

JURISDICTIONAL ANNEX:

City of Benicia



SOLANO COUNTY
MULTI-JURISDICTIONAL
HAZARD MITIGATION PLAN



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Solano County

Multi-Jurisdiction Hazard Mitigation Plan

CITY OF Benicia (BN.)

Municipal Annex

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Adoption Resolution

To comply with DMA 2000, the City of Benicia has officially adopted this Solano County Multi-Jurisdictional Hazard Mitigation Plan (MJHMP), Volume 1, and its jurisdictional annex. The adoption of the MJHMP recognizes the City's commitment to reducing the impacts of natural hazards. See included adoption resolution.

ADOPTION RECORD TO BE INSERTED UPON COMPLETION.



Section 1. City of Benicia

1.1 Purpose

This Annex details the hazard mitigation planning elements specific to the City of Benicia. This Annex is not intended to be a standalone document but appends to and supplements the information contained in the umbrella plan document. As such, all sections of the umbrella plan, including the planning process and other procedural requirements apply to and were met by the City of Benicia. This Annex provides additional information specific to the City of Benicia, with a focus on providing additional details on the planning process, risk assessment, and mitigation strategy for this community.

Hazard Mitigation Plan Points of Contact

Primary Point of Contact

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1.2 Planning Methodology

The City of Benicia followed the planning process detailed in Volume 1, Section 3, including participating in the County Hazard Mitigation Planning Committee (HMPC) and Steering Committee and formulating their own internal planning team to support the broader planning process. Internal planning participants, their positions, and how they participated in the planning process are shown in Table 1-1.

Table 1-1: Planning Committee Members

Planning Committee Members	Department
Della Olm	Management Analyst
Josh Chadwick	Fire Chief
Dan Sequeria	Principal Civil Engineer
Danielle Crider	Associate Planner
Rachel O'Shea	Chief Building Official
Rick Knight	Project Manager
Suzanne Thorsen	Planning Manager
Terri Davena	Economic Development Specialist
Vic Randall	Senior Planner

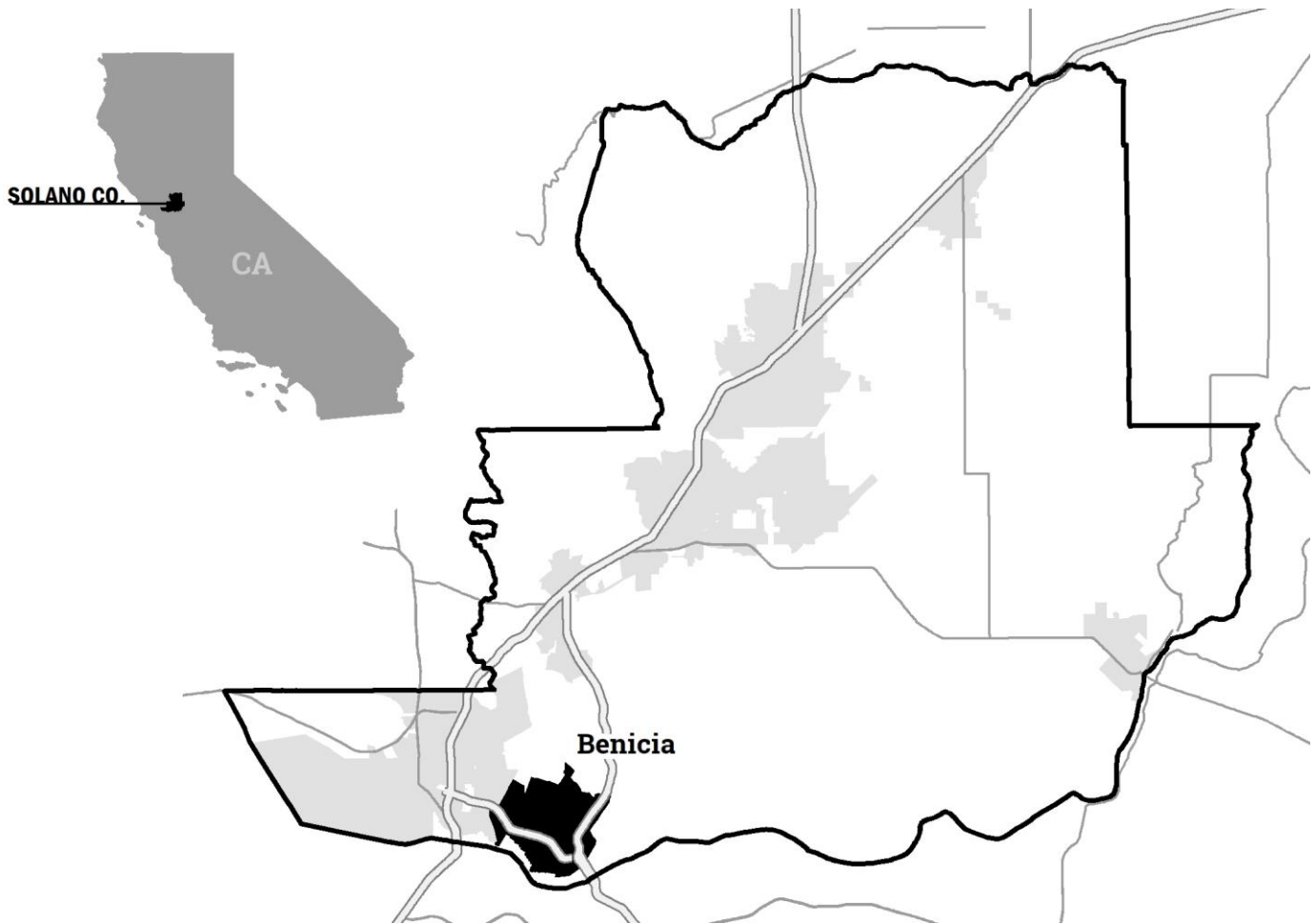


Figure 1-1: City of Benicia Location

1.3 What's New

The City of Benicia has been making improvements toward reducing natural hazard risks to life and property since the existing LHMP was adopted.

The City reevaluated previous mitigation actions. Some mitigation actions have been completed and are highlighted in Table 1-3. The City determined to reprioritize some for lack of funding, or other listed reasons. Table 1-2 lists reprioritized mitigation actions along with an explanation for why. Other mitigation actions are pending or ongoing and are included in Table 1-18.



Table 1-2: Cancelled Mitigation Actions

Mitigation No.	Hazard Type	Status	Year	Primary Agency	Title/Description	Responsible Party	Reason Cancelled
ma-TR-BN-91	Terrorism	Cancelled	2017	City of Benicia	Creation of a complete plan and subsequent training and evaluation of the vulnerability of the community to an active shooter or terrorist event creating mass casualties	Police Department	Not a natural hazard under FEMA's HMA program; not prioritized.

1.3.1 Mitigation Successes

Table 1-3 displays multiple important mitigation actions that have been completed by the City of Benicia. The following describes the City's applicable success stories.

Table 1-3: Completed Mitigation Actions

Mitigation No.	Hazard Type	Status	Year	Primary Agency	Title/Description	Responsible Party
ma-AH-BN-97	All Hazard	Completed	2017	City of Benicia	Increase Community Preparedness by Providing Outreach and Information	Fire, Community Development, others
ma-DR-BN-81	Drought	Completed	2017	City of Benicia	Update Urban Water Management Plan	Public Works Department
ma-DR-BN-92	Drought	Completed	2017	City of Benicia	Prepare feasibility study for a water reuse project	Public Works Department
ma-FL-BN-94	Flood	Completed	2017	City of Benicia	Participate in the Storm Ready Community, National Weather Service program	Fire Department; CDD and PW will be involved



Defensible Space Program and Site-Specific Assessment Project: The City of Benicia is developing a plan for vegetation management in the City's open spaces in order to reduce wildfire risk to the residents surrounding these spaces.

The program involves a report that will serve as a site-specific assessment and report that provides a framework for understanding vegetation/natural resources, fire behavior, and financial investments needed to maintain vegetation in the City's open spaces.

Adoption of the City of Benicia 2020 Urban Water Management Plan: The City of Benicia recently updated their Urban Water Management Plan in order to ensure that the City has secured adequate water supplies for its customers during normal years, a driest year, and multiple dry years. The plan secures water supplies through 2045.

Improving Community Preparedness through public engagement/outreach: Public education is a vital part of the City of Benicia's community risk reduction efforts. The department provides several forms of public education on a recurrent basis ranging from station tours, school site visits, the Benicia Certified Farmers Market, their Annual Open House, Pictures with Santa, and daily interactions while out in the community. The combined outreach from these programs reach nearly 5,000 Benicia residents each year. They reach approximately 20,000 residents each year via social media platforms including Facebook, Twitter, Instagram, and Nexdoor.

City Evacuation Plan added to EOP along with Community Outreach: The City recently created an evacuation plan for the citizens to use in the event of a disaster. Should there be a large-scale emergency or utility failure, citizens will be directed to use the designated exit routes that have been identified and mapped out. A mandatory evacuation order requires the immediate movement of people out of an affected



Figure 1-2: Benicia Fuel Reduction / Veg Management
Source: Marnix A. van Ammers, Patch Staff



Figure 1-3: Public Presentation from City
Source: City of Benicia Staff



area due to an emergency, including a natural hazard event. The public will be alerted by a variety of ways, including public announcements through the Benicia Channel 27 and City of Benicia Social Media Platforms, door-to-door notifications, text messages, phone calls, and emails through ALERT SOLANO.

1.4 Risk Assessment

The intent of this section is to profile the City of Benicia's hazards and assess the City's vulnerabilities, distinct from that of the County wide planning area. The hazard profiles in Volume 1 discuss overall impacts to the planning area and describes the hazard problem description, hazard extent, magnitude/severity, previous occurrences of hazard events and the likelihood of future occurrences. For more information on Risk Assessment Methodologies, see Vol. 1 and Appendix A.

1.4.1 Hazard Screening Criteria

Planning Team members from each participating jurisdiction collectively discussed which hazards should be profiled in the Plan and which should not. The results of that discussion can be found in Table 1-4. Detailed hazard profiles of the most significant County wide hazards are described in Section 4 of Volume 1. The Planning Team reviewed previously-prepared hazard mitigation plans and other relevant documents to determine the realm of natural hazards that have the potential to affect the City of Benicia. Table 1-5 provides a crosswalk of hazards identified in Vol. 1 of this plan, the City of Benicia General Plan, and 2018 California State Hazard Mitigation Plan. The crosswalk was used to develop a preliminary hazards list, providing a framework for the Planning Team members to evaluate which hazards were truly relevant to the City of Benicia and which ones were not. Section 1.4.2 below describes the hazard risk ranking process that was performed by the planning team which prioritized hazards that are specifically relevant to the City of Benicia.



Table 1-4: County-Wide Hazard Prioritization

Hazard Type	Explanation
Climate Change	High priority county-wide, profiled hazard.
Dam/ Levee failure	Dam failure is possible in Solano County but is best addressed in other plans, specifically Emergency Action Plans for high hazard dams affecting Solano County.
Drought	High priority county-wide, profiled hazard.
Earthquake/ Geologic Hazards	High priority county-wide, profiled hazard.
Flood	High priority county-wide, profiled hazard.
Hazardous Material	While hazardous materials can release and impact the County, there are better avenues to address this hazard outside this plan.
High Winds/ Straight Line Winds	High priority county-wide, profiled as part of Extreme Weather.
Insect Hazards	While hazardous insects exist in Solano County, this was not considered a priority and is not profiled in this plan.
Pandemic Disease	While pandemic disease can impact the County, there are better avenues to address this hazard outside this plan.
Extreme Weather, including:	High priority county-wide for high wind, heavy rain, and high heat.
Extreme Heat	Profiled as part of Extreme Weather.
Hail	Hail events are rare and not considered a priority.
High Wind	Profiled as part of Extreme Weather.
Heavy Rain	Profiled as part of Extreme Weather.
Fog	Fog events are rare and are not considered a priority.
Lightning	Not a priority as an extreme weather event; discussed as source of wildfire.
Severe Thunderstorm	Severe thunderstorms were not identified as a priority in this plan.
Winter Storm / Extreme Cold/ Freeze Events	Winter storms are rare in Solano County and not identified as a priority for this plan.
Slope Failure	High priority county-wide, profiled hazard.
Soil Hazards	While limited soil hazards exist in Solano County (erosion and shifting soils), these are not prioritized in this plan. Erosion discussed under flood hazard.
Terrorism/Human Caused Threats	While terrorism is certainly a threat to the County and participating jurisdictions, it is best addressed in other plans as this HMP does not address human-caused threats.
Tornado	Impacts to the County from tornados are extremely unlikely, if any.
Volcanic Activity	Due to distance from volcanoes and the limited chance of an eruption, this hazard was not identified as a priority.
Wildfire	High priority county-wide, profiled hazard.



Table 1-5: City Document Review Crosswalk

Hazards	2014 Solano County HMP	2017 Benicia LHMP	1999 Benicia General Plan	2018 California State HMP
Agricultural Pests				■
Climate Change	■			■
Dam Failure	■			■
Drought	■	■		■
Earthquake	■	■	■	■
Flood	■	■	■	■
Insect Hazards				
Landslide	■	■	■	■
Levee Failure				■
Manmade Hazards			■	■
Pandemic Disease				■
Sea Level Rise	■		■	■
Severe Weather	■	■		■
Soil Hazards			■	■
Terrorism & Tech Hazards		■		■
Tsunami		■		■
Volcano				■
Wildfire	■	■	■	■

1.4.2 Hazard Risk Ranking

The City of Benicia's Planning Team used the same hazard prioritization process as the Solano County Hazard Mitigation Planning Committee. This process is described in detail in Section 4.3.1 of Vol. 1. Figure 1-4 displays the results of the hazard risk ranking exercise that was performed by the Planning Team. The Planning Team chose to assess the City of Benicia's vulnerability to the following hazards:

- Wildfire
- Extreme Weather (high heat, heavy rain, high wind)
- Flood
- Drought
- Earthquake
- Climate Change

All of these hazards have been profiled in Vol. 1 of this document. The purpose of this annex is to specifically address the City of Benicia's vulnerability to these specifically-identified hazards.

1.4.3 Vulnerability Assessment

Assessing vulnerabilities exposes the unique characteristics of individual hazards and begins the process of narrowing down which areas within the City of Benicia are vulnerable to specific hazard events. The vulnerability assessment considered unique local knowledge of hazards and impacts and a GIS overlaying method for examining such vulnerabilities more in depth. Using these methods, participating jurisdictions estimated vulnerable populations, infrastructure, and potential losses from hazards.



1.4.3.1 Risk Assessment

Each participating jurisdiction developed a risk matrix that assessed the probability and impact of various hazards within the jurisdiction. Figure 1-4 is the jurisdiction's risk assessment, which was completed in part using the web based and interactive Risk Assessment Mapping Platform (RAMP), accessed via the project website at www.mitigatehazards.com. RAMP allows interactive discovery of robust risk, vulnerability, and exposure data developed especially for Solano County. RAMP is a mapping platform built specifically for mitigation planning. It displays County/jurisdiction facilities and buildings overlaid with natural hazards layers to bring interactivity and individual discovery to the GIS analysis performed for the MJHMP. See Vol. 1 for a detailed description of RAMP. The Planning Team used RAMP in meetings and as needed to understand vulnerabilities to the City of Benicia. Users interactively filter facilities and buildings by natural hazard zones and/or construction characteristics. The City of Benicia did not conduct a more detailed climate vulnerability assessment as an appendix, as the City is initiating more in-depth climate work. The climate vulnerability assessment analyzed climate-related vulnerabilities by considering the impact from the climate vulnerability and the community's adaptive capacity to respond to the particular vulnerability.

1.4.3.2 Snapshot Exposure Maps & Damage Estimation

The included snapshot maps and damage estimation tables illustrate the City of Benicia's vulnerability to specific hazards. Based on the risk assessment, the snapshot maps focus on those hazards prioritized by the jurisdiction. These maps helped the Planning Team understand the exposure of population, parcels, and critical infrastructure to specific hazards. Each map contains an exposure summary that displays the percent of the population, the improvement and content value of parcels, and the amount of critical infrastructure that is exposed to each respective hazard. For flood and earthquake, detailed damage estimations were conducted through FEMA's Hazus software and are shown in tabular form. Additional mapping is also included. Figures and tables include:

- Figure 1-5: City of Benicia – Mean Fire Return Interval
- Figure 1-6: City of Benicia – Wildfire Risk Exposure
- Figure 1-7: City of Benicia – FEMA Flood Risk Exposure
- Table 1-6: City of Benicia – Damage Estimate Summaries, 100YR Flood
- Table 1-7: City of Benicia – Damage Estimate Summaries, 500 YR Flood
- Table 1-8: City of Benicia – Damage Estimate Summaries, 100YR Coastal Flood
- Figure 1-8: City of Benicia – BAM 200-YR Flooding and Awareness Zones
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- Figure 1-17: City of Benicia – RCP Comparison
- Figure 1-18: City of Benicia – Sea Level Rise



Risk Assessment Matrix Definitions

PROBABILITY RATING

The likelihood of a hazard event occurring within a time period?

PROBABILITY	Highly Likely	Highly likely - 100% annual probability. Or Likely to occur every year in your lifetime.
	Likely	Likely - between 10 & 100% annual probability. Or will occur several times in your lifetime.
	Possible	Possible - between 1 & 10% annual probability. Or Likely to occur some time in your lifetime.
	Unlikely	Unlikely - less than 1% annual probability. Or unlikely but possible to occur in your lifetime.

IMPACT RATING

In terms of injuries, damage, or death, would you anticipate impacts to be minor, limited, critical, or catastrophic when a significant hazard event occurs? The impact could be in terms of one hazard event (flooding from a culvert failure) or a large-scale event (multiple rivers flooding) in the same jurisdictional boundary.

IMPACT			
Minor	Limited	Critical	Catastrophic
Minor - very few injuries, if any. Only minor property damage & minimal disruption on quality of life. Temporary shutdown of critical facilities.	Limited - minor injuries only. Approx. 10% or less of property in disaster footprint damaged or destroyed. Complete shutdown of critical facilities for more than one day.	Critical - multiple deaths/injuries possible. Between 25% and 50% of property in disaster footprint is damaged or destroyed. Complete shutdown of critical facilities for more than one week.	Catastrophic - high number of deaths/injuries possible. More than 50% of property in affected area damaged or destroyed. Complete shutdown of critical facilities for 30 days or more.

To concentrate resources on highest priority hazards, the jurisdictional planning team will focus on "High" and "Extreme" risk hazards in this annex. These hazards have higher probability and greater impact as it relates to the jurisdiction's planning area.

Hazard definitions are included in Vol. 1 of this plan. If a hazard is grey in color, the jurisdictional planning team felt the hazard had a minimal footprint within their planning area, and no mitigation strategy was developed.

Hazard Information / Legend:



Climate Change is prioritized for all jurisdictions.

