Alameda County
Alameda County Fire Department
Alameda County Flood Control and Water Conservation District

Sundry Photography

Public Draft

2021 Alameda County Local Hazard Mitigation Plan

September 2021

2021 ALAMEDA COUNTY
LOCAL HAZARD MITIGATION PLAN

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LIST OF ACRONYMS AND ABBREVIATIONS

°F	degrees Fahrenheit
ACFCWCD	Alameda County Flood Control and Water Conservation District
ACFD	Alameda County Fire Department
ACS	American Community Survey
AECOM	AECOM Technical Services, Inc.
Bay Area	San Francisco Bay Area
Cal FIRE	California Department of Forestry and Fire Protection
Cal OES	California Office of Emergency Services
CDC	Centers for Disease Control and Prevention
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
CRS	Community Rating System
DFIRM	Digital 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
GIS	Geographic Information System
GSA	Alameda County General Services Agency
LHMP	Local Hazard Mitigation Plan
M	magnitude
mph	miles per hour
NFIP	National Flood Insurance Program
PG&E	Pacific Gas and Electric Company
RL	Repetitive Loss
SFHA	Special Flood Hazard Area
USC	University of Southern California
USGS	United States Geological Survey
WUI	Wildland Urban Interface

1.0 INTRODUCTION

1.1 HAZARD MITIGATION PLANNING

As defined in Title 44 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) mitigation plan requirements for the Hazard Mitigation Assistance grant programs.

1.2 2021 LOCAL HAZARD MITIGATION PLAN SYNOPSIS

To meet the requirements of the DMA 2000, Alameda County is updating its 2016 Local Hazard Mitigation Plan (LHMP). The goal of the planning process is to assess risks posed by hazards and to develop prioritized action plans to reduce risks in Alameda County. Like the 2016 LHMP, the 2021 LHMP is written on behalf of three separate entities: Alameda County, Alameda County Fire Department (ACFD), and Alameda County Flood Control and Water Conservation District (ACFCWCD). Because ACFD is a dependent special district of Alameda County, it will not seek separate approval and adoption of the 2021 LHMP.

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

The 2021 LHMP structure has been updated to include the following sections:

- **Section 2, Planning Process,** provides an overview of the 2021 planning process, starting with a timeline. It identifies planning team 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 LHMP and provides a plan update method and schedule. Supporting planning process documentation is provided in **Appendix B.**
- **Section 3, Prologue,** describes the planning area for the 2021 LHMP. It identifies land area and population in Unincorporated Alameda County and the critical facilities located throughout the county. Figures showing the location of the plan area, the population, and critical facilities are provided in **Appendix C**.
- **Section 4, Hazard Identification and Risk Assessment,** describes each of the ten hazards addressed in this plan. Hazard figures are provided in **Appendix C**. In addition, this section includes impact (i.e., risk assessment) tables. An overall summary description is provided for

each hazard. Alameda County and special-district-specific risk assessment information is provided in **Appendix D** through **Appendix F.**

- **Section 5, Mitigation Strategy,** describes the mitigation goals, potential mitigation actions and projects, and prioritization process. Agency-specific capability assessments, prioritized action plans, and the process to integrate the 2021 LHMP into other planning mechanisms are provided in **Appendix D** through **Appendix F.**
- **Section 6, Plan Review, Evaluation, and Implementation,** documents the changes in development and changes to priorities since 2016. Agency-specific progress made in local mitigation efforts is provided in **Appendix D** through **Appendix F**.
- **Section 7, Plan Adoption,** contains scanned copies of the adoption resolutions.
- **Section 8, Appendices,** provides the appendices.

1.3 ACTIVITY 510 FLOODPLAIN MANAGEMENT PLANNING

The Community Rating System (CRS) is a voluntary incentive program that recognizes and encourages community floodplain management activities that exceed the minimum National Flood Insurance Program (NFIP) requirements. Under CRS, flood insurance premium rates are discounted to reflect the reduced flood risk that results when community actions meet the three goals of CRS: reducing flood damage to insurable property, strengthening, and supporting the insurance aspects of the NFIP, and encouraging a comprehensive approach to floodplain management. In October 1992, the Alameda County joined CRS as a class 7 rating, entitling flood insurance policy holders to receive up to a 15 percent premium discount annually.

There are 18 programs or "activities" in CRS that are intended to reduce or eliminate exposure to floods, including Activity 510 Floodplain Management Planning. To implement these activities, FEMA published the 2013 NFIP CRS Coordinators Manual (Federal Insurance Administration 152013), which spells out the credit and credit criteria for CRS activities. The floodplain management planning activities for Unincorporated Alameda County are addressed throughout the 2021 LHMP. The 510 Floodplain Management Planning Checklist is provided in **Appendix A.**

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 LHMP PLANNING PROCESS

The development of the 2021 LHMP was collaborative effort between Alameda County, AECOM Technical Services, Inc. (AECOM), and a planning team. The plan update project officially kicked off in July with County Board approval of the plan update process (letter provided in **Appendix B**) and lasted 4 months. A timeline of the major planning tasks and milestones by month, including the two times the planning team met virtually, is provided in **Table 2-1.** A list of the planning team members and how they contributed to the development of the plan is provided in **Table 2-2.** The planning team agendas are provided in **Appendix B.**

Table 2-1: LHMP Timeline

Date	Tasks	People Involved
June 2021	Conducted project management team kickoff conference call	LHMP project manager, AECOM
July 2021	Held first planning team conference call (July 21) Collected local and regional existing plans and reports Determined the Geographic Information System (GIS) strategy for hazard profiles and impact tables Created plan maintenance process and schedule Created draft hazard figures Developed a list of potential mitigation actions and created a prioritization approach	LHMP project manager, AECOM, planning team

Table 2-1: LHMP Timeline

Date	Tasks	People Involved
August 2021	Collected and geocoded fixed critical facilities Updated the Alameda County LHMP website Identified initial list of stakeholders and emailed stakeholders Crafted and posted public outreach messages for Alameda County's Twitter and Facebook pages Drafted agency-specific capability assessments Created draft hazard profiles Completed hazard impact and overall summary tables Drafted recommended mitigation actions Held second planning team conference call (August 25)	LHMP project manager, AECOM, planning team
September 2021	Selected and prioritized mitigation actions Created the Internal Draft LHMP Created the Public Draft LHMP Notified stakeholders and public about the Public Draft LHMP	LHMP project manager, AECOM, planning team
October 2021	Created the Final Draft LHMP and submitted to California Office of Emergency Services (Cal OES) and FEMA for review	LHMP project manager, AECOM

Table 2-2: Planning Team

Name	Department/Agency and Title	Contribution
Matthew Reed	LHMP & Environmental Project Manager, Alameda County General Services Agency (GSA)-Capital Programs Environmental Dept.	Served as the 2021 LHMP project manager. Led planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP.
Jason Garrison	Environmental Program Manager, Alameda County GSA-Capital Programs Environmental Dept.	Participated on planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP.
Douglas Bond	Deputy Director, Alameda County GSA-Building Maintenance Dept.	Participated on planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP.
Jamesine Rogers Gibson	Senior Climate Analyst, Alameda County GSA-Sustainability	Participated on planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP.
Sophie McGuinness	Senior Planner, Alameda County Community Development Agency Planning Dept.	Participated on planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP.
Bill Lepere	Deputy Director Public Works, Alameda County Public Works Agency	Participated on planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP. Provided GIS data for flood channels.
Moses Tsang	Supervising Civil Engineer, Alameda County Public Works Agency / ACFCWCD	Participated on planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP.
Hank Ankerman	Principal Civil Engineer, Alameda County Public Works Agency / ACFCWCD	Participated on planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP.

Table 2-2: Planning Team

Name	Department/Agency and Title	Contribution
Andy Otsuka	Associate Civil Engineer, Alameda County Public Works Agency / ACFCWCD	Participated on planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP.
Lincoln Casimere	Emergency Preparedness Manager, ACFD	Participated on planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP.
Kristi Dueñas	Senior Emergency Services Coordinator, Alameda County Sheriff's Office	Participated on planning team conference calls; reviewed and commented on hazard figures, risk assessment tables, mitigation strategies, and the Internal Draft LHMP. Provided stakeholder agency contact information.

2.2 OPPORTUNITIES FOR STAKEHOLDERS

On August 6, 2021, the LHMP project manager reached out to stakeholders via email (**Appendix B**) about the 2021 LHMP and invited them to participate in the plan update process. Stakeholders included local city and county governments (Contra Costa, San Francisco, San Mateo, Santa Clara, and San Joaquin Counties and the Cities of Alameda, Albany, Berkeley, Dublin, Emeryville, Fremont, Hayward, Livermore, Newark, Oakland, Piedmont, Pleasanton, San Leandro, and Union City), State partners (Cal OES, California Department of Forestry and Fire Protection [Cal FIRE], California Department of Water Resources, and California Department of Transportation), federal facilities (Lawrence Berkeley National Laboratory, and local and regional organizations, including the Alameda Emergency Managers' Association, Alameda County Resource Conservation District, and Oro Loma Sanitation District. No comments were received.

The LHMP project manager reached out to the stakeholders again via email on September 23, 2021, inviting them to review and provide comments about the Public Draft LHMP (**Appendix B**). No stakeholder comments were received.

2.3 PUBLIC INVOLVEMENT

On August 6, 2021, Alameda County posted information about the 2021 LHMP kickoff on the agency's LHMP website, Twitter, and Facebook.

Alameda County also prepared a hazard mitigation survey to better understand the public's concerns about hazards and thoughts on mitigation strategies. The hazard mitigation survey was posted to the LHMP website on [to be completed].

On September 22 – 23, 2021, Alameda County posted information about the Public Draft LHMP and public comment period on the LHMP website and social media accounts. Although Alameda County's tweets and posts about the 2021 LHMP got several likes, no public comments were received. Links to Alameda County's LHMP website, Twitter, and Facebook are provided below (screenshots are provided in **Appendix B**):

- Website: https://lhmp.acgov.org/
- Twitter: https://twitter.com/AlamedaCounty
- Facebook: https://www.facebook.com/AlamedaCounty

2.4 REVIEW AND INCORPORATION OF EXISTING PLANS AND REPORTS

A list of the major relevant plans and reports reviewed and incorporated into the 2021 LHMP is provided in **Table 2-3**.

Table 2-3: Existing Plans and Reports

Plans and Reports	Information to Be Incorporated into the 2021 LHMP
Safety Element of the Alameda County General Plan (Amended 2014)	Natural hazards section of the plan was incorporated into the 2021 LHMP's hazard profile section.
Alameda County Community Climate Action Plan (2014)	Water Use and Land Use sections of the plan were incorporated into the 2021 LHMP's climate change profile.
Bay Area Earthquake Plan (2016)	Situation section of plan was incorporated into the 2021 LHMP's earthquake profile.

Table 2-3: Existing Plans and Reports

Plans and Reports	Information to Be Incorporated into the 2021 LHMP
Plan Bay Area—Final Plan (2017) and Overview (2019)	Resilience Action Plan items were used to develop mitigation actions in 2021 LHMP's mitigation strategy. Incorporated vision statement into the 2021 LHMP's mitigation goals.
Report to the Community: Then and Now Adapting to Change (Fiscal Years 2017–2018)	Climate change and flood mitigation projects highlighted in report were incorporated into the 2021 LHMP's mitigation strategy.
2018 California's Fourth Climate Change Assessment—San Francisco Bay Area Region Report	Summary of report was incorporated into the 2021 LHMP's climate change profile.
2018 Strategic Fire Plan for California	Summary of report was incorporated into the 2021 LHMP's wildfire profile.
Flood Insurance Study – Alameda County, California and Incorporated Areas (2018)	Flood insurance information is incorporated into the flood hazard profile.
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 LHMP's dam failure profile.
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 LHMP's landslide profile.
Safety First: Improving Hazard Resilience in the Bay Area (2020)	Policy recommendations were used to develop mitigation actions in the 2021 LHMP's mitigation strategy.
Draft Fire Hazard Planning Technical Advisory (2020)	Considerations from "When Developing Fire Hazard Polices" were incorporated into 2021 LHMP's mitigation strategy.

2.5 CONTINUED PUBLIC PARTICIPATION

A copy of the 2021 LHMP will remain available on Alameda County's website along with contact information. The LHMP project manager will work with Alameda County's Information Technology Department to use the LHMP website and County's social media accounts to notify the public of, and seek input on, any changes or updates to the 2021 LHMP, including mitigation action implementation and the 2026 LHMP kickoff.

2.6 PLAN UPDATE METHOD AND SCHEDULE

Due to the retirement of the 2106 LHMP project manager, the 2016 LHMP was not reviewed on an annual basis. The 2021 LHMP will be monitored and evaluated by a subset of the planning team, specifically the LHMP project manager. Should the 2021 LHMP project manager no longer be involved with the 2021 LHMP, the project manager and/or Alameda County GSA will select a new LHMP project manager to oversee the annual reviews and plan update.

The LHMP project manager will get input from specific planning team members as needed. The LHMP project manager will complete the Annual Review Tracker every January and after any major disaster to ensure that the 2021 LHMP 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; progress summaries will be included in the Annual Review Tracker (**Table 2-4**) at the beginning of each year.

Beginning in January 2026:

- The LHMP project manager will complete the Annual Review Tracker.
- The LHMP project manager will reconvene the planning team and update membership, if necessary.
- The planning team will review **Table 2-4**, which provides annual summaries of the disasters that have occurred; new permanent information that becomes available; implementation measures; and public outreach and response to determine the hazards to be included in the 2026 LHMP.
- The LHMP project manager will develop a new work plan.
- The LHMP project manager—with support from the planning team—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 LHMP	Public Outreach Conducted	Changes Made to 2021 LHMP
2022					
2023					
2024					
2025					

3.0 PROLOGUE

3.1 ALAMEDA COUNTY

In 1853, just 3 years after the addition of California as the 31st state of the union, Alameda County was established. Situated on the east side of San Francisco Bay, it was carved out of territory from two previously established neighboring counties: Contra Costa and Santa Clara.

The name of the county, "Alameda," means "a place where poplar trees grow." It was derived from the Spanish/Mexican heritage of the region and was the name originally given to a local creek, the Arroyo de la Alameda (Poplar Grove Creek).

Alameda County's 14 cities and 6 unincorporated communities and rural areas are within 745 square miles of land and 84 square miles of water. A regional map of the nine county San Francisco Bay Area (Bay Area) is shown on **Figure C-1**. A map of the Alameda County is shown on **Figure C-2**. For the purposes of this plan, the geographic planning area boundaries include the land area of Alameda County only.

Though sparsely populated in the early years after incorporation, the county has since become the fourth most-inhabited county in California. According to the U.S. Census Bureau, as of 2019, the county has a population of 1,671,329. At the time of the drafting of this plan, block group level population datasets were not available for the 2015–2019 U.S. Census American Community Survey (ACS) or for the 2020 U.S. Census. As such, the 2010–2014 ACS 5-year population estimates are used for this plan. Population for Unincorporated Alameda County was determined by intersecting the block group level population dataset with a recently updated Unincorporated Alameda County boundary dataset known as "PAM". Block group level population "slivers" present between the datasets were merged with the largest adjacent polygon with a threshold of 100,000 square feet. Alameda County population information is provided in **Table 3-1** and shown on **Figure C-3**.

Alameda County's government provides health care, social services, public protection, and general government programs to residents of Alameda County. It currently owns and occupies approximately 6.5 million square feet of office and institutional space, leases another 1.2 million square feet of space, and owns, operates, and maintains bridges, dams, and other infrastructure.

Since the time that the county was incorporated, residents have enjoyed a diverse and beautiful landscape throughout the county, which includes rolling open spaces, urban marinas and coastal plains along the bay, and densely vegetated hillsides with lakes and streams. However, these features have various dangers associated with them, including earthquakes, flooding, landslides, and wildfires. These inherent dangers—both in and around the county—have produced a number of emergencies and major disasters, including numerous floods, the Hayward Quake of 1868, the Great San Francisco Earthquake and Fire of 1906, the Loma Prieta Earthquake of 1989, the Oakland Hills Fire Storm of 1991 and the SCU Lightning Complex in 2021.

Table 3-1: Alameda County Land Area and Population

Area	Square Miles	2010–2014 ACS 5-Year Population Estimates
Alameda County	745.26	1,533,672
Unincorporated Alameda County	425.33	227,065*

Notes:
* Population for Unincorporated Alameda County was determined by intersecting the 2010 – 2014 ACS US Census block group level population dataset with updated "PAM" Unincorporated Alameda County boundary dataset. U.S. Census block group level population "slivers" present between the datasets were merged with the largest adjacent polygon with a threshold of 100,000 square feet. As a result, there is likely some overcounting in the population that resides in Unincorporated Alameda County.

3.2 SPECIAL DISTRICTS

As noted in **Section 1, Introduction,** there are two special districts participating in this 2021 LHMP. They are described in detail below.

Alameda County Fire Department: The ACFD was formed on July 1, 1993, as a dependent special district with the Alameda County Board of Supervisors as its governing body. This consolidation brought together into a single jurisdiction the Castro Valley Fire Department, Eden Fire Department, and County Fire Patrol. In subsequent years, the following entities elected to receive emergency fire and medical services by ACFD through a contractual agreement with Alameda County: the City of San Leandro (1995), the City of Dublin (1997), Lawrence Berkeley National Laboratory (2002), Lawrence Livermore National Laboratory (2007), the Alameda County Regional Emergency Communications Center (2008), the City of Newark (2010), the City of Union City (2010), and the City of Emeryville (2012).

