2021 Metropolitan Transportation Commission

Multi-Jurisdictional Hazard Mitigation Plan

April 2021

2021 METROPOLITAN TRANSPORTATION COMMISSION MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN

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LIST OF ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
AC Transit	Alameda-Contra Costa Transit District
ACTC	Alameda County Transportation Commission
AECOM	AECOM Technical Services, Inc.
Bay Area	San Francisco Bay Area
Cal OES	California Office of Emergency Services
CCCTA	Central Contra Costa Transit Authority
CFR	Code of Federal Regulations
CGS	California Geological Survey
CO_2	carbon dioxide
COVID-19	coronavirus disease 2019
CPG 201	Comprehensive Preparedness Guide 201
CPUC	California Public Utilities Commission
DFIRM	Digit Flood Insurance Rate Map
DMA 2000	Disaster Mitigation Act of 2000
DSOD	Division of Safety of Dams
FEMA	Federal Emergency Management Agency
FHSZ	Fire Hazard Severity Zone
FHWA	Federal Highway Administration
Cal FIRE	California Department of Forestry and Fire Protection
GIS	Geographic Information System
LRA	local responsibility area
M	magnitude
Marin Transit	Marin County Transit District
MJHMP	Multi-Jurisdictional Hazard Mitigation Plan
mph	miles per hour
MTC	Metropolitan Transportation Commission
NFIP	National Flood Insurance Program
NVTA	Napa Valley Transportation Authority
PG&E	Pacific Gas & Electric
SARS CoV-2	severe acute respiratory syndrome coronavirus-2
SFHA	Special Flood Hazard Area
SFPUC	San Francisco Public Utilities Commission
SolTrans	Solano County Transit
SRA	state responsibility area
USC	University of Southern California
USGS	United States Geological Survey
WestCAT	Western Contra Costa Transit Authority
WETA	Water Emergency Transportation Authority
WUI	Wildland Urban Interface

1.0 INTRODUCTION

1.1 HAZARD MITIGATION PLANNING

As defined in Title 44 of the Code of Federal Regulations (CFR), Subpart M, Section 206.401, hazard mitigation is "any action taken to reduce or eliminate the long-term risk to human life and property from natural hazards." As such, hazard mitigation is any work to minimize the impacts of any type of hazard event before it occurs. Hazard mitigation aims to reduce losses from future disasters. It is a process that identifies and profiles hazards, analyzes the people and facilities at risk, and develops mitigation actions to reduce or eliminate hazard risk. The implementation of the mitigation actions—which include short- and long-term strategies that may involve planning, policy changes, programs, projects, and other activities—is the end result of this process.

Over the past two decades, local hazard mitigation planning has been driven by a federal law, known as the Disaster Mitigation Act of 2000 (DMA 2000). On October 30, 2000, Congress passed the DMA 2000 (Public Law 106-390), which amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1988 (Title 42 of the United States Code Section 5121 et seq.) by repealing the act's previous mitigation planning section (409) and replacing it with a new mitigation planning section (322). This new section emphasized the need for state, tribal, and local entities to closely coordinate mitigation planning and implementation efforts. This new section also provided the legal basis for the Federal Emergency Management Agency's (FEMA's) mitigation plan requirements for the Hazard Mitigation Assistance grant programs.

1.2 2021 MULTI-JURISDICTIONAL HAZARD MITIGATION PLAN SYNOPSIS

To meet the requirements of the DMA 2000, the Metropolitan Transportation Commission (MTC), along with eight partner transit agencies, has prepared a Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) to assess risks posed by hazards and to develop a mitigation action plan for reducing the risks in the nine county San Francisco Bay Area (Bay Area). In addition to MTC, the eight partner transit agencies are as follows:

- AC Transit: Alameda-Contra Costa Transit District
- CCCTA: Central Contra Costa Transit Authority
- Marin Transit: Marin County Transit District
- NVTA: Napa Valley Transportation Authority
- Santa Rosa CityBus
- SolTrans: Solano County Transit
- WestCAT: Western Contra Costa Transit Authority
- WETA: San Francisco Bay Area Water Emergency Transportation Authority

The 2021 MJHMP is organized to follow FEMA's Local Mitigation Plan Review Tool, which demonstrates how hazard mitigation plans meet the DMA 2000 regulations. As such, specific planning elements of this review tool are in their appropriate plan sections.

The 2021 MJHMP structure has been updated to including the following sections:

- **Section 2 Planning Process** provides an overview of the 2020 planning process, starting with a timeline. It identifies planning committee members and describes their involvement with the planning process. This section also details stakeholder outreach, public involvement, and continued public involvement. It provides an overview of the existing plans and reports, details how those

documents were incorporated into the 2021 MJHMP and includes a plan update method and schedule. Supporting planning process documentation is listed in **Appendix A**.

- **Section 3 Prologue** describes the planning area for the 2021 MJHMP. It identifies land area by county and fixed critical infrastructure by participating agency. Location and critical facility figures are in **Appendix B**.
- **Section 4 Hazard Identification and Risk Assessment** describes each of the nine hazards addressed in this plan. Hazard figures are in **Appendix B**. In addition, it includes impact (i.e., risk assessment) tables for land area by county and fixed critical facility by agency. An overall summary description is provided for each hazard. Agency-specific impact tables are provided in **Appendix C** through **Appendix K**.
- **Section 5 Mitigation Strategy** describes the participating agency's mitigation goals, potential mitigation actions and projects, and prioritization process. Agency-specific capability assessments, prioritized action plans, and the process to integrate the 2021 MJHMP into other planning mechanisms is in **Appendix C** through **Appendix K**.
- **Section 6 Plan Review, Evaluation and Implementation** is not addressed in the 2021 MJHMP since no previous version of the plan existed. However, **Appendix K** documents the changes in development, progress made in local mitigation efforts, and changes to priorities for WETA. WETA previously had its own hazard mitigation plan.
- **Section 7 Plan Adoption** contains a scanned copy of the adoption resolutions.

2.0 PLANNING PROCESS

This section addresses Element A of the Local Mitigation Plan Regulation Checklist.

Regulation Checklist – 44 CFR 201.6 Local Mitigation Plans
Element A: Planning Process
A1. Does the Plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (Requirement §201.6(c)(1))
A2. Does the Plan document an opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, agencies that have the authority to regulate development as well as other interests to be involved in the planning process? (Requirement §201.6(b)(2))
A3. Does the Plan document how the public was involved in the planning process during the drafting stage? (Requirement §201.6(b)(1))
A4. Does the Plan describe the review and incorporation of existing plans, studies, reports, and technical information? (Requirement §201.6(b)(3))
A5. Is there discussion of how the community(ies) will continue public participation in the plan maintenance process? (Requirement §201.6(c)(4)(iii))
A6. Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a 5-year cycle)? (Requirement §201.6(c)(4)(i))

2.1 OVERVIEW OF THE 2021 MJHMP PLANNING PROCESS

The development of the 2021 MJHMP was collaborative effort between MTC, AECOM Technical Services, Inc. (AECOM), and a planning committee. **Table 2-1** provides a timeline of the major planning tasks and milestones by month over a 6-month period, including the two times the planning committee met virtually. **Table 2-2** lists the planning committee members and how they contributed to the development of the plan. Planning committee agendas are provided in **Appendix A**.

Table 2-1: MJHMP Timeline

Date	Tasks	People Involved
August 2020	Conducted planning committee kick-off conference call (August 25)	MJHMP project manager, AECOM
September 2020	Collected local and regional existing plans and reports Determined the Geographic Information System (GIS) strategy for hazard profiles and impact tables Identified initial list of stakeholders and emailed stakeholders Crafted and posted public outreach messages for MTC's website and Twitter account @MTCBATA Created plan maintenance process and schedule	MJHMP project manager, AECOM, planning committee
October 2020	Created draft hazard figures	MJHMP project manager, AECOM, planning committee
November 2020	Collected and geo-coded fixed critical facilities Draft agency-specific capability assessments Created draft hazard profiles	MJHMP project manager, AECOM, planning committee

Table 2-1: MJHMP Timeline

Date	Tasks	People Involved
December 2020	Held second planning committee conference call (December 1) Developed a list of potential mitigation actions and created a prioritization approach Completed hazard impact and overall summary tables	MJHMP project manager, AECOM, planning committee
January 2021	Selected and prioritized mitigation actions Created the Internal Draft MJHMP	MJHMP project manager, AECOM, planning committee
March 2021	Created Facebook post and emailed stakeholders about the Public Draft MJHMP review period Created the Public Draft MJHMP	MJHMP project manager, AECOM

Table 2-2: Planning Committee

Name	Department/Agency and Title	Contribution
Steve Terrin	MTC, Planner/Emergency Coordinator	Served as the 2021 MJHMP project manager, led planning committee conference calls, analyzed hazard figures and risk assessment tables, created an agency-specific capability assessment and mitigation strategy, and reviewed the Internal Draft MJHMP.
William Wong	AC Transit, Assistant Transportation Superintendent Transbay	Participated in planning committee conference calls, responded to agency-specific email inquiries, analyzed hazard figures and risk assessment tables, created an agency-specific capability assessment and mitigation strategy, and reviewed the Internal Draft MJHMP.
Kevin Finn	CCCTA, Purchasing/Grants Manager	Participated in planning committee conference calls, responded to agency-specific email inquiries, analyzed hazard figures and risk assessment tables, created an agency-specific capability assessment and mitigation strategy, and reviewed the Internal Draft MJHMP.
Amy Van Doren	Marin Transit, Director of Policy & Legislative Programs	Participated in planning committee conference call #1, responded to agency-specific email inquiries, analyzed hazard figures and risk assessment tables, created an agency-specific capability assessment and mitigation strategy, and reviewed the Internal Draft MJHMP.
Antonio Onorato	NVTA, Director of Administration, Finance and Policy	Participated in planning committee conference calls, responded to agency-specific email inquiries, analyzed hazard figures and risk assessment tables, created an agency-specific capability assessment and mitigation strategy, and reviewed the Internal Draft MJHMP.

Table 2-2: Planning Committee

Name	Department/Agency and Title	Contribution
Matthew Wilcox	Santa Rosa CityBus, Transit Planner	Participated in planning committee conference calls, responded to agency-specific email inquiries, responded to agency-specific email inquiries, analyzed hazard figures and risk assessment tables, created an agency-specific capability assessment and mitigation strategy, and reviewed the Internal Draft MJHMP.
John Sanderson	SolTrans, Operations & Planning Manager	Participated in planning committee conference calls, responded to agency-specific email inquiries, analyzed hazard figures and risk assessment tables, created an agency-specific capability assessment and mitigation strategy, and reviewed the Internal Draft MJHMP.
Rob Thompson	WestCAT, Assistant General Manager	Participated in planning committee conference calls, responded to agency-specific email inquiries, analyzed hazard figures and risk assessment tables, created an agency-specific capability assessment and mitigation strategy, and the reviewed Internal Draft MJHMP.
Chad Mason	WETA, Senior Transportation Planner/Project Manager	Participated in planning committee conference calls, responded to agency-specific email inquiries, analyzed hazard figures and risk assessment tables, reviewed and updated existing capability assessment and mitigation strategy, and reviewed the Internal Draft MJHMP.

2.2 OPPORTUNITIES FOR STAKEHOLDERS

On October 26, 2020, the MTC MJHMP project manager reached out to stakeholders via email (**Appendix A**) about the 2021 MJHMP and invited them to participate in the plan update process. Stakeholders included: county emergency management agencies in the Bay Area (Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Solano, and Sonoma), State partners (California Office of Emergency Services [Cal OES], California Department of Transportation, and California Highway Patrol), and non-profit organizations (SPUR and Greenbelt Alliance). Greenbelt Alliance reached out to the MJMHP project manager and consultant to discuss mitigation projects related to climate change.

MTC's MJHMP project manager reached out to the stakeholders again via email on March 9, 2021, inviting them to review and provide comments about the Public Draft MJHMP (**Appendix A**). No stakeholder comments were received.

2.3 PUBLIC INVOLVEMENT

On October 5, 2020, MTC posted information about the 2021 MJHMP kick-off on the agency's website and Twitter account. On March 8, 2021, MTC posted information about the Public Draft MJHMP and public comment period on the agency's website, Twitter account, and blog. While MTC's tweets about the 2021 MJHMP got several likes, no public comments were received. Links to MTC's website, Twitter, and blog are provided below (and as screenshots in **Appendix A**):

- Website: Multi-Jurisdictional Hazard Mitigation Plan | Metropolitan Transportation Commission (ca.gov)
- Twitter: https://twitter.com/MTCBATA

- Blog: The Bay Link Blog | News, Views and Analysis from the Metropolitan Transportation Commission and the Association of Bay Area Governments (bayareametro.gov)

2.4 REVIEW AND INCORPORATION OF EXISTING PLANS AND REPORTS

Table 2-3 lists the major relevant plans and reports reviewed and incorporated into the 2021 MJHMP.

Table 2-3: Existing Plans and Reports

Plans and Reports	Information to be Incorporated into the 2021 MJHMP
United States Department of Transportation Climate Adaption Plan 2014: Ensuring Transportation Infrastructure and System Resilience	Potential impacts as well as future policies addressed in the plan were incorporated into the 2021 MJHMP's hazard impacts as mitigation strategy sections.
National Cooperative Highway Research Program Report 769: A Guide for Public Transportation Pandemic Planning and Response (2014)	Potential impacts and vulnerabilities in the report were included in the 2021 MJHMP's vulnerability analysis section.
Transportation System Resilience to Extreme Weather and Climate Change (2015)	"Checklist for Technical Staff" was used to develop mitigation actions in the 2021 HJHMP's mitigation strategy.
Bay Area Earthquake Plan (2016)	Situation section of plan was incorporated into the 2021 MJHMP's earthquake profile section.
Plan Bay Area —Final Plan (2017) and Overview (2019)	Resilience Action Plan items were used to develop mitigation actions in 2021 MJHMP's mitigation strategy. Incorporated vision statement into the 2021 MJHMP's mitigation goals.
2018 California's Fourth Climate Change Assessment—San Francisco Bay Area Region Report	Summary of report was incorporated into the 2021 MJHMP's climate change profile section.
2019 Dams Within Jurisdiction of the State of California Report	Dam-specific information (e.g., number, name, type, height, crest, reservoir capacity, dam type, and High Hazard Potential status) included in the 2021 MJHMP's hazard identification and risk assessment sections.
Rain and Landslides in Northern California: United States Geological Survey (USGS) Publication (2020)	A summary of recent and past landslides and debris flows caused by rainfall was incorporated into the 2021 MJHMP's landslide profile section.
Safety First: Improving Hazard Resilience in the Bay Area (2020)	Policy recommendations were used to develop mitigation actions in 2021 MJHMP's mitigation strategy.

2.5 CONTINUED PUBLIC PARTICIPATION

A copy of the 2021 MJHMP will remain available on MTC's website along with contact information. MTC's MJHMP project manager will work with MTC's public information officer to use its website and @MTCBATA Twitter account to notify the public of and seek input on any changes or updates to the 2021 MJHMP, including mitigation action implementation and the 2026 MJHMP kick-off.

2.6 PLAN UPDATE METHOD AND SCHEDULE

The 2021 MJHMP will be monitored and evaluated by a subset of the planning committee, specifically MTC's MJHMP project manager. MTC's MJHMP project manager will get input from specific planning

committee members as needed. MTC's MJHMP project manager will complete the annual review tracker every January and after any major disaster to ensure that the 2021 MJHMP is relevant and effective in achieving the plan's goals. Annual review will be tracked in a table in this document (**Table 2-4**). FEMA-funded mitigation projects will continue to be tracked and reviewed using FEMA Mitigation Progress Report forms, and progress summaries will be included in the Annual Review Tracker (**Table 2-4**) at the beginning of each year.

Beginning in January 2025:

- MTC's MJHMP project manager will complete the annual review tracker.
- MTC's MJHMP project manager will reconvene the planning committee and update membership, if necessary.
- The planning committee will review **Table 2-4**, which includes annual summaries of disasters that have occurred, new permanent information available, implementation measures, and public outreach and response, to determine the hazards to be included in the 2025 MJHMP.
- MTC's MJHMP project manager will develop a new work plan.
- MTC's MJHMP project manager—with support from the planning committee—will begin the plan update process, which is expected to take up to 6 months.

Table 2-4: Annual Review Tracker

Year	Disasters that Occurred	Mitigation Actions Implemented	New Relevant Studies/Reports to Include in 2026 MJHMP	Public Outreach Conducted	Changes Made to 2020 LHMP
2022					
2023					
2024					
2025					

3.0 COMMUNITY PROFILE

3.1 PLANNING AREA

For the purposes of this plan, the geographic planning area boundaries include the nine counties of the Bay Area: Alameda, Contra Costa, Marin, Napa, San Francisco, San Mateo, Santa Clara, Sonoma, and Solano. The region includes the major cities of San Jose, San Francisco, and Oakland. Together, the major metropolitan, smaller urban, and rural areas in the Bay Area comprise 7,047.61 squares miles and over 7.7 million people. A map of the planning area is provided in **Figure B-1**.

Table 3-1: Bay Area Counties

County	Square Miles	2019 Census Population Estimates
Nine Bay Area Counties Total	7,047.61	7,739,378
Alameda	744.16	1,671,329
Contra Costa	746.80	1,153,526
Marin	527.16	258,826
Napa	788.31	137,744
San Francisco	47.57	881,549
San Mateo	455.77	766,573
Santa Clara	1,298.62	1,927,852
Solano	849.549	447,643
Sonoma	1,589.66	494,336

3.2 TRANSIT AND TRANSPORTATION AGENCIES

As noted in **Section 1**, MTC and eight partner transit agencies included in this 2021 MJHMP. They are:

- MTC: a public, governmental agency responsible for planning, financing and coordinating transportation for the Bay Area.
- AC Transit: an Oakland-based public transit agency serving the western portions of Alameda and Contra Costa counties in the East Bay. AC Transit also operates "Transbay" routes across San Francisco Bay to San Francisco and selected areas in San Mateo and Santa Clara counties.
- CCCTA: a public transit agency operating fixed-route bus and paratransit service in and around central Contra Costa County and in the San Francisco Bay Area.
- Marin Transit: a public bus agency that provides a variety of contracted fixed-route and demand-response services in Marin County.
- NVTA: a congestion management agency that also serves as the countywide transportation planning agency. It also operates Vine Transit, the Napa Valley's bus system in addition to planning and funding of paratransit; the maintenance and improvement of highways, streets, and roads; and bicycle transit.
- Santa Rosa CityBus: a public transportation agency providing bus service in the city of Santa Rosa.
- SolTrans: a joint-powers authority that provides public transportation service to the southern Solano County cities of Vallejo and Benicia.

- WestCAT: a public transportation service in western Contra Costa County.
- WETA: a public transit passenger ferry service in the San Francisco Bay.

3.3 CRITICAL FACILITIES

The DMA 2000 does not specify or define the term "critical facility." In general, a critical facility is essential to the health and welfare of the population and it is especially important during and after a disaster or hazard event. Ground transportation critical facilities are vast and varied, but generally include fixed facilities such as operation centers, depots, maintenance yards, fueling stations, parking lots, and terminals.

For the 2021 MJHMP, MTC and eight partner transit agencies provided a list of fixed critical facilities owned, leased, contracted, and/or used by their agency. Fixed critical facility names and addresses were then geocoded to a location and the resulting geographic features were used for the risk assessment. Fixed critical facility information is shown in **Table 3-2** and **Figure B-2** through **Figure B-10**. **Table 3-3** includes MTC Express Lanes. MTC Express Lanes are toll lanes where carpools, buses, motorcycles, and clean air vehicles travel toll-free or pay a partial toll while solo motorists can also use express lanes for a toll. MTC Express Lanes includes current, upcoming, and future MTC Express Lanes. All agency-specific information is provided in **Appendix C** through **Appendix K**.

Table 3-2: Fixed Critical Facilities

Agency	# of Facilities
Nine Agencies Total	60
MTC	10
AC Transit	9
CCCTA	2
Marin Transit	13
NVTA	3
Santa Rosa CityBus	2
SolTrans	4
WestCAT	3
WETA	13
Other: Salesforce Transit Center	1

Table 3-3: MTC Express Lanes

Name	Length (miles)
Express Lanes Total	129.88
MTC Express Lanes—Current	82.57
MTC Express Lanes—Upcoming	16.37
MTC Express Lanes—Future	30.94

4.0 HAZARD IDENTIFICATION AND RISK ASSESSMENT

This section addresses Element B of the Local Mitigation Plan Regulation Checklist.

Regulation Checklist – 44 CFR 201.6 Local Mitigation Plans
Element B: Hazard Identification and Risk Assessment
B1. Does the Plan include a description of the type, location, and extent of all natural hazards that can affect each jurisdiction(s)? (Requirement § 201.6(c)(2)(ii))
B2. Does the Plan include information on previous occurrences of hazard events and on the probability of future hazard events for each jurisdiction? (Requirement § 201.6(c)(2)(i))
B3. Is there a description of each identified hazard's impact on the community as well as an overall summary of the community's vulnerability for each jurisdiction? (Requirement §201.6(c)(2)(ii))
B4. Does the Plan address NFIP insured structures within the jurisdiction that have been repetitively damaged by floods? (Requirement §201.6(c)(2)(ii))

During the kick-off planning committee conference call, the MJHMP project manager, consultant, and planning committee determined the list of hazards to include in the 2021 MJHMP based on past disaster declarations; known probabilities and vulnerabilities; and regional, state, and federal plans and reports. The list includes climate change, dam failure inundation, drought, earthquake, flood, infectious disease, landslide, public safety power shutoff, tsunami, and wildfire.

Hazard identification consists of describing the nature of the hazard, disaster history, location, extent/severity, and probability of future events. Hazard identification profiles have been developed for each of the nine hazards addressed in **Section 4.1** through **Section 4.10**. In addition, semi-quantitative or qualitative impact tables for land area and fixed critical facilities, as well as summary descriptions, have been created for each hazard. For GIS, elevation data for each fixed critical facility was not available; therefore, additional analysis will need to be conducted in order to understand a more accurate vulnerability. The section does not address the National Flood Insurance Program's (NFIP's) repetitively damaged structures as transit agencies are not considered participating communities.

According to the *Comprehensive Preparedness Guide 201: Threat and Hazard Identification and Risk Assessment Guide—Second Edition* (CPG 201) dam failure, drought, earthquake, flood, landslide, tsunami, and wildfire are classified natural hazards. CPG 201 does not classify climate change, outbreak/epidemic/ pandemic or public safety power shutoff. As such, the hazards profiled for this MJHMP are discussed in alphabetical order and not by CPG 201 classification. The order does not signify level of risk.

4.1 CLIMATE CHANGE

Table 4-1: Climate Change Profile

Profile	Description
Nature	Climate change is defined as the average statistics of weather, which includes temperature, precipitation, and seasonal patterns in a particular region. Climate change refers to the long-term and irrevocable shift in these weather-related patterns, either regionally or globally. The Earth and its natural ecosystem are very closely tied to the climate and any permanent climate change will lead to an imbalance in the existing ecosystem, impacting the way people live, the food they grow, their health, the wildlife, availability of water, and much more. Research indicates that much of this warming is due to human activities—primarily burning fossil fuels and clearing forests—that release carbon dioxide (CO_2) and other gases into the atmosphere, which traps heat that would otherwise escape into space. Once in the atmosphere, these heat-trapping emissions remain there for many years (for example, CO_2 lasts about 100 years). If left unchecked, by the end of the century CO_2 concentrations could reach levels three times higher than pre-industrial times. According to most climatologists, the planet is starting to experience shifts in climate patterns and increased frequency of extreme weather events at both the global and local levels. Over the next century, increasing atmospheric greenhouse gas concentrations are expected to cause a variety of changes to local climate conditions, including sea level rise and storm surge in coastal areas, increased riverine flooding and storm water inundation, and more frequent, higher temperatures (leading to extreme heat events and wildfires), particularly inland, decreasing air quality, and extended periods of drought.
Location	According to California's Fourth Climate Change Assessment, climate change is already underway in the entire Bay Area.
History	The history of the scientific discovery of climate change began in the early nineteenth century, when ice ages and other natural changes in paleoclimate were first suspected and the natural greenhouse effect first identified. In the late nineteenth century, scientists first argued that human emissions of greenhouse gases could change the climate. Many other theories of climate change were advanced, involving forces from volcanism to solar variation. In the 1960s, the warming effect of carbon dioxide gas became increasingly convincing, although some scientists also pointed out that human activities—in the form of atmospheric aerosols (i.e., pollution)—could have cooling effects as well. During the 1970s, scientific opinion increasingly favored the warming viewpoint. By the 1990s, as a result of improving fidelity of computer models and observational work confirming the Milankovitch theory of the ice ages, a consensus position formed: greenhouse gases were deeply involved in most climate changes, and human emissions were resulting in serious global warming. Since the 1990s, scientific research on climate change has expanded and includes multiple disciplines, significantly increasing our understanding of causal relations, links with historic data, and ability to numerically model climate change. The most recent work has been summarized in the Assessment Reports by the Intergovernmental Panel on Climate Change. Climate change is a significant and lasting change in the statistical distribution of weather patterns over periods ranging from decades to millions of years. It may be a change in average weather conditions, or in the distribution of weather around the average conditions (i.e., more or fewer extreme weather events). Climate change is caused by factors that include oceanic processes (e.g., oceanic circulation), biotic processes, variations in solar radiation received by Earth, plate tectonics and volcanic eruptions, and human-induced alterations of the natural world; these latter effects are currently causing global warming. The term "climate change" is often used to describe human-specific impacts. As noted in California's Fourth Climate Change Assessment, impacts of climate change in the Bay Area already include:

Table 4-1: Climate Change Profile

Profile	Description
	• Sea level rise (over 8 inches in the last 100 years) • Increase average annual maximum temperature (1.7 degrees Fahrenheit [°F] from 1950 to 2005) • Severe moisture deficit (2012 to 2016 California drought led to the most severe moisture deficit over the last 1,200 years) • Coastal erosion (2015-16 El Niño was one of the three largest in the historical record • Wildfires (lower precipitation and warmer air temperatures dry the forests and other vegetation)
Extent / Severity	Over the next century, weather patterns that are considered extreme today are expected to become the standard. According to California's Fourth Climate Change Assessment – San Francisco Bay Area Report, while all parts of the Bay Area are projected to get warmer with an annual mean warming of approximately 3.3°F by mid-century, the majority of warming will occur in the inland areas. Precipitation in the Bay Area will "continue to exhibit high year-to-year variability – 'booms and busts' - with very wet and very dry years." Boom years will result in heavy rainfall and substantial flood risks, with bust years leading to consecutive years of low or no snowpack. Drier conditions along with increased temperatures will also make wildfires more frequent and intense. The National Oceanic and Atmospheric Administration has produced a sea level rise viewer that shows the impacts of predicted sea level rise. As shown in **Figure B-1**, a sea level rise of just 3 feet above mean higher high tide (approximate year 2050 to 2060) will result in coastal flooding of 334.97 square miles (4.75%) of the Bay Area, while a sea level rise of 6 feet above mean higher high tide (approximate year 2100) will result in coastal flooding of 405.46 square miles (5.75%) in the Bay Area.
Recurrence Probability	According to the National Aeronautics and Space Administration, "the current warming trend is of particular significance because most of it is extremely likely (i.e., greater than 95% probability) to be the result of human activity since the mid-twentieth century and proceeding at a rate that is unprecedented over decades to millennia." National Aeronautics and Space Administration also states that "scientists have high confidence that global temperatures will continue to rise for decades to come, largely due to greenhouse gases produced by human activities."

Table 4-2: Climate Change Impact on Land Area

County	Sea Level Rise Inundation Area—3 Feet		Sea Level Rise Inundation Area—6 Feet	
	# of Sq. Miles	% of Sq. Miles	# of Sq. Miles	% of Sq. Miles
Nine Bay Area Counties Total	334.97	4.75	405.46	5.75
Alameda	44.63	6.00	66.90	8.99
Contra Costa	21.15	2.83	26.04	3.49
Marin	30.78	5.84	37.24	7.06
Napa	22.72	2.88	24.83	3.15
San Francisco	1.28	2.68	3.65	7.67
San Mateo	23.24	5.10	39.85	8.74
Santa Clara	26.35	2.03	31.05	2.39
Solano	118.39	13.94	125.95	14.83
Sonoma	46.43	2.92	49.95	3.14

Table 4-3: Climate Change Impact on Transit Agencies Fixed Critical Facilities

Agency	Sea Level Rise Inundation Area—3 Feet		Sea Level Rise Inundation Area—6 Feet	
	# of Facilities	% of Facilities	# of Facilities	% of Facilities
Nine Transit Agencies Total	5	8.33	16	32.00
MTC	0	0.00	1	10.00
AC Transit	0	0.00	1	11.11
CCCTA	0	0.00	0	0.00
Marin Transit	5	38.46	6	46.15
NVTA	0	0.00	0	0.00
Santa Rosa CityBus	0	0.00	0	0.00
SolTrans	0	0.00	1	25.00
WestCAT	0	0.00	0	0.00
WETA	0	0.00	7	53.85
Other: Salesforce Transit Center	0	0.00	0	0.00

Table 4-4: Climate Change Impact on MTC Express Lanes

MTC Express Lane	Sea Level Rise Inundation Area—3 Feet		Sea Level Rise Inundation Area—6 Feet	
	# of Miles	% of Miles	# of Miles	% of Miles
Express Lanes Total	4.52	3.48	7.23	5.57
MTC Express Lanes—Current	4.40	5.33	6.61	8.01
MTC Express Lanes—Upcoming	0.12	0.73	0.62	3.78
MTC Express Lanes—Future	0.00	0.00	0.00	0.00

Table 4-5: Overall Summary of Transit Agencies Vulnerability to Climate Change

Climate Change	
Summary	MTC and its partner transit agencies overall vulnerabilities to climate change include sea level rise, coastal erosion, increased average annual maximum temperature, severe moisture deficit/drought, and wildfires. • Nearly 5% (334.97 miles) of the Bay Area will be affected by 3 feet of sea level rise, while nearly 6% (405.46 miles) of the Bay Area will be at risk to 6 feet of sea level rise by the end of the century. Sea level rise will affect all Bay Area counties, in particular the low-lying coastal areas of Alameda, Marin, San Mateo, and Solano counties. • For MTC and its partner transit agencies, five fixed critical facilities (8.33%) will be affected by 3 feet of sea level rise and 16 fixed critical facilities (32%) will be affected 6 feet of sea level rise. Marin Transit has all of the five fixed critical facilities in the 3-foot sea level rise area. It also has six fixed critical facilities in the 6-foot sea level rise hazard. WETA has a total of seven fixed critical facilities in this hazard area, while AC Transit, MTC, and SolTrans each have one. CCCTA, NVTA, Santa Rosa CityBus, and WestCAT do not have fixed critical facilities in this hazard area. • Approximately 4.52 miles (3.48%) of the MTC Express Lanes are in the 3-foot sea level rise area, while an additional 7.23 miles (5.57%) are in the 6-foot sea level rise area. • Throughout the Bay Area, flooding due to sea level rise will likely disrupt or limit transit operations, delay transit-related construction activities, and weaken or wash out the soil and culverts that support roads, tunnels, and bridges used by transit. • Increased average annual maximum temperature will likely affect all of the Bay Area, but most noticeably in the interior counties. Increased temperatures will likely leave all transit agencies vulnerable to vehicle fleets overheating and faster deterioration of tires. Transit riders—particularly the elderly—could be vulnerable to heat-related illnesses; therefore, transit agencies will likely need to rethink greening measures at transit terminals and stops, as well as temperature control measures on vehicles or in vessels. • Transit agencies, particularly those located in public safety power shutoff areas (**Section 4.8**), may also be vulnerable to more power outages associated with increased temperatures. Without back-up power, power outages will likely jeopardize operations and supporting ancillary assets. • Climate change will likely increase MTC and its partner transit agencies vulnerability to drought (**Section 4.3**) and wildfires (**Section 4.10**).

4.2 DAM FAILURE

Table 4-6: Dam Failure Profile

Profile	Description
Nature	Dam failure, also known as a dam breach, is the structural collapse of a dam that releases the water stored in the reservoir behind the dam. A dam failure is usually the result of the age of the structure, inadequate spillway capacity used in construction, or structural damage caused by an earthquake or flood. When a dam fails, a large quantity of water is suddenly released with a great potential to cause human casualties, economic loss, and environmental damage. This type of disaster is especially dangerous because it can occur suddenly, providing little warning and evacuation time for the people living downstream. The flows resulting from dam failure are generally much larger than the capacity of the downstream channels and therefore lead to extensive flooding. Flood damage occurs as a result of the momentum of the flood caused by the sediment-laden water flooding over the channel banks and impact debris carried by the flow.
Location	In California, any dam with a height of more than 6 feet and impounding 50 acre-feet or more of water, or any dam that is 25 feet or higher and impounds more than 15 acre-feet of water, falls under the State's jurisdictional oversight, unless it is exempted. As shown in **Figure B-12**, according to the California Department of Water Resource's Division of Safety of Dams (DSOD) as of December 2019, there are 270 jurisdictional dams in the Bay Area. By county, these include: • Alameda County: 23 • Contra Costa County: 25 • Marin County: 13 • Napa County: 57 • San Francisco County: 7 • San Mateo County: 20 • Santa Clara County: 42 • Solano County: 19 • Sonoma County: 64
History	According to the University of California, Davis there have been four dam failures in the Bay Area, including: • 1905: An outlet wall sheared off at core wall, Piedmont #1 Dam, Alameda County • 1918: A concrete outlet tower toppled over during construction, Calaveras Reservoir, Santa Clara County • 1921: Fill loss through riprap, San Pablo Reservoir, Contra Costa County • 1928: foundation slide during construction, Lafayette Reservoir, Contra Costa County

Table 4-6: Dam Failure Profile

Profile	Description
Extent / Severity	The Federal Guidelines for Inundation Mapping of Flood Risks Associated with Dam Incidents and Failures (FEMA P-946, July 2013) defines downstream hazards for dam incidents and not the indicator of the probability of failure. Downstream hazards are based "solely on the potential downstream impacts to life and property should the dam fail when operating with a full reservoir." FEMA has developed three categories in increasing severity for downstream hazards: Low, Significant, and High. DSOD adds a fourth category of Extremely High. According to DSOD, 149 dams are classified as High or Extremely High Potential dams. High Hazard Potential dams have the potential impact expected to cause loss of at least one human life, while dams that are classified as Extremely High Hazard Potential dams have the potential impact to cause considerable loss of human life or result in an inundation area with a population of 1,000 or more. By county, these include: • Alameda County: 18 • Contra Costa County: 22 • Marin County: 8 • Napa County: 23 • San Francisco County: 7 • San Mateo County: 10 • Santa Clara County: 23 • Solano County: 14 • Sonoma County: 24 **Figure B-13** shows the approved Extremely High Hazard Potential and High Hazard Potential dam breach inundation maps for the Bay Area. The inundation areas of these mapped 88 dams total of 370.22 square miles (5.25%). A dam breach inundation map shows downstream flooding that could result from a hypothetical failure of a dam or its critical appurtenant structure. In 2017, the California Legislature passed a law requiring all State jurisdictional dam owners—except for owners of low-hazard dams—to develop inundation maps approved by DSOD and emergency action plans approved by Cal OES.
Recurrence Probability	Dams fail for a variety of reasons, including sub-standard construction materials/techniques, spillway design error, geological instability, poor maintenance, intense rainfall, and earthquakes; therefore, recurrence probabilities are unknown. State jurisdiction dams are regulated by the DSOD and each dam undergoes inspection on an annual basis to ensure it is safe, performing as intended, and is not developing issues. According to the DSOD, dams have been designed to withstand storms so massive that they happen only once every 1,000 years (i.e., 0.1% chance). In recent years, there has been growing concern around extreme precipitation events pushing aging dams beyond what they were designed to handle. Water flowing over the top of a dam is considered among the worst possible failures as it puts pressure on the structure and increases the odds of a complete collapse. According to the former administrator of FEMA Craig Fugate, "even if kept in good condition, thousands of dams could be at risk because of extreme rainstorms." One way to measure extreme precipitation events that may cause failure to dams in the Bay Area is to calculate extreme storm frequency return intervals. According to California's Fourth Climate Change Assessment, by the end of the century, the Bay Area will experience once in 20-year storm every 7 years instead and a once every 200-year sequence of storms every 40 to 50 years instead.