Sea Level Rise is a subhazard of climate change for some jurisdictions (County, Vallejo, Benicia, Suisun City, Fairfield).



Extreme Weather in Solano County includes high heat, high wind, and heavy rain.

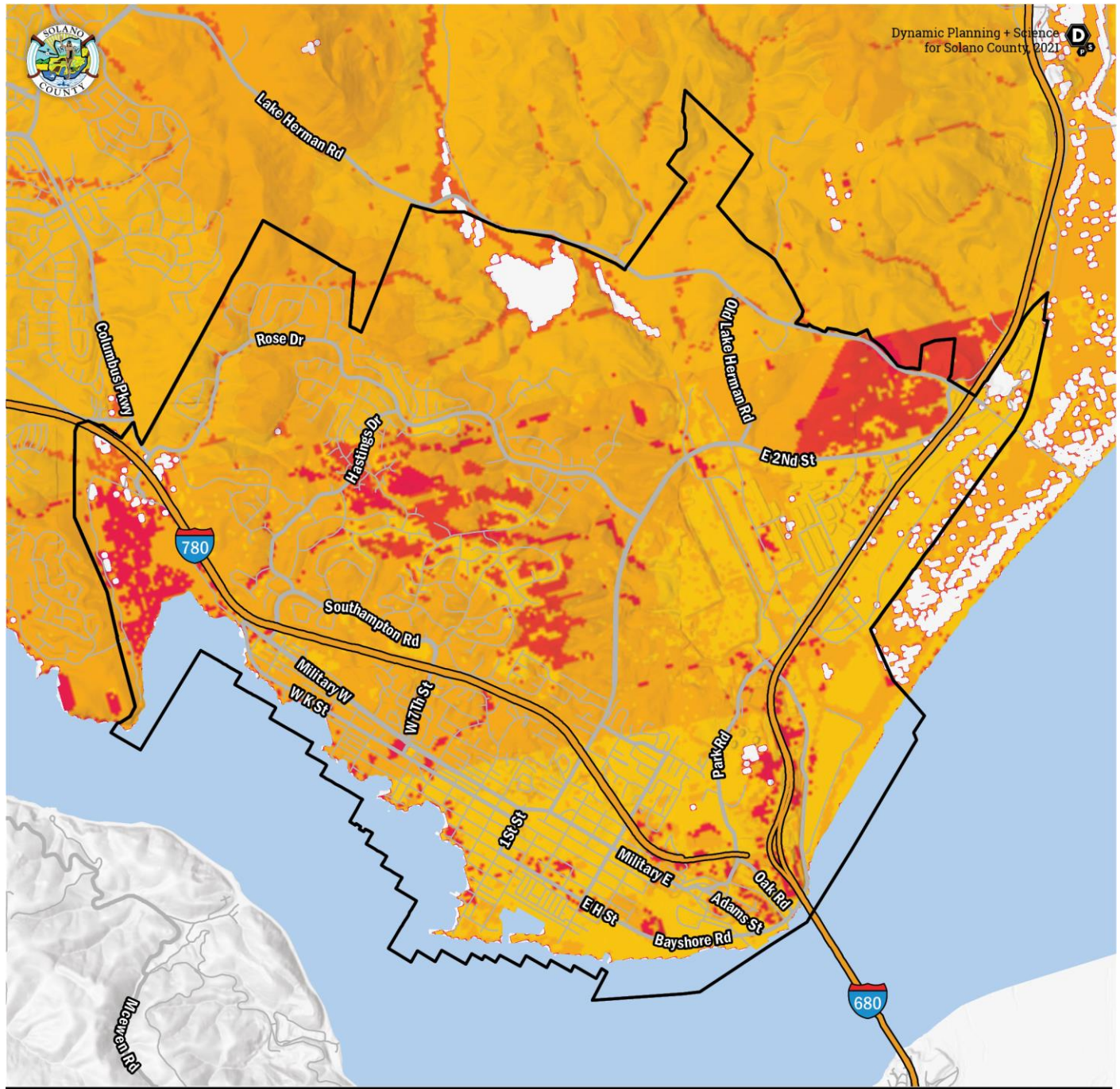


If a hazard symbol is grey, the planning team did not develop hazard vulnerability information due to lower perceived probability and impact.

City Of Benicia Risk Matrix

		IMPACT			
		Minor	Limited	Critical	Catastrophic
PROBABILITY	Highly Likely	Medium	FLOOD WILDFIRE	EXTREME WEATHER	Extreme
	Likely	Medium	DROUGHT	High	Extreme
	Possible	SLOPE FAILURE	Medium	EARTHQUAKE	High
	Unlikely	Low	Low	Medium	Medium

Figure 1-4: City of Benicia Risk Assessment



MEAN FIRE RETURN INTERVAL BENICIA

*Data sources: USGS LANDFIRE.

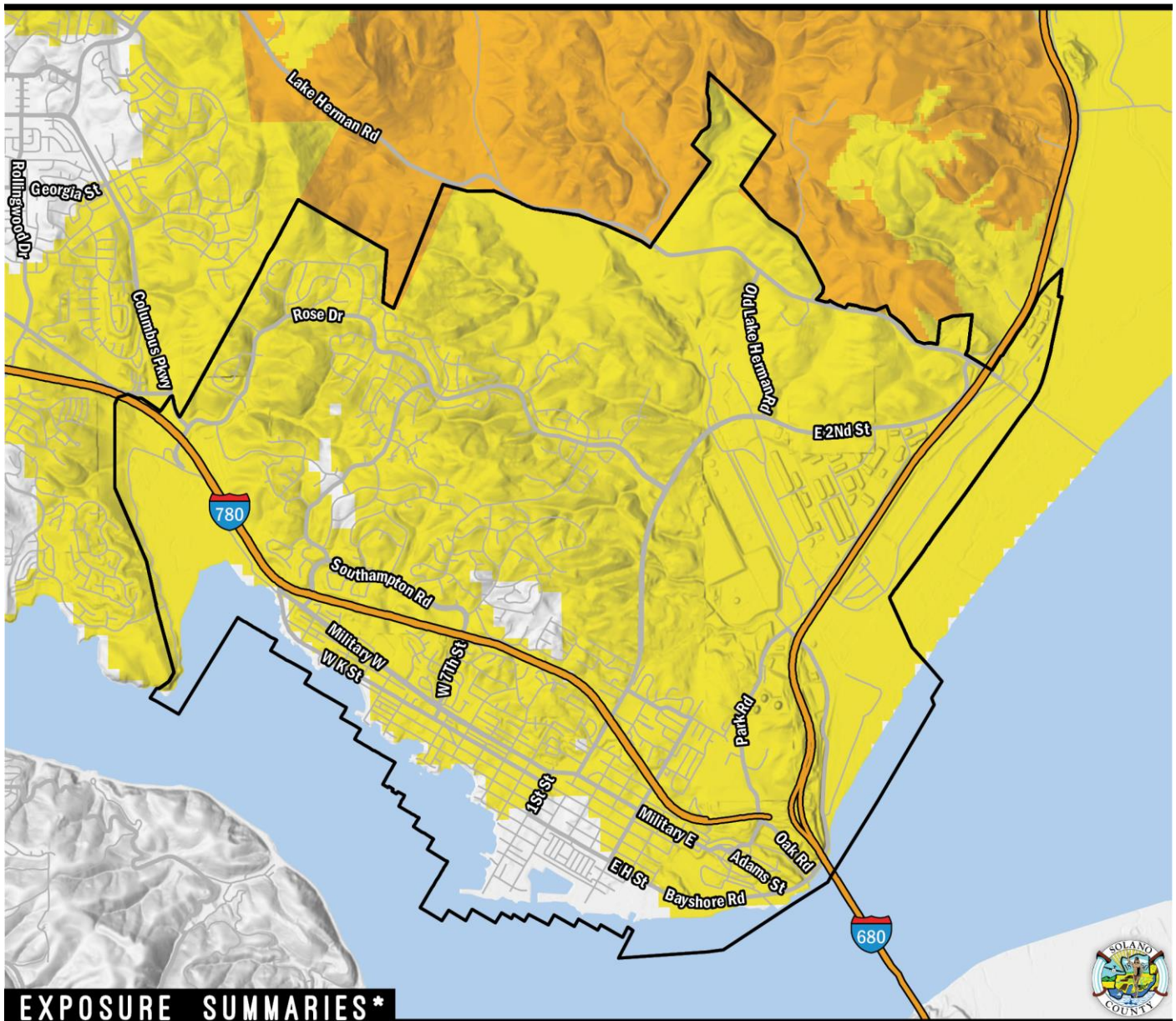


Figure 1-5: City of Benicia – Mean Fire Return Interval



WILDFIRE RISK EXPOSURE

BENICIA



EXPOSURE SUMMARIES*

POPULATION COUNT IN HAZARD AREA		PARCEL COUNT IN HAZARD AREA		PARCEL VALUE IN HAZARD AREA		CRITICAL INFRASTRUCTURE COUNTS IN HAZARD AREA			
Count	Exp. Rate**	Count	Exp. Rate**	Sum of Improvement Value	Exp. Rate**	Infrastructure Category	Count	Exp. Rate**	Count/Sum Includes:
67	0%	0	0%	\$0	0%	Essential Facilities	0	0%	H VH
Count Includes:	H VH	Count Includes:	H VH	Sum of Content Value	0%	High Potential Loss	0	0%	Sum of Transportation & Lifeline Linear Mileage
				\$0	0%	Transportation & Lifeline	0	0%	1 0%
				Count Includes:	H VH				

MAP LEGEND

MODERATE
HIGH (H)
VERY HIGH (VH)

*Exposure summaries include high and very high risk areas. Hazard data source: Cal Fire, CPUC.

**Exposure Rate - Exposed summary or count as a percentage of total summary or count within jurisdiction.

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Figure 1-6: City of Benicia – Wildfire Risk Exposure



FEMA FLOOD RISK EXPOSURE

BENICIA

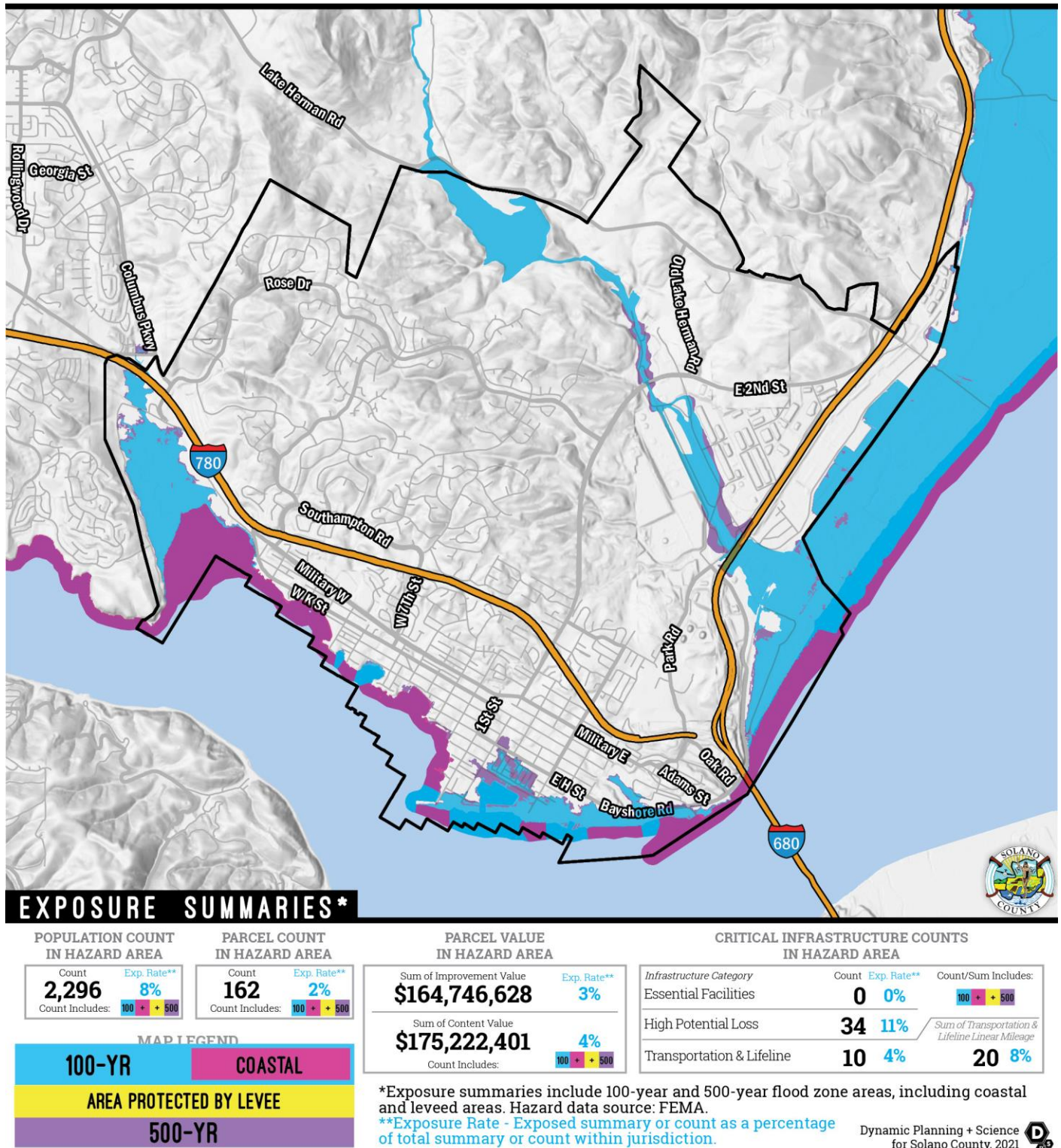


Figure 1-7: City of Benicia – FEMA Flood Risk Exposure



Table 1-6: City of Benicia – Damage Estimate Summaries, 100YR Flood

Building Type	Building Damage (\$)	Building Damage (% of total loss)	Content Damage (\$)	Content Damage (% of total loss)	Total Damage (\$)	Proportion of Loss (%)
Agriculture	\$0	0.0%	\$0	0.0%	\$0	0%
Commercial	\$650,835	1.4%	\$2,132,143	4.5%	\$2,782,978	6%
Education*	\$0	0.0%	\$0	0.0%	\$0	0%
Emergency	\$0	0.0%	\$0	0.0%	\$0	0%
Government	\$1,471,181	3.1%	\$6,144,674	12.9%	\$7,615,855	16%
Industrial	\$8,731,613	18.3%	\$25,649,558	53.7%	\$34,381,172	72%
Religion	\$0	0.0%	\$0	0.0%	\$0	0%
Residential	\$2,142,338	4.5%	\$838,469	1.8%	\$2,980,806	6%
Total	\$12,995,967	27%	\$34,764,843	73%	\$47,760,811	

*School district asset information not available during time of Hazus analysis.

Note: Total Inventory Values

1 - Building Replacement Costs = \$3,773,922,295

2 - Content Replacement Costs = \$2,667,166,517

3 - Total Value = \$6,441,088,812

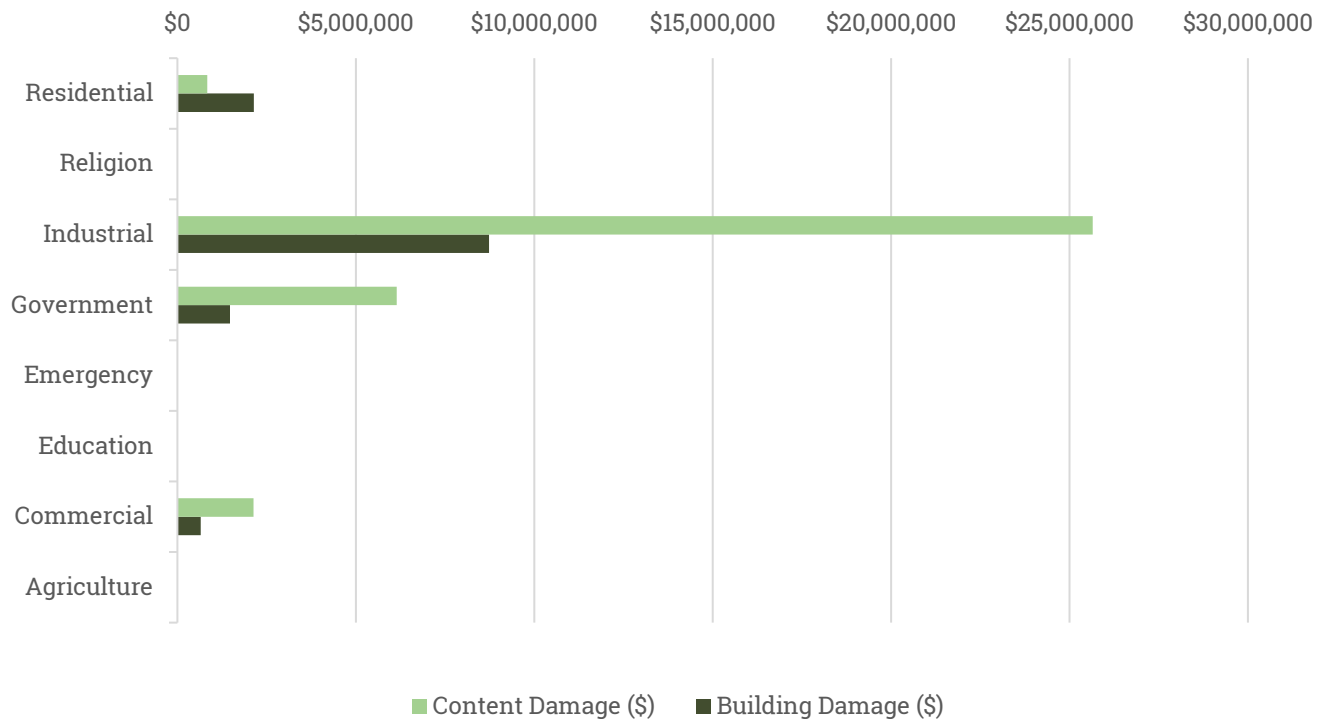




Table 1-7: City of Benicia – Damage Estimate Summaries, 500 YR Flood

Building Type	Building Damage (\$)	Building Damage (% of total loss)	Content Damage (\$)	Content Damage (% of total loss)	Total Damage (\$)	Proportion of Loss (%)
Agriculture	\$0	0.0%	\$0	0.0%	\$0	0%
Commercial	\$0	0.0%	\$0	0.0%	\$0	0%
Education*	\$0	0.0%	\$0	0.0%	\$0	0%
Emergency	\$0	0.0%	\$0	0.0%	\$0	0%
Government	\$0	0.0%	\$0	0.0%	\$0	0%
Industrial	\$2,191	0.2%	\$0	0.0%	\$2,191	0%
Religion	\$0	0.0%	\$0	0.0%	\$0	0%
Residential	\$785,942	70.3%	\$329,918	29.5%	\$1,115,860	100%
Total	\$788,133	70%	\$329,918	30%	\$1,118,051	

*School district asset information not available during time of Hazus analysis.