The ACFD is composed of four organizational branches: the operations branch, the communications and special operations branch, the administrative support services branch, and the fire prevention branch. The ACFD service area covers approximately 508 square miles, has a daytime population of approximately 394,000 residents (plus an additional 500,000 daily commuters traveling through service roads, freeways, and railways). ACFD's 30 fire stations respond to over 35,000 calls annually. In addition to their 30 fire stations, ACFD has offices for administration, urban search and rescue, fire prevention, and training/ emergency medical services. Services are provided by a staff of 414 personnel and 75 volunteer reserve firefighters of various skills and rankings. ACFD is the Operational Area Dispatch Center for 10 East Bay area fire service agencies in Alameda County and the coordinator for Fire and Fire Rescue Region II in California, which serves 16 counties along the Northern California coast.

Due to the broad range of community hazards including earthquakes, wildfires, and terrorist attacks, ACFD has numerous special operations programs—including Heavy and Water Rescue, Hazardous Material, Urban Search and Rescue, and Dozer Operations—to save lives and protect critical infrastructure. Automatic/mutual aid is a daily occurrence.

Alameda County Flood Control & Water Conservation District: The ACFCWCD was created in 1949, when the state legislature passed Act 205 of the California Uncodified Water Code. Act 205 defines the district's role in providing for the control and conservation of flood and stormwater. The district provides flood protection for Alameda County residents and businesses. It plans, designs, constructs, and maintains flood control projects such as natural creeks, channels, levees, pump stations, dams, and reservoirs.

Although the ACFCWCD serves the people of Alameda County, it is a separate legal entity from the Alameda County government. Many people often mistake or confuse the ACFCWCD with the Alameda County Public Works Agency. The district relies on the staff of the Alameda County Public Works Agency to carry out its mission. Although staff is shared between the two entities, there is no legal link between the two. The ACFCWCD is composed of four departments, each of which serves a unique function: engineering, maintenance and operations, construction and development, and management services.

3.3 CRITICAL FACILITIES

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.

For the 2021 LHMP, Alameda County GSA, ACFD, and ACFCWCD created a list of critical facilities owned, leased, contracted, and/or used by each agency or other county departments and agencies. Critical facility names and addresses were then geocoded to their locations and the resulting geographic features were used for the risk assessment. As provided in **Table 3-2** and shown on **Figure C-4** through **Figure C-9** there are 250 critical facilities with single points and an additional 42 facilities (flood control channels)

with line locations**.** All agency-specific information is provided in **Appendix D** through **Appendix F**. Specific critical facility information is kept on file with Alameda County, ACFD, and ACFCWCD.

Table 3-2: Critical Facilities

Entity	# of Facilities
Alameda County—Critical Facilities	118
Alameda County—Bridges	48
ACFD—Critical Facilities	48
ACFCWCD—Critical Facilities	36
ACFCWCD—Flood Control Channels	42

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 planning team kickoff conference call, the LHMP project manager, consultant, and planning team updated the list of hazards in the 2021 LHMP based on past disaster declarations; known probabilities and vulnerabilities; and regional, state, and federal plans and reports. As such, the hazards addressed in the 2021 LHMP include climate change, dam failure, 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 ten hazards addressed in **Section 4.1** through **Section 4.10**. In addition, semi-quantitative or qualitative impact tables for land area, population, and critical facilities, as well as summary descriptions, have been created for each hazard. This analysis is a simplified assessment of the potential effects of the hazards on land area, population, and critical facilities at risk, without consideration of the probability or level of damage. In addition, elevation data were not available; therefore, additional analysis will need to be conducted to develop a more accurate understanding of hazard vulnerabilities.

According to the *Comprehensive Preparedness Guide 201: Threat and Hazard Identification and Risk Assessment Guide,* 2d ed. (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. Therefore, the hazards profiled for this LHMP 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, which impacts the way people live, the food they grow, their health, the wildlife, the availability of water, and much more. Research indicates that much of this warming is due to human activities—primarily the burning of fossil fuels and the clearing of forests—that release carbon dioxide (CO_2) and other gases into the atmosphere, which trap 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 in pre-industrial times. According to most climatologists, the planet is starting to experience shifts in climate patterns and an increased frequency of extreme weather events at both the global level and the local level. 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 stormwater inundation; and more frequent and prolonged higher temperatures (leading to extreme heat events and wildfires)—particularly inland—that decrease air quality and cause extended periods of drought. In addition, expected social and economic impacts as a result of climate change include energy shortages, heat-related mortality and illnesses, failing infrastructure, and food and water insecurity, to name a few.
Location	According to California's Fourth Climate Change Assessment, the effects from climate change including sea level rise, rising temperatures and extreme heat, severe moisture deficit, coastal erosion and inland flooding, and wildfires, is already under way throughout Alameda County. Specific details regarding the location of sea level rise are shown on **Figure C-10.** As shown on the figure, nearly all of the coastal areas along Alameda County are affected by sea level rise, with the exception of some coastal areas for the cities of Emeryville, Berkeley, and Albany. Specific details regarding the location of severe moisture deficient because of drought are addressed in **Section 4.3**, while location information about coastal erosion and inland flooding are addressed in **Section 4.5** and location information about wildfires are addressed in **Section 4.10**.
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 a consensus position formed: greenhouse gases were deeply involved in most climate changes, and human emissions has warmed the atmosphere, ocean and land. Since the 1990s, scientific research on climate change has expanded and includes multiple disciplines, significantly increasing our understanding of the causal relations, the links with historic data, and our 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

Table 4-1: Climate Change Profile

Profile	Description
	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 accelerating global warming. The term "climate change" is often used to describe human-specific impacts. According to Cal FIRE and as noted in California's Fourth Climate Change Assessment, the impacts of climate change affecting the Bay Area/Alameda County include: • Sea level rise (over 8 inches in the last 100 years) • Increased average annual maximum temperature (1.7 degrees Fahrenheit [°F] from 1950 to 2000) • Severe moisture deficit (2012 to 2016 California drought led to the most severe moisture deficit over the last 1,200 years) • Coastal erosion (the 2015–16 El Niño was one of the three largest in the historical record) • Wildfires (100 more wildfire days annually in the Bay Area from 1973 to 2020)
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, all parts of the Bay Area—including Alameda County—are projected to become warmer, with an annual mean warming of approximately 3.3°F by mid-century. 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 Union of Concerned Scientists predicts that "Alameda County will experience over 30 days a year by mid-century that feel like 90 degrees or higher, as opposed to a historical average of 11 such days per year." The National Oceanic and Atmospheric Administration has produced a sea level rise viewer that shows the impacts of predicted sea level rise. As shown on **Figure C-10**, a sea level rise of just 3 feet above mean higher high tide (approximate year 2050 to 2060) will result in coastal flooding of 43.26 square miles (5.80%) in Alameda County, with just 0.15 square mile (0.04%) being in the unincorporated areas of the county. A sea level rise of 6 feet above mean higher high tide (approximate year 2100) will result in coastal flooding of 65.52 square miles (8.79%) in Alameda County. However, only 0.49 square mile (0.12%) will be affected by a 6-foot sea level rise in the unincorporated areas of the county.
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." The 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

Area	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
Alameda County	43.26	5.80	65.52	8.79
Unincorporated Alameda County	0.15	0.04	0.49	0.12

Table 4-3: Climate Change Impact on Population

Area	Sea Level Rise Inundation Area—3 Feet		Sea Level Rise Inundation Area—6 Feet	
	# of People	% of Population	# of People	% of Population
Alameda County	20,081	1.3	77,256	5.0
Unincorporated Alameda County	578	0.3	1,976	0.9

Table 4-4: Climate Change Impact on Critical Facilities

Entity	Sea Level Rise Inundation Area—3 Feet		Sea Level Rise Inundation Area—6 Feet	
	# of Facilities	% of Facilities	# of Facilities	% of Facilities
Alameda County—Critical Facilities	1	0.85	5	4.24
Alameda County—Bridges	1	2.08	1	2.08
ACFD—Critical Facilities	0	0.00	2.	4.17
ACFCWCD—Critical Facilities	5	13.89	17	47.22
ACFCWCD—Flood Control Channels	27	64.29	32	76.19

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

Climate Change	
Summary	Alameda County's overall vulnerabilities to climate change include sea level rise, coastal erosion and inland flooding, an increased average annual maximum temperature, severe moisture deficit/drought, and wildfires. • Sea level rise: Nearly 6% of county land, 1.3% of the county's total population, 2.8% of single point critical facilities and 64.29% of flood control channels in the county will be vulnerable to 3-foot sea level rise. Nearly 9% of the county land, 5.0% of the county's total population, 10.0% of single point critical facilities, and 76.19% of flood control channels in the county will be vulnerable to 6-foot sea level rise. Flooding due to sea level rise will cause destructive erosion; wetland flooding; contamination of aquifers and agricultural soil with salt; loss of habit for fish, birds, and plants; disruption and/or delay of transportation or construction-related activities; and damages to homes and businesses on a more regular basis. • Rising temperatures and extreme heat will likely affect all of Alameda County, but most noticeably in the interior area of the county or areas of the county that lack sufficient tree canopy and/or have large amounts of impervious and dark surfaces. As noted above, the number of extreme heat days will rise and inland or exposed county areas will experience days with temperatures in excess of 100°F more frequently. Extreme heat can trigger a variety of heat stress conditions, such as heat stroke. Higher temperatures can also contribute to the build-up of harmful pollutants and cause respiratory issues. Drier, hotter conditions will also make wildfires more frequent and intense, particularly in the High and Very High Fire Hazard Severity Zones (FHSZs). Wildfires can burn homes, businesses, and critical facilities; interrupt transportation and utilities; reduce air quality; and cause death to people and animals. • Climate change will likely increase Alameda County's vulnerability to drought (see **Section 4.3**), coastal erosion and inland flooding (see **Section 4.5**), infectious disease (see **Section 4.6**), landslides (see **Section 4.7**), public safety power shutoff (see **Section 4.8**), and wildfires (see **Section 4.10**) too.

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 or 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 the impact of the 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 is under the State's jurisdictional oversight, unless exempted. As shown on **Figure C-11**, according to the California Department of Water Resources, Division of Safety of Dams (DSOD), as of September 2017, there are 23 State-jurisdictional dams in Alameda County: • Almond: an earthen dam built in 1954 with a capacity of 20 acre-feet • Bethany Forebay: an earthen dam built in 1961 with a capacity of 5,000 acre-feet • Calaveras: a hydraulic fill dam built in 1925 with a capacity of 100,000 acre-feet • Central: an earthen dam built in 1910 with a capacity of 485 acre-feet • Chabot: a hydraulic fill dam built in 1892 with a capacity of 10,281 acre-feet • Cull Creek: an earthen dam built in 1963 with a capacity of 140 acre-feet • Decoto Reservoir: an earthen dam built in 1966 with a capacity of 46 acre-feet • Del Valle: an earthen dam built in 1968 with a capacity of 77,100 acre-feet • Dunsmuir Reservoir: a reinforced tank built in 1968 with a capacity of 197 acre-feet • Dyer: an earthen dam built in 2011 with a capacity of 525 acre-feet • James H Turner: an earthen dam built in 1964 with a capacity of 50,500 acre-feet • Middlefield Reservoir: an earthen dam built in 1958 with a capacity of 22 acre-feet • New Upper San Leandro: an earthen dam built in 1977 with a capacity of 42,000 acre-feet • Patterson: an earthen dam built in 1962 with a capacity of 104 acre-feet and 46 acre-feet • Piedmont: an earthen dam built in 1905 with a capacity of 60 acre-feet • Quarry Pits: an earthen dam built in 1997 with a capacity of 3,360 acre-feet • Rubber Dam 3: an inflatable dam built in 1990 with a capacity of 154 acre-feet • San Lorenzo Creek: an earthen dam built in 1964 with a capacity of 380 acre-feet • Seneca: an earthen dam built in 1950 with a capacity of 92 acre-feet • Shinn: an earthen dam built in 1987 with a capacity of 390 acre-feet • Summit: an earthen dam built in 1891 with a capacity of 117 acre-feet • Temescal, Lake: an earthen dam built in 1869 with a capacity of 200 acre-feet • Ward Creek: an earthen dam built in 1963 with a capacity of 130 acre-feet
History	There have been three recorded dam failures in Alameda County: • 1905: the Piedmont #1 Dam had an outlet wall sheared off at the core wall. • 1918: the Calaveras Dam failed during construction in 1918. A landslide damaged the upstream shell of the dam and destroyed the dam's outlet tower. • 2015: the inflatable dam on Alameda Creek (Rubber Dam 3) failed due to vandalism, releasing a significant supply of the community's water into San Francisco Bay.

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) define downstream hazards for dam incidents, not 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 of increasing severity for downstream hazards: Low, Significant, and High. DSOD adds a fourth category of Extremely High. High Hazard Potential dams are expected to cause the loss of at least one human life if they fail. Dams that are classified as Extremely High Hazard Potential dams are expected to cause considerable loss of human life or result have an inundation area with a population of 1,000 or more. According to DSOD, 18 dams in Alameda County are classified as High or Extremely High Hazard Potential dams. Bethany Forebay, Cull Creek, Dyer, Middlefield Reservoir, Patterson, Quarry Pits, San Lorenzo Creek, and Ward Creek dams are classified as High while Almond, Calaveras, Central, Chabot, Decoto Reservoir, Del Valle, Dunsmuir Reservoir, James H Turner, New Upper San Leandro, and Temescal (Lake) dams are classified as Extremely High. A dam breach inundation map shows the downstream flooding that could result from a hypothetical failure of the 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 Potential dams—to develop inundation maps approved by DSOD and emergency action plans approved by Cal OES. The approved Extremely High and High Hazard Potential dam breach inundation maps in Alameda County are shown on **Figure C-12**. The inundation areas of these mapped dams total 135.54 square miles (18.19%) in Alameda County. In the unincorporated areas of the county, 18.23 square miles (4.29%) are in these inundation hazard areas.
Recurrence Probability	Dams fail for a variety of reasons, including substandard construction materials/techniques, spillway design error, geological instability, poor maintenance, intense rainfall, or earthquakes. Therefore, recurrence probabilities are unknown. State-jurisdictional dams are regulated by the DSOD, and each dam undergoes inspection on an annual basis to ensure it is safe, performing as intended, and not developing safety 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., a 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 Craig Fugate, former administrator of FEMA, "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 dam failure in Alameda County is to calculate extreme storm frequency return intervals. According to California's Fourth Climate Change Assessment, by the end of the century Alameda County will experience a once in 20-year storm event every 7 years and a once every 200-year storm every 40 to 50 years.

Table 4-7: Dam Failure Impact on Land Area

Area	Dam Breach Inundation Area—High Hazard and Extremely High Hazard Potential	
	# of Sq. Miles	% of Sq. Miles
Alameda County	135.54	18.19
Unincorporated Alameda County	18.23	4.29

Table 4-8: Dam Failure Impact on Population

Area	Dam Breach Inundation Area—High Hazard and Extremely High Hazard Potential	
	# of People	% of Population
Alameda County	496,150	32.4
Unincorporated Alameda County	10,574	4.7

Table 4-9: Dam Failure Impact on Critical Facilities

Entity	Dam Breach Inundation Area—High Hazard and Extremely High Hazard Potential	
	# of Facilities	% of Facilities
Alameda County—Critical Facilities	29	25.48
Alameda County—Bridges	12	25.00
ACFD—Critical Facilities	16	33.33
ACFCWCD—Critical Facilities	16	44.44
ACFCWCD—Flood Control Channels	31	73.81

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

Dam Failure	
Summary	According to the DSOD, there are 18 mapped High and Extremely High Hazard Potential dams in Alameda County that—should a hypothetical failure occur—would cause loss of human life and/or affect an inundation area with a population of 1,000 or more. These mapped High and Extremely High Hazard Potential dam breach inundation areas encompass 135.54 square miles, nearly 500,000 people, 73 single point critical facilities, and 31 flood control channels throughout Alameda County. For those living in a dam breach inundation area, the potential loss of life, injuries, and damage to homes and critical facilities due to a dam failure depends on a number of variables, including depth and velocity of water released, number of people residing in the inundation area, warning time, and public perception of the hazard.

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, though the characteristics of droughts will vary significantly from one region to another. Drought 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, 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 as follows: • **Meteorological drought** is defined solely on the degree of dryness, expressed as a departure from 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 the 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, geographic extent, and 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 effects of an event after its apparent end. Second, the lack of an exact and universally accepted definition adds to the confusion about its existence and severity. Third, in contrast to 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 a drought in the Bay Area typically affects Alameda County.
History	Drought is a cyclic part of the climate of California, occurring in both summer and winter, with an average recurrence interval of 3 to 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. The droughts that have occurred in Alameda County 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 • 2021–present statewide

Table 4-11: Drought Profile

Profile	Description
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. As of July 14, 2021, Alameda County (along with the rest of the Bay Area) was classified as being in D3 (extreme drought) and D4 (exceptional drought) categories.
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 Alameda County at least every decade.

Table 4-12: Drought Impact on Alameda County

	Drought
Summary	Drought impacts on Alameda County will likely include: • Stress on flora and fauna • Need to curtail water-use activities • Increase in susceptibility to wildfires • Poor air quality (increase in fine particulate matter and ground level ozone)

Table 4-13: Overall Summary of Vulnerability to Drought

	Drought
Summary	Drought is regional in nature and scope (see **Table 4-11**); therefore, drought will affect all of Alameda County. Drought can be difficult to define in exact terms and poses difficulties in terms of comprehensive risk assessments. Droughts will likely leave Alameda County vulnerable to water-use shortages; residents will need to curtail water-use activities and conserve water. Residents may also be vulnerable to increased heat-related illnesses and favorable conditions for wildfires may also exist. Drought can reduce air quality, which can increase pollen levels, pollution, and smoke. In the more rural areas of the county, drought conditions may damage crops and farmers may have to reduce their growing season and/or switch to less water-intensive crops.