Table 4-7: Dam Failure Impact on Land Area

County	Dam Breach Inundation Area—High Hazard Potential		Dam Breach Inundation Area—Extremely High Hazard Potential	
	# of Sq. Miles	% of Sq. Miles	# of Sq. Miles	% of Sq. Miles
Nine Bay Area Counties Total	30.51	0.43	339.71	4.82
Alameda	2.46	0.33	83.84	11.27
Contra Costa	3.24	0.43	54.14	7.25
Marin	9.76	1.85	3.54	0.67
Napa	7.68	0.97	31.55	4.00
San Francisco	0.00	0.00	3.15	6.62
San Mateo	0.22	0.05	12.32	2.70
Santa Clara	4.02	0.31	143.56	11.05
Solano	0.77	0.09	5.60	0.66
Sonoma	2.36	0.15	2.01	0.13

Table 4-8: Dam Failure Impact on Transit Agencies Fixed Critical Facilities

Agency	Dam Breach Inundation Area—High Hazard Potential		Dam Breach Inundation Area—Extremely High Hazard Potential	
	# of Facilities	% of Facilities	# of Facilities	% of Facilities
Nine Transit Agencies Total	1	1.67	2	3.33
MTC	0	0.00	0	0.00
AC Transit	0	0.00	0	0.00
CCCTA	0	0.00	0	0.00
Marin Transit	1	7.69	0	0.00
NVTA	0	0.00	2	66.67
Santa Rosa CityBus	0	0.00	0	0.00
SolTrans	0	0.00	0	0.00
WestCAT	0	0.00	0	0.00
WETA	0	0.00	0	0.00
Other: Salesforce Transit Center	0	0.00	0	0.00

Table 4-9: Dam Failure Impact on MTC Express Lanes

MTC Express Lane	Dam Breach Inundation Area—High Hazard Potential		Dam Breach Inundation Area—Extremely High Hazard Potential	
	# of Miles	% of Miles	# of Miles	% of Miles
Express Lanes Total	0.01	0.01	15.03	11.57
MTC Express Lanes—Current	0.00	0.00	13.68	16.57
MTC Express Lanes—Upcoming	0.00	0.00	1.35	8.26
MTC Express Lanes—Future	0.01	0.03	0.00	0.00

Table 4-10: Overall Summary of Transit Agencies Vulnerability to Dam Failure

	Dam Failure
Summary	According to the DSOD, there are 88 mapped High and Extremely High Hazard Potential dams in the Bay Area that—should a hypothetical failure occur—will cause loss of human life and/or result in an inundation area for areas with a population of 1,000 or more. In these mapped High and Extremely High Hazard Potential dam breach inundation areas, there are 370.22 miles of square miles (5.25%) in the Bay Area. Santa Clara and Alameda counties have the greatest percentage of square miles (22.32% combined) of Extremely High dam breach inundation areas. In terms of fixed critical facilities, there are only three fixed critical facilities (5.00%) in High and Extremely High Hazard Potential dam breach inundation areas. Marin Transit has one fixed critical facility in the High Hazard Potential dam breach inundation area, while NVTA has two fixed critical facilities in the Extremely High Hazard Potential dam breach inundation area. These agencies may experience flooding and/or damage to their facilities should a dam failure occur. MTC, AC Transit, CCCTA, Santa Rosa CityBus, SolTrans, WestCAT, and WETA do not have any fixed critical facilities in this hazard area. However, a hypothetical failure of a High or Extremely High dam or its critical appurtenant, may disrupt or limit services in nearby areas that are under evacuation and/or damaged. While there are almost no MTC Express Lanes in the High Hazard Potential dam breach inundation area, there are over 15 miles (11.57%) of MTC Express Lanes in the Extremely High Hazard Potential dam breach inundation area.

4.3 DROUGHT

Table 4-11: Drought Profile

Profile	Description
Nature	Drought is a normal, recurrent feature of virtually all climatic zones, including areas of both high and low rainfall, although characteristics will vary significantly from one region to another; it differs from normal aridity, which is a permanent feature of the climate in areas of low rainfall. Drought is the result of a natural decline in the expected precipitation over an extended period of time, typically one or more seasons. Other climatic characteristics impact the severity of drought conditions, such as high temperature, high wind, and low relative humidity. Four common definitions for drought are provided as follows: • **Meteorological drought** is defined solely on the degree of dryness, expressed as a departure of actual precipitation from an expected average or normal amount based on monthly, seasonal, or annual time scales. • **Hydrological drought** is related to the effects of precipitation shortfalls on stream flows and reservoir, lake, and groundwater levels. • **Agricultural drought** is defined principally in terms of soil moisture deficiencies relative to water demands of plant life, usually crops. • **Socioeconomic drought** associates the supply and demand of economic goods or services with elements of meteorological, hydrologic, and agricultural drought. Socioeconomic drought occurs when the demand for water exceeds the supply as a result of weather-related supply shortfall. It may also be referred to as a water management drought. A drought's severity depends on numerous factors, including duration, intensity, and geographic extent, as well as regional water supply demands by humans and vegetation. Due to its multi-dimensional nature, drought is difficult to define in exact terms and poses difficulties in terms of comprehensive risk assessments. Drought differs from other natural hazards in three ways. First, the onset and end of a drought are difficult to determine due to the slow accumulation and lingering of effects of an event after its apparent end. Second, the lack of an exact and universally accepted definition adds to the confusion of its existence and severity. Third, in contrast with other natural hazards, the impact of drought is less obvious and may be spread over a larger geographic area. These characteristics have hindered the preparation of drought contingency or mitigation plans by many governments.
Location	The occurrence of drought is regional in nature and scope, which holds true for the Bay Area. Therefore, the occurrence of drought typically affects all nine counties.
History	Drought is a cyclic part of the climate of California, occurring in both summer and winter, with an average recurrence interval between 3 and 10 years. The most recent drought from 2012 to 2016 was the driest 4-year period on record in California since recordkeeping began in 1895. Droughts that have occurred in the Bay Area and California over the past 100 years are listed below: • 1917–1921, statewide except for central Sierra Nevada and north coast • 1922–1926, statewide except for central Sierra Nevada • 1928–1937, statewide • 1943–1951, statewide • 1959–1962, statewide • 1976–1977, statewide, except for southwestern deserts • 1987–1992, statewide • 2007–2009, statewide, particularly the central coast • 2012–2016, statewide
Extent / Severity	The National Drought Mitigation Center produces drought monitor maps for the United States. It classifies droughts into five categories: D0 is the least severe, with abnormally dry conditions; D4 is the most severe, with exceptional drought conditions. California, including the Bay Area, was

Table 4-11: Drought Profile

Profile	Description
	in some form of drought for 376 consecutive weeks from December 20, 2011 until March 14, 2019. As of December 31, 2020, the majority of the Bay Area is classified as being in a D2 drought (severe drought) intensity; Napa and Solano counties are also classified in a D3 (extreme drought) intensity.
Recurrence Probability	Researchers for California's Fourth Climate Change Assessment have noted that California has a "highly variable climate" with wet or dry periods that can span years and are "heavily affected by extreme precipitation events." Furthermore, climate scientists suggest the possibility of longer and more destructive droughts with climate change. Therefore, drought conditions are likely to occur in the Bay Area at least every decade.

Table 4-12: Drought Impact on Transit Agencies

Drought	
Summary	Drought impacts on MTC and its partner transit agencies will likely include: • Stress on right of way landscaping and vegetation. • Need to curtail transit agencies water-use activities (e.g., washing transit vehicles). • Increase in susceptibility in wildfires which will affect transit operations, particularly in evacuation areas.

Table 4-13: Overall Summary of Transit Agencies Vulnerability to Drought

Drought	
Summary	As noted in **Table 4-11**, drought is regional in nature and scope; therefore, drought will affect MTC and each of its partner transit agencies. Drought can be difficult to define in exact terms and poses difficulties in terms of comprehensive risk assessments. Droughts will likely leave MTC and all of its partner agencies vulnerable to water-use shortages (for vehicle cleaning and landscaping purposes). The combined effect of heat and drought could increase heat-related illnesses for drivers and riders too. Drought can create favorable wildfire conditions that could affect ridership and limit route services.

4.4 EARTHQUAKE

Table 4-14: Earthquake Profile

Profile	Description
Nature	An earthquake is a sudden motion or trembling caused by a release of strain accumulated in or along the edge of Earth's tectonic plates. The effects of an earthquake can be felt far beyond the site of its occurrence. Earthquakes usually occur without warning and can cause massive damage and extensive casualties in a few seconds. Common effects of earthquakes are ground motion and shaking, surface fault ruptures, and ground failure. Ground motion is the vibration or shaking of the ground during an earthquake. When a fault ruptures, seismic waves radiate, causing the ground to vibrate. The severity of the vibration increases with the amount of energy released and decreases with distance from the causative fault or epicenter. Soft soils can amplify ground motions. In addition to ground motion, several secondary natural hazards can occur from earthquakes, such as the following: • **Surface Faulting**: Surface faulting is the differential movement of two sides of a fault at the Earth's surface. Displacement along faults varies in terms of both length and width but can be significant (e.g., up to 20 feet), as can the length of the surface rupture (e.g., up to 200 miles). Surface faulting can cause severe damage to linear structures, including railways, highways, pipelines, tunnels, and dams. • **Liquefaction**: Liquefaction occurs when seismic waves pass through saturated granular soil distorting its granular structure and causing some of the empty spaces between granules to collapse. Liquefaction causes lateral spreads (i.e., horizontal movements of commonly 10 to 15 feet, but up to 100 feet), flow failures (i.e., massive flows of soil, typically hundreds of feet, but up to 12 miles), and loss of bearing strength (i.e., soil deformations causing structures to settle or tip). Liquefaction can cause severe damage to property. • **Landslides/Debris Flows**: Landslides/debris flows occur as a result of horizontal seismic inertia forces induced in the slopes by the ground shaking. The most common earthquake-induced landslides include shallow, disrupted landslides such as rock falls, rockslides, and soil slides. Debris flows are created when surface soil on steep slopes becomes completely saturated with water. Once the soil liquefies, it loses the ability to hold together and can flow downhill at very high speeds, taking vegetation and/or structures with it. Slide risks increase after an earthquake during a wet winter. The two most common measures of earthquake intensity used in the United States are the Modified Mercalli Intensity Scale, which measures felt intensity; and peak ground acceleration, which measures instrumental intensity by quantifying how hard the earth shakes in a given location. Magnitude (M) is measured by the amplitude of the earthquake waves recorded on a seismograph using a logarithmic scale.
Location	The Bay Area is transected by a series of significant subparallel faults between the Pacific and North American plates, which include the San Andreas, Calaveras, Concord-Green Valley, Greenville, Hayward, Rodgers Creek, and San Gregorio faults. The faults are shown in **Figure B-14**.

Table 4-14: Earthquake Profile

Profile	Description
History	According to the USGS, 52 earthquakes M 5.0 or greater have been recorded in the region since 1769 (**Figure B-14**). Three of these earthquakes have been greater or equal to an M 7.0 including: • M 7.0 earthquake occurred on October 21, 1868, on the Hayward Fault in the East Bay. The cities of Hayward, San Leandro, and Fremont were hardest hit; 30 people were killed and hundreds of buildings were damaged and destroyed. • M 7.4 earthquake occurred in June 1838 along the San Andreas Fault. It is believed to have affected 62 miles of the fault from the San Francisco Peninsula to the Santa Cruz Mountains. • M 7.8 earthquake occurred on April 18, 1906 along the San Andreas Fault. The epicenter was near San Francisco although shaking could be felt from as far north as Southern Oregon and as far south as Los Angeles. Approximately 3,000 people died as a result of the earthquake and subsequent fires.
Extent / Severity	The California Geological Survey (CGS) has developed a probabilistic seismic hazard maps for earthquake shaking potential for California. The maps show the relative intensity of ground shaking and damage in California from anticipated future earthquakes. The maps are probabilistic in that the analysis "takes into consideration the uncertainties in the size and location of earthquakes and the resulting ground motions that can affect a particular site." Regions near major, active faults are shown in red and pink and experience stronger earthquake shaking more frequently. Regions that are distant from known, active faults are shown in orange and yellow; these areas experience lower levels of shaking, less frequently. **Figure B-15** depicts a probabilistic seismic hazard map that shows a 10% probability of exceedance in 50 years (an annual probability of 1 in 475 of being exceeded each year). In the Bay Area, there are 4716.81 square miles (66.93%) with severe shaking potential, and 1422.21 square miles (20.18%) with violent shaking potential.
Recurrence Probability	In 2015, scientists developed a new earthquake forecast model for California. Known as the third Uniform California Earthquake Rupture Forecast, the model estimates the magnitude, location, and likelihood of earthquake fault rupture throughout the state. The model shows that the probability of having a nearby earthquake rupture with a 30-year likelihood of one of more events in the Bay Area include: • 100% for a M 5.0 • 98% for a M 6.0 • 72% for a M 6.7 • 51% for a M 7.0 • 20% for a M 7.5

Table 4-15: Earthquake Impact on Land Area

County	Probabilistic Earthquake Shaking Area—Severe		Probabilistic Earthquake Shaking Area—Violent	
	# of Sq. Miles	% of Sq. Miles	# of Sq. Miles	% of Sq. Miles
Nine Bay Area Counties Total	4716.81	66.93	1422.21	20.18
Alameda	465.70	62.58	201.80	27.12
Contra Costa	621.29	83.19	73.97	9.91
Marin	355.68	67.47	172.79	32.78
Napa	619.63	78.60	0.55	0.07
San Francisco	23.40	49.18	23.35	49.08
San Mateo	174.49	38.28	280.34	61.51
Santa Clara	691.25	53.23	343.03	26.42
Solano	562.16	66.17	1.44	0.17
Sonoma	1203.21	75.69	324.92	20.44

Table 4-16: Earthquake Impact on Transit Agencies Fixed Critical Facilities

Agency	Probabilistic Earthquake Shaking Area—Severe		Probabilistic Earthquake Shaking Area—Violent	
	# of Facilities	% of Facilities	# of Facilities	% of Facilities
Nine Transit Agencies Total	38	63.33	19	31.66
MTC	5	50.00	2	20.00
AC Transit	0	0.00	9	100.00
CCCTA	2	100.00	0	0.00
Marin Transit	10	66.66	3	20.00
NVTA	3	100.00	0	0.00
Santa Rosa CityBus	1	50.00	1	50.00
SolTrans	4	100.00	0	0.00
WestCAT	2	66.67	1	33.33
WETA	10	76.92	3	23.08
Other: Salesforce Transit Center	1	100.00	0	0.00

Table 4-17: Earthquake Impact on MTC Express Lanes

MTC Express Lane	Probabilistic Earthquake Shaking Area—Severe		Probabilistic Earthquake Shaking Area—Violent	
	# of Miles	% of Miles	# of Miles	% of Miles
Express Lanes Total	70.71	54.44	60.04	46.23
MTC Express Lanes—Current	23.40	28.34	60.04	72.71
MTC Express Lanes—Upcoming	16.37	100.00	0.00	0.00
MTC Express Lanes—Future	30.94	100.00	0.00	0.00

Table 4-18: Overall Summary of Transit Agencies Vulnerability to Earthquakes

Earthquake	
Summary	According to the CGS, nearly 90% of Bay Area will likely experience severe or violent shaking from anticipated future earthquakes. Counties that will experience mostly violent shaking include San Francisco (49.08% land area) and San Mateo (61.51% land area). For MTC and its partner transit agencies, 38 fixed critical facilities (63.33%) are in severe shaking hazard areas, while 19 fixed critical facilities (31.66%) are in violent shaking hazard areas, for a total of 57 fixed critical facilities (95%) at risk to severe or violent shaking. In addition, over 70 miles (54.44%) of MTC Express Lanes are located in severe shaking hazard areas while an additional 60.04 miles (46.23%) of MTC Express Lanes are located in violent shaking hazard areas. For transit agencies vulnerable to severe shaking (or Modified Mercalli Intensity 8), fixed critical facilities that are considered ordinary substantial buildings may have considerable damage including partial building collapse and furniture will be overturned. Fixed critical facilities in this hazard area include. • MTC: 5 fixed critical facilities • CCCTA: 2 fixed critical facilities • Marin Transit: 10 fixed critical facilities • NVTA: 3 fixed critical facilities • Santa Rosa CityBus: 1 fixed critical facility • SolTrans: 4 fixed critical facilities • WestCAT: 2 fixed critical facilities • WETA: 10 fixed critical facilities • Other: Salesforce Transit Center All of AC Transit's critical facilities are in the violent shaking hazard area. In addition, so are two MTC fixed critical facilities, three Marin Transit fixed critical facilities, one Santa Rosa CityBus fixed critical facility, one WestCAT fixed critical facility, and three WETA fixed critical facilities. For fixed critical facilities vulnerable to violent shaking (or Modified Mercalli Intensity 9), ordinary substantial buildings will likely have considerable damage, including partial building collapse, and buildings will likely separate from their foundations. Finally, the MTC and its partner transit agencies may experience delayed, limited, or suspended service after severe or violent earthquake shaking due to damage assessments and infrastructure damage.

4.5 FLOOD

Table 4-19: Flood Profile

Profile	Description
Nature	A flood occurs when the existing channel of a stream, river, canyon, or other watercourse cannot contain excess runoff from rainfall or snowmelt, resulting in overflow onto adjacent lands. In coastal areas, flooding may occur when high winds or tides result in a surge of seawater into areas that are above the normal high tide line. Secondary hazards from floods can include: • Erosion or scouring of stream banks, roadway embankments, foundations, footings for bridge piers, and other features. • Impact damage to structures, roads, bridges, culverts, and other features from high-velocity flow and from debris carried by floodwaters. Such debris may also accumulate on bridge piers and in culverts, increasing loads on these features or causing overtopping or backwater effects. • Destruction of crops, erosion of topsoil, and deposition of debris and sediment on croplands. • Release of sewage and hazardous or toxic materials when wastewater treatment plants are inundated, storage tanks are damaged, and pipelines are severed. In the Bay Area, floods usually occur during the season of highest precipitation or during heavy rainfalls after prolonged dry periods. The Bay Area is dry during late spring, summer, and early fall, receiving most of its rain during the winter months. The rainfall season extends from November through April, with approximately 95% of the annual rainfall occurring during this period.
Location	In the Bay Area, there are four main types of flooding known to occur: • Coastal flooding: Coastal flooding is caused by waves generated by severe winter storms. The occurrence of such a storm event in combination with high astronomical tides and strong winds can cause a significant wave runup and allow storm waves to reach higher than normal elevations along the coastline. As shown in **Figure B-16**, the areas with the worst coastal flooding in the Bay Area include Alameda, Marin, San Mateo, and Santa Clara counties. • Riverine flooding: Also known as overbank flooding, riverine flooding occurs in narrow, confined channels in the steep valleys of mountainous and hilly regions to wide as well as flat areas in plains and coastal regions. The amount of water in the floodplain is a function of the size and topography of the contributing watershed, the regional and local climate, and land use characteristics. Flooding in steep, mountainous areas is usually confined, strikes with less warning time, and has a short duration. Larger rivers typically have longer, more predictable flooding sequences and broad floodplains. In the Bay Area streams and rivers that empty into San Francisco Bay or its tributary bays include: Corte Madera Creek, Novato Creek, Petaluma River, Sonoma Creek, Napa River, Carneros Creek, Suisun Bay, Suisun Slough, Corderia Slough, Suisun Creek, Montezuma Slough, Pacheco Creek, Sacramento River, San Joaquin River, San Pablo Creek, Pinole Creek, San Leandro Creek, San Lorenzo Creek, Alameda Creek, Coyote Creek, Guadalupe River, Stevens Creek, San Francisquito Creek, Redwood Creek, and San Mateo Creek (**Figure B-16**). • Localized/urban flooding: Localized flooding may also occur outside of recognized drainage channels or delineated floodplains due to a combination of locally heavy precipitation, increased surface runoff, and inadequate facilities for drainage and storm water conveyance. Such events frequently occur in flat areas and in urbanized areas with large impermeable surfaces. • Sea level rise: **Section 4.1**.
History	The number of days associated with a flood event from January 1, 2000 to June 1, 2020 according to the National Oceanic and Atmospheric Administration Storm Events Database are as follows:

Table 4-19: Flood Profile

Profile	Description
	• Alameda County: 42 days • Contra Costa County: 8 days • Marin County: 42 days • Napa County: 20 days • San Francisco County: 37 days • San Mateo County: 24 days • Santa Clara County: 40 days • Solano County: 9 • Sonoma County: 49 Of these, the federal government declared seven major disaster declarations for floods for the Bay Area: • California Severe Winter Storms, Flooding, Landslides, and Mudslides (CR-4434-CA), February 24, 2019 to March 1, 2019 • California Severe Winter Storms, Flooding, Landslides, and Mudslides (DR-4431-CA), February 13, 2019 to February 15, 2019 • California Severe Winter Storms, Flooding, Landslides, and Mudslides (DR-4308-CA), February 1, 2017 to February 23, 2017 • California Severe Winter Storms, Flooding, Landslides, and Mudslides (DR-4305-CA), January 18, 2017 to January 23, 2017 • California Severe Winter Storms, Flooding, Landslides, and Mudslides (DR-4301-CA), January 3, 2017 to January 12, 2017 • California Storms, Flooding, Landslides, and Mudslides (DR-1646-CA), March 29, 2006 to April 16, 2006 • California Storms, Flooding, Landslides, and Mudslides (DR-1628-CA), December 17, 2005 to February 3, 2006
Extent / Severity	The magnitude of flooding that is used as the standard for floodplain management in the United States is a flood with a probability of occurrence of 1% in any given year. This flood is also known as the 100-year flood (i.e., base flood). The 100-year flood (1%), as well as the 500-year flood (0.2%), are considered Special Flood Hazard Areas (SFHAs) and identified on FEMA's Digit Flood Insurance Rate Maps (DFIRMs). DFIRMs have been developed for Alameda, Contra Costa, Marin, Napa, San Mateo, Santa Clara, Solano, and Sonoma counties. In San Francisco County, the 100-year flood is identified on the San Francisco Public Utilities Commission (SFPUC) 100-Year Storm Flood Risk Map. The DFIRMs for the Bay Area as well as the SFPUC map identify 834.78 square miles (11.84%) with a 1% annual chance of flooding. In addition, the DFIRMs identify an additional 193.81 square miles (2.75%) with a 0.2% annual chance of flooding.
Recurrence Probability	Floods can occur at any time but are most common with annual winter storms packed with subtropical moisture. Severe flooding is most likely to occur during strong El Niño events, which generally occur every 2 to 7 years.

Table 4-20: Flood Impact on Land Area

County	SFHA—0.2% Annual Chance Flood		SFHA—1% Annual Chance Flood	
	# of Sq. Miles	% of Sq. Miles	# of Sq. Miles	% of Sq. Miles
Nine Bay Area Counties Total	193.81	2.75	834.78	11.84
Alameda	22.53	3.03	63.16	8.49
Contra Costa	12.56	1.68	118.40	15.85
Marin	5.23	0.99	45.19	8.57
Napa	4.12	0.52	78.22	9.92
San Francisco	N/A	N/A	1.44	3.02
San Mateo	7.01	1.54	32.83	7.20
Santa Clara	116.67	8.98	88.74	6.83
Solano	16.02	1.89	308.88	36.36
Sonoma	9.66	0.61	97.93	6.16

Table 4-21: Flood Impact on Transit Agencies Fixed Critical Facilities

Agency	SFHA—0.2% Annual Chance Flood		SFHA—1% Annual Chance Flood	
	# of Facilities	% of Facilities	# of Facilities	% of Facilities
Nine Transit Agencies Total	10	16.67	6	10.00
MTC	0	0.00	0	0.00
AC Transit	0	0.00	0	0.00
CCCTA	0	0.00	0	0.00
Marin Transit	6	40.00	5	38.46
NVTA	1	33.33	1	33.33
Santa Rosa CityBus	0	0.00	0	0.00
SolTrans	0	0.00	0	0.00
WestCAT	0	0.00	0	0.00
WETA	3	23.08	0	0.00
Other: Salesforce Transit Center	0	0.00	0	0.00

Table 4-22: Flood Impact on MTC Express Lanes

Agency	SFHA—0.2% Annual Chance Flood		SFHA—1% Annual Chance Flood	
	# of Miles	% of Miles	# of Miles	% of Miles
Express Lanes Total	9.56	7.36	7.33	5.64
MTC Express Lanes – Current	7.97	9.65	6.04	7.31
MTC Express Lanes – Upcoming	0.13	0.78	0.63	3.85
MTC Express Lanes – Future	1.46	4.72	0.66	2.12

Table 4-23: Overall Summary of Transit Agencies Vulnerability to Floods

	Flood
Summary	Nearly 15% of the Bay Area (1,028.59 square miles) is in a SFHA. For MTC and its partner transit agencies, 10 fixed critical facilities (16.67%) are in the 500-year (0.2%) flood zone, and an additional six fixed critical facilities (10.00%) are in the 100-year (1%) flood zone. Within the 500-year flood zone, Marin Transit has five fixed critical facilities, while NVTA has one and WETA has the remaining three. Marin Transit has five of the six fixed critical facilities in the 100-year (1%) flood zone, while NVTA has one. MTC, AC Transit, CCCTA, Santa Rosa CityBus, SolTrans, and WestCAT do not have any fixed critical facilities in this hazard area. There are 16.89 miles (13.00%) of MTC Express Lanes are in the SFHA. For MTC and its partner transit agencies, flooding may cause route/commuter delays or disruption due to inundated roadways. Flooding may affect ridership as riders may not venture out in the rain/flooded areas and may not be able to use the limited route service.

4.6 INFECTIOUS DISEASE

Table 4-24: Infectious Disease

Profile	Description
Nature	A disease is a pathological condition of a part, organ, or system of a living organism resulting from various causes, such as infection or exposure to toxins, and characterized by an identifiable group of signs or symptoms. The major concern here is an epidemic, when a disease affects a disproportionally large number of individuals in a population, community, or region at the same time. Of great concern are infectious diseases caused by the entry and growth of microorganisms in humans. Infectious diseases are diseases caused by a pathogen that enters the body, triggering development of an infection. Such pathogens may include bacteria, viruses, fungi, prions, or protozoans. Infectious diseases can have a range of causes and are often contagious or communicable, meaning they can be passed from person-to-person. They can be transmitted through numerous modes, including direct contact (person-to-person, animal-to-person, or mother-to-unborn child), insect bites, food and water contamination, or airborne inhalation. Many infectious diseases can make the body vulnerable to secondary infections, which are caused by other organisms taking advantage of an already weakened immune system. According to the Global Health Council, over 9.5 million people die each year from infectious diseases. Although progress has been made to control or eradicate many infectious diseases, humans remain vulnerable to many new emerging organisms, such as the coronavirus disease 2019 (COVID-19), a new coronavirus discovered in 2019. In addition, previously recognized pathogens can evolve to become resistant to available antibiotics and other treatments. For example, malaria, tuberculosis, and bacterial pneumonias are appearing in new forms that are resistant to drug treatments. The spread of infectious diseases also increases with population growth and the ease of travel. The State of California has established a list of over 95 communicable (infectious) diseases, which—by law—must be reported by health providers to report to state or local public health officials. These diseases are those of public interest by reason of their communicability, severity, or frequency.
Location	The entire Bay Area is susceptible to infectious diseases. Segments of the population at highest risk for contracting an illness from a pathogen are the very young, the elderly, or individuals who currently experience respiratory or immune deficiencies. These segments of the population are present throughout the region. In addition, because of the communicable nature of these diseases, tourism centers or areas of high population density are considered more at risk. As a result, the population in and around San Francisco may have an increased potential for exposure and spread of infectious diseases.

Table 4-24: Infectious Disease

Profile	Description
History	Notable historical outbreaks, epidemics, and pandemics in the Bay Area include: • 1873: The Cholera Epidemic of 1873 in the United States. The Surgeon General's Office believed that cholera first landed in San Francisco as early as September 1850 with the arrival of the *S.S. Carolina.* It was exacerbated due to poor sanitation conditions in the city and quickly spread to San Jose, Carson Valley, and Sacramento. • 1888: The California Department of Public Health reported that the entire Bay Area was dealing with cases of smallpox, scarlet fever, typhoid, consumption, diphtheria, and cholera. • 1900-1904: Outbreak of the bubonic plague in San Francisco was the first plague epidemic in the continental United States. It was centered in San Francisco's Chinatown and resulted in 119 deaths. A second plague hit San Francisco in 1907 and spread to Oakland, resulting in an additional 78 deaths. • 1918-1919: The Flu Pandemic of 1918 infected and killed 45,000 and 3,000 San Franciscans, respectively. • 1948: The nation—including the Bay Area—experienced its largest epidemic of poliomyelitis, with 288 cases of local origin and 27,658 cases reported throughout the country. Previous outbreaks had occurred in the Bay Area in 1934, 1943, and 1945. • 2010: California declared pertussis (commonly referred to as whooping cough) as an epidemic in 2010. The State recorded more than 9,000 cases, including 809 hospitalizations and 10 deaths. • 2015: Although measles were declared eliminated by the United States in 2000, California experienced a measles outbreak in 2015 as the result an exposure at Disneyland. This led to the infection of 131 California residents. • 2019-present: COVID-19, caused by severe acute respiratory syndrome coronavirus-2 (SARS-CoV-2), was first confirmed in the Bay Area in Santa Clara County on January 31, 2020. As of February 21, 2021, there have been nearly 406,991 confirmed cases and 5,362 deaths related to COVID-19 in the Bay Area.
Extent / Severity	Each infectious disease has a different pathogenicity, which can affect the probability of occurrence and the extent of occurrence. In addition, infectious diseases are affected by factors, such as environmental changes, human behavior and demographics, and technological advancement. According to the Mayo Clinic, most infectious diseases only have minor complications, but some can be life-threatening. People who have weakened immune systems are particularly vulnerable to infectious diseases. Infectious diseases can seriously affect those who are immunocompromised. Others who may be disproportionately affected by infectious diseases include the young and the elderly; people being cared for in institutional settings (such as hospitals and nursing homes); and people with inadequate access to healthcare, such as the homeless and others of low socioeconomic status. In addition, pregnant women and people who care for small children are generally at higher risk for acquiring infectious diseases.
Recurrence Probability	The probability and magnitude of an infectious disease occurrence is difficult to evaluate due to the wide variation in disease characteristics, such as rate of spread, morbidity and mortality, detection and response time, and the availability of vaccines and other forms of prevention. A review of the historical record indicates that disease-related disasters do occur in humans with some regularity and varying degrees of severity; however, there is growing concern about emerging infectious diseases. Infectious diseases pose a significant risk to the Bay Area; however, the probability of a major infectious disease outbreak with the potential of reaching the scale of an epidemic is not nearly as common. Based on recent history, an infectious disease outbreak occurs in the Bay Area about every 5 to 10 years, while a pandemic occurs every 100 years plus.

Table 4-25: Infectious Disease Impact on Transit Agencies

Infectious Disease	
Summary	Infectious disease impacts on MTC and its partner transit agencies will likely include: • Decrease in ridership/revenue due to individual behavior changes, such as fear-induced aversion to workplaces and public gathering places, and loss of jobs. • Increase in expenses associated with infection control and disinfection measures. • Employee refusal to work during an outbreak, which could in turn impacts transit service routes, maintenance and repair, local critical infrastructure, and supporting vendors. • Loss of revenue which could lead to layoffs and cuts in current service levels which in turn could impact essential workers and other-transit dependent riders.

Table 4-26: Overall Summary of Transit Agencies Vulnerability to Infectious Diseases

Infectious Disease	
Summary	Infectious diseases can be difficult to evaluate due to the wide variation in disease characteristics and therefore pose difficulties in terms of comprehensive risk assessments. According to the National Cooperative Highway Research Program Report 769, transit agencies, including the MTC and its partner transit agencies, are most vulnerable to infectious diseases from a lack of preparedness, across-the-board workforce shortages, and/or response to public information and/or public health strategies, including shelter-in-place orders, to limit disease. As a result, the MTC and its partner agencies are vulnerable to keeping transit workers employed and bringing back service both during and after an infectious disease epidemic or pandemic. According to the San Francisco Chronicle, transit use in the Bay Area has dropped by over 70% since the COVID-19 pandemic emerged in the Bay Area in early 2020. Transit agencies that have suffered the most are those that have serviced commuter routes to downtown San Francisco. It remains unclear when ridership will be back to pre-pandemic levels. As noted in the article (January 11, 2021), the COVD-19 pandemic has change how and where Bay Area residents “live, work and travel” and the region’s “commitment to urbanism and to a public 'transit first' policy,” remains unknown.

4.7 LANDSLIDE

Table 4-27: Landslide Profile

Profile	Description
Nature	Landslide is a general term for the dislodging and fall of a mass of soil or rocks along a sloped surface, or for the dislodged mass itself. The term is used for varying phenomena, including mudflows, mudslides, debris flows, rock falls, rockslides, debris avalanches, debris slides, and slump-earth flows. Landslides may result from a wide range of combinations of natural rock, soil, or artificial fill. The susceptibility of hillside and mountainous areas to landslides depends on variations in geology, topography, vegetation, and weather. Landslides may also occur because of indiscriminate development of sloping ground or the creation of cut-and-fill slopes in areas of unstable or inadequately stable geologic conditions. In California, landslides range from small shallow landslides that may mobilize into rapidly moving deadly debris flows, to larger, deep-seated landslides that are capable of moving entire houses and infrastructure downslope. Coastal cliff collapses and cliff erosion also concerns along the coast of northern California, and more recently, debris flows from burned areas are a particular concern following wildfires.
Location	In 2011, CGS created a deep-seated landslide grip map to show the relative likelihood of deep-seated landslides in California. The map combines landslide inventory, geology, rock strength, slope, average annual rainfall, and earthquake shaking potential layers to create classes of landslide susceptibility (**Figure B-17**). According to CGS, "these classes express the generalization that on very low slopes, landslide susceptibility is low even in weak materials, and that landslide susceptibility increases with slope and in weaker rocks. Very high landslide susceptibility, classes VIII, IX, and X, includes very steep slopes in hard rocks and moderate to very steep slopes in weak rocks." Therefore, the hilly or mountainous areas of Marin and Sonoma counties as well as the East Bay Hills and Santa Cruz Mountains are more in danger than other places to a landslide. In 2018, MTC created a map (**Figure B-18**) that shows where landslides have previously occurred. The generalized location of landslides was determined using 1997 USGS landslide inventory maps and drawing "envelopes" around areas containing mapped landslides. Areas identified as "most" existing landslides cover areas with the largest and most concentrated landslides; "few" existing landslides indicates smaller, more scattered landslides; and "flat land" are areas that have not had landslide events. **Figure B-18** shows the "most" existing mapped landslides have occurred in Alameda, Marin, San Mateo, Santa Clara, and Sonoma counties.
History	As noted in **Table 4-19**, there have been seven major disaster declarations for mudslides and landslides associated with winter storms in the Bay Area over the last 20 years. In fact, mudslides and landslides associated with severe storms have been among the most common disasters in the Bay Area during the period from 1950 to 2009 and have caused hundreds of millions of dollars in property loss, tens of deaths, and hundreds of injuries. In 2006, a fatal landslide occurred in Mill Valley when a "fast-moving wall of mud" buried a 76-year-old man behind his home. In February 2019, a destructive landslide occurred in the neighboring town of Sausalito. The slide trapped one woman and damaged two homes and five cars.

