as a forestry management strategy. WUI fires, by contrast, pose a significant hazard to communities located near the border between urban and wild areas. Even relatively small fires in the WUI zone can be extremely damaging given the density of development and the complexity of the topography. For example, the 1991 Tunnel Fire in the Oakland foothills burned 1,600 acres and destroyed 2,900 structures, more structures than the 2003 Cedar Fire near San Diego, which burned over 273,000 acres (Cal OES 2013).

Fire-prone areas in California are divided into three categories: federal responsibility areas, state responsibility areas, and local responsibility areas. The California Department of Forestry and Fire Protection (Cal Fire) has responsibility for fire prevention and firefighting services within the state responsibility areas, while local agencies have these responsibilities in the local

responsibility areas and the US Forest Service has fire-related responsibilities in the federal responsibility areas. Areas of elevated fire hazard, known as Fire Hazard Severity Zones (FHSZs) are classified as Moderate, High, or Very High.

LOCATION AND EXTENT

Wildfires may occur anywhere in the District's service territory outside of the urbanized Highway 101 corridor and Santa Clara Valley. In general, the areas with the highest fire risk hazard (designated a Very High FHSZ) are found in the parts of the District's service territory farthest from urbanized areas, including along the border with Stanislaus and Santa Cruz Counties. However, there are also Very High FHSZs near urban areas, including south of Los Gatos, west of Saratoga, west of Morgan Hill, and west of Gilroy. Note that wildfires may still occur in Moderate or High FHSZs. Additionally, buildings that are technically outside of a wildfire hazard zone but near the WUI may still be damaged or destroyed by a wildfire that spreads into more urban areas, and the entire District's service territory may be vulnerable to disruptions from a major wildfire event. **Figure 5-11** shows the wildfire hazard zones in the District's service territory.

The District is also concerned about the secondary effect of landslide and erosion hazards post wildfire event. As a result, **Figure 5-12** was developed identifying critical water reservoir infrastructure that is prone to both landslide hazards and wildfire hazards. Of the 14 District reservoirs analyzed for these potential hazards, the following characteristics were identified within a one-mile radius:

- Fire Hazard Severity Zones:
    - 23 percent of the area is within a very high wildfire hazard severity zone.
    - 69 percent of the area is within a high wildfire hazard severity zone.
- Earthquake Induced Landslide Zones:
    - 55 percent of the area is within an identified landslide zone, with the remaining area either planned for mapping or not evaluated yet.
- Rainfall Induced Landslide Zone:
    - 10 percent of the area is identified as surficial landslide deposits;
    - 35 percent of the area is identified as mostly landslide deposits; and
    - 55 percent of the area is identified as few landslide deposits.

HAZARD HISTORY

With the exception of some parts of the Central Valley and the Colorado Desert, all of California has experienced wildfire disasters. From 1950 to 2012, Santa Clara County saw five declared wildfire disasters, more than any other Bay Area county except for Napa County (Cal OES 2013). Most wildfires in the District's service territory have occurred near the eastern border with Stanislaus County, although some have occurred in the Santa Cruz Mountains in the

southwestern part of the District's service territory (ABAG 2014). Past notable fires in the District's service territory include the 2008 Summit Fire, which burned 4,270 acres along with 35 residences, and 64 outbuildings along the border with Santa Cruz County (Cal Fire 2008b) ; 2009 Pacheco Fire, which burned 1,650 acres; 2014 Curie Fire which burned 125 acres off Curie Drive south of San Jose; 2015 Pacheco Fire, which burned 215 acres off Highway 152, 3 miles west of the San Luis Reservoir; 2016 Sierra Fire, which burned 114 acres off Sierra Road and Calaveras Road; 2016 Bailey Fire, which burned 100 acres off highway 101 and Bailey Road; 2016 Oak Fire, which burned 25 acres off Oak Glen Avenue, 2 miles west of Morgan Hill; and the 2016 Loma Fire, which burned 4,474 acres and destroyed 12 residences and 16 outbuildings off Loma Prieta Road and Loma Chiquita Road, 10 miles northwest of Morgan Hill.

RISK OF FUTURE HAZARDS

Wildfires are often caused by humans, intentionally or accidentally. There is no way to predict when one might break out. Low precipitation and high temperatures increase the possibility of wildfires throughout the county. According to the State of California Multi-Hazard Mitigation Plan and the California Department of Forestry and Fire Protection, Santa Clara County experiences wildfires every two to three years, and all indications are that such events will continue to occur. Wildfires are likely to continue to affect the more mountainous areas of the District's service territory and the communities in these locations, although more urbanized areas near the WUI may be threatened in some circumstances. Based on the analysis identified in **Figure 5-12**, areas where high or very high wildfire hazard zones and landslide hazard zones intersect will be most prone to soil instability post wildfire and should be a focus for future mitigation.

CLIMATE CHANGE CONSIDERATIONS

Climate change is expected to cause an increase in the risk of wildfires as a result of warmer temperatures, decreases in precipitation, and increases in the frequency and severity of drought conditions. While the greatest increases in risk are expected to occur in the Sierra Nevada and the mountains of northwestern California (potentially up to a twelvefold increase in burnt areas by the 2080s), other parts of California are expected to see mild to moderate increases. In the District's service territory, the wildlands and WUI lands may see a 10–20 percent increase in the amount of land burned by wildfires by the end of the century (CEC 2017)

The impacts of climate change on wildfires are already being felt. On October 30, 2015, Governor Brown declared a state of emergency for all of California due to increased tree mortality brought on by ongoing drought conditions. In the proclamation, Governor Brown noted that the US Forest Service estimated that 22 million trees had already died, and tens of millions more were likely to die by the end of 2015. The proclamation also declared that the increased tree mortality was large enough to elevate the fire risk in large parts of California, as well as posing other hazards (Office of the Governor 2015b). In multiple recent disaster proclamations, the governor has noted the impacts of the drought and its related effects on escalating wildfire risk in the state (Office of the Governor 2014b, 2015c, 2015d, 2015e).

Figure 5-11: Wildfire Hazard Zones

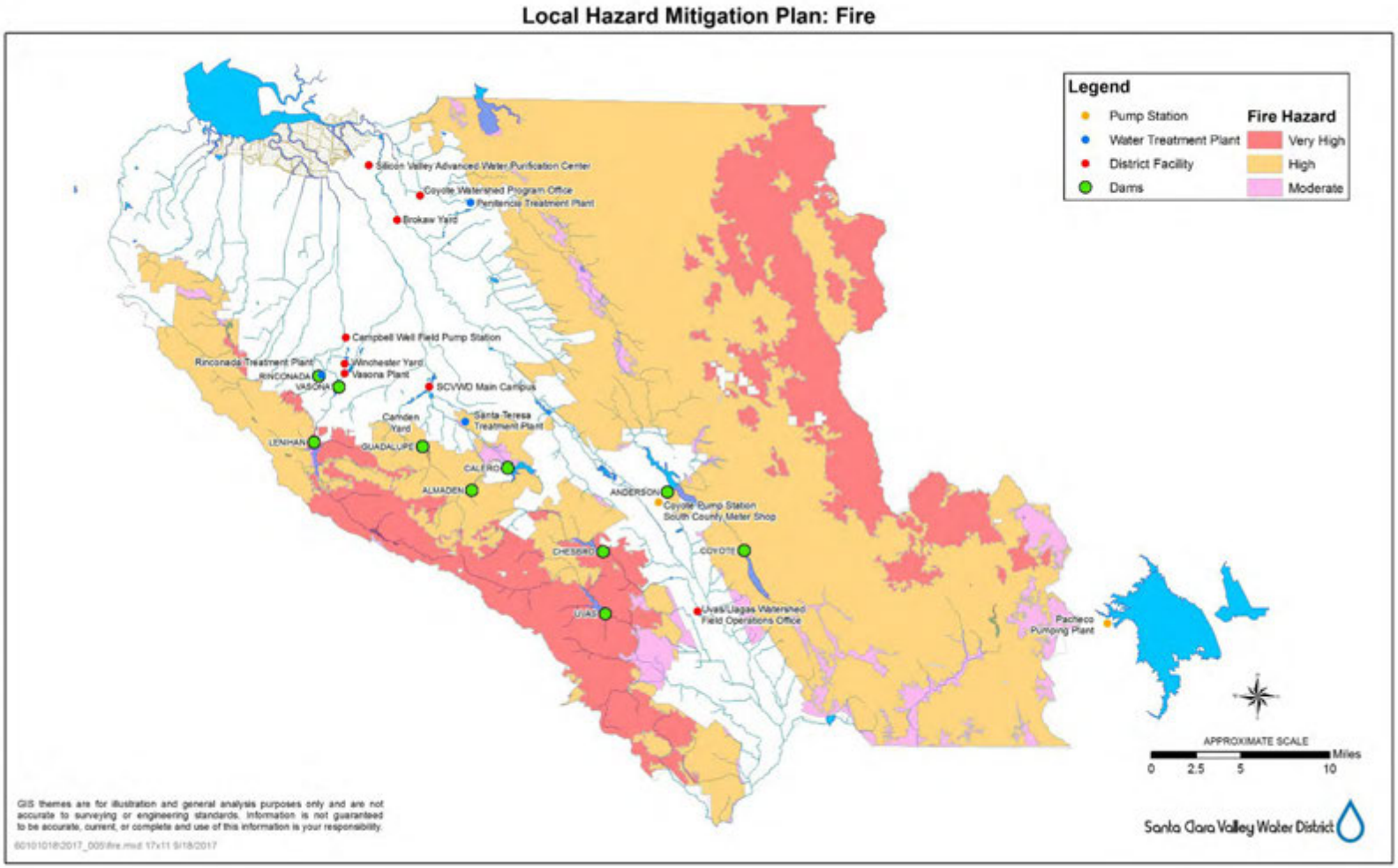

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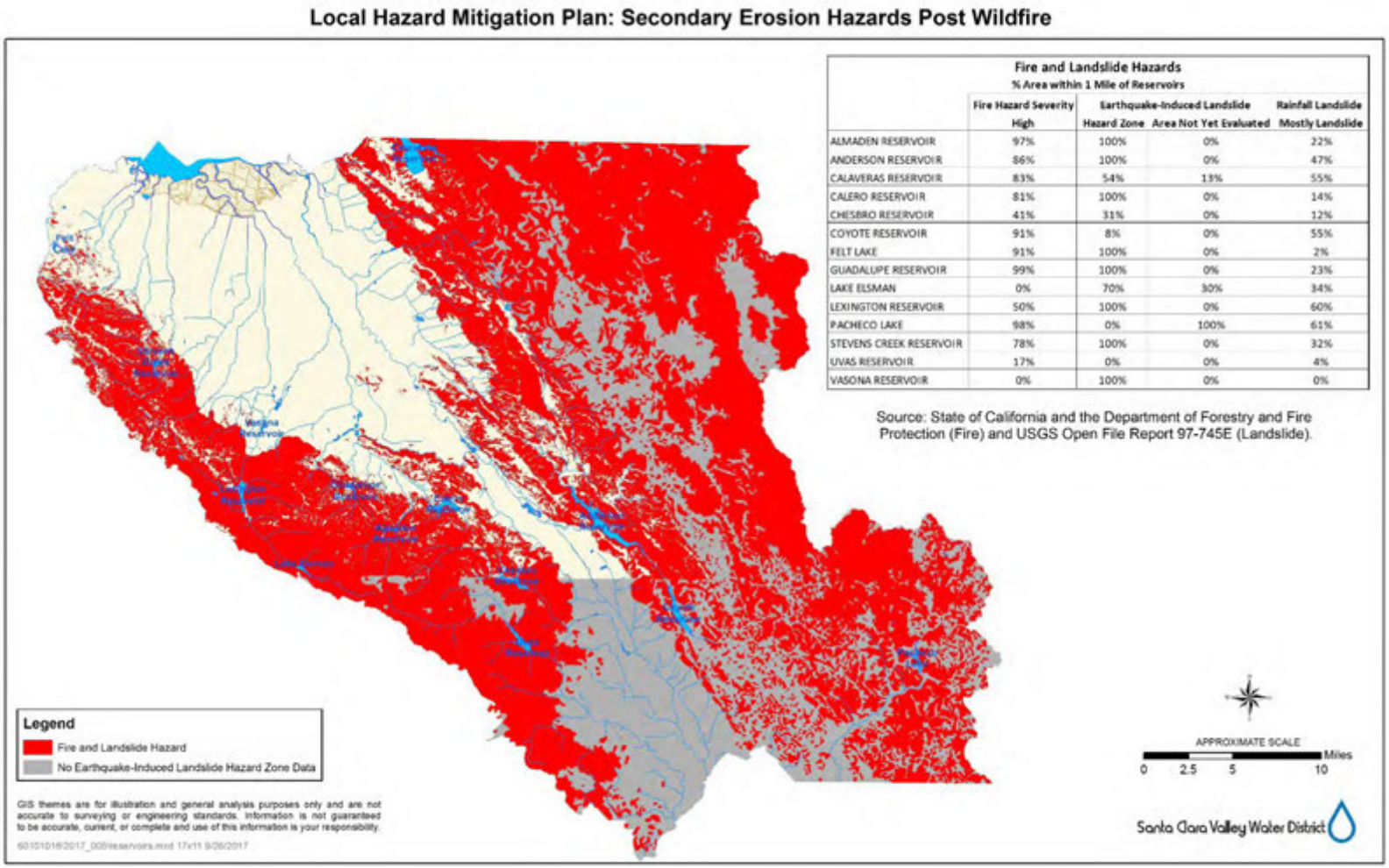
Figure 5-12: Secondary Erosion Hazards Post Wildfire



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VULNERABILITY ASSESSMENT

The District operates a variety of key assets throughout its service territory which are critical to carrying out the District's responsibilities. These assets include dams, pumping stations, levees, pipelines, water treatment plants, and administrative facilities. The District's key assets were mapped against the affected areas for various hazards to determine which facilities were vulnerable to which hazards. These overlays were not prepared for severe wind and drought, which generally affect the entire service territory and do not have specific areas of elevated risk.

The types of facilities evaluated in the risk assessment are given in **Table 5-12**. Not all District facilities were evaluated as part of this vulnerability assessment. For security reasons, the risk assessment will not identify the vulnerabilities of specific assets.

Table 5-12: Number of District Facilities in Risk Assessment

Facility Type	Number
Administrative and operations facilities	17
Pumping stations *	3
Treatment centers	4
Dams	10
Levees	20
Major pipelines	30
All facilities	**84**

The District operates a fourth pumping station, located outside of Santa Clara County. The vulnerability of this pumping station was not included in this risk assessment

DAM FAILURE VULNERABILITY ASSESSMENT

Many of the District's facilities are located downstream of lakes and reservoirs. As a result, many District facilities are within or close to the potential inundation zones from dam failures. This includes all of the District's pumping stations and most of the District's other assets, except for treatment centers. The types of facilities within 500 feet of a dam inundation zone are identified in **Table 5-13**.

Table 5-13: Facilities within 500 feet of a Dam Inundation Zone

Facility Type	Number of Vulnerable Facilities	Number of Facilities Not at Risk
Administrative and operations facilities	16	1
Pumping stations	3	0
Treatment centers	0	4
Dams	9	1
Levees	13	7
Major pipelines	24	6
All facilities	**65**	**19**

DROUGHT VULNERABILITY ASSESSMENT

The regional nature of drought hazards means that most or all of District's service territory is likely to face similar degrees of drought conditions. Droughts are not likely to damage the District's critical facilities, although it is possible that infrastructure that is not used or is used less may fall into some degree of disrepair without regular maintenance. Droughts are primarily a threat to the District's operations, as prolonged drought conditions may decrease the amount of water available to the District to meet its service requirements.

FLOOD VULNERABILITY ASSESSMENT

As many of the District's key assets must be located in or directly adjacent to water, a large majority of the District's facilities are within or near flood hazard zones. This includes all dams, levees, and pumping stations, as well as a substantial majority of major pipelines and administrative/operations facilities.