4.4 EARTHQUAKE

Table 4-14: Earthquake Profile

Profile	Description
Nature	An earthquake is a sudden motion or trembling caused by the 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. Seismic waves radiate when a fault ruptures, 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, including 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 10 to 15 feet most commonly 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 and debris flows occur as a result of horizontal seismic inertia forces induced in the slopes by 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 during a wet winter after an earthquake. The two most common measures of earthquake intensity used in the United States are the Modified Mercalli Intensity Scale, which measures felt intensity, peak ground acceleration, and 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	As shown on **Figure C-13**, 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 most active fault in Alameda County is the 74-mile-long Hayward Fault.
History	According to the USGS, 52 M 5.0 or greater earthquakes have been recorded in the Bay Area since 1769. **Figure C-13** shows M 5.0 or greater earthquakes that have occurred in Alameda County and neighboring counties. The strongest recorded earthquake (M 6.8) in Alameda County occurred on October 21, 1868. The cities of Hayward, San Leandro, and Fremont were hardest hit; 30 people were killed and hundreds of buildings were damaged and destroyed.

Table 4-14: Earthquake Profile

Profile	Description
Extent / Severity	The California Geological Survey (CGS) has developed 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. A probabilistic seismic hazard map depicting a 10% probability of exceedance in 50 years (an annual probability of 1 in 475 of being exceeded each year) is shown on **Figure C-14**. In Alameda County, there are 466.03 square miles (62.53%) with severe shaking potential and 202.44 square miles (27.16%) with violent shaking potential. In Unincorporated Alameda County, there are 317.17 square miles (74.57%) with severe shaking potential and 33.58 square miles (7.90%) with violent shaking potential.
Recurrence Probability	In 2015, scientists developed a new earthquake forecast model for California. Known as the Uniform California Earthquake Rupture Forecast (Version 3), 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 or more events in the Bay Area that would likely have a significant impact on Alameda County 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

Area	Probabilistic Earthquake Shaking Area—Severe		Probabilistic Earthquake Shaking Area—Violent	
	# of Sq. Miles	% of Sq. Miles	# of Sq. Miles	% of Sq. Miles
Alameda County	466.03	62.53	202.44	27.16
Unincorporated Alameda County	317.17	74.57	33.58	7.90

Table 4-16: Earthquake Impact on Population

Area	Probabilistic Earthquake Shaking Area—Severe		Probabilistic Earthquake Shaking Area—Violent	
	# of People	% of Population	# of People	% of Population
Alameda County	372,402	24.2	1,146,784	74.8
Unincorporated Alameda County	80,861	35.6	85,996	37.9

Table 4-17: Earthquake Impact on Critical Facilities

Entity	Probabilistic Earthquake Shaking Area—Severe		Probabilistic Earthquake Shaking Area—Violent	
	# of Facilities	% of Facilities	# of Facilities	% of Facilities
Alameda County—Critical Facilities	42	35.59	75	63.56
Alameda County—Bridges	26	54.17	12	25.00
ACFD—Critical Facilities	19	35.98	29	60.42
ACFCWCD—Critical Facilities	14	38.89	22	61.11
ACFCWCD—Flood Control Channels	13	30.95	39	92.86

Table 4-18: Overall Summary of Vulnerability to Earthquakes

	Earthquake
Summary	All of Alameda County is vulnerable to ground shaking from an earthquake and the entire county is in areas of very strong, severe, and violent perceived ground shaking hazard. Nearly 100% of Alameda County's residents live and nearly 100% single point critical facilities and flood control channels are situated in areas of severe and violent shaking potential; areas with less potential for strong shaking are sparsely populated. Those that live in areas of severe shaking potential can expect earthquake events to cause trauma or death and produce moderate to heavy damage. According to the USGS, this damage could mean slight damage in specially designed structures, considerable damage in ordinary substantial buildings with partial building collapse, and considerable damage in poorly built or badly designed structures. Those that live in areas of violent shaking potential can expect earthquake events with the potential to produce heavy damage. According to the USGS, this could mean that well-designed framed structures could be thrown out of plumb and substantial buildings could experience partial building collapse.

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 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 Alameda County, floods usually occur during the season of highest precipitation or during heavy rainfalls after prolonged dry periods. Alameda County 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	As shown on **Figure C-15**. in Alameda County, four main types of flooding are 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. • Riverine flooding: Also known as overbank flooding, riverine flooding occurs in narrow, confined channels in the steep valleys of hilly regions to wide and 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 the land use characteristics. Flooding in hilly 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 Alameda County the following watercourses pose a potential flood risk: Alameda Creek; Altamont Creek; Arroyo De La Laguna; Arroyo Del Valle; Arroyo Las Positas; - Arroyo Mocho; Arroyo Seco; Bockman Canal; Castro Creek (Line J); Castro Creek (Line I); Cayetano Creek; Chabot Creek (Line F); Chabot Creek (Line G); Collier Canyon Creek; Crow Creek; Cull Creek; Estudillo Canal; Palomares Creek; San Antonio Reservoir and Creek; San Lorenzo Creek; Sulphur Creek; Tassajara Creek; and Line N, San Lorenzo. • Localized/urban flooding: Localized flooding may 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 stormwater conveyance. Such events frequently occur in flat areas and urbanized areas with large areas of impermeable surfaces. Throughout the urbanized parts of Alameda County, flood hazards have been greatly reduced through the ACFCWCD flood control system. • Sea level rise (see **Section 4.1)**.
History	There have been 45 days associated with a flood event from January 1, 2000, to May 31, 2021, in Alameda County according to the National Oceanic and Atmospheric Administration Storm Events Database.

Table 4-19: Flood Profile

Profile	Description
	Of these, the federal government declared five major disaster declarations for floods in Alameda County: • 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., the base flood). The 100-year flood (1%) and the 500-year flood (0.2%) are considered Special Flood Hazard Areas (SFHAs) and identified on FEMA's Digital Flood Insurance Rate Maps (DFIRMs). The DFIRM for Alameda County identifies 61.60 square miles (8.27%) with a 1% annual chance of flooding. In the 1% annual chance of flood area, Zone V is closest to the shoreline. Zone V is used on flood maps to indicate areas where wave action and fast-moving water can cause extensive damage during the base flood event, with wave heights of 3 feet or higher. There are 6.00 square miles (0.80%) of land in Alameda County that are in Zone V. In addition, the DFIRM identifies 22.62 square miles (3.04%) with a 0.2% annual chance of flooding.
Recurrence Probability	Floods can occur at any time in Alameda County 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

Area	SFHA—0.2% Annual Chance Flood		SFHA—1% Annual Chance Flood	
	# of Sq. Miles	% of Sq. Miles	# of Sq. Miles	% of Sq. Miles
Alameda County	22.62	3.04	61.60	8.27
Unincorporated Alameda County	2.44	0.57	6.71	1.58

Table 4-21: Flood Impact on Population

Area	SFHA—0.2% Annual Chance Flood		SFHA—1% Annual Chance Flood	
	# of People	% of Population	# of People	% of Population
Alameda County	102,294	6.7	57,442	3.7
Unincorporated Alameda County	7,520	3.3	8,071	3.6

Table 4-22: Flood Impact on Critical Facilities

Entity	SFHA—0.2% Annual Chance Flood		SFHA—1% Annual Chance Flood	
	# of Facilities	% of Facilities	# of Facilities	% of Facilities
Alameda County—Critical Facilities	6	5.08	1.	0.85
Alameda County—Bridges	1	2.08	10	20.83
ACFD—Critical Facilities	4	8.33	3	6.25
ACFCWCD—Critical Facilities	7	19.44	8	22.22
ACFCWCD—Flood Control Channels	29	69.05	41	97.62

Table 4-23: Overall Summary of Vulnerability to Floods

	Flood
Summary	Alameda County has a long history of moderate to severe flooding during major storms. An extensive flood control system has eliminated much of this problem and only 10.4% of the county's population lives and 18.40% of single point critical facilities are located in the SFHA. However, most of the flood control system built in the 1960s and 1970s was designed at the time to meet the 15-year flood event standards. Today, the United States Army Corps of Engineers and FEMA require such infrastructure to meet the 100-year flood event standards. Alameda County still remains vulnerable to sustained damage from storms in the form of creek bank erosion, road wash-outs, and downed trees. In addition, Alameda County expects to experience more frequent severe storms and sea level rise caused by climate change. According to FEMA Region IX, as of July 2021, there are 4,977 flood insurance policies in force in Alameda County's unincorporated areas totaling $1.47 billion. Of those policies, 1,894 (38.06%) are policies for properties in the SFHA, which include 6.71 square miles (1.58%) of the unincorporated areas. Two of those properties are considered RL properties. A RL property is any insurable building for which two or more claims of more than $1,000 were paid by the NFIP in any rolling 10-year period since 1978. The average premium for a single-family home not in a SFHA is $408, while the average premium for a single-family home in the SFHA is $1,297; premiums are discounted

Table 4-23: Overall Summary of Vulnerability to Floods

Flood	
	because Alameda County participates in the CRS program. The CRS is a voluntary incentive program that recognizes and encourages community floodplain management practices that exceed the minimum requirements of the NFIP. Alameda County is recognized as Class 7 in CRS, thereby saving properties owners 15% in flood insurance premiums in Unincorporated Alameda County.

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 with regard to infectious disease 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 transmittal), 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 state or local public health officials. These diseases are of public interest by reason of their communicability, severity, or frequency.
Location	All of Alameda County is susceptible to infectious diseases. The 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 county. However, higher-poverty neighborhoods of color, including the unincorporated areas of central Alameda County, are at greater risk due to the effects of health/social inequality. In addition, because of the communicable nature of these diseases, those who are especially at-risk to infection and disease transmission include people experiencing homelessness and people in congregate settings, such as people in long-term care facilities and people who are incarcerated.
History	Alameda County residents have been affected by the following infectious disease outbreaks, epidemics, and pandemics over the last 150 years: • 1873: cholera epidemic • 1888: cases of smallpox, scarlet fever, typhoid, consumption, diphtheria, and cholera • 1900–1904, 1907: outbreak of the bubonic plague • 1918–1919: flu pandemic • 1934, 1943, 1945, and 1948: polio • 2010, 2014, and 2018: whooping cough • 2015: measles • 2019–present: COVID-19
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

Table 4-24: Infectious Disease

Profile	Description
	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 cause severe illness or even death.
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 Alameda County; 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 Alameda County about every 5 to 10 years, while a pandemic occurs every 100 plus years.

Table 4-25: Infectious Disease Impact on Alameda County

Infectious Disease	
Summary	Infectious disease impacts on Alameda County will likely include: • Physical: morbidity, mortality, and indirect health impacts • Psychosocial: social isolation, stress, mental health, substance use, and violence • Socioeconomic: loss of wages and work, unemployment, and strain on small businesses, housing, and basic living needs • Institutional/structural: health system burden, social safety net strain, racism and xenophobia, and health and social inequalities

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

Infectious Disease	
Summary	Infectious diseases can be difficult to evaluate due to the wide variation in disease characteristics. Therefore, they pose difficulties in terms of comprehensive risk assessments. According to the Alameda County Department of Public Health, "In Alameda County, communities of color face inequitable conditions that increase the risk of chronic diseases. Others especially at-risk of infection and disease transmission are people experiencing homelessness and people in congregate settings." The Mayo Clinic states that "signs and symptoms of infectious diseases vary depending on the organism causing the infection, but often include fever and fatigue. Mild infections may respond to rest and home remedies, while some life-threatening infections may need hospitalization. Many infectious diseases can be prevented through vaccines."

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 hilly 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 stabilized 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 are also concerns along the coast of Northern California and, more recently, debris flows from burned areas after 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 layers with earthquake shaking potential to create classes of landslide susceptibility (**Figure C-16**). 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." In Alameda County, the areas that are most susceptible to landsliding are predominately in the north-central and southeastern portions of the county. In 2018, the Association of Bay Area Governments' Resilience Program created a map (**Figure C-17**) that shows where landslides have previously occurred. The generalized location of historical 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; areas identified as "few" existing landslides cover areas with smaller, more scattered landslides. Areas identified as "flat land" are areas that have not had landslide events.
History	There have been five major disaster declarations for mudslides and landslides associated with winter storms in the Alameda County over the last 20 years (**Table 4-19**). In fact, mudslides and landslides associated with severe storms have been among the most common disasters throughout the Bay Area from 1950 to 2009, causing hundreds of millions of dollars in property loss, tens of deaths, and hundreds of injuries.

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. As shown on **Figure C-16**, there are 144.82 square miles (19.43%) of land classified as class IX or X deep-seated landslide susceptibility areas in Alameda County. The majority of this hazard area (117.23 square miles) is in Unincorporated Alameda County. As shown on **Figure C-17**, 269.47 square miles (36.16%) of Alameda County have experienced "few" existing landslides, and another 198.90 square miles (26.69%) have experienced "most" existing landslides. Similar to deep-seated landslides, the majority of "few" and "most" landslides are in hilly areas. In fact, 187.25 of the 269.47 square miles of "few" existing landslides are in Unincorporated Alameda County, and 176.26 of the 198.90 square miles of "most" existing landslides are also in Unincorporated Alameda County.
Recurrence Probability	Shallow landslides can occur at any time during the winter but are more likely to happen when the ground is nearly saturated, which typically occurs after the first few storms in November and December. However, deep-seated landslides are generally triggered by deep infiltration of rainfall (which can take weeks or months to occur) and therefore tend to occur toward the end of the winter season in March or April. Every landslide event reported in Alameda County has followed a winter storm/rain event; therefore, it is assumed that the 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 in Alameda County every 2 to 7 years.

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

Area	Class IX and X Area	
	# of Sq. Miles	% of Sq. Miles
Alameda County	144.82	19.43
Unincorporated Alameda County	117.23	27.56

Table 4-29: Deep-Seated Landslide Impact on Population

Area	Class IX and X Area	
	# of People	% of Population
Alameda County	69,166	4.5
Unincorporated Alameda County	13,839	6.1

Table 4-30: (Deep-Seated) Landslide Impact on Critical Facilities

Entity	Class IX and X Area	
	# of Facilities	% of Facilities
Alameda County—Critical Facilities	0	0.00
Alameda County—Bridges	3	6.25
ACFD—Critical Facilities	0	0.00
ACFCWCD—Critical Facilities	0	0.00
ACFCWCD—Flood Control Channels	16	38.10

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
Alameda County	269.47	36.16	198.90	26.69
Unincorporated Alameda County	187.25	44.02	176.26	41.44

Table 4-32: (Existing) Landslide Impact on Population

County	Existing Landslide Area—Few		Existing Landslide Area—Most	
	# of People	% of Population	# of People	% of Population
Alameda County	422,620	27.6	32,925	2.1
Unincorporated Alameda County	60,873	26.8	14,038	6.2

Table 4-33: (Existing) Landslide Impact on Critical Facilities

Agency	Existing Landslide Area—Few		Existing Landslide Area—Most	
	# of Facilities	% of Facilities	# of Facilities	% of Facilities
Alameda County—Critical Facilities	34	28.81	0	0.00
Alameda County—Bridges	13	27.08	4	8.33
ACFD—Critical Facilities	7	14.58	0	0.00
ACFCWCD—Critical Facilities	5	13.89	2	5.66
ACFCWCD—Flood Control Channels	11	26.19	2	4.76

Table 4-34: Overall Summary of Vulnerability to Landslides

Landslide	
Summary	Alameda County is vulnerable to both shallow and deep-seated landslides. Both types of landslides are the result of ground saturation associated with winter storms. In Alameda County there are 144.82 square miles (19.43%) of land in Class IX and X deep-seated landslide susceptibility areas. Fortunately, the landslide-prone areas of Alameda County are sparsely populated; only 4.5% (69,166 people) of all county residents, 1.20% (3) of the county's single point critical facilities, and 38.10% (16) of county's flood control channels are located in the area. A similar—but larger—area of Alameda County has experienced "few" and "most" existing landslides. Overall, 269.47 square miles (36.16%) of Alameda County have experienced "few" existing landslides, while another 198.90 square miles (26.69%) have experienced "most" existing landslides. Approximately 422,620 people, 59 single point critical facilities, and 11 flood control channels are in the "few" existing landslide areas while another 32,925 people, and six single point critical facilities and two flood control channels are in the "most" existing landslide areas. People that live in landslide-prone areas are vulnerable to rapidly moving water and debris that can cause trauma or death. Landslides can also cause damage to buildings, including moving them off of their foundations. Finally, landslides can cause damage to and impact critical infrastructure, including water, sewer, and roadways.