Table 4-27: Landslide Profile

Profile	Description
Extent / Severity	Shallow landslides are generally those less than 10 to 15 feet deep. When shallow landslides are sufficiently wet, they may move rapidly and can be highly mobile over long distances. Deep-seated landslides are hundreds to thousands of feet long or wide and only move fractions of an inch per year; however, during heavy rainfall events, a landslide can move several yards a minute or faster. In these areas, rocks have been weakened through faulting and fracturing, uplift, and saturated soils due to heavy or prolonged rainfall. In addition, these slippages can be exacerbated by the temperature fluctuation, known as the freeze-thaw cycle. **Figure B-17** shows the extent of deep-seated landslide susceptibility areas in Bay Area; there are 1907.96 square miles (27.97%) of land in Classes IX and X, according to this figure. **Figure B-18** shows that 2828.43 square miles (40.13%) of the Bay Area have experienced "few" existing landslides while another 1868.14 square miles (26.51%) have experienced "most" existing landslides.
Recurrence Probability	Shallow landslides can occur at any time during the winter but are more likely happen when the ground is nearly saturated, which typically occurs after the first few storms in November and December. However, deep-seated landslides generally need deep infiltration of rainfall (which can take weeks or months to occur) to be triggered and therefore generally occur toward the end of the winter season in March or April. Every landslide event reported in the Bay Area has followed a winter storm/rain event; therefore, it is assumed that probability of a future landslide event will be highly tied to winter storm/rain events. Based on historical occurrences, severe winter storm conditions are likely to occur in Bay Area generally occur every 2 to 7 years.

Table 4-28: Deep-Seated Landslide Impact on Land Area

County	Deep-Seated Landslide Class IX and X Area	
	# of Sq. Miles	% of Sq. Miles
Nine Bay Area Counties Total	1970.96	27.97
Alameda	144.86	19.47
Contra Costa	124.38	16.65
Marin	239.28	45.39
Napa	206.22	26.16
San Francisco	4.06	8.54
San Mateo	102.58	22.51
Santa Clara	403.37	31.06
Solano	28.60	3.37
Sonoma	717.60	45.14

Table 4-29: (Deep-Seated) Landslide Impact on Transit Agencies Fixed Critical Facilities

Agency	Deep-Seated Landslide Class IX and X Area	
	# of Facilities	% of Fixed Facilities
Nine Transit Agencies Total	0	0.00
MTC	0	0.00
AC Transit	0	0.00
CCCTA	0	0.00
Marin Transit	0	0.00
NVTA	0	0.00
Santa Rosa CityBus	0	0.00
SolTrans	0	0.00
WestCAT	0	0.00
WETA	0	0.00
Other: Salesforce Transit Center	0	0.00

Table 4-30: (Deep-Seated) Landslide Impact on MTC Express Lanes

MTC Express Lane	Deep-Seated Landslide Class IX and X Area	
	# of Miles	% of Miles
Express Lanes Total	2.51	1.93
MTC Express Lanes—Current	1.21	1.46
MTC Express Lanes—Upcoming	0.65	3.95
MTC Express Lanes—Future	0.65	2.09

Table 4-31: (Existing) Landslide Impact on Land Area

County	Existing Landslide Area—Few		Existing Landslide Area—Most	
	# of Sq. Miles	% of Sq. Miles	# of Sq. Miles	% of Sq. Miles
Nine Bay Area Counties Total	2828.43	40.13	1868.14	26.51
Alameda	269.48	36.21	199.17	26.77
Contra Costa	263.73	35.31	156.42	20.94
Marin	240.85	45.69	186.62	35.40
Napa	465.24	59.02	139.69	17.72
San Francisco	7.41	15.58	0.45	0.95
San Mateo	221.33	48.56	103.40	22.69
Santa Clara	529.36	40.76	383.40	29.52
Solano	224.06	26.37	38.99	4.59
Sonoma	606.97	38.18	659.99	41.52

Table 4-32: (Existing) Landslide Impact on Transit Agencies Fixed Critical Facilities

Agency	Existing Landslide Area—Few		Existing Landslide Area—Most	
	# of Facilities	% of Facilities	# of Facilities	% of Facilities
Nine Transit Agencies Total	8	13.33	2	3.33
MTC	2	20.00	0	0.00
AC Transit	1	11.11	2	22.22
CCCTA	0	0.00	0	0.00
Marin Transit	1	6.66	0	0.00
NVTA	0	0.00	0	0.00
Santa Rosa CityBus	0	0.00	0	0.00
SolTrans	1	25.00	0	0.00
WestCAT	3	100.00	0	0.00
WETA	0	0.00	0	0.00
Other: Salesforce Transit Center	0	0.00	0	0.00

Table 4-33: (Existing) Landslide Impact on MTC Express Lanes

Agency	Existing Landslide Area—Few		Existing Landslide Area—Most	
	# of Miles	% of Miles	# of Miles	% of Miles
Express Lanes Total	11.45	8.82	2.48	1.25
MTC Express Lanes—Current	5.02	6.08	1.94	2.35
MTC Express Lanes—Upcoming	2.95	18.02	0.00	0.00
MTC Express Lanes—Future	3.48	11.25	0.00	0.00

Table 4-34: Overall Summary of Transit Agencies Vulnerability to Landslides

Landslide	
Summary	The Bay Area is vulnerable to both shallow and deep-seated landslides. Both types of landslides are the result of ground saturation associated with winter storms. • In the nine counties, there are 1907.96 square miles (27.97%) mapped as high (class IX & X) deep-seated landslide susceptibility. The majority of these landslide-prone areas include over 30% of the mountainous or hilly areas of Marin County, Sonoma, and Santa Clara counties. Fortunately, MTC and its partner transit agencies do not have any fixed critical facilities in this hazard area. • Landslides can occur along existing old landslides, which are shown in **Figure B-18**. There are eight fixed critical facilities (13.33%) that are in “few” existing landslide hazard areas. Fixed critical facilities in this hazard area include: MTC (2), AC Transit (1), Marin Transit (1), SolTrans (1), and WestCAT (3). In addition, AC Transit has two fixed critical facilities in the "most” existing landslide hazard area. CCCTA, NVTA, Santa Rosa CityBus, and WETA do not have any fixed critical facilities in this hazard area. • There are 2.51 miles (1.93%) of MTC Express Lanes in high deep-seated landslide susceptibility areas, 11.45 miles (8.82%) in “few” existing landslide hazard areas, and 2.48 miles (1.25%) in “most” existing landslide hazard areas. • All of the transit agencies included in this plan may be vulnerable to landslides blocking or damaging roadways, thereby likely disrupting route service.

4.8 PUBLIC SAFETY POWER SHUTOFF

Table 4-35: Public Safety Power Shutoff Profile

Profile	Description
Nature	The risk of wildfire increases when several factors combine including high temperatures, high sustained and peak winds, as well as critically low humidity. During these conditions, electrical transmission and distribution lines may ignite fires if they are downed by winds and/or trees. To reduce the chance of accidental fire ignition in certain areas, Pacific Gas & Electric (PG&E) may de-energize electrical grids or blocks off an area(s) in advance of or during periods of heightened risk conditions. Heightened risk conditions include: • Red Flag Warning declared by the National Weather Service • Low humidity levels, generally 20% and below • Forecasted sustained winds above approximately 25 miles per hour (mph) and wind gusts in excess of approximately 45 mph • Site-specific conditions such as temperature, terrain, and local climate • Condition of dry fuel on the ground and live vegetation (moisture content) • On-the-ground, real-time wildfire relation information from PG&E Wildfire Safety Operations Center and field observations from PG&E field crews Per the California Public Utilities Commission (CPUC), utilities will only de-energize if the utility "reasonably believes that there is an 'imminent and significant risk' to strong winds that may topple power lines or cause major vegetation-related damage to power lines, leading to increased risk of fire."
Location	In 2012, the CPUC developed a statewide map to identify areas associated with increased risk for "utility associated wildfires." The map, known as the CPUC Fire-Threat map, incorporates historical powerline wildfires and ranks fire-threat areas based on the risk that utility wildfires pose to people. **Figure B-19** shows the Tier 2 (Elevated) and Tier 3 (Extreme) CPUC Fire-Threat Areas in Bay Area. With the exception of San Francisco County, every Bay Area county has Tier 2 CPUC Fire-Threat Areas. Tier 3 CPUC Fire-Threat Areas can be found in every Bay Area county except San Francisco and Solano counties.
History	The Bay Area experienced widescale public safety power shutoffs in late October 2019 due to Red Flag Warnings. Almost a year later, in September through December 2020, parts of Napa and Sonoma counties experienced public safety power shut offs also due to increasing fire danger.
Extent / Severity	As shown in **Figure B-19**, 2788.10 square miles (39.56%) of the Bay Area is in Tier 2 (Elevated) CPUC Fire-Threat Areas, with an additional 1200.21 square miles (17.03%) in Tier 3 (Very High) CPUC Fire-Threat Areas.
Recurrence Probability	PG&E "anticipates that a public safety power shutoff could occur 1 to 2 times a year in PG&E's service area, although it is impossible to predict future weather conditions in the new normal of climate-driven extreme weather events."

Table 4-36: Public Safety Power Shutoff Impact on Land Area

County	CPUC—Fire Threat Area: Tier 2 Elevated		CPUC—Fire Threat Area: Tier 3 Extreme	
	# of Sq. Miles	% of Sq. Miles	# of Sq. Miles	% of Sq. Miles
Nine Bay Area Counties Total	2788.10	39.56	1200.21	17.03
Alameda	242.15	32.54	86.30	11.60
Contra Costa	202.13	27.07	133.40	17.86
Marin	254.65	48.31	109.54	20.78
Napa	399.28	50.65	187.69	23.81
San Francisco	0.00	0.00	0.00	0.00
San Mateo	205.60	45.11	79.04	17.34
Santa Clara	711.22	54.77	138.35	10.65
Solano	103.18	12.15	0.00	0.00
Sonoma	669.89	42.14	465.87	29.31

Table 4-37: Public Safety Power Shutoff Impact on Transit Agencies Fixed Critical Facilities

Agency	CPUC—Fire Threat Area: Tier 2 Elevated		CPUC—Fire Threat Area: Tier 3 Extreme	
	# of Facilities	% of Facilities	# of Facilities	% of Facilities
Nine Transit Agencies Total	1	1.67	0	0.00
MTC	0	0.00	0	0.00
AC Transit	0	0.00	0	0.00
CCCTA	0	0.00	0	0.00
Marin Transit	1	7.69	0	0.00
NVTA	0	0.00	0	0.00
Santa Rosa CityBus	0	0.00	0	0.00
SolTrans	0	0.00	0	0.00
WestCAT	0	0.00	0	0.00
WETA	0	0.00	0	0.00
Other: Salesforce Transit Center	0	0.00	0	0.00

Table 4-38: Public Safety Power Shutoff Impact on MTC Express Lanes

MTC Express Lane	CPUC—Fire Threat Area: Tier 2 Elevated		CPUC—Fire Threat Area: Tier 3 Extreme	
	# of Miles	% of Miles	# of Miles	% of Miles
Express Lanes Total	6.84	5.27	0.00	0.00
MTC Express Lanes—Current	0.00	0.00	0.00	0.00
MTC Express Lanes—Upcoming	0.00	0.00	0.00	0.00
MTC Express Lanes—Future	6.84	22.11	0.00	0.00

Table 4-39: Overall Summary of Transit Agencies Vulnerability to Public Safety Power Shutoffs

Public Safety Power Shutoffs	
Summary	Over half of the Bay Area is vulnerable to public safety power shutoffs, particularly during Red Flag Warnings. As shown in **Table 4-36**, 2,788.10 square miles (39.56%) and 1,200.21 square miles (17.03%) are in Tier 2 (Elevated) and Tier 3 (Extreme) CPUC Fire-Threat Areas, respectively. Marin, Napa, San Mateo, Santa Clara, and Sonoma counties all have over 40% of land area in Tier 2 (Elevated) CPUC Fire Threat-Areas. In addition, Marin, Napa, and Sonoma counties have over 20% of land area in Tier 3 (Extreme) CPUC Fire-Threat Areas. Despite the fact that public safety power shutoffs may affect such a large portion of the Bay Area, only 6.84 miles (5.27%) of the MTC Express Lanes are located in this hazard area. Only one (Marin Transit) of the 60 fixed critical facilities included in this plan is in a CPUC Fire-Threat Area. Therefore, MTC, AC Transit, CCCTA, NVTA, Santa Rosa CityBus, SolTrans, WestCAT, and WETA do not have any fixed critical facilities located in this hazard area. However, de-energization of electrical systems in affected areas will likely impact traffic control systems and communication systems to carry out daily operations as well as those to support evacuation throughout the region and therefore may affect all transit agencies included in this plan.

4.9 TSUNAMI

Table 4-40: Tsunami Profile

Profile	Description
Nature	A tsunami is a series of traveling ocean waves of extremely long length, generated by disturbances associated primarily with earthquakes occurring below or near the ocean floor. Subduction zone earthquakes at plate boundaries often cause tsunamis. However, tsunamis can also be generated by underwater landslides or volcanic eruptions, the collapse of volcanic edifices, and—in very rare instances—large meteorite impacts in the ocean. In the deep ocean, a tsunami may have a length from wave crest to wave crest of 100 miles or more, but a wave height of only a few feet or less. Therefore, the wave period can be up to several hours, and wavelengths can exceed several hundred miles. Tsunamis are unlike typical wind-generated swells on the ocean, which might have a period of about 10 seconds and a wavelength of up to 300 feet. Tsunamis cannot be felt aboard ships and they cannot be seen from the air or the open ocean. In deep water, the waves may reach speeds exceeding 700 mph. Tsunamis arrive as a series of successive crests (high water levels) and troughs (low water levels). These successive crests and troughs can occur anywhere from 5 to 90 minutes apart; however, they usually occur 10 to 45 minutes apart. Tsunamis not only affect beaches that are open to the ocean, but also bay mouths, tidal flats, and the shores of large coastal rivers. Tsunami waves can also diffract around land masses. Because tsunamis are asymmetrical, the waves may be much stronger in one direction than another, depending on the nature of the source and the surrounding geography. However, tsunamis propagate outward from their source, so coasts in the shadow of affected land masses are safer. In the Bay Area, tsunamis are most likely to be generated by very distant subduction faults (such as those in Washington, Alaska, Japan, and Russia) than local strike-slip faults (such as the San Andreas Fault).
Location	**Figure B-20** shows maximum tsunami inundation areas based on the modeling of realistic local and distant earthquakes and hypothetical extreme undersea, near-shore landslides. The model, developed by University of Southern California (USC) Tsunami Research Center, does not represent inundation from a single scenario event, but rather an "ensemble" of source events affecting a given region. As such, the inundation area shown will not likely be inundated completely during a single tsunami event. As shown in **Figure B-20**, all of the Pacific Coast as well the bay coastline is affected by tsunami inundation, with the exception of Suisun Bay.
History	Since 1854, more than 71 tsunamis have been recorded in San Francisco Bay. Most of these tsunamis were generated by earthquakes in distant subduction zones near Russia, Japan, or Alaska. The worst tsunami to hit the Bay Area produced waves of just under 4 feet in Marin County. That tsunami was generated in Alaska by a M 9.2 earthquake on March 27, 1964.
Extent / Severity	According to USC modeling, 80.41 square miles (1.14%) in the Bay Area are at-risk of tsunami run-up from a number of extreme, yet realistic, tsunami sources.
Recurrence Probability	According to USC engineers, the "likelihood of a large tsunami to strike California would be hard to predict…. small tsunamis will swell into California (which includes the Bay Area) every few years." Additionally, Cal OES and CGS are preparing a new type of tsunami hazard map, the probabilistic tsunami hazard analysis map, which will show potential tsunami events that have a 1000-year average return occurrence. The maps were expected to be completed in 2020.

Table 4-41: Tsunami Impact on Land Area

County	Maximum Tsunami Run-Up Area	
	# of Sq. Miles	% of Sq. Miles
Nine Bay Area Counties Total	80.41	1.14
Alameda	32.15	4.32
Contra Costa	3.43	0.46
Marin	13.56	2.57
Napa	3.77	0.48
San Francisco	2.97	6.23
San Mateo	13.18	2.89
Santa Clara	1.41	0.11
Solano	5.87	0.69
Sonoma	4.08	0.26

Table 4-42: Tsunami Impact on Transit Agencies Fixed Critical Facilities

County	Maximum Tsunami Run-Up Area	
	# of Facilities	% of Facilities
Nine Transit Agencies Total	10	16.67
MTC	1	10.00
AC Transit	0	0.00
CCCTA	0	0.00
Marin Transit	0	0.00
NVTA	0	0.00
Santa Rosa CityBus	0	0.00
SolTrans	0	0.00
WestCAT	0	0.00
WETA	9	69.23
Other: Salesforce Transit Center	0	0.00

Table 4-43: Tsunami Impact on MTC Express Lanes

MTC Express Lanes	Maximum Tsunami Run-Up Area	
	# of Miles	% of Miles
Express Lanes Total	0.00	0.00
MTC Express Lanes—Current	0.00	0.00
MTC Express Lanes—Upcoming	0.00	0.00
MTC Express Lanes—Future	0.00	0.00

Table 4-44: Overall Summary of Transit Agencies Vulnerability to Tsunamis

Tsunami	
Summary	According to USC modeling, only 80.41 square miles of the Bay Area (1.14%) is at risk of tsunami run-up. Coastal areas are more at-risk than those in the bay because the Golden Gate serves as a protective element. In the bay, only 10 of the 60 fixed critical facilities (16.67%) included in this plan are at risk of tsunami run-up. Nine of the 10 fixed critical facilities are owned/contracted/used by WETA for ferry service operations. The remaining fixed critical facility is the MTC's Bay Area Toll Authority. Fortunately, AC Transit, CCCTA, NVTA, Santa Rosa CityBus, SolTrans, and WestCAT do not have any fixed critical facilities in this hazard area. In addition, none of the MTC Express Lanes are in a tsunami run-up hazard area either. Tsunami run-up in the bay will likely cause some flooding and as a result, impact transit service.

4.10 WILDFIRE

Table 4-45: Wildfire Profile

Profile	Description
Nature	Wildfires spread by consuming flammable vegetation. This type of fire often begins unnoticed, spreads quickly, and is usually signaled by dense smoke that may be visible from miles away. Wildfires can be caused by human activities (e.g., unattended burns, campfires, or off-road vehicles without spark-arresting mufflers) or by natural events such as lightning. Wildfires often occur in forests or other highly vegetated areas. In addition, wildfires can be classified as forest, urban, interface or intermix fires, and prescribed burns. The following three factors contribute significantly to wildfire behavior and can be used to identify wildfire hazard areas: • Topography describes slope increases, which influences wildfire spread rate increases. South-facing slopes are also subject to more solar radiation, making them drier and thereby intensifying wildfire behavior. However, ridge tops may mark the end of wildfire spread because fire spreads more slowly (or may even be unable to spread) downhill. • Fuel is the type and condition of vegetation that plays a significant role in wildfire spread occurrence. Certain plant types are more susceptible to burning or will burn with greater intensity. Dense or overgrown vegetation increases the amount of combustible material available as fire fuel (referred to as the "fuel load"). The living-to-dead plant matter ratio is also important. Certain climate changes may increase wildfire risk significantly during prolonged drought periods, as both living and dead plant matter moisture content decreases. Both the horizontal and vertical fuel load continuity is also an important factor. • Weather is the most variable factor affecting wildfire behavior. Temperature, humidity, wind, and lightning can affect ignition opportunities and fire spread rate. Extreme weather, such as high temperatures and low humidity, can lead to extreme wildfire activity. Climate change increases fire to vegetation ignition susceptibility due to longer dry seasons. By contrast, cooling and higher humidity often signal reduced wildfire occurrence and easier containment. Wildfire frequency and severity sometimes result from other hazard impacts such as lightning, drought, and infestations (e.g., damage caused by spruce-bark beetles). If not promptly controlled, wildfires may grow into an emergency or disaster. Even small fires can threaten lives and resources and destroy improved properties. In addition to affecting people, wildfires may severely affect livestock and pets. Such events may require emergency water/food, evacuation, and shelter. Indirect wildfire effects can be catastrophic. In addition to stripping the land of vegetation and destroying forest resources, large, intense fires can harm the soil, waterways, and the land itself. Soil exposed to intense heat may lose its capability to absorb moisture and support life. Exposed soils erode quickly and exacerbate river and stream siltation; thereby increasing flood potential, harming aquatic life, and degrading water quality. Vegetation-stripped lands are more susceptible to increased debris flow hazards.
Location	The California Department of Forestry and Fire Protection's (Cal FIRE's) Fire Resource and Assessment Program provides vital data on California's forests and rangelands through a variety of mapping tools. The Fire Resource and Assessment Program Fire Hazard Severity Zone (FHSZ) maps fire hazards based on factors such as fuel, terrain and weather. The FHSZ areas are represented as Moderate, High, and Very High. The maps are divided into local responsibility areas (LRAs) and state responsibility areas (SRAs). LRAs generally include cities, cultivated agriculture lands, and portions of the desert. LRA fire protection is typically provided by city fire departments, fire protection districts, counties, and by Cal FIRE under contract to the local government. SRA is a legal term defining the area where the state has financial responsibility for wildfire protection.

Table 4-45: Wildfire Profile

Profile	Description
	Figure B-21 displays the areas most susceptible to wildfires. Counties that have over 40% of High FHSZ SRA include Alameda, Contra Costa, San Mateo, Santa Clara, and Sonoma Counties. Napa County is the only county with over 40% (49.15%) of land area in a Very High FHSZ SRA. The Wildland Urban Interface (WUI) maps show the zones of transition between wildland and human development. Known commonly as the WUI, communities in these areas are at a greater risk to wildfires. California has three types of WUI areas, including: • Interface areas, developed areas that have sparse or no wildland vegetation, but are in close proximity to a large patch of wildland • Intermix areas, where houses and wildland vegetation directly intermingle • Influence areas, wildfire-susceptible vegetation up to 1.5 miles from WUI or Wildland Urban Intermix zones As shown in **Figure B-22** no county in the Bay Area has a significant percentage of land area in the Interface or Intermix areas. However, Contra Costa, Marin, Napa, San Mateo, and Sonoma counties have over 40% of their land area in the Influence Zone.
History	According to Cal FIRE, the Bay Area experiences 300 wildfires a year on average. As shown in **Figure B-23**, some of the county's most destructive fires have occurred in the past 5 years, including: • The Jerusalem Fire started on August 9, 2015 in Lake County before eventually spreading to Napa County. Over 25,000 acres were burned as well as 6 residences and 21 outbuildings destroyed. The cause of the fire is listed as faulty residential wiring. • The Valley Fire started on September 12, 2015, in Lake County and also burned Napa and Sonoma counties. Over 76,000 acres were burned and 1,955 structures destroyed. The cause of the fire is listed as faulty outdoor electrical wiring. • The Tubbs Fire started on October 8, 2017, in Napa County. It burned 36,704 acres in Sonoma, Napa, and Lake counties. The fire destroyed 5,643 structures (with over half of these structures in the city of Santa Rosa) and killed 22 people. The cause of the fire is listed as faulty private electrical system. • The Pocket Fire started on October 9, 2017, in Sonoma County. It burned 17,362 acres and destroyed six structures by the time it was contained. The cause of the fire is listed as a downed conductor. • The Nuns Fire started on October 8, 2017 in Sonoma County. It started when strong winds knocked an alder tree into a powerline conductor. It merged with the Norrbom Fire, the Adobe Fire, the Pressley Fire, and the Oakmont Fire, and grew to over 54,000 acres in size. 1,527 structures were destroyed by the time it was contained. • The Atlas Fire also started on October 8, 2017 in Napa County. It burned 51,623 acres and resulted in 120 structured destroyed and six lives lost. The fire had multiple starts from tree branches falling onto powerline conductors. • The County Fire in Yolo and Napa counties was first reported on June 30, 2018. It burned 89,841 acres and destroyed 20 buildings. The cause of the fire was an improperly installed electric livestock fence unit. • The Kincade Fire started on October 23, 2019 in Sonoma County. It burned 77,772 acres and destroyed 374 buildings. The fire was caused by electrical transmission lines. During the drafting of this plan, between August 16 and 18, 2020, 650 wildfires ignited across Northern California due to rare, massive summer thunderstorms that produced dry lightning. The three largest fires as a result included: • The CZU Lightning Complex, which burned 86,509 acres and destroyed 1,490 structures in Santa Cruz and San Mateo counties. • LNU Lightning Complex, which burned 363,220 and destroyed 1,491 structures across Napa, Sonoma, Lake, Yolo, and Solano counties.

Table 4-45: Wildfire Profile

Profile	Description
	• SCU Lightning Complex, which burned 396,624 acres and destroyed 222 structures in Santa Clara, Contra Costa, Alameda, Stanislaus, and San Joaquin counties. In addition, on September 27, 2020, the Glass Fire started and burned 67,484 acres and destroyed 1,555 structures in Napa and Sonoma counties over a 23-day period. The cause of the fire is still under investigation.
Extent / Severity	As shown on the Cal FIRE FHSZ map, 32.34.59 square miles (45.90%) of the Bay Area are in the High FHSZ SRA, while an additional 1422.92 square miles (20.19) are in the Very High FHSZ SRA, and 148.54 square miles (2.11%) are in the Very High FHSZ LRA. As shown on the WUI map, 226.57 square miles (3.21%) of the Bay Area are in the Interface area, while an additional 278.36 square miles (3.95%) are in the Intermix area and 2,718.58 square miles (38.57%) are in the Influence area.
Recurrence Probability	Based on historical Cal FIRE records, the Bay Area has averaged approximately 300 wildfires annually over the past 5 years. However, according to a recent study by Stanford University; the University of California, Los Angeles; and the University of California, Merced: "wildfires in California are going to continue or get worse….it could be that [we are] going to see more seasons where we have multiple large wildfires across the state of California."

Table 4-46: Wildfire Impact on Land Area (State Responsibility Area)

County	Fire Hazard Severity Zones			
	State Responsibility Area—High		State Responsibility Area—Very High	
	# of Sq. Miles	% of Sq. Miles	# of Sq. Miles	% of Sq. Miles
Nine Bay Area Counties Total	3234.58	45.90	1422.98	20.19
Alameda	384.78	51.71	59.80	8.04
Contra Costa	328.11	43.93	64.02	8.57
Marin	91.58	17.37	19.22	3.65
Napa	193.07	24.49	387.47	49.15
San Francisco	0.00	0.00	0.00	0.00
San Mateo	231.28	50.74	97.96	21.49
Santa Clara	918.00	70.69	365.99	28.18
Solano	80.63	9.49	32.66	3.84
Sonoma	1007.14	63.36	395.85	24.90

Table 4-47: Wildfire Impact on Transit Agencies Fixed Critical Facilities (State Responsibility Area)

Agency	Fire Hazard Severity Zones			
	State Responsibility Area—High		State Responsibility Area—Very High	
	# of Facilities	% of Facilities	# of Facilities	% of Facilities
Nine Transit Agencies Total	1	1.67	0	0.00
MTC	0	0.00	0	0.00
AC Transit	0	0.00	0	0.00
CCCTA	0	0.00	0	0.00
Marin Transit	1	7.69	0	0.00
NVTA	0	0.00	0	0.00
Santa Rosa CityBus	0	0.00	0	0.00
SolTrans	0	0.00	0	0.00
WestCAT	0	0.00	0	0.00
WETA	0	0.00	0	0.00
Other: Salesforce Transit Center	0	0.00	0	0.00

Table 4-48: Wildfire Impact on MTC Express Lanes (State Responsibility Area)

MTC Express Lanes	Fire Hazard Severity Zones			
	State Responsibility Area—High		State Responsibility Area—Very High	
	# of Miles	% of Miles	# of Miles	% of Miles
Express Lanes Total	2.34	1.80	0.00	0.00
MTC Express Lanes—Current	0.00	0.00	0.00	0.00
MTC Express Lanes—Upcoming	0.00	0.00	0.00	0.00
MTC Express Lanes—Future	2.34	7.56	0.00	0.00

Table 4-49: Wildfire Impact on Land Area (Local Responsibility Area)

County	Fire Hazard Severity Zones	
	Local Responsibility Area—Very High # of Sq. Miles	Local Responsibility Area—Very High % of Sq. Miles
Nine Bay Area Counties Total	148.54	2.11
Alameda	37.32	5.02
Contra Costa	42.21	5.65
Marin	8.84	1.68
Napa	1.79	0.23
San Francisco	0.00	0.00
San Mateo	22.66	4.97
Santa Clara	31.29	2.41
Solano	0.00	0.00
Sonoma	4.41	0.28

Table 4-50: Wildfire Impact on Transit Agencies Fixed Critical Facilities (Local Responsibility Area)

Agency	Fire Hazard Severity Zones	
	Local Responsibility Area—Very High # of Facilities	Local Responsibility Area—Very High % of Facilities
Nine Transit Agencies Total	0	0.00
MTC	0	0.00
AC Transit	0	0.00
CCCTA	0	0.00
Marin Transit	0	0.00
NVTA	0	0.00
Santa Rosa CityBus	0	0.00
SolTrans	0	0.00
WestCAT	0	0.00
WETA	0	0.00
Other: Salesforce Transit Center	0	0.00

Table 4-51: Wildfire Impact on MTC Express Lanes (Local Responsibility Area)

MTC Express Lanes	Fire Hazard Severity Zones	
	Local Responsibility Area—Very High # of Sq. Miles	Local Responsibility Area—Very High % of Sq. Miles
Express Lanes Total	0.00	0.00
MTC Express Lanes—Current	0.00	0.00
MTC Express Lanes—Upcoming	0.00	0.00
MTC Express Lanes—Future	0.00	0.00

Table 4-52: Wildfire Urban Interface Impact on Land Area

County	Wildland Urban Interface					
	Wildland Urban Influence		Wildland Urban Intermix		Wildland Urban Interface	
	# of Sq. Miles	% of Sq. Miles	# of Sq. Miles	% of Sq. Miles	# of Sq. Miles	% of Sq. Miles
Nine Bay Area Counties Total	2,718.58	38.57	278.36	3.95	226.57	3.21
Alameda	256.03	34.41	27.73	2.00	42.05	5.65
Contra Costa	315.13	42.20	31.18	3.71	56.61	7.58
Marin	312.43	59.27	26.63	5.91	20.01	3.80
Napa	337.17	42.77	0.70	3.38	11.25	1.43
San Francisco	1.76	3.70	21.57	1.48	1.82	3.84
San Mateo	242.60	53.23	39.56	4.73	26.06	5.72
Santa Clara	350.59	27.00	15.16	3.05	30.85	2.38
Solano	173.41	20.41	100.96	1.78	15.73	1.85
Sonoma	729.47	45.89	14.87	6.35	22.19	1.40

Table 4-53: Wildfire Urban Interface Impact on Fixed Critical Facilities

Agency	Wildland Urban Interface					
	Wildland Urban Influence		Wildland Urban Intermix		Wildland Urban Interface	
	# of Facilities	% of Facilities	# of Facilities	% of Facilities	# of Facilities	% of Facilities
Nine Transit Agencies Total	1	1.67	0	0.00	3	5.00
MTC	1	10.00	0	0.00	0	0.00
AC Transit	0	0.00	0	0.00	0	0.00
CCCTA	0	0.00	0	0.00	0	0.00
Marin Transit	0	0.00	0	0.00	2	15.38
NVTA	0	0.00	0	0.00	0	0.00
Santa Rosa CityBus	0	0.00	0	0.00	0	0.00
SolTrans	0	0.00	0	0.00	0	0.00
WestCAT	0	0.00	0	0.00	0	0.00
WETA	0	0.00	0	0.00	1	7.69
Other: Salesforce Transit Center	0	0.00	0	0.00	0	0.00

Table 4-54: Wildfire Urban Interface Impact on MTC Express Lanes

MTC Express Lanes	Wildland Urban Interface					
	Wildland Urban Influence		Wildland Urban Intermix		Wildland Urban Interface	
	# of Miles	% of Miles	# of Miles	% of Miles	# of Miles	% of Miles
Express Lanes Total	1.68	1.29	4.77	3.68	13.92	10.72
MTC Express Lanes – Current	0.27	0.33	1.34	1.62	10.55	12.78
MTC Express Lanes – Upcoming	0.03	0.20	0.00	0.00	2.11	12.87
MTC Express Lanes – Future	1.38	4.45	3.43	11.10	1.26	4.08

Table 4-55: Overall Summary of Transit Agencies Vulnerability to Wildfires

Wildfires	
Summary	While over 65% of the Bay Area is in a FHSZ, only one fixed critical facility (Marin Transit) included in this plan is in this hazard area. Likewise, while over 45% of the Bay Area is in the WUI (including approximately 15% of MTC Express Lanes), only four fixed critical facilities (Marin Transit [2], MTC [1] and WETA [1]) included in this plan are in a WUI area. AC Transit, CCCTA, NVTA, Santa Rosa CityBus, SolTrans, and WestCAT do not have any critical facilities in the WUI area. The low number of fixed critical facilities in the FHSZ and WUI areas is due to the fact that the majority of them located in non-wildland, non-urban, and urban unzoned areas. However, as recent Bay Area wildfires have shown, living outside a higher-risk zone does not mean an area is without risk. In addition, the MTC and its partner transit agencies are vulnerable to wildfire-related highway and roadway closures as well as power outages associated that can leave traffic control systems, communication systems, ticket stations, etc. inoperable.

5.0 MITIGATION STRATEGY

This section addresses Element C of the Local Mitigation Plan Regulation Checklist.

Regulation Checklist – 44 CFR 201.6 Local Mitigation Plans
Element C: Mitigation Strategy
C1. Does the Plan document each jurisdiction's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (Requirement § 201.6(c)(3))
C2. Does the Plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (Requirement § 201.6(c)(3)(i))
C3. Does the Plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (Requirement §201.6(c)(3)(i))
C4. Does the Plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (Requirement §201.6(c)(3)(ii))
C5. Does the Plan contain an action plan that describes how the actions identified will be prioritized (including cost benefit review), implemented, and administered by each jurisdiction? (Requirement §201.6(c)(3)(iv)); (Requirement §201.6(c)(3)(iii))
C6. Does the Plan describe a process by which local governments will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (Requirement §201.6(c)(4)(ii))

5.1 AUTHORITIES, POLICIES, PROGRAMS, AND RESOURCES

MTC and its partner transit agencies' existing authorities, policies, programs, and resources available for hazard mitigation are listed in **Appendix C** through **Appendix K**. The appendices also identify each agency's ability to expand and improve on its hazard mitigation capabilities when possible.

5.2 NATIONAL FLOOD INSURANCE PROGRAM PARTICIPATION

The NFIP aims to reduce the impact of flooding to residential and non-residential buildings by providing insurance to property owners and encouraging communities to adopt and enforce floodplain management regulations. Participation in the NFIP is based on an agreement between local communities and the federal government. According to FEMA:

> A community, as defined for the NFIP's purposes, is any state, area, or political subdivision; any Indian tribe, authorized tribal organization, or Alaska native village; or authorized native organization that has the authority to adopt and enforce floodplain management ordinances for the area under its jurisdiction. In most cases, a community is an incorporated city, town, township, borough, or village, or an unincorporated area of a county or parish.

Therefore, MTC and its partner transit agencies do not participate in the NFIP. However, each of the nine counties in the Bay Area do.

5.3 MITIGATION GOALS

Mitigation goals are defined as general guidelines that explain what an agency wants to achieve in terms of hazard and loss prevention. Goal statements are typically long-range, policy-oriented statements

representing community-wide vision. The Plan Bay Area's resilience action objectives provided the basis for the three goals for the 2021 MJHMP. They include:

- Enhance climate protection and adaptation efforts
- Create healthy and safe transit agencies
- Protect transit agencies against hazards

5.4 RECOMMENDED MITIGATION ACTIONS

Mitigation actions help achieve the goals of the MJHMP. The recommended mitigation actions in **Table 5-1** include: education and awareness, structure and infrastructure projects, preparedness and response, and local plans and regulations. This list addresses every hazard profiled in this plan and is based on the plan's risk assessment as well as lessons learned from recent disasters. It was developed using FEMA success stories and best management practices, FEMA job aids, local and regional plans and reports, and input from planning committee members, stakeholder groups, and sustainability practitioners.