Note: Total Inventory Values

1 - Building Replacement Costs = \$3,773,922,295

2 - Content Replacement Costs = \$2,667,166,517

3 - Total Value = \$6,441,088,812

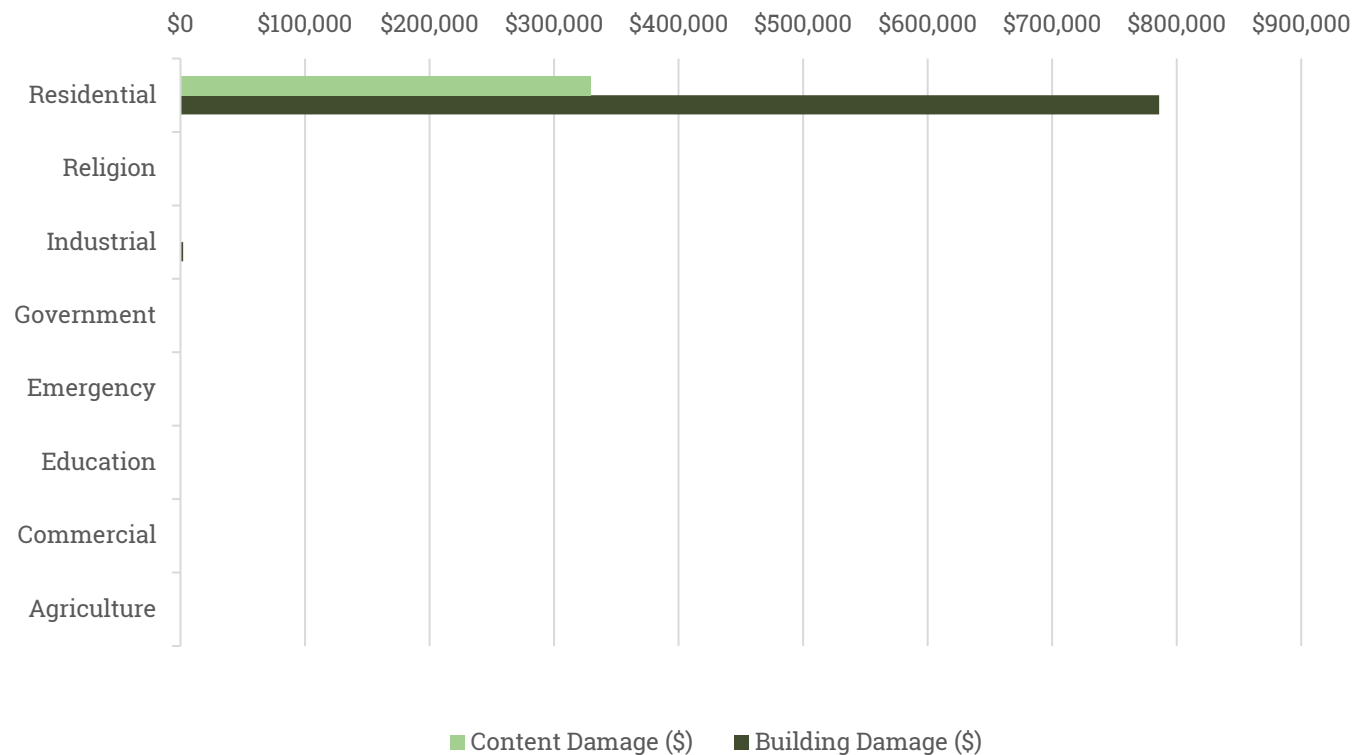




Table 1-8: City of Benicia – Damage Estimate Summaries, 100YR Coastal Flood

Building Type	Building Damage (\$)	Building Damage (% of total loss)	Content Damage (\$)	Content Damage (% of total loss)	Total Damage (\$)	Proportion of Loss (%)
Agriculture	\$0	0.0%	\$0	0.0%	\$0	0%
Commercial	\$16,061	17.2%	\$43,979	47.1%	\$60,040	64%
Education*	\$0	0.0%	\$0	0.0%	\$0	0%
Emergency	\$0	0.0%	\$0	0.0%	\$0	0%
Government	\$0	0.0%	\$0	0.0%	\$0	0%
Industrial	\$0	0.0%	\$0	0.0%	\$0	0%
Religion	\$0	0.0%	\$0	0.0%	\$0	0%
Residential	\$20,860	22.3%	\$12,531	13.4%	\$33,391	36%
Total	\$36,921	40%	\$56,510	60%	\$93,431	

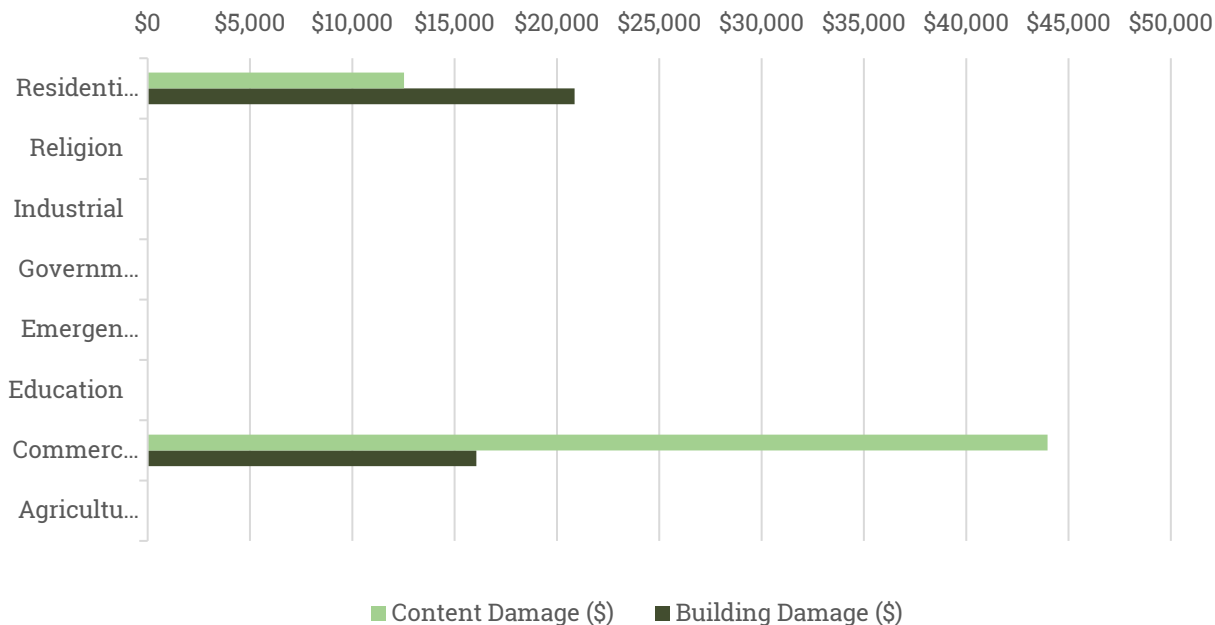
*School district asset information not available during time of Hazus analysis.

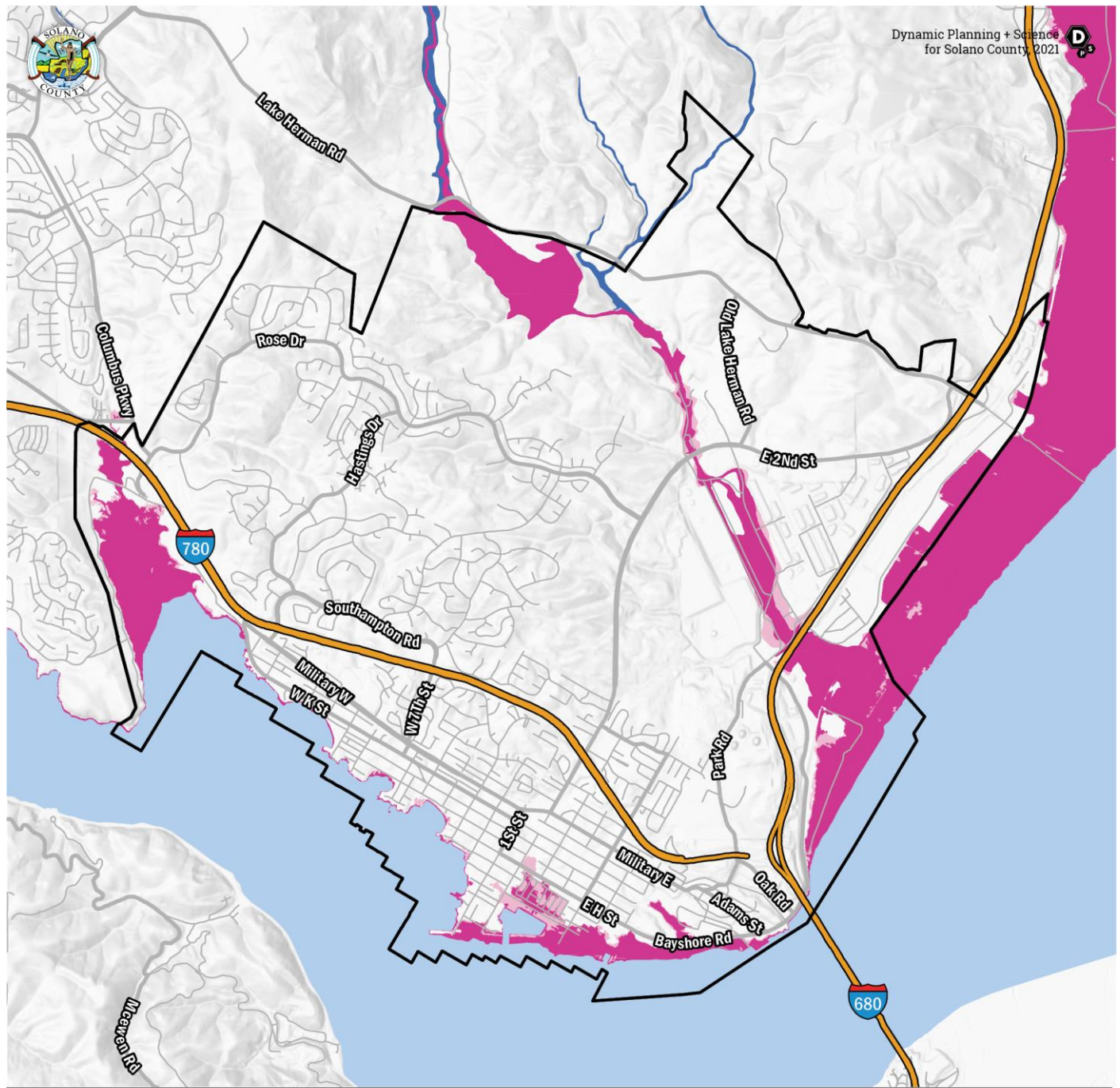
Note: Total Inventory Values

1 - Building Replacement Costs = \$3,773,922,295

2 - Content Replacement Costs = \$2,667,166,517

3 - Total Value = \$6,441,088,812





BEST AVAILABLE MAPPING (BAM) BENICIA

*Data sources: FEMA DFIRM, DWR Awareness Zones (Flood Prone Areas), USACE Comprehensive Study (2002, Sacramento and San Joaquin River Basins).

FEMA FLOOD ZONES

100-YR (SFHA) 500-YR

DWR AWARENESS ZONES

USACE SAC, SAN JOAQUIN R. COMPREHENSIVE STUDY

100-YR 200-YR 500-YR

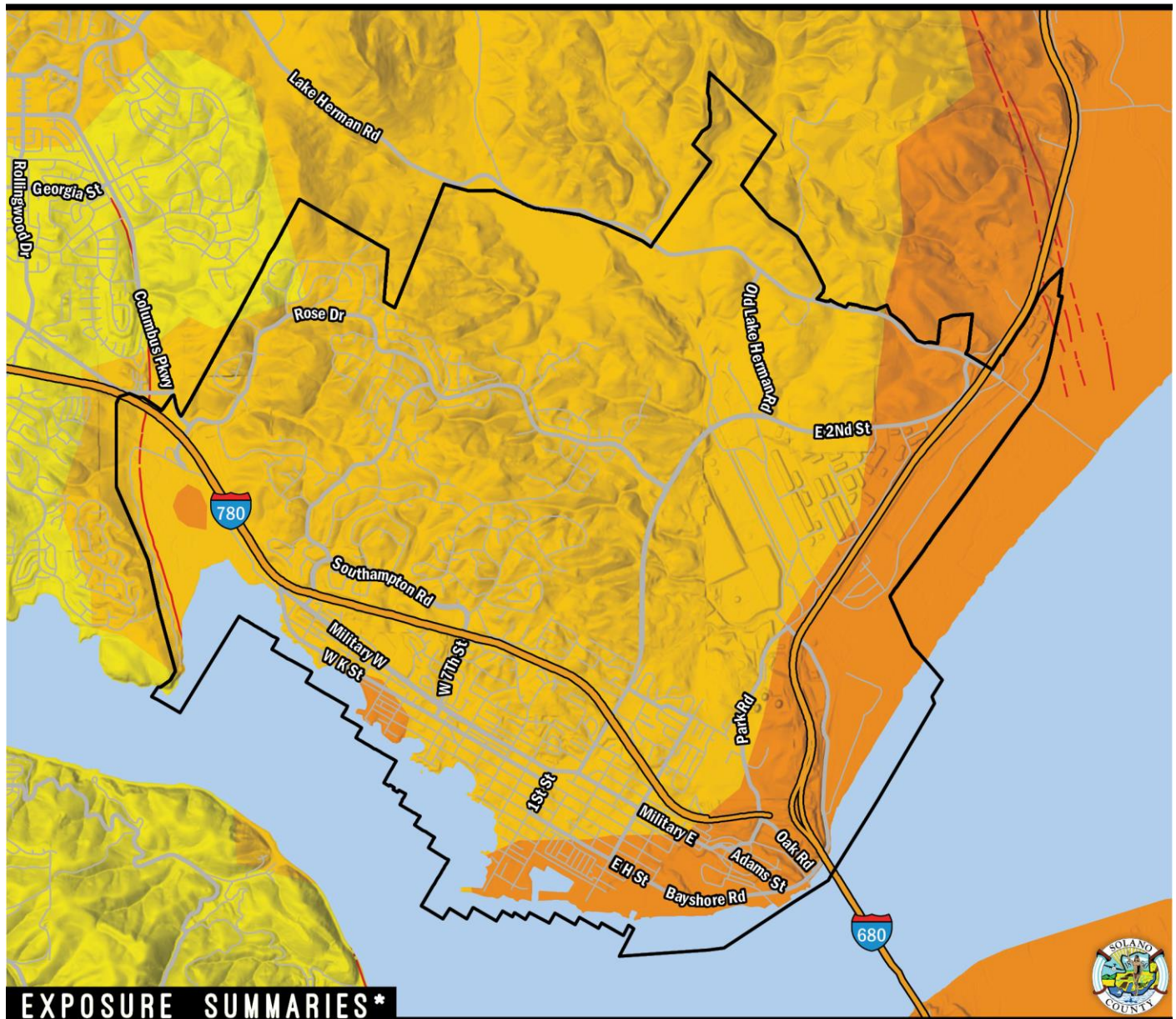
Legend above represents all possible flood classes - may not be present on map

Figure 1-8: City of Benicia – BAM 200-YR Flooding and Awareness Zones



CONCORD-GREEN VALLEY EARTHQUAKE SCENARIO (M6.8)

BENICIA



EXPOSURE SUMMARIES*

**POPULATION COUNT
IN HAZARD AREA**

Count	Exp. Rate**
28,088	100%
Count Includes: S+++E	

**PARCEL COUNT
IN HAZARD AREA**

Count	Exp. Rate**
9,517	100%
Count Includes: S+++E	

**PARCEL VALUE
IN HAZARD AREA**

Sum of Improvement Value	Exp. Rate**
\$6,573,932,887	100%
Sum of Content Value	
\$4,882,423,858	100%
Count Includes: S+++E	

**CRITICAL INFRASTRUCTURE COUNTS
IN HAZARD AREA**

Infrastructure Category	Count	Exp. Rate**	Count/Sum Includes:
Essential Facilities	4	100%	S+++E
High Potential Loss	305	100%	Sum of Transportation & Lifeline Linear Mileage
Transportation & Lifeline	271	100%	
	266	100%	

MAP LEGEND

III	IV	V	VI	VII	VIII	IX	X
WEAK	LIGHT	MODERATE	STRONG	VERY STRONG	SEVERE	VIOLENT	EXTREME
MMI							

*Exposure summaries include strong, very strong, violent, and severe MMI classes.
Hazard data source: USGS.

**Exposure Rate - Exposed summary or count as a percentage of total summary or count within jurisdiction.

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Figure 1-9: City of Benicia – Concord Green Valley Earthquake Scenario (M6.8)



Table 1-9: City of Benicia – Concord Green Valley Damage Estimate Summaries

Building Type	Average of Potential Damage to Exceed "Slight"	Average of Potential Damage to Exceed "Moderate"	Average of Potential Damage to Exceed "Extensive"	Average Economic Loss for Each Building Category	Sum of Economic Loss	Proportion of Loss (%)
Agriculture	0%	0%	0%	\$0	\$0	0%
Commercial	52%	23%	8%	\$1,487,686	\$364,483,142	38%
Education*	75%	58%	39%	\$2,892,590	\$5,785,180	1%
Emergency	42%	23%	8%	\$236,206	\$1,181,030	0%
Government	48%	25%	9%	\$235,778	\$16,975,983	2%
Industrial	78%	51%	17%	\$1,177,698	\$297,957,566	31%
Religion	41%	11%	1%	\$77,581	\$1,629,204	0%
Residential	38%	7%	1%	\$29,187	\$262,452,956	28%
Total					\$950,465,061	

*School district asset information not available during time of Hazus analysis.