Table 5-14 shows the number of assets within 500 feet of the 100-year floodplain.

Table 5-14: Assets Within 500 feet of the 100-Year Floodplain

Facility Type	Number of Vulnerable Facilities	Number of Facilities Not at Risk
Administrative and operations facilities	14	3
Pumping stations	3	0
Treatment centers	2	2
Dams	10	0
Levees	20	0
Major pipelines	29	1
All facilities	**78**	**6**

GEOLOGIC HAZARDS VULNERABILITY ASSESSMENT

Within the District's service territory, landslide risk is present primarily in the hilly, rural areas of Santa Clara County. The specific level of risk is determined by the presence of historic landslide events. Assets located in areas composed mostly of material from landslides are at the highest risk. Facilities in areas with few historical landslide events face a lower, but still elevated, risk. Facilities showing no historical landslides or only superficial deposits are not deemed at risk. Dams, major pipelines, and other facilities found in the hillier areas of the District's service territory face a generally higher risk from landslides.

Table 5-15 shows the number of key assets at risk from landslides.

Table 5-15: Risk to District Facilities from Landslides

Facility Type	Number of Vulnerable Facilities		Number of Facilities Not at Risk
	Mostly Landslides	Few Landslides	
Administrative and operations facilities	0	0	17
Pumping stations	0	0	3
Treatment centers	1	2	1
Dams	1	4	5
Levees *	0	0	20
Major pipelines *	5	10	15
All facilities	**7**	**16**	**61**

***Some levees and major pipelines span multiple landslide hazard zones. For the purpose of this risk assessment, these facilities have been assigned to the higher hazard zone.**

SEISMIC ACTIVITY VULNERABILITY ASSESSMENT

Seismic activity may threaten District facilities in three different ways: ground movement as a result of fault rupture, ground shaking, or liquefaction. Of these, ground shaking poses the threat to the largest number of facilities. The risk of ground shaking is highest near the San Andreas, Calaveras, and Hayward faults, but virtually all of the District's service territory has a 10 percent chance of experiencing an earthquake with an MMI of at least VII (Very Strong) within the next 50-year period. All of the District's key assets are considered vulnerable to ground shaking. **Table 5-16** shows the number of facilities within different earthquake hazard zones.

Table 5-16: Risk to District Facilities from Ground Shaking

Facility Type	Number of Vulnerable Facilities		
	Mercalli Intensity IX	Mercalli Intensity VIII	Mercalli Intensity VII
Administrative and operations facilities	3	14	0
Pumping stations	1	2	0
Treatment centers	2	2	0
Dams	4	6	0
Levees *	6	14	0
Major pipelines *	8	22	0
All facilities	**24**	**60**	**0**

***Some levees and major pipelines span multiple ground shaking hazard zones. For the purpose of this risk assessment, these facilities have been assigned to the higher hazard zone.**

The affected area for fault rupture is much more limited, as only facilities within approximately 500 feet of a fault are vulnerable to this hazard. **Table 5-17** identifies the number of assets within 500 feet of a fault line and so are vulnerable to fault rupture.

Table 5-17: Risk to District Facilities from Fault Rupture

Facility Type	Number of Vulnerable Facilities	Number of Facilities Not at Risk
Administrative and operations facilities	0	17
Pumping stations	0	3
Treatment centers	1	3
Dams	1	9
Levees	1	19
Major pipelines	1	29
All facilities	**4**	**80**

The liquefaction risk is highest near the Highway 101 corridor and in the urbanized Santa Clara Valley. Most of the District's key assets face some degree of liquefaction risk, and approximately 45 percent of these facilities are in areas with a very high liquefaction risk. Facilities in areas of very low liquefaction risk are not deemed at risk from liquefaction in this assessment. **Table 5-18** identifies the number of key facilities within different liquefaction risk zones.

Table 5-18: Risk to District Facilities from Liquefaction

Facility Type	Number of Vulnerable Facilities				Number of Facilities Not at Risk
	Very High Risk	High Risk	Moderate Risk	Low Risk	
Administrative and operations facilities	6	1	7	3	0
Pumping stations	0	0	2	1	0
Treatment centers	0	0	1	0	3
Dams	0	0	0	6	4
Levees *	12	3	5	0	0
Major pipelines *	20	1	7	2	0
All facilities	**38**	**5**	**22**	**12**	**7**

***Some levees and major pipelines span multiple liquefaction hazard zones. For the purpose of this risk assessment, these facilities have been assigned to the higher hazard zone.**

LAND SUBSIDENCE VULNERABILITY ASSESSMENT

Land subsidence primarily affects the flat, urbanized Santa Clara Valley. Approximately half of the District's key assets are located within this area and so are vulnerable to subsidence, albeit to varying degrees. Levees and major pipelines are the most affected types of assets. The number of vulnerable facilities is shown in **Table 5-19**.

Table 5-19: Risk to District Facilities from Land Subsidence

Facility Type	Number of Vulnerable Facilities	Number of Facilities Not at Risk
Administrative and operations facilities	4	13
Pumping stations	2	1
Treatment centers	2	2
Dams	1	9
Levees	16	4
Major pipelines	19	11
All facilities	**44**	**40**

SEA LEVEL RISE VULNERABILITY ASSESSMENT

The risk of sea level rise is limited to coastal areas near the shore of San Francisco Bay. The facilities most at risk from sea level rise are levees within the potential inundation zone, although a small number of other facility types are vulnerable as well. Key assets at risk may face between 1 and 6 feet of sea level rise. The higher the potential sea level rise, the greater the risk of damage to the facility. Sea level rise primarily affects the District's levees, although a few other asset types are at risk as well. The number of vulnerable facilities is shown in **Table 5-20**.

Table 5-20: Risk to District Facilities from Sea Level Rise

	Number of Vulnerable Facilities						
Facility Type	6 feet	5 feet	4 feet	3 feet	2 feet	1 foot	Number of Facilities Not at Risk
Administrative and operations facilities	0	0	0	0	0	0	17
Pumping stations	0	0	0	0	0	0	3
Treatment centers	0	0	1	0	0	0	3
Dams	0	0	0	0	0	0	10
Levees *	10	0	0	0	0	0	10
Major pipelines *	1	0	0	0	0	0	29
All facilities	**11**	**0**	**1**	**0**	**0**	**0**	**72**

*** Some levees and major pipelines span multiple sea level rise hazard zones. For the purpose of this risk assessment, these facilities have been assigned to the higher hazard zone.**

SEVERE WINDS VULNERABILITY ASSESSMENT

The risk of severe winds is generally consistent across all areas of the District's service territory, and no specific facilities are considered more or less vulnerable. High Winds are more likely to affect power than SCVWD structures.

WILDFIRE VULNERABILITY ASSESSMENT

Within the District's service territory, the areas of elevated fire risk are generally in the rural and hilly parts of Santa Clara County. This hazard only affects dams and major pipelines, as all other facilities are outside of the risk zones. However, facilities not listed at risk may still be near a wildfire hazard zone, and so could still be substantially damaged or otherwise affected by a wildfire burning within the nearby hazard zone. **Table 5-21** shows the number of facilities within each of the three elevated wildfire risk zones.

Table 5-21: Risk to District Facilities from Wildfire

Facility Type	Number of Vulnerable Facilities			Number of Facilities Not at Risk
	Very High Risk	High Risk	Moderate Risk	
Administrative and operations facilities	0	0	0	17
Pumping stations	0	0	0	3
Treatment centers	0	0	0	4
Dams	2	4	1	3
Levees *	0	0	0	20
Major pipelines *	1	11	1	17
All facilities	3	15	2	64

***Some levees and major pipelines span multiple fire hazard zones. For the purpose of this risk assessment, these facilities have been assigned to the higher hazard zone.**

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CHAPTER 6—MITIGATION AND ADAPTATION STRATEGY

Hazard mitigation actions are strategies and policies to reduce the impacts of hazard events on the District's critical infrastructure. These actions are informed by the physical conditions of the District's infrastructure and landscape, as well as the scope and severity of potential hazard events. These items serve as the long-term blueprint for reducing the potential losses identified in the risk assessment.

MITIGATION GOALS

The goal of the 2017 SCVWD Local Hazard Mitigation Plan (LHMP) is to maintain and enhance a disaster-resistant region by reducing the potential for loss of life, property damage, and environmental degradation from natural disasters, while accelerating economic recovery from those disasters. This goal is unchanged from the 2010 LHMP and continues to be the goal of the District in developing its mitigation program.

The specific goals of the LHMP include:

- Protection of life and safety
- Continued coordination with key stakeholders and other agencies
- A flexible and engaging public outreach campaign.
- Foster better communication and coordination within the District and surrounding communities.
- Reduce risk of loss and damage from hazard events
- Address aging infrastructure issues to reduce/minimize future hazards and disasters.

UPDATES FROM PREVIOUS PLAN

The county experienced a 7.6-percent increase in population between 2010 and 2015, and an average annual growth rate of 1.52 percent per year. All of the hazards identified in the previous LHMP are still current and work is ongoing. The 2016 update to the District's Infrastructure Reliability Plan found that the District's retail customers had developed sufficient back-up supplies and could withstand a longer duration outage of the District's treated water system than what was previously identified. The previous study also did not recommend retrofitting pipelines due to the high cost, but the 2016 study took into account that the pipeline would need to be replaced in the next 20 to 50 years anyway (dependent on conditions), and that seismic upgrades should be included during the pipeline replacements. It was also discovered that risk for liquefaction of soils in the upstream shell of Anderson, Calero and Guadalupe dams existed. Targeted specific mitigation strategies and work to address these findings is being implemented. Additionally, the District has increased resiliency by removing 2,480 parcels from FEMA 1-percent flood plain" in 2014 and adding 10 stream and rainfall gauges since 2011 to monitor storm events and provide flood warning.

INTEGRATION

The information on hazards and risks, vulnerability, and mitigation in this LHMP is based on the best and most recent available information, technology, and resources available at the time this LHMP was prepared. The District has used and will continue to use a variety of project-specific mechanisms to ensure that the projects and mitigation strategies identified as existing or having relatively high priorities in this 2017 LHMP are implemented. Information and existing priorities and recommendations of the hazard mitigation plan are integrated with District master plans, policies, programs, and processes. The District also participates in regional meetings and works closely with state, local and county agencies and cities in its service area to collaborate and share information related to natural hazards and mitigation planning. Examples include the SCC Operational Area Council, SCC Emergency Managers Association, San Francisquito Creek Joint Powers Authority, and CA Utilities Emergency Association.

The principal means for project approval and implementation are the District's Capital Improvement Plan (CIP) and the annual budget. The CIP is an annual comprehensive review of asset investment required over a 10-year period to ensure adequate water resources, maintain clean, safe water and meet the present and future needs of District customers. The vulnerability of key assets to natural disasters identified in this annex will be considered in future asset investments strategies.

In addition, as the District assesses infrastructure needs through risk assessments, asset management planning, performance audits, or from other planning mechanisms that can enhance this plan, that information will be incorporated via the update process.

ANALYSIS OF MITIGATION ACTIONS

FEMA requires local governments to consider the benefits and costs of hazard mitigation actions, and to determine if the monetary and nonmonetary benefits of the proposed mitigation actions exceed the costs of the activity. While local governments are not required to assign dollar values to the benefits and costs of the mitigation action, this analysis nevertheless helps to determine if a mitigation action is worth pursuing. At a minimum, the analysis should look at the following items:

- The frequency, severity, and associated risks of hazard situations
- The future damage or impacts avoided by the action
- The number of people that will benefit from the action
- The critical nature of the facilities that benefit from the action
- The environmental benefits or impacts associated with the action

The Planning Team evaluated potential hazard mitigation actions using a method called STAPLE/E (Social, Technical, Administrative, Political, Legal, Economic, and Environmental). This approach looks at a wide range of criteria to assist in deciding which actions make the most sense for the community and how they should be prioritized. The STAPLE/E analysis helps ensure that the actions included in this Plan are the most equitable, cost-effective, and otherwise feasible for the District. The STAPLE/E analysis incorporates the items in the cost-benefit analysis as required by FEMA. The criteria used in the STAPLE/E analysis are shown in **Table 6-1**.

Table 6-1: STAPLE/E Review and Selection Criteria

Issue	Criteria
Social	• Is the action socially acceptable to community members within the District's service territory? • Would the action treat one or some community members or entire communities within the District's service territory unfairly? • Could the action result in social disruption?
Technical	• Is the action likely to reduce the intended risk, or will it only reduce a symptom of the risk? • Will the action create more problems, or more severe problems, than the ones it is intended to solve? • Given the goals of the District and community members in the District's service territory, is the action the most useful course of action for the issue?
Administrative	• Does the District have the administrative capabilities to implement the action? • Are District staff available to coordinate and lead implementation of the action, or could the District reasonably hire staff to carry out these responsibilities? • Is there sufficient technical support, staff, and funding for action implementation? • Are there administrative barriers to this action?
Political	• Is the action politically acceptable to the District and to jurisdictions within the District's service territory? • Do community members support implementing and maintaining the action?
Legal	• Does the District have the authority to implement the action? • Are there potential legal consequences or barriers to implementing the action? • Will the District be liable for any action or lack of action taken as a result of this action? • Will the action face legal challenges?
Economic	• What are the economic costs and benefits of the action, and do the benefits exceed the costs? • Are there start-up, maintenance, and administrative costs associated with the action? • Has funding for the action been secured, or is a potential funding source available? • How will the action affect the District's financial capabilities? • What sort of burden, if any, will the action place on the local economy or tax base? • What, if any, are the budgetary and revenue effects of the action?
Environmental	• How will the action affect the environment? • Will the action need environmental regulatory approvals? • Will the action meet local, regional, and state regulatory requirements? • Is the action likely to affect any endangered, threatened, or otherwise sensitive species?

PRIORITIZATION

During Meeting 3 of the Hazard Mitigation Planning process, the Planning Team discussed a series of proposed mitigation actions and to identify revisions to the LHMP, including, new actions and proposed deletions based on a variety of factors (political, financial, feasibility, etc.) Upon completion of this discussion Planning Team members were given sticky dots and instructed to vote on their top priorities. Using the exercise, the Planning Team developed three priority levels for mitigation actions. Actions that received zero votes were considered low priority actions. Actions with more than 3 dots were considered high priority actions and those with 1 to 2 dots were considered medium priority actions.

COST ESTIMATES

The members of the Planning Team identified relative cost estimates for each mitigation action. These estimates are based on their understanding of the effort and types of work needed to implement each action, based on their understanding of the action and experience in implementing similar projects. All mitigation actions are characterized as low cost, medium cost, or high cost.

- Low-cost actions are those estimated to cost $100,000 or less, and are symbolized as "$"
- Medium-cost actions are estimated to cost between $100,001 and $1 million, and are symbolized as "$$"
- High-cost actions are estimated to cost more than $1 million, and are symbolized as "$$$"

MITIGATION ACTIONS

Using the above process, the Planning Team developed a prioritized list of mitigation actions to reduce vulnerabilities to hazard events within the District's service territory. **Table 6-2** shows the mitigation actions that make up the District's recommended mitigation strategy. This table also shows information related to implementation for each recommended action.