Table 5-1: Recommended Mitigation Actions

No.	Hazard Mitigated	Project Name	Project Description	Project Source
1	All hazards	After-Action Report	Require after-action reports with clear recommendations for improvement following hazard events.	Federal Highway Administration (FHWA)
2	All hazards	Stand-by Contracts	Establish standby contracts to be used for emergency response and recovery support, including on-call executive support.	FHWA
3	All hazards	Interagency Communication and Coordination	Improve interagency communication and coordination. Promote establishment of resource-sharing agreements and information sharing about plans, initiatives, risks, and resources. Ensure that transit agencies are integrated into emergency radio communication systems.	FHWA
4	All hazards	Emergency Response Plan Hazard-Specific Annexes	Develop hazard-specific annexes for any functional annex that does not by itself give enough information to perform the function adequately in the face of a particular high-priority hazard.	New Jersey Transit Corporation
5	All hazards	Owner/Operator Roles and Responsibilities	For transit agencies that have leased or contracted facilities and services, clarify owner/operator roles and responsibilities during emergencies.	FEMA
6	Climate change	Saltwater Corrosion Monitoring and Mitigation	Monitor for potential adverse corrosion effects of saltwater on steel reinforcement and other system components and mitigate as needed.	FEMA
7	Climate change	Cool Pavement Program	Install cool pavements (with higher solar reflectance) over asphalt at waiting areas to lower surface temperature.	C40 Cities

Table 5-1: Recommended Mitigation Actions

No.	Hazard Mitigated	Project Name	Project Description	Project Source
8	Climate change, drought and flood	Green Infrastructure Stormwater Management Best Practices	Transit agencies have significant opportunities to prevent localized flooding and capture water by reducing runoff from new and existing park and ride lots, administrative buildings, maintenance facilities, storage lots, and joint development projects through green infrastructure stormwater management best practices (e.g., rain gardens, green roofs, stormwater ponds, trees, native plants, pervious pavements, native vegetation buffers along waterways).	FHWA
9	Climate change and flood	Bus Rapid Transit Station Elevation	Elevate new and existing bus rapid transit stations.	C40 Cities
10	Climate change, dam failure, flood, and tsunami	Protective Maintenance and Storage Facilities	Provide portable or permanent protective maintenance and storage facilities to prevent flood damage.	New Jersey Transit Corporation
11	Climate change, dam failure, flood, and tsunami	Critical Utility System Elevation	Elevate new and existing critical utility systems, such as emergency power, electrical and steam power, communication and information technology/data, as well as medical and mechanical equipment, above the design flood elevation.	FHWA
12	Climate change, dam failure, flood, and tsunami	Passive Floodproofing Measures	Install passive floodproofing measures in existing facilities that cannot be elevated.	FEMA
13	Climate change, dam failure, flood, and tsunami	Water Pumps	Elevate water pumps or adding more pumps to the backup system to new and existing critical facilities.	FEMA
14	Climate change, dam failure, flood, and tsunami	Fuel Storage Tanks Strengthening	Strengthen new and existing fuel storage tanks and their anchorage for flood design-level hydrostatic submersion forces.	FEMA
15	Climate change, dam failure, flood, and tsunami	Fuel Pump Elevation	Elevate new and existing fuel pumps above the design flood elevation.	FEMA

Table 5-1: Recommended Mitigation Actions

No.	Hazard Mitigated	Project Name	Project Description	Project Source
16	Climate change, dam failure, flood, and tsunami	Oil Storage Drum Anchorage	Anchor existing oil storage drums to prevent flotation and release of contents or elevate them above anticipated flood levels.	FEMA
17	Climate change, dam failure, flood, landslide, public safety power shutoff, tsunami, and wildfire	Standard Operating Procedures for Alternative Locations	Develop standard operating procedures to be implemented to move vehicles and other portable assets out of harm's way to an alternative location when a hazard event is predicted or eminent. Pursue necessary memorandum of agreement to store additional vehicles/assets at alternative locations.	FHWA
18	Climate change, dam failure, flood, landslide, public safety power shutoff, tsunami, and wildfire	Fuel Storage Capacity / Contingency	Determine and secure enough fuel storage for generators to use. Develop contingency plans for obtaining generator fuel.	FEMA
19	Climate change, drought, and wildfire	Cooling and Smoke Relief Centers and Wildfire Evacuation Points and Shelter Locations Transportation Assessment	Work with local government entities to develop Action Plans that identify/describe public transportation access/routes, particularly for transit-dependent neighborhoods, to pre-identified cooling and smoke relief centers as well as wildfire evacuation points and shelters.	Center for Disease Control and Prevention
20	Climate change, earthquake, flood, public safety power shutoff, and wildfire	Standby Power Systems / Generators	Install appropriate standby power systems such as generators, solar PV systems in new and existing critical facilities that meet current and projected loads, site parameters, risk assessment, flexibility requirements, and operating concerns.	New Jersey Transit Corporation
21	Climate change, earthquake, flood, public safety power shutoff, and wildfire	Energy Storage for Electric Fleets	Develop and implement an energy storage / on-site generator emergency program for electric fleets.	C40 Cities

Table 5-1: Recommended Mitigation Actions

No.	Hazard Mitigated	Project Name	Project Description	Project Source
22	Earthquake	Seismic Retrofits	Seismic retrofit existing vulnerable critical facilities to better protect structural and non-structural components (suspended ceilings, non-load-bearing walls and utility systems) and building contents (furnishings, supplies, inventory, and equipment).	FEMA
23	Earthquake	Fuel-Oil-Based Generators	Replace existing generators that use natural gas with fuel-oil-based generators for emergency power, since natural gas supplies are often turned off after earthquakes to avoid gas leaks.	FEMA
24	Infectious disease	Crowding Information App	Create or use a transit app with real-time crowding information to help customers make more informed ride-making decisions.	Transit (app)
25	Landslide	Highway Corridor Landslide Hazard Mapping	For transit agencies in Alameda, Marin and Santa Clara counties, incorporate Highway Corridor Landslide Hazard Mapping into route and evacuation route planning in order to facilitate slide-aware maintenance practices along these highway corridors.	CGS
26	Wildfire	Ignition-Resistant Retrofits	Retrofit existing critical facilities through ignition-resistant construction using noncombustible materials, technologies, and assemblies on existing buildings and structures that are in conformance with local fire-related codes and standards.	FEMA
27	Wildfire	Defensible Space	Create defensible space around new and existing critical facilities by reducing or removing flammable vegetation around perimeter of given structure.	FEMA
28	Wildfire (can dam failure and tsunami)	Evacuation Preparedness	Work with local entities to develop evacuation need assessment and evacuations plan for transit dependent communities.	FHWA

5.5 PRIORITIZED ACTION PLAN

A prioritized action plan is an itemized list of recommended mitigation actions that a community/agency hopes to put into practice to reduce its risks and vulnerabilities.

For this MJHMP, the planning committee created a two-tier prioritization process based on the following:

- Tier 1 (high priority) mitigation actions are those that address hazards of immediate concern and are also cost-effective (positive cost-benefit ratio) and have an identified funding source.
- Tier 2 (medium priority) mitigation actions are those that address hazards that are not of immediate concern and/or those that are of immediate concern but are not cost-effective or do not have an identified funding source.

The MTC and partner transit agencies determined hazards/threats of immediate concern based on the 2021 MJHMP's hazard profiles, risk assessments and capability assessments. By agency, they include:

- MTC: climate change, earthquake, infectious disease, public safety power shutoff, and wildfire
- AC Transit: earthquake, infectious disease, landslide, public safety power shutoff, and wildfire
- CCCTA: earthquake, public safety power shutoff and wildfire
- Marin Transit: climate change (sea level rise), earthquake, flood, public safety power shutoff, and wildfire
- NVTA: earthquake, dam failure, flood, landslide, public safety power shutoff, and wildfire
- Santa Rosa CityBus: earthquake, infectious disease, public safety power shutoff, and wildfire
- SolTrans: earthquake, public safety power shutoff and wildfire
- WestCAT: earthquake, infectious disease, public safety power shutoff and wildfire
- WETA: climate change (sea level rise), earthquake, infectious disease and public safety power shutoff

The results of the above prioritization process are shown in **Appendix C** through **Appendix K**. For each mitigation action listed, potential funding sources, responsible departments/agencies, and implementation timelines have been identified.

5.6 PLAN INTEGRATION

Appendix C through **Appendix K** also identify how the 2021 MJHMP will be integrated into agency-specific relevant plans and programs.

6.0 PLAN REVIEW, EVALUATION, AND IMPLEMENTATION

This section addresses Element D of the Local Mitigation Plan Regulation Checklist.

Regulation Checklist – 44 CFR 201.6 Local Mitigation Plans
Element D: Plan Review, Evaluation and Implementation
D1. Was the plan revised to reflect changes in development? (Requirement § 201.6(d)(3))
D2. Was the plan revised to reflect progress in local mitigation efforts? (Requirement § 201.6(d)(3))
D3. Was the plan revised to reflect changes in priorities? Requirement §201.6(d)(3))

6.1 CHANGES IN DEVELOPMENT

This is the first MJHMP developed by MTC and its partner transit agencies; therefore, it does not include a discussion on changes in development. As noted previously, WETA created a standalone Local Hazard Mitigation Plan in 2016. Changes in development for WETA between 2016 and 2020 included:

- Expansion of the San Francisco Bay ferry fleet, including the addition of two ferries in 2017 and one ferry in 2018, 2019, and 2020.
- Opening of its second Operations and Maintenance Facility in Alameda in 2018.
- Completion of the new Richmond Ferry Terminal at Fort Point in 2019.
- Completion of the Downtown San Francisco Ferry Terminal expansion project in 2020.

The above changes to WETA's critical facilities list were included in the 2021 MJHMP.

6.2 PROGRESS IN LOCAL MITIGATION EFFORTS

Appendix K addresses progress made in local mitigation efforts for WETA. In addition, the 2016 WETA Local Hazard Mitigation Plan (in particular, the hazard profiles) was included in a document review for the WETA Emergency Response Plan update.

6.3 CHANGES IN PRIORITIES

Mitigation actions included in WETA's 2016 Local Hazard Mitigation Plan were prioritized using a point system (1 to 6 low priority, 7 to 12 medium priority, and 13 to 18 high priority) of 18 criteria. The 2021 MJHMP prioritization process includes three of the same criteria (cost-effectiveness, funding source, and immediate/high priority hazard/disaster) for a more streamlined multi-agency approach to prioritizing mitigation actions.

7.0 PLAN ADOPTION

This section addresses Element E of the Local Mitigation Plan Regulation Checklist.

Regulation Checklist – 44 CFR 201.6 Local Mitigation Plans
Element E: Plan Adoption
E1. Does the Plan include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval? (Requirement §201.6(c)(5)) E2. For multi-jurisdictional plans, has each jurisdiction requesting approval of the plan documented formal plan adoption? (Requirement §201.6(c)(5))

7.1 FORMAL ADOPTION

To be completed.

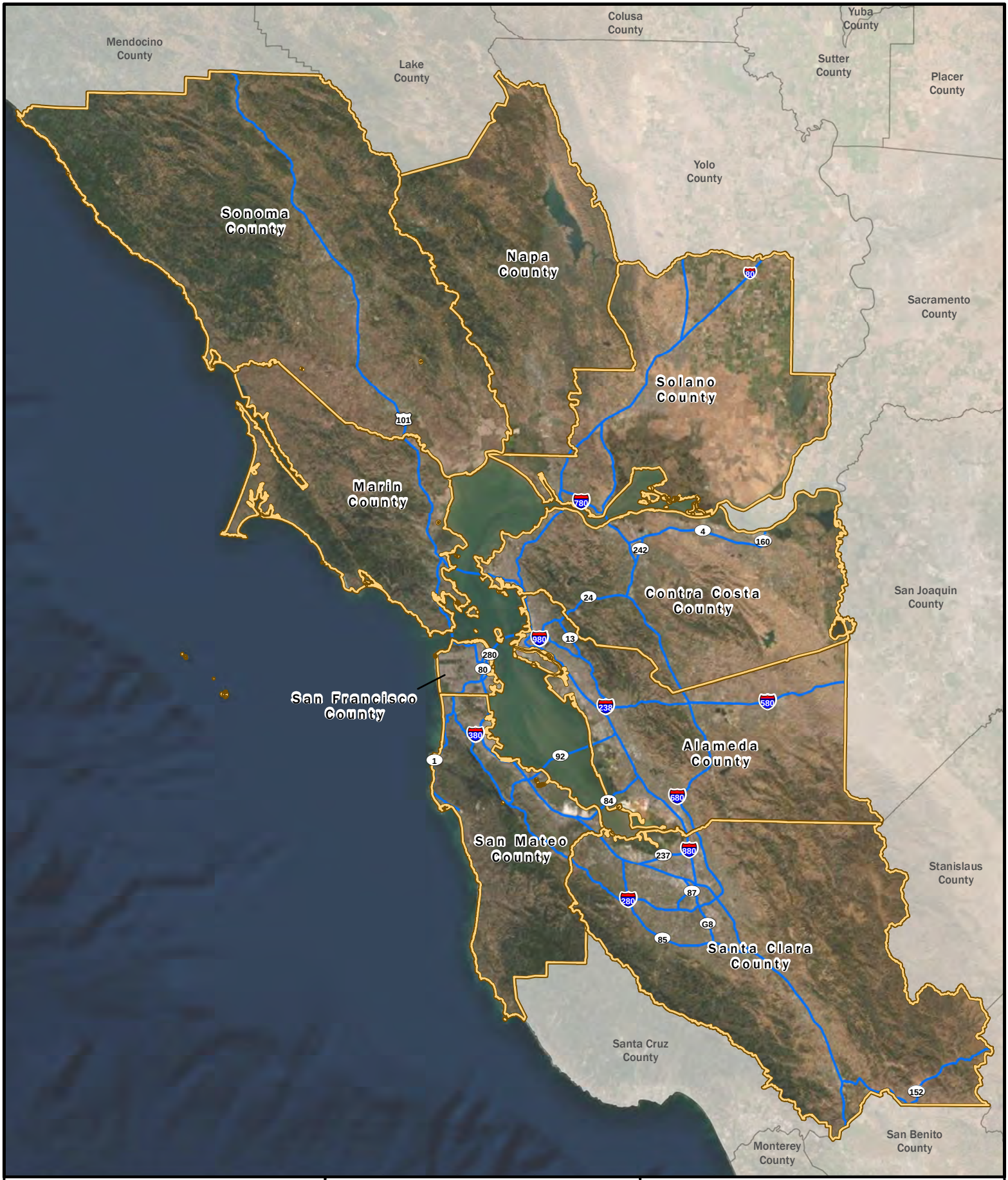
7.2 MULTI-JURISDICTIONAL ADOPTION

To be completed.

8.0 APPENDICES

APPENDIX A—PLANNING PROCESS

APPENDIX B—FIGURES



Legend

County Boundary

Source
Bay Area Counties (2020)
https://geodata.lib.berkeley.edu/

Scale: 1:1,000,000
1 in = 16 miles
Date: 1/27/2021
Projection: NAD 83 State Plane Zone III
0 2.5 5 10 15 20 25 30 Miles

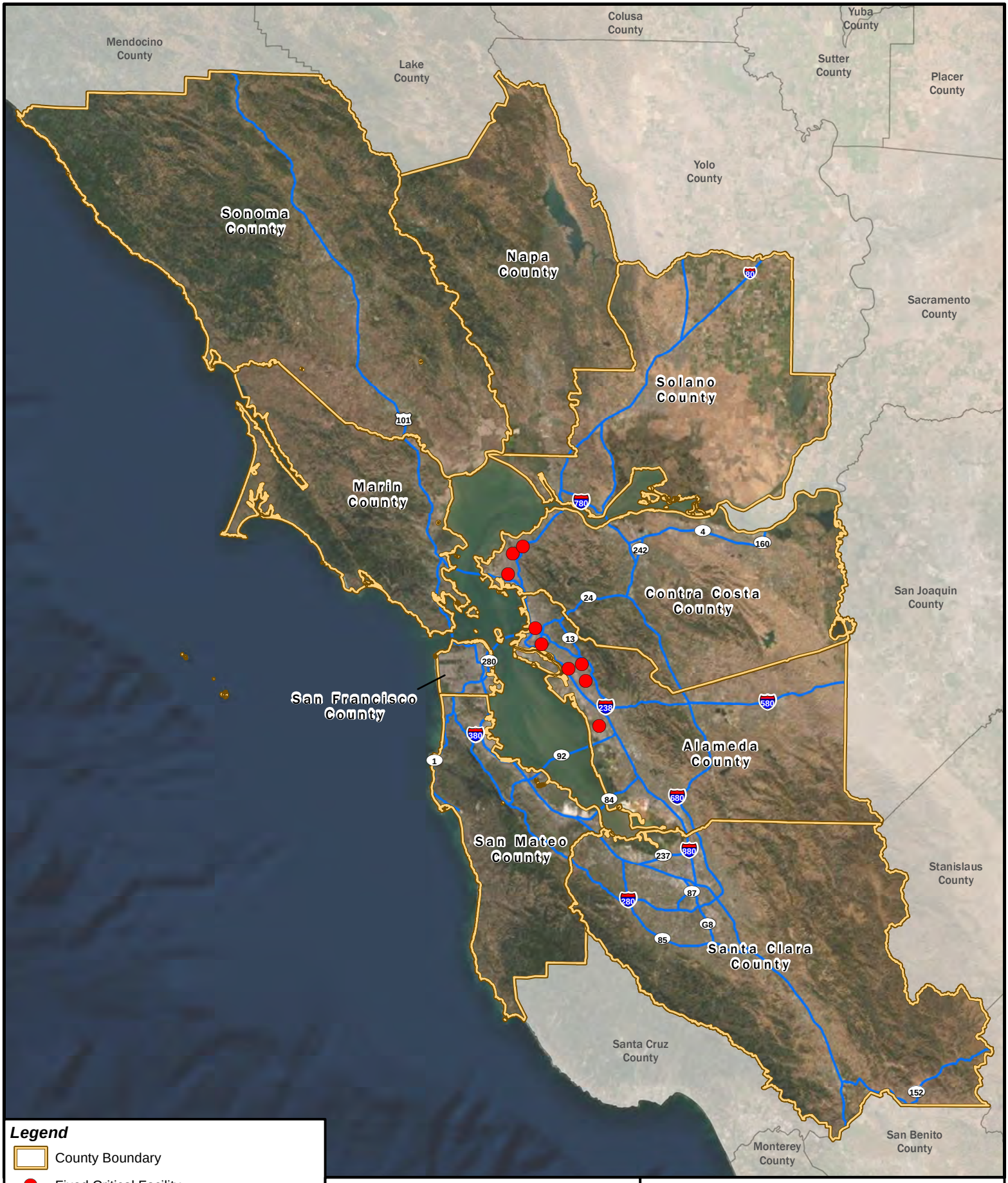
N W E S

Nine Bay Area Counties
Figure B-1

2021 MTC
Multi-Jurisdictional Hazard Mitigation Plan

MTC Fixed Critical Facilities and Express Lanes
Figure B-2

2021 MTC
Multi-Jurisdictional Hazard Mitigation Plan



Legend

County Boundary

Fixed Critical Facility

Source
Bay Area Counties (2020)
https://geodata.lib.berkeley.edu/
Metropolitan Transportation Commission (2020)

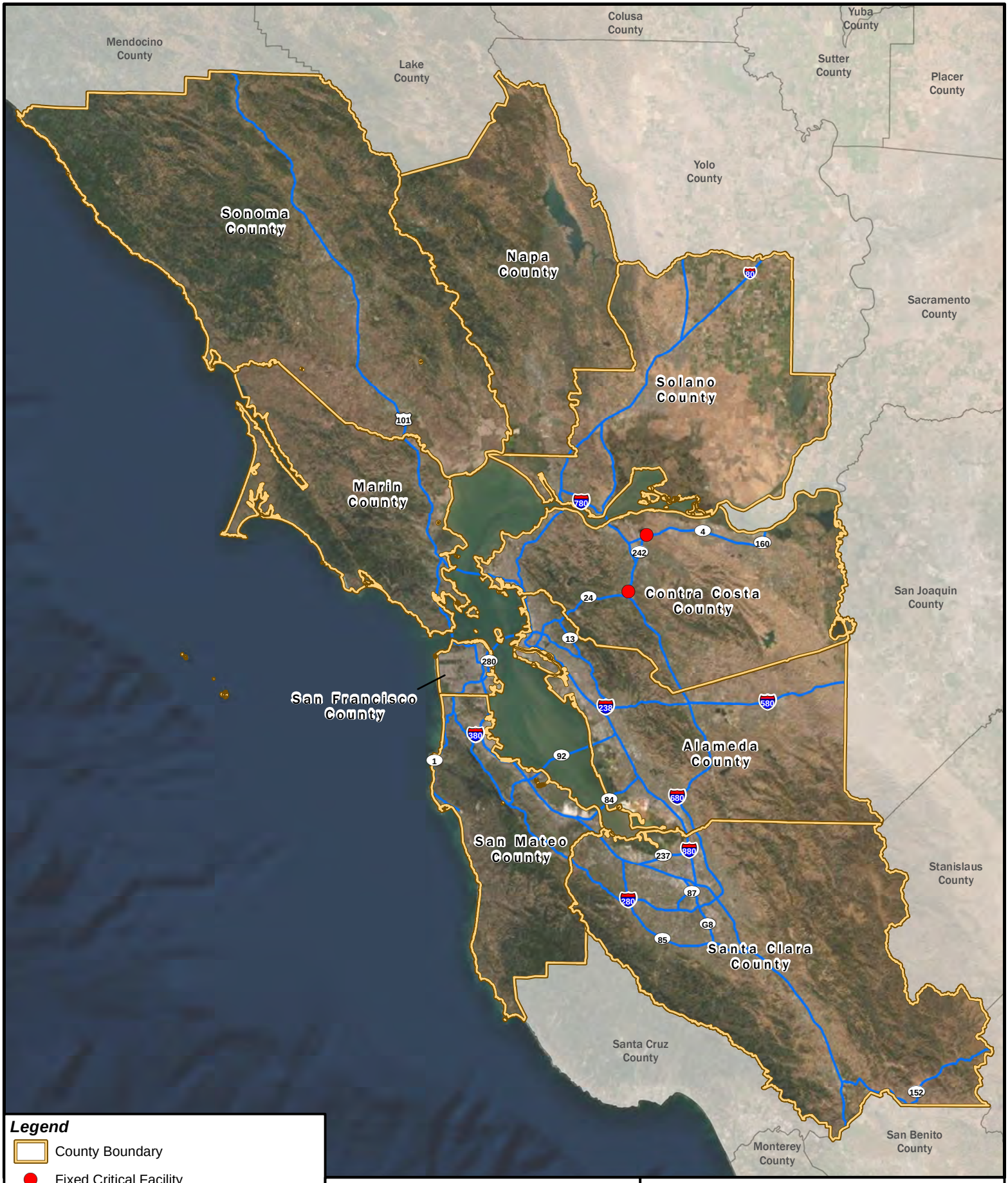
Note
Fixed critical facilities may be owned, leased, contracted, and/or used by an agency

Scale: 1:1,000,000
1 in = 16 miles
Date: 1/28/2021
Projection: NAD 83 State Plane Zone III
0 2.5 5 10 15 20 25 30 Miles

N
W E
S

AC Transit Fixed Critical Facilities
Figure B-3

2021 MTC
Multi-Jurisdictional Hazard Mitigation Plan



Legend

County Boundary

Fixed Critical Facility

Source
Bay Area Counties (2020)
https://geodata.lib.berkeley.edu/
Metropolitan Transportation Commission (2020)

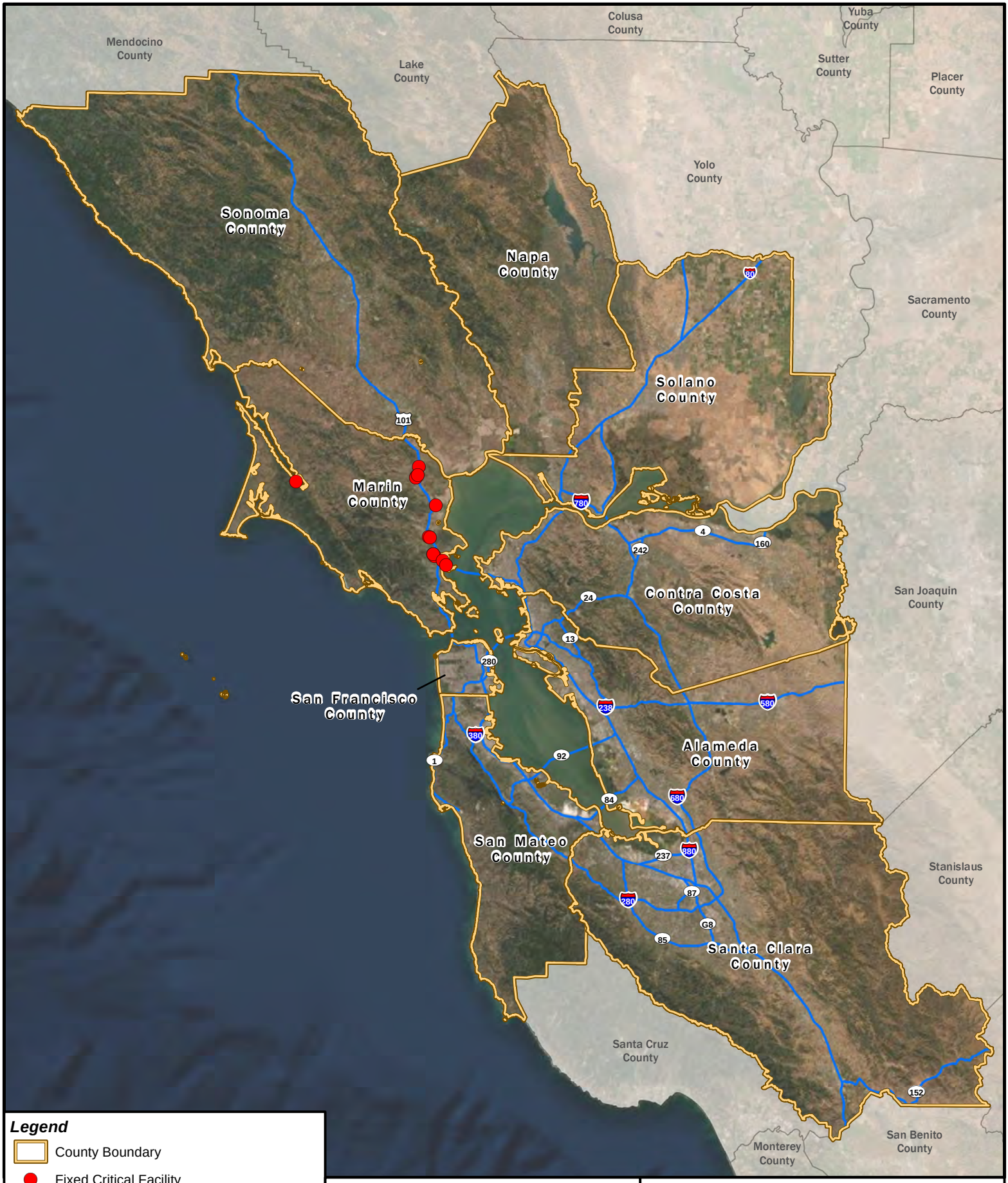
Note
Fixed critical facilities may be owned, leased, contracted, and/or used by an agency

Scale: 1:1,000,000
1 in = 16 miles
Date: 1/27/2021
Projection: NAD 83 State Plane Zone III
0 2.5 5 10 15 20 25 30 Miles

N W E S

CCCTA Fixed Critical Facilities
Figure B-4

2021 MTC
Multi-Jurisdictional Hazard Mitigation Plan



Legend

County Boundary

Fixed Critical Facility

Source
Bay Area Counties (2020)
https://geodata.lib.berkeley.edu/
Metropolitan Transportation Commission (2020)

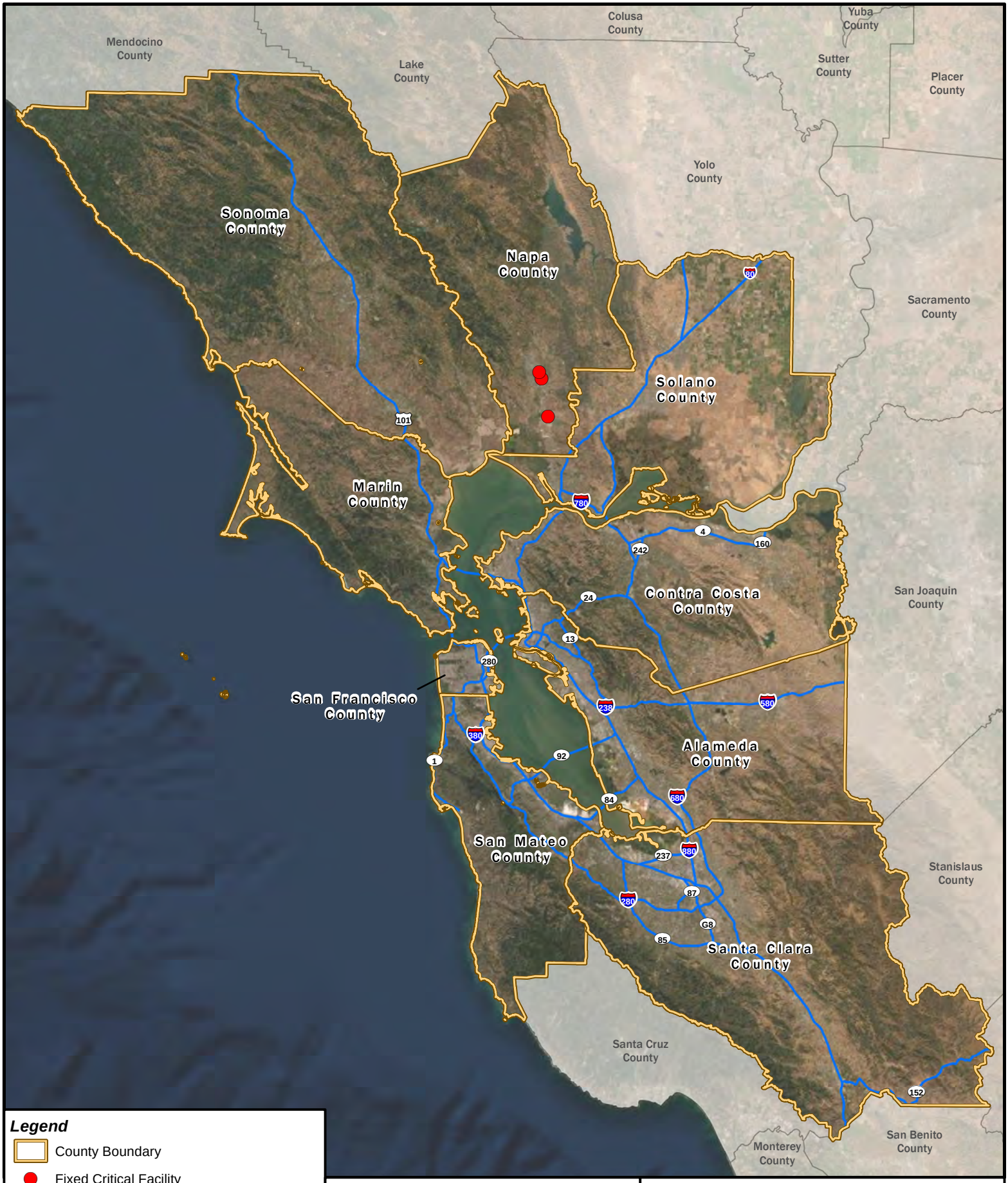
Note
Fixed critical facilities may be owned, leased, contracted, and/or used by an agency

Scale: 1:1,000,000
1 in = 16 miles
Date: 1/27/2021
Projection: NAD 83 State Plane Zone III
0 2.5 5 10 15 20 25 30 Miles

N
W E
S

Marin Transit Fixed Critical Facilities
Figure B-5

2021 MTC
Multi-Jurisdictional Hazard Mitigation Plan



Legend

County Boundary

Fixed Critical Facility

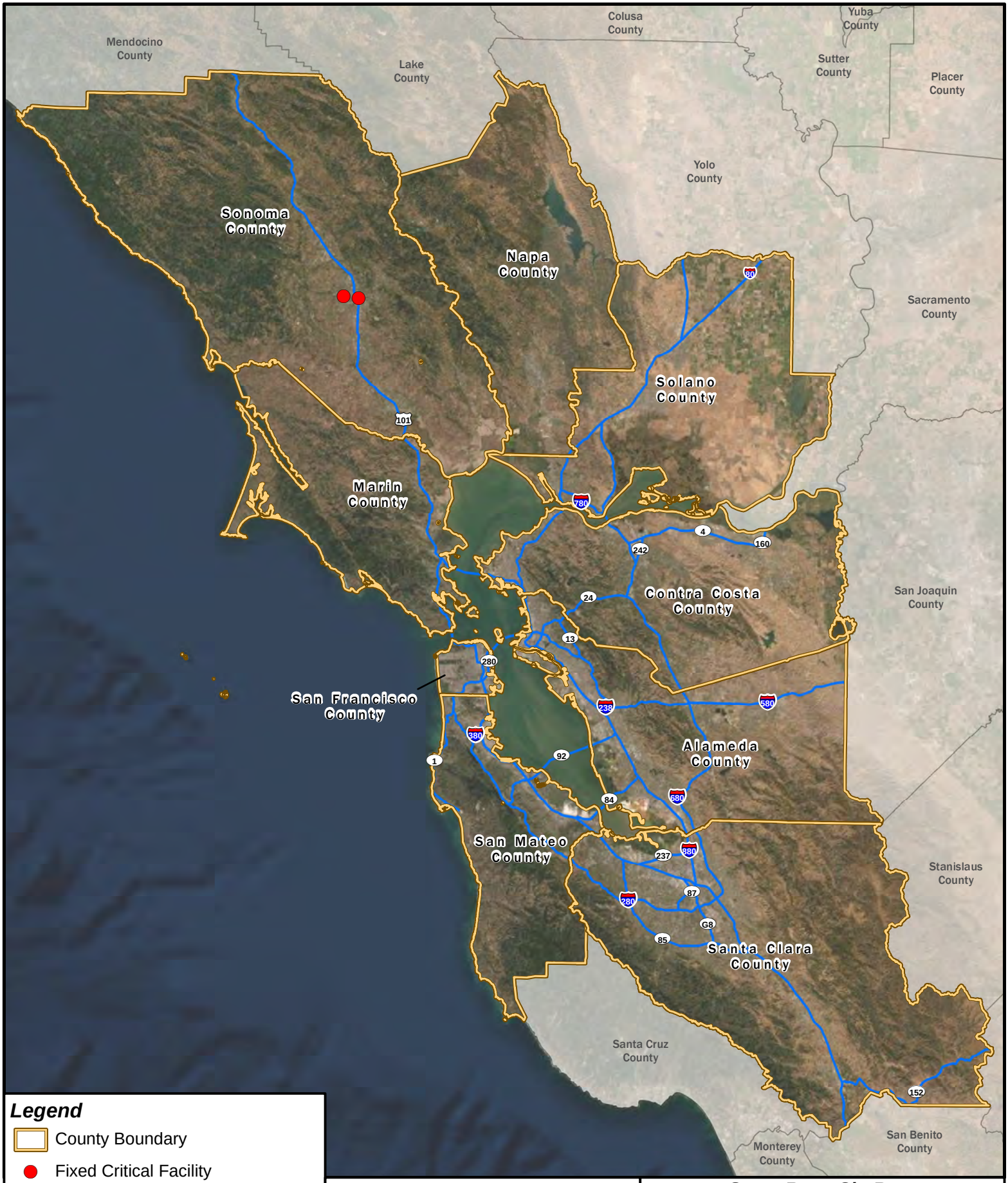
Source
Bay Area Counties (2020)
https://geodata.lib.berkeley.edu/
Metropolitan Transportation Commission (2020)
Note
Fixed critical facilities may be owned, leased, contracted, and/or used by an agency

Scale: 1:1,000,000
1 in = 16 miles
Date: 1/27/2021
Projection: NAD 83 State Plane Zone III
0 2.5 5 10 15 20 25 30 Miles

N W E S

NVTA Fixed Critical Facilities
Figure B-6

2021 MTC
Multi-Jurisdictional Hazard Mitigation Plan



Legend

- County Boundary
- Fixed Critical Facility

Source
Bay Area Counties (2020)
https://geodata.lib.berkeley.edu/
Metropolitan Transportation Commission (2020)

