SWEETWATER SPRINGS WATER DISTRICT HAZARD MITIGATION PLAN

OCTOBER 22, 2020

PLANNING MEETING #2

Sweetwater Springs WATER DISTRICT

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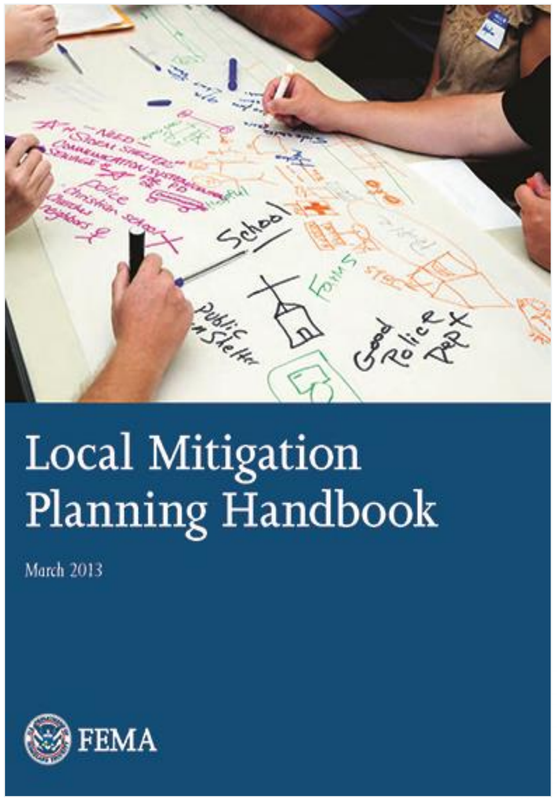


WELCOME AND INTRODUCTIONS

HAZARDS OF CONCERN

- Hazards identified in bold were assigned "High" probability of occurrence or impact and will therefore be included in the Risk Assessment of the LHMP
- [1] The influence of climate change will be evaluated with respect to the probability of occurrence for these hazards of concern.

Hazard Name	History	Probability	Impact
Wildfire[1]	Yes	High	High
Landslide[1]	Yes	High	Medium
Flood[1]	Yes	High	High
Earthquake	No	Low	High
Drought[1]	No	Medium	Low
Heat[1]	Yes	High	Medium

HISTORICAL EVENTS - WILDFIRE

Recent or significant wildland fires in Sonoma County include the following (CAL FIRE 2020):

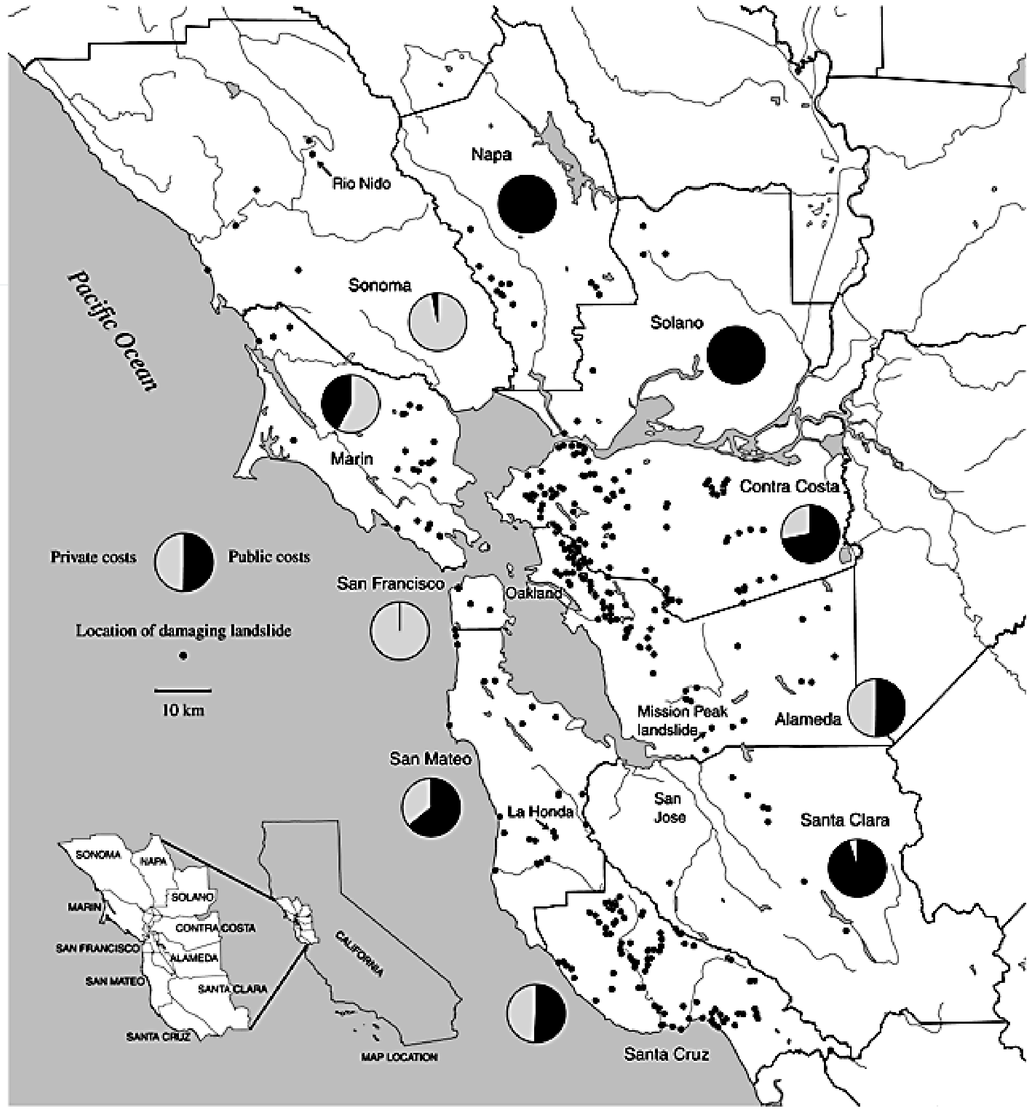
- 1964: Hanley – 52,700 acres burned
- 1964: Nuns Canyon – 10,400 acres burned
- 1965: Knight's Valley – 6,000 acres burned
- 1965: Pocket Ranch – 4,000 acres burned
- 1972: Bradford – 1,760 acres burned
- 1978: Creighton Ridge – 11,405 acres burned
- 1988: Geysers – 9,000 acres burned
- 1996: Cavedale – 2,100 acres burned
- 1999: Geyser Road – 1,300 acres burned
- 2000: Berryessa – 5,731 acres burned
- 2004: Geysers – 12,000 acres burned
- 2008: 85 –322 acres burned
- 2008: Pine – 989 acres burned
- 2013: McCabe – 3,505 acres burned
- 2015: Valley – 76,067 acres burned

HISTORICAL EVENTS - EARTHQUAKE

- 2014 South Napa earthquake is the most recent notable earthquake, resulting in a major disaster declaration for Sonoma County.
- Other significant earthquakes include the 1989 Loma Prieta Earthquake (M6.9) along the San Andreas Fault.
- The 1969 Rodgers Creek/Healdsburg Fault Earthquake was the last major earthquake epicentered in Sonoma County

HISTORICAL EVENTS - LANDSLIDE

- The winters of 1982, 1983, 1986, and 1998 produced significant landslides in Sonoma County.
- The 1997-98 El Nino rainstorms resulted in severe landslides throughout Sonoma County.
- Thee landslides caused an estimated $21 million in damages at seven major locations.
- The three most heavily damaged sites were Rio Nido, Hidden Acres, and Gold Ridge.