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Table 6-2: Mitigation Actions

Prior Mitigation Number	New Mitigation Number	Mitigation Action	Responsible Division(s)	Potential Funding Source(s)	Estimated Cost	Target Completion Date	Priority (# 0f Votes)
	1	**All Hazards**					
Infr a-6 Infr b-6	1.1	Continue to stockpile repair materials, portable pumps and hydrants, and other supplies to assist with rapid and functional repairs to water and watershed infrastructure.	Watersheds Water Utility	ABAG San Francisco Bay Area Water Multi- Agency Coordination Group General District funds Homeland Security Infrastructure grants	$$$	Ongoing	High (4)
Infr d-2 Infr d-3	1.2	Continue to incorporate the effects of climate change into water utility and watershed infrastructure vulnerability studies.	Watersheds Water Utility	General District funds Grant funding	$	Ongoing	Medium (1)
Infr a-7 Infr a-8 Infr a-11 Env b-5	1.3	Improve the energy independence of the District's facilities and infrastructure through energy efficiency, on-site or local renewable energy systems, microgrids, and energy storage facilities. Ensure adequate emergency power is available in the interim.	Administration Water Utility	General District funds Grant funding	$$$	Ongoing	Low (0)

Prior Mitigation Number	New Mitigation Number	Mitigation Action	Responsible Division(s)	Potential Funding Source(s)	Estimated Cost	Target Completion Date	Priority (# 0f Votes)
Infr g-4 Infr g-5 Infr g-7	1.4	Continue to distribute information about disaster preparations through mailings, printed notifications, educational campaigns, social media, digital devices, addressing media inquiries, and in-person events and workshops. This information should be distributed widely and in all commonly spoken languages within the District's service territory.	Office of the CEO	San Francisco Bay Area Water Multi- Agency Coordination Group General District funds Grant funding	$$	Annually	Medium (2)
Govt a-1 Govt a-9 Govt a-12	1.5	Conduct hazard vulnerability studies, including anticipated climate change impacts, in advance of all new infrastructure siting and construction.	Watersheds Water Utility	ABAG General District funds Grant funding NWS	$$	Ongoing	Medium (1)
Govt c-7 Govt c-8	1.6	Continue to participate in the Silicon Valley Regional Interoperability Partnership to improve emergency communications between the District and other Santa Clara County jurisdictions.	Administration	General District funds	$$$	Ongoing	Medium (2)
Govt a-11	1.7	When siting new infrastructure, try to avoid locating facilities in areas of high hazard risk. If this is unavoidable, integrate extensive mitigation measures into the facility to reduce vulnerability from all applicable hazards.	Watersheds Water Utility	ABAG Bay Area water purveyors General District funds Department of Homeland Security USACE	$$$	Ongoing	Low (0)

Prior Mitigation Number	New Mitigation Number	Mitigation Action	Responsible Division(s)	Potential Funding Source(s)	Estimated Cost	Target Completion Date	Priority (# 0f Votes)
Infr a-1	1.8	Improve estimates of potential damage to District facilities from various potential emergency situations, and integrate these estimates into appropriate planning efforts.	Watersheds Water Utility	Academic institutions General District funds USGS	$$	Ongoing	Low (0)
Infr a-13 Govt c-12 Govt c-22 Env a-1	1.9	Update all emergency planning documents every five years to ensure consistency with state and federal laws, eligibility for hazard mitigation grant funding, best practices, local conditions, and updated science.	Watersheds Water Utility	General District funds Grant funding	$	Ongoing	Low (0)
Infr d-5 Govt a-1 Govt a-9 Env a-3 Land f-4	1.10	Regularly monitor and pursue funding opportunities for hazard mitigation activities.	Watersheds Water Utility	Bay Area Urban Areas Security Initiative	$	Ongoing	Low (0)
Infr a-22	1.11	Assess the capability and feasibility of using inter- organizational and public/private water distribution infrastructure (“water-wheeling”) as an alternate or backup.	Water Utility	General District funds Grant funding	$$	July 31, 2020	Low (0)
Infr a-4 Infr b-7	1.12	Install pipeline isolation valves to enable smaller geographic service outages and shorter recovery periods.	Water Utility	Bonds Capital Improvement Program	$$$	July 31, 2026	High (3)
Infr a-4	1.13	Conduct a Retailer Intertie Study to explore the capacity and interconnectivity of retailer interties.	Water Utility	General District funds Grant funding Regional water agencies	$$	July 31, 2019	Medium (1)

Prior Mitigation Number	New Mitigation Number	Mitigation Action	Responsible Division(s)	Potential Funding Source(s)	Estimated Cost	Target Completion Date	Priority (# 0f Votes)
Infr a-4	1.14	Install interties and connections to public and private groundwater wells for redundancy, including connections between the Snell Pipeline and the Great Oaks Water Company wells, the Santa Clara Distributary and the planned Santa Clara Water Company Serra Tank well, and the Mountain View Distributary and the planned Mountain View Water Company Miramonte well.	Water Utility	General District funds Grant funding Regional water agencies	$$$	July 31, 2025	Low (0)
Infr a-5 Infr a-22	1.15	Support regional and state efforts to improve resiliency and increase redundancy in water supply and safety infrastructure.	Watersheds Water Utility	General District funds	$	Ongoing	High (3)
Infr a-19 Infr a-20 Govt b-2 Govt c-13	1.16	Develop interagency mutual-aid agreements and emergency assistance protocols between the District and surrounding Jurisdictions	Watersheds	General District funds	$	Ongoing	Low (0)
	2	**Dam Failure**					
Govt d-1 Govt d-3 Infr a-5 Infr a-7 Infr d-18 Govt a-8 Govt c-22 Govt c-23	2.1	Work with local jurisdictions in dam inundation zones to ensure residents and businesses are aware of the potential risk, and that dam inundation mitigation strategies are integrated into local planning efforts. Use GIS mapping for risk analysis and communication as appropriate.	Water Utility	General District funds Local jurisdictions	$$	Ongoing	High (3)

Prior Mitigation Number	New Mitigation Number	Mitigation Action	Responsible Division(s)	Potential Funding Source(s)	Estimated Cost	Target Completion Date	Priority (# 0f Votes)
Govt a- 2	2.2	If appropriate, identify critical infrastructure at heightened risk from dam failure and develop a plan to protect or relocate those facilities.	Water Utility	General District funds Local jurisdictions	$$$	Ongoing	Low (0)
	3	**Drought**					
Env a- 4 Env b- 1 Env b-10	3.1	Evaluate the long-term impact of climate change on future water supplies, and include more severe drought conditions in water supply planning documents.	Watersheds Water Utility	General District funds Grant funding	$	Ongoing Every 5 years	High (3)
Govt d-2	3.2	Work with retail water suppliers to offer free or low-cost water audits for residents and businesses within the District's service territory.	Water Utility	General District funds Grant funding Regional water agencies	$$	Ongoing	Low (0)
Govt d-2	3.3	Work with retail water suppliers to support real- time water monitoring for all customers.	Water Utility	General District funds Regional water agencies	$$$	TBD	Low (0)
Infr d-16 Infr g-3 Env b-13	3.4	In coordination with retail water suppliers, host regular workshops and classes on water conservation, including providing information on drought-tolerant landscaping, available rebates for water retrofits, and water efficiency strategies in new buildings. Continue to offer workshops and classes even when drought conditions are not present. Develop outreach materials for water conservation.	Office of the CEO Water Utility	General District funds Regional water agencies	$$	Ongoing	Medium (2)

Prior Mitigation Number	New Mitigation Number	Mitigation Action	Responsible Division(s)	Potential Funding Source(s)	Estimated Cost	Target Completion Date	Priority (# 0f Votes)
Env b-11	3.5	Increase recycled and purified water supplies and expand the existing recycled and purified water infrastructure.	Water Utility	Public-private partnerships, grants, low interest loans	$$$	TBD	Low (0)
Env b-11	3.6	Explore opportunities to recycle water for non- potable and potable uses.	Water Utility	General District funds Grant funding	$	Ongoing	Low (0)
Infr a-5 Govt d-1 Govt d-2 Govt d-3 Env a-2 Env a-4	3.7	As identified in the Capital Improvement Program (CIP), continue to prioritize water supply improvements as they relate to the risks outlined in this Plan. Coordinate future updates to the CIP to support mitigation actions outlined in this Plan.	Water Utility	Bonds Capital Improvement Program DWR General District funds	$	Ongoing	Low (0)
Infr a-22	3.8	Implement projects that increase the resiliency or reliability of future water supplies.	Water Utility	Bonds Capital Improvement Program General District funds	$$$	Ongoing	Low (0)
	4	**Floods**					
Infr d-6	4.1	Continue to repair and improve storm drainage systems owned and maintained by SCVWD to better accommodate sudden large volumes of water.	Watersheds	General District funds Regional water agencies	$$	Ongoing	High (3)
Infr d-7 Infr d-8 Env a-2 Env a-5 Env a-7	4.2	Continue to enforce creek protection, stormwater management, and discharge control requirements to keep drainage infrastructure free of obstructions. Monitor drainage infrastructure for obstructions and remove any obstructions as quickly as possible.	Watersheds	General District funds Regional water agencies	$$	Ongoing	High (4)

Prior Mitigation Number	New Mitigation Number	Mitigation Action	Responsible Division(s)	Potential Funding Source(s)	Estimated Cost	Target Completion Date	Priority (# 0f Votes)
	4.3	Retrofit hardscaped areas on District property, including parking lots and plazas, to use permeable paving, green infrastructure, and other low-impact development design features to allow for increased infiltration, even in heavy rain events.	Administration	Capital Improvement Program General District funds	$$$	TBD	Low (0)
Infr d-14 Env a-5 Env a-7	4.4	Identify and implement effective flood protection measures around water supply facilities and pumping stations, prioritizing facilities located within the 100-year floodplain.	Water Utility	Capital Improvement Program General District funds	$$$	Ongoing	Low (0)
Infr b-5 Infr d-4 Infr d-11 Infr d-17 Govt d-1 Govt d-2 Govt d-3 Govt c-20 Env a-2	4.5	As identified in the Capital Improvement Program (CIP), continue to prioritize flood protection improvements as they relate to the risks outlined in this Plan. Coordinate future updates to the CIP to support mitigation actions outlined in this Plan.	Watersheds Water Utility	Bonds Capital Improvement Program	$	Ongoing	Low (0)
Infr g-4 Infr g-5 Infr g-7	4.6	Develop outreach materials for extreme flood conditions and events.	Office of the CEO Watersheds	General District funds Grant funding	$	Annually	Medium (2)

Prior Mitigation Number	New Mitigation Number	Mitigation Action	Responsible Division(s)	Potential Funding Source(s)	Estimated Cost	Target Completion Date	Priority (# 0f Votes)
	5	**Geologic Hazards**					
Infr b-8 Infr d-9 Infr d-10 Env a-2	5.1	Use erosion and sediment control features that provide protection beyond those required by local or state standards for all District construction activities.	Watersheds Water Utility	General District funds	$	Ongoing	Medium (2)
Infr a-2 Infr d-7	5.2	Prevent landslide and debris flows from compromising the structure and function of District infrastructure.	Watersheds Water Utility	General District Funds	$$$	Ongoing	Medium (2)
	6	**Land Subsidence**					
	6.1	Continue to monitor the rate of groundwater pumping within the District, and coordinate groundwater pumping and increase groundwater recharge if subsidence begins to occur.	Water Utility	General District Funds Water sales	$$	Ongoing	High (3)
	7	**Sea Level Rise**					
Env b-1	7.1	Develop and implement plans to protect key facilities within the sea level rise hazard area as sea levels increase.	Watersheds	General District funds Grant funding USACE	$$$	Ongoing	Medium (1)
Govt d-1 Govt d-2 Govt d-3 Env b-1	7.2	Coordinate with Santa Clara County, ABAG, and the Bay Conservation and Development Commission to defend against and retreat from sea level rise.	Watersheds	Bonds Capital Improvement Program General District Funds Local jurisdictions	$$$	Ongoing	Low (0)

Prior Mitigation Number	New Mitigation Number	Mitigation Action	Responsible Division(s)	Potential Funding Source(s)	Estimated Cost	Target Completion Date	Priority (# 0f Votes)
	8	**Seismic Activity**					
Infr b-5 Infr d-12	8.1	Maintain existing levee inspection and repair program to address seismic vulnerabilities of levee systems.	Watersheds	General District Funds	$	Ongoing	Medium (2)
Infr a-1 Infr b-5 Govt a-2	8.2	Secure funding to conduct necessary seismic strengthening work on District-owned dams as identified in seismic evaluations.	Water Utility	Bonds Capital Improvement Program General District Funds	$$$	Ongoing	High (5)
Infr a-1 Infr a-2 Govt a-2 Infr a-4 Infr b-5 Infr d-9 Infr d-12	8.3	Replace or retrofit structures that are determined to be structurally deficient, including levees, dams, reservoirs, and tanks. Continue to analyze and identify needs for future upgrades. Evaluate, reinforce, and/or enhance district facilities to mitigate seismic risk.	Water Utility	Bonds Capital Improvement Program General District Funds	$$$	Ongoing	Medium (1)
Govt a-1 Govt a-9 Govt a-12	8.4	Conduct evaluations of District facilities (Offices, Ancillary Structures) to determine seismic vulnerability.	Administration	General District Funds Grant funding	$$	TBD	Low (0)
Infr b-8	8.5	Avoid siting of new infrastructure in areas of highest liquefaction, ground shaking, and/or fault rupture risk. If siting new infrastructure in these high-risk zones is unavoidable, include significant mitigation measures to reduce the vulnerability to earthquake hazards.	Watersheds Water Utility	General District Funds Grant funding	$$$	Ongoing	Low (0)
Infr a-4 Infr b-3 Infr b-4	8.6	Replace seismically vulnerable sections of the Almaden Valley Pipeline.	Water Utility	Bonds Capital Improvement Program	$$$	TBD	Low (0)

Prior Mitigation Number	New Mitigation Number	Mitigation Action	Responsible Division(s)	Potential Funding Source(s)	Estimated Cost	Target Completion Date	Priority (# 0f Votes)
	9	**Severe Winds**					
Infr d-7	9.1	Monitor trees, telephone poles, and other large objects that may threaten nearby District infrastructure in high wind events, and maintain or reinforce as appropriate.	Watersheds Water Utility	General District Funds Local jurisdictions PG&E	$	Ongoing	Low (0)
	10	**Wildfires**					
Infr c-3	10.1	Frequently monitor 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.	Watersheds	External fire partners FireSafe Council General District Funds	$$$	Ongoing	Medium (1)
Infr c-3 Infr c-7 Infr c-8	10.2	Work with surrounding landowners to ensure adequate fire road access to District facilities.	Watersheds	General District Funds	$	TBD	Low (0)
Infr c-3 Env a-1	10.3	Identify District-owned waterways and water sources adjacent to any high-fire risk areas, and prepare for increased turbidity as a result of vegetation loss and increased erosion. Conduct mitigation measures as appropriate to reduce turbidity.	Watersheds Water Utility	Cal Fire General District Funds	$	TBD	Low (0)
Infr c-3 Env a-2	10.4	Design and implement mitigation measures to reduce turbidity in waterways and water sources near high-fire risk areas.	Watersheds Water Utility	Bonds Capital Improvement Program General District Funds	$$$	TBD	Low (0)

CHAPTER 7—PLAN MAINTENANCE

This Plan must remain up to date in order to continue to help protect the community against hazards and to remain eligible for federal and state funding. To that end, this chapter contains a schedule for Plan monitoring, evaluation, and revision. It describes how the District will incorporate mitigation actions in the Plan into existing policies and programs, including the Capital Improvement Program and the District's Water Utility Enterprise Funds.

IMPLEMENTATION, UPDATES, AND ENHANCEMENT

The effectiveness of this Plan depends on implementation of the mitigation actions and incorporation of these actions into other District plans, policies, and programs. These mitigation actions provide the framework for activities that the District can implement over the next five years. The SCVWD has prioritized the actions in this Plan, which will be implemented through existing plans, policies, and programs as both established and new resources become available. The LHMP Team, led by the Security and Emergency Services Unit and in conjunction with the applicable District Divisions, is responsible for implementing the mitigation actions in the Plan.

The information on hazards and risks, vulnerability, and mitigation in this LHMP is based on the best and most recent available information, technology, and resources available at the time this LHMP was prepared. The District's Water Supply and Infrastructure Master Plan, as well as SCVWD's various other policy documents, is integral for the implementation of the LHMP, as it provides a framework for the Plan to expand upon. Many of the ongoing recommendations identified in the mitigation activities are recommended by District adopted plans, such as the SCWVD Capital Improvement Program.