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, and 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 and Electric Company (PG&E) may de-energize electrical grids or blocks of an area in advance of or during periods of heightened risk conditions. Heightened risk conditions include: • Areas where the National Weather Service has declared a Red Flag Warning • 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 information from the 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 power-line wildfires and ranks fire-threat areas based on the risk that utility wildfires pose to people. As shown on **Figure C-18**, the majority of Tier 2 (Elevated) CPUC Fire-Threat Areas are in the southeastern portion of the county, and the Tier 3 (Extreme) CPUC Fire-Threat Areas are in the north-central portion of Alameda County.
History	The Bay Area, including Alameda County, experienced widescale public safety power shutoffs in late October 2019 due to Red Flag Warnings. In October 2020, 40,000 utility customers in Alameda County were expected to lose power from another public safety power shutoff. However, the shutoff was canceled due to a change in weather conditions. In August 2021, a few dozen utility customers were expected to lose power to Red Flag Warnings again, but the public safety power shutoff was called off.
Extent / Severity	As shown on **Figure C-18**, 242.02 square miles (32.47%) of Alameda County is in a Tier 2 (Elevated) CPUC Fire-Threat Area, with an additional 86.51 square miles (11.61%) in a Tier 3 (Very High) CPUC Fire-Threat Area. In the unincorporated areas, 214.05 square miles (50.33%) are in the in a Tier 2 (Elevated) CPUC Fire-Threat Area, and an additional 66.37 square miles (15.60%) are in a Tier 3 (Very High) CPUC Fire-Threat Area.
Recurrence Probability	PG&E "anticipates that a public safety power shutoff could occur one to two times per 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." In July 2021, PG&E announced that new technology would allow for fewer and more targeted shutoffs in the future.

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

Area	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
Alameda County	242.02	32.47	86.51	11.61
Unincorporated Alameda County	214.05	50.33	66.37	15.60

Table 4-37: Public Safety Power Shutoff Impact on Population

Area	CPUC—Fire Threat Area: Tier 2 Elevated		CPUC—Fire Threat Area: Tier 3 Extreme	
	# of People	% of Population	# of People	% of Population
Alameda County	66,972	4.4	35,495	2.3
Unincorporated Alameda County	20,012	1.3	15,846	7.0

Table 4-38: Public Safety Power Shutoff Impact on Critical Facilities

Entity	CPUC—Fire Threat Area: Tier 2 Elevated		CPUC—Fire Threat Area: Tier 3 Extreme	
	# of Facilities	% of Facilities	# of Facilities	% of Facilities
Alameda County—Critical Facilities	7	5.93	0	0.00
Alameda County—Bridges	8	16.67	9	18.75
ACFD—Critical Facilities	2	4.17	0	0.00
ACFCWCD—Critical Facilities	3	8.33	1	2.78
ACFCWCD—Flood Control Channels	0	0.00	0	0.00

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

Public Safety Power Shutoffs	
Summary	As shown on **Figure C-18**, 242.02 square miles (32.47%) of Alameda County are in a Tier 2 (Elevated) CPUC Fire-Threat Area, with an additional 86.51 square miles (11.61%) of the county in a Tier 3 (Very High) CPUC Fire-Threat Area. Fortunately, less than 70,000 people (4.4%) in Alameda County reside in a Tier 2 (Elevated) CPUC Fire-Threat Area, and only 35,000 people (2.3%) reside in the Tier 3 (Very High) CPUC Fire-Threat Area. There are only 18 (7.20%) single point critical facilities in the Tier 2 (Elevated) CPUC Fire-Threat Area and an additional 10 (2.5%) single point critical facilities located in the Tier 3 (Very High) CPUC Fire-Threat Area. There are no flood control channel in either CPUC Fire-Threat Area. De-energization of electrical systems in affected areas can pose a life-safety risk to residents, particularly those who have medical needs that require medications to be refrigerated or medical devices that require power. De-energization can also impact the capabilities of local agencies to respond to wildfire due to loss of alert, warning, and public information communications systems, including internet and cellular towers; inability to monitor or maintain water supplies; and a loss of traffic control systems that could support evacuation.

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 by local strike-slip faults (such as the San Andreas Fault). Most tsunami damage and destruction, including that to the Bay Area, is caused by flooding, wave impacts, erosion, strong currents, and floating debris.
Location	Maximum tsunami inundation areas based on the modeling of realistic local and distant earthquakes and hypothetical extreme undersea, near-shore landslides are shown on **Figure C-19**. 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 on **Figure C-19**, nearly all of the Alameda County coastline is subject to being affected by tsunami inundation.
History	More than 71 tsunamis have been recorded in San Francisco Bay since 1854. 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 was generated in Alaska by a M 9.2 earthquake on March 27, 1964. This event produced a 2-foot runup in the city of Alameda and a 4-foot runup in the city of Oakland. No damage was reported, however. On March 11, 2011 a tsunami generated in Japan resulted in a 2-foot runup in the cities of Alameda and Berkeley. Minor damages to docks and piles were reported.
Extent / Severity	According to USC modeling, 33.85 square miles (4.54%) in Alameda County are at risk of tsunami run-up from a number of extreme—yet realistic—tsunami sources. Only 0.31 square mile (0.07%) of this hazard area is in Unincorporated Alameda County.

Table 4-40: Tsunami Profile

Profile	Description
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." In addition, 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.

Table 4-41: Tsunami Impact on Land Area

Area	Maximum Tsunami Run-Up Area	
	# of Sq. Miles	% of Sq. Miles
Alameda County	33.85	4.54
Unincorporated Alameda County	0.31	0.07

Table 4-42: Tsunami Impact on Population

Area	Maximum Tsunami Run-Up Area	
	# of People	% of Population
Alameda County	50,064	3.3
Unincorporated Alameda County	775	0.3

Table 4-43: Tsunami Impact on Critical Facilities

Entity	Maximum Tsunami Run-Up Area	
	# of Facilities	% of Facilities
Alameda County—Critical Facilities	13	11.02
Alameda County—Bridges	0	0.00
ACFD—Critical Facilities	1	2.08
ACFCWCD—Critical Facilities	6	16.67
ACFCWCD—Flood Control Channels	17	40.48

Table 4-44: Overall Summary of Vulnerability to Tsunamis

Tsunami	
Summary	According to USC modeling, 33.85 square miles (4.54%) of Alameda County, 50,064 (3.3%) people, 20 (3.84%) single point critical facilities, and 17 (40.48%) flood control channels are at risk of tsunami run-up. According to CGS, in the San Francisco Bay tsunami heights may not be that large; however, there is potential for a tsunami to knock people down, causing injuries, and cause localized flood damage. Researchers warn that California needs to be better prepared for tsunamis and while new deep-sea sensors have helped in tsunami detection, they are better suited for far-away tsunamis than for local tsunamis. Cal OES and CGS lead Tsunami Preparedness Week in California annually. During this week, governmental agencies (such as the Alameda County Office of Emergency Services) and community organizations participate in exercises, test warning systems and response plans, and host community events to promote tsunami awareness.

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, 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 influence wildfire spread rate increases. South-facing slopes are subject to more solar radiation than slopes facing other directions, so south-facing slopes tend to be drier and thereby intensify 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 refers to the type and condition of vegetation; fuel plays a significant role in wildfire spread. 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, because the moisture content of both living and dead plant matter 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 also more susceptible to increased debris flow hazards.
Location	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 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 areas most susceptible to wildfire, including the hilly northwestern, central, and southeastern portions of the county, are shown on **Figure C-20**. 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 of wildfires. California has three types of WUI areas:

Table 4-45: Wildfire Profile

Profile	Description
	• 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 on **Figure C-21**, Alameda County does not have a significant percentage of land area in the Interface or Intermix areas; however, much of central Alameda County is in an Influence area.
History	According to Cal FIRE, Alameda County has experienced 221 wildfires since record keeping began 70 years ago. One-third of the recorded fires have been 10 acres or less. Only 19 wildfires have been greater than 500 acres. As shown on **Figure C-22**, the largest wildfire to occur in Alameda County occurred in 2020. The SCU Lightning Complex, burned 396,624 acres (24,0642 acres within Alameda County) and destroyed 222 structures in Santa Clara, Contra Costa, Alameda, Stanislaus, and San Joaquin Counties.
Extent / Severity	As shown on the Cal FIRE FHSZ map, 240.66 square miles (32.29%) of Alameda County are in High FHSZs, with the majority (238.61 square miles) in Unincorporated Alameda County. In addition, 60.83 square miles (8.16%) of Alameda County are in the Very High FHSZ. Nearly 40 square miles of the Very High FHSZ are in Unincorporated Alameda County. As shown on the WUI map, 42.07 square miles (5.64%) of Alameda County are in the Interface area, while an additional 14.86 square miles (1.99%) are in the Intermix area, and 256.47 square miles (34.41%) are in the Influence area. For Unincorporated Alameda County, 8.08 square miles (1.90%) of Alameda County are in the Interface area, 9.73 square miles (2.29%) are in the Intermix area, and 179.13 square miles (42.12%) are in the Influence area.
Recurrence Probability	Based on historical Cal FIRE records, Alameda County has averaged approximately 4-5 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….[I]t 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

Area	Fire Hazard Severity Zones			
	High		Very High	
	# of Sq. Miles	% of Sq. Miles	# of Sq. Miles	% of Sq. Miles
Alameda County	240.66	32.29	60.83	8.16
Unincorporated Alameda County	238.61	56.10	39.19	9.21

Table 4-47: Wildfire Impact on Population

Area	Fire Hazard Severity Zones			
	High		Very High	
	# of People	% of Population	# of People	% of Population
Alameda County	23,095	1.5	71,004	4.6
Unincorporated Alameda County	22,717	10.0	9,918	4.4

Table 4-48: Wildfire Impact on Critical Facilities

Entity	Fire Hazard Severity Zones			
	High		Very High	
	# of Facilities	% of Facilities	# of Facilities	% of Facilities
Alameda County—Critical Facilities	0	0.00	8	6.78
Alameda County—Bridges	8	16.67	3	6.25
ACFD—Critical Facilities	1	2.08	1	2.08
ACFCWCD—Critical Facilities	2	5.56	2	5.56
ACFCWCD—Flood Control Channels	0	0.00	0	0.00

Table 4-49: Wildfire Urban Interface Impact on Land Area

Area	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
Alameda County	256.47	34.41	14.86	1.99	42.07	5.64
Unincorporated Alameda County	179.13	42.12	9.73	2.29	8.08	1.90

Table 4-50: Wildfire Urban Interface Impact on Population

Area	Wildland Urban Interface					
	Wildland Urban Influence		Wildland Urban Intermix		Wildland Urban Interface	
	# of People	% of Population	# of People	% of Population	# of People	% of Population
Population	99,478	6.5	13,171	0.9	148,378	9.7
Unincorporated Alameda County	31,104	13.7	4,110	1.8	25,250	11.1

Table 4-51: Wildfire Urban Interface Impact on Critical Facilities

Entity	Wildland Urban Interface					
	Wildland Urban Influence		Wildland Urban Intermix		Wildland Urban Interface	
	# of Facilities	% of Facilities	# of Facilities	% of Facilities	# of Facilities	% of Facilities
Alameda County—Critical Facilities	3	2.54	0	0.00	27	22.88
Alameda County—Bridges	8	16.67	6	12.50	8	12.50
ACFD—Critical Facilities	3	6.25	0	0.00	8	16.67
ACFCWCD—Critical Facilities	3	8.33	0	0.00	5	13.89
ACFCWCD—Flood Control Channels	24	57.14	4	9.52	14	33.33

Table 4-52: Overall Summary of Vulnerability to Wildfires

Wildfires	
Summary	As noted above, 240.66 square miles (32.29%) of Alameda County are in a High FHSZ. In addition, 60.83 square miles (8.16%) of Alameda County are in the Very High FHSZ. Fortunately, only 6.0% of the county's population and 10.00% of single point critical facilities are in the High and Very FHSZ. There are no flood control channels in either FHSZ. With regard to the WUI, 42.07 square miles (5.64%) of Alameda County are in the Interface area, 14.86 square miles (1.99%) are in the Intermix area, and 256.47 square miles (34.41%) are in the Influence area. Nearly 20% of the county's population, 28% of single point critical facilities, and 52.38% of flood control channels are in this hazard area. Vulnerability to wildfires is commonly based on exposure to the hazard: those that live in rural, woody, and/or hilly areas are more at risk than those living in urban areas. The US Forest Service's *Wildfire Risk to Communities* assumes all structures that encounter wildfire will be damaged, and the degree of damage is directly related to wildfire intensity. However, it does not take into account "for homes that may have been mitigated and does not measure other important resources that may be damaged by a wildfire such as infrastructure, watersheds, or forest health." Additionally, recent California wildfires have shown, living outside a higher-risk zone does not mean an area is without risk.

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

Lists of Alameda County's, ACFD's, and ACFCWCD's existing authorities, policies, programs, and resources available for hazard mitigation are provided in Appendix D through Appendix F. 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 on residential and nonresidential 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.

Alameda County joined the NFIP for the unincorporated areas of Alameda County on April 15, 1981, the same day the county was mapped to a FIRM. The current FIRM date for Alameda County is December 21, 2018. As a participant of the NFIP, Alameda County Public Works Agency enforces a floodplain management ordinance and participates in FEMA's Community Assisted Visits, which occur on a 3- to 5-year cycle. On May 26, 2017, FEMA's Community Assistance Visits Unit conducted an audit to evaluate Alameda County's floodplain management program and found that the Alameda County Public Works Agency has been appropriately and effectively enforcing its floodplain requirements. However, FEMA identified minor deficiencies with the County's Flood Prevention Ordinance, and recommended revisions to be adopted, and to codify certain procedures to lessen chances for liabilities and potential future violations. This includes, the adoption of Appendix G, Flood Resistant Construction of the California Building Code, into Chapter 15.08, and adoption of the revised Chapter 15.40, Floodplain Management General Ordinance Code. The Alameda County Board of Supervisors voted to amend Chapter 15.08 to the General Ordinance Code to adopt Appendix G, Flood Resistant Construction of the California Building

Code. Repeal Chapter 15.40, Floodplain Management of the Alameda County General Ordinance Code and adopt a revised Chapter 15.40, Floodplain Management on September 18, 2018.

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 a community-wide vision. The Plan Bay Area's resilience action objectives provided the basis for the three goals for the 2021 LHMP. The three goals are:

- Enhance climate protection and adaptation efforts
- Create healthy and safe communities
- Protect critical facilities and infrastructure against hazards

5.4 RECOMMENDED MITIGATION ACTIONS

Mitigation actions help achieve the goals of the LHMP. The recommended mitigation actions provided in **Table 5-1** include education and awareness, structure and infrastructure projects, preparedness and response, local plans and regulations, and floodplain management (which includes preventive, property protection, natural resource protection, and structural projects and public information). This list of actions addresses every hazard profiled in this plan and is based on the plan's risk assessment and 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 team 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 improvements after events in which the Operational Area Emergency Operations Center is activated.	Federal Highway Administration
2.	All hazards	Standby contracts	Establish standby contracts to be used for emergency response and recovery support.	Federal Highway Administration
3.	All hazards	Owner/operator roles and responsibilities	For county-leased or contracted facilities and services, clarify building owner roles and responsibilities during and after an emergency or disaster.	FEMA
4.	All hazards	Hazard assessment	Develop and implement a methodology to systematically assess all hazards outlined in this LHMP in considering building acquisitions and sales, portfolio planning, major retrofits, capital improvement planning, and master planning for county-owned and county-leased facilities.	Los Angeles County
5.	Climate change	Alameda County government climate action plan	Develop a climate action plan for government services and operations that includes actions to reduce the County's contributions to climate emissions as well as to prepare for and address climate hazards such as smoke and fire which regularly affect County residents. (Actions will be carried out by relevant agencies.)	Alameda County GSA
6.	Climate change	Carbon mitigation ordinance	Develop a comprehensive carbon mitigation energy policy ordinance for adoption by the County Board of Supervisors that sets all electric design, energy efficiency and renewables as a priority, requires the development of design standards, and requires development of a strategic implementation plan for County owned, constructed, and leased facilities.	2016 LHMP
7.	Climate change	Global warming public education	Leverage the County’s existing communication channels and Board of Supervisor policies across the agencies to educate the public, schools, other jurisdictions, professional associations, and businesses and industry about reducing global warming pollution and how to prepare for inevitable climate changes.	2016 LHMP

Table 5-1: Recommended Mitigation Actions

No.	Hazard Mitigated	Project Name	Project Description	Project Source
8.	Climate change	Cool pavement	Install cool pavements (with higher solar reflectance) over asphalt to lower surface temperatures at waiting areas and gathering spots.	C40 Cities
9.	Climate Change	Environmental Justice Element	Prepare an Environmental Justice Element for the County General Plan to respond to impacts of environmental factors on disadvantaged and low-income communities in Unincorporated Alameda County. The Environmental Justice Element will address the requirements of Senate Bill 1000, including impacts related to climate change (heat, smoke, drought, flooding) and how these disproportionality impact Environmental Justice communities.	Alameda County Community Development Agency, Senate Bill 1000
10.	Climate change	Community Action Plan update	Update the existing Community Climate Action Plan for the unincorporated areas, to reduce the community's contributions to climate emissions and to prepare for and address climate hazards. (Actions will be carried out by relevant agencies).	Alameda County Community Development Agency
11.	Climate change, dam failure, flood, 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, and medical and mechanical equipment, above the design flood elevation.	FEMA
12.	Climate change, dam failure, flood, tsunami	Passive floodproofing measures	Install passive floodproofing measures in existing critical facilities that cannot be elevated and are in the SFHA, sea level rise hazard area, tsunami inundation area, and dam breach inundation areas.	FEMA
13.	Climate change, dam failure, flood, tsunami	NFIP outreach	Develop/expand an outreach program to educate property owners about the adjustments in flood zones due to levees; many property owners may be removed from a flood zone due to a levee. Continue the public outreach program that informs property owners in dam breach inundation areas, sea level rise hazard areas, and tsunami inundation areas about voluntary flood insurance.	Best practices
14.	Climate change, drought, flood	Green infrastructure / low-impact development	Continue to implement green infrastructure / low-impact development projects to capture stormwater on-site, harvest rainwater, capture pollutants, and provide shade.	ACFCWCD