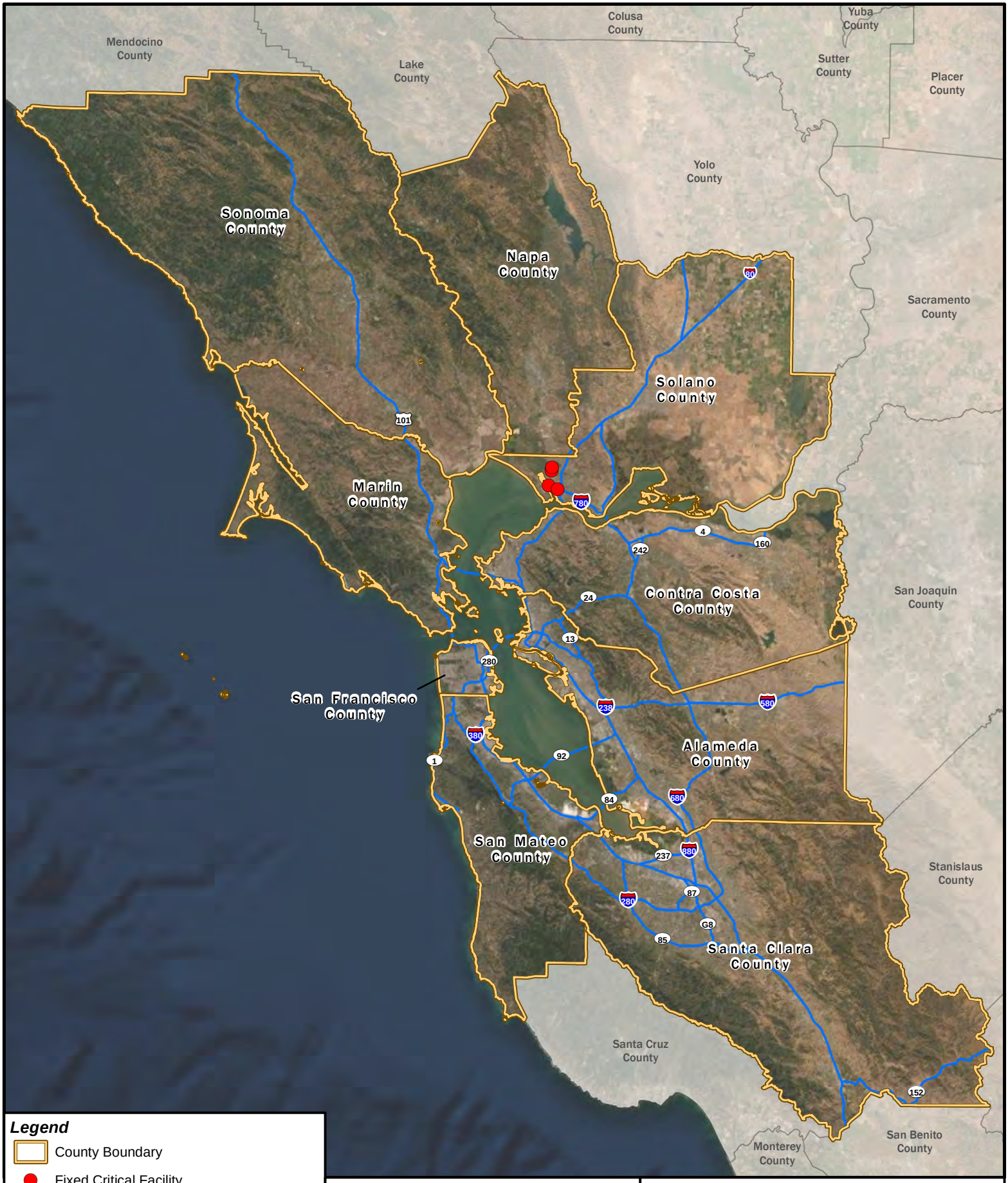
Note
Fixed critical facilities may be owned, leased, contracted, and/or used by an agency

Scale: 1:1,000,000
1 in = 16 miles
Date: 1/27/2021
Projection: NAD 83 State Plane Zone III
0 2.5 5 10 15 20 25 30 Miles

N W E S

Santa Rosa CityBus
Fixed Critical Facilities
Figure B-7

2021 MTC
Multi-Jurisdictional Hazard Mitigation Plan



Legend

County Boundary

Fixed Critical Facility

Source
Bay Area Counties (2020)
https://geodata.lib.berkeley.edu/
Metropolitan Transportation Commission (2020)

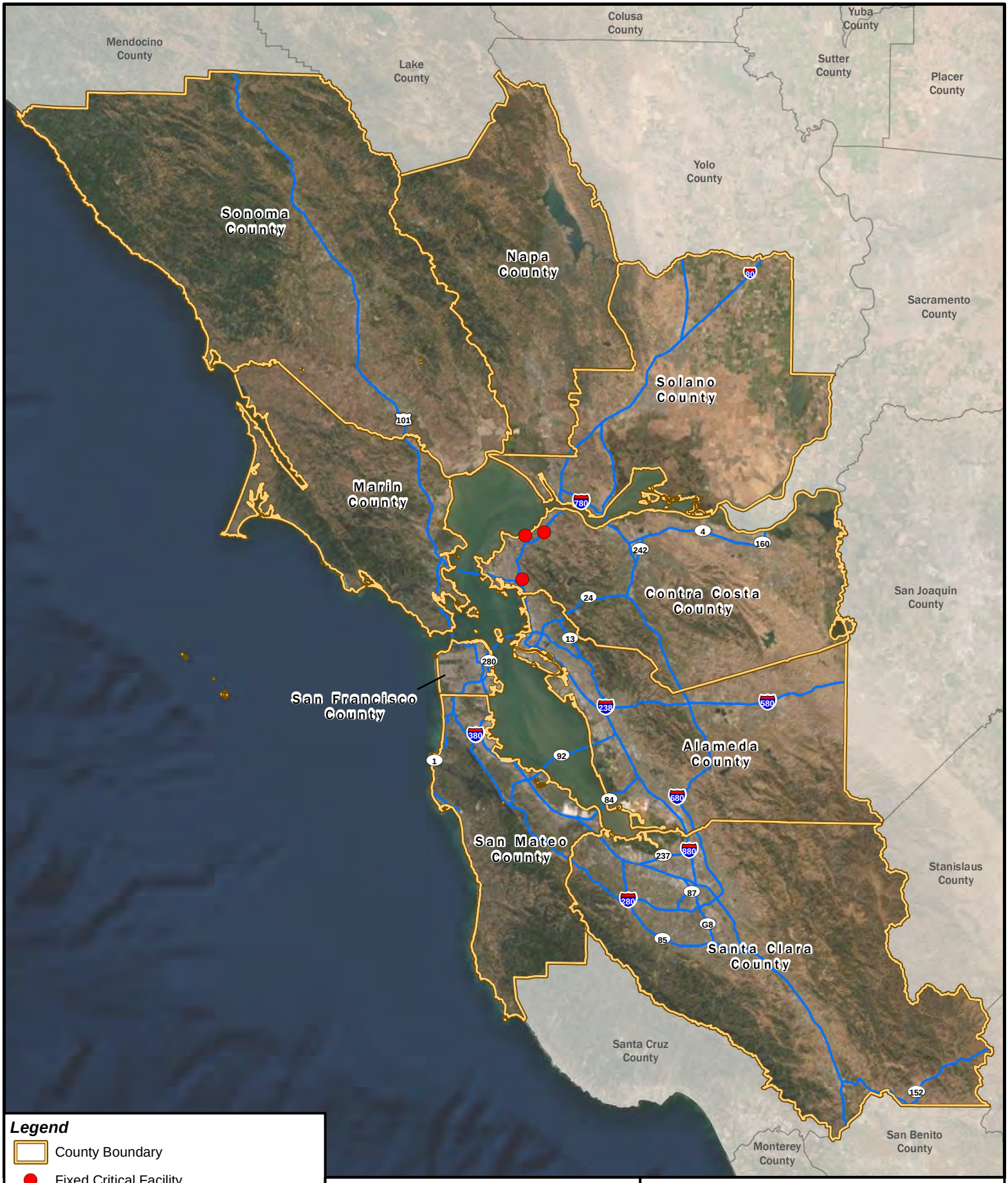
Note
Fixed critical facilities may be owned, leased, contracted, and/or used by an agency

Scale: 1:1,000,000
1 in = 16 miles
Date: 3/1/2021
Projection: NAD 83 State Plane Zone III
0 2.5 5 10 15 20 25 30 Miles

N W E S

SolTrans Fixed Critical Facilities
Figure B-8

2021 MTC
Multi-Jurisdictional Hazard Mitigation Plan



Legend

County Boundary

Fixed Critical Facility

Source
Bay Area Counties (2020)
https://geodata.lib.berkeley.edu/
Metropolitan Transportation Commission (2020)

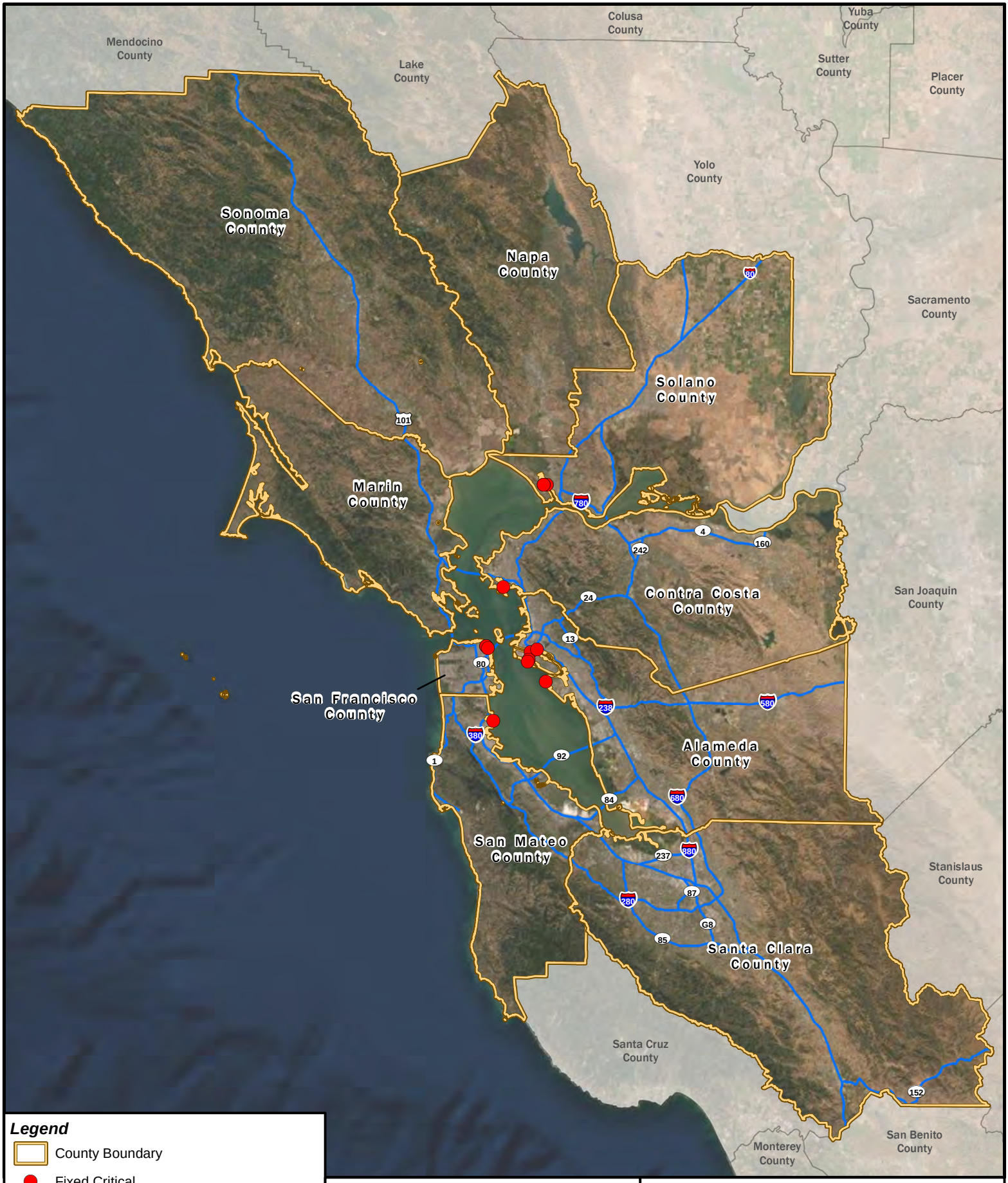
Note
Fixed critical facilities may be owned, leased, contracted, and/or used by an agency

Scale: 1:1,000,000
1 in = 16 miles
Date: 2/8/2021
Projection: NAD 83 State Plane Zone III
0 2.5 5 10 15 20 25 30 Miles

N W E S

WestCAT Fixed Critical Facilities
Figure B-9

2021 MTC
Multi-Jurisdictional Hazard Mitigation Plan



Legend

County Boundary

Fixed Critical

Source
Bay Area Counties (2020)
https://geodata.lib.berkeley.edu/
Metropolitan Transportation Commission (2020)

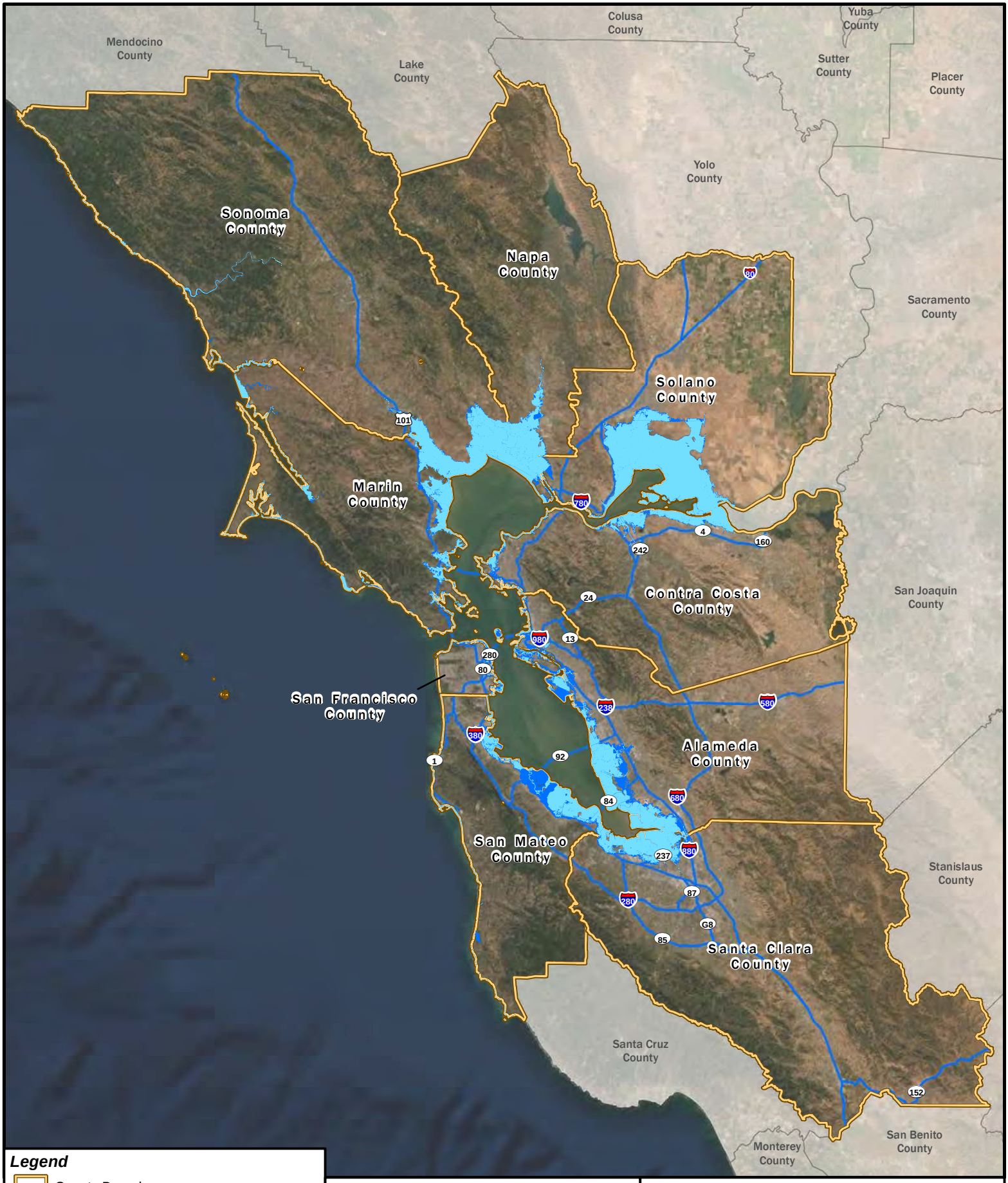
Note
Fixed critical facilities may be owned, leased, contracted, and/or used by an agency

Scale: 1:1,000,000
1 in = 16 miles
Date: 2/8/2021
Projection: NAD 83 State Plane Zone III
0 2.5 5 10 15 20 25 30 Miles

N
W E
S

WETA Fixed Critical Facilities
Figure B-10

2021 MTC
Multi-Jurisdictional Hazard Mitigation Plan



Legend

- County Boundary
- 3-foot Sea Level Rise
- 6-foot Sea Level Rise

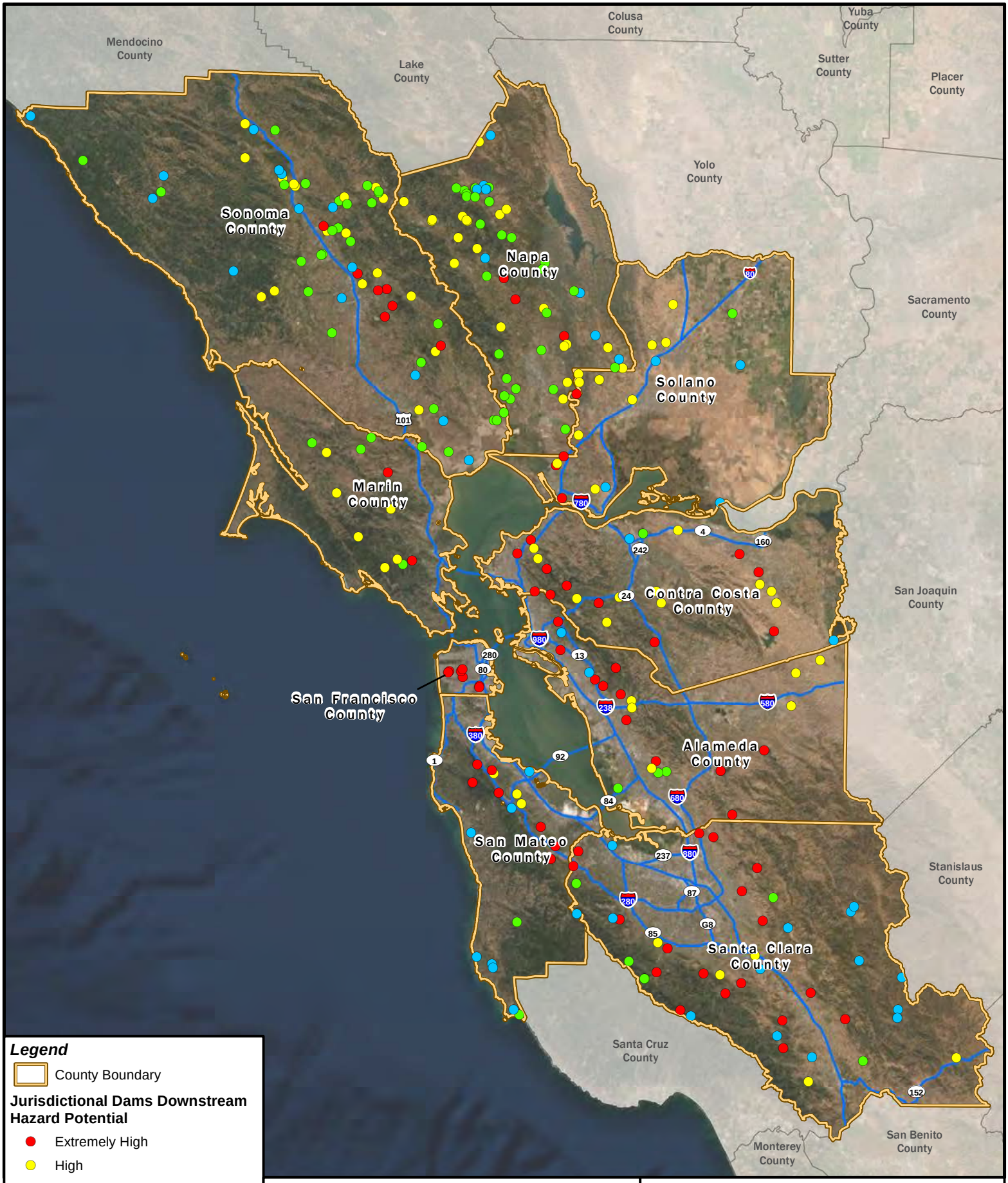
Source
NOAA Sea Level Rise Database (2019)
https://coast.noaa.gov/slrdata/

Scale: 1:1,000,000
1 in = 16 miles
Date: 2/8/2021
Projection: NAD 83 State Plane Zone III
0 2.5 5 10 15 20 25 30 Miles

N W E S

Sea Level Rise Inundation Areas
Figure B-11

2021 MTC
Multi-Jurisdictional Hazard Mitigation Plan



Legend

County Boundary

Jurisdictional Dams Downstream Hazard Potential

- Extremely High
- High
- Significant
- Low

Source

California Jurisdictional Dams (2020)
https://hub.arcgis.com/
Dam Breach Inundation Database (2020)
https://fmds.water.ca.gov/

Scale: 1:1,000,000
1 in = 16 miles
Date: 2/8/2021
Projection: NAD 83 State Plane Zone III

N W E S

0 2.5 5 10 15 20 25 30 35 40 Miles

California Jurisdictional Dams
Figure B-12

2021 MTC
Multi-Jurisdictional Hazard Mitigation Plan

Legend

County Boundary

Jurisdictional Dams
Downstream Hazard Potential

- Extremely High
- High

Dam Breach Inundation Areas (Extremely High & High)

Source
California Jurisdictional Dams (2020)
https://hub.arcgis.com/
Dam Breach Inundation Database (2020)
https://fmds.water.ca.gov/

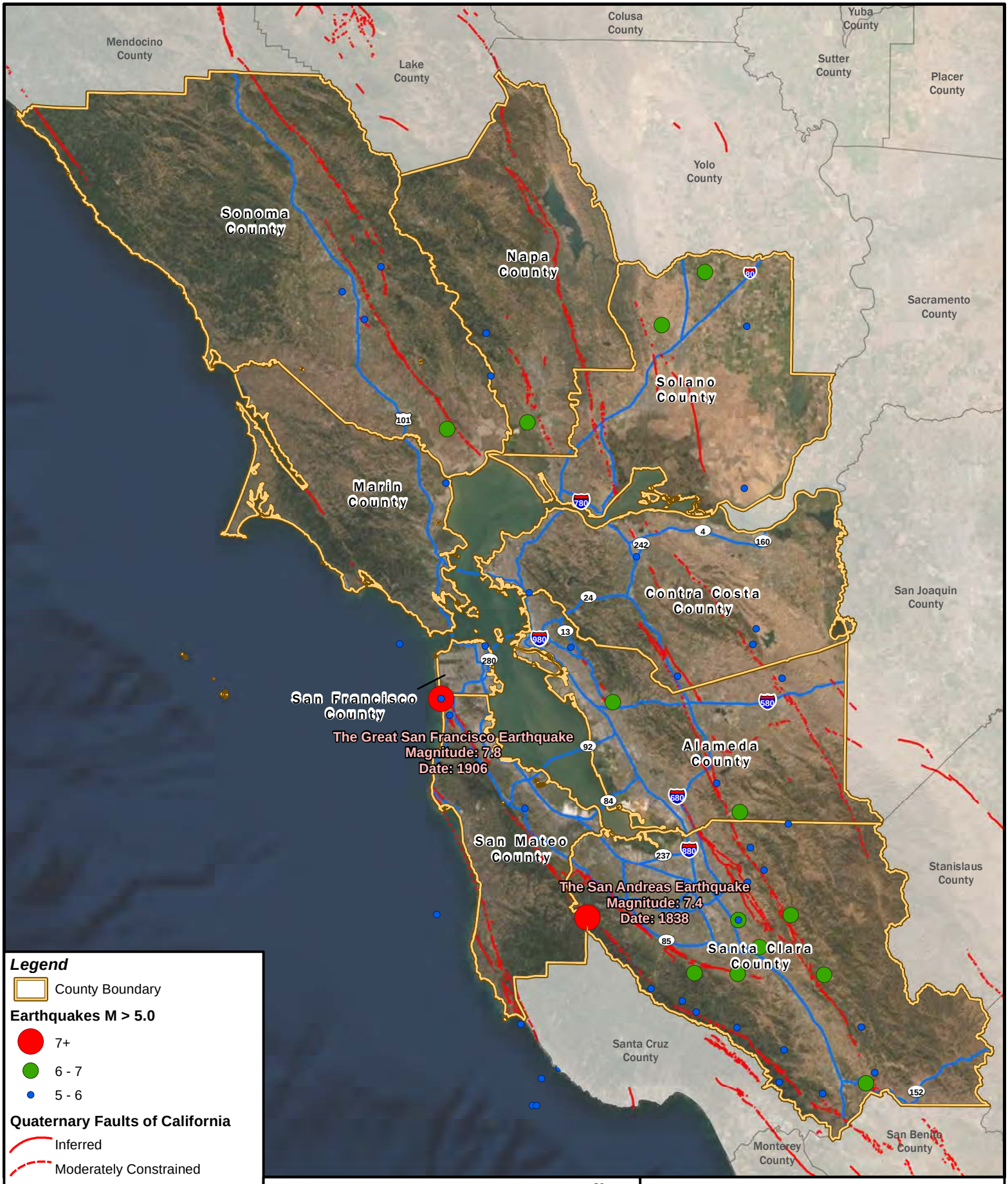
Scale: 1:1,000,000
1 in = 16 miles
Date: 2/8/2021
Projection: NAD 83 State Plane Zone III

0 2.5 5 10 15 20 25 30 35 40 Miles

N W E S

Dam Breach Inundation Areas
Figure B-13

2021 MTC
Multi-Jurisdictional Hazard Mitigation Plan



Legend

County Boundary

Earthquakes M > 5.0

7+

6 - 7

5 - 6

Quaternary Faults of California

Inferred

Moderately Constrained

Well Constrained

Source

Historic Earthquakes, 1769 to 2020
California (Magnitude 5.0 plus) (2020)
https://hub.arcgis.com/
Earthquake Catalogs 1932-2019 (2020)
http://service.scedc.caltech.edu

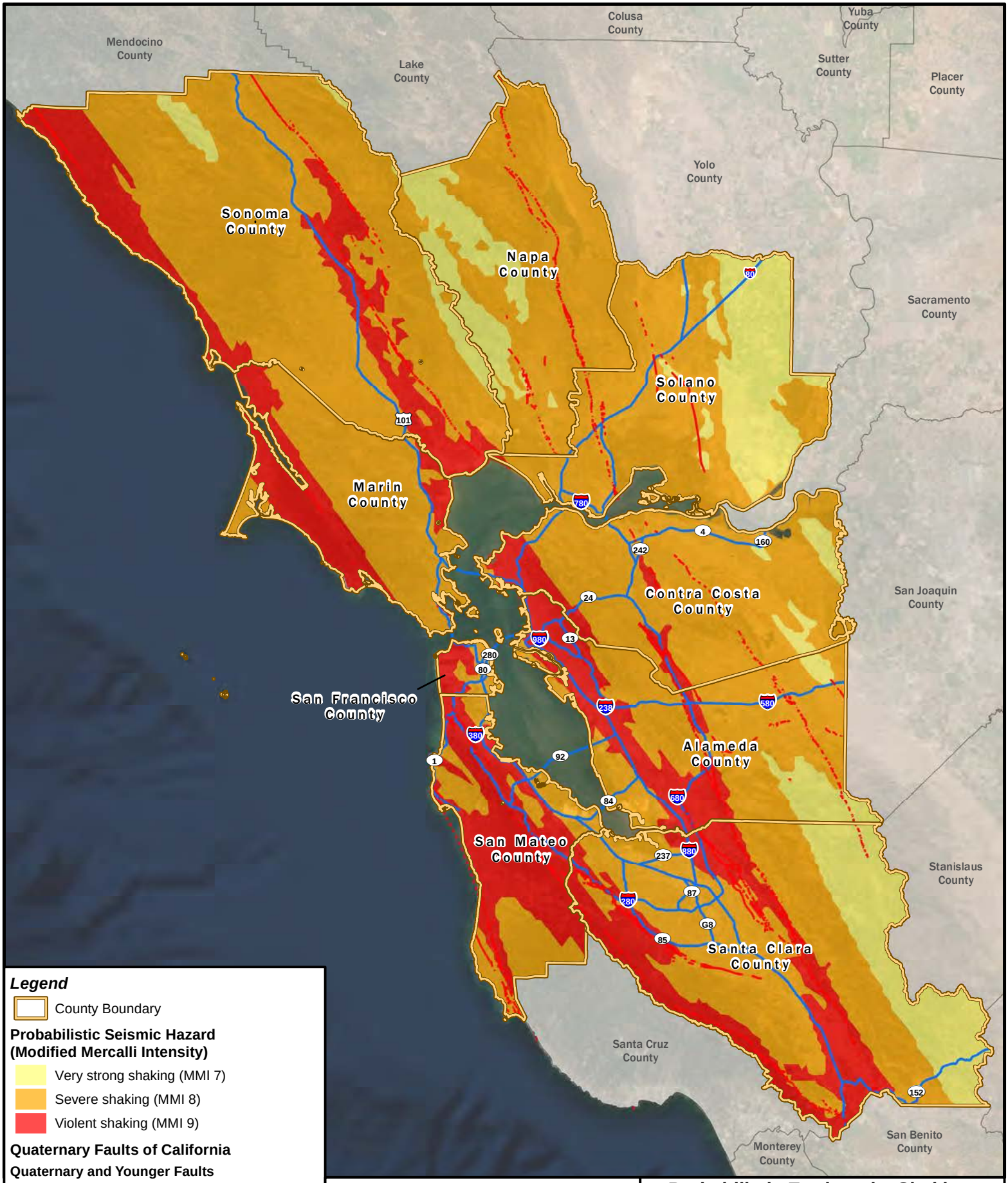
Scale: 1:1,000,000
1 in = 16 miles
Date: 2/8/2021
Projection: NAD 83 State Plane Zone III

0 2.5 5 10 15 20 25 30 35 40 Miles

N W E S

Historical Earthquakes (1769-2020)
Figure B-14

2021 MTC
Multi-Jurisdictional Hazard Mitigation Plan



Legend

County Boundary

Probabilistic Seismic Hazard (Modified Mercalli Intensity)

- Very strong shaking (MMI 7)
- Severe shaking (MMI 8)
- Violent shaking (MMI 9)

Quaternary Faults of California

Quaternary and Younger Faults

- Inferred
- Moderately Constrained
- Well Constrained

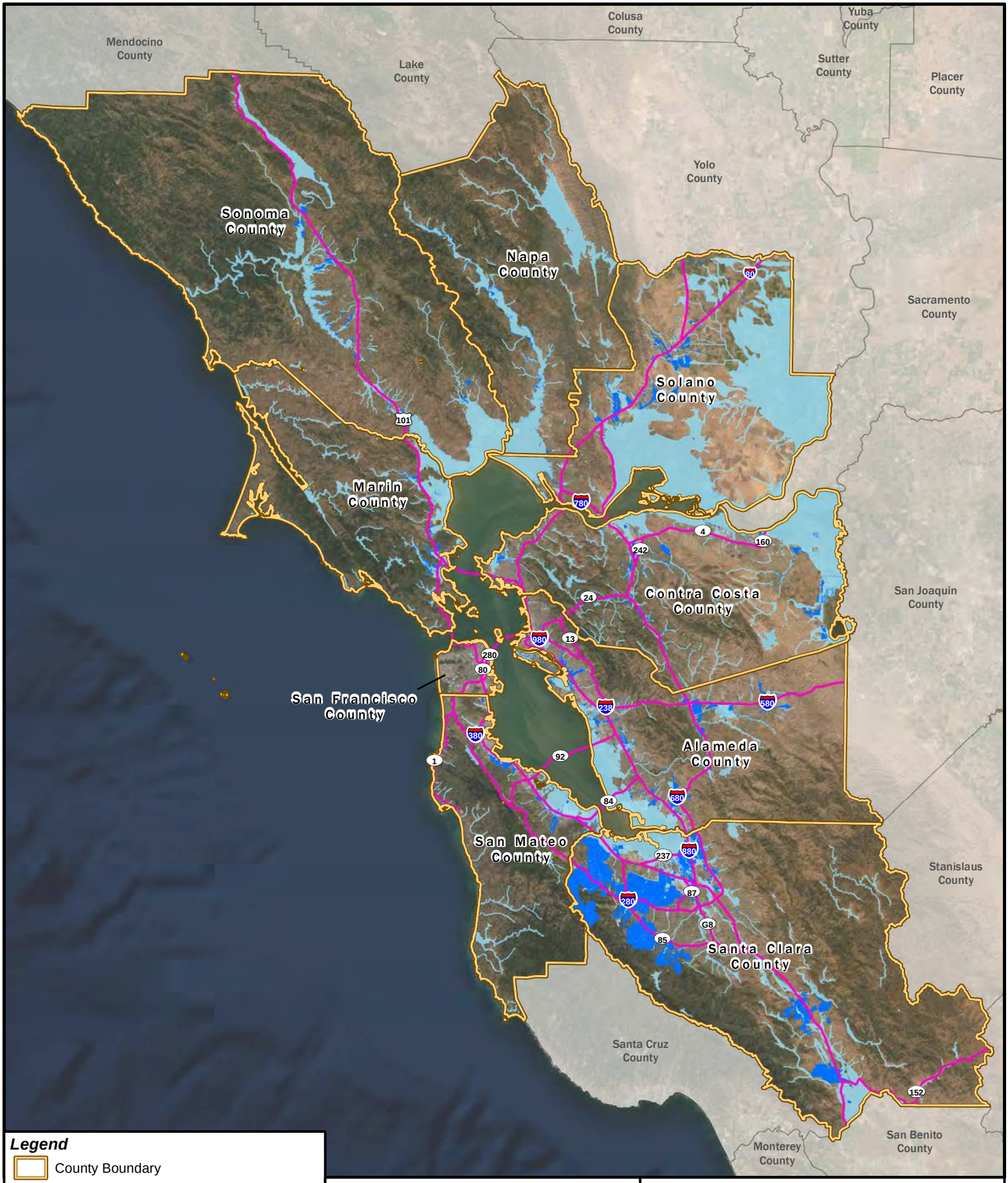
Source
Probabilistic Seismic Hazard Assessment (2020)
https://opendata.mtc.ca.gov

Scale: 1:1,000,000
1 in = 16 miles
Date: 2/8/2021
Projection: NAD 83 State Plane Zone III
0 2.5 5 10 15 20 25 30 Miles