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

- A state or federal declaration disaster that impacts the District.
- A hazard event that results in the loss of life within the District's service territory.

The update process will allow the District to add new planning process methods, community profile data, hazard data and events, vulnerability analyses, mitigation actions, and goals to the Plan. Due to this update process, the Plan should always be current and up-to-date.

The LHMP Team will carry out the update process, which will include the following steps:

- Review and update the risk assessment based on the best and most recent available information and technologies.
- Evaluate the mapping and lists of critical structures, and update and improve as necessary and as funding becomes available.

- Review and revise the list of mitigation actions to account for any actions that are completed, postponed, changed to account for revisions in the risk assessment, or changed to account for new or revised District policies identified by other planning mechanisms.

- Send the draft update to the appropriate agencies for review and comment.

- Provide members of the public an opportunity to comment on the draft update, and revise the draft as appropriate based on public comment.

- Transmit the draft update to the California Office of Emergency Services (Cal OES) and FEMA for review and approval.

The SCWVD Board of Directors is responsible for the final adoption of the Plan, following notification from FEMA that the Plan is Approved Pending Adoption (APA). The Emergency and Security Manager will transmit the Plan to FEMA following adoption by the Board of Directors.

MONITORING

The LHMP Team will meet at least once annually to monitor implementation progress and integration of mitigation actions into other documents. As part of this evaluation process, members of the LHMP Team should review the following:

- Any hazard events that occurred within the District's boundaries in the past year, including the scale of impact.

- Mitigation activities in the Plan which have been implemented and are achieving success.

- The timeline for implementation of mitigation activities, and whether the timeline should be amended.

- Any mitigation activities prioritized for the past year which have not been completed, and why.

- The need for any new or revised mitigation actions.

- Any changes or potential for changes in funding options for mitigation activities.

- Any new scientific data or mapping that informs the information in the Plan.

- Any new or revised planning programs or other initiatives applicable to SCVWD that involve hazard mitigation.

The LHMP Team will prepare an annual progress report, which will be distributed to chief officers for review and presented to the Board of Directors. It will be posted on the SCVWD website, with the ability for members of the public to provide comments. This annual report will also be provided to local media as a press release.

CONTINUED PUBLIC INVOLVEMENT

The communities within the Santa Clara Valley Water District will continue to be informed of and involved in the LHMP update process. When the next LHMP update process begins, a new public involvement strategy will be developed based on guidance from the LHMP Team. This strategy will be based on the needs and capabilities of the District and its communities at the time of the update. This strategy will, at minimum, include the use of the District's website and local media to inform the public and gather public feedback.

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LIST OF ACRONYMS AND ABBREVIATIONS

AB: Assembly Bill

ABAG: Association of Bay Area Governments

AR: Atmospheric River

BORP: Building Occupancy Resumption Program

CADRE: Collaborating Agencies Disaster Relief Effort

Cal Fire: California Department of Forestry and Fire Prevention

Cal OES: California Office of Emergency Services

CEC: California Energy Commission

CIP: Capital Improvement Program

CNRA: California Natural Resources Agency

CUPA: Certified Unified Program Agency

CVP: Central Valley Project

DMA 2000: Disaster Mitigation Act of 2000

DWR: California Department of Water Resources

ENSO: El Niño Southern Oscillation

FEMA: Federal Emergency Management Agency

FHSZ: Fire Hazard Severity Zone

IPCC: Intergovernmental Panel on Climate Change

IRWMP: Integrated Regional Water Management Plan

LHMP: Local Hazard Mitigation Plan

MMI: Modified Mercalli Intensity scale

MMS: Moment Magnitude Scale

NASA: National Aeronautics and Space Administration

NOAA: National Oceanic and Atmospheric Administration

NPS: National Park Service

NWS: National Weather Service

PG&E: Pacific Gas and Electric Company

SCVWD: Santa Clara Valley Water District

SPUR: San Francisco Planning and Urban Research Association

STAPLE/E: Social, Technical, Administrative, Political, Legal, Economic, and Environmental

SVCE: Silicon Valley Clean Energy

SWP: State Water Project

USACE: US Army Corps of Engineers

USBR: US Bureau of Reclamation

USEPA: US Environmental Protection Agency

USGS: US Geological Survey

WARN: Water/Wastewater Agency Response Network

WUI: Wildland-Urban Interface

APPENDIX A: RESOLUTION OF ADOPTION

BOARD OF DIRECTORS
SANTA CLARA VALLEY WATER DISTRICT

RESOLUTION NO. 18-22

ADOPTING THE SANTA CLARA VALLEY WATER DISTRICT LOCAL HAZARD MITIGATION PLAN

WHEREAS, Santa Clara County is subject to various weather-related hazards including wildfires, floods, and landslides; and

WHEREAS, Santa Clara County is subject to various earthquake-related hazards such as ground shaking, liquefaction, landsliding, fault surface rupture, and tsunamis; and

WHEREAS, the Santa Clara Valley Water District acknowledges that disasters do not recognize city, county, or special district boundaries; and

WHEREAS, the Santa Clara Valley Water District seeks to maintain and enhance both a disaster-resistant Santa Clara Valley Water District and region by reducing the potential loss of life, property damage, and environmental degradation from natural disasters, while accelerating economic recovery from those disasters; and

WHEREAS, the Santa Clara Valley Water District is committed to increasing the disaster resistance of the infrastructure, health, housing, economy, government services, education, environment, and land use systems in the Santa Clara Valley Water District, as well as in the Bay Area as a whole; and

WHEREAS, the federal Disaster Mitigation Act of 2000 requires all cities, counties, and special districts to have adopted a Local Hazard Mitigation Plan to receive disaster mitigation funding from the Federal Emergency Management Agency.

NOW, THEREFORE, BE IT RESOLVED by the Board of Directors of the Santa Clara Valley Water District that the District adopts this Local Hazard Mitigation Plan (Exhibit A).

NOW, THEREFORE, BE IT FURTHER RESOLVED that the Santa Clara Valley Water District commits to continuing to take those actions and initiating further actions, as appropriate, as identified in the Santa Clara Valley Water District Local Hazard Mitigation Plan.

RL14219 1

Resolution No. 18-22

PASSED AND ADOPTED by the Board of Directors of Santa Clara Valley Water District by the following vote on April 24, 2018

AYES:	Directors	T. Estremera, B. Keegan, N. Hsueh, G. Kremen, L. LeZotte, J. Varela
NOES:	Directors	None
ABSENT:	Directors	R. Santos
ABSTAIN:	Directors	None

SANTA CLARA VALLEY WATER DISTRICT

By _____
LINDA J. LEZOTTE
Vice Chair/Board of Directors

ATTEST: MICHELE L. KING, CMC

_____
Clerk/Board of Directors

APPENDIX B: HAZARD MITIGATION PLANNING TEAM MEETING MATERIALS

Santa Clara Valley Water District
Local Hazard Mitigation Plan

KICK-OFF MEETING

Wednesday November 18, 2015

AGENDA

1. INTRODUCTIONS (5 MINUTES)
2. PROJECT GOALS & EXPECTATIONS (10 MINUTES)
3. STAFFING & COMMUNICATION PROTOCOLS (5 MINUTES)
4. LOCAL HAZARD MITIGATION PLAN (LHMP) OVERVIEW (15 MINUTES)
5. PUBLIC ENGAGEMENT (15 MINUTES)
    A. LHMP PLANNING TEAM
    B. PUBLIC SURVEY
6. DATA COLLECTION
    A. HAZARDS OF CONCERN (15 MINUTES)
    B. CRITICAL FACILITIES (15 MINUTES)
    C. MITIGATION STRATEGIES (15 MINUTES)
    D. PRIORITIZATION EXERCISE (15 MINUTES)
7. WORK PLAN & SCHEDULE REVIEW (10 MINUTES)
    A. OVERVIEW OF WORK PROGRAM, KEY TASKS, AND SCHEDULE
    B. WRAP-UP AND NEXT STEPS

PROJECT OVERVIEW

The Santa Clara Valley Water District is initiating a planning effort to update their Local Hazard Mitigation Plan (LHMP). This plan serves as the District's five-year strategic plan to analyze and mitigate natural hazards in the community. Preparation of the LHMP increases the District's eligibility for future disaster mitigation and post-disaster grant funding from FEMA.

LOCAL HAZARD MITIGATION PLAN

DMA 2000 (Public Law 106-390) provides the legal basis for FEMA mitigation planning requirements for State, local and Indian Tribal governments as a condition of mitigation grant assistance. DMA 2000 amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act by repealing the previous mitigation planning provisions and replacing them with a new set of requirements that emphasize the need for State, local, and Indian Tribal entities to closely coordinate mitigation planning and implementation efforts. The requirement for a State mitigation plan is continued as a condition of disaster assistance, adding incentives for increased coordination and integration of mitigation activities at the State level through the establishment of requirements for two different levels of state plans. DMA 2000 also established a new requirement for local mitigation plans and authorized up to 7 percent of HMGP funds available to a State for development of State, local, and Indian Tribal mitigation plans.

Completion and acceptance of the District's LHMP by FEMA opens up access to the following competitive FEMA grant programs for the next 5 years:

- ☐ Hazard Mitigation Grant Program (HMGP)
- ☐ Pre-Disaster Mitigation (PDM)

Under these programs up to 75 percent of the cost of an implementation project could be covered by a FEMA grant.

PRELIMINARY GOALS OF THE PROJECT

At the kick-off meeting, the project team will have the opportunity to discuss and confirm project goals. Based on guidance from the District's 2010–2015 Strategic Plan, preliminary goals for the HMP to consider include the following:

- ☐ ***STRATEGY AM-1:*** *MAKE COORDINATED, ENVIRONMENTALLY RESPONSIBLE AND PRIORITIZED ASSET INVESTMENT DECISIONS*
- ☐ ***STRATEGY AM-3:*** *PREPARE FOR CONTINUITY OF SERVICE DURING DISRUPTIONS*

PROJECT OBJECTIVES

Drawn from the preliminary goals identified above, the following project objectives have been drafted. Each objective has a corresponding question that will help refine the Plan's approach.

A. Continued coordination with key stakeholders and other agencies.

   a. Who are key stakeholders to contact?

B. A flexible and engaging public outreach campaign.

   a. What are the lessons learned from previous outreach events?

C. Foster better communication and coordination within the Agency and surrounding communities.

   a. What Cities/Agencies should be contacted regarding this project?

D. Address aging infrastructure issues to reduce/minimize future hazards and disasters.

   a. What infrastructure is at risk in your opinion?

SCVWD HAZARD MITIGATION PLANNING TEAM

This core team of District staff members will participate in actively reviewing and commenting on the District's Local Hazard Mitigation Plan. The following is a listing of District departments that should be involved. At least one staff member from each department should be in attendance for any meetings scheduled for the project.

- ☐ **Office of Emergency Services**
- ☐ **Office of Watershed Planning**
- ☐ **Watershed Business Management**
- ☐ **Water Quality Unit**
- ☐ **Infrastructure Planning Unit**
- ☐ **Water Utilities Treated Water Operations Unit**

External Stakeholders…

Critical Facilities

See attached Data Collection Packet.

Public Outreach Strategy

See attached Public Outreach Strategy

Hazards of Concern Prioritization

See Hazards Ranking Worksheet

Sign-In Sheet November 18, 2015

Kick-off Attendee Sign-In Sheet

Name	Department/Company
CORRY NAGAOKA	SCVWD
Juan Ledesma for Shree Dharmker	Safe, Clean Water Info
CHAD GRANDE	SCVWD
Afshin Rashani	SCVWD
Donna Germany	SCVWD /OES
Karen Uyeda	SCVWD
D CALDON	"
TAMMY DUNBAR	COUNTY OES
TeresaAlvarado	SCVWD PIO
Bob Teeter	Records + Library
Sara Duckler	Water Resources Planning
Mark Wander	Veg Mgt Unit
CRIS TULLOCH	Climate Change Conservation & Water Supply Planning
Aaron Baker	Raw Water Operations
Jill Bernhard	Information Technology
PAUL BURNETT	EHS
PAUL Thomas	Ethos
mike Rodriguez	OES & Security
Jose Villarreal	Communications (PIO)

December 17, 2015—Materials Unavailable

February 15, 2017—Materials Unavailable

APPENDIX C: PUBLIC OUTREACH

Local Hazard Mitigation Plan – FY16
Community Stakeholder Input

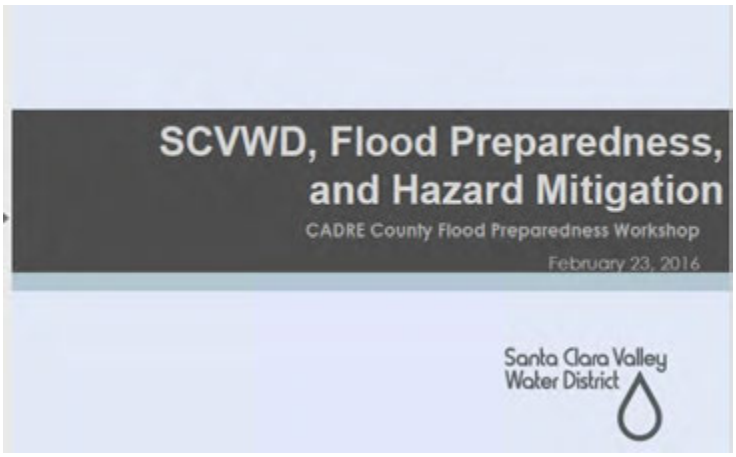
Santa Clara Valley Water District

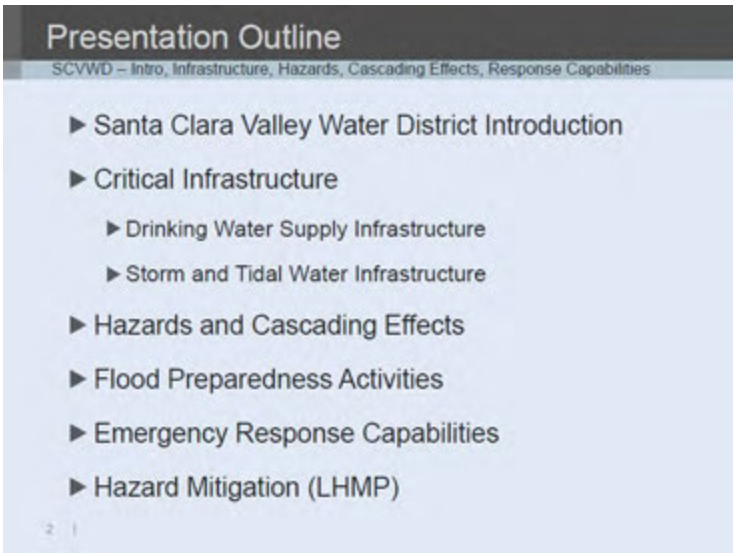
Stakeholder Group

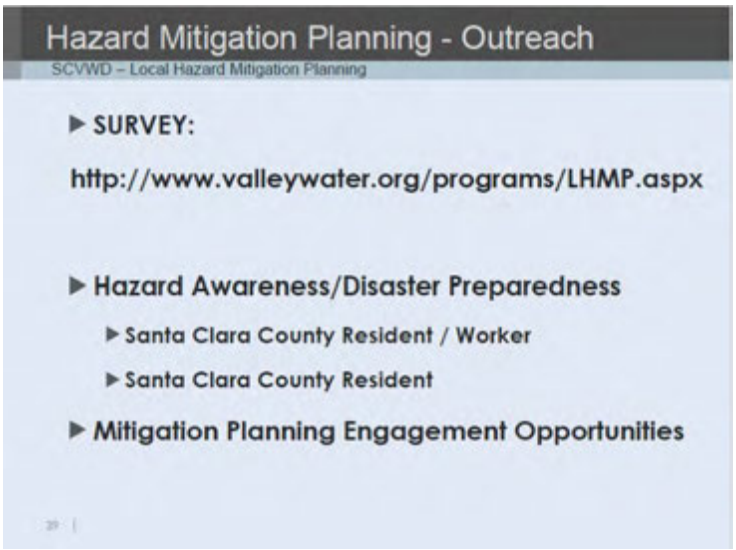
Forum	SCVWD Integrated Water Resources Master Plan Stakeholder Meeting
Date	9/1/2015
Venue	SCVWD HQ Board Room
Agenda	See Attached
Stakeholders	See Attached
Announcement	I want to thank Ngoc, Brian, and Afshin for allowing me this opportunity to announce that the SCVWD is updating its Local Hazard Mitigation Plan, or LHMP. I felt this is an appropriate meeting to make this announcement for two reasons: The Mitigation Planning Process requires: 1. that Mitigation Planning be done in conjunction and be consistent with other master planning efforts generally; 2. an Objective of the IWRMP process is to "Anticipate and Prepare for Emergencies;" and 3. that Mitigation Planning seek input from community stakeholders. Mitigation in the LHMP context means building agency and community resiliency to the effects of natural and manmade disasters. As such the Mitigation Planning seeks community engagement in the process including input on: 1. Identification of Community Hazards 2. Hazard Risks Assessment 3. Identification and Prioritization of Potential Disaster Mitigation Projects I'll be seeking opportunities to link to existing stakeholders Initiatives like this one but please feel free to sign up to be informed and included in future LHMP outreach efforts. Thanks You.