Table 5-1: Recommended Mitigation Actions

No.	Hazard Mitigated	Project Name	Project Description	Project Source
15.	Climate change, drought, infectious disease, public safety power shutoff	Safety Element update	Update the Safety Element to include hazards and mitigation strategies addressed in the 2021 LHMP. The Alameda County Safety Element does not currently address climate change, drought, infectious disease, or public safety power shutoff.	Best practices, Alameda County Community Development Agency, Senate Bill 379
16.	Climate change, earthquake, public safety power shutoff, wildfire	Standby power systems / generators	Install appropriate standby power systems such as generators and solar photovoltaic systems in new and existing critical facilities that meet current and projected loads, site parameters, risk assessment, flexibility requirements, and operating concerns.	FEMA
17.	Climate change, earthquake, public safety power shutoff, wildfire	Fuel storage capacity / contingency	Determine and secure enough fuel storage for generators to use. Develop contingency plans for obtaining generator fuel.	FEMA
18.	Climate change, flood	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
19.	Climate change, flood	Tidal marshes	Create tidal marshes with resilience to climate change by providing space for the tidal marshes to spread vertically upslope when sea level rises.	United States Army Corps of Engineers
20.	Climate change, flood	CRS program	Explore and, if applicable, implement Section 404 of the 2017 CRS Manual. Section 404 lists several activities that credit consideration of future sea level rise, including elements of Activities 410, 430 and 450.	FEMA
21.	Climate change, wildfire	Cooling Our Communities / Heat Preparedness Program expansion	Continue to expand the County's Cooling Our Communities / Heat Preparedness Program by developing action plans that identify and describe public transportation access and routes—particularly for transit-dependent neighborhoods—to pre-identified extreme weather centers and wildfire evacuation points and Red Cross shelters.	Cooling Our Communities, Centers for Disease Control and Prevention (CDC)

Table 5-1: Recommended Mitigation Actions

No.	Hazard Mitigated	Project Name	Project Description	Project Source
22.	Climate change, drought, wildfire	Water storage tanks	Replace deteriorating and/or install more water storage tanks to be available for use during periods of prolonged droughts and for firefighting activities.	Alameda County Public Works Agency
23.	Earthquake	Retrofits/upgrades of critical facilities	Retrofit or upgrade existing vulnerable critical facilities to better protect structural and nonstructural components. Continued focus should be on county and local ramps and bridges that are categorized as structurally deficient, the pumps and pump stations identified in the recent ACFCWCD condition assessment, and other facilities deemed necessary during emergency response operations.	Alameda County Public Works Agency, ACFCWCD
24.	Earthquake	Seismic upgrade guide	Develop a guide to include general knowledge of and appreciation for the value of seismic upgrading of the building's structural and nonstructural elements.	2016 LHMP
25.	Earthquake, landslide	Earthquake-resistant pipes replacement	Replace aging critical pipes in areas of extreme or violent shaking hazard and Class IX and X landslide hazard areas to improve seismic reliability and safeguard critical water distribution lines against the potential destructive impacts of large-scale earthquakes and accompanying landslides.	Los Angeles County
26.	Flood, climate change	Creek restoration	Continue to restore urban creeks throughout Alameda County to more natural conditions to ensure flood protection and enhance the ability of wildlife species to adapt to climate change.	ACFCWCD
27.	Flood	Storm drains, channels, levees, and pump station improvements	Continue to repair and make capacity/structural improvements to storm drains, channels, levees, and pump stations to enable them to perform to their design capacity in handling water flows.	ACFCWCD
28.	Flood	Creek setback requirements	Establish design standards, guidelines, and setback requirements for development on properties that abut creeks and waterways and require the replanting and restoration of riparian vegetation as part of any discretionary permit.	Alameda County Safety Element
29.	Flood	Zone 5 and 12 improvements	Once Zone 5 and Zone 12 Drainage Studies have been completed, develop and implement improvement projects to address drainage deficiencies in various open channels and underground flood control drainage facilities.	ACFCWCD

Table 5-1: Recommended Mitigation Actions

No.	Hazard Mitigated	Project Name	Project Description	Project Source
30.	Flood	Zone 6 Capacity improvements	Improve line E between Grimmer Blvd. and Auto Mall Parkway; Line E at Auto Mall Parkway crossing; Line E at Fremont Blvd. crossing, and Line E between I-880 Freeway and Starboard Drive.	ACFCWCD
31.	Flood	Estudillo Canal	Upgrade tidegate structure and lower South Levee downstream of UPRR. Start Estudillo Canal Upstream Riverine Mitigation Study Advance Assistance.	ACFCWCD
32.	Flood, wildfire	Goat grazing	Continue with and expand on the rent-a-goat program to control vegetation along creeks and in flood control channels and to reduce fire fuels.	ACFCWCD, ACFD
33.	Landslide	Hillside protection	Stabilize landslide-prone areas through stability improvement measures, including interceptor drains, in situ soil piles, drained earth buttresses, and subdrains.	Best practices
34.	Tsunami	TsunamiReady program	Join the TsunamiReady program. The main goal of the program is to improve public safety before, during and after tsunami emergencies. It aims to do this by establishing guidelines for a standard level of capability to mitigate, prepare for and respond to tsunamis and working with communities to help them meet the guidelines and ultimately become recognized as TsunamiReady by the National Weather Service.	2016 LHMP
35.	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
36.	Wildfire	Red Flag Warning outreach	Create an online and offline public outreach campaign for Red Flag Warnings and fire weather flags. Include information about what a Red Flag Warning is, what areas may be closed, what individuals should do to be prepared, and what activities should be avoided. Tailor outreach material to various target groups, including people experiencing homelessness and older, younger, and non-English-speaking residents.	Cal FIRE

Table 5-1: Recommended Mitigation Actions

No.	Hazard Mitigated	Project Name	Project Description	Project Source
37.	Wildfire	Defensible space	Continue to implement the Defensible Space Fuel Reduction Program. The program helps Alameda County property owners with vegetation management projects that will lead to compliance with their local fire department's defensible space requirements in areas designated as Priority Hazard Zones.	ACFD
38.	Wildfire	Fireproof coating of critical assets	Fireproof-coat critical facilities in Very High FHSZs to allow structures to extend their strength in the event of a fire.	Los Angeles County
39.	Wildfire	Structure ignition zone assessment	Develop a countywide structure ignition zone assessment program for homeowners where mitigation specialists visit interested homeowners to develop a comprehensive report that recommends mitigation actions to take. Develop a grant program to assist homeowners with implementing recommended action items if funding is available.	Mariposa County
40.	Wildfire	Hazardous fuel reduction	Implement fuel reduction projects, such as pruning, utility management, removal of understory, and biomass removal, which are beyond defensible space measures but within 2 miles of homes and other structures.	FEMA

5.5 PRIORITIZED ACTION PLAN

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

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

- Tier 1 (high priority) mitigation actions are those that address hazards of immediate concern but 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.

Alameda County, ACFD, and ACFCWCD determined the hazards and threats of immediate concern based on the 2021 LHMP's hazard profiles, risk assessments, and capability assessments, as follows:

- Alameda County: climate change, drought, flood, earthquake, public safety power shutoff, and wildfire
- ACFD: climate change, earthquake and wildfire
- ACFCWCD: climate change and flood

The results of the above prioritization process are provided in **Appendix D** through **Appendix F**. For each mitigation action listed, potential funding sources, responsible departments or agencies, and implementation timelines have been identified.

5.6 PLAN INTEGRATION

Appendix D through **Appendix F** also identify how the 2021 LHMP 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

The 2021 LHMP was updated to reflect changes in development as follows:

- Fifty-five additional critical facilities and infrastructure were identified, geocoded, and assessed for risks. Three critical facilities that are no longer leased by Alameda County were removed.
- Climate change was included as a stand-alone hazard, helping the Alameda County government better understand the risks for existing and future development in this hazard area.
- The boundaries for the unincorporated areas of Alameda County were updated using "PAM," which is a new resource developed by the Alameda County Community Development Agency. The PAM dataset is a more complete boundary dataset than the dataset used for the 2016 LHMP. Although the change in datasets does not reflect changes in development per se; the updated unincorporated area boundaries changed the land area for the unincorporated areas from 378.91 square miles to 425.33 square miles and the estimated number of people residing in the unincorporated areas from 189,977 to 227,065.

6.2 PROGRESS IN LOCAL MITIGATION EFFORTS

Appendix D through **Appendix F** address progress made in local mitigation efforts for each plan participant.

6.3 CHANGES IN PRIORITIES

The 2016 LHMP's prioritization process focused on projects that met the HMA Guidance program requirements. Although benefit-cost and funding are still considerations in the 2021 LHMP's prioritization process, the updated process also takes into consideration hazards of immediate concerns, including climate change, drought, public safety power shutoff, and wildfires.

Because Alameda County is susceptible to a wide range of hazards, some which are not considered of immediate concern, the 2021 LHMP prioritization process also took into account these hazards with a new medium priority rating.

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—LHMP AND FMP CHECKLISTS

APPENDIX B—PLANNING PROCESS DOCUMENTS

1401 LAKESIDE DRIVE, OAKLAND, CALIFORNIA 94612 510 208 9700 FAX 510 208 9711 WWW.ACGOV.ORG/GSA/

June 23, 2021

Honorable Board of Supervisors
County of Alameda
1221 Oak Street, Suite 536
Oakland, California 94612-4305

SUBJECT: APPROVE THE CONTRACTOR NAME CORRECTION DATED JUNE 8, 2021; RETROACTIVELY AWARD A PROFESSIONAL SERVICES AGREEMENT TO AECOM TECHNICAL SERVICES, INC. FOR HAZARD MITIGATION CONSULTING SERVICES; PROCUREMENT CONTRACT NO. 22221; AMOUNT: $40,500

Dear Board Members:

RECOMMENDATIONS:

A. Approve a retroactive contract and correct a contractor name approved by your Board on June 8, 2021 (File No. 30650, Item No. 34) wherein the consultant name for Procurement Contract No. 22221 was incorrectly stated as AECOM Technology Services, Inc. and should be AECOM Technical Services, Inc. (Principal: Steve Leach, Location: Oakland), to provide hazard mitigation consulting services to the County of Alameda General Services Agency, for the contract term of 6/8/2021 – 6/8/2022, in the amount of $40,500; and

B. Authorize the Director of the General Services Agency or his designee to prepare and execute the proper contract documents, subject to review and approval as to form by County Counsel, and submit executed copies to the Clerk of the Board for filing.

DISCUSSION/SUMMARY:

On June 8, 2021, your Board approved (Item No. 34, File No. 30650) the award of a Professional Services Agreement (Procurement Contract No. 22221) to AECOM Technology Services, Inc. to provide hazard mitigation consulting services to the County of Alameda General Services Agency (GSA). A clerical error was made and the consultant name was incorrectly stated as AECOM Technology Services, Inc. The correct name of the consultant is AECOM Technical Services, Inc. (AECOM). This letter serves to correct the error and retroactively award the Professional Services Agreement to AECOM for the contract term of 6/8/2021 to 6/8/2022. In addition, the Fiscal Year in relation to the action that was approved was listed as Fiscal Year 2020-2021. The correct fiscal year for which funding will be provided will be Fiscal Year 2021-2022.

In October of 2000, the Federal government passed legislation called the Disaster Mitigation Act of 2000, requiring local governments to develop a Pre-Disaster Local Hazard Mitigation Plan (LHMP). The legislation requires all local government agencies to prepare these plans based on criteria from the Federal Emergency Management Agency (FEMA). The purpose of the plans is to find methods to

reduce the effects that future natural and man-made hazards can have on people, property, the economy, and the environment. When a local jurisdiction's plan is approved by FEMA and officially adopted by the local jurisdiction, said jurisdiction then becomes eligible for Federal pre-disaster and post-disaster mitigation grant programs. Every five years the plans must be reviewed, updated, and approved by FEMA.

The County of Alameda's early mitigation planning efforts were as a participant in the multi-jurisdictional plans developed by the Association of Bay Area Governments (ABAG) in 2006 and again in 2011. On January 23, 2007, your Board adopted (Item No. 14, File No. 21755) Resolution No. R-2007-26, approving the original Alameda County Annex to ABAG's 2005-2010 Multi-Jurisdictional Mitigation Plan (MJMP). In addition, on January 24, 2012, your Board adopted (Item No. 29, File No. 27899) Resolution No. R-2012-25 and approved the first update of the Alameda County Annex to ABAG's 2010-2015 MJMP. The Alameda County Annex to that plan expired on March 16, 2012. Those prior plan documents were prepared by the GSA staff.

On January 26, 2016, your Board adopted (Item No.53, File No. 29753) Resolution No. R-2016-30 to approve the updated 2016 LHMP prepared by AECOM.

The 2016 LHMP is now expired and needs to be updated. To complete the update, AECOM will include document restructuring of the existing plan to be more concise; update to the Activity 510 Floodplain Management Planning (FMP) activities of the Community Rating System (CRS); provide public outreach and stakeholder involvement; revise population and residential building estimates with current 2020 United States Census Bureau data; hazard analysis, risk management and strategic mitigation planning, to include infectious disease and climate change adaptation; review and integration of relevant federal, state and local plans; documentation of the planning, review and update process; develop a more realistic approach to monitor, evaluate and update the LHMP; and will, per FEMA requirements, be referenced to the Alameda County's Safety Element of the General Plan. GSA has determined that it is in Alameda County's best interest to meet the update deadline for submission and to produce the timely effort by utilizing outside expert consultants to produce the plan.

Due to the urgent time restraints required to submit an approved plan by October 2021 to receive $10 million in FEMA grant funding, we recommend authorizing the Chief Deputy of Operations of GSA to prepare and execute the contract document, subject to review and approval as to form by the County Counsel, and submit executed copies to the Clerk of the Board for filing.

SELECTION CRITERIA/PROCESS:

GSA has determined that the County of Alameda does not currently have the resources to provide hazard mitigation consulting services. Further, given the urgency of updating the LHMP plan to meet submission deadlines for a $10 million FEMA grant, GSA has determined that award of the contract to AECOM, the firm that prepared the original County approved LHMP, is a qualified Sole Source exemption. As such, a Sole Source waiver (Waiver No. 7492, Expiration Date: June 1, 2022) has been approved by GSA - Purchasing Department.

It was determined that there are no subcontracting opportunities available for AECOM, therefore GSA – Office of Acquisition Policy issued a Small Local Emerging Business Waiver (No. 7495, Expiration Date: June 1, 2022).

FINANCING:

Appropriations for this contract are available in the GSA Hazmat Fund Fiscal Year 2021-22 budget. No additional appropriations are required, and there will be no increase in net County cost.

VISION 2026 GOAL:

The updating of the LHMP meets the 10X goal pathways of **Healthcare for All** and **Accessible Infrastructure** in support of our shared vision of **Safe and Livable Communities**.

Respectfully submitted,

DocuSigned by:
6DC9F310AA3D4A2...
Alan Baxter
Chief Deputy of Operations, General Services Agency

cc: County Administrator
Auditor-Controller/Clerk-Recorder
County Counsel

ALAMEDA COUNTY BOARD OF SUPERVISORS
MINUTE ORDER

The following action was taken by the Alameda County Board of Supervisors on 07/13/2021

Approved as Recommended ☑ **Other** ☐

Unanimous ☑ **Chan:** ☐ **Haubert:** ☐ **Miley:** ☐ **Valle:** ☐ **Carson:** ☐ - **5**
Vote Key: N=No; A=Abstain; X=Excused

Documents accompanying this matter:
Contract: **C-22221**

Documents to be signed by Agency/Purchasing Agent:

File No. 30666
Item No. 39

Copies sent to:

Cindy Wong, QIC 26021
Auditor's Office, QIC 20111

Special Notes:

I certify that the foregoing is a correct copy of a Minute Order adopted by the Board of Supervisors, Alameda County, State of California.

ATTEST:
Clerk of the Board
Board of Supervisors

By: Cheryl Perkins
Deputy

2021 Alameda County Local Hazard Mitigation Plan
Planning Team Meeting #1
July 21, 2021
10:00 AM – 11:00 AM

Agenda*

WELCOME

- Introductions

MITIGATION PLANNING OVERVIEW

- Disaster Mitigation Act of 2000 and Local Mitigation Planning Requirements
- FEMA Mitigation Grants

2021 LOCAL HAZARD MITIGATION PLAN

- 2021 LHMP Outline
- 2021 LHMP Update Process

NEXT STEPS

- 2021 LHMP Timeline
- Engage Public and Stakeholders
- Review and Update 2016 LHMP's Critical Facilities List
- Review and Update 2016 LHMP's Mitigation Action Plans
- Draft Hazard Profiles and Hazard Figures

.

QUESTIONS & ANSWERS

*Please follow along on Microsoft Teams or the PowerPoint presentation emailed in advance!

2021 Alameda County Local Hazard Mitigation Plan
Planning Team Meeting #2
August 25, 2021
10:30 AM – 11:30 AM

Agenda*

WELCOME

HAZAD IDENTIFICATION & RISK ASSESSMENT

- Hazard Figures
- Impact Tables

MITIGATION STRATEGY

- Goals
- Recommended Mitigation Actions
- Mitigation Priorities
- Prioritized Action Plans

NEXT STEPS

- Prioritized Action Plans
- Draft LHMP
- Grant Funding Update

.