N W E S

Probabilistic Earthquake Shaking Hazard Areas
Figure B-15

2021 MTC
Multi-Jurisdictional Hazard Mitigation Plan



Legend

- County Boundary
- 0.2% Annual Chance
- 1% Annual Chance

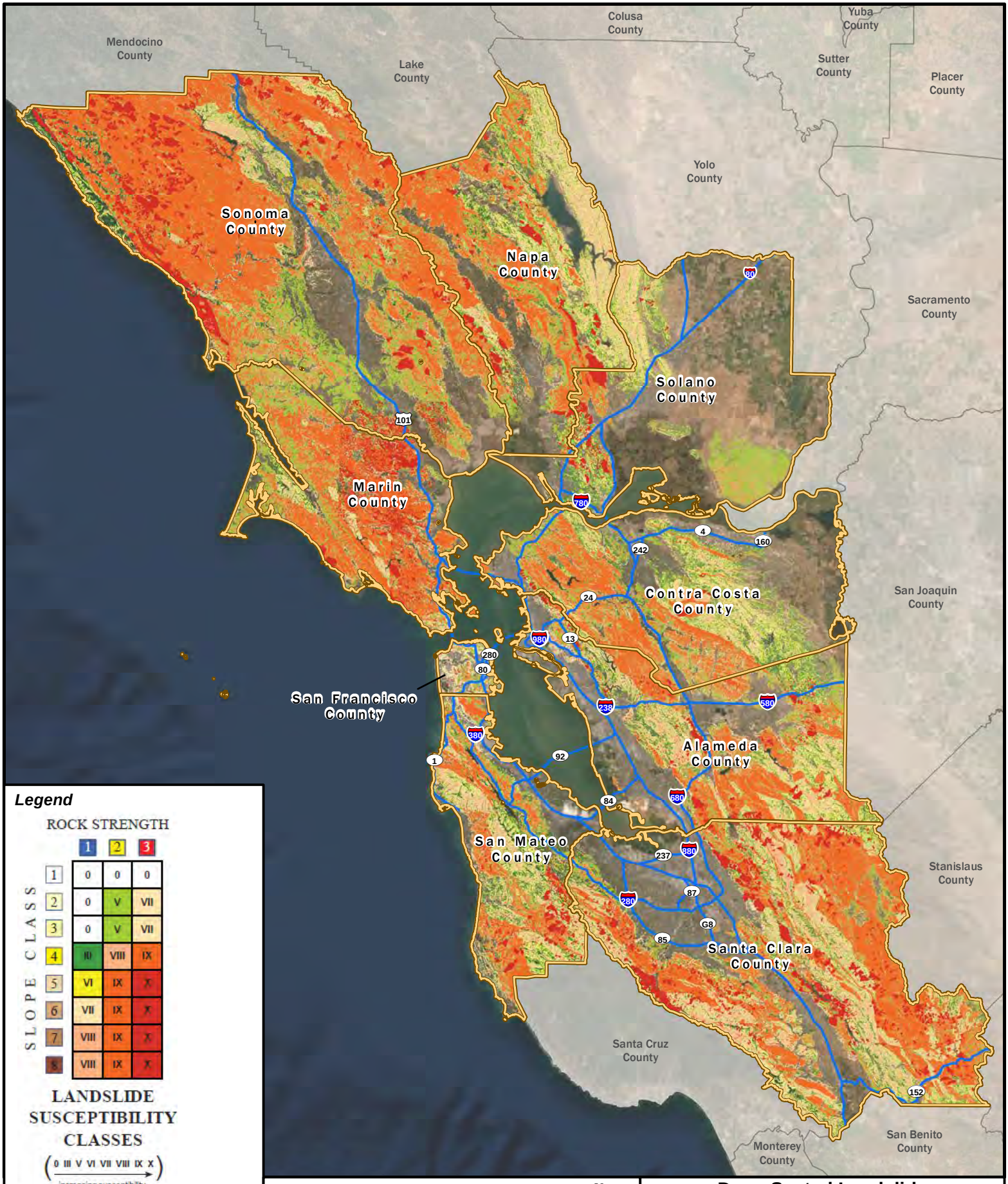
Source
FEMA Digital Flood Insurance Rate Map (2019, 2020)
https://datasf.org/; https://msc.fema.gov

Scale: 1:1,000,000
1 in = 16 miles
Date: 2/8/2021
Projection: NAD 83 State Plane Zone III
0 2.5 5 10 15 20 25 30 Miles

N W E S

Special Flood Hazard Areas
Figure B-16

2021 MTC
Multi-Jurisdictional Hazard Mitigation Plan



Legend

ROCK STRENGTH

SLOPE CLASS	1	2	3
1	0	0	0
2	0	V	VII
3	0	V	VII
4	III	VIII	IX
5	VI	IX	X
6	VII	IX	X
7	VIII	IX	X
8	VIII	IX	X

LANDSLIDE SUSCEPTIBILITY CLASSES

(0 III V VI VII VIII IX X)

increasing susceptibility

County Boundary

Source
Susceptibility to Deep-Seated Landslides in California (2018)
https://maps.conservation.ca.gov

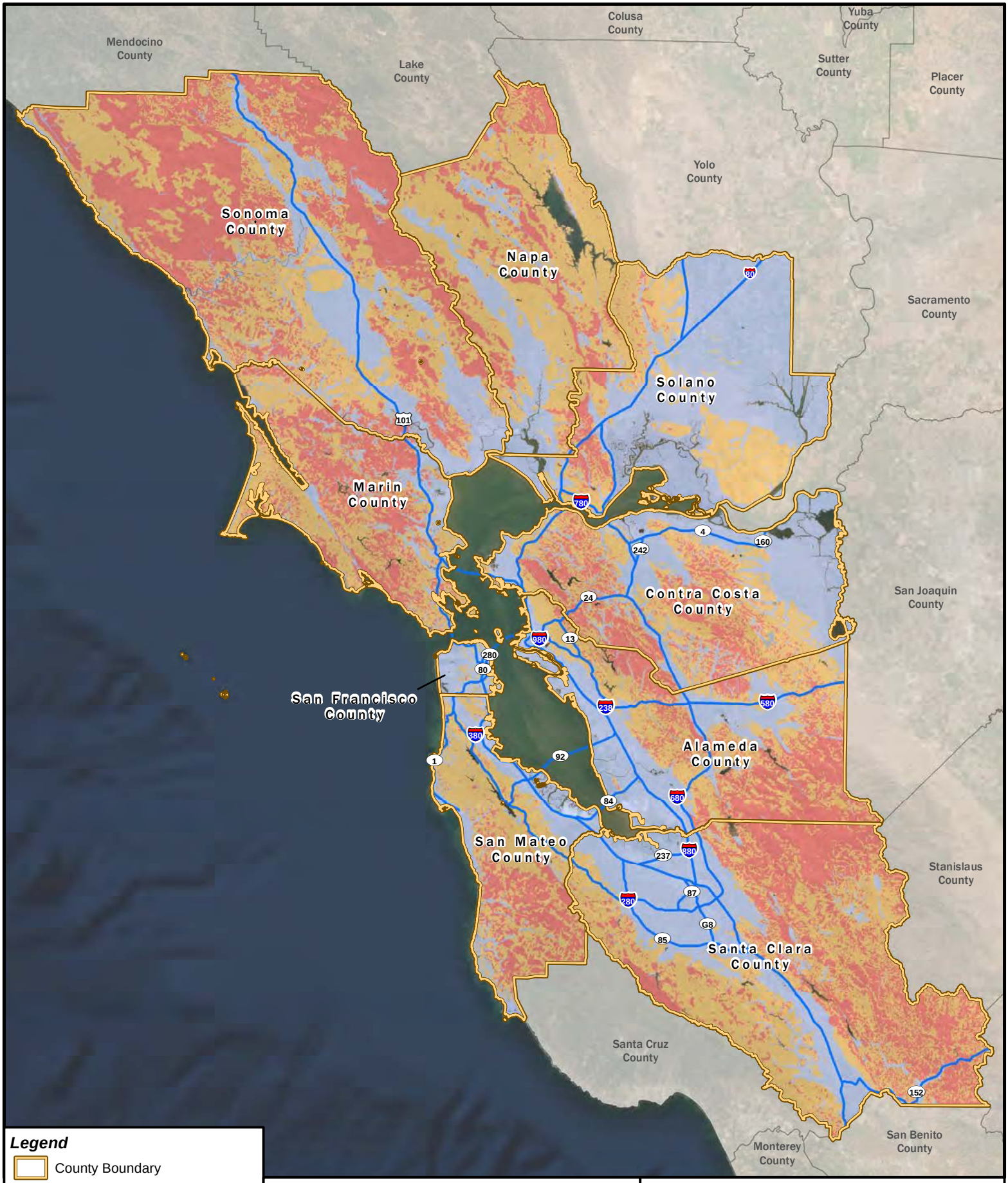
Scale: 1:1,000,000
1 in = 16 miles
Date: 2/8/2021
Projection: NAD 83 State Plane Zone III

N W E S

0 2.5 5 10 15 20 25 30 35 40 Miles

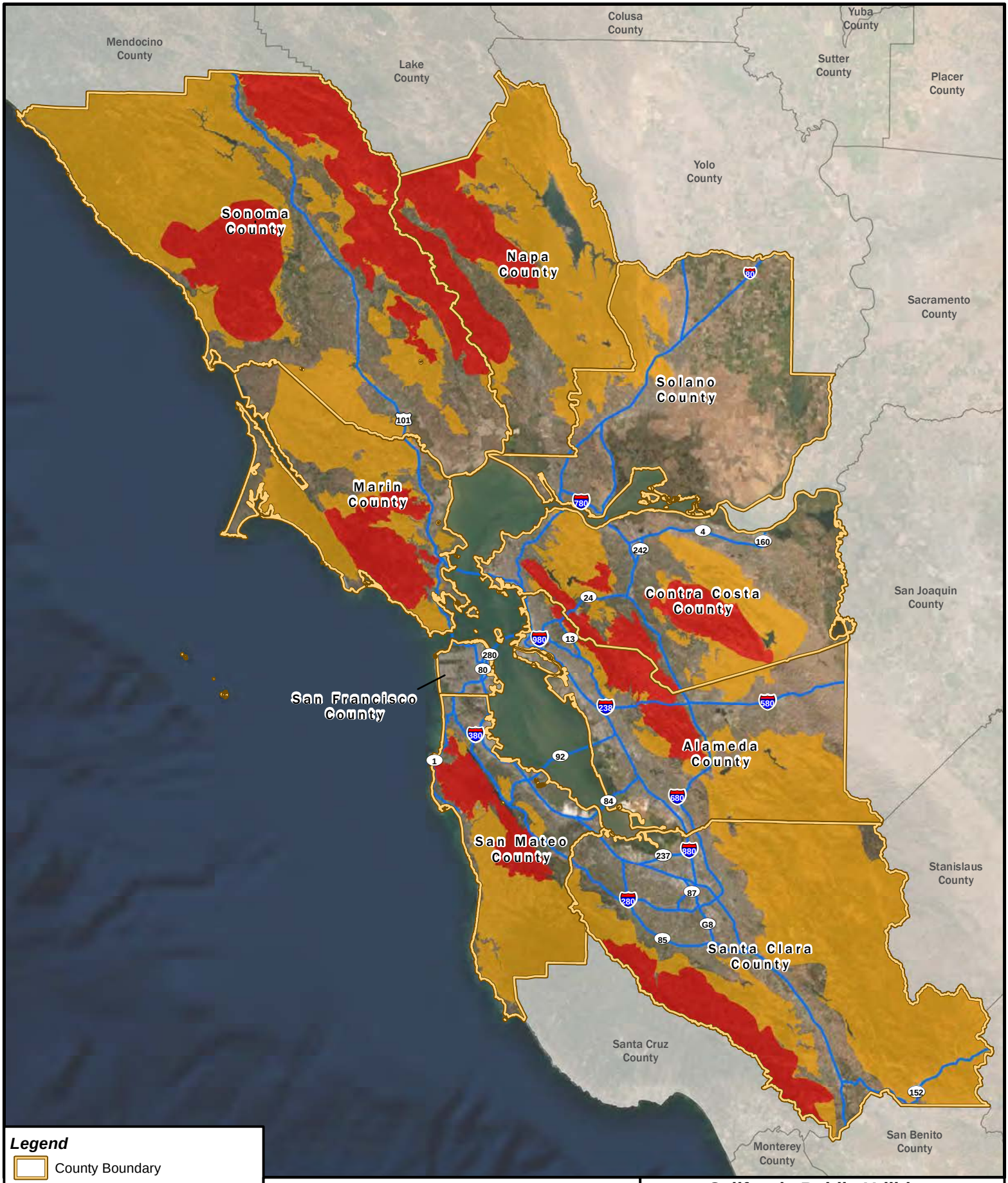
Deep-Seated Landslide Suspectibility Areas
Figure B-17

2021 MTC
Multi-Jurisdictional Hazard Mitigation Plan



Existing Landslide Areas
Figure B-18

2021 MTC
Multi-Jurisdictional Hazard Mitigation Plan



Legend

- County Boundary
- Tier 2 - Elevated
- Tier 3 - Extreme

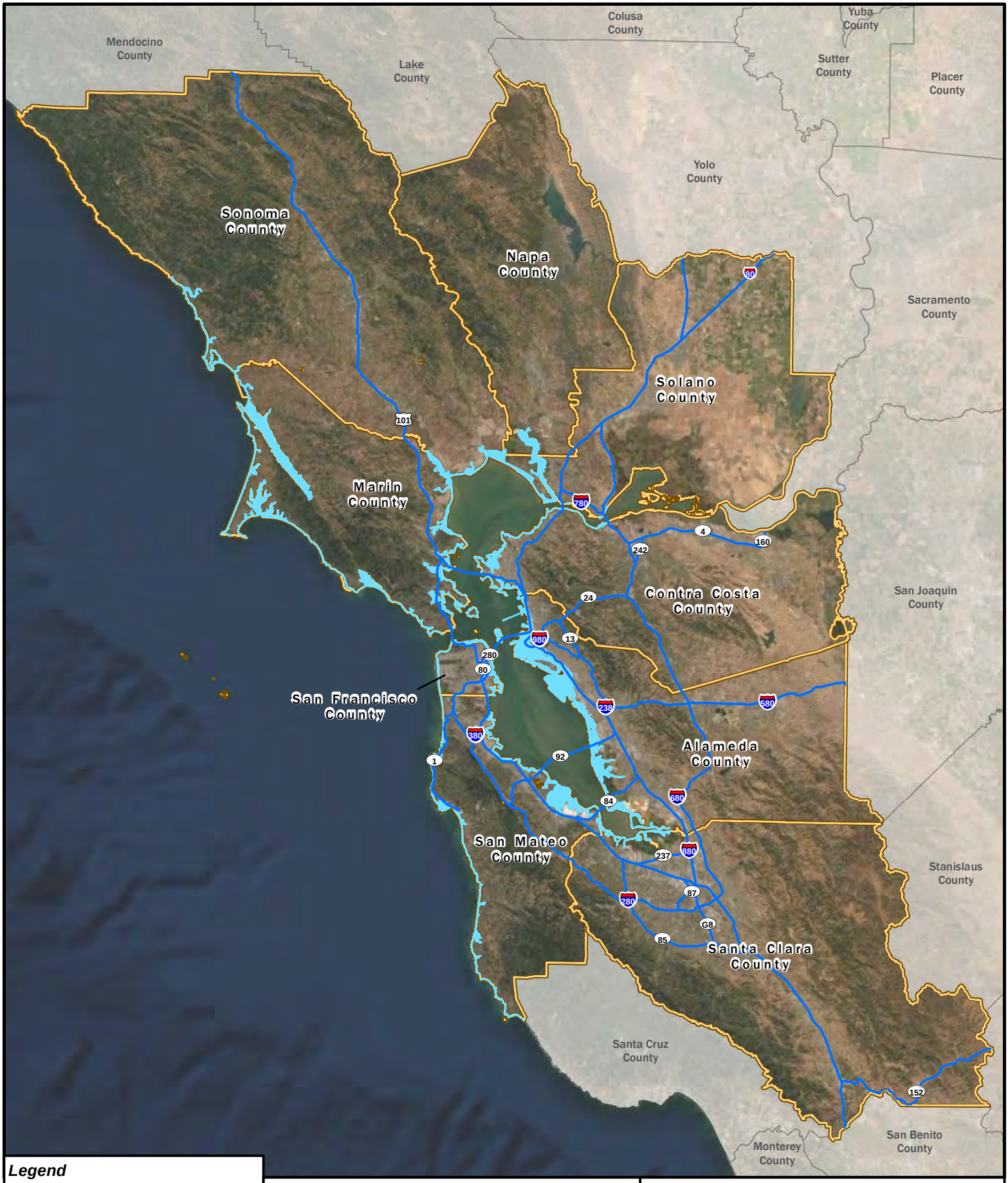
Source
California Public Utilities Commission Fire-Threat (2020)
https://www.cpuc.ca.gov/

Scale: 1:1,000,000
1 in = 16 miles
Date: 2/8/2021
Projection: NAD 83 State Plane Zone III
0 2.5 5 10 15 20 25 30 35 40 Miles

N W E S

California Public Utilities Commission Fire-Threat Areas
Figure B-19

2021 MTC
Multi-Jurisdictional Hazard Mitigation Plan



Legend

- County Boundary
- Maximum Run-Up

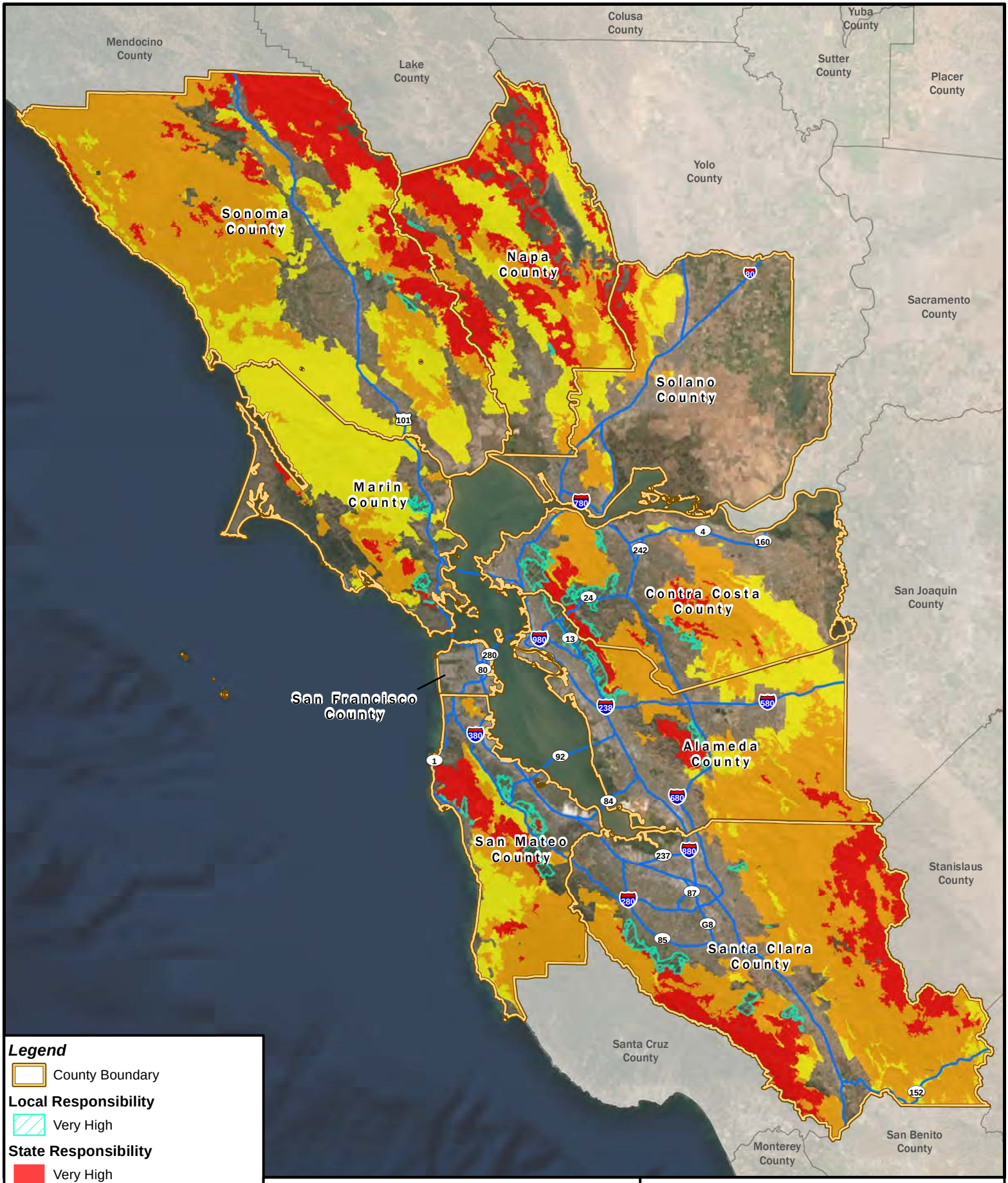
Source
Tsunami Inundation Areas (Potential) for Evacuation Planning (2020)
https://mtc.maps.arcgis.com/

Scale: 1:1,000,000
1 in = 16 miles
Date: 2/8/2021
Projection: NAD 83 State Plane Zone III
0 2.5 5 10 15 20 25 30 35 40 Miles

N W E S

Tsunami Run-Up Areas
Figure B-20

2021 MTC
Multi-Jurisdictional Hazard Mitigation Plan



Legend

County Boundary

Local Responsibility

Very High

State Responsibility

Very High

High

Moderate

Source

Fire Hazard Severity Zone (2020)
https://gis.data.ca.gov/
https://frap.fire.ca.gov

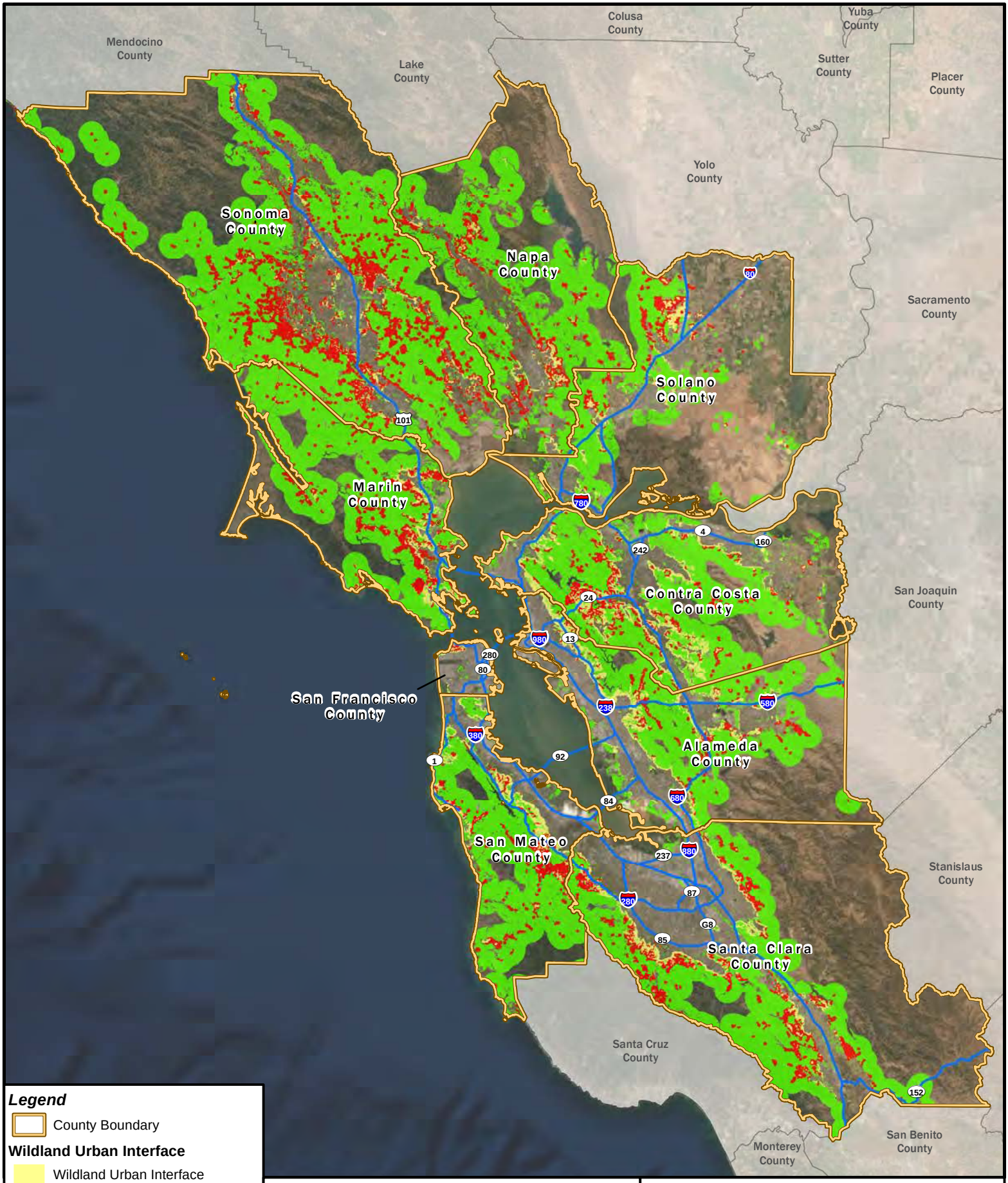
Scale: 1:1,000,000
1 in = 16 miles
Date: 2/8/2021
Projection: NAD 83 State Plane Zone III

N W E S

0 2.5 5 10 15 20 25 30 35 40 Miles

Fire Hazard Severity Zones
Figure B-21

2021 MTC
Multi-Jurisdictional Hazard Mitigation Plan



Legend

County Boundary

Wildland Urban Interface

- Wildland Urban Interface
- Wildland Urban Intermix
- Wildland Urban Influence

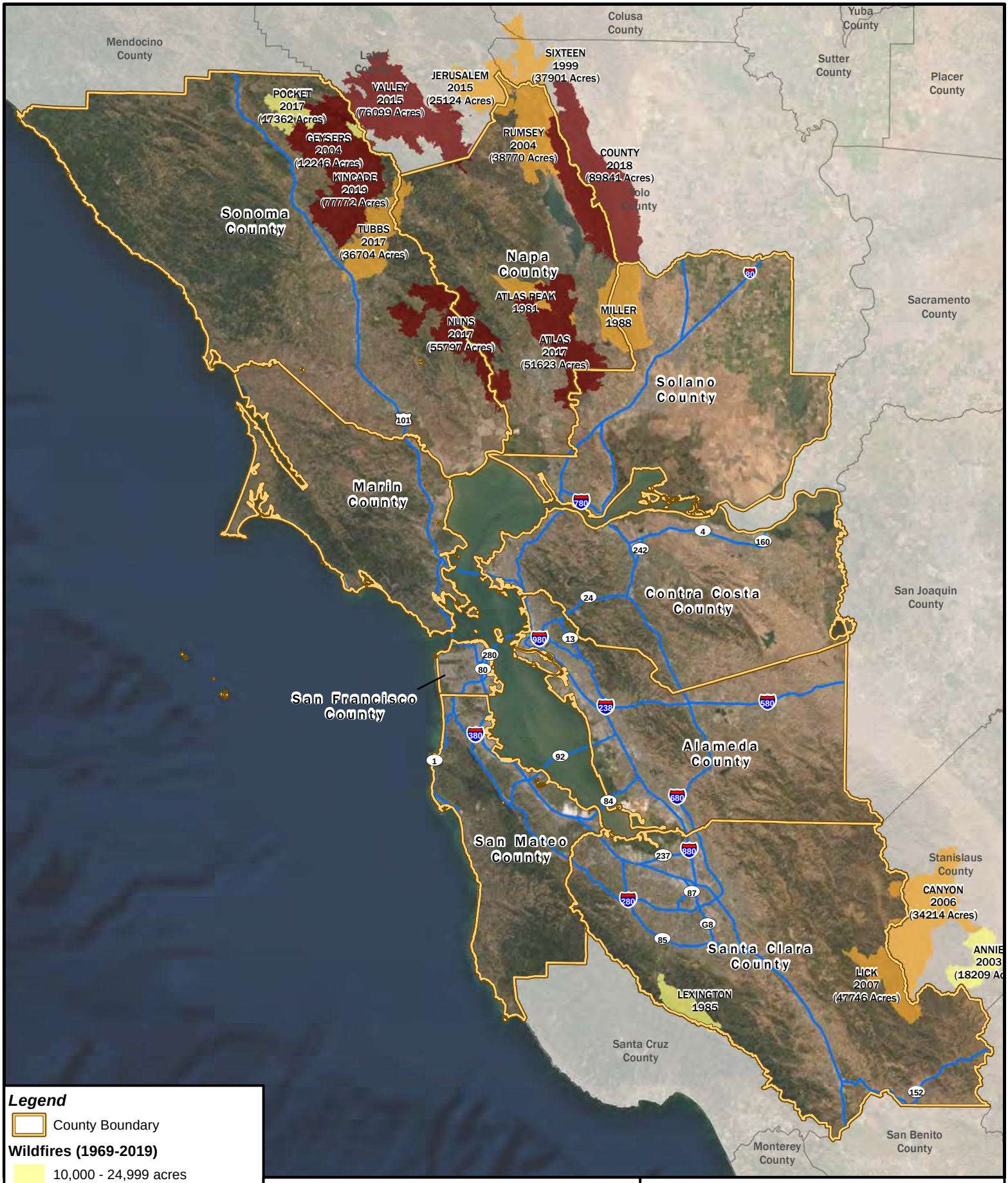
Source
Wildland Urban Interface (2020)
https://gis.data.ca.gov/
https://frap.fire.ca.gov

Scale: 1:1,000,000
1 in = 16 miles
Date: 2/8/2021
Projection: NAD 83 State Plane Zone III
0 2.5 5 10 15 20 25 30 35 40 Miles

N W E S

Wildland Urban Interface
Figure B-22

2021 MTC
Multi-Jurisdictional Hazard Mitigation Plan



Legend

County Boundary

Wildfires (1969-2019)

- 10,000 - 24,999 acres
- 25,000 - 49,999 acres
- 50,000+ acres

Source

Fire Resource and Assessment Program
Fire Perimeters Database (2019)
https://frap.fire.ca.gov

Scale: 1:1,000,000
1 in = 16 miles
Date: 2/8/2021
Projection: NAD 83 State Plane Zone III

N W E S

0 2.5 5 10 15 20 25 30 35 40 Miles

Historical Wildfires (1969-2019)
Figure B-23

2021 MTC
Multi-Jurisdictional Hazard Mitigation Plan

APPENDIX C—METROPOLITAN TRANSPORTATION COMMISSION

Table C-1: Hazard Impacts on MTC's Fixed Critical Facilities and Express Lanes

Hazard Area	# of Facilities Impacted	Miles of Express Lanes Impacted
Sea Level Rise Inundation Area—3 Ft.	0	9.02
Sea Level Rise Inundation Area—6 Ft.	1	12.18
Dam Breach Inundation Area—High Hazard	0	0.06
Dam Breach Inundation Area—Extremely High Hazard	0	20.07
Probabilistic Earthquake Shaking Area—Severe	5	110.96
Probabilistic Earthquake Shaking Area—Violent	2	88.06
Special Flood Hazard Area—0.2% Annual Chance Flood	0	18.50
Special Flood Hazard Area—1% Annual Chance Flood	0	15.97
Deep-Seated Landslide Class IX and X Area	0	6.93
Existing Landslides Area—Few	2	22.40
Existing Landslides Area—Most	0	2.48
CPUC—Fire Threat Area—Tier 2 Elevated	0	8.41
CPUC—Fire Threat Area—Tier 3 Extreme	0	0.00
Maximum Tsunami Run-Up Area	1	0.00
Fire Hazard Severity Zones: State Responsibility Area—High	0	5.18
Fire Hazard Severity Zones: State Responsibility Area—Very High	0	0.00
Fire Hazard Severity Zones: Local Responsibility Area—Very High	0	0.00
Wildland Urban Interface—Influence	1	3.88
Wildland Urban Interface—Intermix	0	9.70
Wildland Urban Interface—Interface	0	25.53

Notes:
CPUC = California Public Utilities Commission
Ft. = foot/feet
MTC = Metropolitan Transportation Commission

Table C-2: MTC—Authorities, Policies, Programs, and Resources

Type/Name	Description	Ability to Expand/Improve
Planning and Regulatory		
San Francisco Bay Area Regional Transportation Emergency Management Plan—2018	• Supports the coordinated emergency response capabilities for transportation agencies throughout the Bay Area. • Focuses on two key areas: 1) interagency communications; and 2) preparation of detailed emergency response plans. • Includes a baseline-operating plan adaptable to a range of emergency recovery scenarios too.	
Plan Bay Area	• Is an updated long-range Regional Transportation Plan and Sustainable Communities Strategy for the nine-county San Francisco Bay Area. • Roadmap for forecasting transportation needs through the year 2040, preserving the character of our diverse communities, and adapting to the challenges of future population growth. • The plan includes resiliency action measures.	The MTC can make amendments to the Plan Bay Area 2020 through the TIP. The TIP is updated at least every 4 years.
2019 San Francisco Bay Area's Transportation Improvement Program	• Lists the near-term transportation projects, programs and investment priorities of the region's surface transportation system that have a federal interest along with locally and state-funded projects that are regionally significant.	There are several ways that a project can get included in the TIP; the most common course is when local partner agencies submit their priority list to the MTC for approval.
Climate Change Initiatives Program	• Focuses on reducing transportation greenhouse gas emissions through innovative pilot projects.	
Administrative and Technical		
Operations	• Coordinates local response and relief activities in the Emergency Operation Center, and works closely with local, state, and federal partners to support planning and training and to provide information and coordinate assistance.	
Operations	• Provides direct or contract civil, structural, and mechanical engineering services, including contract, project, and construction management.	

Table C-2: MTC—Authorities, Policies, Programs, and Resources

Type/Name	Description	Ability to Expand/Improve
Policy	• Develops and maintains transportation plans. Anticipates and acts on the need for new plans and policies.	The Plan Bay Area 2040 identifies the MTC as a partner agency to establish a resilience technical services team. The team can share data, best practices, and grant opportunities for climate adaptation and natural hazard mitigation.
Operations	• Sources, negotiates, and selects goods and services.	
Policy	• Provides information to the public and media as necessary.	
Financial		
Bridge Tolls	• Charges via direct user fees for the use of facility capacity and services and are used as a way to pay for operating expenses and transportation projects.	
FTA 5303	• Provides funding and procedural requirements for multimodal transportation planning in metropolitan areas and states. • Planning needs to be cooperative, continuous, and comprehensive, resulting in long-range plans and short-range programs that reflect transportation investment priorities.	
The Mills-Alquist-Deddeh Act (SB 325) / TDA of 1971 funds	• Provides local agencies with two major sources of funding: the Local Transportation Fund and State Transit Assistance funds; these funds contribute to the development and support of public transportation and are allocated to areas of each county based on population, taxable sales, and transit performance.	
Caltrans Sustainable Transportation Planning Grants	• Encourages local and regional planning that furthers state goals, including—but not limited to—the goals and best practices cited in the Regional Transportation Plan Guidelines. • Includes improving public safety and security, and practicing environmental stewardship, adopted by the California Transportation Commission.	MTC can apply for annual grants to address: 1) transportation-related issues around climate change and wildfires; and 2) emergency preparedness/response planning projects.

Table C-2: MTC—Authorities, Policies, Programs, and Resources

Type/Name	Description	Ability to Expand/Improve
FEMA HMA Grants	• Provides funding for eligible mitigation activities that reduce disaster losses and protect life and property from future disaster damages. • Supports pre- and post-disaster mitigation plans and projects. • Available to California communities/agencies after a presidentially declared disaster has occurred in California, administered by Cal OES. • The Building Resilient Infrastructure and Communities program is an annual nationally competitive program that focuses on reducing the nation's risk by funding public infrastructure projects that increase a community's resilience before a disaster affects an area.	MTC can apply for HMA grant funding once the 2021 MJHMP has been approved and adopted.
FTA Emergency Relief Program	• Provides post-disaster assistance to public transit operators by funding the protection, repair, and/or replacement of equipment and facilities that may suffer or have suffered serious damage as a result of an emergency or disaster. • Funds capital projects to protect, repair, or replace facilities or equipment that are in danger of suffering serious damage, or have suffered serious damage as a result of an emergency. • Can also fund the operating costs of evacuation, rescue operations, temporary public transportation service, or reestablishing, expanding, or relocating service before, during, or after an emergency.	
Education and Outreach		
511 SF Bay	• Provides traffic, transit, carpool, vanpool, and bicycling information 24 hours a day, 7 days a week from anywhere in the nine-county Bay Area. • Travelers can register for 511ALERT, a text-based notification system. • In the event of an emergency, registered users will receive up-to-date transportation alert information gathered from various trusted government sources. • Alerts complement the information currently provided by 511 on its website, phone line, and social media channels.	