Godt, John. 1999. Maps showing locations of damaging landslides caused by El Nino rainstorms, US. Geological Survey. https://pubs.usgs.gov/mf/1999/mf-2325/

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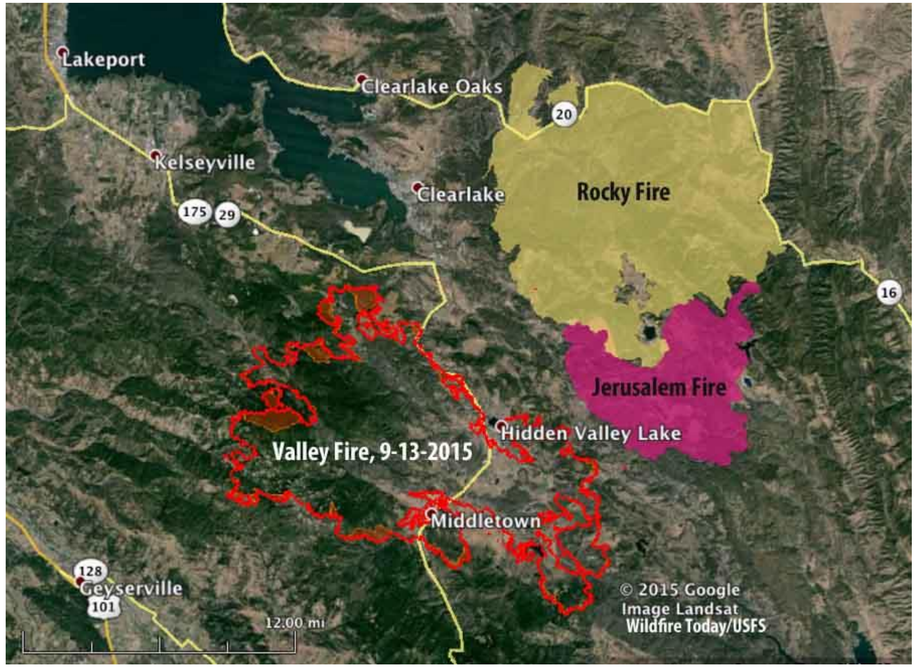


HISTORICAL EVENT – FLOOD

- The largest flood in recent history occurred between February 14 and 18, 1986, when a peak discharge of 102,000 cubic feet per second was recorded and the flood reached a gauge height of 48.6 feet at Guerneville

Year	Date	Gauge Height (ft)	Streamflow (cfs)	Year	Date	Gauge Height (ft)	Streamflow (cfs)
1955	Dec. 06	19.32	13,500	**1986**	Feb. 18	48.56	102,000*
1956	Dec. 23	49.70	90,100	**1987**	Mar. 13	24.34	26,000*
1957	Feb. 25	33.77	45,800	**1988**	Jan. 04	28.35	35,300*
1958	Feb. 25	42.95	68,700	**1989**	Mar. 19	25.42	23,800*
1959	Feb. 16	35.98	48,900	**1990**	Jan. 14	20.34	18,000*
1960	Jan. 31	40.80	63,100	**1991**	Mar. 04	33.32	48,500*
1961	Jan. 31	29.73	33,100	**1992**	Feb. 20	25.29	28,000*
1962	Feb. 13	28.91	57,400	**1993**	Jan. 21	37.79	55,100*
1963	Feb. 01	43.70	71,800	**1994**	Feb. 20	19.43	14,700*
1964	Jan. 21	29.88	33,400	**1995**	Jan. 09	48.01	93,900*
1965	Dec. 23	49.60	93,400	**1996**	Feb. 05	35.21	49,200*
1966	Jan. 05	45.28	77,000	**1997**	Jan. 01	44.99	82,100*
1967	Jan. 21	42.45	68,400	**1998**	Feb. 03	38.66	56,100*
1968	Jan. 30	32.22	40,600	**1999**	Feb. 09	31.86	37,800*
1969	Jan. 14	42.52	68,600	**2000**	Feb. 14	31.89	37,900*
1970	Jan. 24	43.95	72,900	**2001**	Mar. 05	24.15	24,700*
1971	Dec. 04	39.33	59,800	**2002**	Jan. 03	33.43	44,000*
1972	Dec. 27	14.71	8,990	**2003**	Dec. 16	36.48	57,600*
1973	Jan. 12	40.56	62,800	**2004**	Feb. 18	38.17	63,400*
1974	Jan. 17	43.18	74,000	**2005**	Dec.28	22.78	21,900
1975	Feb. 13	37.97	67,300	**2006**	Jan 1	42.0	86,000
1976	Mar. 01	11.74	5,260	**2007**	Feb. 11	26.42	29,800
1977	Mar. 16	7.50	1,370	**2008**	Jan. 5	29.22	36,600
1978	Jan. 17	40.73	65,200	**2009**	Feb. 24	22.99	22,400
1979	Jan. 11	24.93	26,200	**2010**	Jan.21	29.62	37,900
1980	Jan. 14	37.46	59,700	**2011**	Mar. 21	29.39	37,300
1981	Jan. 28	27.95	35,200	**2012**	Mar. 28	24.99	26,800
1982	Dec. 20	40.90	67,200*	**2013**	Dec. 24	32.79	38,400
1983	Jan. 27	41.63	71,900*	**2014**	Dec. 12	36.09	42,900
1984	Dec. 25	35.79	55,200*	**2015**	Feb. 7	25.21	21,900
1985	Feb. 08	25.10	28,500*				

Source: Sonoma County Hazard Mitigation Plan Update 2016

WHAT IS A RISK ASSESSMENT?

1. **Inventory of Existing Assets**

   The District provided an inventory of critical facilities to consider in the Risk Assessment

2. **Vulnerability Assessment**

   This step provides a general description of District facilities in relation to the identified hazards

3. **Impact Analysis**

   Estimating potential losses involves assessing the damage, injuries, and financial costs likely to be sustained

The risk assessment provides information regarding the location of hazards, the value of existing property in hazard locations, and an analysis of risk to District assets that may result from natural hazard events.

Description	Fire
10000 Gallon Tank	High
10000 Gallon Tank (Shoeneman)	High
120,000 Gallon Tank (Monte Rio 1)	High
60,000 Gallon Tank (Middle Schoolhouse)	High
Booster Pump/Control Station (Middle Schoolhouse)	High
Booster Pump/Control Station (Middle Schoolhouse)	High
Monte Rio Filter Plant Contro. Bldg	High
Santa Rosa Booster Station	High
Treatment Building, Chlorine Generation & Pump Bui	High
ATEC Filter (6) Monte Rio Treatment Plant	High