Participation List for Integrated Water Resources Master Plan Stakeholder Work Group 9/1/15 Meeting:

Name	Organization/Agency
Terra Alpaugh	Santa Clara Valley Water District
Ariel Ambruster	Center for Collaborative Policy
Maria Angeles	City of Gilroy Public Works Department
Jill Bicknell	Santa Clara Valley Urban Runoff Pollution Prevention Program
Katherine Cushing	San Jose State University
Sara Duckler	Santa Clara Valley Water District
Marci DuPraw	Center for Collaborative Policy
Scott Dusterhoff	San Francisco Estuary Institute
Anthony Eulo	Morgan Hill
Carole Foster	Santa Clara Valley Water District
Tracy Hemmeter	Santa Clara Valley Water District
Barry Hill	Santa Clara County Parks & Recreation Department
Leila Hufana	Santa Clara Valley Transportation Authority
Dale Jacques	Santa Clara Valley Water District
Alice Kaufman	Committee for Green Foothills
Liang Lee	Santa Clara Valley Water District
Eileen McLaughlin	Citizens Committee to Complete the Refuge
Brian Mendenhall	Santa Clara Valley Water District
Stephanie Moreno	Guadalupe-Coyote RCD
Ngoc Nguyen	Santa Clara Valley Water District
Jil Kauffman Nunez	La Raza Roundtable of California
Abby Ramsden	The Nature Conservancy
Ed Rast	United Neighborhoods of Santa Clara County
Curt Rayer	San Jose Water Company
Afshin Rouhani	Santa Clara Valley Water District
Jason Sidley	Department of Water Resources
Jake Smith	Santa Clara Open Space Authority
Salote Soqo	Environmental justice Coalition for Water


SCVWD, Flood Preparedness, and Hazard Mitigation
CADRE County Flood Preparedness Workshop
February 23, 2016
Santa Clara Valley Water District


Presentation Outline
SCVWD – Intro, Infrastructure, Hazards, Cascading Effects, Response Capabilities
Santa Clara Valley Water District Introduction
Critical Infrastructure
Drinking Water Supply Infrastructure
Storm and Tidal Water Infrastructure
Hazards and Cascading Effects
Flood Preparedness Activities
Emergency Response Capabilities
Hazard Mitigation (LHMP)


Hazard Mitigation Planning - Outreach
SCVWD – Local Hazard Mitigation Planning
SURVEY:
http://www.valleywater.org/programs/LHMP.aspx
Hazard Awareness/Disaster Preparedness
Santa Clara County Resident / Worker
Santa Clara County Resident
Mitigation Planning Engagement Opportunities

CADRE Workshop

Storm Reponse and Flood Planning

	First Name	Last Name	Job Title	Company
✓	Jimmy	Ancira	director	OUR LADY OF GUADALUPE FOOD PROGRAM
	Norma	Avalos	Director of Nursing Services	Gardner Family Health Network, Inc.
✓	Jason	Bisely	Facility Attendant	City of Cupertino
	Pearl	Bray-Chavez	Administrative Assistant	Social Services Agency
✓	Cory	Brill	Admin. Asst.	Catholic Charities of Santa Clara County
	Jennifer	Ceynowa	Program Specialist II	Santa Clara County Fire Department
✓	Karen	Comey	Volunteer and Youth Services Coordinator	American Red Cross
✓	Joseph	Cornejo	maintenance	Parisi House on the Hill
✓	Sarah	Davison	Program Officer	Silicon Valley Community Foundation
	Liz	Dietz, EdD, RN	Staff Wellness Lead	American Red Cross
✓	Lauren	Doud	Consultant	EORM, Inc.
✓	Natalie	Edelman	Volunteer & Youth Services Coordinator	American Red Cross
✓	David	Fernandez	Mass Care, Shelter, & Emergency Preparedness Mgr	SCC, SSA
	Kent	Fielden	Disaster Program manager	American Red Cross
	Lauren	Finke	Program Coordinator	American Red Cross
✓	Stephanie	Frink	Emergency Management Specialist	Santa Clara County Public Health Department
✓	Yvette	Galindo	Human Resources Director	Center for Employment Training (CET)
	Derek	Gaskin	Director	ADSF
✓	Elizabeth	Harkins	Firefighter	Santa Clara Fire Department
✓	Dale	Jacques	Emergency and Security Manager	Santa Clara Valley Water District
✓	Dennis	Kempel	Contractor	CADRE
✓	Patricia	Kempel	President	Two Pencils Marketing Group
✓	Gerald	Kiernan	Deputy Executive Director	Bay Area Center for Regional Disaster Resilience
✓	Karen	Levy	Coordinator of Recreation Activities	City of Cupertino
✓	John Francis	Maggio	BandLeader	NWGNA
	Jeana marie	Maggio	student	NWGNA
✓	David	McCreath	Retired Clergy	Presbytery of San Jose
✓	Laurel	Mechling	Director, Compliance	EMQ FamiliesFirst
✓	Corazon	Mendoza	Child Care Specialist	4C Council
	Mark	Meyers	Facilities Manager	Bill Wilson Center
✓	Christie	Moore	Asst. Deputy Director, Community Ed.	Santa Clara County Fire Department
✓	Chris	Munson	Senior Project Manager	SETI Institute
✓	Salvador	Murillo	Emergency Management Specialist	Santa Clara County Public Health Department

February 23, 2016

CADRE Workshop

Storm Reponse and Flood Planning

	First Name	Last Name	Job Title	Company
✓	Greg	Murphy	Dir. of Operations	Jewish Family and Children's Services
	Tammy	Norem	Emergency Planning Coordinator	County of Santa Clara OES
✓	Rev. Dr. John	Palmer	Chaplain	Santa Clara Police Department
	Brenda	Phillips	site safety conrdinator	Momentum for mental health
✓	Bruno	Pillet	VP Program and Services	SHFB
✓	Rich	Saito	facilitator	Japantown Prepared
✓	V.	SANDRA	DRIVER	OUR LADY OF GUADALUPE FOOD PROGRAM
✓	Paula	Scalingi	Executive Director	Bay Area Center for Regional Disaster Resilience
	Alexander	Schubek	Public Health Preparedness Manager	Santa Clara County Public Health Dept.
	Roy	Shackel	Fire Captain/OES Coordinator	City of Gilroy Fire Department/OES
✓	James	Uhey	President	The Phoenix Project USA
	Blanca	Uribe	Nursing Administrative Assistant	Gardner Family Health Network, Inc.
	Michael	Watzka	Facilities Operations Manager	Children's Health Council
✓	Allysha	Wiseman	Safety Adminstrator	California Water Service
✓	David	Yardley	County Coordinator	The Salvation Army
✓	Jim	Yoke	Program Specialist II	Santa Clara County Fire Department
✓	Antonio	Garcia	Technician	Momentum mental Health
✓	Aprilyn	Young		Elwyn CA.
✓	Anna	Shakesheff		
✓	Ivan	Williams	DAC Liaison	SCC OES
	22-Feb			

February 23, 2016

2015 Santa Clara Valley Water District

Hazard Mitigation Plan Survey

I. Introduction

Dear Community Member,

The Santa Clara Valley Water District (SCVWD), in an effort to continually protect and serve its customers, is conducting a local effort to prepare a Hazard Mitigation Plan. This plan identifies natural hazards throughout the District and assesses the vulnerability of critical infrastructure and facilities to these hazards. Using this understanding, the plan lists potential actions to reduce risk and future damage.

Is your home or office building susceptible to damage from earthquakes, floods, or fire? Do you want to recover more quickly from disasters and prevent future damage from these and other natural hazards? Your participation in this survey can make the SCVWD more resilient to disasters. Your responses to this survey will inform the plan preparation. Thank you for your time and cooperation to respond to the brief survey below.

II. Hazard Awareness

1. Please indicate whether you live or work in Santa Clara County
   a. I live in Santa Clara County
   b. I work in Santa Clara County
   c. I live and work in Santa Clara County
   d. Neither apply to me, but I am interested in the District's resiliency

2. What is the ZIP Code of your home?

   _____

3. Have you been impacted by a disaster in your current residence?
   a. Yes
   b. No

4. If you answered yes to the previous question, please select the type of disaster that you have been impacted by (select all that apply).
   a. Flooding
   b. Heavy Rains
   c. Earthquakes
   d. Fire (wildland and WUI)

Please list any additional hazards that have previously impacted your neighborhood or home.

5. The following hazards could potentially impact the District. Please mark the THREE (3) hazards that are of most concern to your neighborhood or home.
   a. Flooding
   b. Heavy Rains
   c. Earthquakes
   d. Fire (wildland and WUI)

Please list any additional hazards that present a threat to your neighborhood or home.

6. The planning team is using various data sources to identify hazards in your community; however, some of these data sources do not provide local data at a general district-wide level. Are there any small-scale issues, such as ponding at a certain intersection during rain, that you would like the planning team to consider?
   a. I am not aware of any local hazards
   b. I am aware of local hazards

If you are aware of such hazards, please provide as much detail as possible, including location and type of hazard.

7. If you are a homeowner, do you have adequate homeowner's insurance to cover the hazards that could impact your home?
   a. Yes, my insurance coverage should be adequate.
   b. No, I don't believe my insurance coverage would be adequate for a major disaster.
   c. Unsure.
   d. I do not have an insurance policy.
   e. Not applicable; I rent my current residence.

8. If you rent your residence, do you have renter's insurance?
   a. Yes
   b. No
   c. Not applicable; I own my residence.

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

10. Please note any additional insurance you have for your home or property.

11. Have you done anything to your home to make it less vulnerable to hazards such as earthquakes, floods, and fires? Do you plan to?
    a. Yes, I have taken action to make my home less vulnerable to hazards.
    b. I have not taken action to make my home less vulnerable to hazards, but do plan to.
    c. No, I have not and do not place to take action to make my home less vulnerable to hazards.

12. If a severe hazard event occurred today such that all services were cut off from your home (power, gas, water, sewer) and you were unable to leave or access a store for 72 hours, which of these items do you have readily available?
    a. Potable water (3 gallons per person)
    b. Cooking and eating utensils
    c. Can opener
    d. Canned / nonperishable foods (ready to eat)
    e. Gas grill / camping stove
    f. Extra medications
    g. First aid kit / supplies
    h. Portable AM/FM radio (solar powered, hand crank, or batteries)
    i. Handheld "walkie-talkie" radios (with batteries)
    j. Important family photos / documentation in a water- and fireproof container
    k. Extra clothes and shoes
    l. Blanket(s) / sleeping bag(s)
    m. Cash
    n. Flashlight (with batteries)
    o. Gasoline
    p. Telephone (with batteries)
    q. Pet supplies
    r. Secondary source of heat

    What else do you have in your emergency kit?

For more information on preparing an emergency kit, please visit: http://m.fema.gov/build-a-kit

13. Are you familiar with the special needs of your neighbors in the event of a disaster situation (special needs may include limited mobility, severe medical conditions, memory impairments)?
    a. Yes
    b. No

14. Are you a trained member of your Community Emergency Response Team (CERT)?
    a. Yes
    b. No, but I would like to learn more about CERT.
    c. No, I am not interested in being a trained CERT member.

    For more information about CERT, please visit: www.citizencorps.gov/cert.

    Please share with us why you are a trained CERT member or why you are not yet part of CERT.

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

If you do NOT work in Santa Clara County, please skip to question 19.

16. What is the ZIP code of your workplace?

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

18. Does your employer have a workforce communications plan to implement following a disaster so they are able to contact you?
    a. Yes
    b. No

III. Hazard Awareness

19. Please list any studies you are aware of conducted in the District or the region regarding the risk of future hazard events (e.g., mining impact studies, dam inundation analyses).

20. Would you like to review and comment on the draft of the 2015 Santa Clara Valley Water District Hazard Mitigation Plan?
    a. Yes; please notify me using my contact information in the next question.
    b. No

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

Full Name:	
Email Address:	
Street Address:	
City, State, Zip:	

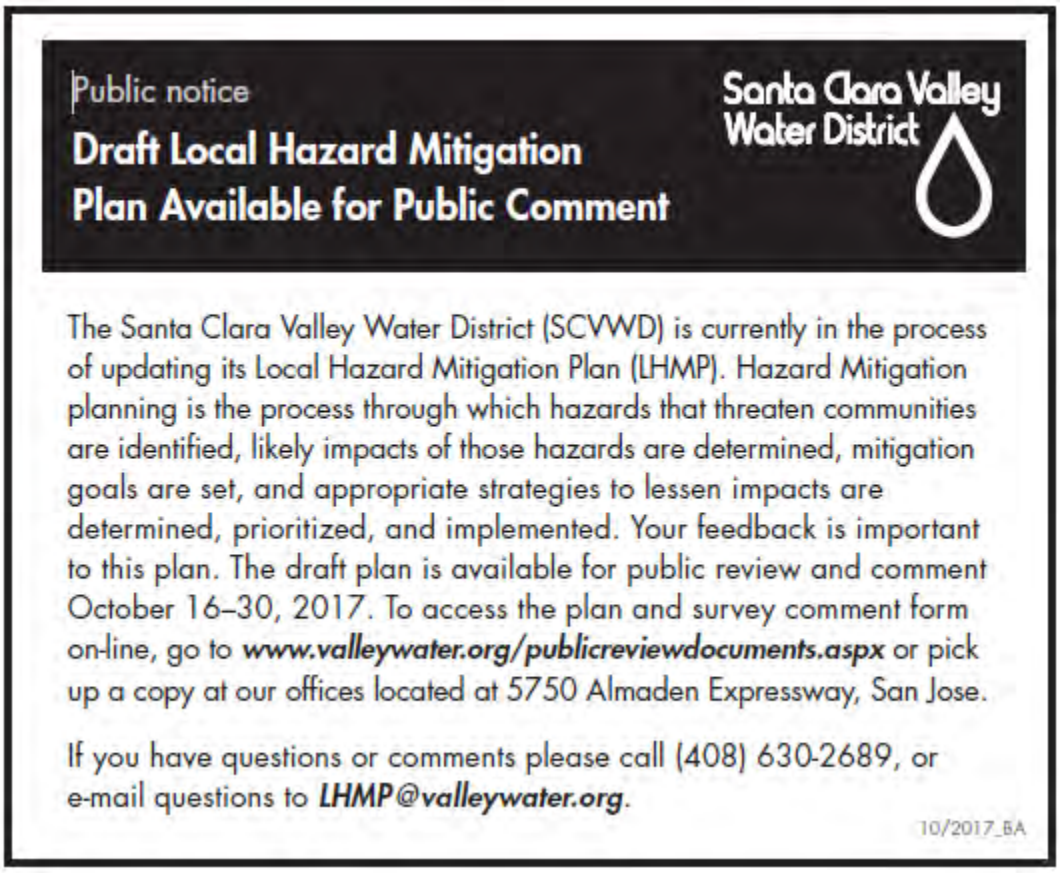
22. Please provide us with any additional comments/suggestions/questions that you have regarding your risk of future hazard events.