Note: Total Inventory Values

1 - Building Replacement Costs = \$3,773,922,295

2 - Content Replacement Costs = \$2,667,166,517

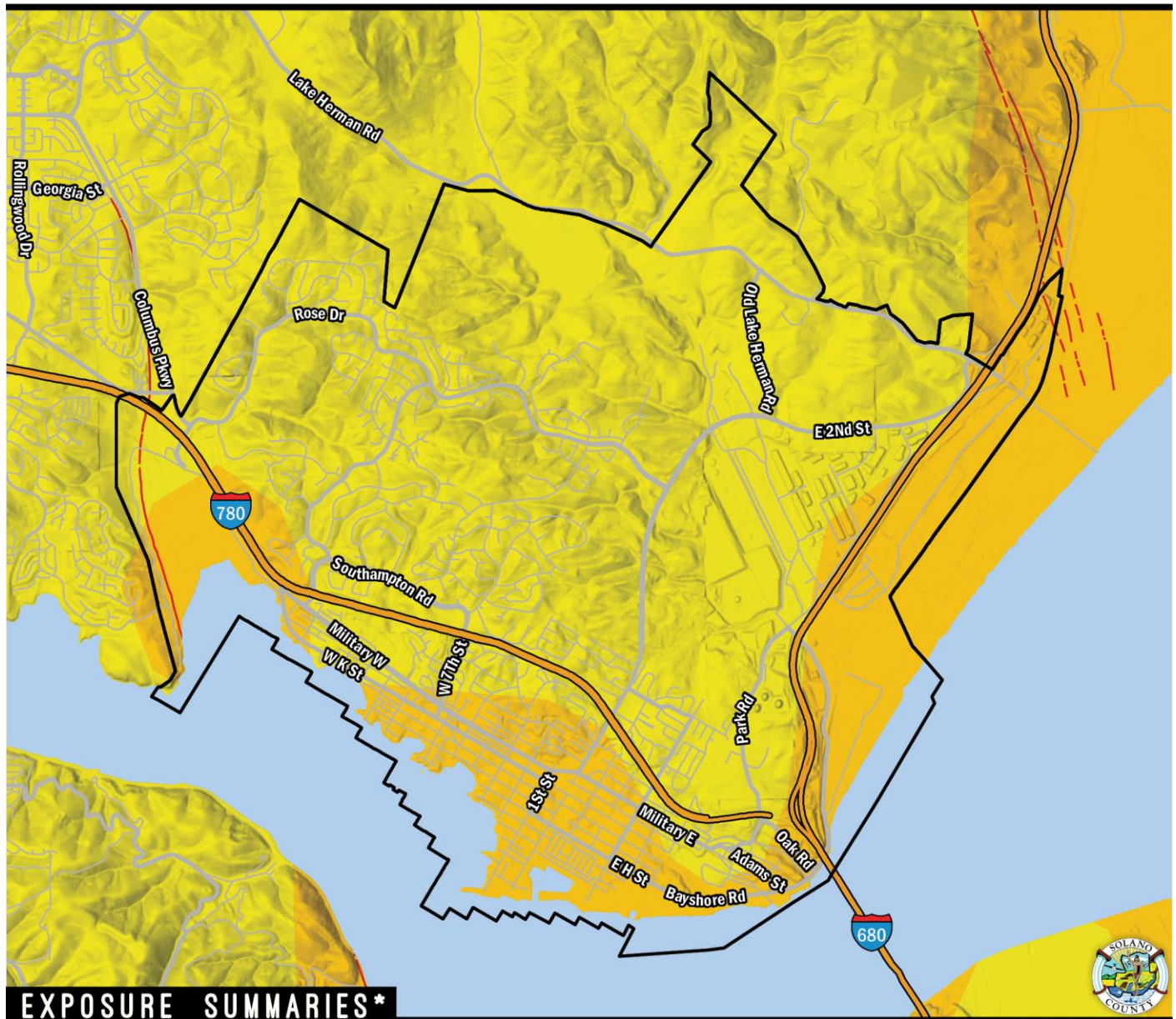
3 - Total Value = \$6,441,088,812





HAYWARD-RODGER'S CREEK EARTHQUAKE SCENARIO (M7.1)

BENICIA



EXPOSURE SUMMARIES*

**POPULATION COUNT
IN HAZARD AREA**

Count	Exp. Rate**
28,088	100%
Count Includes: S+++E	

**PARCEL COUNT
IN HAZARD AREA**

Count	Exp. Rate**
9,517	100%
Count Includes: S+++E	

**PARCEL VALUE
IN HAZARD AREA**

Sum of Improvement Value	Exp. Rate**
\$6,573,932,887	100%
Count Includes: S+++E	

Sum of Content Value	Exp. Rate**
\$4,882,423,858	100%
Count Includes: S+++E	

**CRITICAL INFRASTRUCTURE COUNTS
IN HAZARD AREA**

Infrastructure Category	Count	Exp. Rate**	Count/Sum Includes:
Essential Facilities	4	100%	S+++E
High Potential Loss	305	100%	Sum of Transportation & Lifeline Linear Mileage
Transportation & Lifeline	271	100%	266 100%

MAP LEGEND

III	IV	V	VI	VII	VIII	IX	X
WEAK MMI	LIGHT	MODERATE	STRONG	VERY STRONG	SEVERE	VIOLENT	EXTREME

*Exposure summaries include strong, very strong, violent, and severe MMI classes.
Hazard data source: USGS.

**Exposure Rate - Exposed summary or count as a percentage of total summary or count within jurisdiction.

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Figure 1-10: City of Benicia – Hayward Rodger's Creek Earthquake Scenario (M7.1)



Table 1-10: City of Benicia – Hayward Rodgers Creek Damage Estimate Summaries

Building Type	Average of Potential Damage to Exceed "Slight"	Average of Potential Damage to Exceed "Moderate"	Average of Potential Damage to Exceed "Extensive"	Average Economic Loss for Each Building Category	Sum of Economic Loss	Proportion of Loss (%)
Agriculture	0%	0%	0%	\$0	\$0	0%
Commercial	23%	7%	1%	\$427,689	\$104,783,712	41%
Education*	42%	22%	5%	\$776,246	\$1,552,493	1%
Emergency	16%	7%	1%	\$71,121	\$355,605	0%
Government	18%	6%	1%	\$52,298	\$3,765,431	1%
Industrial	31%	12%	2%	\$289,033	\$73,125,229	29%
Religion	13%	2%	0%	\$13,996	\$293,908	0%
Residential	13%	1%	0%	\$7,898	\$71,018,687	28%
Total					\$254,895,066	

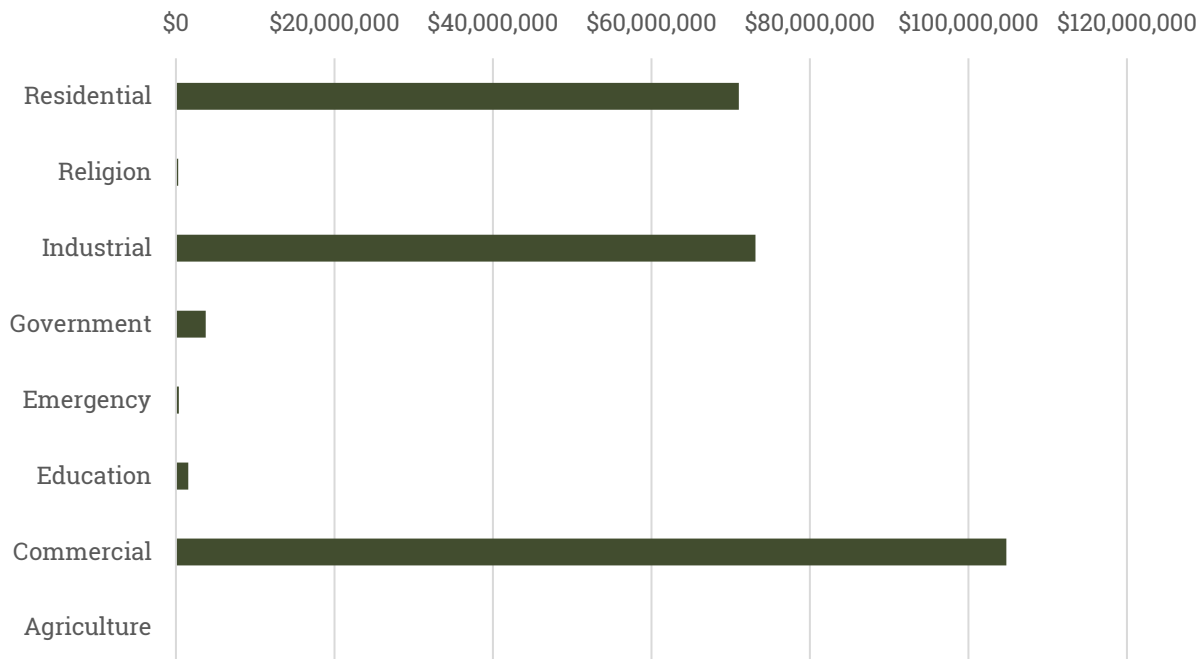
*School district asset information not available during time of Hazus analysis.

Note: Total Inventory Values

1 - Building Replacement Costs = \$3,773,922,295

2 - Content Replacement Costs = \$2,667,166,517

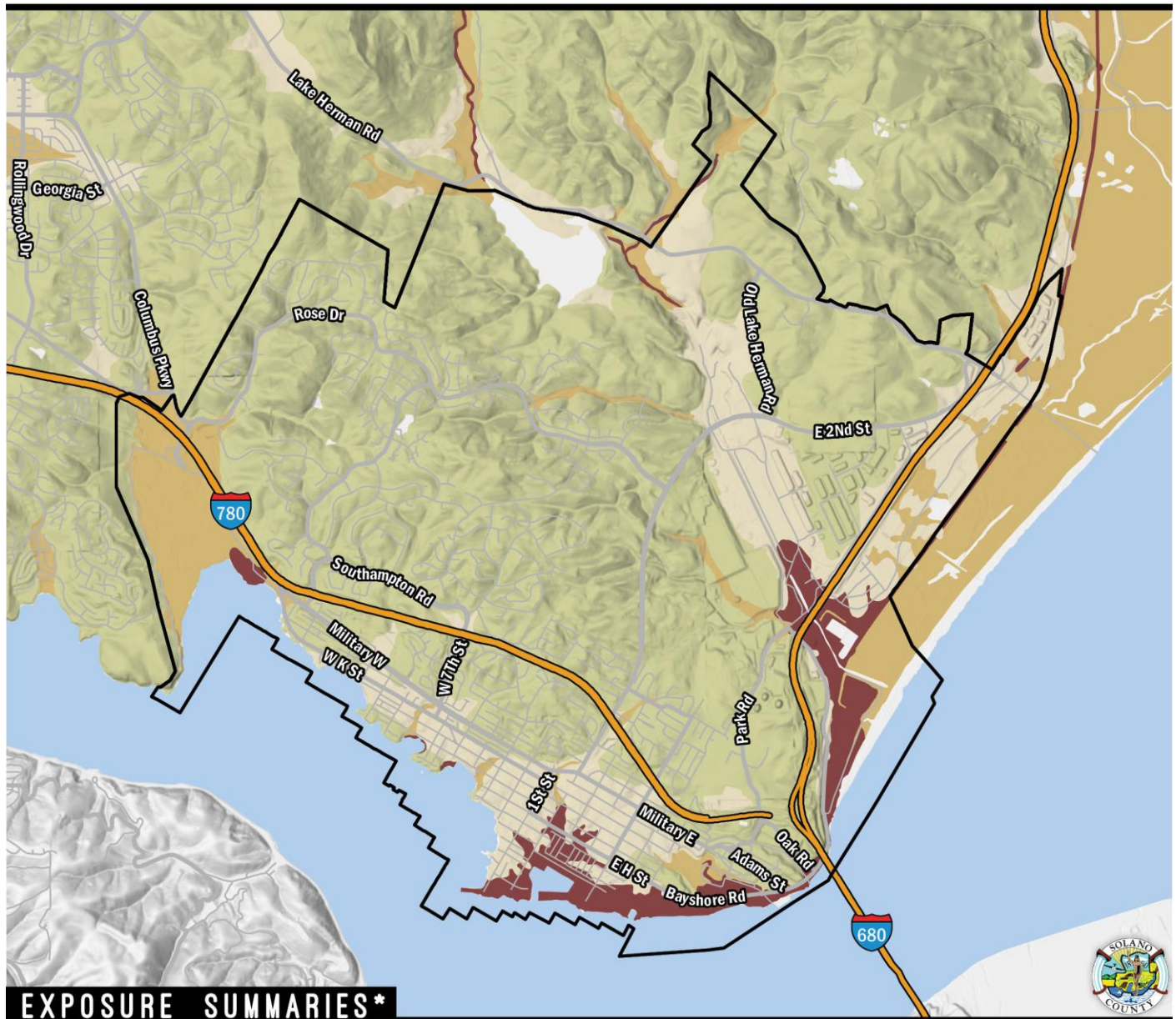
3 - Total Value = \$6,441,088,812





AREAS WITH POTENTIAL FOR LIQUEFACTION

BENICIA



EXPOSURE SUMMARIES*

POPULATION COUNT IN HAZARD AREA		PARCEL COUNT IN HAZARD AREA		PARCEL VALUE IN HAZARD AREA		CRITICAL INFRASTRUCTURE COUNTS IN HAZARD AREA		
Count	Exp. Rate**	Count	Exp. Rate**	Sum of Improvement Value	Exp. Rate**	Infrastructure Category	Count	Exp. Rate**
3,092	11%	364	4%	\$453,000,959	7%	Essential Facilities	0	0%
Count Includes: M H VH		Count Includes: M H VH		Sum of Content Value		High Potential Loss	57	19%
				\$454,530,635	9%	Transportation & Lifeline	23	8%
				Count Includes: M H VH			38	14%

MAP LEGEND

VL	L	M	H	VH
VERY LIGHT	LIGHT	MODERATE	HIGH	VERY HIGH

*Exposure summaries include medium, high, very high susceptibility. Hazard data source: USGS.

**Exposure Rate - Exposed summary or count as a percentage of total summary or count within jurisdiction.

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Figure 1-11: City of Benicia – Areas with Potential for Liquefaction



FAULT ZONE AREAS OF REQUIRED INVESTIGATION

BENICIA

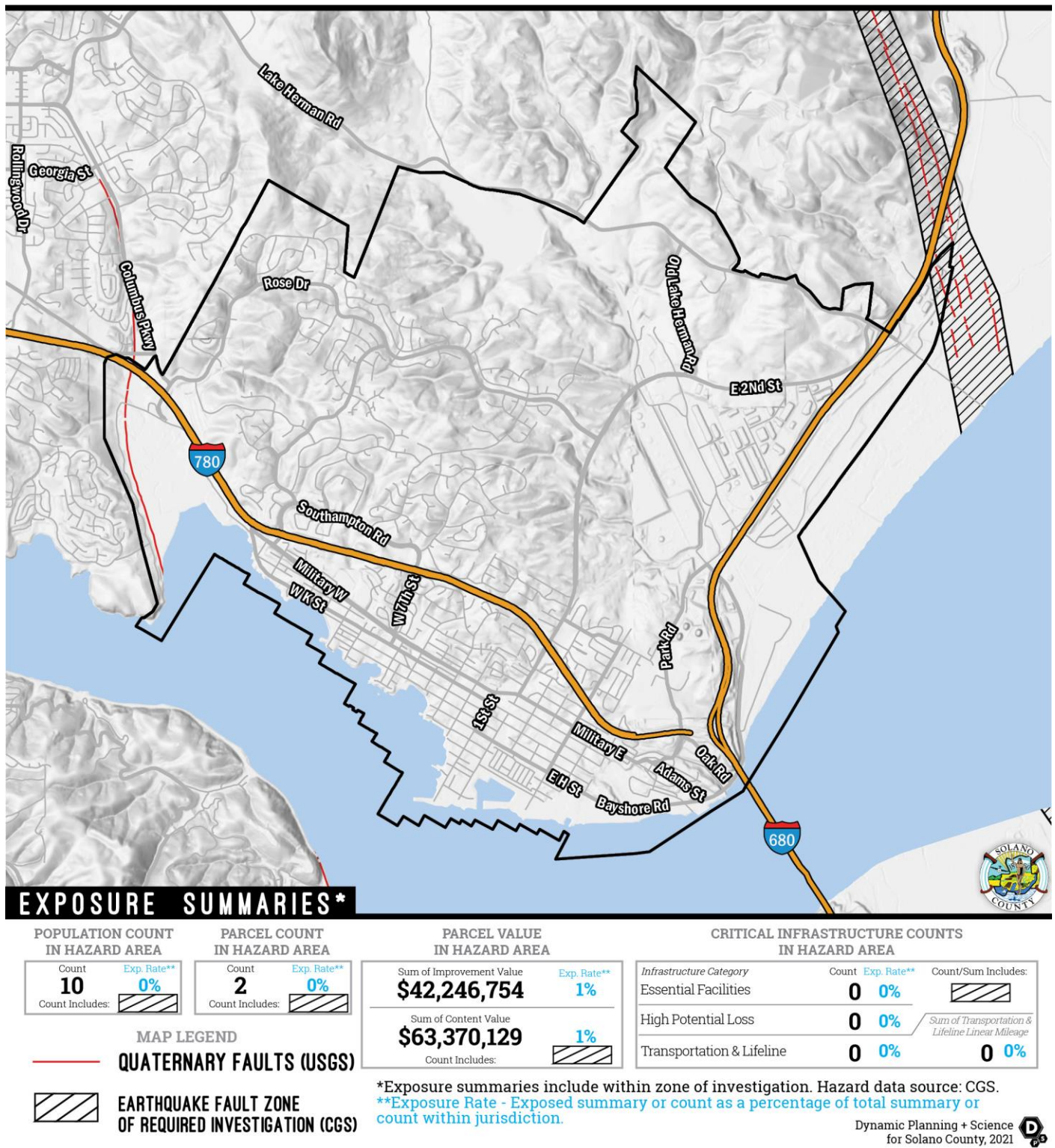
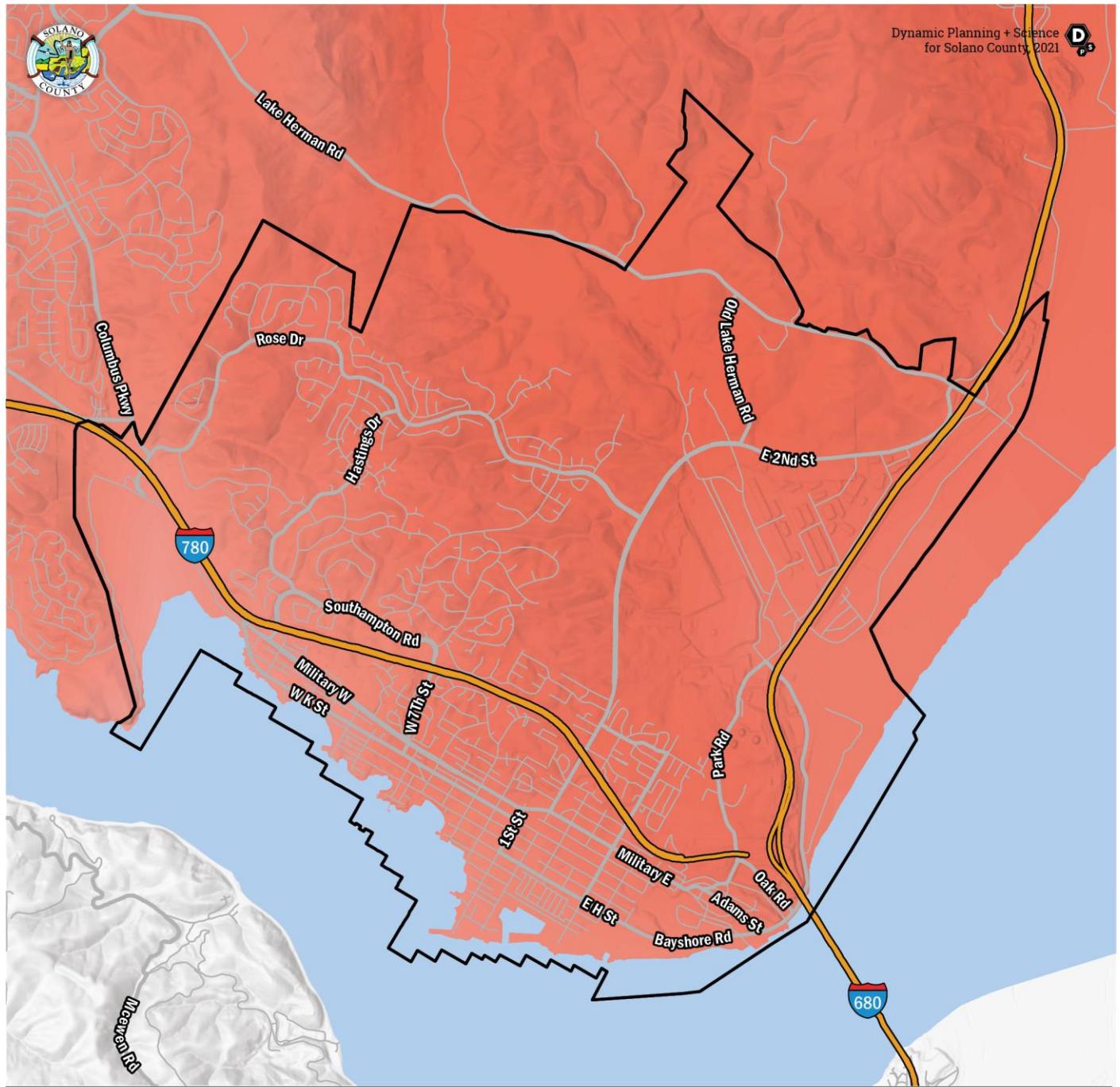