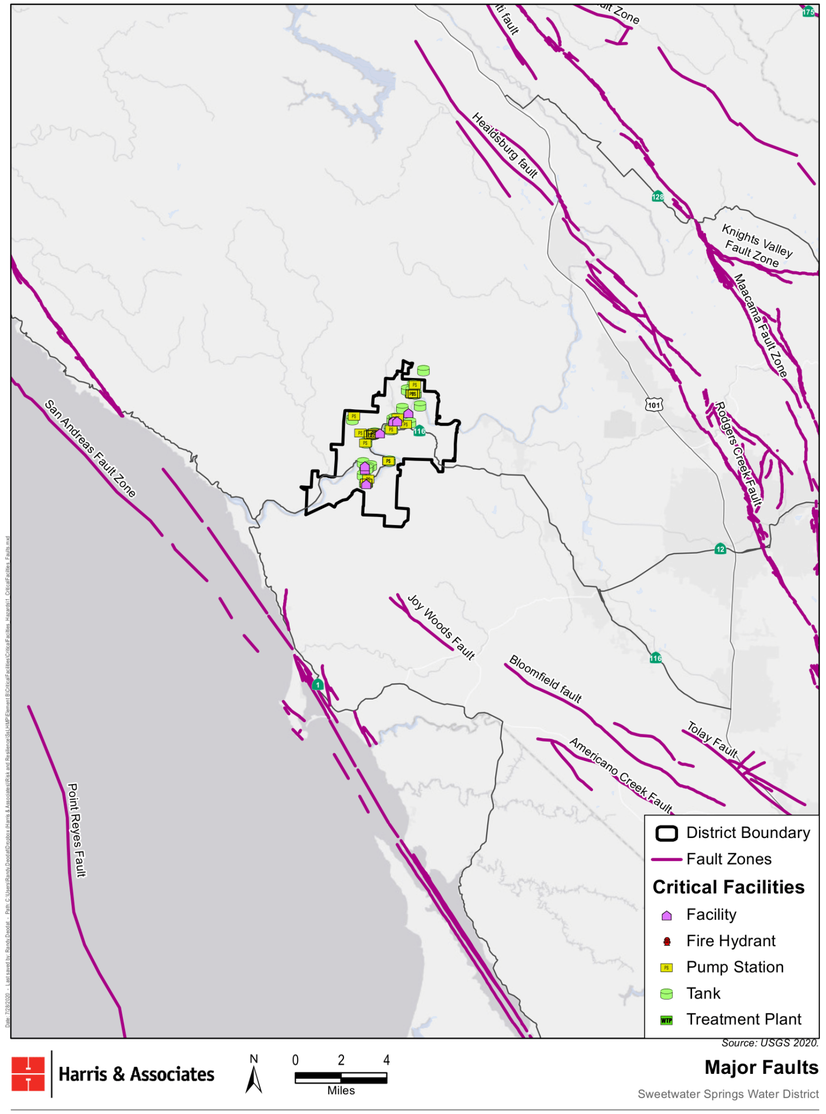
Description	Liquefactio
45000 Gallon Backwash Tank & Filter Vessels	High
Administration	High
El Bonita Well Field (Control Building)	Very High
Monte Rio Filter Plant Contro. Bldg	High
Monte Rosa Booster	High
Treatment Building, Chlorine Generation & Pump Bui	High
ATEC Filter (6) Monte Rio Treatment Plant	High

Description	Floodway
10000 Gallon Tank, Pump and Shed	100-Year Flood Zone
10000 Gallon Tank, Pump and Shed	100-Year Flood Zone
26000 Gallon Tank, Pump & Shed (Northwood)	100-Year Flood Zone
45000 Gallon Backwash Tank & Filter Vessels	500-Year Flood Zone
70000 Gallon Tank (Gonfotti 1)	100-Year Flood Zone
Administration	500-Year Flood Zone
El Bonita Well Field (Control Building)	Floodway
Monte Rio Filter Plant Contro. Bldg	Floodway
Treatment Building, Chlorine Generation & Pump Bui	100-Year Flood Zone
fire	100-Year Flood Zone
ATEC Filter (6) Monte Rio Treatment Plant	100-Year Flood Zone

Description	Landslide
10000 Gallon Tank	Strong
10000 Gallon Tank (Hay & Bay)	Strong
10000 Gallon Tank (Shoeneman)	Strong
10000 Gallon Tank (Upper Schoolhouse)	Strong
10000 Gallon Tank, Pump and Shed	Strong
10000 Gallon Tank, Pump and Shed	Strong
100000 Gallon Tank (Villa Grande)	Strong
120,000 Gallon Tank (Monte Rio 1)	Strong
125000 Gallon Tank (Harrison)	Strong
125000 Gallon Tank (Monte Rosa)	Strong
Pump and Shed	Strong
130000 Gallon Tank (Drake)	Strong
15000 Gallon Tank & Booster Station	Strong
15000 Gallon Tank & Booster Station	Strong
15000 Gallon Tank (Natoma)	Strong
20000 Gallon Tank & Booster Station (Park)	Strong
20000 Gallon Tank & Booster Station (Park)	Strong
10000 Gallon Tank (Rio Nido)	Strong
26000 Gallon Tank, Pump & Shed (Northwood)	Strong
26000 Gallon Tank, Pump & Shed (Northwood)	Strong
3-2500 Gallon Tanks (Crespo)	Strong
300000 Gallon Tank (Highland Park 1)	Strong
50000 Gallon Tank, Pump & Shed	Strong
50000 Gallon Tank, Pump & Shed	Strong
60,000 Gallon Tank (Middle Schoolhouse)	Strong
6000 Gallon Hydropneumatic Tank (Lower Summit)	Strong
7000 Gallon Tank & Hydropneumatic Booster Station	Strong
7000 Gallon Tank & Hydropneumatic Booster Station	Strong
70000 Gallon Tank (Gonfotti 1)	Strong
70000 Gallon Tank (Gonfotti 2)	Strong
Booster Pump/Control Station (Middle Schoolhouse)	Strong
Booster Pump/Control Station (Middle Schoolhouse)	Strong
Edgehill Booster	Strong
Monte Rosa Booster	Strong
Santa Rosa Booster Station	Strong
Schoenemann Booster Pumphouse	Strong
Sunshine Bypass Booster & Valve	Strong
15000 Gallon Tank	Strong
Canyon 3 Pump Station	Strong
Harrison Tank Booster Station	Strong