QUESTIONS & ANSWERS

*Please follow along on Microsoft Teams

From: Reed, Matthew GSA - Capital Programs <Matthew.Reed@acgov.org>
Sent: Friday, August 6, 2021 10:28 AM
Subject: [EXTERNAL] Alameda County Local Hazard Mitigation Plan 2021 Update

Good morning,

The Alameda County – General Services Agency is kicking off the 2021 Alameda County Local Hazard Mitigation Plan (LHMP) update process. LHMPs are pre-disaster plans that are focused on reducing the impacts of disasters *before* they occur. In addition, local governments that prepare LHMPs are eligible for certain types of FEMA funding.

By Fall 2021, we will have identified and profiled hazards, analyzed risk and developed mitigation actions to reduce or eliminate these risks. The implementation of the mitigation actions, which include short- and long-term strategies that may involve planning, policy changes, programs, projects, and other activities, will be the end result of this process.

To learn more about hazard mitigation planning, please visit: Hazard Mitigation Planning | FEMA.gov

To learn more about our plan, please follow our Twitter account @AlamedaCounty, Facebook page @AlamedaCounty, or our LHMP website: Alameda County Local Hazard Mitigation Plan (acgov.org)

If you would like to participate in our planning process, please contact me via email at Matthew.Reed@acgov.org. I will send out a follow-up email when our Public Draft is available for review and comment.

Respectfully,

Matthew Reed

Matthew Reed, CAC, CDPH I/A
Environmental Project Manager

Environmental Department-Capital Programs
1401 Lakeside Drive, Suite 800
Oakland, CA 94612
Office: 510.208.9695
Email: matthew.reed@acgov.org

Home

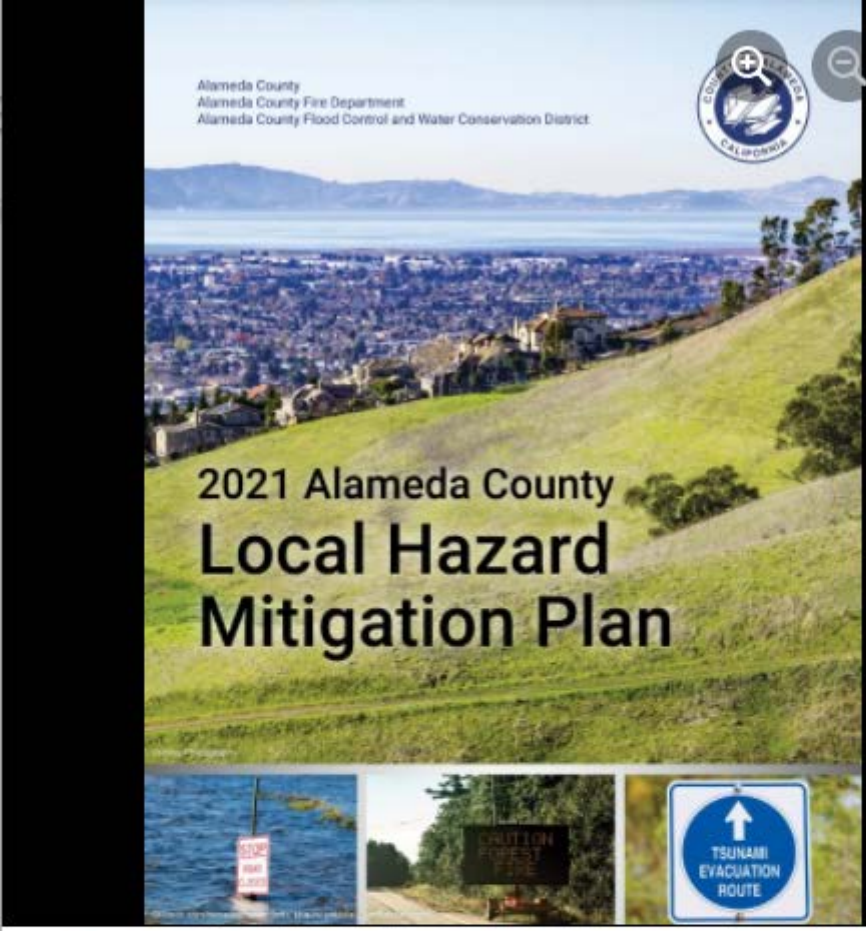
Alameda County Local Hazard Mitigation Plan

Alameda County, on behalf of Unincorporated Alameda County, is updating its 2016 Local Hazard Mitigation Plan (LHMP). The purpose of this plan, a requirement of the Federal Emergency Management Agency (FEMA), is to identify the natural and human-caused hazards in our area, determine how they will impact our community, and develop strategies to lessen the effect of those hazards and create a more disaster resilient Alameda County. The updated LHMP will also maximize the Community Rating System credit for County residents under the auspices of the National Flood Insurance Program.

The plan update process, which will include a public review period for the 2021 LHMP, will occur over this summer and fall.

News and Announcements

Alameda County has kicked off the 2021 LHMP update process! Please check back soon to take our hazard survey and also view and comment on the Public Draft 2021 LHMP.



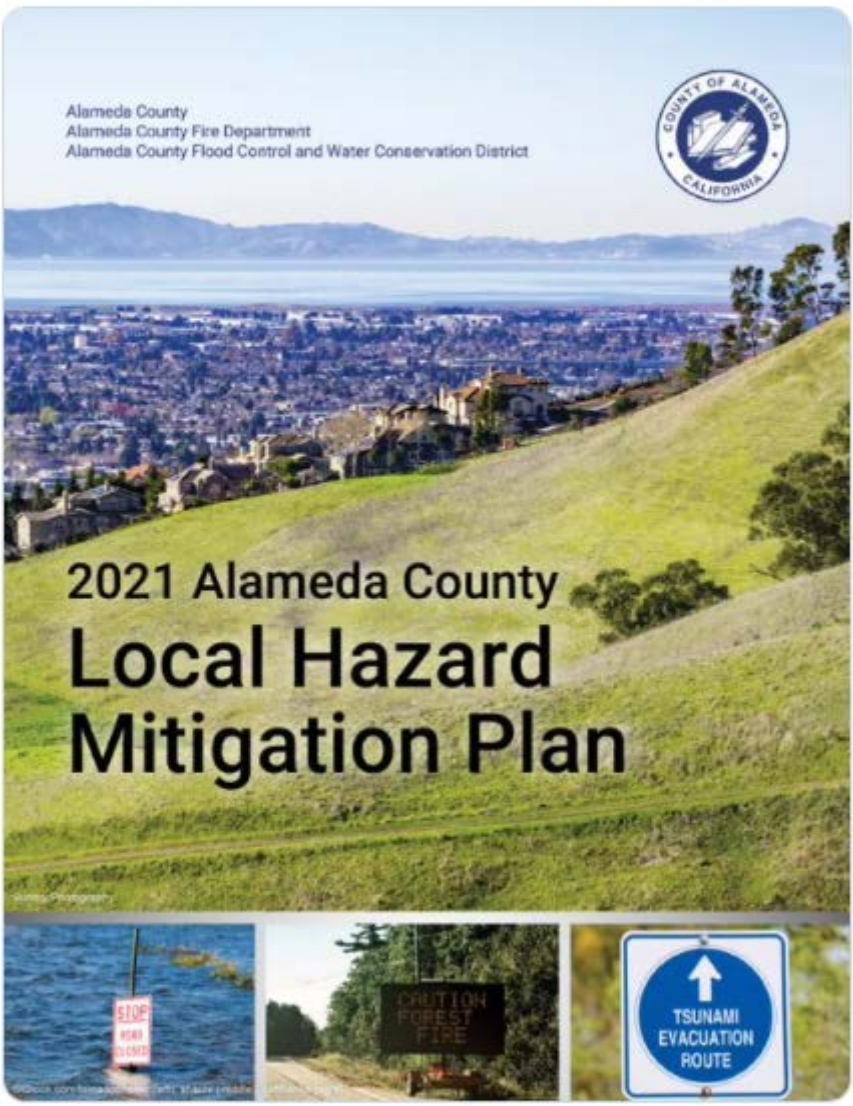
County of Alameda, CA - Government
August 6 at 11:45 AM ·

Alameda County is kicking off the 2021 Alameda County Local Hazard Mitigation Plan (LHMP) update process. LHMPs are pre-disaster plans that focus on reducing impacts of disasters before they occur. Additionally, local governments that prepare LHMPs are eligible for certain types of funding from the Federal Emergency Management Agency (FEMA). To learn more about our LHMP please visit: https://lhmp.acgov.org/

3 1 Share

Alameda County ✓
@AlamedaCounty

We are kicking off the 2021 Local Hazard Mitigation Plan (LHMP) update process. LHMPs are pre-disaster plans that focus on reducing impacts of disasters before they occur. Local governments that prepare LHMPs are eligible for funding from FEMA. Learn more: lhmp.acgov.org



2:45 PM · Aug 6, 2021 · Hootsuite Inc.

1 Retweet **1** Quote Tweet

APPENDIX C—FIGURES

AECOM

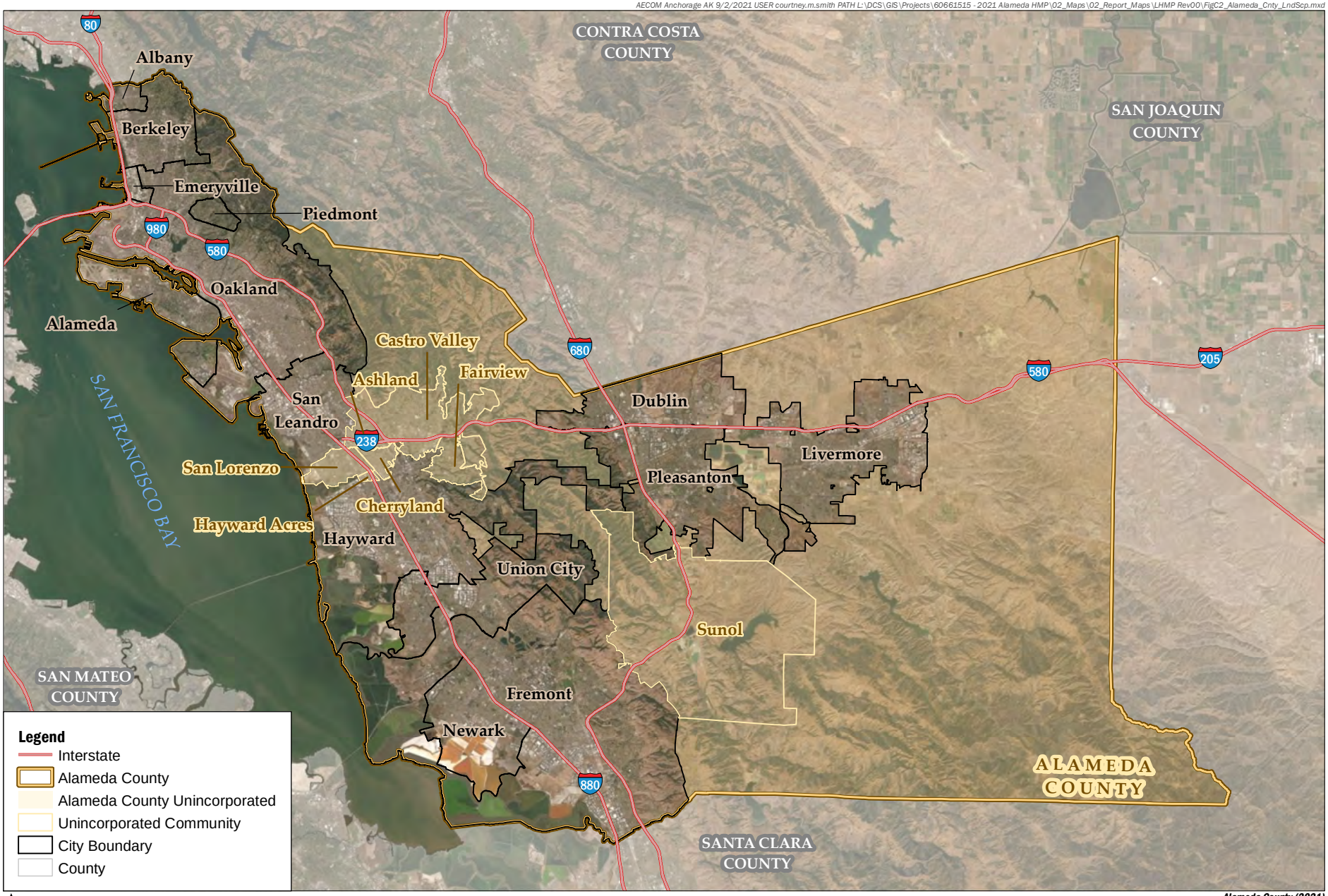
Alameda County

2021 Alameda County Local Hazard Mitigation Plan

SAN FRANCISCO BAY AREA

Figure C-1

AECOM Anchorage AK 9/2/2021 USER courtney.m.smith PATH L:\DCS\GIS\Projects\60661515 - 2021 Alameda HMP\02_Maps\02_Report_Maps\LHMP Rev00\FigC2_Alameda_Cnty_LndScp.mxd



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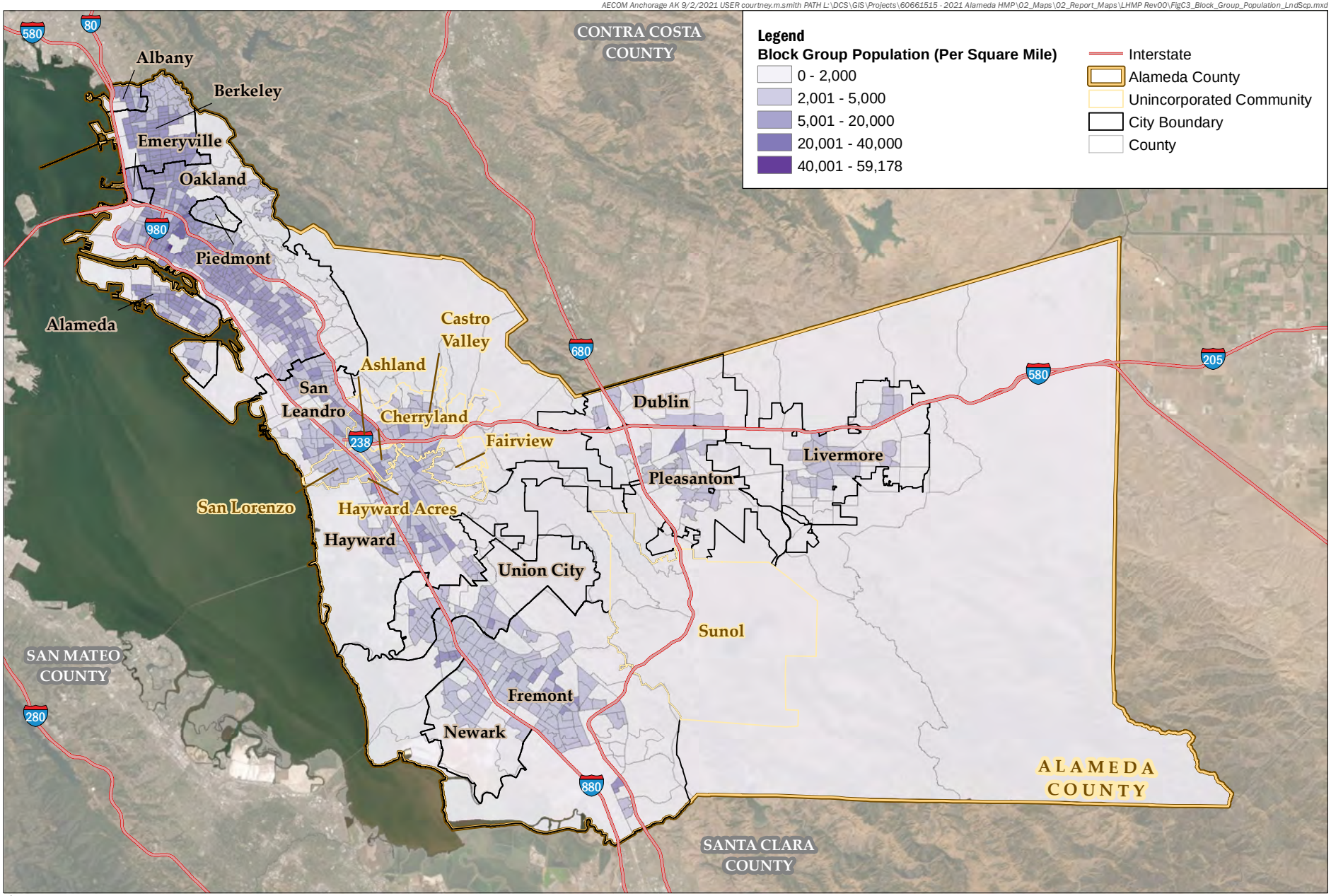
Alameda County

2021 Alameda County Local Hazard Mitigation Plan

ALAMEDA COUNTY

Figure C-2



U.S. Census Bureau, 2009-2013 5-Year American Community Survey (B01003, Total Population).