Figure 1-12: City of Benicia – Fault Zone Areas of Required Investigation



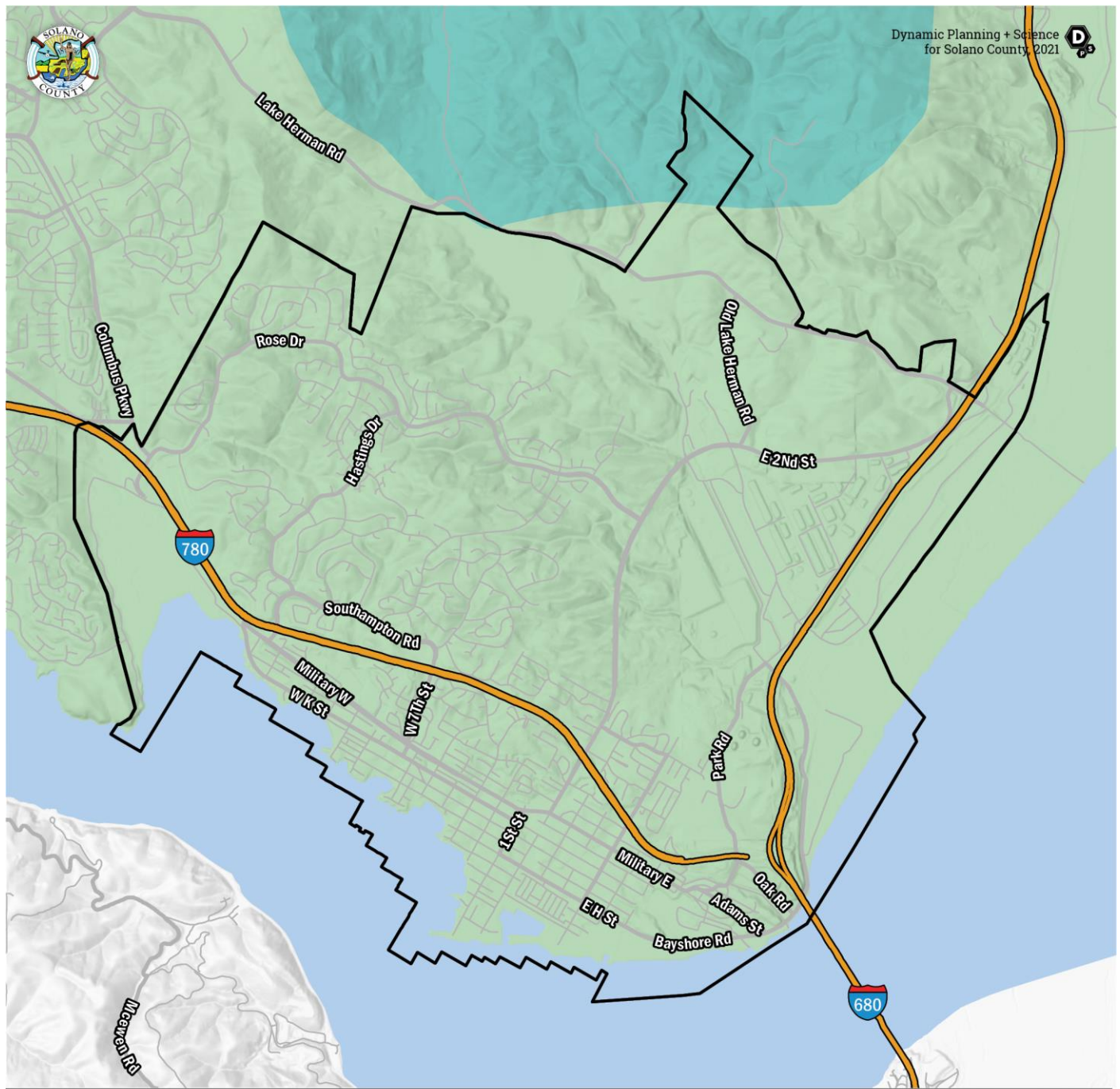
30-YR NORMAL MAXIMUM TEMPERATURE FOR JULY BENICIA

*Data sources: PRISM 800m Resolution 30-YR Normals.

MAP LEGEND



Figure 1-13: City of Benicia – 30-YR Normal Maximum Temperature for July

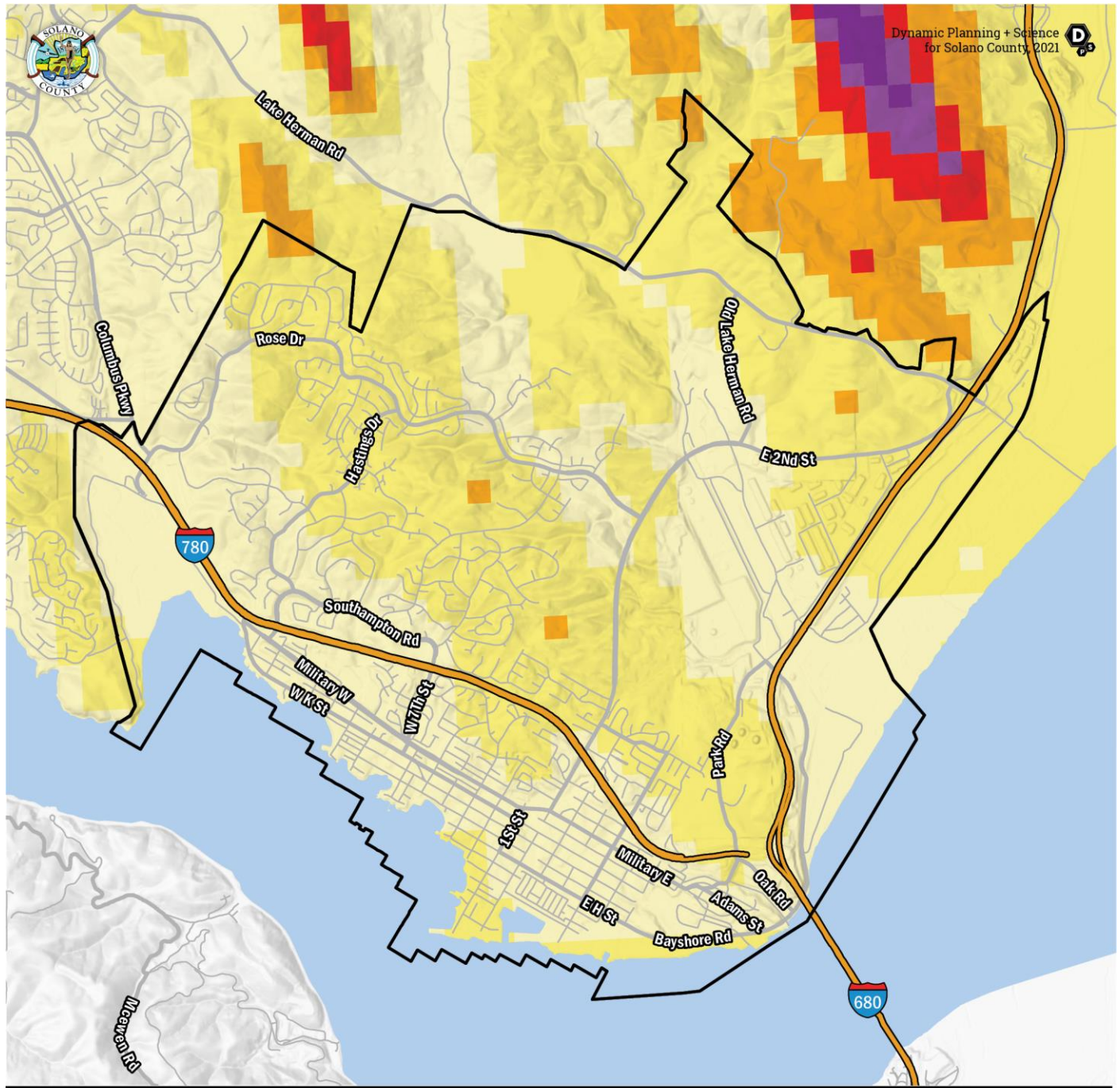


AVERAGE ANNUAL PRECIPITATION (1981-2010, INCHES) BENICIA

*Data sources: USDA - 1981-2010 Annual Average Precipitation by State.



Figure 1-14: City of Benicia – Average Annual Precipitation (1981-2010)



ANNUAL AVERAGE WIND SPEED (POWER CLASS) BENICIA

*Data sources: NREL.

MAP LEGEND



Figure 1-15: City of Benicia –Annual Average Wind Speed (Power Class)



Table 1-11: Drought Classifications and Impacts

Category	Description	Possible Impacts
D0	Abnormally Dry	<ul style="list-style-type: none"> Active fire season begins Going into drought, short term dryness, slowing planting, growth of crops or pastures. Coming out of drought, some lingering water deficits and pasture or crops not fully recovered,
D1	Moderate Drought	<ul style="list-style-type: none"> Some damage to crops, pastures Streams, reservoirs, or wells low, some water shortages developing or imminent Voluntary water-use restrictions requested
D2	Severe Drought	<ul style="list-style-type: none"> Crop or pasture losses likely Water shortages common Water restrictions imposed
D3	Extreme Drought	<ul style="list-style-type: none"> Major crop/ pasture losses Widespread water shortages or restrictions
D4	Exceptional Drought	<ul style="list-style-type: none"> Exceptional and widespread crop/ pasture losses Shortages of water in reservoirs, streams, and wells creating water

Adapted from U.S. Drought Monitor Drought Classifications and Impacts

Drought Severity Timeline

Suisun Bay

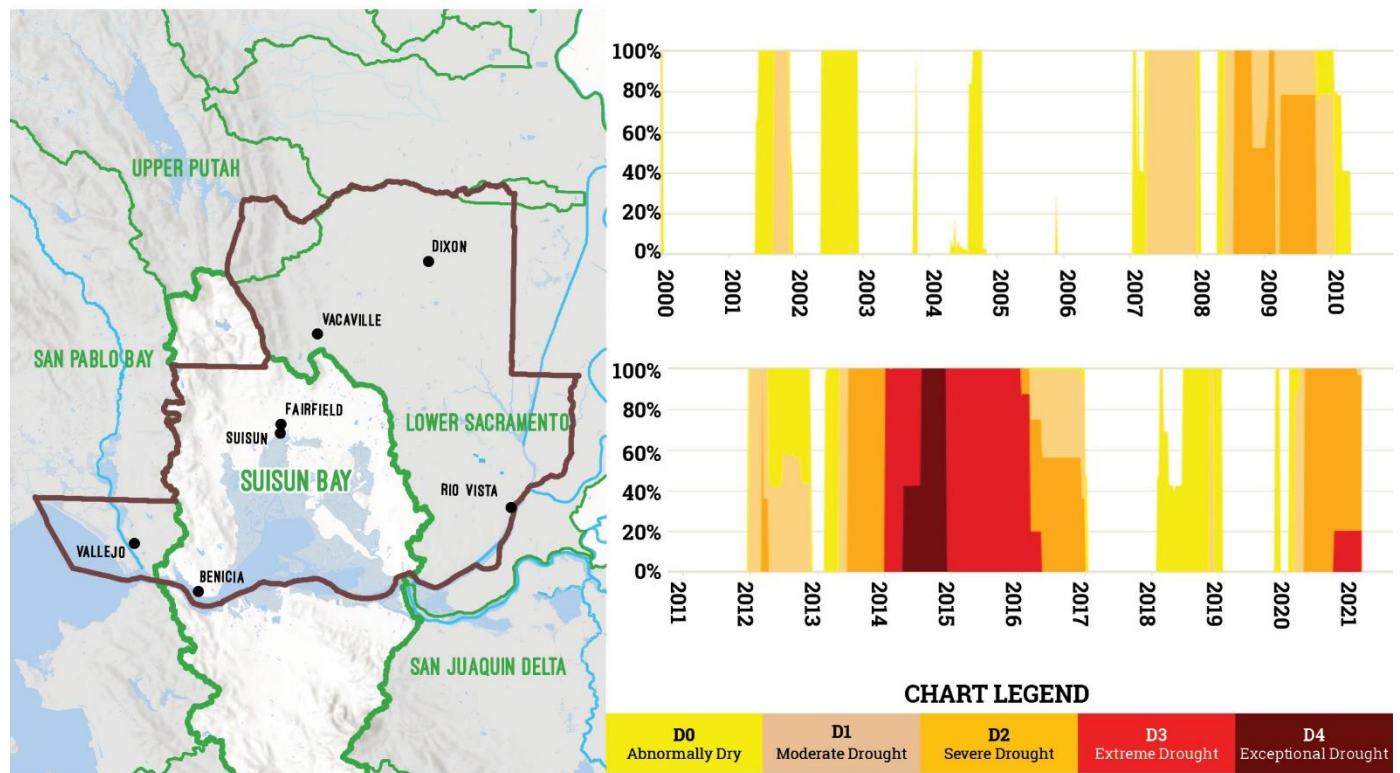


Figure 1-16: City of Benicia–Drought Severity Timeline – Suisun Bay



BENICIA

AVERAGE ANNUAL MAXIMUM TEMPERATURE

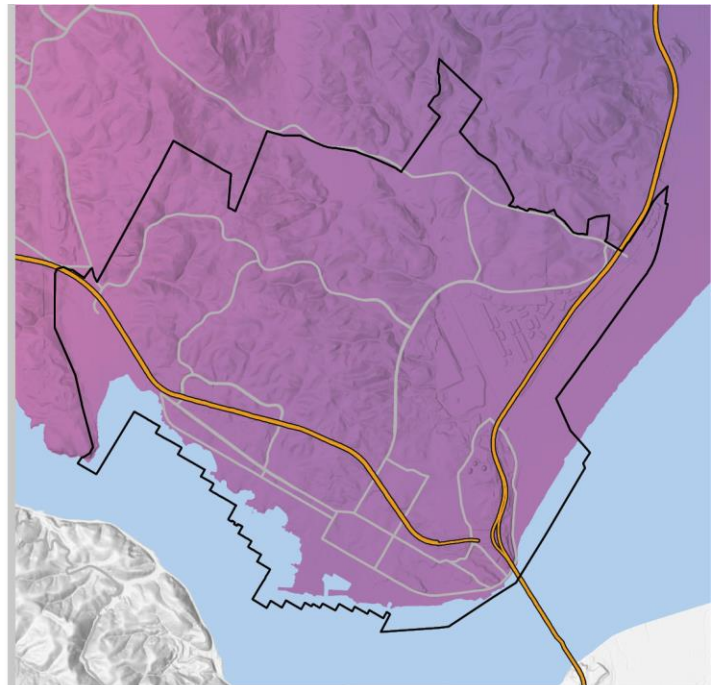
COMPARISON OF CURRENT OBSERVED TO RCP 4.5 AND RCP 8.5 SCENARIOS



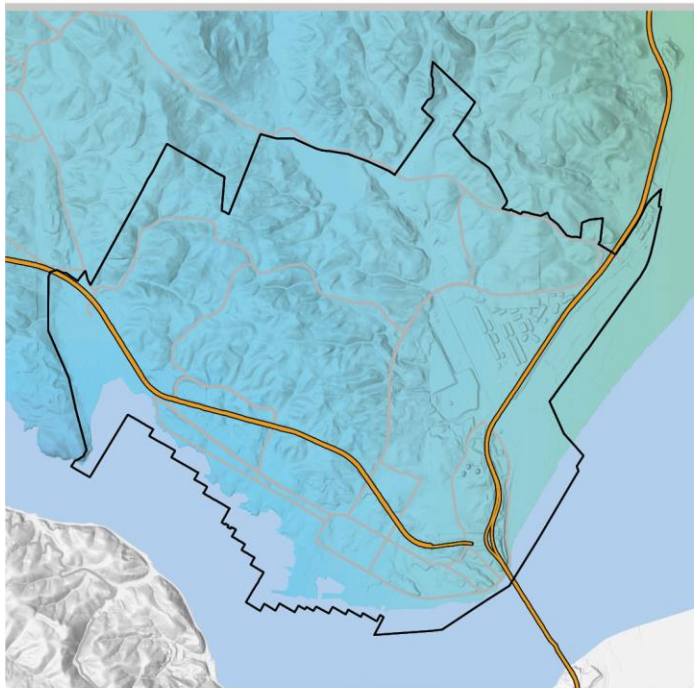
*Data sources: Cal-Adapt CanESM2 RCP 4.5 & 8.5, PRISM 30-YR Norms Annual Max Temp