EARTHQUAKE

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



SAN ANDREAS M8

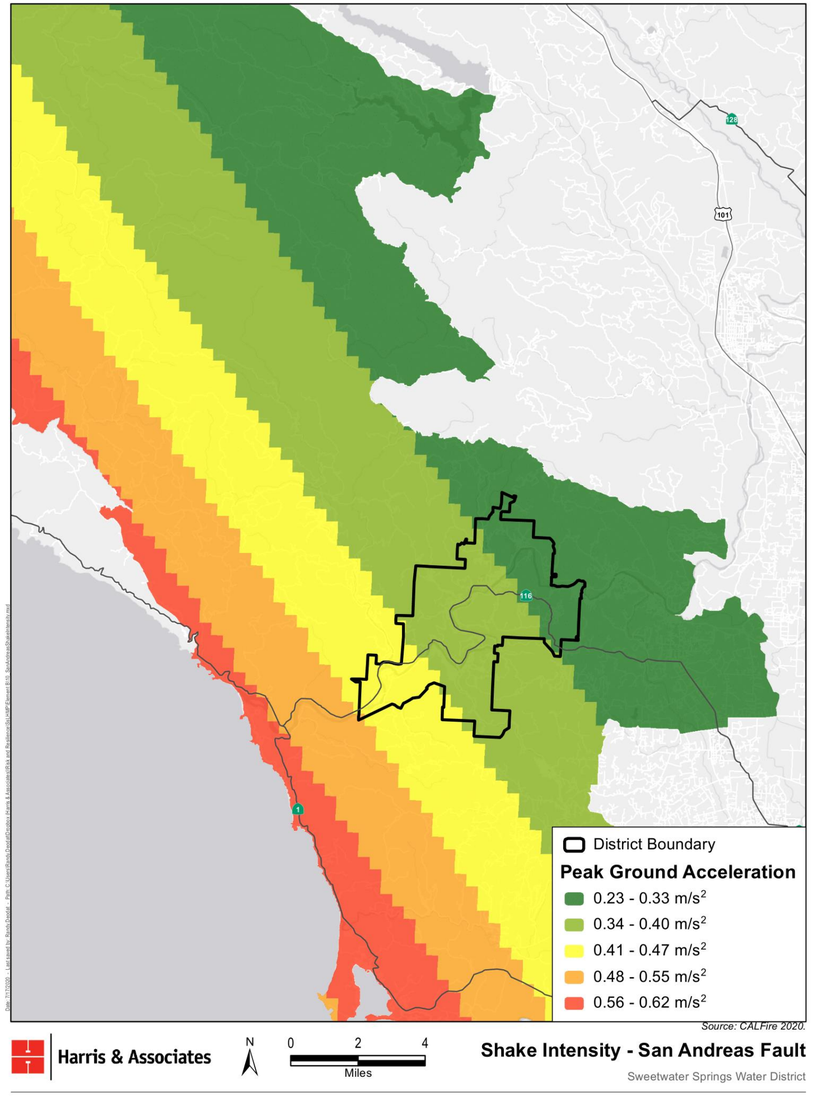
- Expected Building Damage

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

- Water System Damage: % Functionality

Day	@ Day 1	@ Day 3	@ Day 7	@ Day 14	@ Day 30	@ Day 90
Functionality	11-22%	19-36%	26-51%	28-54%	31-77%	48-100%

- The total economic loss estimated for the San Andreas M8.0 earthquake scenario for water facilities is estimated at **approximately $2B**



RODGERS CREEK M7.29

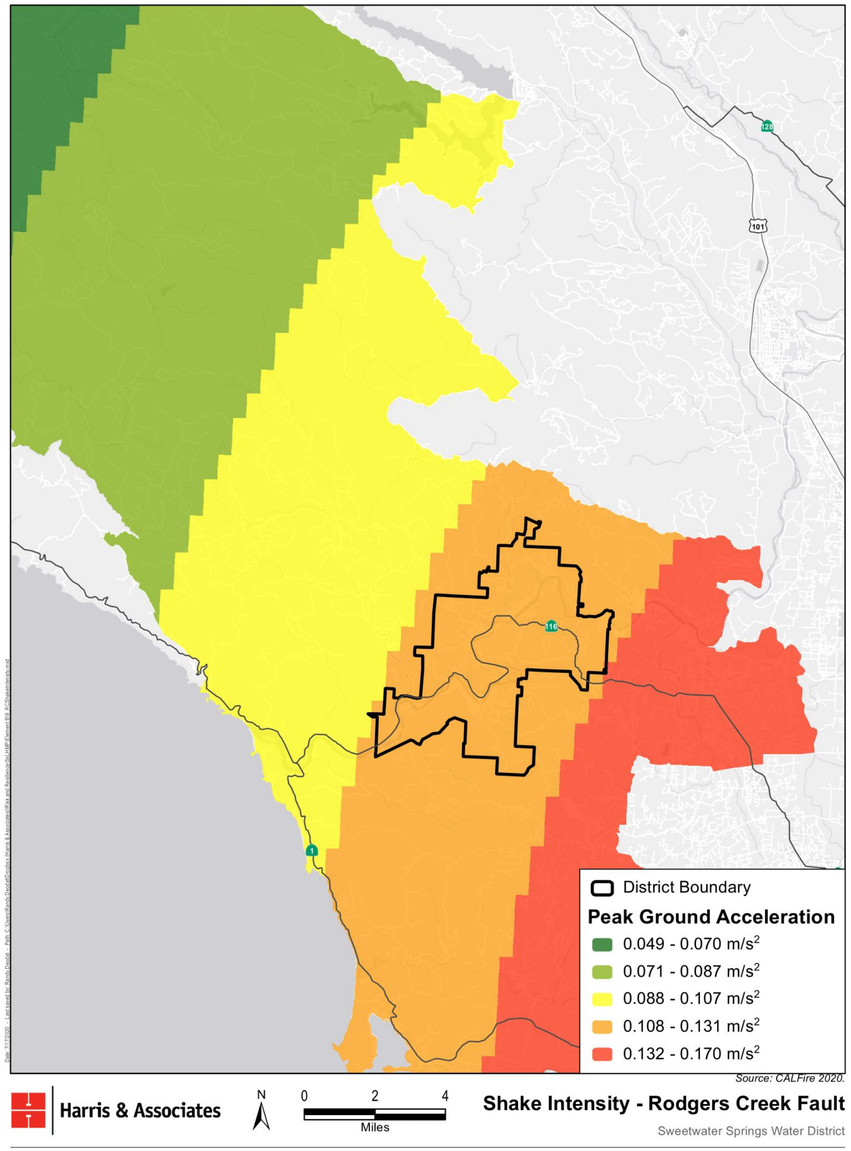
- Expected Building Damage

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

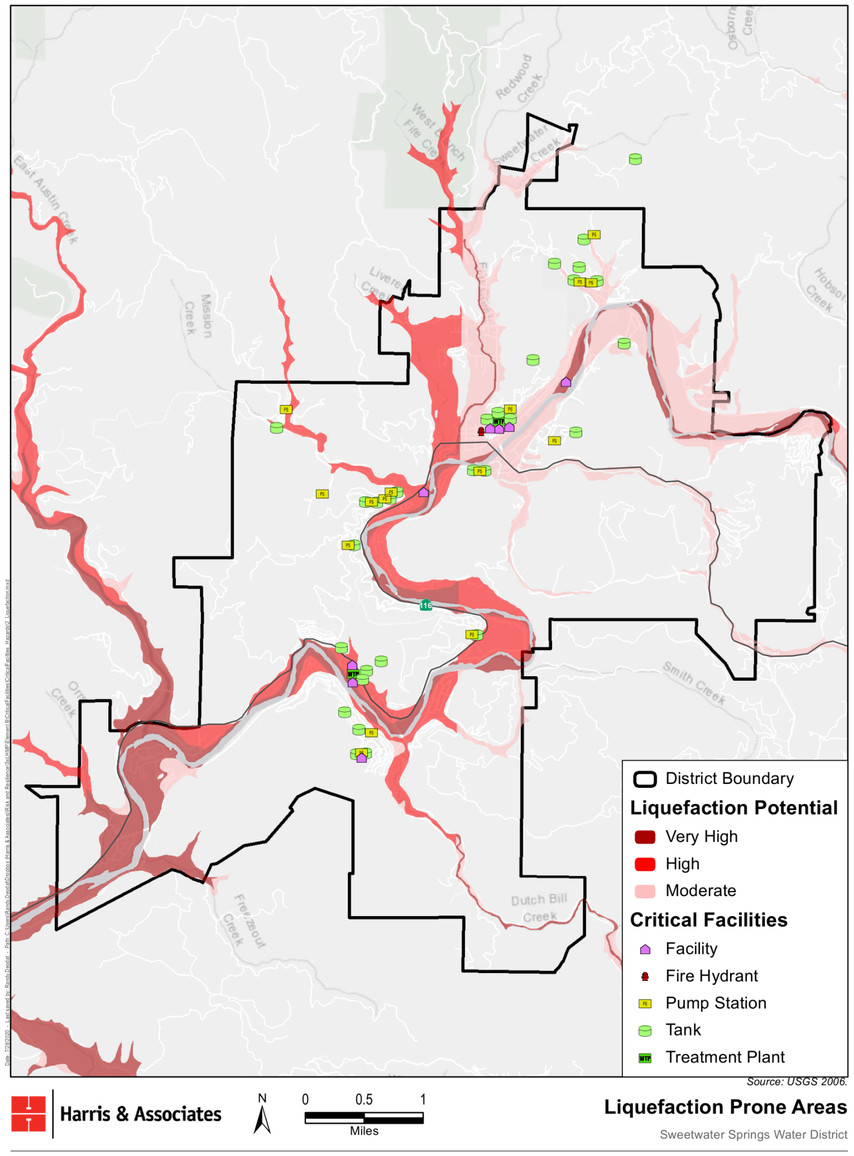
- Water System Damage: % Functionality

Day	@ Day 1	@ Day 3	@ Day 7	@ Day 14	@ Day 30	@ Day 90
Functionality	88-93%	96-99%	99-100%	99-100%	99-100%	99-100%