Thank you for taking the time to complete this survey. If you have any questions, or if you know of other people/organizations that should be involved, please contact Dale Jacques or Cindy Martinez at LHMP@valleywater.org.

Public Draft Review October 2017

Public Draft Review Notices

Bay Area New Group Newspaper Posting (10/13/2017)



Public notice

Draft Local Hazard Mitigation Plan Available for Public Comment

Santa Clara Valley Water District

The Santa Clara Valley Water District (SCVWD) is currently in the process of updating its Local Hazard Mitigation Plan (LHMP). Hazard Mitigation planning is the process through which hazards that threaten communities are identified, likely impacts of those hazards are determined, mitigation goals are set, and appropriate strategies to lessen impacts are determined, prioritized, and implemented. Your feedback is important to this plan. The draft plan is available for public review and comment October 16–30, 2017. To access the plan and survey comment form on-line, go to ***www.valleywater.org/publicreviewdocuments.aspx*** or pick up a copy at our offices located at 5750 Almaden Expressway, San Jose.

If you have questions or comments please call (408) 630-2689, or e-mail questions to ***LHMP@valleywater.org***.

10/2017_BA

Twitter Posting (10/13/2017)

Facebook Posting 10/13/2017

Public Draft Review Online Survey (October 16–30, 2017)

The Santa Clara Valley Water District (SCVWD) is currently in the process of updating its Local Hazard Mitigation Plan (LHMP). Before the plan is submitted to the State of California and FEMA for approval, we need your feedback! Please review the draft plan, in particular the mitigation actions in Table 6.2, and then fill out the quick survey form. Public Review period is open October 16 through October 30, 2017. If you have questions or comments, please contact LHMP@valleywater.org

SCVWD LHMP FEEDBACK AND COMMENTS

Upon reviewing the draft 2017 Local Hazard Mitigation Plan, please answer the following questions to provide feedback and suggestions. Thank You!

1. **After reviewing the mitigation actions (Table 6.2 pages 108-117), do you have any ideas for new ones to add? Please explain in as much detail as possible.**

2. **Do you feel the priorities for the mitigation actions are appropriately set?**

3. **Does this plan reflect the needs of SCVWD to mitigate against future natural hazards? If not, please explain.**

4. Do you have any other comments or suggestions on the plan?

Optional: If you are willing for us to follow up with you to clarify any of your answers, please provide your name and e-mail address:

Name:	
Email Address:	

APPENDIX D: PREVIOUS MITIGATION MEASURES

2009 to 2010 Strategy Number	2010 Mitigation Strategy	2017 Status
INFRASTRUCTURE		
a-1	Assess the vulnerability of critical facilities owned by infrastructure operators subject to damage in natural disasters or security threats, including fuel tanks and facilities owned outside of the Bay Area that can impact service delivery within the region. Note-Infrastructure agencies, departments, and districts are those that operate transportation and utility facilities and networks.	A district-wide vulnerability assessment of critical facilities will be conducted in FY18-19.
a-2	If a dam owner, comply with State of California and federal requirements to assess the vulnerability of dams to damage from earthquakes, seiches, landslides, liquefaction, or security threats.	Seismic stability evaluation of the first four dams was completed by October 2012. Seismic embankment deficiencies were identified in 3 of these 4 dams (Anderson, Calero, and Guadalupe); and other (i.e. spillway and intake) deficiencies were identified in the 4th (Almaden) dam. Capital retrofit and improvement projects were initiated to remediate these four dams. Seismic stability evaluation of the next two dams (Lenihan and Stevens Creek) was completed by January 2013. The seismic embankment stability was found to be adequate in both these dams. Seismic stability evaluation studies on three additional dams (Coyote, Chesbro, and Uvas) was initiated in 2014 and is currently ongoing. Completion of planning, design, and construction of Anderson, Calero, and Guadalupe Dam seismic retrofit projects is projected to be by 2024. Completion of Capital improvement project at Almaden is projected to be by 2026.

2009 to 2010 Strategy Number	2010 Mitigation Strategy	2017 Status
a-3	Encourage the cooperation of utility system providers and cities, counties, and special districts, and PG&E to develop strong and effective mitigation strategies for infrastructure systems and facilities.	Participation in Bay Area Security Information Collaborative and RP all contribute to this. We are actively working with PG&E, other PWRPA member agencies to strengthen our reliable energy infrastructure. Also, District is monitoring local community choice aggregations (CCA) and has converted qualifying minor PG&E accounts to Silicon Valley Clean Energy to operate using 100% carbon-free energy. The newly approved San Jose Clean Energy is currently in development and may benefit most of the remaining minor PG&E accounts.
a-4	Retrofit or replace critical lifeline infrastructure facilities and/or their backup facilities that are shown to be vulnerable to damage in natural disasters.	The District updated its Infrastructure Reliability Report in 2016 and is implementing recommended projects from the 2016 report, including constructing interties with retailers, installing several isolation valves, and conducting various studies. In addition, the District implements an ongoing asset management program to ensure aging infrastructure is replaced or rehabilitated at end of life, or as conditions degrade.
a-5	Support and encourage efforts of other (lifeline infrastructure) agencies as they plan for and arrange financing for seismic retrofits and other disaster mitigation strategies. (For example, a city might pass a resolution in support of a transit agency's retrofit program.)	Supports the Delta-Mendota levee project and efforts of DWR to improve the South Bay Aqueduct. A partnership is in place with FEMA to produce risk-based flood maps for communication and hazard mitigation planning. Work on the latter is funded by the Safe Clean Water Plan.
a-6	Develop a plan for speeding the repair and functional restoration of water and wastewater systems through stockpiling of shoring materials, temporary pumps, surface pipelines, portable hydrants, and other supplies, such as those available through the Water /Wastewater Agency Response Network (WARN). Communicate that plan to local governments and critical facility operators.	Some materials have been stockpiled, however a formal plan has yet to be developed.

2009 to 2010 Strategy Number	2010 Mitigation Strategy	2017 Status
a-7	Engage in, support, and/or encourage research by others (such as USGS, universities, or Pacific Earthquake Engineering Research Center-PEER) on measures to further strengthen transportation, water, sewer, and power systems so that they are less vulnerable to damage in disasters.	The District will participate in the Santa Clara County Op Area Recovery Framework Plan
a-8	Pre-position emergency power generation capacity (or have rental/lease agreements for these generators) in critical buildings of cities, counties, and special districts to maintain continuity of government and services.	Water Treatment Facilities and Pump Stations have working backup generators. All generators are under one contract overseen by the WUE and Facilities for the various campus locations.
a-11	Minimize the likelihood that power interruptions will adversely impact lifeline utility systems or critical facilities by ensuring that they have adequate back-up power.	We have expanded the backup capacity for many of our facilities and there is a project planned to further expand the capacity (design starting in FY18 and Construction in FY19).
a-13	If you own a dam, coordinate with the State Division of Safety of Dams to ensure an adequate timeline for the maintenance and inspection of dams, as required of dam owners by State law, and communicate this information to local governments and the public.	On-going program. The District works closely with the State Division of Safety of Dams to ensure compliance with all requirements.
a-14	Encourage communication between State Emergency Management Agency (CalEMA), FEMA, and utilities related to emergencies occurring outside of the Bay Area that can affect service delivery in the region.	The District continues to attend monthly, quarterly and annual meetings such as but not limited to BAESIC, SCCEMA, CESA, UASI, and Cal WARN.
a-19	Coordinate with other critical infrastructure facilities to establish plans for delivery of water and wastewater treatment chemicals.	The Bay Area has a chemical purchasing consortium that the District belongs to. The District participates in monthly meetings with other agencies, including CCWD, ACWD, EBMUD, and SFPUC.

2009 to 2010 Strategy Number	2010 Mitigation Strategy	2017 Status
a-20	Establish plans for delivery of fuel to critical infrastructure providers.	The District's 2016 Infrastructure Reliability Project did evaluate the re-fueling needs for generators at Water Treatment Plants in the event of a sustained long-term power outage. A plan for fuel delivery has yet to be developed.
a-21	As an infrastructure operator, designate a back-up Emergency Operations Center with redundant communications systems.	Alternate EOC relocation to be completed in FY18 to include redundant communications systems
INFR-b-EARTHQUAKES		
a-22	Monitor scientific studies of the Sacramento-San Joaquin Delta and policy decisions related to the long-term disaster resistance of that Delta system to ensure that decisions are made based on comprehensive analysis and in a scientifically- defensible manner. Levee failure due to earthquakes, flooding, and climate change (including sea level rise and more frequent and more severe flooding) are all of concern. The long-term health of the Delta area is critical to the Bay Area's water supply, is essential for the San Francisco Bay and estuary's environmental health, provides recreation opportunities for Bay Area residents, and provides the long- term sustainability of Delta communities. The Delta is tied to the infrastructure, water supply, and economy of the Bay Area.	We have been monitoring and participating in planning and research efforts to restore the health of the Delta ecosystem and to ensure the long-term reliability of water supplies conveyed through the Delta. We will continue to monitor and participate in these efforts.
b-3	Include "areas subject to high ground shaking, earthquake- induced ground failure, and surface fault rupture" in the list of criteria used for determining a replacement schedule for pipelines (along with importance, age, type of construction material, size, condition, and maintenance or repair history).	The Asset Management program is developing a pipeline asset management plan that will account for seismic vulnerability. The plan will develop a schedule of pipeline replacements and rehabs based on pipeline risk, including seismic risk. The WUE currently inspects and rehabilitates one to two pipelines per year.

2009 to 2010 Strategy Number	2010 Mitigation Strategy	2017 Status
b-4	Install specially-engineered pipelines in areas subject to faulting, liquefaction, earthquake-induced landsliding, or other earthquake hazard.	The Asset Management program is developing a pipeline asset management plan that will account for seismic vulnerability. The plan will develop a schedule of pipeline replacements and rehabs based on pipeline risk, including seismic risk. The WUE currently inspects and rehabilitates one to two pipelines per year. Future rehabilitations and replacements will be designed to withstand seismic hazards where needed.
b-5	Replace or retrofit water-retention structures that are determined to be structurally deficient, including levees, dams, reservoirs and tanks.	Current Capital retrofit and improvement projects are on-going.
b-6	Install portable facilities (such as hoses, pumps, emergency generators, or other equipment) to allow pipelines to bypass failure zones such as fault rupture areas, areas of liquefaction, and other ground failure areas (using a priority scheme if funds are not available for installation at all needed locations).	Class IV shop has pumps, hoses and generators. There are Standing Orders (SOs) in place for pumps, hoses and generators through the Stream Maintenance Program and emergency SOs initiated by Water Utility. Funding is through various operating projects.
b-7	Install earthquake-resistant connections when pipes enter and exit bridges and work with bridge owners to encourage retrofit of these structures.	This is standard design practice for capital projects if a proposed project involves a new or existing pipeline in a bridge. The District works with bridge owners to comply with their requirements.
b-8	Comply with all applicable building and fire codes, as well as other regulations (such as state requirements for fault, landslide, and liquefaction investigations in particular mapped areas) when constructing or significantly remodeling infrastructure facilities.	This is standard design practice for capital projects.

2009 to 2010 Strategy Number	2010 Mitigation Strategy	2017 Status
b-9	Clarify to workers in critical facilities and emergency personnel, as well as to elected officials and the public, the extent to which the facilities are expected to perform only at a life safety level (allowing for the safe evacuation of personnel) or are expected to remain functional following an earthquake.	The District's EAP outlines the evacuation procedures for District facilities.
INFR- c – WILDFIRE		
c-3	Develop a defensible space vegetation program that includes the clearing or thinning of (a) non-fire resistive vegetation within 30 feet of access and evacuation roads and routes to critical facilities, or (b) all non-native species (such as eucalyptus and pine, but not necessarily oaks) within 30 feet of access and evacuation roads and routes to critical facilities.	District maintains fire breaks along district facilities.
c-7	Ensure adequate fire equipment road or fire road access to developed and open space areas.	District maintains access roads to facilities and creeks within district ROW on an on-going basis.
c-8	Maintain fire roads and/or public right-of-way roads and keep them passable at all times.	District maintains access roads to facilities and creeks within district ROW on an on-going basis.
INFR - d - FLOODING		
d-1	Conduct a watershed analysis of runoff and drainage systems to predict areas of insufficient capacity in the storm drain and natural creek system.	Annual inspections are conducted on all creeks where the district has ROW. Assessments are made on the capacity and work orders prepared for next work season.
d-2	Develop procedures for performing a watershed analysis to examine the impact of development on flooding potential downstream, including communities outside of the jurisdiction of proposed projects.	Performed by the local municipalities and the developers relative to development reviewed sporadically by the District through CPRU. Hydrology staff periodically updates hydrology based on General Plan buildout. Watershed Planning staff is looking to partner with FEMA to develop risk-based flood maps to be used for communication and planning/ mitigation of risk.

2009 to 2010 Strategy Number	2010 Mitigation Strategy	2017 Status
d-3	Conduct a watershed analysis at least once every ten years unless there is a major development in the watershed or a major change in the Land Use Element of the General Plan of the cities or counties within the watershed.	The One Water integrated water resources master plan project is comprehensively addressing the flood protection status and needs of all District watersheds. This plan is to be updated on a regular basis.
d-4	Assist, support, and/or encourage the U.S. Army Corp of Engineers, various Flood Control and Water Conservation Districts, and other responsible agencies to locate and maintain funding for the development of flood control projects that have high cost-benefit ratios (such as through the writing of letters of support and/or passing resolutions in support of these efforts).	District meets with local district Corps staff on biannual basis and District delegations visit Washington DC Corps offices annually to encourage support and funding of flood protection projects from federal interests.
d-5	Pursue funding for the design and construction of storm drainage projects to protect vulnerable properties, including property acquisitions, upstream storage such as detention basins, and channel widening with the associated right-of-way acquisitions, relocations, and environmental mitigations.	District is participating on a Stormwater Master Plan with partner agencies (Cities and County). The plan will identify priority locations for stormwater collection and detention and other system enhancements for program and grant funding by all affiliated agencies.
d-6	Continue to repair and make structural improvements to storm drains, pipelines, and/or channels to enable them to perform to their design capacity in handling water flows as part of regular maintenance activities. (This strategy has the secondary benefit of addressing fuel, chemical, and cleaning product issues.)	Currently the Stream Maintenance Program is within its 16th year of maintenance and continues, on an annual basis, to conduct vegetation management, erosion control, minor maintenance and sediment removal, to help maintain flow conveyance of the creeks and channels.
d-7	Continue maintenance efforts to keep storm drains and creeks free of obstructions, while retaining vegetation in the channel (as appropriate) to allow for the free flow of water.	The district has preventive and emergency debris removal programs.