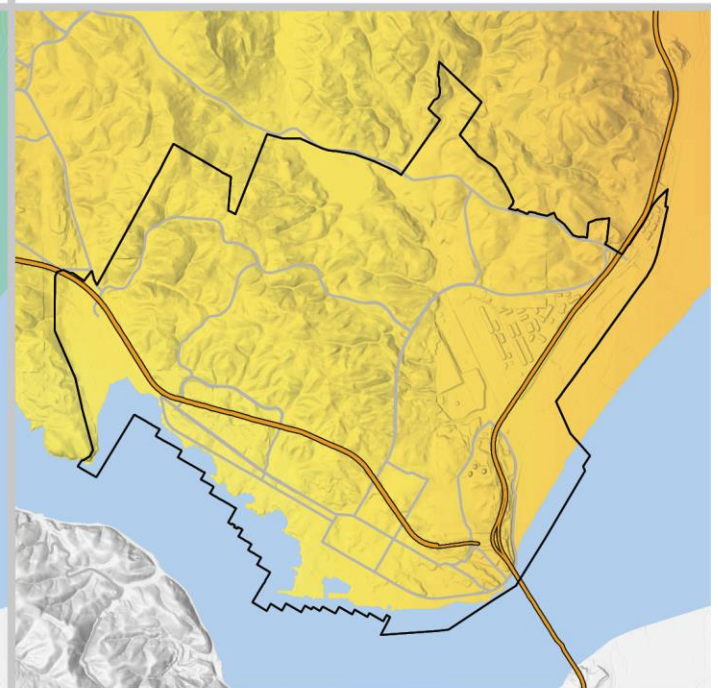
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CURRENT 30-YR NORMAL

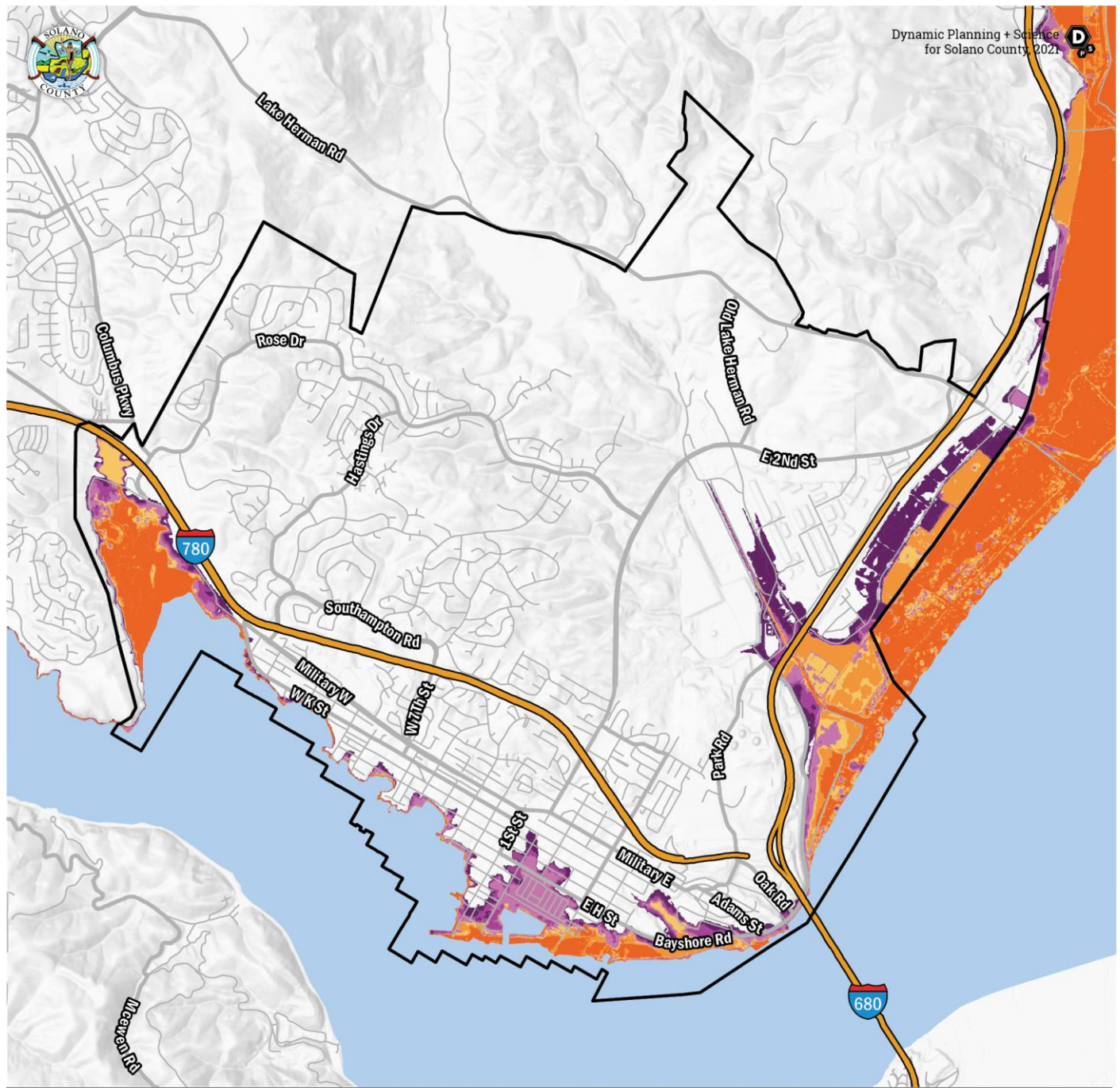


RCP 4.5 YEAR 2100



RCP 8.5 YEAR 2100

Figure 1-17: City of Benicia – RCP Comparison



SEA LEVEL RISE BENICIA

*Data sources: NOAA - Classified by scenarios low rise to extreme rise..

Figure 1-18: City of Benicia – Sea Level Rise



1.4.3.3 Past and Future Development

The City of Benicia is a general law city that crafts its own development regulations and is subject to State law. Future development is subject to compliance with state and local planning, zoning, subdivision, and architecture laws.

The City of Benicia's General Plan (GP) establishes long-range development policies. The GP is designed to help the City address issues related to land use, circulation (traffic), housing, open space, conservation, noise, and safety. The Land Use portion of the plan helps guide the City in determining the location of future development(s), including possible future annexation. In addition to the GP, the City has other plans that guide development in specific areas, including specific plans, policy plans, and master plans. These plans help to shape future development and dictate the City's Sphere of Influence (SOI). One of the central functions in these planning documents is to decrease risk of impact from natural hazards.

Development since Previous HMP

The City considered its growth since the last HMP and determined it had completed a central mitigation action and substantially decreased its vulnerability to hazards. The City updated its Building Code in January of 2020. This HMP Annex has been revised to reflect this substantial change in past development and continues to focus on avenues to better mitigate impacts from problematic past development. This is especially important as the City does not regulate future development and instead provides services and infrastructure to such development.

Future Development

City of Benicia is required to update building codes to meet the minimum standards to those required in the California Building Code last updated in 2019. California Building Codes provide some of the safest construction standards in the world and are meant to reduce risk to occupants from high wind, seismic activity, landslides, flood, wildfire, and other natural hazards. In addition to California minimum development standards, all jurisdictions belong to the NFIP, and all development must meet minimum flood protection standards set forth by FEMA. See Section 4.3.5 of Volume 1 for more information about past and future development in Solano County.

As the General Plan is updated and incorporates information from this HMP, City of Benicia staff are continually improving hazard information through these hazard mitigation plan updates. With this 2020 update, improved online mapping about natural hazards available on RAMP will inform those responsible for future development to make better decisions where and how future development occurs.

City of Benicia reviewed its general plans under the capability assessments undertaken for this hazard mitigation plan. See Section 1.5.1. Deficiencies revealed by these reviews are identified as mitigation actions to decrease risks to move beyond past trends.



The City's municipal codes includes regulations to mitigate the impact of hazards on new and existing development, including:

- Drainage and stormwater retention requirements,
- Steep slope restrictions for new development,
- Waterbody buffer requirements,
- Floodplain management regulations,
- Zoning that prevents development in hazardous areas of the community such as floodplains, landslide areas, the wildland-urban interface (WUI), or other known hazard areas, and
- Building codes that include the most up-to-date California Fire Code, seismic standards, and many other provisions crafted to protect new construction from hazard events.

Even in the event that limited development did occur within a hazard area, the municipal code should ensure impacts from a hazard event are mitigated and losses are minimal. If development does occur in hazard areas, evacuation and emergency planning should take into consideration the anticipated local impacts of the hazard event, including potential interrupted services or the elimination of access.

The anticipated growth in the City will not cause significant change in vulnerability to the City for identified priority hazards.

National Flood Insurance Program (NFIP)

The NFIP makes federally backed flood insurance available to homeowners, renters, and business owners in participating communities. FEMA has prepared a detailed Flood Insurance Study (FIS) for Solano County and municipalities. The study presents water surface elevations for floods of various magnitudes, including the 1-percent annual chance flood and the 0.2-percent annual chance flood (the 500-YR flood). Base flood elevations and the boundaries of the 100- and 500-YR floodplains are shown on Flood Insurance Rate Maps (FIRMs), which are the principal tools for identifying the extent and location of the flood hazard. FIRMs are the most detailed and consistent data source available, and for many communities they represent the minimum area of oversight under their floodplain management program. See Section 4 of Volume 1 for general information on the NFIP.

The City of Benicia has participated in the NFIP since 1977. The City of Benicia is currently in good standing with the provisions of the NFIP. Compliance is monitored by FEMA regional staff and by the California Department of Water Resources under a contract with FEMA. Maintaining compliance under the NFIP is an important component of flood risk reduction. See Table 1-12 for more information on the City's policies and historic flood insurance claims.



Table 1-12: NFIP Status Table

NFIP and CRS Status & Information	
City of Benicia	
NFIP Status	05/31/77
CRS Class	-
Policies in Force	25
Policies in SFHA	20
Policies in non-SFHA	5
Total Claims Paid	\$56,438
Paid Losses	3
Repetitive Loss Properties	1
Severe Repetitive Loss Properties	-
Repetitive Loss Payment by NFIP on Building	\$395,030
Repetitive Loss Payment by NFIP on Contents	\$176,206

Source: OpenFEMA Data, FIMA RUL Solano County

Note: Policies and claims tabulation by jurisdiction is derived from the "reported city." Repetitive loss tabulations by jurisdiction derived via GIS-based intersect of data available at OpenFEMA Data (<https://www.fema.gov/about/openfema/data-sets>). Countywide data reported for entire county area including municipalities. The Privacy Act of 1974 (5 U.S.C. 522a) restricts the release of certain types of data to the public. Flood insurance policy and claims data are included in the list of restricted information. FEMA can only release such data to state and local governments, and only if the data are used for floodplain management, mitigation, or research purposes. Therefore, this plan does not identify the repetitive loss properties or include claims data for any individual property.

See Volume 1, Section 4.5 for more information on the NFIP

1.4.3.4 Identify Hazard Problem Statements

As part of the mitigation action identification process, the Planning Committee for each jurisdiction identified areas of concern (aka problem statements) for their respective facilities based on the risk assessment and vulnerability analysis, utilizing the RAMP mapping and static snapshot maps. Problem statements focused on the impact, victim, or threat that the hazard could create in the jurisdiction, as described in Figure 1-19. Identifying common issues and weaknesses through these problem statements assisted the Planning Committee in understanding the realm of resources needed for mitigation. Jurisdiction problem statements are listed in Table 1-13.

The goal is to have at least one mitigation action for every problem statement. Projects or actions have been developed to mitigate each problem identified. See Table 1-18 for a full list of mitigation actions and corresponding problem statements that they address. Each problem statement is coded with a problem number for cross-referencing between Table 1-13 and Table 1-18.

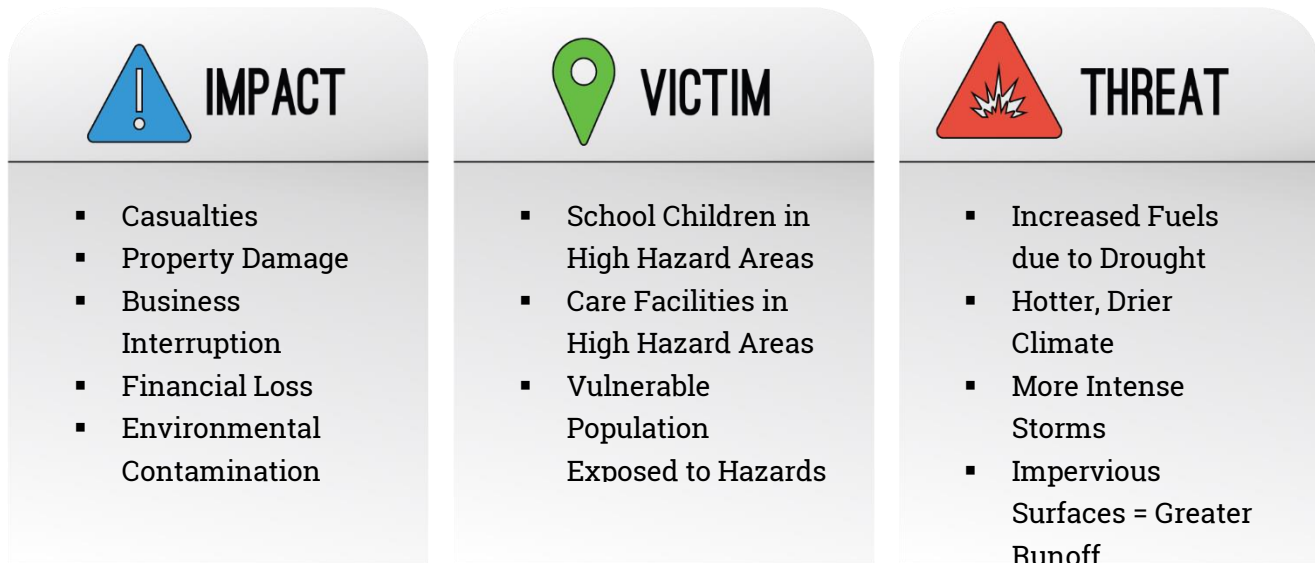


Figure 1-19: Guidance for Problem Statements

Table 1-13: Problem Statements

Problem No.	Hazard Type	Area of Concern	Mitigation Alternatives	Primary Agency	Problem Description	Related MA
ps-AH-BN-15	All Hazard	Impact	ES - Emergency Services	City of Benicia	The Clock Tower is a designated Red Cross Shelter that lacks a backup generator.	ma-AH-BN-65
ps-AH-BN-16	All Hazard	Impact	ES - Emergency Services	City of Benicia	6 out of the 7 backup generators the City has are used and may need to be replaced.	ma-AH-BN-66, ma-AH-BN-65
ps-EQ-BN-17	Earthquake	Impact	PE&A - Public Education & Awareness, ES - Emergency Services, SP - Structural Projects	City of Benicia	Earthquakes can cause major damage to the jurisdiction causing liquefaction throughout the city.	ma-EQ-BN-68, ma-AH-BN-86
ps-EQ-BN-18	Earthquake	Impact	PPRO - Property Protection, PE&A - Public Education & Awareness, SP - Structural Projects	City of Benicia	Many buildings throughout the City are of older tilt up construction, making them particularly vulnerable to the impacts of an earthquake.	ma-EQ-BN-68, ma-EQ-BN-89, ma-AH-BN-85, ma-EQ-BN-83
ps-EQ-BN-19	Earthquake	Impact	SP - Structural Projects	City of Benicia	The City's Clocktower is constructed of sandstone masonry making it vulnerable to an earthquake.	ma-EQ-BN-68, ma-EQ-BN-89
ps-EQ-BN-20	Earthquake	Impact	ES - Emergency Services, SP - Structural Projects	City of Benicia	Benicia has several petroleum transmission (PGE) lines running through the jurisdiction, mostly natural gas, which presents the potential for gas leaks throughout the town.	ma-EQ-BN-87



Problem No.	Hazard Type	Area of Concern	Mitigation Alternatives	Primary Agency	Problem Description	Related MA
ps-EQ-BN-21	Earthquake	Impact	SP - Structural Projects	City of Benicia	The City's Wastewater Treatment Plant is located in a severe shake zone for the M6.8 Concord Green Valley EQ scenario.	ma-EQ-BN-68, ma-EQ-BN-70, ma-EQ-BN-89
ps-EQ-BN-22	Earthquake	Victim	PE&A - Public Education & Awareness, ES - Emergency Services, SP - Structural Projects	City of Benicia	The entire population of Benicia is located in a strong or very strong shake zone for the M6.8 Concord Green Valley EQ scenario.	ma-EQ-BN-68, ma-EQ-BN-71, ma-EQ-BN-89, ma-AH-BN-82, ma-AH-BN-98
ps-EQ-BN-24	Earthquake	Impact	PRV - Prevention, PPRO - Property Protection	City of Benicia	The City is in need of a list of single-family homes with cripple wall foundations to make the State standard approved plan set available to those structures.	ma-AH-BN-86
ps-EQ-BN-25	Earthquake	Impact	PRV - Prevention, PPRO - Property Protection	City of Benicia	The City needs an inventory list of structures with soft story construction.	ma-AH-BN-86
ps-EQ-BN-26	Earthquake	Impact	PRV - Prevention, PPRO - Property Protection	City of Benicia	The City needs an inventory list of buildings throughout the City with tilt up construction.	ma-AH-BN-86
ps-EQ-BN-27	Earthquake	Impact	PRV - Prevention, PE&A - Public Education & Awareness	City of Benicia	The City currently does not have a seismic gas shut-off valve ordinance or program.	ma-EQ-BN-87
ps-EQ-BN-28	Earthquake	Impact	PPRO - Property Protection, SP - Structural Projects	City of Benicia	City owned facilities may lack seismic gas shut-off valves.	ma-EQ-BN-69, ma-EQ-BN-87
ps-EQ-BN-29	Earthquake	Impact	SP - Structural Projects	City of Benicia	City Hall Chambers is in need of seismic retrofits	ma-EQ-BN-68
ps-EQ-BN-31	Earthquake	Impact	SP - Structural Projects	City of Benicia	The City Pool is twelve feet deep (below sea level) and is routinely impacted by liquefaction from small earthquakes.	ma-EQ-BN-68
ps-EQ-BN-32	Earthquake	Impact	SP - Structural Projects	City of Benicia	The Camel Barn Museum Complex is in need of seismic retrofitting.	ma-EQ-BN-68
ps-FL-BN-33	Flood	Impact	SP - Structural Projects	City of Benicia	The City's wastewater treatment facility is located in the 100-year flood zone.	ma-FL-BN-80, ma-FL-BN-95, ma-FL-BN-147
ps-FL-BN-34	Flood	Impact	SP - Structural Projects	City of Benicia	3 City Bridges are located in the 100-year flood zone.	ma-FL-BN-95, ma-FL-BN-88
ps-FL-BN-35	Flood	Impact	SP - Structural Projects	City of Benicia	Portions of the Vallero Benicia Refinery are located in the 100-year flood zone.	ma-FL-BN-80, ma-FL-BN-95
ps-FL-BN-36	Flood	Impact	SP - Structural Projects	City of Benicia	Some City streets were built on lightweight fill where flooding warps the streets and threatens damage to underground utilities.	ma-FL-BN-95
ps-FL-BN-37	Flood	Impact	SP - Structural Projects	City of Benicia	E. Channel Road and small portions of W. Channel Road, Park Road, and Industrial Way have flooded in the past from Lake Herman overflow.	ma-FL-BN-95, ma-FL-BN-88