- The total economic loss estimated for the San Andreas M8.0 earthquake scenario for water facilities is estimated at **approximately $49M**

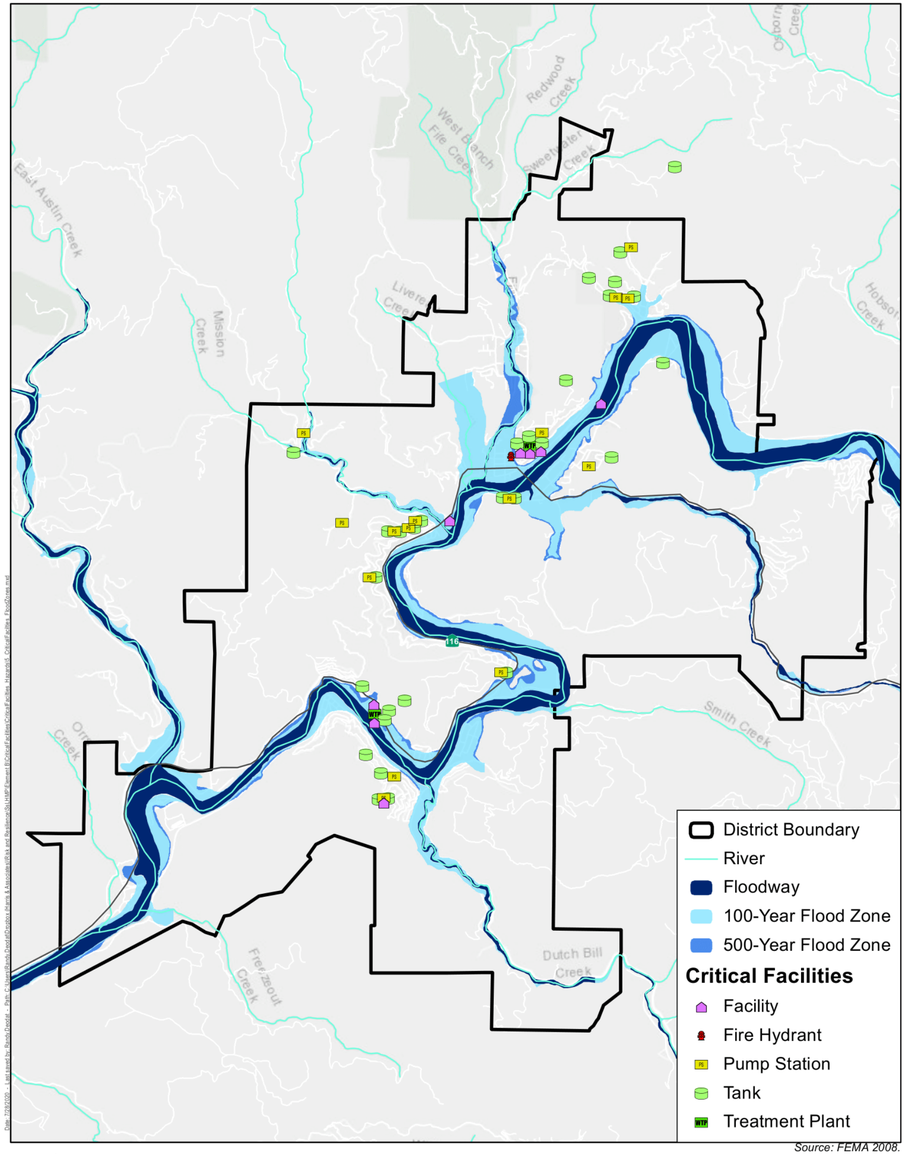


LIQUEFACTION



Critical Facilities in Liquefaction Risk Areas			
Category	Very High	High	Moderate
Tank	0	0	3
Pump Station	0	1	1
Treatment Plant	0	0	0
Facility	0	0	0
Fire Hydrant	0	0	0