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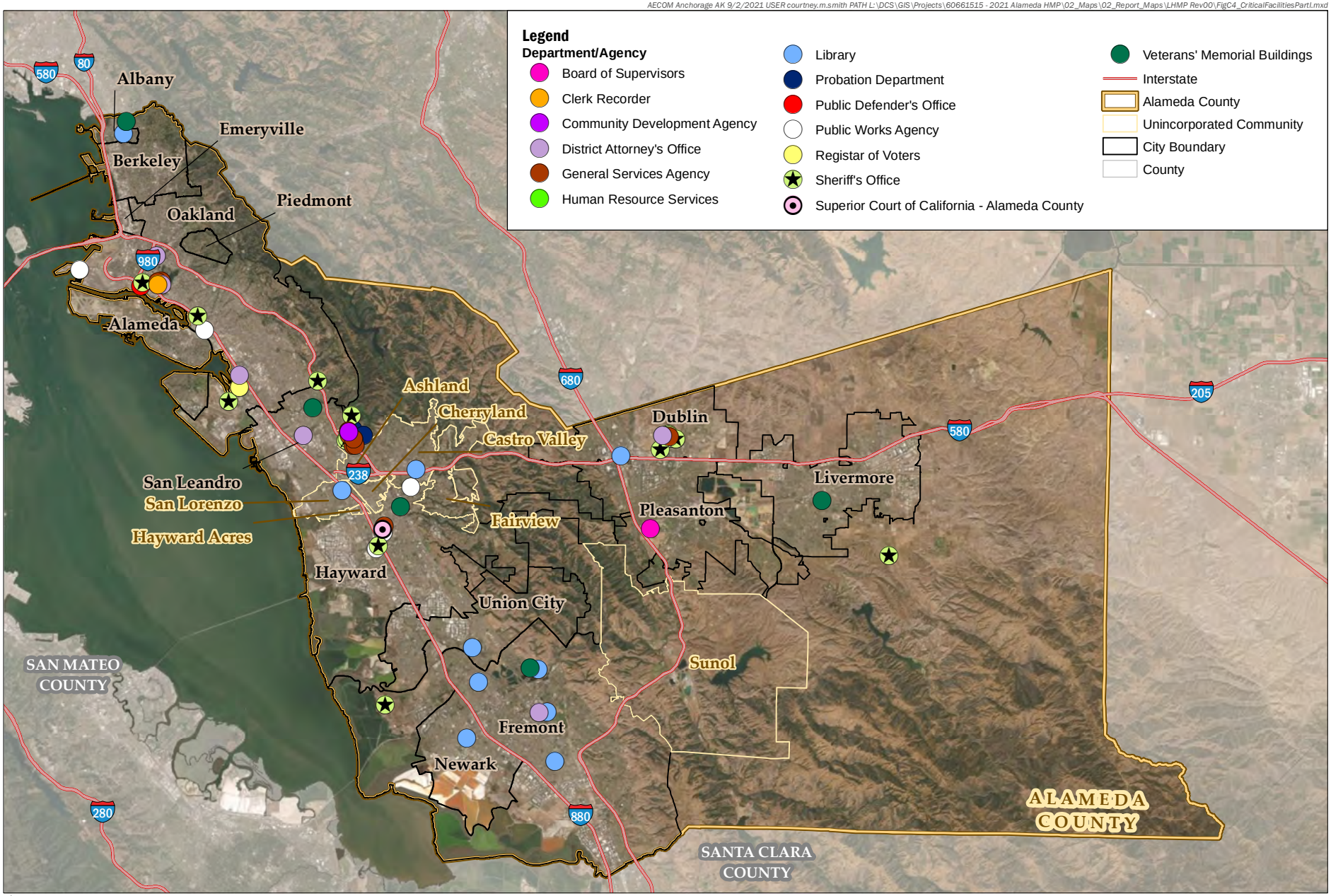
Alameda County

2021 Alameda County Local Hazard Mitigation Plan

POPULATION

Figure C-3



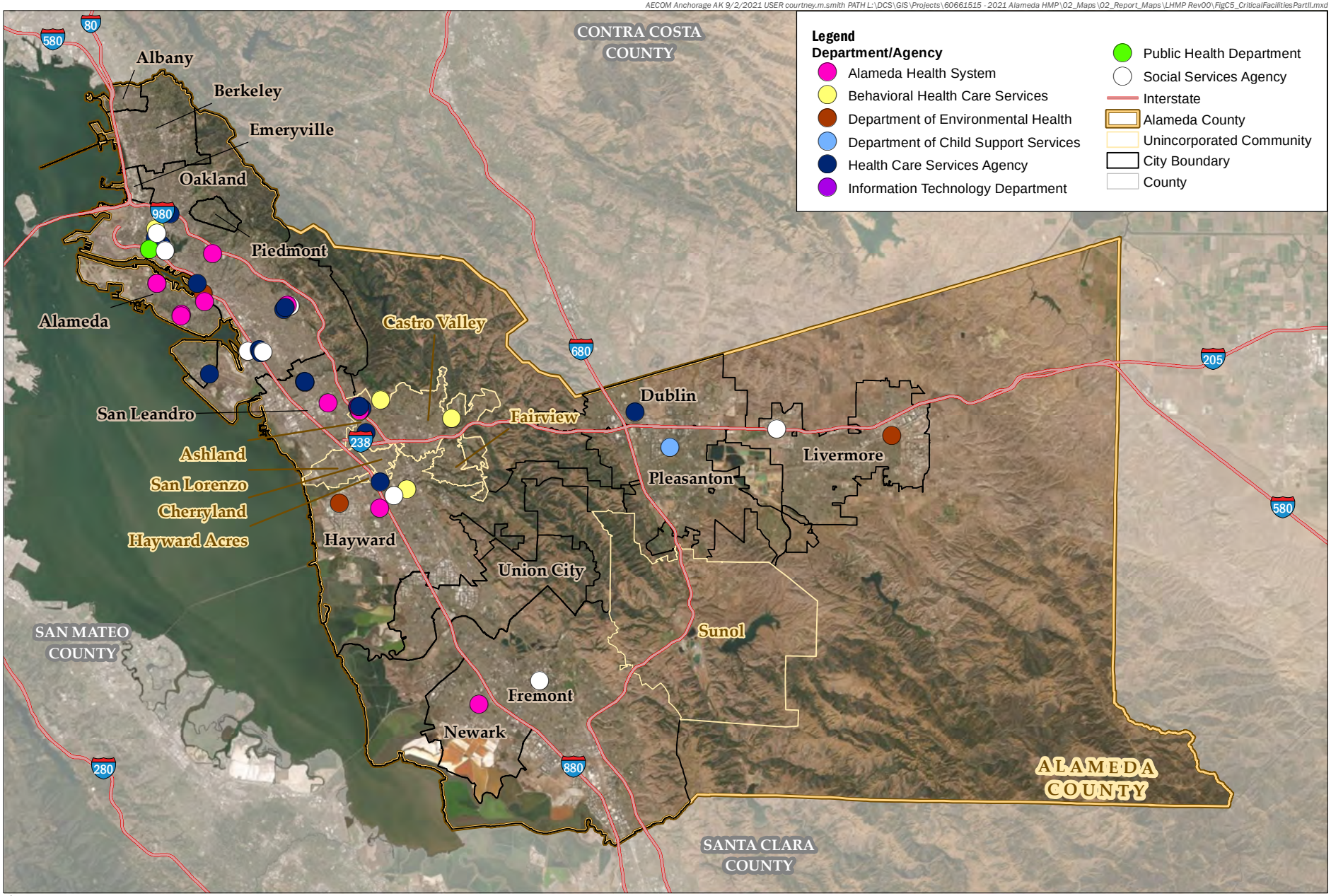
AECOM

Alameda County

2021 Alameda County Local Hazard Mitigation Plan

ALAMEDA COUNTY: CRITICAL FACILTIES PART I

Figure C-4



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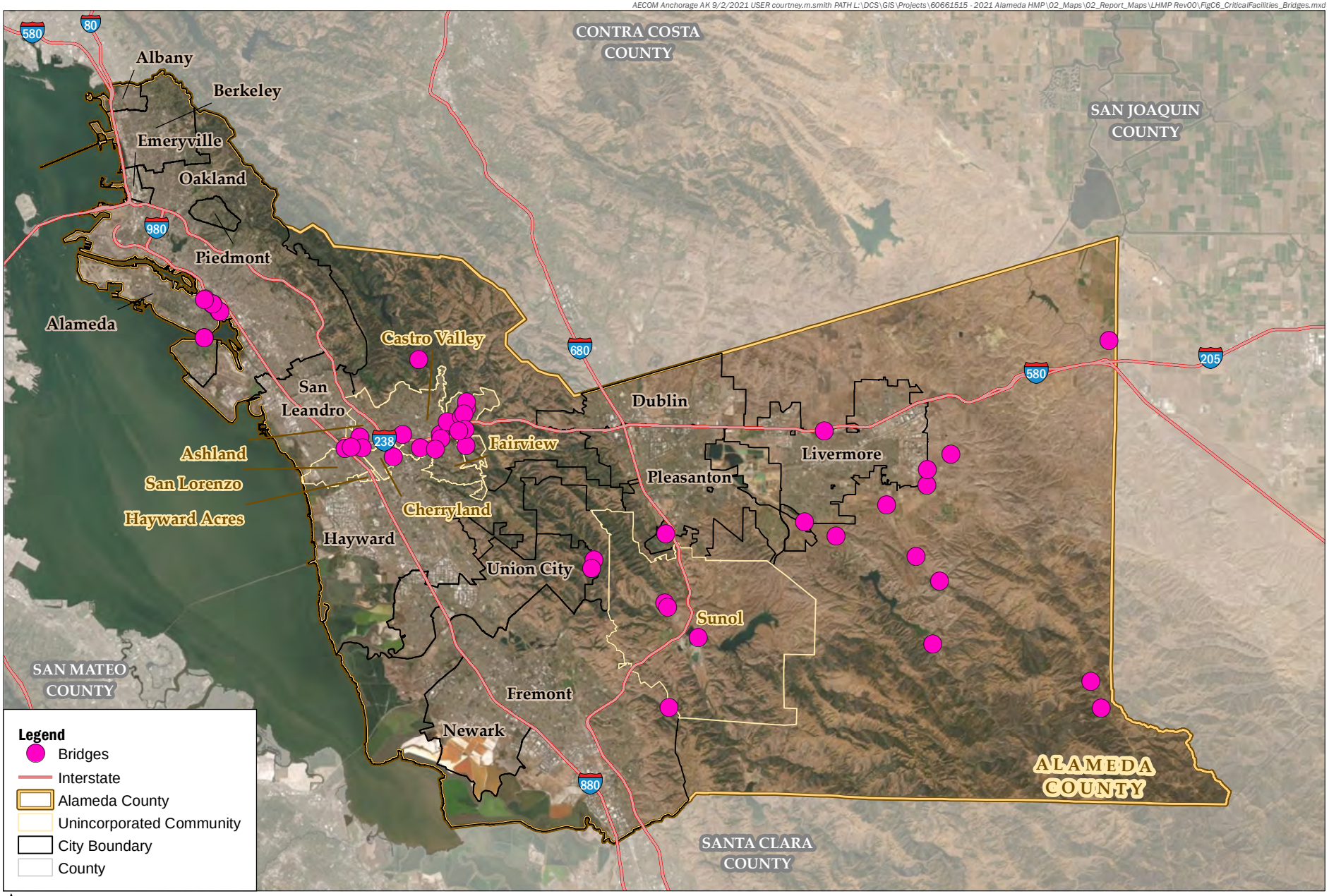
Alameda County

2021 Alameda County Local Hazard Mitigation Plan

ALAMEDA COUNTY: CRITICAL FACILTIES PART II

Figure C-5



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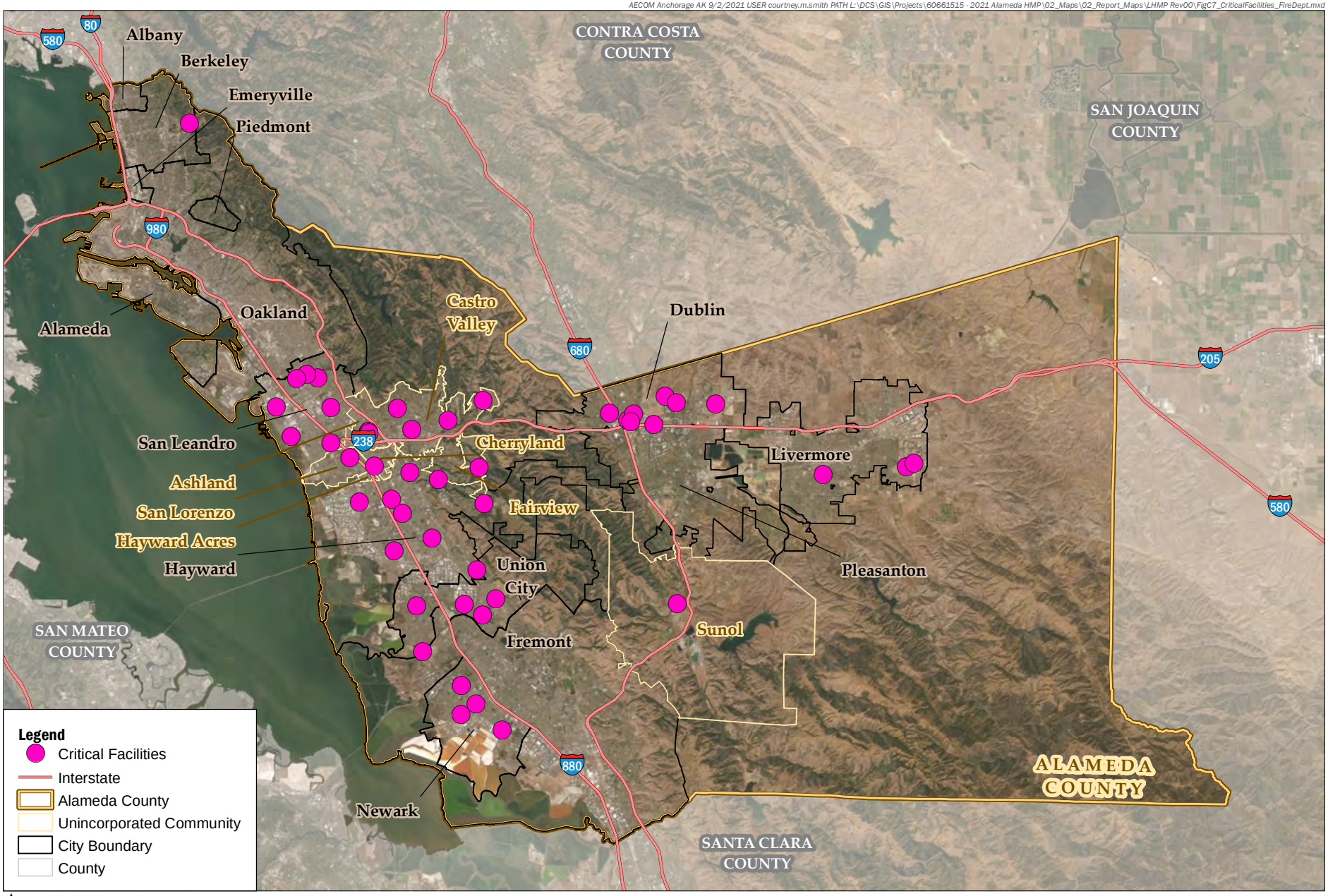
Alameda County

2021 Alameda County Local Hazard Mitigation Plan

ALAMEDA COUNTY: BRIDGES

Figure C-6



Alameda County (2021)

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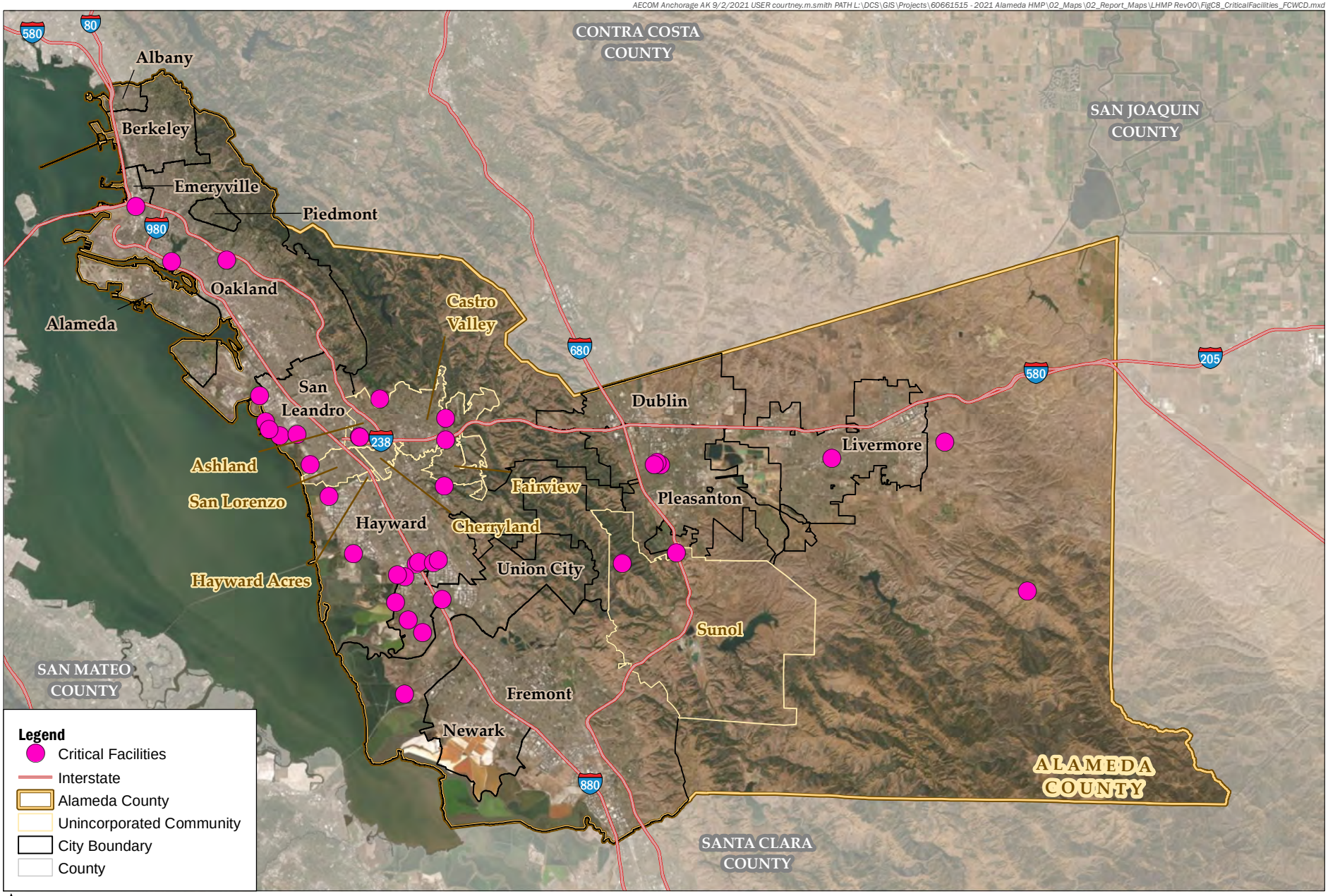
Alameda County