Problem No.	Hazard Type	Area of Concern	Mitigation Alternatives	Primary Agency	Problem Description	Related MA
ps-FL-BN-38	Flood	Impact	PPRO - Property Protection , SP - Structural Projects	City of Benicia	Sulphur Creek routinely floods. Further investigation is needed to determine mitigation.	ma-FL-BN-88
ps-FL-BN-39	Flood	Victim	PPRO - Property Protection , PE&A - Public Education & Awareness , SP - Structural Projects	City of Benicia	1401 people live in the 100-year flood zone.	ma-FL-BN-95, ma-FL-BN-88, ma-AH-BN-82
ps-FL-BN-40	Flood	Victim	PPRO - Property Protection , PE&A - Public Education & Awareness , SP - Structural Projects	City of Benicia	Rancho Benicia Mobile Home Park is an affordable senior oriented community that is located in the 100-year flood zone.	ma-FL-BN-95, ma-FL-BN-88
ps-WF-BN-41	Wildfire	Impact	PRV - Prevention , SP - Structural Projects	City of Benicia	The City's Water Treatment Plant is located in the middle of open space and at an increased risk of wildfire.	ma-WF-BN-90, ma-WF-BN-90, ma-WF-BN-114
ps-WF-BN-42	Wildfire	Impact	PRV - Prevention , PPRO - Property Protection , PE&A - Public Education & Awareness , SP - Structural Projects	City of Benicia	Almost the entire City of Benicia is located in a moderate designated wildfire risk area.	ma-AH-BN-82, ma-AH-BN-98, ma-WF-BN-114, ma-WF-BN-115
ps-WF-BN-43	Wildfire	Impact	ES - Emergency Services , SP - Structural Projects	City of Benicia	Both City Hall and the Police Department do not have fire sprinkler suppression systems.	ma-WF-BN-104
ps-WF-BN-44	Wildfire	Victim	PRV - Prevention , PPRO - Property Protection , PE&A - Public Education & Awareness , ES - Emergency Services , SP - Structural Projects	City of Benicia	Approximately 24,861 people live in a moderate or high wildfire risk area.	ma-AH-BN-98, ma-WF-BN-90, ma-WF-BN-115
ps-WF-BN-45	Wildfire	Threat	PRV - Prevention , PE&A - Public Education & Awareness , NRP - Natural Resource Protection	City of Benicia	Recreational use around Lake Herman increases the threat of wildfire (BBQ's, cigarettes).	ma-WF-BN-105, ma-WF-BN-114



Problem No.	Hazard Type	Area of Concern	Mitigation Alternatives	Primary Agency	Problem Description	Related MA
ps-WF-BN-46	Wildfire	Threat	PRV - Prevention , PPRO - Property Protection , PE&A - Public Education & Awareness , ES - Emergency Services	City of Benicia	The City has 2200 acres of open spaces, located between residential areas, which increase the risk of wildfire.	ma-WF-BN-90, ma-WF-BN-105
ps-EW-BN-47	Extreme Weather	Impact	PPRO - Property Protection , SP - Structural Projects	City of Benicia	The Industrial Park area (Bayshore and E Channel Rd.) experiences flooding from heavy rain events.	ma-FL-BN-95, ma-FL-BN-148
ps-EW-BN-48	Extreme Weather	Impact	SP - Structural Projects	City of Benicia	Heavy rain events can lead to overtopping of Lake Herman and downstream flooding.	ma-FL-BN-95, ma-AH-BN-76
ps-EW-BN-49	Extreme Weather	Impact	ES - Emergency Services	City of Benicia	Need for more generators and evacuation shelters throughout the jurisdiction for cooling centers.	ma-AH-BN-66, ma-EW-BN-96, ma-AH-BN-65
ps-EW-BN-50	Extreme Weather	Impact	PPRO - Property Protection , SP - Structural Projects	City of Benicia	W 9th St. City Pier is routinely impacted by storm events and lacks a breakwater to protect it.	ma-EW-BN-77, ma-FL-BN-84
ps-EW-BN-51	Extreme Weather	Victim	PE&A - Public Education & Awareness , ES - Emergency Services	City of Benicia	Most households in Benicia lack air conditioning systems (although this is changing with widespread installations).	ma-EW-BN-78, ma-EW-BN-96
ps-EW-BN-52	Extreme Weather	Victim	PE&A - Public Education & Awareness , ES - Emergency Services	City of Benicia	Benicia has a high number of senior residents who are vulnerable to high heat events.	ma-EW-BN-78, ma-EW-BN-96
ps-EW-BN-53	Extreme Weather	Threat	PRV - Prevention , PPRO - Property Protection , PE&A - Public Education & Awareness , NRP - Natural Resource Protection	City of Benicia	High mortality of pine and redwood trees throughout the City creating a hazard for high wind events, especially around roads and buildings.	ma-EW-BN-79
ps-DR-BN-54	Drought	Threat	PPRO - Property Protection , NRP - Natural Resource Protection	City of Benicia	County buildings and facilities have irrigated landscaping including turf grass, which can consume high amounts of water in times of drought.	ma-DR-BN-67, ma-DR-BN-93
ps-SR-BN-55	Sea Level Rise	Impact	PPRO - Property Protection , SP - Structural Projects	City of Benicia	The areas between 1st Street and E. 5th, between E Street and the water. B Street at E. 2nd, W 2nd St., west of E 2nd St. down to B St. are vulnerable to flooding sea level rise and king tide events.	ma-FL-BN-84, ma-SR-BN-101, ma-SR-BN-102



Problem No.	Hazard Type	Area of Concern	Mitigation Alternatives	Primary Agency	Problem Description	Related MA
ps-SR-BN-56	Sea Level Rise	Impact	SP - Structural Projects	City of Benicia	The City's wastewater treatment facility is located in a low sea level rise scenario area.	ma-SR-BN-101
ps-SR-BN-57	Sea Level Rise	Impact	PPRO - Property Protection , ES - Emergency Services , SP - Structural Projects	City of Benicia	There is concern regarding erosion due to sheet flow and sea level rise on the bluff between W. 9th Street and W. 10th Street.	ma-SR-BN-101, ma-SR-BN-102
ps-SR-BN-58	Sea Level Rise	Impact	SP - Structural Projects	City of Benicia	Fitzgerald Field is routinely flooded during high tide.	ma-SR-BN-103
ps-SR-BN-59	Sea Level Rise	Victim	PPRO - Property Protection , PE&A - Public Education & Awareness , ES - Emergency Services	City of Benicia	Approximately 1571 people live in a low sea level rise scenario area.	ma-SR-BN-101, ma-SR-BN-102, ma-SR-BN-103
ps-DR-BN-183	Drought	Impact	PRV - Prevention , PE&A - Public Education & Awareness	City of Benicia	Drought continues to cyclically worsen and is projected to increase due to climate change.	ma-DR-BN-99

1.4.4 Mitigation Action Support Tool (MAST)

As a living document, hazard problem statements and mitigation activities will be updated through a web interface application developed specifically for participating jurisdictions. The Mitigation Action Support Tool (MAST) is accessible through mitigatehazards.com/SolanoHMP/.

MAST is a web-based interactive tool that enables multiple users to search, view, enter, and update mitigation actions, ideas or projects, and other information. MAST provides participating jurisdictions and plan reviewers (Cal OES/FEMA) access to valuable mitigation information that can be leveraged by future planning or other risk reduction efforts within the County. Participating jurisdictions can update the status of their mitigation projects throughout the planning lifecycle, and this web-based tool will improve participating jurisdiction's ability to apply for FEMA's Hazard Mitigation Assistance (HMA) grant programs including initial grant application processes through Cal OES.



1.5 Mitigation Strategy

The mitigation strategy is the guidebook to future hazard mitigation administration, capturing the key outcomes of the MJHMP planning process. The mitigation strategy is intended to reduce vulnerabilities outlined in the previous section (a.k.a. problem statements) with a prescription of policies and physical projects. These mitigation actions should be compatible with existing planning mechanisms and should outline specific roles and resources for implementation success.

1.5.1 Capabilities & Adaptive Capacity Assessment

This section examines the planning and regulatory, administrative, technical, financial, educational, and outreach capabilities to augment known issues and weaknesses from identified natural hazards.

Capabilities assessments in this Volume 1 and in Volume 2 include considerations of a community's adaptive capacity for climate change, as outlined in Cal OES' 2020 California Adaptation Planning Guide. Adaptive capacity is a community or region's existing ability to moderate climate change impacts. Assessing adaptive capacity includes analysis of policies, plans, programs, funding, and staffing capacity.

The tables in this section explore various local planning mechanisms, administrative capacity, financial capabilities, and education and outreach initiatives. The columns in each table represent deeper dives into the following questions:

- Is the existing planning or regulatory mechanism used currently? (Column 1, Status)
- Has the HMP been integrated into the planning mechanism currently so that the named mechanism is currently used in HMP planning? (Column 2, Current Mitigation Use)
- Is there a future opportunity to expand, improve upon, and incorporate this 2020 HMP Update into the planning or regulatory mechanism? (Column 3, Future Opportunity)

The capabilities assessment is easily-digestible and based on color coding to indicate which policies and plans are adequate, need improvement or in which the HMP could be integrated. Each table includes a legend that explain how each one of these questions are being answered according to the color indicated: green, yellow, and orange.

For more information on the regulatory environment surrounding each hazard, see hazard-specific sections of Volume 1. Volume 1, Section 5.3.5 includes an extensive list of federal and state funding opportunities as well.



1.5.1.1 Planning and Regulatory Capabilities

Table 1-14: Planning and Regulatory Capabilities

CAPABILITY ASSESSMENT LEGEND		
Status	Current Mitigation Use	Future Opportunity
Currently in use or present.	Used widely for mitigation.	Opportunity to expand and integrate.
(Sort of) Seldomly used or limited presence.	Limited use in mitigation planning.	Limited opportunity to expand and integrate.
(No) Not present or available.	Not used in mitigation planning.	No opportunity to expand or integrate.

Resource	HMP Integration			Notes / Additional Detail
	Status	Current Mitigation Use	Future Opportunity	
Planning and Regulatory Capabilities				
Construction and Future Development Regulations				
Building Codes				2019 California Building Code
Building Code Effectiveness Grading Schedule (BCEGS) Rating				Class 3 rating by BCEGS for 1 & 2 family dwellings and class 3 for all other construction. (2018)
Public Protection (ISO Class)				
Hazard Related Development Standards				
Hazard-Specific Ordinance				
Zoning Ordinance				Benicia Municipal code Title 17 Zoning
Growth Management Ordinance				
Hazard Reduction Programs (Annually Conducted)				
Capital Improvements Program (CIP) or Plan				
Erosion/Sediment Control Program				
Hazard-Related Public Outreach Program				See Education & Outreach Capabilities for more specifics.
Stormwater Management Program (Annual Inspections)				Stormwater Management Program (update ongoing, 2021)
Seismic Safety Program (Non-structural Inspections)				
Earthquake Modernization Program (Building Safety Inspections)				
Hazard Plans				
General Plan Safety Element				Benicia General Plan part 2 Chapter 4 Community Health and Safety
Noteworthy Area/ Specific Plan with Hazard Focus				Benicia Business Park EIR, Air Quality



Resource	HMP Integration			Notes / Additional Detail
	Status	Current Mitigation Use	Future Opportunity	
Planning and Regulatory Capabilities				
Community Wildfire Protection Plan (CWPP)				
Wildfire Vulnerability Assessment				
Urban or Integrated Regional Water Management Plan				Urban Water Management Plan, currently being updated
Floodplain Management Plan				Currently being updated as part of Urban Water Mgmt Plan
Stormwater Management Plan				Currently being updated as part of Urban Water Mgmt Plan
Ground Water Management Plan(s)	N/A	N/A		
Open Space and Land Management Plan(s)				1997 Benicia parks, trails and open space master plan, currently being updated
Emergency Operations Plan				2017 Solano County Emergency Operations Plan
Climate Action Plan, Vulnerability Ass'mt, or Adaptation Plan				Benicia Climate Action Plan not formally adopted
Sustainable Community Plan (SB 375)				ABAG Plan Bay Area 2040 (2017)
Local Delta/ Wetlands Program(s)				
Downtown Plan with hazard focus				
Community Health Assessment(s)				2016 Solano County Community Health Assessment
National Flood Protection Program (NFIP)				
Floodplain Management Regulations				
Flood Insurance Education and Technical Assist.				2013 Flood Insurance Study
Flood Hazard Mapping / Re-Mapping				
Community Rating System (CRS)				



1.5.1.2 Administrative and Technical Capabilities

Table 1-15: Administrative and Technical Capabilities

CAPABILITY ASSESSMENT LEGEND		
Status	Current Mitigation Use	Future Opportunity
Currently in use or present.	Used widely for mitigation.	Opportunity to expand and integrate.
(Sort of) Seldomly used or limited presence.	Limited use in mitigation planning.	Limited opportunity to expand and integrate.
(No) Not present or available.	Not used in mitigation planning.	No opportunity to expand or integrate.

Resource	HMP Integration			Notes / Additional Detail
	Status	Current Mitigation Use	Future Opportunity	
Administrative and Technical				
Community Planning and Development Services				
Community Planner				
Civil Engineer				Dan Sequeria Principal Civil Engineer
Building Code Official				Rick Knight Building Dept.
Floodplain Administrator				Rachel O'Shea Building Official / Floodplain Mgr.
Fire Marshall				
Dedicated Public Outreach Personnel				Teri Davena, City PIO. Irma Widjojo, Police PIO. Della Olm, Fire PIO.
GIS Specialist and Capability				We contract with a GIS company but need more GIS data. Rebecca Brooks (PW) is point person
Emergency Manager				No specific EM. Fire Chief takes on this roll
Grant Manager, Writer, or Specialist				No specific grant-writer. Each department's MA takes on this roll. Fire MA (Della Olm) does hazard mitigation grant writing.
Other				
Warning Systems/Services				
General				AlertSolano
Flood				Emergency Alert: Flood Risk: California Department of Water Resources Flood Risk Notification Program Flood Control: Solano County Water Agency
Wildfire				AlertSolano
Geological Hazards				ShakeAlert.org (nation-wide)



1.5.1.3 Financial Capabilities

Table 1-16: Financial Capabilities

CAPABILITY ASSESSMENT LEGEND		
Status	Current Mitigation Use	Future Opportunity
Currently in use or present.	Used widely for mitigation.	Opportunity to expand and integrate.
(Sort of) Seldomly used or limited presence.	Limited use in mitigation planning.	Limited opportunity to expand and integrate.
(No) Not present or available.	Not used in mitigation planning.	No opportunity to expand or integrate.

Resource	HMP Integration			Notes / Additional Detail
	Status	Current Mitigation Use	Future Opportunity	
Fiscal Capabilities				
Financial Resources for Hazard Mitigation				
Levy for Specific Purposes with Voter Approval				
Utilities Fees				
Benefit assessments				
System Development Fee				
Various Bonds to Incur Debt				
Withheld Spending in Hazard-Prone Areas	N/A	N/A	N/A	
Stormwater Service Fees				We institute fees part of development, but not as a separate annual/monthly charge for existing or needed upgrades.
Capital Improvement Project Funding				



1.5.1.4 Education and Outreach

Table 1-17: Education and Outreach Capabilities

CAPABILITY ASSESSMENT LEGEND		
Status	Current Mitigation Use	Future Opportunity
Currently in use or present.	Used widely for mitigation.	Opportunity to expand and integrate.
(Sort of) Seldomly used or limited presence.	Limited use in mitigation planning.	Limited opportunity to expand and integrate.
(No) Not present or available.	Not used in mitigation planning.	No opportunity to expand or integrate.

Resource	HMP Integration			Notes / Additional Detail
	Status	Current Mitigation Use	Future Opportunity	
Education / Outreach Capabilities				
Education/Outreach Resources				
Website Dedicated to Hazard Topics				Education & outreach marked as "red" opportunity indicates levels are satisfactory currently and thus no need for expansion or better incorporation of hazard mitigation.
Dedicated Social Media				
Hazard Info. Avail. at Library/ Planning Desk				
Annual Public Safety Events				
Ability to Field Public Tech. Assistance Requests				
Public Safety Newsletters or Printed Outreach				
Fire Safe Councils				
Resource Conservation Districts				Solano Resource Conservation District

1.5.1.5 Capability and Adaptive Capacity Opportunities

The City of Benicia identified many opportunities for strengthening community capabilities and adaptive capacity. The City considered this assessment in developing its Mitigation Strategy in Section 1.5.2.

Notably, the City identified additional staffing capacity including GIS data and processing, emergency management duties, and grant writing assistance. The City is updating several planning documents that will improve planning and regulatory capacity. The City also had good capacity under its current codes and current education and outreach capacity.

Volume 1, Section 5.3.5 includes an extensive list of federal and state funding opportunities to leverage to improve community capabilities.



1.5.2 Mitigation Actions

Mitigation actions were developed based upon the jurisdiction's priorities, risk assessment results, and mitigation alternatives. The mitigation action prioritization method used by all participating jurisdictions is described in Section 5.5.1 of Volume 1. Table 1-18 lists each priority mitigation action, responsible party, time frame, potential funding source, implementation steps, and resources need to implement based upon the Planning Committee consensus.

Each participating jurisdiction, including the City of Benicia, considered ongoing relevancy of mitigation actions from the existing MJHMP and retained or removed such actions while adding new relevant actions as well. Mitigation actions were examined for relevancy and the potential for future implementation and then evaluated for potential follow-up. Some mitigation actions developed during the previous HMP effort were not included because they were an inherent part of the HMP update process or were not detailed enough for implementation at a local Jurisdiction level. the City of Benicia has made significant changes to

other mitigation actions because of the updated risk assessment and implementation strategy, to include more detail, or to update based on current mitigation practices. Volume 1, Section 5.5.2 provides a record of County wide mitigation actions, the status, and additional notes for each action.

Table 1-18 lists each mitigation action for the City of Benicia. Each participating jurisdiction developed unique mitigation actions, targeted at their own unique priorities and vulnerabilities. Each mitigation action identifies the responsible party, time frame, potential funding source, implementation steps and resources needed to implement these priority mitigation actions. As a living document, hazard problem statements and mitigation activities will be updated through MAST. The detail in Table 1-18 meets the regulatory requirements of FEMA and DMA 2000.