FLOOD

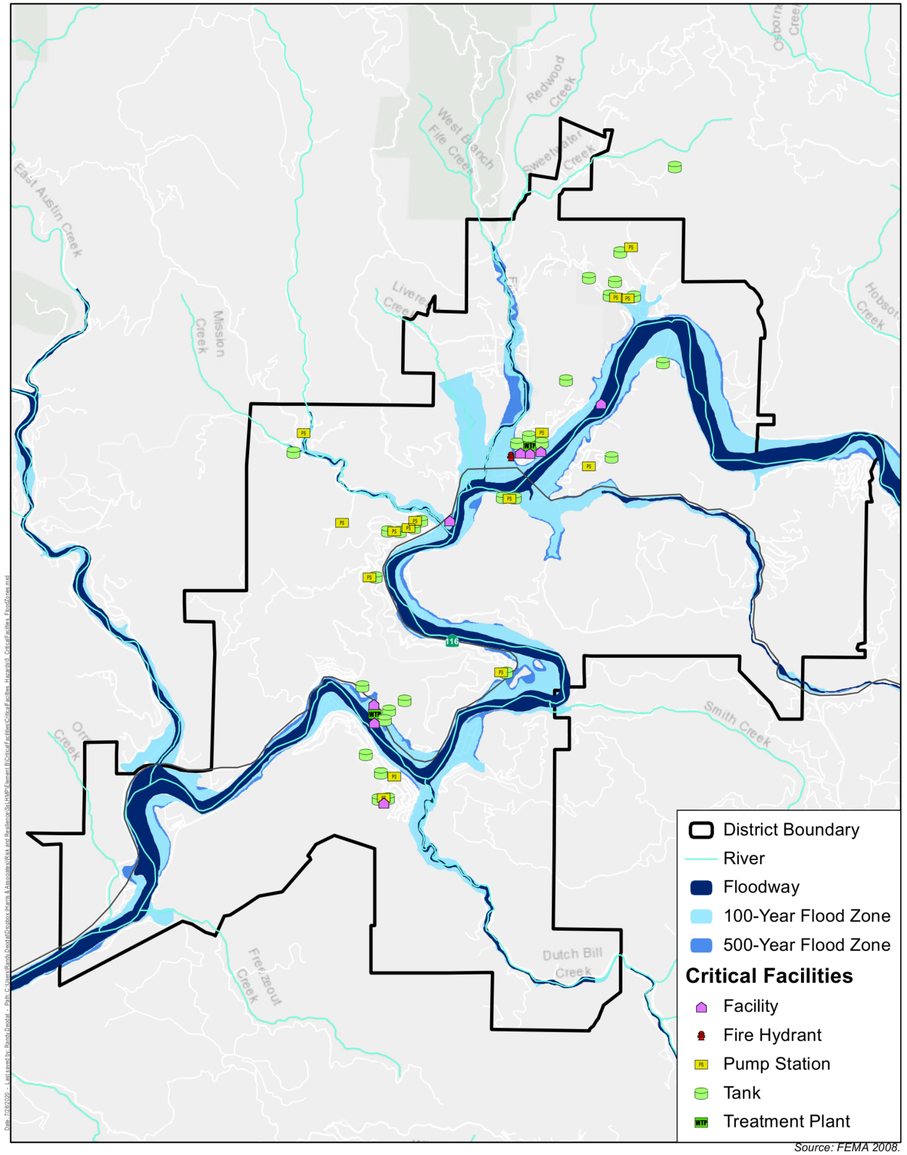


Facility Type	FEMA Flood Hazard Areas	
	100-Year	500-Year
Tank	3	1
Pump Station	1	0
Treatment Plant	1	0
Facility	3	4
Fire Hydrant	1	0

Facility	Percent Damage (%)	Economic Loss* ($)	Functional?
El Bonita Well Field	25.43	27,783.38	No
Monte Rosa Booster	0.10	31.39	Yes
Monte Rosa Tank	0.10	146.47	Yes

*Thousands of dollars

FLOOD



- An extreme precipitation event is defined in this assessment by 2-day rainfall totals during a water year (October-September) exceeding the 95th percentile of maximum rainfall based on precipitation data between 1961 and 1990. The City of Guerneville's extreme precipitation event threshold is 2.08 inches.

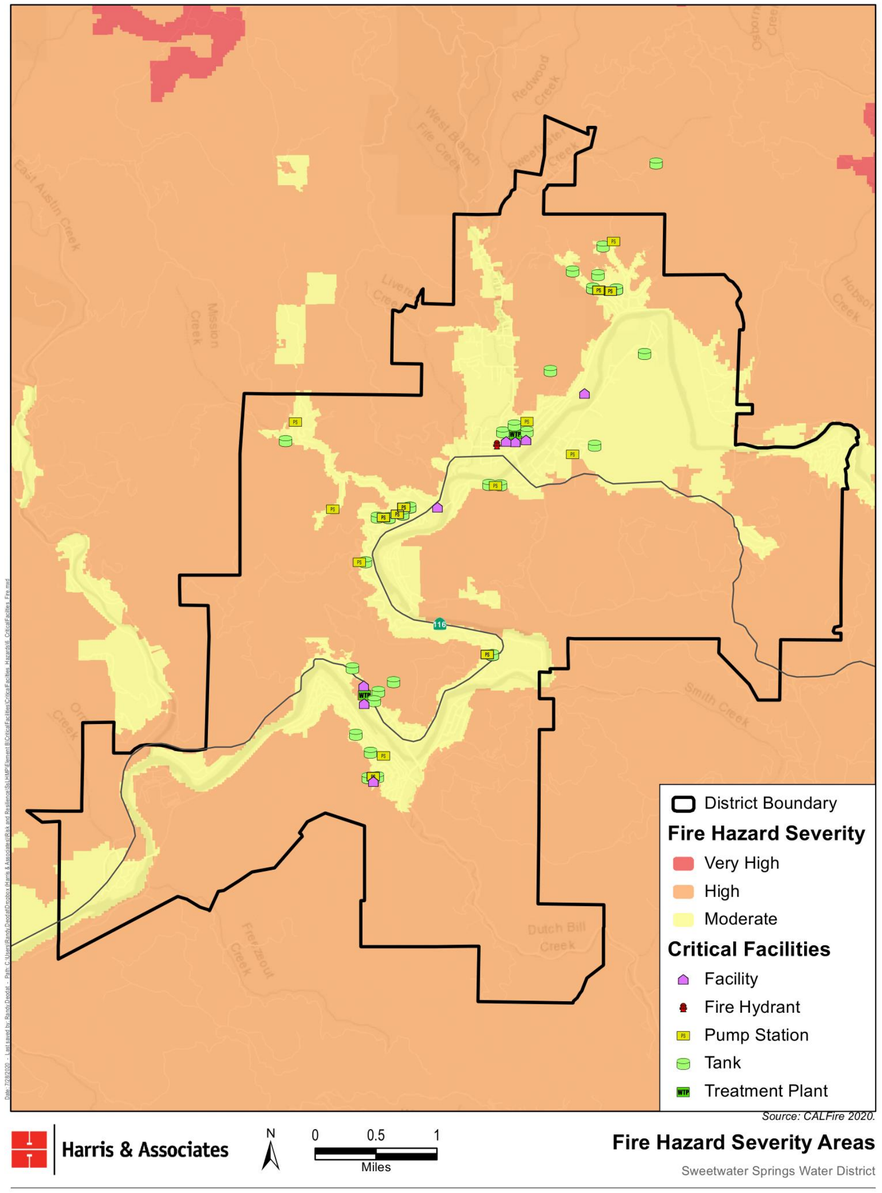
Average Number of Extreme Precipitation Events by Water Year

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

Source: CEC 2020c.
Notes: NA = not applicable; RCP = Representative Concentration Pathway

- Intensity of extreme precipitation events will increase to between 10-15 inches per event by end of century under a business as usual, RCP 8.5 scenario.