Table C-2: MTC—Authorities, Policies, Programs, and Resources

Type/Name	Description	Ability to Expand/Improve
Service Alerts	• Creates service alerts with additional information when there is a network disruption.	
Media / Social Media	• Creates and shares content via media or social networking.	

Notes:
Cal OES = California Office of Emergency Services
FTA = Federal Transit Administration
HMA = Hazard Mitigation Assistance
MJHMP = Multi-Jurisdictional Hazard Mitigation Plan
MTC = Metropolitan Transportation Commission
SB = Senate Bill
SF = San Francisco
TDA = Transportation Development Act
TIP = Transportation Improvement Program

Table C-3: MTC—Prioritized Action Plan

No.	Project Name	Priority	Potential Funding Source	Responsibility	Timing
1	After-Action Report	Medium	General operating budget, FTA Emergency Relief Program	Operations	As required after a hazard/ disaster
2	Stand-by Contracts	High	General operating budget	Operations	0 to 5 years
3	Interagency Communication and Coordination	High	Caltrans Sustainable Transportation Planning Grants	Operations	0 to 5 years
4	Emergency Response Plan Hazard-Specific Annexes	High	Caltrans Sustainable Transportation Planning Grants	Policy	0 to 5 years
17	Standard Operating Procedures for Alternative Locations	High	Caltrans Sustainable Transportation Planning Grants	Operations	0 to 5 years
18	Fuel Storage Capacity / Contingency	High	Caltrans Sustainable Transportation Planning Grants	Operations	0 to 5 years
19	Cooling and Smoke Relief Centers and Wildfire Evacuation Points and Shelter Locations Transportation Assessment	High	FEMA HMA Grants	Operations	0 to 5 years
20	Standby Power Systems / Generators	High	FEMA HMA Grants	Operations	0 to 5 years
24	Crowding Information App	High	Caltrans Sustainable Transportation Planning Grants	Operations	0 to 5 years
25	Highway Corridor Landslide Hazard Mapping	Medium	FEMA HMA Grants	Policy	5+ years
27	Defensible Space	High	FEMA HMA Grants	Operations	0 to 5 years
28	Evacuation Preparedness	High	Caltrans Sustainable Transportation Planning Grants	Operations	0 to 5 years

Table C-3: MTC—Prioritized Action Plan

No.	Project Name	Priority	Potential Funding Source	Responsibility	Timing
*addition	Disaster Regional Funding Plan	High	General operating budget	Policy	0 to 5 years
*addition	Transit-Oriented Residential Seismic/Wildfire Retrofits	High	FEMA HMA Grants	Operations	0 to 5 years

Notes:
FEMA = Federal Emergency Management Agency
FTA = Federal Transit Administration
HMA = Hazard Mitigation Assistance
MTC = Metropolitan Transportation Commission

Table C-4: MTC—Integration of 2021 MJHMP

MJHMP Section	Existing Plan/Policy/Program	Process/Timeframe
Mitigation strategy	Relevant mitigation actions in the 2021 MJHMP will be incorporated into the Plan Bay Area Implementation Plan.	When the Transportation Improvement Program is updated every 4 years.
Mitigation strategy	Relevant mitigation actions in the 2021 MJHMP will be incorporated into the MTC's Climate Change Initiatives Program.	As directed in the Plan Bay Area.

Notes:
MJHMP = Multi-Jurisdictional Hazard Mitigation Plan
MTC = Metropolitan Transportation Commission
TIP = Transportation Improvement Program

APPENDIX D—ALAMEDA-CONTRA COSTA TRANSIT DISTRICT

Table D-1: Hazard Impacts on AC Transit's Fixed Critical Facilities

Hazard Area	# of Facilities Impacted
Sea Level Rise Inundation Area—3 Ft.	0
Sea Level Rise Inundation Area—6 Ft.	1
Dam Breach Inundation Area—High Hazard	0
Dam Breach Inundation Area—Extremely High Hazard	0
Probabilistic Earthquake Shaking Area—Severe	0
Probabilistic Earthquake Shaking Area—Violent	9
Special Flood Hazard Area—0.2% Annual Chance Flood	0
Special Flood Hazard Area—1% Annual Chance Flood	0
Deep-Seated Landslide Class IX and X Area	0
Existing Landslides Area—Few	1
Existing Landslides Area—Most	2
CPUC—Fire Threat Area—Tier 2 Elevated	0
CPUC—Fire Threat Area—Tier 3 Extreme	0
Maximum Tsunami Run-Up Area	0
Fire Hazard Severity Zones: State Responsibility Area—High	0
Fire Hazard Severity Zones: State Responsibility Area—Very High	0
Fire Hazard Severity Zones: Local Responsibility Area—Very High	0
Wildland Urban Interface—Influence	0
Wildland Urban Interface—Intermix	0
Wildland Urban Interface—Interface	0

Notes:
AC Transit = Alameda-Contra Costa Transit District
CPUC = California Public Utilities Commission
Ft = foot/feet

Table D-2: AC Transit—Authorities, Policies, Programs, and Resources

Type/Name	Description	Ability to Expand/Improve
Planning and Regulatory		
AC Transit Emergency Operations Plan	• Describes the organizational structures, roles and responsibilities, and protocols for providing emergency response and short-term recovery. • Describes the purpose, situation and assumptions, concept of operations, organization, assignment of responsibilities, plan development and maintenance, authorities, and references.	
SRTP FY 2014/15 through 2023/24	• Provides information on an agency's transportation goals and policies as well as socioeconomic, environmental, and other factors that will affect the operation of the transportation system over the next 10 years.	
AC Transit Strategic Plan	• The overall approach of this plan is to focus bus transit resources on the services that AC Transit can provide best, the services that will continue to be needed by transit-dependent people, and the services that will help East Bay cities meet their land use and environmental goals now and in the future.	AC Transit can develop hazard mitigation related strategic initiatives in the plan.
Administrative and Technical		
Emergency Management	• Coordinates local response and relief activities in the Emergency Operations Center. • Works closely with local, state, and federal partners to support planning and training and to provide information and coordinate assistance.	
Operations	• Provides direct or contract civil, structural, and mechanical engineering services, including contract, project, and construction management.	
Planning	• Develops and maintains transportation plans. • Anticipates and acts on the need for new plans and policies.	
Finance	• Sources, negotiates, and selects goods and services.	
Media Affairs	• Provides information to the public and media as necessary.	
Financial		
Tolls/Fares	• Charges via direct user fees for the use of facility capacity and services and are used as a way to pay for operating expenses and transportation projects.	

Table D-2: AC Transit—Authorities, Policies, Programs, and Resources

Type/Name	Description	Ability to Expand/Improve
Local Option Transportation Sales Tax	• Funds local transportation projects and programs.	
The Mills-Alquist-Deddeh Act (SB 325) / TDA of 1971 funds	• Provides local agencies with two major sources of funding: the Local Transportation Fund and State Transit Assistance funds; these funds contribute to the development and support of public transportation and are allocated to areas of each county based on population, taxable sales, and transit performance.	
Caltrans Sustainable Transportation Planning Grants	• Encourages local and regional planning that furthers state goals, including—but not limited to—the goals and best practices cited in the Regional Transportation Plan Guidelines. • Includes improving public safety and security, and practicing environmental stewardship, adopted by the California Transportation Commission.	AC Transit can apply for annual grants to address: 1) transportation-related issues around climate change and wildfires; and 2) emergency preparedness/response planning projects.
FEMA HMA Grants	• Provides funding for eligible mitigation activities that reduce disaster losses and protect life and property from future disaster damages. • Supports pre- and post-disaster mitigation plans and projects. • Available to California communities/agencies after a presidentially declared disaster has occurred, administered by Cal OES. • The Building Resilient Infrastructure and Communities program is an annual nationally competitive program that focuses on reducing the nation's risk by funding public infrastructure projects that increase a community's resilience before a disaster affects an area.	AC Transit can apply for HMA grant funding once the 2021 MJHMP has been approved and adopted.
FTA Emergency Relief Program	• Provides post-disaster assistance to public transit operators by funding the protection, repair, and/or replacement of equipment and facilities that may suffer or have suffered serious damage as a result of an emergency or disaster. • Funds capital projects to protect, repair, or replace facilities or equipment that are in danger of suffering serious damage, or have suffered serious damage, as a result of an emergency. • Can also fund the operating costs of evacuation, rescue operations, temporary public transportation service, or reestablishing, expanding, or relocating service before, during or after an emergency.	

Table D-2: AC Transit—Authorities, Policies, Programs, and Resources

Type/Name	Description	Ability to Expand/Improve
Education and Outreach		
511 SF Bay	• Provides traffic, transit, carpool, vanpool, and bicycling information 24 hours a day, 7 days a week from anywhere in the nine-county Bay Area. • Travelers can register for 511ALERT, a text-based notification system. • In the event of an emergency, registered users will receive up-to-date transportation alert information gathered from various trusted government sources. • Alerts complement the information currently provided by 511 on its website, phone line, and social media channels.	
Service Alerts	• Creates service alerts with additional information when there is a network disruption.	
Media / Social Media	• Creates and shares content via media or social networking.	

Notes:
AC Transit = Alameda-Contra Costa Transit District
Cal OES = California Office of Emergency Services
FTA = Federal Transit Administration
FY = fiscal year
HMA = Hazard Mitigation Assistance
MJHMP = Multi-Jurisdictional Hazard Mitigation Plan
SB = Senate Bill
SF = San Francisco
SRTP = Short-Range Transit Plan
TDA = Transportation Development Act

Table D-3: AC Transit—Prioritized Action Plan

No.	Project Name	Priority	Potential Funding Source	Responsibility	Timing
3	Interagency Communication and Coordination	High	Caltrans Sustainable Transportation Planning Grants	Planning & Operations	0 to 5 years
20	Standby Power Systems / Generators	High	FEMA HMA Grants	Operations	0 to 5 years
22	Seismic Retrofits	High	FEMA HMA Grants	Operations	0 to 5 years
24	Crowding Information App	High	Caltrans Sustainable Transportation Planning Grants	Planning & Operations	0 to 5 years
25	Highway Corridor Landslide Hazard Mapping	Medium	FEMA HMA Grants	Planning & Operations	5+ years
28	Evacuation Preparedness	High	Caltrans Sustainable Transportation Planning Grants	Planning & Operations	0 to 5 years

Notes:
AC Transit = Alameda-Contra Costa Transit District
Caltrans = California Department of Transportation
FEMA = Federal Emergency Management Agency
HMA = Hazard Mitigation Assistance

Table D-4: AC Transit—Integration of 2021 MJHMP

MJHMP Section	Existing Plan/Policy/Program	Process/Timeframe
Mitigation strategy	Relevant mitigation goals and actions in the 2021 MJHMP will be incorporated into the SRTP's goals, objectives and standards.	When the SRTP is updated every 2 years.
Mitigation Strategy	Relevant mitigation goals and actions in the 20221 MJHMP can be incorporated into the Strategic Plan's strategic initiatives.	When objectives/metrics are refined.

Notes:
AC Transit = Alameda-Contra Costa Transit District
MJHMP = Multi-Jurisdictional Hazard Mitigation Plan
SRTP = Short-Range Transit Plan
TIP = Transportation Improvement Program

APPENDIX E—CENTRAL CONTRA COSTA TRANSIT AUTHORITY

Table E-1: Hazard Impacts on CCCTA's Fixed Critical Facilities

Hazard Area	# of Facilities Impacted
Sea Level Rise Inundation Area—3 Ft.	0
Sea Level Rise Inundation Area—6 Ft.	0
Dam Breach Inundation Area—High Hazard	0
Dam Breach Inundation Area—Extremely High Hazard	0
Probabilistic Earthquake Shaking Area—Severe	2
Probabilistic Earthquake Shaking Area—Violent	0
Special Flood Hazard Area—0.2% Annual Chance Flood	0
Special Flood Hazard Area—1% Annual Chance Flood	0
Existing Landslides Area—Few	0
Existing Landslides Area—Most	0
Deep-Seated Landslide Class IX and X Area	0
CPUC—Fire Threat Area—Tier 2 Elevated	0
CPUC—Fire Threat Area—Tier 3 Extreme	0
Maximum Tsunami Run-Up Area	0
Fire Hazard Severity Zones: State Responsibility Area—High	0
Fire Hazard Severity Zones: State Responsibility Area—Very High	0
Fire Hazard Severity Zones: Local Responsibility Area—Very High	0
Wildland Urban Interface—Influence	0
Wildland Urban Interface—Intermix	0
Wildland Urban Interface—Interface	0

Notes:
CCCTA = Central Contra Costa Transit Authority
CPUC = California Public Utilities Commission
Ft. = foot/feet

Table E-2: CCCTA—Authorities, Policies, Programs, and Resources

Type / Name	Description	Ability to Expand / Improve
Planning and Regulatory		
Internal Emergency Plan	• Describes the organizational structures, roles and responsibilities, and protocols for providing emergency response and short-term recovery. • Describes the purpose, situation and assumptions, concept of operations, organization, assignment of responsibilities, plan development and maintenance, authorities, and references.	
2020 TEP	• Provides information on an agency's transportation goals and policies as well as socioeconomic, environmental, and other factors that will affect the operation of the transportation system over the next 35 years. • Includes a list of planned major capital projects, their estimated costs, and the revenues reasonably expected to be available to fund the projects.	The TEP can be amended by the authority-governing body.
Hazard / Safety Analysis (Assessment Studies)	• A variety of transit studies, corridor studies, improvement studies, etc. • Identifies potential transportation-related hazards and safety measures and proposes how to mitigate risks.	Studies can be expanded to include a hazard analysis component.
Administrative and Technical		
Safety and Training	• Coordinates local response and relief activities in the Emergency Operations Center. • Works closely with local, state, and federal partners to support planning and training and to provide information and coordinate assistance.	
Construction	• Provides direct or contract civil, structural, and mechanical engineering services, including contract, project, and construction management.	
Planning	• Develops and maintains transportation plans. • Anticipates and acts on the need for new plans and policies.	

Table E-2: CCCTA—Authorities, Policies, Programs, and Resources

Type / Name	Description	Ability to Expand / Improve
Finance and Accounting	• Sources, negotiates and selects goods and services.	
External Affairs	• Provides information to the public and media as necessary.	
Financial		
Tolls / Fares	• Charges via direct user fees for the use of facility capacity and services and are used as a way to pay for operating expenses and transportation projects.	
Local Option Transportation Sales Tax	• A half-cent transportation sales tax from 2009 through 2034, approved by Contra Costa County voters in 2004.	
California Senate Bill 1 – the Road Repair and Accountability Act of 2017	• Aims to repair roads, improve traffic safety, and expand public transit systems through maintenance projects on state highways. • Provides funding to enhance trade corridors, transit, and active transportation facilities, in addition to repairing local streets and roads throughout California.	
The Mills-Alquist-Deddeh Act (SB 325) / TDA of 1971 funds	• Provides local agencies with two major sources of funding: the Local Transportation Fund and State Transit Assistance funds; these funds contribute to the development and support of public transportation and are allocated to areas of each county based on population, taxable sales, and transit performance.	
Caltrans Sustainable Transportation Planning Grants	• Encourages local and regional planning that furthers state goals, including—but not limited to—the goals and best practices cited in the Regional Transportation Plan Guidelines. • Includes improving public safety and security, and practicing environmental stewardship, adopted by the California Transportation Commission.	CCCTA can apply for annual grants to address: 1) transportation-related issues around climate change and wildfires; and 2) emergency preparedness/response planning projects.

Table E-2: CCCTA—Authorities, Policies, Programs, and Resources

Type / Name	Description	Ability to Expand / Improve
FEMAHMA Grants	• Provides funding for eligible mitigation activities that reduce disaster losses and protect life and property from future disaster damages. • Supports pre- and post-disaster mitigation plans and projects. • Available to California communities/agencies after a presidentially declared disaster has occurred, administered by Cal OES. • The Building Resilient Infrastructure and Communities program is an annual nationally competitive program that focuses on reducing the nation's risk by funding public infrastructure projects that increase a community's resilience before a disaster affects an area.	CCCTA can apply for HMA grant funding once the 2021 MJHMP has been approved and adopted.
FTA Emergency Relief Program	• Provides post-disaster assistance to public transit operators by funding the protection, repair, and/or replacement of equipment and facilities that may suffer or have suffered serious damage as a result of an emergency or disaster. • Funds capital projects to protect, repair, or replace facilities or equipment that are in danger of suffering serious damage, or have suffered serious damage as a result of an emergency. • Can also fund the operating costs of evacuation, rescue operations, temporary public transportation service, or reestablishing, expanding, or relocating service before, during, or after an emergency.	

Table E-2: CCCTA—Authorities, Policies, Programs, and Resources

Type / Name	Description	Ability to Expand / Improve
Education and Outreach		
511 SF Bay	• Provides traffic, transit, carpool, vanpool, and bicycling information 24 hours a day, 7 days a week from anywhere in the nine-county Bay Area. • Travelers can register for 511ALERT, a text-based notification system. • In the event of an emergency, registered users will receive up-to-date transportation alert information gathered from various trusted government sources. • Alerts complement the information currently provided by 511 on its website, phone line, and social media channels.	
Service Alerts	• Creates service alerts with additional information when there is a network disruption.	
Media / Social Media	• Creates and shares content through media or social networking.	

Notes:
Cal OES = California Office of Emergency Services
CCCTA = Central Contra Costa Transit Authority
FTA = Federal Transit Administration
HMA = Hazard Mitigation Assistance
MJHMP = Multi-Jurisdictional Hazard Mitigation Plan
MTC = Metropolitan Transportation Commission
SB = Senate Bill
SF = San Francisco
TDA = Transportation Development Act
TEP = Transportation Expenditure Plan

Table E-3: CCCTA—Prioritized Action Plan

No.	Project Name	Priority	Potential Funding Source	Responsibility	Timing
20	Standby Power Systems / Generators	High	FEMA HMA Grants	Construction	0 to 2 years
27	Defensible Space	High	FEMA HMA Grants	Construction	0 to 5 years

Notes:
CCCTA = Central Contra Costa Transit Authority
FEMA = Federal Emergency Management Agency
HMA = Hazard Mitigation Assistance

Table E-4: CCCTA—Integration of 2021 MJHMP

MJHMP Section	Existing Plan/Policy/Program	Process/Timeframe
Mitigation strategy	Relevant mitigation actions in the 2021 MJHMP will be incorporated into the 2020 TEP.	When the authority-governing body amends the 2020 TEP.

Notes:
CCCTA = Central Contra Costa Transit Authority
MJHMP = Multi-Jurisdictional Hazard Mitigation Plan
TEP = Transportation Expenditure Plan

APPENDIX F—MARIN COUNTY TRANSIT DISTRICT

Table F-1: Hazard Impacts on Marin Transit's Fixed Critical Facilities

Hazard Area	# of Facilities Impacted
Sea Level Rise Inundation Area—3 Ft.	5
Sea Level Rise Inundation Area—6 Ft.	6
Dam Breach Inundation Area—High Hazard	1
Dam Breach Inundation Area—Extremely High Hazard	0
Probabilistic Earthquake Shaking Area—Severe	10
Probabilistic Earthquake Shaking Area—Violent	3
Special Flood Hazard Area—0.2% Annual Chance Flood	6
Special Flood Hazard Area—1% Annual Chance Flood	5
Deep-Seated Landslide Class IX and X Area	0
Existing Landslides Area—Few	1
Existing Landslides Area—Most	0
CPUC—Fire Threat Area—Tier 2 Elevated	1
CPUC—Fire Threat Area—Tier 3 Extreme	0
Maximum Tsunami Run-Up Area	0
Fire Hazard Severity Zones: State Responsibility Area—High	1
Fire Hazard Severity Zones: State Responsibility Area—Very High	0
Fire Hazard Severity Zones: Local Responsibility Area—Very High	0
Wildland Urban Interface—Influence	0
Wildland Urban Interface—Intermix	0
Wildland Urban Interface—Interface	2

Notes:
CPUC = California Public Utilities Commission
Ft. = foot/feet
Marin Transit = Marin County Transit District

Table F-2: Marin Transit—Authorities, Policies, Programs, and Resources

Type/Name	Description	Ability to Expand/Improve
Planning and Regulatory		
Emergency Response Plan	• Addresses the needs of passengers first in an emergency. • Develops communication and coordination, then strategies to meet priorities for emergency needs in response to the Marin EOC. • Provides paratransit operator basic first aid training and emergency management training for key management staff. • When the Marin EOC is activated, Marin Transit staff serve in the Marin EOC in the transportation unit of the Logistics Section. • Under direction of the EOC and incident command, the transportation unit develops strategies and delivers resources from partner transit agencies and operations contractors. • Integrates information and operations with the Marin EOC when activated. • Marin Transit and its contractors' plans for emergency staffing, fuel, repairs, maintenance, and staging areas, except when directed by an incident commander. • Deploys Marin Transit Bus Resource Coordinator to the County.	
2020 – 2029 SRTP	• Provides information on the district's transportation goals and policies as well as socioeconomic, environmental, and other factors that will affect the operation of the transportation system over the next 10 years. • The SRTP will be fiscally constrained in the first 5 years and forecasts the costs and revenues associated with the delivery of services. • It also includes a list of planned major capital projects, their estimated costs, and the revenues reasonably expected to be available to fund the projects.	The local transportation sales tax measure requires Marin Transit to amend the SRTP every 2 years.
Marin County emergency exercises	• Since at least 2004, Marin Transit staff have participated in Marin County Office of Emergency Services exercises and workshops and staff to the Marin EOC.	Exercises can be expanded to address recent hazards and/or emerging hazard/threat issues while workshops can be created to address organizational response, resources, and communication strategies.

Table F-2: Marin Transit—Authorities, Policies, Programs, and Resources

Type/Name	Description	Ability to Expand/Improve
Administrative and Technical		
Policy & Legislative Programs	• Works closely with local, state, and federal partners to support planning, and training, and emergency preparedness. • Acts as staff to the Marin EOC under the Logistics Section P and to provides information and coordinates assistance with emergency response strategies.	
Planning & Operations	• Develops and maintains transportation plans. • Anticipates and acts on the need for new plans and policies. • Manages the delivery of all transportation services, including paratransit and fixed route.	
Finance & Capital Programs	• Provides direct or contracted civil, structural, and mechanical engineering services, including contract, project, and construction management.	
General Manager, Transportation Planning Manager, Planning Analyst	• Provides information to the public and media as necessary.	
Financial		
Tolls / Fares	• Develops and implements fare policies • Charges via direct user fees for the use of facility capacity; services and are used as a way to partially offset to pay for operation expenses and transportation projects with an emphasis on equitable access for low-income residents.	
Local Option Transportation Sales Tax	• Funds local transportation services, projects, and programs.	
The Mills-Alquist-Deddeh Act (SB 325) / TDA of 1971 funds	• Provides local agencies with two major sources of funding: the Local Transportation Fund and State Transit Assistance funds; these funds contribute to the development and support of public transportation and are allocated to areas of each county based on population, taxable sales, and transit performance, and operator revenues.	

Table F-2: Marin Transit—Authorities, Policies, Programs, and Resources

Type/Name	Description	Ability to Expand/Improve
Caltrans Sustainable Transportation Planning Grants	• Encourages local and regional planning that furthers state goals, including—but not limited to—the goals and best practices cited in the Regional Transportation Plan Guidelines. • Includes improving public safety and security, and practicing environmental stewardship, adopted by the California Transportation Commission.	Marin Transit can apply for annual grants to address: 1) transportation-related issues around climate change and wildfires; and 2) emergency preparedness/response planning projects.
FEMA HMA Grants	• Provides funding for eligible mitigation activities that reduce disaster losses and protect life and property from future disaster damages. • Supports pre- and post-disaster mitigation plans and projects. • Available to California communities/agencies after a presidentially declared disaster has occurred, administered by Cal OES. • The Building Resilient Infrastructure and Communities is an annual nationally competitive program that focuses on reducing the nation's risk by funding public infrastructure projects that increase a community's resilience before a disaster affects an area.	Marin Transit can apply for HMA grant funding once the 2021 MJHMP has been approved and adopted.
FTA—Section 5311 Funds	• Provides funding to help ensure that rural Americans have access to transit to meet basic mobility needs. • Funds are provided to the states to be used for public transportation projects in areas other than urbanized areas.	Marin Transit relies on 5311 to partially fund the West Marin Stagecoach, with consists of two routes linking West Marin to the US 101 corridor.
FTA Emergency Relief Program	• Provides post-disaster assistance to public transit operators by funding the protection, repair, and/or replacement of equipment and facilities that may suffer or have suffered serious damage as a result of an emergency or disaster. • Funds capital projects to protect, repair, or replace facilities or equipment that are in danger of suffering serious damage, or have suffered serious damage as a result of an emergency. • Can also fund the operating costs of evacuation, rescue operations, temporary public transportation service, or reestablishing, expanding, or relocating service before, during or after an emergency.	

Table F-2: Marin Transit—Authorities, Policies, Programs, and Resources

Type/Name	Description	Ability to Expand/Improve
Education and Outreach		
511 SF Bay	• Provides traffic, transit, carpool, vanpool, and bicycling information 24 hours a day, 7 days a week from anywhere in the nine-county Bay Area. • Travelers can register for 511ALERT, a text-based notification system. • In the event of an emergency, registered users will receive up-to-date transportation alert information gathered from various trusted government sources. • Alerts complement the information currently provided by 511 on its website, phone line, and social media channels.	
Service Alerts	• Creates service alerts with additional information when there is a network disruption.	
Media / Social Media	• Creates and shares content and alerts via media or social networking.	

Notes:
EOC = Emergency Operations Center
FTA = Federal Transit Administration
HMA = Hazard Mitigation Assistance
Marin Transit = Marin County Transit District
MJHMP = Multi-Jurisdictional Hazard Mitigation Plan
SF = San Francisco
STRP = Short Range Transit Plan
TDA = Transportation Development Act

Table F-3: Marin Transit—Prioritized Action Plan

No.	Project Name	Priority	Potential Funding Source	Responsibility	Timing
3	Interagency Communication and Coordination (Marin Emergency Alert Authority)	High	Caltrans Sustainable Transportation Planning Grants	Planning & Operations	0 to 5 years
5	Owner/Operator Roles and Responsibilities	High	General operating budget	Planning & Operations	0 to 5 years
8	Green Infrastructure Stormwater Management Best Practices	High	Caltrans Sustainable Transportation Planning Grants	Planning & Operations	0 to 5 years
11	Critical Utility System Elevation	High	FEMA HMA Grants	Planning & Operations	0 to 5 years
12	Passive Floodproofing Measures	High	FEMA HMA Grants	Planning & Operations	0 to 5 years
20	Standby Power Systems / Generators	High	FEMA HMA Grants	Planning & Operations	0 to 5 years
22	Seismic Retrofits	High	FEMA HMA Grants	Planning & Operations	0 to 5 years
28	Evacuation Preparedness	High	Caltrans Sustainable Transportation Planning Grants	Planning & Operations	0 to 5 years

Notes:
FEMA = Federal Emergency Management Agency
HMA = Hazard Mitigation Assistance
Marin Transit = Marin County Transit District

Table F-4: Marin Transit—Integration of 2021 MJHMP

MJHMP Section	Existing Plan/Policy/Program	Process/Timeframe
Mitigation strategy	Relevant mitigation goals and actions in the 2021 MJHMP will be incorporated into the SRTP.	When the SRTP is amended every 2 years.

Notes:
Marin Transit = Marin County Transit District
MJHMP = Multi-Jurisdictional Hazard Mitigation Plan
STRP = Short Range Transit Plan

APPENDIX G—NAPA VALLEY TRANSPORTATION AUTHORITY

Table G-1: Hazard Impacts on NVTA's Fixed Critical Facilities

Hazard Area	# of Facilities Impacted
Sea Level Rise Inundation Area—3 Ft.	0
Sea Level Rise Inundation Area—6 Ft.	0
Dam Breach Inundation Area—High Hazard	0
Dam Breach Inundation Area—Extremely High Hazard	2
Probabilistic Earthquake Shaking Area—Severe	3
Probabilistic Earthquake Shaking Area—Violent	0
Special Flood Hazard Area—0.2% Annual Chance Flood	1
Special Flood Hazard Area—1% Annual Chance Flood	1
Deep-Seated Landslide Class IX and X Area	0
Existing Landslides Area—Few	0
Existing Landslides Area—Most	0
CPUC—Fire Threat Area—Tier 2 Elevated	0
CPUC—Fire Threat Area—Tier 3 Extreme	0
Maximum Tsunami Run-Up Area	0
Fire Hazard Severity Zones: State Responsibility Area—High	0
Fire Hazard Severity Zones: State Responsibility Area—Very High	0
Fire Hazard Severity Zones: Local Responsibility Area—Very High	0
Wildland Urban Interface—Influence Zone	0
Wildland Urban Interface—Urban Intermix Zone	0
Wildland Urban Interface—Interface Zone	0

Notes:
CPUC = California Public Utilities Commission
Ft. = foot/feet
NVTA = Napa Valley Transportation Authority

Table G-2: NVTA—Authorities, Policies, Programs, and Resources

Type / Name	Description	Ability to Expand/Improve
Planning and Regulatory		
Countywide Transportation Plan	• Provides information on an agency's transportation goals and policies as well as socioeconomic, environmental, and other factors that will affect the operation of the transportation system over the next 25 years. • Includes a list of planned major capital projects, their estimated costs, and the revenues reasonably expected to be available to fund the projects. • Generally updated every 4 years.	
SRTP	• Outlines the capital expenditure program and forecasted expenditures and needs for the next 5 years for NVTA and Vine Transit. • Identifies short-range goals necessary to meet the 5-year planning horizon.	The SRTP identifies specific capital projects, which could include mitigation actions identified in the 2021 MJHMP.
Administrative and Technical		
Capital Development & Planning	• Coordinates local response and relief activities in the Emergency Operation Center. • Works closely with local, state, and federal partners to support planning and training to provide information and coordinate assistance.	
Engineering & Projects	• Provides direct or contract civil, structural, and mechanical engineering services, including contract, project, and construction management.	
Capital Development &Planning	• Develops and maintains transportation plans. • Anticipates and acts on the need for new plans and policies.	
Administration, Finance & Policy	• Sources, negotiates and selects goods and services.	
Communications	• Provides information to the public and media as necessary.	

Table G-2: NVTA—Authorities, Policies, Programs, and Resources

Type / Name	Description	Ability to Expand/Improve
Financial		
Tolls/Fares	• Charges via direct user fees for the use of facility capacity and services and are used as a way to pay for operating expenses and transportation projects.	
Local Option Transportation Sales Tax	• Funds local transportation projects and programs.	
The Mills-Alquist-Deddeh Act (SB 325) / TDA of 1971 funds	• Provides local agencies with two major sources of funding: the Local Transportation Fund and State Transit Assistance funds; these funds contribute to the development and support of public transportation and are allocated to areas of each county based on population, taxable sales, and transit performance.	
Caltrans Sustainable Transportation Planning Grants	• Encourages local and regional planning that furthers state goals, including—but not limited to—the goals and best practices cited in Regional Transportation Plan Guidelines. • Includes improving public safety and security, and practicing environmental stewardship, adopted by the California Transportation Commission.	NVTA can apply for annual grants to address: 1) transportation-related issues around climate change and wildfires; and 2) emergency preparedness/response planning projects.
FEMA HMA Grants	• Provides funding for eligible mitigation activities that reduce disaster losses and protect life and property from future disaster damages. • Supports pre- and post-disaster mitigation plans and projects. • Available to California communities/agencies after a presidentially declared disaster has occurred, administered by Cal OES. • The Building Resilient Infrastructure and Communities program is an annual nationally competitive program that focuses on reducing the nation's risk by funding public infrastructure projects that increase a community's resilience before a disaster affects an area.	NVTA can apply for HMA grant funding once the 2021 MJHMP has been approved and adopted.

Table G-2: NVTA—Authorities, Policies, Programs, and Resources

Type / Name	Description	Ability to Expand/Improve
FTA Emergency Relief Program	• Provides post-disaster assistance to public transit operators by funding the protection, repair, and/or replacement of equipment and facilities that may suffer or have suffered serious damage as a result of an emergency or disaster. • Funds capital projects to protect, repair, or replace facilities or equipment that are in danger of suffering serious damage, or have suffered serious damage as a result of an emergency. • Can also fund the operating costs of evacuation, rescue operations, temporary public transportation service, or reestablishing, expanding, or relocating service before, during or after an emergency.	
Education and Outreach		
511 SF Bay	• Provides traffic, transit, carpool, vanpool, and bicycling information 24 hours a day, 7 days a week from anywhere in the nine-county Bay Area. • Travelers can register for 511ALERT, a text-based notification system. • In the event of an emergency, registered users will receive up-to-date transportation alert information gathered from various trusted government sources. • Alerts complement the information currently provided by 511 on its website, phone line, and social media channels.	
Service Alerts	• Creates service alerts with additional information when there is a network disruption.	
Media / Social Media	• Creates and shares context via media or social networking.	

Notes:
Cal OES = California Office of Emergency Services
FTA = Federal Transit Administration
HMA = Hazard Mitigation Assistance
MJHMP = Multi-Jurisdictional Hazard Mitigation Plan
NVTA = Napa Valley Transportation Authority
SF = San Francisco
STRP = Short Range Transit Plan
TDA = Transportation Development Act

Table G-3: NVTA—Prioritized Action Plan

No.	Project Name	Priority	Potential Funding Source	Responsibility	Timing
3	Interagency Communication and Coordination	High	Caltrans Sustainable Transportation Planning Grants	Administration, Finance & Policy	0 to 5 years
11	Critical Utility System Elevation	High	FEMA HMA Grants	Administration, Finance & Policy	0 to 5 years
12	Passive Floodproofing Measures	High	FEMA HMA Grants	Administration, Finance & Policy	0 to 5 years
17	Standard Operating Procedures for Alternative Locations	High	Caltrans Sustainable Transportation Planning Grants	Administration, Finance & Policy	0 to 5 years
20	Standby Power Systems / Generators	High	FEMA HMA Grants	Administration, Finance & Policy	0 to 5 years
22	Seismic Retrofits	High	FEMA HMA Grants	Administration, Finance & Policy	0 to 5 years
28	Evacuation Preparedness	High	Caltrans Sustainable Transportation Planning Grants	Administration, Finance & Policy	0 to 5 years

Notes:
NVTA = Napa Valley Transportation Authority
FEMA = Federal Emergency Management Agency
HMA = Hazard Mitigation Assistance

Table G-4: NVTA—Integration of 2021 MJHMP

MJHMP Section	Existing Plan/Policy/Program	Process/Timeframe
Mitigation strategy	Relevant mitigation actions in the 2021 MJHMP will be presented at public meetings. NVTA implements projects and programs approved by the voters through policy, planning, and funding decisions made in public meetings.	Ongoing / during public meetings.
Mitigation strategy	Relevant mitigation goals and actions in the 2021 MJHMP will be incorporated into the SRTP's goals, objectives and standards.	When the SRTP is amended every 5 years.