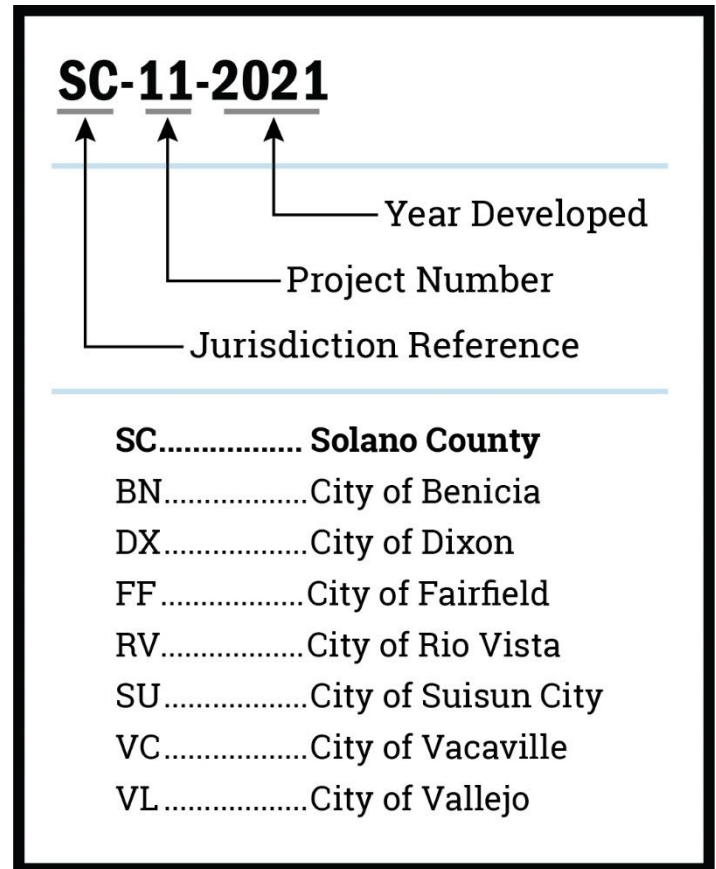


Figure 1-20: Mitigation Action Key



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Table 1-18: City of Benicia Mitigation Actions

Mitigation No.	Hazard Type	Mitigation Type	Status	Year	Primary Agency	Title/Description	Responsible Party	Estimated Cost	Estimated Benefit	Time Frame	HMA Activity Type	Potential Grant Source	Priority	Related Goal(s)	Related Problem Statements
ma-AH-BN-65	All Hazard	SP - Structural Projects	Pending	2021	City of Benicia	Install Emergency Power Generators for City critical facilities as needed, including for the Clock Tower Emergency Shelter.	Building and Public Works	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	High - Project will provide an immediate reduction of risk exposure for life and property.	1-3 Years	Project	HMGP / BRIC	High	Goal 2: Infrastructure , Goal 4: Resilience	ps-AH-BN-15, ps-AH-BN-16, ps-EW-BN-49
ma-AH-BN-82	All Hazard	PRV - Prevention	Ongoing	2017	City of Benicia	Evaluate Public Safety Communications Infrastructure including Radio Communications	Police Department and Fire Department	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	High - Project will provide an immediate reduction of risk exposure for life and property.	1-3 Years	Planning	HMGP / BRIC , EMPG	Medium	Goal 1: People , Goal 2: Infrastructure	ps-EQ-BN-22, ps-FL-BN-39, ps-WF-BN-42
ma-AH-BN-85	All Hazard	PRV - Prevention	Pending	2017	City of Benicia	Develop Post Emergency Inspection and Plan Check Protocols	Community Development Department	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	High - Project will provide an immediate reduction of risk exposure for life and property.	1-3 Years	Planning	HMGP / BRIC	High	Goal 4: Resilience	ps-EQ-BN-18
ma-AH-BN-86	All Hazard	PRV - Prevention	Ongoing	2017	City of Benicia	Update Critical Facilities, Vulnerable Building Types & Infrastructure Mapping for Hazard Identification	Community Development Department and Public Works Dept.	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	High - Project will provide an immediate reduction of risk exposure for life and property.	Ongoing	Planning	HMGP / BRIC	High	Goal 2: Infrastructure	ps-EQ-BN-17, ps-EQ-BN-24, ps-EQ-BN-25, ps-EQ-BN-26
ma-AH-BN-98	All Hazard	PRV - Prevention	Ongoing	2017	City of Benicia	Expand Training Program for City Staff of Emergency Operations Center	Fire Department	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	High - Project will provide an immediate reduction of risk exposure for life and property.	Ongoing	Planning	HMGP / BRIC	High	Goal 4: Resilience	ps-WF-BN-44, ps-WF-BN-42, ps-EQ-BN-22

Mitigation No.	Hazard Type	Mitigation Type	Status	Year	Primary Agency	Title/Description	Responsible Party	Estimated Cost	Estimated Benefit	Time Frame	HMA Activity Type	Potential Grant Source	Priority	Related Goal(s)	Related Problem Statements
ma-DR-BN-67	Drought	NRP - Natural Resource Protection	Pending	2021	City of Benicia	Replace irrigated landscaping with drought resistant vegetation and increase use of recycled water for irrigation in City-owned facilities	City of Benicia	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	High - Project will provide an immediate reduction of risk exposure for life and property.	1-3 Years	Project	HMGP / BRIC	High	Goal 2: Infrastructure , Goal 3: Environment	ps-DR-BN-54
ma-DR-BN-93	Drought	PRV - Prevention	Ongoing	2017	City of Benicia	Conduct Turf Analysis as part of the Parks, Trails, and Open Space Master Plan Update (plan underway in 2021).	Parks & Community Services	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	High - Project will provide an immediate reduction of risk exposure for life and property.	1-3 Years	Planning	HMGP / BRIC , Internal Funding	High	Goal 3: Environment , Goal 4: Resilience	ps-DR-BN-54
ma-DR-BN-99	Drought	PE&A - Public Education & Awareness	Ongoing	2017	City of Benicia	Increase Public Education About Water Conservation	Public Works Department	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	High - Project will provide an immediate reduction of risk exposure for life and property.	Ongoing	5%	HMGP / BRIC , Internal Funding	Medium	Goal 4: Resilience	ps-DR-BN-183
ma-EQ-BN-68	Earthquake	SP - Structural Projects	Pending	2021	City of Benicia	Conduct seismic retrofits of city-owned buildings and infrastructure throughout the jurisdiction, and reinforce soil to withstand liquefaction.	City of Benicia	High - Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases).	High - Project will provide an immediate reduction of risk exposure for life and property.	3-5 Years	Project	HMGP / BRIC	High	Goal 2: Infrastructure	ps-EQ-BN-17, ps-EQ-BN-18, ps-EQ-BN-19, ps-EQ-BN-21, ps-EQ-BN-22, ps-EQ-BN-23, ps-EQ-BN-29, ps-EQ-BN-31, ps-EQ-BN-32
ma-EQ-BN-69	Earthquake	SP - Structural Projects	Pending	2021	City of Benicia	Install seismic shut-off valves on gas fixtures on City-owned critical facilities and lines.	Public Works	High - Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases).	High - Project will provide an immediate reduction of risk exposure for life and property.	3-5 Years	Project	HMGP / BRIC	High	Goal 1: People , Goal 2: Infrastructure	ps-EQ-BN-28
ma-EQ-BN-70	Earthquake	SP - Structural Projects	Pending	2021	City of Benicia	Conduct geotechnical evaluation and appropriate seismic retrofits of City's Wastewater Treatment Plant.	City of Benicia	High - Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases).	High - Project will provide an immediate reduction of risk exposure for life and property.	1-3 Years	Project	HMGP / BRIC	High	Goal 1: People , Goal 2: Infrastructure	ps-EQ-BN-21

Mitigation No.	Hazard Type	Mitigation Type	Status	Year	Primary Agency	Title/Description	Responsible Party	Estimated Cost	Estimated Benefit	Time Frame	HMA Activity Type	Potential Grant Source	Priority	Related Goal(s)	Related Problem Statements
ma-EQ-BN-71	Earthquake	PE&A - Public Education & Awareness	Pending	2021	City of Benicia	Conduct public education campaign on earthquake preparedness and seismic housing retrofits.	City of Benicia	Low - The project could be funded under the existing budget. The project is part of or can be part of an ongoing existing program.	High - Project will provide an immediate reduction of risk exposure for life and property.	Annually	5%	HMGP / BRIC	High	Goal 4: Resilience	ps-EQ-BN-22
ma-EQ-BN-83	Earthquake	PRV - Prevention	Pending	2017	City of Benicia	Conduct Vulnerability Assessment of the City's Police Station to Groundshaking	Police Department	High - Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases).	High - Project will provide an immediate reduction of risk exposure for life and property.	1-3 Years	Planning	HMGP / BRIC	Medium	Goal 2: Infrastructure	ps-EQ-BN-18
ma-EQ-BN-87	Earthquake	PRV - Prevention	Pending	2017	City of Benicia	Draft Natural Gas Shut-Off Valve Ordinance	Community Development Department	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	High - Project will provide an immediate reduction of risk exposure for life and property.	1-3 Years	Planning	HMGP / BRIC	High	Goal 1: People , Goal 2: Infrastructure	ps-EQ-BN-20, ps-EQ-BN-27, ps-EQ-BN-28
ma-EQ-BN-89	Earthquake	PRV - Prevention	Pending	2017	City of Benicia	Evaluate Jurisdictional Ordinances and Programs for Earthquake Retrofit of Unreinforced Masonry Structures.	Community Development	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	High - Project will provide an immediate reduction of risk exposure for life and property.	1-3 Years	Planning	HMGP / BRIC	High	Goal 2: Infrastructure , Goal 4: Resilience	ps-EQ-BN-18, ps-EQ-BN-19, ps-EQ-BN-21, ps-EQ-BN-22
ma-EW-BN-77	Extreme Weather	SP - Structural Projects	Pending	2021	City of Benicia	Construct a breakwater to protect the W 9th St. City Pier.	City of Benicia	High - Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases).	High - Project will provide an immediate reduction of risk exposure for life and property.	1-3 Years	Project	HMGP / BRIC	High	Goal 2: Infrastructure	ps-EW-BN-50
ma-EW-BN-78	Extreme Weather	PE&A - Public Education & Awareness	Pending	2021	City of Benicia	Conduct a public education campaign to increase awareness of the negative effects of extreme heat; include information on steps that households can take to mitigate these effects such as the location of emergency cooling centers.	City of Benicia	Low - The project could be funded under the existing budget. The project is part of or can be part of an ongoing existing program.	High - Project will provide an immediate reduction of risk exposure for life and property.	Annually	Planning	HMGP / BRIC , Internal Funding	High	Goal 1: People , Goal 4: Resilience	ps-EW-BN-51, ps-EW-BN-52

Mitigation No.	Hazard Type	Mitigation Type	Status	Year	Primary Agency	Title/Description	Responsible Party	Estimated Cost	Estimated Benefit	Time Frame	HMA Activity Type	Potential Grant Source	Priority	Related Goal(s)	Related Problem Statements
ma-EW-BN-79	Extreme Weather	PRV - Prevention	Pending	2021	City of Benicia	Replace dying or dead evergreen vegetation with wind resistant vegetation and implement annual tree trimming program.	City of Benicia	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	High - Project will provide an immediate reduction of risk exposure for life and property.	Annually	Project	HMGP / BRIC , Internal Funding	Medium	Goal 3: Environment , Goal 4: Resilience	ps-EW-BN-53
ma-EW-BN-96	Extreme Weather	PRV - Prevention	Ongoing	2017	City of Benicia	Develop Operational Guidelines for Cooling Centers	Fire Department	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	High - Project will provide an immediate reduction of risk exposure for life and property.	1-3 Years	Planning	HMGP / BRIC	High	Goal 1: People , Goal 4: Resilience	ps-EW-BN-49, ps-EW-BN-51, ps-EW-BN-52
ma-FL-BN-80	Flood	SP - Structural Projects	Pending	2021	City of Benicia	Retrofit infrastructure in 100 year floodplains as needed and ensure they conform to existing 100-year floodplain elevation standards.	Public Works Department	High - Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases).	High - Project will provide an immediate reduction of risk exposure for life and property.	1-3 Years	Project	HMGP / BRIC	High	Goal 2: Infrastructure	ps-FL-BN-33, ps-FL-BN-35, ps-EW-BN-48
ma-FL-BN-84	Flood	PRV - Prevention	Ongoing	2017	City of Benicia	Implement Urban Waterfront Enhancement Master Plan	Parks & Community Services, Community Development Department, Public Works, Library, & Economic Development	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	High - Project will provide an immediate reduction of risk exposure for life and property.	1-3 Years	Planning	HMGP / BRIC	Medium	Goal 2: Infrastructure , Goal 4: Resilience	ps-EW-BN-50, ps-SR-BN-55
ma-FL-BN-88	Flood	PRV - Prevention	Ongoing	2017	City of Benicia	Increase use of Stormwater Management and create Flood Mitigation Plan	Public Works Department - Engineering	High - Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases).	High - Project will provide an immediate reduction of risk exposure for life and property.	1-3 Years	Planning	HMGP / BRIC	High	Goal 4: Resilience	ps-FL-BN-34, ps-FL-BN-38, ps-FL-BN-37, ps-FL-BN-39, ps-FL-BN-40

Mitigation No.	Hazard Type	Mitigation Type	Status	Year	Primary Agency	Title/Description	Responsible Party	Estimated Cost	Estimated Benefit	Time Frame	HMA Activity Type	Potential Grant Source	Priority	Related Goal(s)	Related Problem Statements
ma-FL-BN-95	Flood	PRV - Prevention	Ongoing	2017	City of Benicia	Conduct Flood Fighting Training from the Department of Water Resources	Fire Department; Public Works, Parks, and Police Dept	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	High - Project will provide an immediate reduction of risk exposure for life and property.	Annually	N/A	EMPG , Internal Funding	High	Goal 1: People , Goal 4: Resilience	ps-EW-BN-47, ps-EW-BN-48, ps-FL-BN-33, ps-FL-BN-34, ps-FL-BN-36, ps-FL-BN-37, ps-FL-BN-39, ps-FL-BN-40, ps-FL-BN-35
ma-FL-BN-147	Flood	SP - Structural Projects	Pending	2021	City of Benicia	Make improvements to existing floodwall to protect against 100-year flood event.	City of Benicia	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	High - Project will provide an immediate reduction of risk exposure for life and property.	1-3 Years	Project	HMGP / BRIC	High	Goal 2: Infrastructure	ps-FL-BN-33
ma-FL-BN-148	Flood	PRV - Prevention	Pending	2021	City of Benicia	Conduct flood study to determine whether flood channel can be enhanced or detention basins added.	City of Benicia	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	High - Project will provide an immediate reduction of risk exposure for life and property.	1-3 Years	Planning	HMGP / BRIC	High	Goal 2: Infrastructure , Goal 4: Resilience	ps-EW-BN-47
ma-SR-BN-101	Sea Level Rise	PRV - Prevention	Pending	2021	City of Benicia	Incorporate consideration of sea level rise into the City's Capital Improvement Program, and into the design and funding of infrastructure.	City of Benicia	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	High - Project will provide an immediate reduction of risk exposure for life and property.	Ongoing	Planning	HMGP / BRIC , FMA	High	Goal 4: Resilience	ps-SR-BN-55, ps-SR-BN-56, ps-SR-BN-57, ps-SR-BN-59
ma-SR-BN-102	Sea Level Rise	PRV - Prevention	Pending	2021	City of Benicia	Incorporate sea level rise and coastal flooding potential into existing and future recovery plans.	City of Benicia	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	High - Project will provide an immediate reduction of risk exposure for life and property.	1-3 Years	Planning	HMGP / BRIC , FMA	High	Goal 4: Resilience	ps-SR-BN-55, ps-SR-BN-57, ps-SR-BN-59

Mitigation No.	Hazard Type	Mitigation Type	Status	Year	Primary Agency	Title/Description	Responsible Party	Estimated Cost	Estimated Benefit	Time Frame	HMA Activity Type	Potential Grant Source	Priority	Related Goal(s)	Related Problem Statements
ma-SR-BN-103	Sea Level Rise	PRV - Prevention	Pending	2021	City of Benicia	Prepare a Downtown Sea Level Rise Adaptation Strategy	City of Benicia	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	High - Project will provide an immediate reduction of risk exposure for life and property.	1-3 Years	Planning	HMGP / BRIC , FMA	High	Goal 2: Infrastructure , Goal 4: Resilience	ps-SR-BN-58, ps-SR-BN-59
ma-WF-BN-90	Wildfire	PRV - Prevention	Ongoing	2017	City of Benicia	Implement a Defensible Space Program with Site Specific Assessment (assessment underway in 2021)	Fire Department	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	High - Project will provide an immediate reduction of risk exposure for life and property.	3-5 Years	Planning	HMGP / BRIC , AFG , FP&S , Internal Funding	High	Goal 1: People , Goal 3: Environment , Goal 4: Resilience	ps-WF-BN-41, ps-WF-BN-41, ps-WF-BN-44, ps-WF-BN-46
ma-WF-BN-104	Wildfire	SP - Structural Projects	Pending	2021	City of Benicia	Install fire sprinkler suppression system for City Hall and the Police Department	City of Benicia	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	High - Project will provide an immediate reduction of risk exposure for life and property.	1-3 Years	Project	FP&S , Internal Funding	High	Goal 1: People , Goal 2: Infrastructure	ps-WF-BN-43
ma-WF-BN-105	Wildfire	PE&A - Public Education & Awareness	Pending	2021	City of Benicia	Conduct Public Education Campaign to increase awareness of threats of wildfire due to recreational use.	Benicia Fire Department	Low - The project could be funded under the existing budget. The project is part of or can be part of an ongoing existing program.	High - Project will provide an immediate reduction of risk exposure for life and property.	1-3 Years	Planning	HMGP / BRIC		Goal 4: Resilience	ps-WF-BN-45, ps-WF-BN-46
ma-WF-BN-114	Wildfire	PRV - Prevention	Ongoing	2021	City of Benicia	Implement recommendations from City's 2021-2022 Defensible Space Prgram & Site-specific Assessment Project	Fire Department	High - Existing funding will not cover the cost of the project; implementation would require new revenue through an alternative source (for example, bonds, grants, and fee increases).	High - Project will provide an immediate reduction of risk exposure for life and property.	3-5 Years	Project	HMGP / BRIC , AFG , FP&S , Internal Funding	High	Goal 4: Resilience	ps-WF-BN-41, ps-WF-BN-42, ps-WF-BN-45,
ma-WF-BN-115	Wildfire	PRV - Prevention	Pending	2017	City of Benicia	Develop an Urban Interface Ordinance	Fire Department; Community Development	Medium - The project could be implemented with existing funding but would require a re-apportionment of the budget or a budget amendment, or the cost of the project would have to be spread over multiple years.	Medium - Project will have a long-term impact on the reduction of risk exposure for life and property, or project will not provide an immediate reduction in the risk exposure for property.	3-5 Years	Planning	HMGP / BRIC , Internal Funding	High	Goal 1: People , Goal 4: Resilience	ps-WF-BN-42, ps-WF-BN-44