2009 to 2010 Strategy Number	2010 Mitigation Strategy	2017 Status
d-8	Enforce provisions under stormwater management, and discharge control ordinances designed for water quality and to protect drainage facilities to **conform** with the Regional Water Quality Control Board.	District participates as a co-permittee in the Santa Clara Valley Urban Runoff Pollution Prevention Program. District also works with local municipalities to delineate responsibilities for enforcement of local ordinances. In December 2016, the District on behalf of SCVURPPP was awarded a Proposition 1 grant to develop a Storm Water Resource Plan for the Santa Clara Basin that will support the development and implementation of MRP- required Green Infrastructure Plans and produce a list of prioritized runoff capture and use projects eligible for future state implementation grant funds. The District, in addition to managing the grant, participates on the Technical Advisory Committee.
d-9	Develop an approach and locations for various watercourse bank protection strategies, including for example, (1) an assessment of banks to inventory areas that appear prone to failure, (2) bank stabilization, including installation of rip rap, or whatever regulatory agencies allow (3) stream bed depth management using dredging, and (4) removal of out-of-date coffer dams in rivers and tributary streams.	The One Water integrated water resources master plan project is comprehensively addressing the status and needs of all District watersheds. This plan is to be updated on a regular basis.
d-10	Use reservoir sediment or reed removal as one way to increase storage for both flood control and water supply.	This strategy is not currently being considered by the District
d-11	Identify critical locally-owned bridges affected by flooding and either elevate them to increase stream flow and maintain critical ingress and egress routes or modify the channel to achieve equivalent objectives.	The FY 2018-2022 Capital Improvement Program includes a number of flood protection capital improvement projects to be implemented in the next 5 years. Locally-owned bridges affected by flooding that are parts of those flood protection projects will be modified or replaced to meet the flood protection levels for those projects.

2009 to 2010 Strategy Number	2010 Mitigation Strategy	2017 Status
d-12	Provide or support the mechanism to expedite the repair or replacement of levees that are vulnerable to collapse from earthquake-induced shaking or liquefaction, rodents, and other concerns, particularly those protecting critical infrastructure.	District has a levee inspection and repair program to ensure safety of levees. District also has emergency response capabilities to carry out repairs.
d-13	Ensure that utility systems in new developments are constructed in ways that reduce or eliminate flood damage.	Performed by the local municipalities and the developers and reviewed by the District through the CPRU permit program.
d-14	Determine whether or not wastewater treatment plants are protected from floods, and if not, investigate the use of flood- control berms to not only protect from stream or river flooding, but also increase plant security.	The District operates one advanced purification center that is not in the flood zone.
d-15	Work cooperatively with water agencies, flood control districts, Caltrans, and local transportation agencies to determine appropriate performance criteria for watershed analysis.	District projects always coordinate and collect information from multiple sources in formulating project approaches.
d-16	Work for better cooperation among the patchwork of agencies managing flood control issues.	District provides technical assistance in efforts such as Community Rating System and Levee Recertification's. District sponsors free floodplain management courses to local floodplain managers

2009 to 2010 Strategy Number	2010 Mitigation Strategy	2017 Status
d-17	Improve monitoring of creek and watercourse flows to predict potential for flooding downstream by working cooperatively with land owners and the cities and counties in the watershed.	The District is working on the following projects in support of this mitigation strategy: --Creation of an Emergency Action Plan for Coyote Creek, a collaboration effort with the City of San Jose. --Plans are in process to develop similar plans for other watersheds. --A flood forecasting system has been developed for some creeks, and is in the process of being expanded to include more creeks. --The District is developing an improved, map based website for visualizing stream stage and rainfall data.
d-18	Using criteria developed by EPA for asset management, inventory existing assets, the condition of those assets, and improvements needed to protect and maintain those assets. Capture this information in a Geographic Information System (GIS) and use it to select locations for creek monitoring gauges.	The District has an asset management program based on the EPA's asset management planning model. The District maintains an asset inventory, condition information, and asset improvement plans. The District does not utilize GIS to track its assets, and instead uses Maximo and another proprietary system. All assets are available in a GIS map, however condition and other asset information is not. There is no tie to creek monitoring gauges.
INFR - e - LANDSLIDES		
e-1	Include “areas subject to ground failure” in the list of criteria used for determining a replacement schedule (along with importance, age, type of construction material, size, condition, and maintenance or repair history) for pipelines.	The Asset Management program is developing a pipeline asset management plan that will account for seismic vulnerability. The plan will develop a schedule of pipeline replacements and rehabs based on pipeline risk, including seismic risk. The WUE currently inspects and rehabilitates one to two pipelines per year.

2009 to 2010 Strategy Number	2010 Mitigation Strategy	2017 Status
INFR - f - BUILDING REOCCUPANCY		
f-1	Ensure that critical buildings owned or leased by special districts or private utility companies participate in a program similar to San Francisco's Building Occupancy Resumption Program (BORP).	The District has engineers on staff that are certified through the State Safety Assessment Training Program
INFR - g - PUBLIC EDUCATION		
g-3	Provide materials to the public related to coping with reductions in water supply or contamination of that supply BEYOND regulatory notification requirements.	When water use reductions are necessary, the Office of Communications works with the Conservation Unit to provide practical tools on reducing water use. Water quality outreach materials will be produced as needed to help communities cope with any water contamination issues.
g-4	Provide materials to the public related to coping with disrupted storm drains, sewage lines, and wastewater treatment (such as that developed by ABAG's Sewer Smart Program).	While storm drains, sewage lines and wastewater treatment are beyond the purview of SCVWD, we promote flood safety information with includes advice on monitoring storm drains to reduce the risk of localized street flooding. We send a mailer to flood prone properties every fall, among other outreach activities.
g-5	Facilitate and/or coordinate the distribution of emergency preparedness or mitigation materials that are prepared by others, such as by making the use of the internet or other electronic means, or placing materials on community access channels or in city or utility newsletters, as appropriate	Our annual flood awareness campaign will focus on the flood preparations, including promotions of the County's AlertSCC emergency notification system and the ReadySCC app. We will post these messages on social media platforms and our own websites.
g-6	Sponsor the formation and training of Community Emergency Response Teams (CERT) for the employees of your agency. [Note – these programs go by a variety of names in various cities and areas.]	This is currently being reviewed.

2009 to 2010 Strategy Number	2010 Mitigation Strategy	2017 Status
g-7	Develop and distribute culturally appropriate materials related to disaster mitigation and preparedness, such as those on the http://www.preparenow.org website related to infrastructure issues.	Flood plain mailer is distributed to approximately 60,000 homes. This mailer will be translated and available in Spanish, Vietnamese and Chinese.
GOVT - a - FOCUS ON CRITICAL FACILITIES		
a-1	Assess the vulnerability of critical facilities (such as city halls, fire stations, operations and communications headquarters, community service centers, seaports, and airports) to damage in natural disasters and make recommendations for appropriate mitigation.	The Headquarters building was built in 2000 and was built as an essential building. The WQL was built in 2007 as an essential building. The Administration building was evaluated to be renovated to current codes and to as an essential building but was too costly, so the project was not implemented. Winfield and Vegetation Management warehouses has had seismic upgrading as part of the current project that has been put on hold in Aug. 2016.
a-2	Retrofit or replace critical facilities that are shown to be vulnerable to damage in natural disasters.	These were included in the approved January 2012 Conceptual Master Plan but were put on hold in August 2016 due to financial considerations.
a-3	Clarify to workers in critical facilities and emergency personnel, as well as to elected officials and the public, the extent to which the facilities are expected to perform only at a life safety level (allowing for the safe evacuation of personnel) or are expected to remain functional following an earthquake.	The District's EAP outlines the evacuation procedures for District facilities.

2009 to 2010 Strategy Number	2010 Mitigation Strategy	2017 Status
a-4	Conduct comprehensive programs to identify and mitigate problems with facility contents, architectural components, and equipment that will prevent critical buildings from being functional after major natural disasters. Such contents and equipment includes computers and servers, phones, files, and other tools used by staff to conduct daily business.	The District completed a Business Impact Analysis in 2015 that Identified the critical resources, buildings, and essential records that support continuity of operations.
a-5	Encourage joint meetings of security and operations personnel at critical facilities to develop innovative ways for these personnel to work together to increase safety and security.	The District continues to attend monthly, quarterly and annual meetings such as but not limited to BAESIC and Infragard
a-6	When Installing micro and/or surveillance cameras around critical public assets tied to web-based software, and develop a surveillance protocol to monitor these cameras, investigate the possibility of using the cameras for the secondary purpose of post-disaster damage assessment.	The District has a current planned installation of security cameras at critical assets that will also be used for the secondary purpose of damage assessment.
a-7	Identify and undertake cost-effective retrofit measures related to security on critical facilities (such as moving and redesigning air intake vents and installing blast-resistant features) when these buildings undergo major renovations related to other natural hazards.	Capital Projects undertakes cost-effective retrofit measures related to security on critical facilities.
a-8	Coordinate with the state Division of Safety of Dams to ensure that cities and counties are aware of the timeline for the maintenance and inspection of dams whose failure would impact their jurisdiction.	On-going program. District works with State Division of Safety of Dams and has regular meetings with Morgan Hill, County Parks.

2009 to 2010 Strategy Number	2010 Mitigation Strategy	2017 Status
a-9	As a secondary focus, assess the vulnerability of non-critical facilities to damage in natural disasters based on occupancy and structural type, make recommendations on priorities for structural improvements or occupancy reductions, and identify potential funding mechanisms.	Recommendations where incorporated into the approved Conceptual Master plan approved by the Board in Jan 2012.
a-10	Ensure that new government-owned facilities comply with and are subject to the same or more stringent regulations as imposed on privately-owned development.	District owned facilities comply with all local, state, and federal building regulations.
a-12	Prior to acquisition of property to be used as a critical facility, conduct a study to ensure the absence of significant structural hazards and hazards associated with the building site.	This is standard design practice for capital projects.
GOVT - b - Maintain and Enhance Local Government's Emergency Recovery Planning		
b-1	Establish a framework and process for pre-event planning for post- event recovery that specifies roles, priorities, and responsibilities of various departments within the local government organization, and that outlines a structure and process for policy-making involving elected officials and appointed advisory committees.	The District will participate in the Santa Clara County Op Area Recovery Framework Plan
b-2	Prepare a basic Recovery Plan that outlines the major issues and tasks that are likely to be the key elements of community recovery, as well as integrate this planning into response planning (such as with continuity of operations plans).	The District is working on implementing a Continuity of Operations Program and Plans. The District will also participate in the development of the county-wide Recovery Plan.

2009 to 2010 Strategy Number	2010 Mitigation Strategy	2017 Status
a-11	Comply with all applicable building and fire codes, as well as other regulations (such as state requirements for fault, landslide, and liquefaction investigations in particular mapped areas) when constructing or significantly remodeling government-owned facilities.	The District continues to comply with all applicable building and fire codes, and other regulations when constructing or remodeling facilities.
b-3	Establish a goal for the resumption of local government services that may vary from function to function.	The District is working on implementing a Continuity of Operations Program and Plans. The District will also participate in the development of the county-wide Recovery Plan.
b-4	Develop a continuity of operations plan that includes back-up storage of vital records, such as plans and back-up procedures to pay employees and vendors if normal finance department operations are disrupted, as well as other essential electronic files.	The District adopted a Continuity of Operations Policy Ad 16.3 in 2012 and completed a Business Impact Analysis in 2015. The District is working on implementing a Continuity of Operations Program and Plans.
b-5	Plan for the emergency relocation of government-owned facilities critical to recovery, as well as any facilities with known structural deficiencies or in hazardous areas.	This plan will be considered under the District's Continuity of Operations Program.
GOVT - c - Maintain and Enhance Local Government's Emergency Response Capacity		
c-1	Develop a plan for short-term and intermediate-term sheltering of your employees.	Currently under consideration. Survey to staff will be distributed in the next 30 days (Oct 2017)
c-2	Encourage your employees to have a family disaster plan.	Employee Preparedness and Planning is promoted through the Disaster Service Worker Program Annual Guide, Internal electronic news publications (NYCU); OES outreach; EOC responder trainings; promotions of AlertSCC and ReadySCC.
c-3	Offer CERT/NERT-type training to your employees.	Currently under consideration.

2009 to 2010 Strategy Number	2010 Mitigation Strategy	2017 Status
c-5	Periodically assess the need for changes in staffing levels, as well as for additional or updated supplies, equipment, technologies, and in-service training classes.	The District periodically assesses the need for changes in staffing levels, supplies, equipment, technologies, and training.
c-7	Participate in developing and maintaining a system of interoperable communications for first responders from cities, counties, special districts, state, and federal agencies.	The District has voice over IP (VOIP) phone on the microwave carrier system to Santa Clara County Communications and their emergency operations center. The District is a non-voting member of the Silicon Valley Regional Operability Authority (http://svria.org/svrcs/). SVRIA is building a new digital radio communications system that allow interoperability of radio communications with participating agencies. This project is two years from completion.
c-8	Harden emergency response communications, including, for example, building redundant capacity into public safety alerting and/or answering points, replacing or hardening microwave and simulcast systems, adding digital encryption for programmable radios, and ensuring a plug-and-play capability for amateur radio.	We now have backup links to all our Microwave Communications links to the Plant sites.
c-9	Purchase command vehicles for use as mobile command/EOC vehicles if current vehicles are unsuitable or inadequate.	No current funding in FY18 budget; FY19 budget will include another request to management
c-10	Maintain the local government's emergency operations center in a fully functional state of readiness.	The District maintains a primary and secondary EOC which are both maintained in a fully functional state of readiness.
c-11	Expand or participate in expanding traditional disaster exercises involving city and county emergency personnel to include airport and port personnel, transit and infrastructure providers, hospitals, schools, park districts, and major employers.	Beginning Sept 2017; County Wide Op Area exercise will take place each year. OES staff participated in Sept 14-15, 2017 County Wide drill

2009 to 2010 Strategy Number	2010 Mitigation Strategy	2017 Status
c-12	Maintain and update as necessary the local government's Standardized Emergency Management System (SEMS) Plan and the National Incident Management System (NIMS) Plan, and submit an appropriate NIMSCAST report.	Last updated to NIMSCAST submitted in FY17; agency has adopted both, FY18 EOC responder training includes SEMS/NIMS refresher
c-13	Continue to participate not only in general mutual-aid agreements, but also in agreements with adjoining jurisdictions for cooperative response to fires, floods, earthquakes, and other disasters.	The District is a signatory to the San Francisquito Multi Agency Coordination (MAC) agreement. The District is also jointly developing a MAC and EAP with the City of San Jose. The District also provides fire tenders as part of mutual aid to CalFire.
c-20	Create and maintain an automated system of rain and flood gauges that is web enabled and publicly-accessible. Work toward creating a coordinated regional system.	The District continues expanding and improving ALERT system and provides the data to NWS and the District's emergency operations.
c-21	Place remote sensors in strategic locations for early warning of hazmat releases or use of weapons of mass destruction, understanding that the appropriate early warning strategy depends on the type of problem.	The District has alarm systems in place at its treatment plants to detect leaks for its hazardous chemicals
c-22	Review and update, as necessary, procedures pursuant to the *State Dam Safety Act* for the emergency evacuation of areas located below major water-storage facilities.	The District is responsible for notification of Downstream Emergency Management Agencies. District actively cooperates with these entities, but has no responsibility or capability to implement local evacuation or other emergency procedures. The District performs annual drills to test communications with downstream agencies and hosts training exercises with external stakeholder agencies to review and update procedures as necessary. Last multi-agency training exercise was June 2016.