Notes:
MJHMP = Multi-Jurisdictional Hazard Mitigation Plan
NVTA = Napa Valley Transportation Authority
SRTP = Short Range Transit Plan

APPENDIX H—SANTA ROSA CITYBUS

Table H-1: Hazard Impacts on Santa Rosa CityBus's Fixed Critical Facilities

Hazard Area	# of Facilities Impacted
Sea Level Rise Inundation Area—3 Ft.	0
Sea Level Rise Inundation Area—6 Ft.	0
Dam Breach Inundation Area—High Hazard	0
Dam Breach Inundation Area—Extremely High Hazard	0
Probabilistic Earthquake Shaking Area—Severe	1
Probabilistic Earthquake Shaking Area—Violent	1
Special Flood Hazard Area—0.2% Annual Chance Flood	0
Special Flood Hazard Area—1% Annual Chance Flood	0
Deep-Seated Landslide Class IX and X Area	0
Existing Landslides Area—Few	0
Existing Landslides Area—Most	0
CPUC—Fire Threat Area—Tier 2 Elevated	0
CPUC—Fire Threat Area—Tier 3 Extreme	0
Maximum Tsunami Run-Up Area	0
Fire Hazard Severity Zones: State Responsibility Area—High	0
Fire Hazard Severity Zones: State Responsibility Area—Very High	0
Fire Hazard Severity Zones: Local Responsibility Area—Very High	0
Wildland Urban Interface—Influence	0
Wildland Urban Interface—Intermix	0
Wildland Urban Interface—Interface	0

Notes:
CPUC = California Public Utilities Commission
Ft. = foot/feet

Table H-2: Santa Rosa CityBus—Authorities, Policies, Programs, and Resources

Type / Name	Description	Ability to Expand /Improve
Planning and Regulatory		
City of Santa Rosa Emergency Operations Plan (2017)	• Describes the organizational structures, roles and responsibilities, and protocols for providing emergency response and short-term recovery. • Also includes the purpose, situation and assumptions, concept of operations, organization, assignment of responsibilities, plan development and maintenance, authorities, and references.	
SRTP for FY 2016-2025	• Provides information on an agency's transportation goals and policies as well as socioeconomic, environmental, and other factors that will affect the operation of the transportation system over the next 10 years. • Includes a list of planned major capital projects, their estimated costs, and the revenues reasonably expected to be available to fund the projects.	Goals, objectives, and standards for Santa Rosa CityBus are reviewed on an annual basis, and formally adjusted—if necessary—in the SRTP updates.
Administrative and Technical		
Santa Rosa CityBus Transit Planning and Operations	• CityBus does not act as the coordinating entity that is the command team in the emergency operations center. • CityBus staff is part of the logistics team and acts at the instruction of the command team and/or logistics team lead. • The CityBus staff that take instruction depends on the shift, but includes the transit operations superintendent and transit planner(s).	
Santa Rosa CityBus Transit Planning and Operations	• Santa Rosa CityBus direct or contract civil, structural, and mechanical engineering services, including contract, project, and construction management. • During an actual emergency, these responsibilities beyond the scope of Santa Rosa CityBus staff members' roles.	
Santa Rosa CityBus Transit Planning and Operations	• Transit planners, transit operations superintendent, and the deputy director for the transit department are responsible for maintaining transportation plans. • They anticipate and act on the need for new plans and policies.	

Table H-2: Santa Rosa CityBus—Authorities, Policies, Programs, and Resources

Type / Name	Description	Ability to Expand /Improve
City of Santa Rosa Purchasing	• Purchasing is handled entirely by the City of Santa Rosa's purchasing officer. • Santa Rosa CityBus may requisition goods and services by going through the purchasing officer.	
City of Santa Rosa Public Information	• All public information is disseminated by the City's Public Information team. • CityBus does not have staff directly attached to that team.	
Financial		
Tolls / Fares	• Charges via direct user fees for the use of facility capacity. • Services and are used as a way to pay for operating expenses and transportation projects.	
Local Option Transportation Sales Tax	• Funds local transportation projects and programs.	
The Mills-Alquist-Deddeh Act (SB 325) / TDA of 1971 funds	• Provides local agencies with two major sources of funding: the Local Transportation Fund and State Transit Assistance funds; these funds contribute to the development and support of public transportation and are allocated to areas of each county based on population, taxable sales, and transit performance.	
Caltrans Sustainable Transportation Planning Grants	• Encourages local and regional planning that furthers state goals, including—but not limited to—the goals and best practices cited in the Regional Transportation Plan Guideline. • Includes improving public safety and security, and practicing environmental stewardship, adopted by the California Transportation Commission.	Santa Rosa CityBus can apply for annual grants to address: 1) transportation-related issues around climate change and wildfires; and 2) emergency preparedness/response planning projects.

Table H-2: Santa Rosa CityBus—Authorities, Policies, Programs, and Resources

Type / Name	Description	Ability to Expand /Improve
FEMAHMA Grants	• Provides funding for eligible mitigation activities that reduce disaster losses and protect life and property from future disaster damages. • Supports pre- and post-disaster mitigation plans and projects. • Available to California communities/agencies after a presidentially declared disaster has occurred, administered by Cal OES. • The Building Resilient Infrastructure and Communities is an annual nationally competitive program that focuses on reducing the nation's risk by funding public infrastructure projects that increase a community's resilience before a disaster affects an area.	Santa Rosa CityBus can apply for HMA grant funding once the 2021 MJHMP has been approved and adopted.
FTA Emergency Relief Program	• Provides post-disaster assistance to public transit operators by funding the protection, repair, and/or replacement of equipment and facilities that may suffer or have suffered serious damage as a result of an emergency or disaster. • Funds capital projects to protect, repair, or replace facilities or equipment that are in danger of suffering serious damage, or have suffered serious damage as a result of an emergency. • Can also fund the operating costs of evacuation, rescue operations, temporary public transportation service, or reestablishing, expanding, or relocating service before, during, or after an emergency.	
Education and Outreach		
511 SF Bay	• Provides traffic, transit, carpool, vanpool, and bicycling information 24 hours a day, 7 days a week from anywhere in the nine-county Bay Area. • Travelers can register for 511ALERT, a text-based notification system. • In the event of an emergency, registered users will receive up-to-date transportation alert information gathered from various trusted government sources. • Alerts will complement the information currently provided by 511 on its website, phone line, and social media channels.	

Table H-2: Santa Rosa CityBus—Authorities, Policies, Programs, and Resources

Type / Name	Description	Ability to Expand /Improve
Service Alerts	• Creates service alerts with additional information when there is a network disruption.	
Media / Social Media	• Creates and shares content via media or social networking.	

Notes:
FTA = Federal Transit Administration
FY = Fiscal Year
HMA = Hazard Mitigation Assistance
MJHMP = Multi-Jurisdictional Hazard Mitigation Plan
SF = San Francisco
SRTP = Short Range Transit Plan
TDA = Transportation Development Act

Table H-3: Santa Rosa CityBus—Prioritized Action Plan

No.	Project Name	Priority	Potential Funding Source	Responsibility	Timing
3	Interagency Communication and Coordination	High	Caltrans Sustainable Transportation Planning Grants	Santa Rosa City Bus Transit Planning and Operations	0 to 5 years
19	Cooling and Smoke Relief Centers and Wildfire Evacuation Points and Shelter Locations Transportation Assessment	High	FEMA HMA Grants	Santa Rosa City Bus Transit Planning and Operations	0 to 5 years
20	Standby Power Systems / Generators	High	FEMA HMA Grants	Santa Rosa City Bus Transit Planning and Operations	0 to 2 years
21	Energy Storage for Electric Fleets	High	Caltrans Sustainable Transportation Planning Grants	Santa Rosa City Bus Transit Planning and Operations	0 to 5 years
24	Crowding Information App	High	Caltrans Sustainable Transportation Planning Grants	Santa Rosa City Bus Transit Planning and Operations	0 to 5 years
*addition	Communication Equipment	High	Operating budget, grant source to be determined	Santa Rosa City Bus Transit Planning and Operations	0 to 5 years

Notes:
FEMA = Federal Emergency Management Agency
HMA = Hazard Mitigation Assistance

Table H-4: Santa Rosa CityBus Integration of 2021 MJHMP

MJHMP Section	Existing Plan/Policy/Program	Process/Timeframe
Mitigation strategy	Relevant mitigation goals and actions in the 2021 MJHMP will be incorporated into the SRTP.	Goals and actions can be reviewed on an annual basis, and formally adjusted—if necessary—in the SRTP updates.

Notes:
MJHMP = Multi-Jurisdictional Hazard Mitigation Plan
SRTP = Short Range Transit Plan

APPENDIX I—SOLANO COUNTY TRANSIT

Table I-1: Hazard Impacts on SolTrans Fixed Critical Facilities

Hazard Area	# of Facilities Impacted
Sea Level Rise Inundation Area—3 Ft.	0
Sea Level Rise Inundation Area—6 Ft.	1
Dam Breach Inundation Area—High Hazard	0
Dam Breach Inundation Area—Extremely High Hazard	0
Probabilistic Earthquake Shaking Area—Severe	4
Probabilistic Earthquake Shaking Area—Violent	0
Special Flood Hazard Area—0.2% Annual Chance Flood	0
Special Flood Hazard Area—1% Annual Chance Flood	0
Deep-Seated Landslide Class IX and X Area	0
Existing Landslides Area—Few	1
Existing Landslides Area—Most	0
CPUC—Fire Threat Area—Tier 2 Elevated	0
CPUC—Fire Threat Area—Tier 3 Extreme	0
Maximum Tsunami Run-Up Area	0
Fire Hazard Severity Zones: State Responsibility Area—High	0
Fire Hazard Severity Zones: State Responsibility Area—Very High	0
Fire Hazard Severity Zones: Local Responsibility Area—Very High	0
Wildland Urban Interface—Influence	0
Wildland Urban Interface—Intermix	0
Wildland Urban Interface—Interface	0

Notes:
CPUC = California Public Utilities Commission
Ft. = foot/feet
SolTrans = Solano County Transit

Table I-2: SolTrans—Authorities, Policies, Programs, and Resources

Type/Name	Description	Ability to Expand/Improve
Planning and Regulatory		
2019 SolTrans Emergency Operations Plan	• Describes the organizational structures, roles and responsibilities, and protocols for providing emergency response and short-term recovery. • Also includes the purpose, situation and assumptions, concept of operations, organization, assignment of responsibilities, plan development and maintenance, authorities, and references.	
2013 SolTrans SRTP	• Provides information on an agency's transportation goals and policies as well as socioeconomic, environmental, and other factors that will affect the operation of the transportation system over the next 10 years. • Includes a list of planned major capital projects, their estimated costs, and the revenues reasonably expected to be available to fund the projects. • The current SRTP is for FY 2012-2013 through FY 2022-2023.	SolTrans can incorporate the 2021 MJHMP mitigation strategy into the SRTP Goals, Objectives, Measures, and Standards.
2018 Comprehensive Operational Analysis	• Evaluates local routes, General Public Dial-A-Ride, and Local Taxi Scrip in order to restructure these services.	SolTrans can add a hazard component into future comprehensive analyses.
Administrative and Technical		
Planning and Operations	• Coordinates local response and relief activities in the Emergency Operation Center. • Works closely with local, state, and federal partners to support planning and training, and to provide information and coordinate assistance.	
Planning and Operations	• Provides direct or contract civil, structural, and mechanical engineering services, including contract, project, and construction management.	
Planning and Operations	• Develops and maintains transportation plans. • Anticipates and acts on the need for new plans and policies.	
Finance and Administration	• Sources, negotiates and selects goods and services.	

Table I-2: SolTrans—Authorities, Policies, Programs, and Resources

Type/Name	Description	Ability to Expand/Improve
Planning and Operations	• Provides information to the public and media as necessary.	
Financial		
Tolls/Fares	• Charges via direct user fees for the use of facility capacity and services and are used as a way to pay for operating expenses and transportation projects.	
Local Option Transportation Sales Tax	• Funds local transportation projects and programs.	
The Mills-Alquist-Deddeh Act (SB 325) / TDA of 1971 funds	• Provides local agencies with two major sources of funding: the Local Transportation Fund and State Transit Assistance funds; these funds contribute to the development and support of public transportation and are allocated to areas of each county based on population, taxable sales and transit performance.	
Caltrans Sustainable Transportation Planning Grants	• Encourages local and regional planning that furthers state goals, including—but not limited to—the goals and best practices cited in Regional Transportation Plan Guidelines. • Includes improving public safety and security, and practicing environmental stewardship, adopted by the California Transportation Commission.	SolTrans can apply for annual grants to address: 1) transportation-related issues around climate change and wildfires; and 2) emergency preparedness/response planning projects.
FEMA HMA Grants	• Provides funding for eligible mitigation activities that reduce disaster losses and protect life and property from future disaster damages. • Supports pre- and post-disaster mitigation plans and projects. • Available to California communities/agencies after a presidentially declared disaster has occurred, administered by Cal OES. • The Building Resilient Infrastructure and Communities (BRIC) is an annual nationally competitive program that focuses on reducing the nation's risk by funding public infrastructure projects that increase a community's resilience before a disaster affects an area.	SolTrans can apply for HMA grant funding once the 2021 MJHMP has been approved and adopted.

Table I-2: SolTrans—Authorities, Policies, Programs, and Resources

Type/Name	Description	Ability to Expand/Improve
FTA Emergency Relief Program	• Provides post-disaster assistance to public transit operators by funding the protection, repair, and/or replacement of equipment and facilities that may suffer or have suffered serious damage as a result of an emergency or disaster. • Funds capital projects to protect, repair, or replace facilities or equipment that are in danger of suffering serious damage, or have suffered serious damage as a result of an emergency. • Can also fund the operating costs of evacuation, rescue operations, temporary public transportation service, or reestablishing, expanding, or relocating service before, during, or after an emergency.	
Education and Outreach		
511 SF Bay	• Provides traffic, transit, carpool, vanpool, and bicycling information 24 hours a day, 7 days a week from anywhere in the nine-county Bay Area. • Travelers can register for 511ALERT, a text-based notification system. • In the event of an emergency registered users will receive up-to-date transportation alert information gathered from various trusted government sources. • These alerts will complement the information currently provided by 511 on its website, phone line, and social media channels.	
Service Alerts	• Creates service alerts with additional information when there is a network disruption.	
Media / Social Media	• Creates and shares content via media or social networking.	

Notes:
Cal OES = California Office of Emergency Services
FTA = Federal Transit Administration
FY = Fiscal Year
HMA = Hazard Mitigation Assistance
MJHMP = Multi-Jurisdictional Hazard Mitigation Plan
SF = San Francisco
SolTrans = Solano County Transit
SRTP = Short Range Transit Plan
TDA = Transportation Development Act

Table I-3: SolTrans—Prioritized Action Plan

No.	Project Name	Priority	Potential Funding Source	Responsibility	Timing
3	Interagency Communication and Coordination	High	Caltrans Sustainable Transportation Planning Grants	Planning and Operations	0 to 5 years
20	Standby Power Systems / Generators	High	FEMA HMA Grants	Planning and Operations	0 to 5 years
22	Seismic Retrofits	High	FEMA HMA Grants	Planning and Operations	0 to 5 years
28	Evacuation Preparedness	High	Caltrans Sustainable Transportation Planning Grants	Planning and Operations	0 to 5 years

Notes:
FEMA = Federal Emergency Management Agency
HMA = Hazard Mitigation Assistance
SolTrans = Solano County Transit

Table I-4: SolTrans—Integration of 2021 MJHMP

MJHMP Section	Existing Plan/Policy/Program	Process/Timeframe
Mitigation strategy	Relevant mitigation goals and actions in the 2021 MJHMP will be incorporated into the SRTP.	When the SRTP is amended every 2 years.

Notes:
MJHMP = Multi-Jurisdictional Hazard Mitigation Plan
SolTrans = Solano County Transit
SRTP = Short Range Transit Plan

APPENDIX J—WESTERN CONTRA COSTA TRANSIT AUTHORITY

Table J-1: Hazard Impacts on WestCAT Fixed Critical Facilities

Hazard Area	# of Facilities Impacted
Sea Level Rise Inundation Area—3 Ft.	0
Sea Level Rise Inundation Area—6 Ft.	0
Dam Breach Inundation Area—High Hazard	0
Dam Breach Inundation Area—Extremely High Hazard	0
Probabilistic Earthquake Shaking Area—Severe	2
Probabilistic Earthquake Shaking Area—Violent	1
Special Flood Hazard Area—0.2% Annual Chance Flood	0
Special Flood Hazard Area—1% Annual Chance Flood	0
Deep-Seated Landslide Class IX and X Area	0
Existing Landslides Area—Few	3
Existing Landslides Area—Most	0
CPUC—Fire Threat Area—Tier 2 Elevated	0
CPUC—Fire Threat Area—Tier 3 Extreme	0
Maximum Tsunami Run-Up Area	0
Fire Hazard Severity Zones: State Responsibility Area—High	0
Fire Hazard Severity Zones: State Responsibility Area—Very High	0
Fire Hazard Severity Zones: Local Responsibility Area—Very High	0
Wildland Urban Interface—Influence	0
Wildland Urban Interface—Intermix	0
Wildland Urban Interface—Interface	0

Notes:
CPUC = California Public Utilities Commission
Ft. = foot/feet
WestCAT = Western Contra Costa Transit Authority

Table J-2: WestCAT—Authorities, Policies, Programs, and Resources

Type/Name	Description	Ability to Expand/Improve
Planning and Regulatory		
Emergency Operations Plan / Emergency Response Plan	• Describes the organizational structures, roles and responsibilities, and protocols for providing emergency response and short-term recovery. • Also includes purpose, situation and assumptions, concept of operations, organization, assignment of responsibilities, plan development and maintenance, authorities, and references.	
2016 – 2026 SRTP	• Provides information on an agency's transportation goals and policies as well as socioeconomic, environmental, and other factors that will affect the operation of the transportation system over the next 10 years. • Includes a list of planned major capital projects, their estimated costs, and the revenues reasonably expected to be available to fund the projects.	Recommendations in the SRTP are likely to be adjusted as necessary to respond to actual financial conditions, demand levels, and development changes.
Administrative and Technical		
Administration Division	• Tasked with planning, scheduling, budgeting, marketing, procurement, community outreach and compliance activities	
Operations Division	• Tasked with operations, including dispatch and road supervision, handled by a private contractor.	
Financial		
Tolls/Fares	• Charges via direct user fees for the use of facility capacity and services and are used as a way to pay for operating expenses and transportation projects.	
Local Option Transportation Sales Tax	• A half-cent transportation sales tax from 2009 through 2034, approved by Contra Costa County voters in 2004.	
The Mills-Alquist-Deddeh Act (SB 325) / TDA of 1971 funds	• Provides local agencies with two major sources of funding: the Local Transportation Fund and State Transit Assistance funds; these funds contribute to the development and support of public transportation and are allocated to areas of each county based on population, taxable sales, and transit performance.	

Table J-2: WestCAT—Authorities, Policies, Programs, and Resources

Type/Name	Description	Ability to Expand/Improve
Caltrans Sustainable Transportation Planning Grants	• Encourages local and regional planning that furthers state goals, including—but not limited to—the goals and best practices cited in the Regional Transportation Plan Guidelines. • Includes improving public safety and security, and practicing environmental stewardship, adopted by the California Transportation Commission.	WestCAT can apply for annual grants to address: 1) transportation-related issues around climate change and wildfires; and 2) emergency preparedness/response planning projects.
FEMA HMA Grants	• Provides funding for eligible mitigation activities that reduce disaster losses and protect life and property from future disaster damages. • Supports pre- and post-disaster mitigation plans and projects. • Available to California communities/agencies after a presidentially declared disaster has occurred, administered by Cal OES. • The Building Resilient Infrastructure and Communities is an annual nationally competitive program that focuses on reducing the nation's risk by funding public infrastructure projects that increase a community's resilience before a disaster affects an area.	WestCAT can apply for HMA grant funding once the 2021 MJHMP has been approved and adopted.
FTA Section 5307 Funds	• Makes federal resources available to urbanized areas and governors for transit capital and operating assistance in urbanized areas and for transportation-related planning.	
FTA Emergency Relief Program	• Provides post-disaster assistance to public transit operators by funding the protection, repair, and/or replacement of equipment and facilities that may suffer or have suffered serious damage as a result of an emergency or disaster. • Funds capital projects to protect, repair, or replace facilities or equipment that are in danger of suffering serious damage, or have suffered serious damage as a result of an emergency. • Can also fund the operating costs of evacuation, rescue operations, temporary public transportation service, or reestablishing, expanding, or relocating service before, during, or after an emergency.	

Table J-2: WestCAT—Authorities, Policies, Programs, and Resources

Type/Name	Description	Ability to Expand/Improve
Education and Outreach		
511 SF Bay	• Provides traffic, transit, carpool, vanpool, and bicycling information 24 hours a day, 7 days a week from anywhere in the nine-county Bay Area. • Travelers can register for 511ALERT, a text-based notification system. • In the event of an emergency, registered users will receive up-to-date transportation alert information gathered from various trusted government sources. • Alerts will complement the information currently provided by 511 on its website, phone line, and social media channels.	
Service Alerts	• Creates service alerts with additional information when there is a network disruption.	
Media / Social Media	• Creates and shares content via media or social networking.	

Notes:
Cal OES = California Office of Emergency Services
FTA = Federal Transit Administration
HMA = Hazard Mitigation Assistance
MJHMP = Multi-Jurisdictional Hazard Mitigation Plan
SF = San Francisco
SRTP = Short Range Transit Plan
TDA = Transportation Development Act
WestCAT = Western Contra Costa Transit Authority

Table J-3: WestCAT—Prioritized Action Plan

No.	Project Name	Priority	Potential Funding Source	Responsibility	Timing
3	Interagency Communication and Coordination	High	Caltrans Sustainable Transportation Planning Grants	Administration Division	0 to 5 years
5	Owner/Operator Roles and Responsibilities	High	Caltrans Sustainable Transportation Planning Grants, Annual Budget	Operations Division	0 to 5 years
17	Standard Operating Procedures for Alternative Locations	High	Caltrans Sustainable Transportation Planning Grants	Administration Division	0 to 5 years
19	Cooling and Smoke Relief Centers and Wildfire Evacuation Points and Shelter Locations Transportation Assessment	High	FEMA HMA Grants	Administration Division	0 to 5 years
24	Crowding Information App	High	Caltrans Sustainable Transportation Planning Grants	Administration Division	0 to 5 years

Notes:
FEMA = Federal Emergency Management Agency
HMA = Hazard Mitigation Assistance
WestCAT = Western Contra Costa Transit Authority

Table J-4: WestCAT—Integration of 2021 MJHMP

MJHMP Section	Existing Plan/Policy/Program	Process/Timeframe
Mitigation strategy	Relevant mitigation goals and actions in the 2021 MJHMP will be incorporated into the SRTP.	When full plans are prepared every 4 years with a mini-SRTP due in September of the years when no full SRTP is produced.

Notes:
MJHMP = Multi-Jurisdictional Hazard Mitigation Plan
SRTP = Short Range Transit Plan
WestCAT = Western Contra Costa Transit Authority

APPENDIX K—SAN FRANCISCO BAY AREA WATER EMERGENCY TRANSPORTATION AUTHORITY

Table K-1: Hazard Impacts on WETA's Fixed Critical Facilities

Hazard Area	# of Facilities Impacted
Sea Level Rise Inundation Area—3 Ft.	0
Sea Level Rise Inundation Area—6 Ft.	7
Dam Breach Inundation Area—High Hazard	0
Dam Breach Inundation Area—Extremely High Hazard	0
Probabilistic Earthquake Shaking Area—Severe	10
Probabilistic Earthquake Shaking Area—Violent	3
Special Flood Hazard Area—0.2% Annual Chance Flood	3
Special Flood Hazard Area—1% Annual Chance Flood	0
Deep-Seated Landslide Class IX and X Area	0
Existing Landslides Area—Few	0
Existing Landslides Area—Most	0
CPUC—Fire Threat Area—Tier 2 Elevated	0
CPUC—Fire Threat Area—Tier 3 Extreme	0
Maximum Tsunami Run-Up Area	9
Fire Hazard Severity Zones: State Responsibility Area—High	0
Fire Hazard Severity Zones: State Responsibility Area—Very High	0
Fire Hazard Severity Zones: Local Responsibility Area—Very High	0
Wildland Urban Interface—Urban Influence	0
Wildland Urban Interface—Urban Intermix	0
Wildland Urban Interface—Urban Influence	1

Notes:
CPUC =
Ft. = foot/feet
WETA = Water Emergency Transportation Authority

Table K-2: WETA—Authorities, Policies, Programs, and Resources

Type/ Name	Description	Ability to Expand/Improve
Planning and Regulatory		
2016 WETA Emergency Response Plan	• Describes the organizational structures, roles and responsibilities, and protocols for providing emergency response and short-term recovery. • Includes purpose, situation and assumptions, concept of operations, organization, assignment of responsibilities, plan development and maintenance, authorities, and references.	WETA is in the process of updating its ERP (which should be completed by the end of 2021) and the changes will focus largely on revising their Emergency Operations Center org chart and the responsibilities assigned to each position.
2020 WETA SRTP	• Provides information about financial resources and performance targets over a 5- to 10-year outlook.	Current SRTP is updated through FY 2028 – 2029.
2016 WETA Strategic Plan	• Outlines a vision for the San Francisco Bay Ferry system over the next 20 years that responds to passenger demand, makes critical infrastructure investments, and increases WETA's ability to respond to emergencies and system disruptions.	The WETA Board can revisit and reassess the direction of the Strategic Plan through planning studies and public forums.
Administrative and Technical		
Operations and Maintenance	• Coordinates local response and relief activities in the Emergency Operations Center. • Works closely with local, state, and federal partners to support planning and training and to provide information and coordinate assistance.	
Operations and Maintenance	• Provides direct or contract civil, structural, and mechanical engineering services, including contract, project, and construction management.	
Planning and Development	• Develops and maintains transportation plans. • Anticipates and acts on the need for new plans and policies.	
Finance and Administration	• Sources, negotiates and selects goods and services.	
Public Information and Marketing	• Provides information to the public and media as necessary.	

Table K-2: WETA—Authorities, Policies, Programs, and Resources

Type/ Name	Description	Ability to Expand/Improve
Financial		
Fares	• Charges via direct user fees for the use of facility capacity and services. • Fees are used to pay for operating expenses and transportation projects.	
Local Option Transportation Sales Tax	• Funds local transportation projects and programs.	
The Mills-Alquist-Deddeh Act (SB 325) / TDA of 1971 funds	• Provides local agencies with two major sources of funding: the Local Transportation Fund and State Transit Assistance funds; these funds contribute to the development and support of public transportation and are allocated to areas of each county based on population, taxable sales, and transit performance.	
Caltrans Sustainable Transportation Planning Grants	• Encourages local and regional planning that furthers state goals, including—but not limited to—the goals and best practices cited in the Regional Transportation Plan Guidelines. • Includes improving public safety and security and practicing environmental stewardship, adopted by the California Transportation Commission.	WETA can apply for annual grants to address: 1) transportation-related issues around climate change and wildfires; and 2) emergency preparedness/response planning projects.
FEMA HMA Grants	• Provides funding for eligible mitigation activities that reduce disaster losses and protect life and property from future disaster damages. • Supports pre- and post-disaster mitigation plans and projects. • Available to California communities/agencies after a presidentially declared disaster has occurred in California, administered by Cal OES. • The Building Resilient Infrastructure and Communities program is an annual nationally competitive program that focuses on reducing the nation's risk by funding public infrastructure projects that increase a community's resilience before a disaster affects an area.	WETA can apply for HMA grant funding once the 2021 MJHMP has been approved and adopted.

Table K-2: WETA—Authorities, Policies, Programs, and Resources

Type/ Name	Description	Ability to Expand/Improve
FTA Emergency Relief Program	• Provides post-disaster assistance to public transit operators by funding the protection, repair, and/or replacement of equipment and facilities that may suffer or have suffered serious damage as a result of an emergency or disaster. • Funds capital projects to protect, repair, or replace facilities or equipment that are in danger of suffering serious damage, or have suffered serious damage as a result of an emergency. • Can also fund the operating costs of evacuation, rescue operations, temporary public transportation service, or reestablishing, expanding, or relocating service before, during, or after an emergency.	
Education and Outreach		
511 SF Bay	• Provides traffic, transit, carpool, vanpool, and bicycling information 24 hours a day, 7 days a week from anywhere in the nine-county Bay Area. • Travelers can register for 511ALERT, a text-based notification system. • In the event of an emergency, registered users will receive up-to-date transportation alert information gathered from various trusted government sources. • These alerts will complement the information currently provided by 511 on its website, phone line, and social media channels.	
Service Alerts	• San Francisco Bay Ferry BayAlerts. San Francisco Bay Ferry's rider notification system, providing regular passengers with important, timely, and customized ferry service information including emergency information.	
Media / Social Media	• Creates and shares content via media or social networking.	

Notes:
Cal OES = California Office of Emergency Services
FTA = Federal Transit Administration
HMA = Hazard Mitigation Assistance
MJHMP = Multi-Jurisdictional Hazard Mitigation Plan
SF = San Francisco
SRTP = Short Range Transit Plan
TDA = Transportation Development Act
WETA = Water Emergency Transportation Authority

Table K-3: WETA—Prioritized Action Plan

No.	Project Name	Priority	Potential Funding Source	Responsibility	Timing
3	Interagency Communication and Coordination	High	Caltrans Sustainable Transportation Planning Grants	Planning and Development	0 to 5 years
5	Owner/Operator Roles and Responsibilities	High	General operating budget	Planning and Development	0 to 5 years
6	Saltwater Corrosion Monitoring and Mitigation	High	FEMA HMA Grants	Planning and Development	0 to 5 years
12	Passive Floodproofing Measures	High	FEMA HMA Grants	Planning and Development	0 to 5 years
18	Fuel Storage Capacity / Contingency	High	Caltrans Sustainable Transportation Planning Grants	Planning and Development	0 to 5 years
21	Energy Storage for Electric Fleets	High	Caltrans Sustainable Transportation Planning Grants	Planning and Development	0 to 5 years
24	Crowding Information App	High	Caltrans Sustainable Transportation Planning Grants	Planning and Development	0 to 5 years

Notes:
FEMA = Federal Emergency Management Agency
HMA = Hazard Mitigation Assistance
WETA = Water Emergency Transportation Authority

Table K-4: WETA—Integration of 2021 MJHMP

MJHMP Section	Existing Plan/Policy/Program	Process / Timeframe
Mitigation strategy	Relevant mitigation goals and actions in the 2021 MJHMP mitigation strategy may be incorporated into Focus Area 6: Emergency Response of the Strategic Plan.	The WETA board will continually revisit and reassess the direction of the Strategic Plan through planning studies and public forums. Additionally, monitoring of WETA's progress toward the goals and objectives outlined in the Strategic Plan will occur through integration with key regional reporting requirements and board oversight.
Mitigation strategy	Relevant mitigation actions in the 2021 MJHMP mitigation strategy may be incorporated into the SRTP.	WETA will incorporate emergency response performance measures into the SRTP to address the goals and objectives set in the Strategic Plan. The SRTP is updated every 4 years.

Notes:
MJHMP = Multi-Jurisdictional Hazard Mitigation Plan
SRTP = Short Range Transit Plan
WETA = Water Emergency Transportation Authority

Table K-5: WETA Progress in Local Mitigation Efforts

Action #	Action	Status
1-1	Assess the vulnerability of critical facilities (including fuel tanks) subject to damage during natural disasters or security threats. Develop a risk register by facility.	Ongoing—also addressed in mitigation actions 6, 12, 18, and 21
1-2	Retrofit or replace critical facilities that are vulnerable to damage in natural disasters.	Ongoing—also addressed in mitigation actions 6, 12, 18, and 21
1-3	Clarify to staff, the contract operator, elected officials, and the public, the extent to which WETA facilities are expected to perform and remain functional following a major earthquake.	Ongoing—also addressed in mitigation action 3
1-4	Identify and mitigate potential impacts to WETA facility contents, architectural components, and equipment that could prevent critical buildings from being functional after major natural disasters. Contents and equipment include computers and servers, phones, files, and other tools used by staff to conduct daily business. Verify that objects subject to toppling or falling are properly secured.	Ongoing—considered preparedness action and not included
1-5	Support and encourage efforts of other lifeline infrastructure agencies as they plan for and arrange financing for seismic retrofits and other disaster mitigation strategies (such as reinforcing the seawall at the Port of San Francisco).	Ongoing—considered support/encouragement and not included
1-6	Encourage joint meetings of security and operations personnel at critical facilities to develop innovative ways to work together to increase safety and security.	Ongoing—considered support/encouragement and not included
1-7	Investigate the possibility of using security cameras for the secondary purpose of post-disaster damage assessment.	Ongoing—considered response/recovery action and not included
1-8	Pre-position emergency power generation capacity (or use rental/lease agreements for generators) in critical buildings to maintain continuity of government and services.	Ongoing—also addressed in mitigation actions 18 and 21
1-9	Explore ways to require that hazardous materials stored in the flood zone be elevated or otherwise protected from tsunami inundation.	Ongoing—also addressed in mitigation action 12
1-10	Comply with all applicable building and fire codes, as well as other regulations (e.g., state requirements for fault, landslide, and liquefaction investigations in particular mapped areas), when constructing or significantly remodeling government-owned facilities.	Ongoing—required by the government and therefore not included in the 2021 MJHMP
1-11	Establish plans for delivery of fuel. Continue to explore alternative fuel sources. Practice refueling from the Maritime Administration Pre-positioned Medium Speed Logistics Roll-on/Roll-off ships using the recently developed procedures.	Ongoing—also addressed in mitigation 18

Table K-5: WETA Progress in Local Mitigation Efforts

Action #	Action	Status
2-1	Conduct and/or promote attendance at local or regional hazard conferences and workshops for elected officials and staff to educate them on the critical need for programs in mitigating hazards.	Ongoing—participates / has participated in: MTC's Emergency Table Top annual exercises; San Francisco Fleet Week Defense Support of Civilian Authorities exercises; Bay Ferry exercises; Urban Shield Yellow Command; and Golden Guardian
3-1	As a critical infrastructure operator, practice using the Emergency Operations Centers and redundant communications systems at the North and Central Bay Maintenance Facilities.	Ongoing—also addressed in mitigation action 3
3-2	Stay informed of scientific information compiled by regional and state sources on the subject of rising sea levels and global warming, especially on additional actions that local governments can take to mitigate this hazard including special design and engineering of government-owned facilities in low-lying areas, such as wastewater treatment plants, ports, and airports.	Ongoing—also addressed in mitigation action 6
3-3	Use proven technologies for vessels and facilities to improve environmental performance.	Ongoing—purchase of new ferries
3-4	Develop a continuity of operations plan that includes backup storage of vital records such as plans, backup procedures to pay employees and vendors if normal finance department operations are disrupted, and backup for other essential electronic files.	Ongoing—considered response/recovery action and not included
3-5	Promote transportation options such as bicycle trails, commute trip reduction programs, incentives for carpooling, and public transit.	Ongoing—addressed in the 2020 SRTP
3-6	Purchase only ENERGY STAR equipment and appliances for local government use.	Ongoing—considered preparedness action and not included
4-1	Continue to participate in general mutual-aid agreements including the San Francisco Bay Transit Operators Mutual Aid Agreement and the San Francisco Bay Area Vessel Mutual Assistance Plan.	Ongoing—no new action necessary
5-1	Expand the WETA water-based transportation "system" for movement of first responders and survivors in the event of major earthquakes. Implement the new routes from Richmond, California and Treasure Island.	Ongoing—new Richmond Ferry Service launched
5-2	Develop a plan for short-term and intermediate-term sheltering of staff.	Completed
5-3	Encourage employees to have a family disaster plan.	Ongoing—considered preparedness action and not included

Table K-5: WETA Progress in Local Mitigation Efforts

Action #	Action	Status
5-4	Encourage CERT/NERT-type training to employees.	Ongoing—considered preparedness action and not included
5-5	Periodically assess the need for changes in staffing levels, amount of or updated supplies, equipment, technologies, and in-service training classes.	Ongoing—considered preparedness action
5-6	Participate in developing and maintaining a system of interoperable communications.	Ongoing—addressed in mitigation action 3
5-7	Keep WETA's emergency response and operations plans current by incorporating changes to resources, staff, and response processes. Conduct after-action reviews of actual response events.	Ongoing/completed—after action reports are already part of WETA's response/recovery process
5-8	Expand participation in disaster exercises involving regional emergency management agencies including cities where ferry terminals, ports, other transit providers, and regional authorities are situated.	Ongoing—participates / has participated in: MTC's Emergency Table Top annual exercises; San Francisco Fleet Week Defense Support of Civilian Authorities exercises; Bay Ferry exercises; Urban Shield Yellow Command; and Golden Guardian
5-9	Develop procedures for the emergency evacuation of areas identified on tsunami evacuation maps.	Ongoing—to be addressed in updated Emergency Response Plan

Notes:
CERT/NERT = Community Emergency Response Team / National Emergency Response Team
MJHMP = Multi-Jurisdictional Hazard Mitigation Plan
MTC = Metropolitan Transportation Commission
SRTP = Short Range Transit Plan
WETA = Water Emergency Transportation Authority