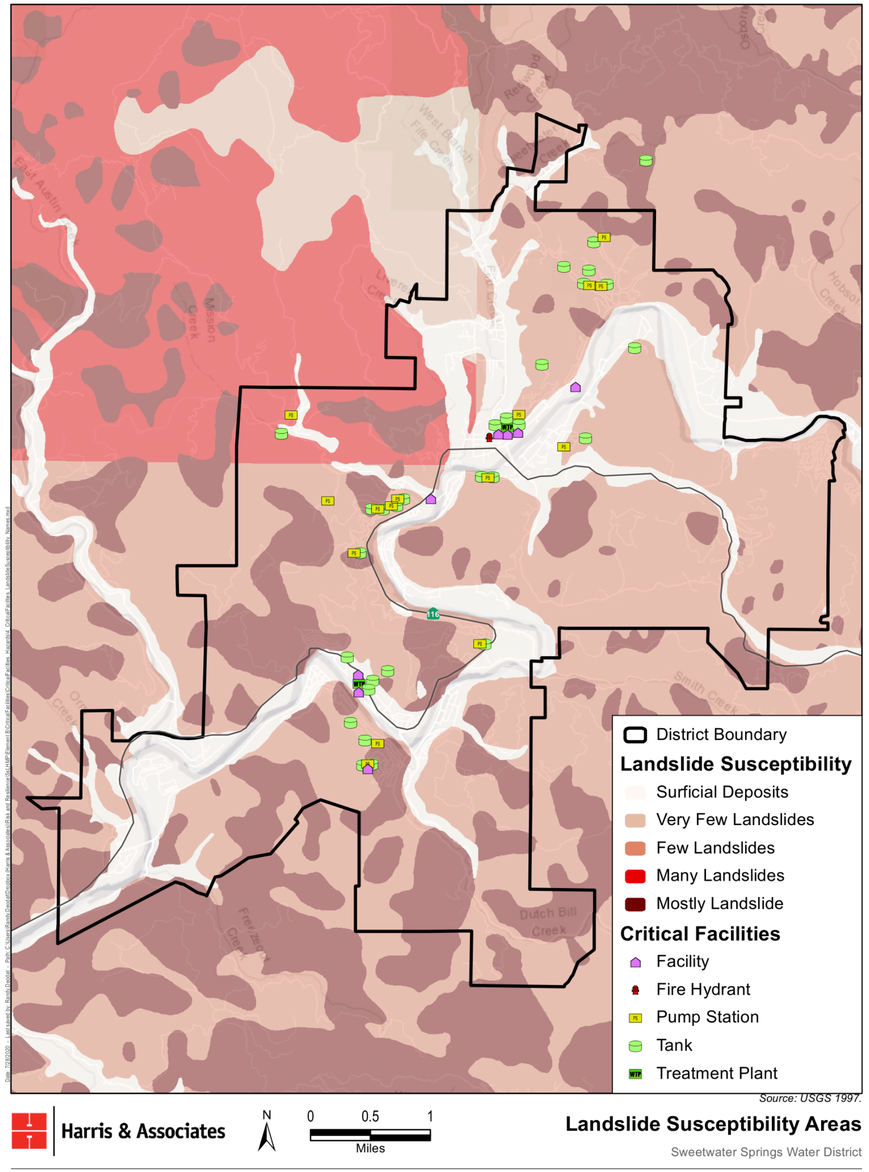
WILDFIRE



Critical Facilities in Fire Hazard Severity Zones			
Category	Moderate	High	Very High
Tank	25	4	0
Pump Station	13	2	0
Treatment Plant	1	1	0
Facility	5	3	0
Fire Hydrant	1	0	0

Historical and Projected Decadal Fire Probability for SSWD							
Scenario	Historical	RCP 8.5			RCP 4.5		
Time Frame	1961–1990	2011–2040	2041–2070	2071–2100	2011–2040	2041–2070	2071–2100
Probability	10%	10%	20%	20%	NA	30%	40%

LANDSLIDE

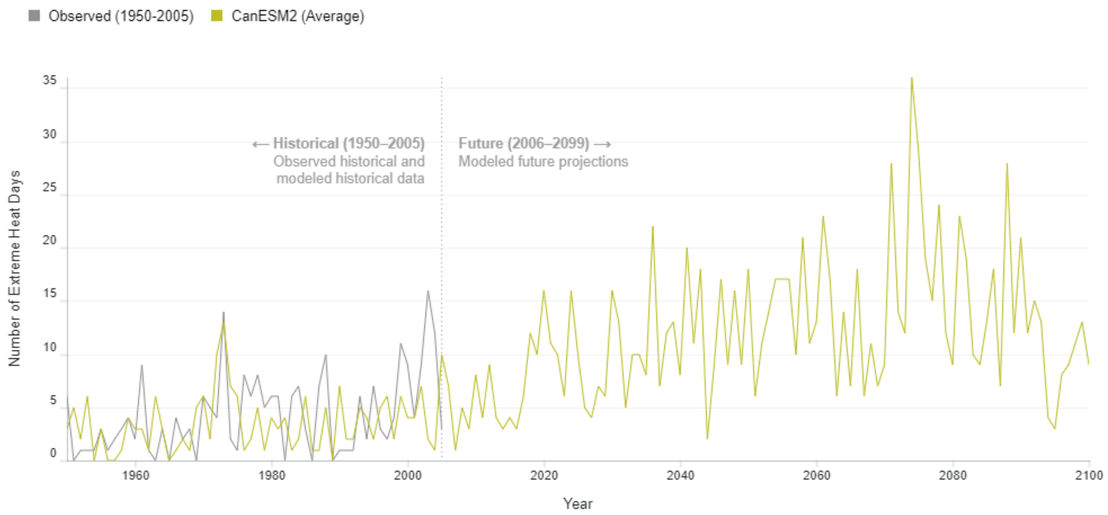


Critical Facility in Landslide Hazard Area	
Category	Count in Susceptibility Class “Strong” (VI) and Above
Tank	24
Pump Station	15
Treatment Plant	0
Facility	1
Fire Hydrant	0

EXTREME HEAT

Number of Extreme Heat Days by Year

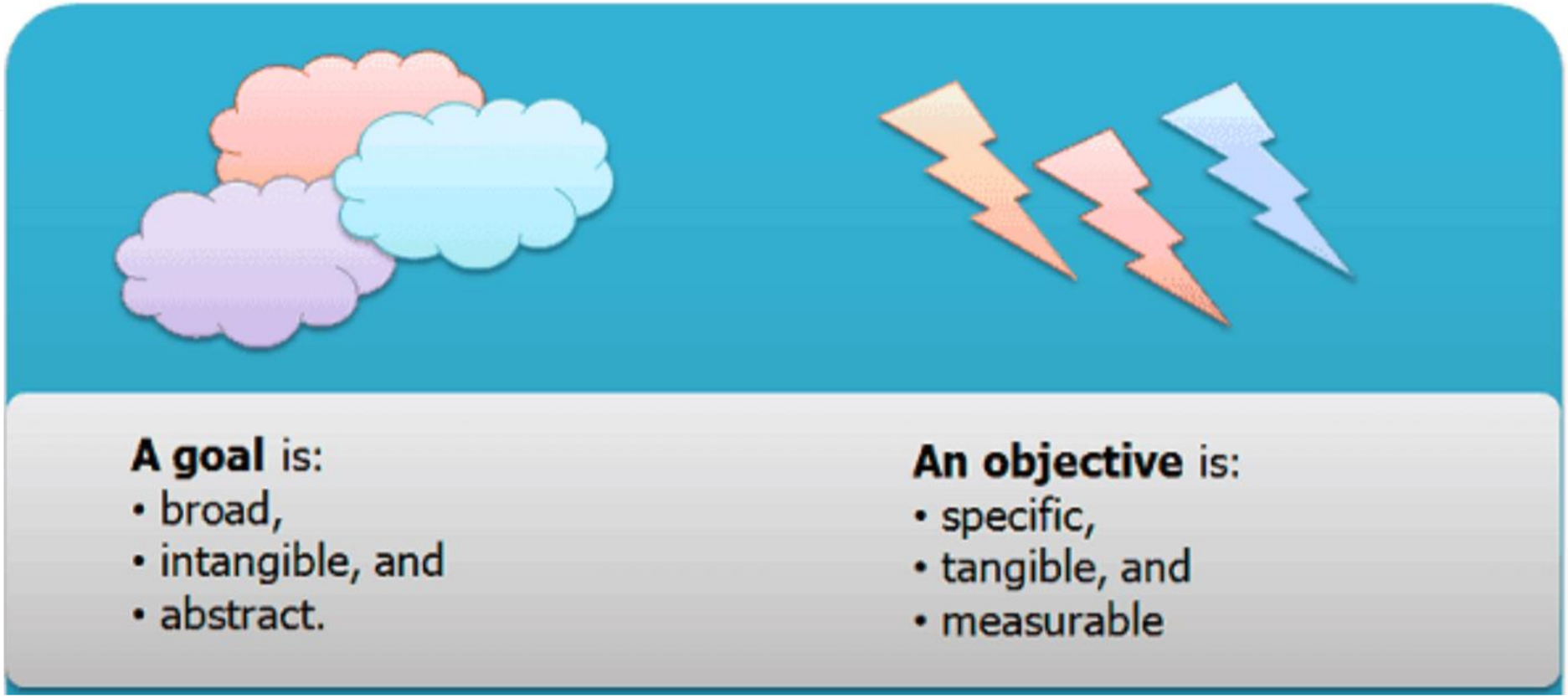
This chart shows number of days in a year when daily maximum temperature is above the extreme heat threshold of 93.4 °F. Data is shown for Guerneville under the RCP 4.5 scenario in which emissions peak around 2040, then decline.