2009 to 2010 Strategy Number	2010 Mitigation Strategy	2017 Status
c-23	Improve coordination among cities, counties, and dam owners so that cities and counties can better plan for the evacuation of areas that could be inundated if a dam failed, impacting their jurisdiction.	The District is responsible for notification of Downstream Emergency Management Agencies. District actively cooperates with these entities, but has no responsibility or capability to implement local evacuation or other emergency procedures. The District performs annual drills to test communications with downstream agencies and hosts training exercises with external stakeholder agencies to review and update procedures as necessary. Last multi-agency training exercise was June 2016.
GOVT - d - Participate in National, State, Multi-Jurisdictional and Professional Society Efforts to Identify and Mitigate Hazards		
d-1	Promote information sharing among overlapping and neighboring local governments, including cities, counties, and special districts, as well as utilities.	The District is actively engaged in Multi Agency Coordination, Emergency Action Plans and Memorandums of Understanding with neighboring agencies.
d-2	Recognize that emergency services is more than the coordination of police and fire response**;** it also includes planning activities with providers of water, food, energy, transportation, financial, information, and public health services.	The District works through the Operational Area to ensure that flooding is considered, in joint agency meetings.
d-3	Recognize that a multi-agency approach is needed to mitigate flooding by having flood control districts, cities, counties, and utilities meet at least annually to jointly discuss their capital improvement programs for most effectively reducing the threat of flooding. Work toward making this process more formal to ensure that flooding is considered at existing joint-agency meetings.	District's CIP program meets annually with all local jurisdictions to discuss upcoming projects. District leads and participates in different collaborative groups. BAFPAA- Bay Area Flood Protection Agencies Association available to work with ABAG on Regional Flood Issues.
d-4	As new flood-control projects are completed, request that FEMA revise its flood-insurance rate maps and digital Geographic Information System (GIS) data to reflect flood risks as accurately as possible.	This is a standard practice. As each flood protection project is completed, SCVWD works with local municipalities to prepare Letter of Map Revisions and supporting documentation for FEMA to revise its flood insurance rate maps.

2009 to 2010 Strategy Number	2010 Mitigation Strategy	2017 Status
d-5	Participate in FEMA's National Flood Insurance Program.	Participation in FEMA's National Flood Insurance Program by bringing FEMA and DWR classes to local city/county staff to increase awareness
d-6	Participate in multi-agency efforts to mitigate fire threat, such as the Hills Emergency Forum (in the East Bay), various FireSafe Council programs, and city-utility task forces. Such participation increases a jurisdictions' competitiveness in obtaining grants.	The District actively participates in the Santa Clara County Fire Safe Council and the Water Tender Program.
d-8	Encourage staff to participate in efforts by professional organizations to mitigate earthquake and landslide disaster losses, such as the efforts of the Northern California Chapter of the Earthquake Engineering Research Institute, the East Bay-Peninsula Chapter of the International Code Council, the Structural Engineers Association of Northern California, and the American Society of Grading Officials.	Staff have participated and continue to participate in these efforts at ASCE and Structural Engineers of Norther California. Staff have also continued with training for the Cal OES Safety Assessment Program.
d-9	Conduct and/or promote attendance at local or regional hazard conferences and workshops for elected officials and staff to educate them on the critical need for programs in mitigating earthquake, wildfire, flood, and landslide hazards.	Through the local Emergency Managers Association, the District has conducted and promoted training for elected officials.
d-10	Cooperate with researchers working on government-funded projects to refine information on hazards, for example, by expediting the permit and approval process for installation of seismic arrays, gravity survey instruments, borehole drilling, fault trenching, landslide mapping, flood modeling, and/or damage data collection.	On-going program

2009 to 2010 Strategy Number	2010 Mitigation Strategy	2017 Status
ENVI - a - Environmental Sustainability and Pollution Reduction		
a-1	Continue to enforce State-mandated requirements, such as the California Environmental Quality Act, to ensure that mitigation activities for hazards, such as seismic retrofits and vegetation clearance programs for fire threat, are conducted in a way that reduces environmental degradation such as air quality impacts, noise during construction, and loss of sensitive habitats and species, while respecting the community value of historic preservation.	District projects comply with CEQA requirements.
a-2	Encourage regulatory agencies to work collaboratively with safety professionals to develop creative mitigation strategies that effectively balance environmental and safety needs, particularly to meet critical wildfire, flood, and earthquake safety levels.	District collaborates with resource agencies in development of projects in the development of mitigation strategies.
a-3	Continue to enforce and/or comply with State-mandated requirements, such as the California Environmental Quality Act and environmental regulations to ensure that urban development is conducted in a way to minimize air pollution. For example, air pollution levels can lead to global warming, and then to drought, increased vegetation susceptibility to disease (such as pine bark beetle infestations), and associated increased fire hazard.	All District projects comply with the California Environmental Quality Act.
a-4	Develop and implement a comprehensive program for watershed management optimizing ecosystem health with water yield to balance water supply, flooding, fire, and erosion concerns.	The One Water integrated water resources master plan project is comprehensively addressing the status and needs of all District watersheds. This plan is to be updated on a regular basis.

2009 to 2010 Strategy Number	2010 Mitigation Strategy	2017 Status
a-5	Balance the need for the smooth flow of storm waters versus the need to maintain wildlife habitat by developing and implementing a comprehensive Streambed Vegetation Management Plan that ensures the efficacy of flood control efforts, mitigates wildfires and maintains the viability of living rivers.	This was accomplished using Best Management Practices (BMPs) approved by Regulatory Agencies under the stream maintenance program (SMP). Adequate staffing and resources have been approved by District management.
-6	Comply with applicable performance standards of any *National Pollutant Discharge Elimination System* municipal stormwater permit that seeks to manage increases in stormwater run-off flows from new development and redevelopment construction projects.	The Water District, in cooperation with the SCVURPPP Co-Permittees, applied for and received a grant from the Storm Water Grant Program's Proposition 1 Planning Grant administered by the State Water Resources Control Board. This grant is funding the development of a Storm Water Resource Plan (SWRP) for the Santa Clara Basin, which will support the development and implementation of Green Infrastructure Plans with the Basin, including a list of prioritized runoff capture and use projects eligible for future Prop 1 implementation grant funds. The SWRP is important for identifying opportunities for communities and the District to utilize storm water and dry weather runoff and create benefits such as increased water supply, improved water quality, and reduced flood risk. District staff from Environmental Planning and Water Supply are participating on the Technical Advisory Committee. The One Water Plan stakeholder process will accomplish stakeholder input.

2009 to 2010 Strategy Number	2010 Mitigation Strategy	2017 Status
a-7	Enforce and/or comply with the grading, erosion, and sedimentation requirements by prohibiting the discharge of concentrated stormwater flows by other than approved methods that seek to minimize associated pollution.	Regulation is done by the cities. CPRU Unit partially regulates through issuance of permits. District projects must comply with construction stormwater requirements. In 2017, Environmental Planning Unit staff conducted training on the new requirements in the municipal regional stormwater permit which went into effect on January 1, 2016. The training also provided a refresher on the State Construction General Stormwater Permit
a-9	Enforce and/or comply with the hazardous materials requirements of the State of California Certified Unified Program Agency (CUPA).	EH&S Unit has an on-going, "Facility Environmental Compliance Project" which oversees the implementation of the various CUPA program elements (i.e. UST, hazwaste, HMBPs, Cal-ARP, etc.). District facilities are routinely inspected by CUPA staff. For any noted deficiencies, EH&S staff coordinate with facility staff to implement corrective actions.
a-11	When remodeling existing government and infrastructure buildings and facilities, remove asbestos to speed up cleanup of buildings so that they can be reoccupied more quickly.	Asbestos abatement accomplished whenever there is work or expected work in areas with asbestos. It is a goal to remove the asbestos whenever possible.
a-12	Develop and implement a program to control invasive and exotic species that contribute to fire and flooding hazards (such as eucalyptus, cattails, and cordgrass). This program could include vegetation removal, thinning, or replacement in hazard areas where there is a direct threat to structures.	The Safe Clean Water program's D2 project provides funding for invasive vegetation management county-wide.

2009 to 2010 Strategy Number	2010 Mitigation Strategy	2017 Status
b-1	Stay informed of scientific information compiled by regional and state sources on the subject of rising sea levels and global warming, especially on additional actions that local governments can take to mitigate this hazard including special design and engineering of government-owned facilities in low-lying areas, such as wastewater treatment plants, ports, and airports.	The District's Climate Change Framework and project provides funding for maintaining and increasing climate change knowledge as well as adaptation and mitigation strategy development.
b-2	Inventory global warming emissions in your own local government's operations and in the community, set reduction targets and create an action plan.	GHG Inventory has been collected annually since 2006. It has been following the GHG Reduction Program. This program also accounts for greenhouse emission reduction benefits from District's contribution to the countywide green business program, the water conservation program, and habitat restoration efforts. In 2008, the board established a target for achieving carbon neutrality by 2020. The policy may need to be updated as we get closer to year 2020.
b-4	Promote transportation options such as bicycle trails, commute trip reduction programs, incentives for carpooling and public transit.	Green Business Program: Commuter Check Program, Vanpool, Carpooling, Bicycle Lockers, Shower Facilities, Telecommuting, Annual Bike to Work Day. The District offers the commute alternatives that are described on the link below and support the District's Green Business efforts. http://www.aqua.gov/hr/commute-alternatives-employees-0
b-5	Increase the use of clean, alternative energy by, for example, investing in “green tags”, advocating for the development of renewable energy resources, recovering landfill methane for energy production, and supporting the use of waste to energy technology.	This is an on-going task that is being carried out through PWRPA participation and other District efforts. The District is also monitoring local community choice aggregations (CCA) and has converted qualifying minor PG&E accounts to Silicon Valley Clean Energy to operate using 100% carbon-free energy. The newly approved San Jose Clean Energy is currently in development and may benefit most of the remaining minor PG&E accounts.

2009 to 2010 Strategy Number	2010 Mitigation Strategy	2017 Status
b-6	Make energy efficiency a priority through building code improvements, retrofitting city facilities with energy efficient lighting and urging employees to conserve energy and save money.	This continues to be our direction to replace lighting with more energy efficient ones.
b-7	Purchase only Energy Star equipment and appliances for local government use.	We have no formal program but we are buying Energy Star equipment when possible.
b-8	Practice and promote sustainable building practices using the U.S. Green Building Council's LEED program or a similar system.	This is being looked at and we are proposing a District overreaching sustainability policy as part of the recommendations of the Employee Workspace project.
b-9	Increase the average fuel efficiency of municipal fleet vehicles; reduce the number of vehicles; launch an employee education program including anti-idling messages; convert diesel vehicles to bio-diesel.	Ongoing practice to purchase Hybrid Replacement Class I vehicles, purchase CARB compliant Tier IV Diesel off road equipment, and replace diesel forklifts with electric equivalent
b-10	Evaluate opportunities to increase pump efficiency in water and wastewater systems; recover wastewater treatment methane for energy production.	Ongoing practice to review projects during Planning Phase to evaluate opportunities to increase pump efficiency in water and wastewater systems; recover wastewater treatment methane for energy production
b-11	Increase recycling rates in local government operations and in the community.	“ES 2.14.a. The District has established a goal of at least 10% of annual recycled water production as a percentage of total County water demands by 2025. In addition, the District chairs the Eco-Gardeners committee, jointly funded by the Recycling and Waste Reduction Committee and SCVURPPP, with a goal of promoting native, drought tolerant landscaping, reducing use of pesticides and encouraging composting.
b-12	Maintain healthy urban forests; promote tree planting to increase shading and to absorb CO2.	The District installs riparian, wetland, and upland mitigation on an annual basis. This includes the installment of trees.

2009 to 2010 Strategy Number	2010 Mitigation Strategy	2017 Status
b-13	Help educate the public, schools, other jurisdictions, professional associations, business and industry about reducing global warming pollution.	The District has developed and incorporated curriculum for the following programs into its public outreach on Climate Change: Hidden Water Education Outreach Program, Plastic Voyage Education Outreach Program, Wetland Game, and Mapping History lesson. Additionally, the District has participated in hosting Project WET workshop to educate teachers on Climate Change curriculum and hosted the meeting for DWR Water Educators' committee which included a presentation on Climate change as it relates to water education.
ENVI - c - Agricultural and Aquaculture Resilience		
LAND		
f-4	Work with non-profits and through other mechanisms to protect as open space those areas susceptible to extreme hazards (such as through land acquisition, zoning, and designation as priority conservation areas).	The District is not a land use agency and therefore cannot use zoning or designations. However, in support of flood protection and habitat stewardship goals and in close coordination with land use agencies and non-profits, the District preserves lands adjacent to water resources.

2009 to 2010 Strategy Number	2010 Mitigation Strategy	2017 Status
HEALTH		
c-6	Ensure mental health continuity of operations and disaster planning is coordinated among county departments, (including Public Health and Emergency Services), private sector mental health organizations, professional associations, and national and community-based non-profit agencies involved in supporting community mental health programs. First, such planning should ensure that the capability exists to provide both immediate on-site mental health support at facilities such as evacuation centers, emergency shelters, and local assistance centers, as well as to coordinate on-going mental health support during the long-term recovery process. Second, this planning should ensure that mental health providers, in collaboration with the county agencies responsible for providing public information, are prepared to provide consistent post-disaster stress and other mental health guidance to the public impacted by the disaster.	The SCVWD provides comprehensive health benefits to its employees and their dependents. This is an on-going program. Mental health benefits are offered through both medical plans (Blue Shield and Kaiser) as well as through the Employee Assistance Program (Concern). The medical plans provide both outpatient and inpatient mental health services subject to certain co-pays and maximum visits per calendar year. Concern also provides counseling services of 8 visits, per issue in a 12-month period. Such services include, family/relationship counseling, emotional issues, work/life services and legal/financial assistance. The program currently is not funded to provide a service level that includes on-site mental health support during emergency incidents that would include the entire recovery phase up to normal operations.

2009 to 2010 Strategy Number	2010 Mitigation Strategy	2017 Status
HSNG - i -LANDSLIDES AND EROSION		
i-1	Increase efforts to reduce landslides and erosion in existing and future development by improving appropriate code enforcement and use of applicable standards for private property, such as those appearing in the California Building Code, California Geological Survey Special Report 117 – Guidelines for Evaluating and Mitigating Seismic Hazards in California, American Society of Civil Engineers (ASCE) report Recommended Procedures for Implementation of DMG Special Publication 117: Guidelines for Analyzing and Mitigating Landslide Hazards in California, and the California Board for Geologists and Geophysicists Guidelines for Engineering Geologic Reports.	The District is not an enforcement agency. Appropriate guidelines are used for District's own Capital and Operations projects and facilities.

APPENDIX E: SOURCES

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APPENDIX F: CRITICAL FACILITIES LIST

Facility Name	City
Dams & Levees	
Calabazas Creek Levees	Cupertino
Uvas Creek Levee	Gilroy
West Branch Llagas Creek Levee	Gilroy
Coyote Dam	Gilroy
Guadalupe Dam	Los Gatos
Lenihan Dam	Los Gatos
Rinconada Dam	Los Gatos
Vasona Dam	Los Gatos
Calera Creek Levee	Milpitas
Chesbro Dam	Morgan Hill
Anderson Dam	Morgan Hill
Uvas Dam	Morgan Hill
Stevens Creek Levees	Mountain View
Permanente Creek Levees	Mountain View
San Francisquito Creek Levees	Palo Alto
Adobe Creek Levees	Palo Alto
Matadero Creek Levees	Palo Alto
Almaden Dam	San Jose
Upper Penitencia Creek Levees	San Jose
Calero Dam	San Jose
Guadalupe River Levees	San Jose
Canoas Creek Levees	San Jose
Thompson Creek Levees	San Jose
Alamitos Creek Levees	San Jose
Randol Creek Levee	San Jose

Facility Name	City
Coyote Creek Levees	San Jose
Berryessa Creek Levees	San Jose
San Tomas Aquino Creek Levees	Santa Clara
Guadalupe River Levees	Santa Clara
Sunnyvale West Channel Levees	Sunnyvale
Sunnyvale East Channel Levees	Sunnyvale
Other District Facilities	
Rinconada Water Treatment Plant	Los Gatos
Vasona Meter Shop	Los Gatos
Vasona Pumping Station	Los Gatos
Coyote Pumping Plant	Morgan Hill
Penitencia Water Treatment Plant	San Jose
Administrative Annex and Warehouse	San Jose
Administration Building	San Jose
Headquarters Building	San Jose
Maintenance Shop	San Jose
Operations and Maintenance	San Jose
Water Quality Lab (Main Campus)	San Jose
Winfield Vegetation Management	San Jose
Winfield Warehouse	San Jose
Santa Teresa Water Treatment Plant	San Jose

Santa Clara Valley Water District

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