- Source: Cal-Adapt. Data: LOCA Downscaled CMIP5 Projections (Scripps Institution of Oceanography), Gridded Observed Meteorological Data (University of Colorado, Boulder).
- Four models have been selected by California's Climate Action Team as priority models for research contributing to California's Fourth Climate Change Assessment (Pierce et al., 2018). Projected future climate from these four models can be described as producing:
  - A *warm/dry* simulation (HadGEM2-ES)
  - A *cooler/wetter* simulation (CNRM-CM5)
  - An *average* simulation (CanESM2)
  - The model simulation that is most unlike the first three for the best coverage of different possibilities (MIROC5)

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

LONG-TERM GOALS FOR MITIGATION ACTIONS



MITIGATION GOALS IDEAS

- Avoid or reduce potential loss of life or injury and disruption of water system facilities and infrastructure caused by natural disasters, and hazards exacerbated by climate change.
- Integrate hazard mitigation practices and policies throughout District departments, services, and planning documents to facilitate a culture of safety and resilience.
- Improve emergency management preparedness through increased stakeholder collaboration and community outreach.
- Prioritize mitigation strategies that are cost-effective.
- Others?

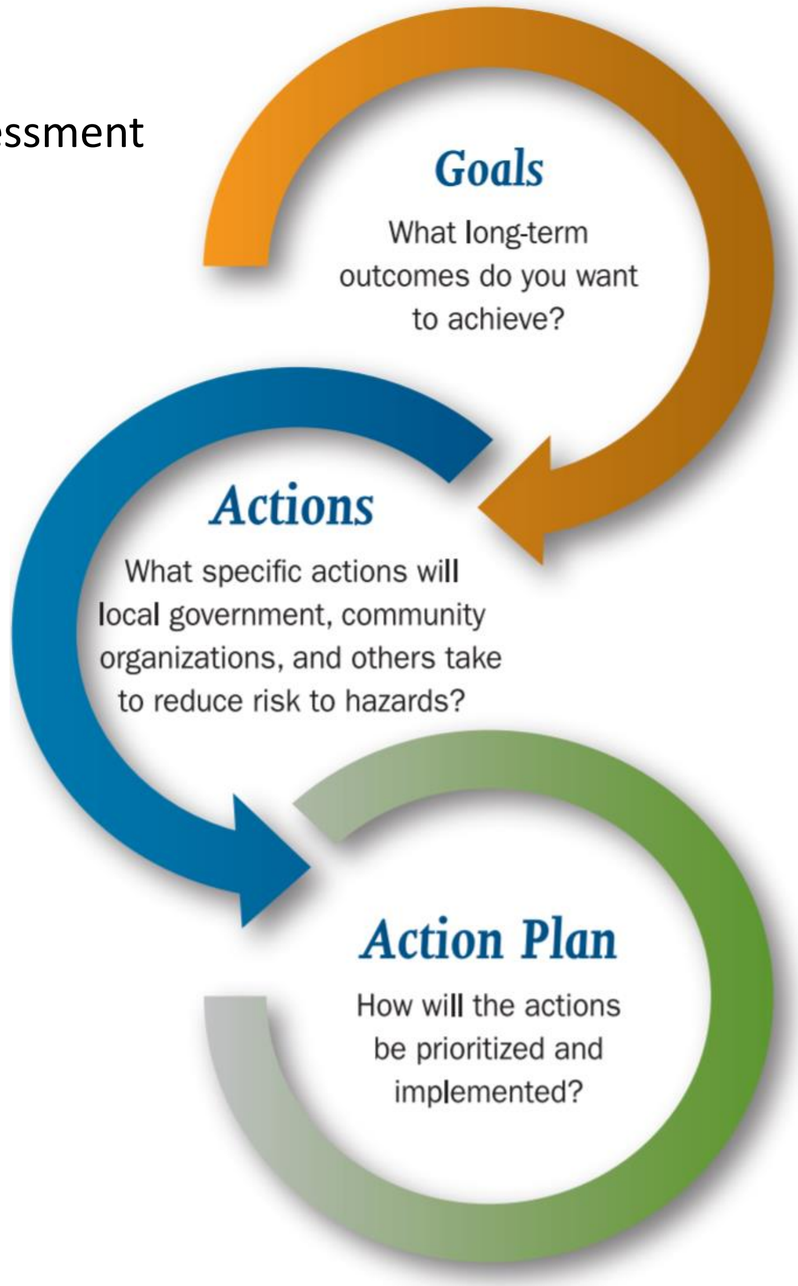
MITIGATION STRATEGIES

The long-term blueprint for reducing the potential losses identified in the risk assessment

- **Goals** – Consider the risk assessment findings, public awareness, hazard mitigation goals in other plans and documents, State HMP goals

- **Actions** – Primary types include local plans and regulations, structure and infrastructure projects, natural systems protections, education and awareness. Preparedness and response could also be included

- **Action Plan** – A description of how the actions will be incorporated into existing planning mechanisms, and how they will be prioritized, implemented, and administered



MITIGATION STRATEGIES - GOALS

What can be achieved

1. Avoid or reduce potential loss of life, injury, and property damage in Watsonville
2. Proactively distribute risk reduction and resilience benefits more equitably
3. Improve the capacity of Watsonville government and the community to prevent, protect against, respond to, mitigate, and recover from hazards
4. Advance local, regional, state, federal, private, and community collaboration and partnerships to deliver actionable, effective, innovative risk reduction solutions and data to support decisions

MITIGATION STRATEGIES – TYPES OF ACTIONS

Ways to reduce risk

Type	Description	Examples
Local Plans and Regulations	Policies or codes that influence the way land and buildings are developed and built	Comprehensive plans • Land use ordinances • Subdivision regulations • Development review • Building codes and enforcement • NFIP Community Rating System • Capital improvement programs • Open space preservation • Stormwater management regulations and master plans
Structure and Infrastructure Projects	Modifying or constructing public or private structures or infrastructure to manage risk	Acquisitions and elevations of structures in flood prone areas • Utility undergrounding • Structural retrofits. • Floodwalls and retaining walls • Detention and retention structures • Culverts • Safe rooms

MITIGATION STRATEGIES – TYPES OF ACTIONS

Ways to reduce risk

Type	Description	Examples
Natural Systems Protection	Actions that minimize damage and losses, preserve or restore the functions of natural systems.	Sediment and erosion control • Stream corridor restoration • Forest management • Conservation easements • Wetland restoration and preservation
Education and Awareness Programs	Actions to inform and educate citizens, elected officials, and property owners about hazards and potential ways to mitigate them. A greater understanding and awareness of hazards and risk among local officials, stakeholders, and the public is more likely to lead to direct actions.	Radio or television spots • Websites with maps and information • Real estate disclosure • Presentations to school groups or neighborhood organizations • Mailings to residents in hazard-prone areas. • StormReady • Firewise Communities

MITIGATION STRATEGIES

Existing Plans and Studies

Sources of mitigation options?

THANK YOU FOR YOUR TIME!

WE LOOK FORWARD TO WORKING WITH YOU TO CREATE A MORE RESILIENT WATER DISTRICT

Please contact Ed Fortner for more information:
efortner@sweetwatersprings.com