2021 Alameda County Local Hazard Mitigation Plan

ALAMEDA COUNTY FIRE DEPARTMENT: CRITICAL FACILITIES

Figure C-7



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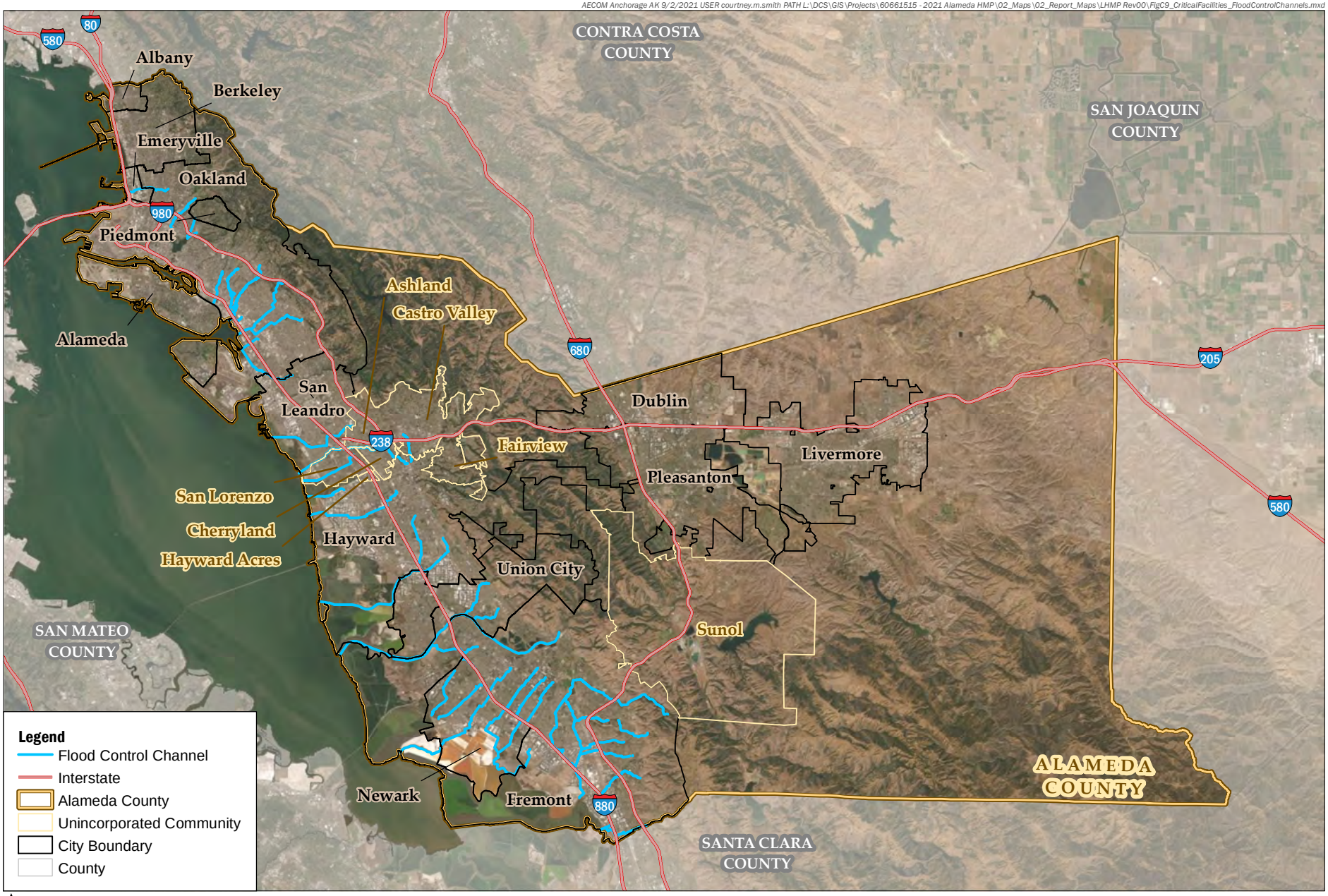
Alameda County

2021 Alameda County Local Hazard Mitigation Plan

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT: CRITICAL FACILITIES

Figure C-8



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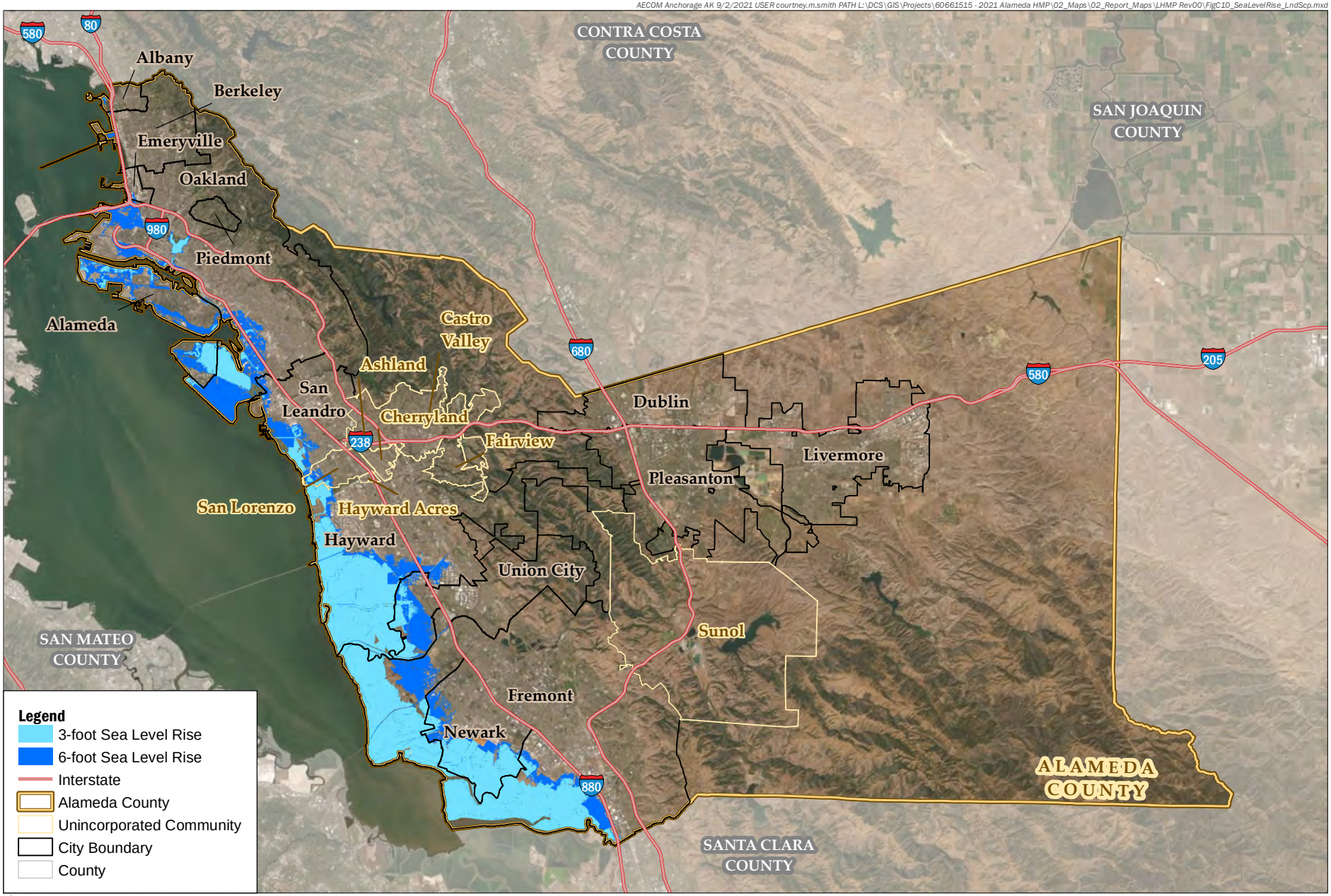
2021 Alameda County Local Hazard Mitigation Plan

ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT: FLOOD CONTROL CHANNELS

Figure C-9

AECOM Anchorage AK 9/2/2021 USER courtney.m.smith PATH L:\DCS\GIS\Projects\60661515 - 2021 Alameda HMP\02_Maps\02_Report_Maps\LHMP Rev00\FigC10_SeaLevelRise_LndScp.mxd



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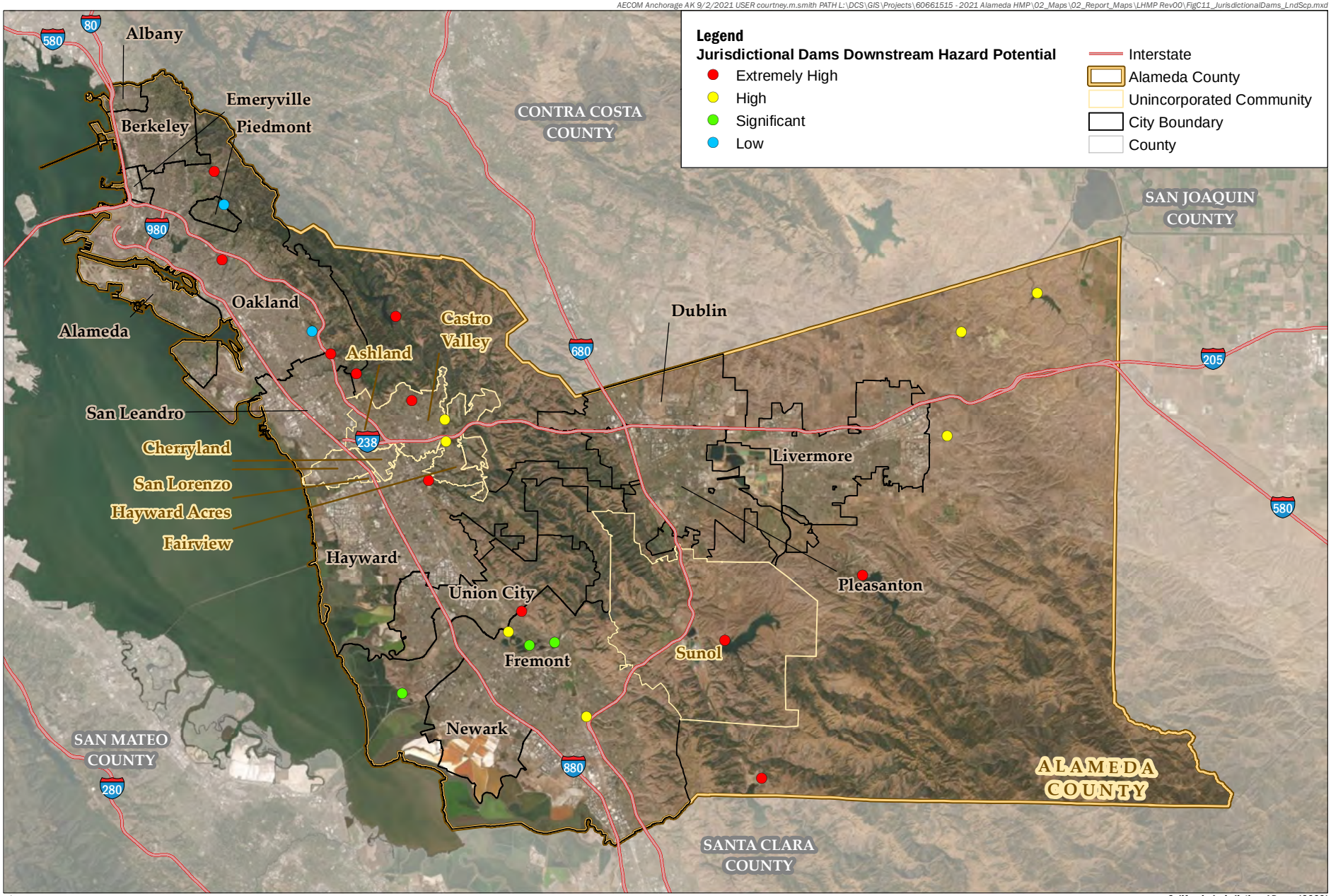
Alameda County

2021 Alameda County Local Hazard Mitigation Plan

SEA LEVEL RISE INUNDATION AREAS

Figure C-10



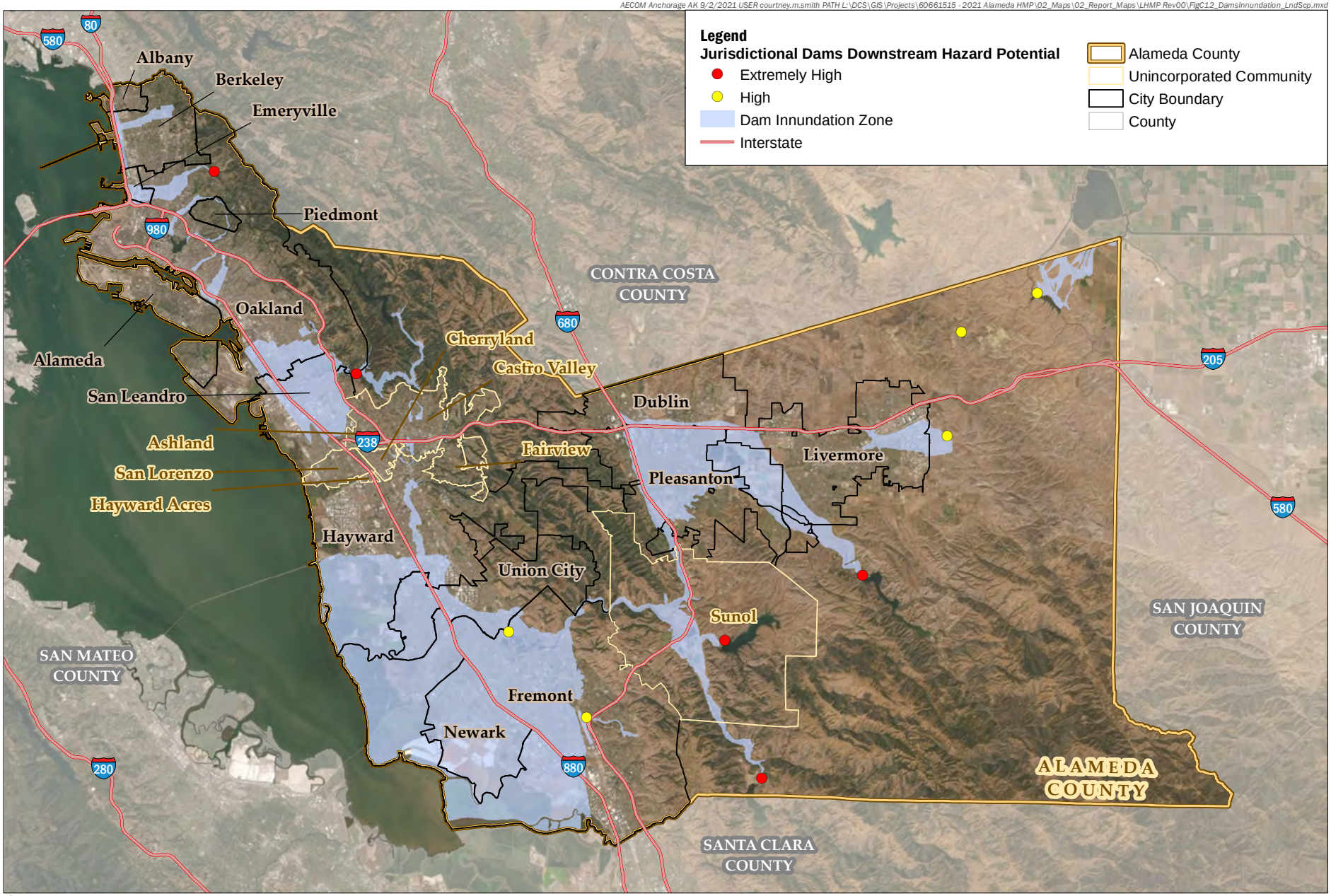
California Jurisdictional Dams (2020)
https://hub.arcgis.com/
Dam Breach Inundation Database (2020)
https://fmds.water.ca.gov/

AECOM

Alameda County
2021 Alameda County Local Hazard Mitigation Plan

CALIFORNIA JURISDICTIONAL DAMS

Figure C-11



California Jurisdictional Dams (2020)
https://hub.arcgis.com/
California Division of Dam Safety (2015)
https://fmds.water.ca.gov/

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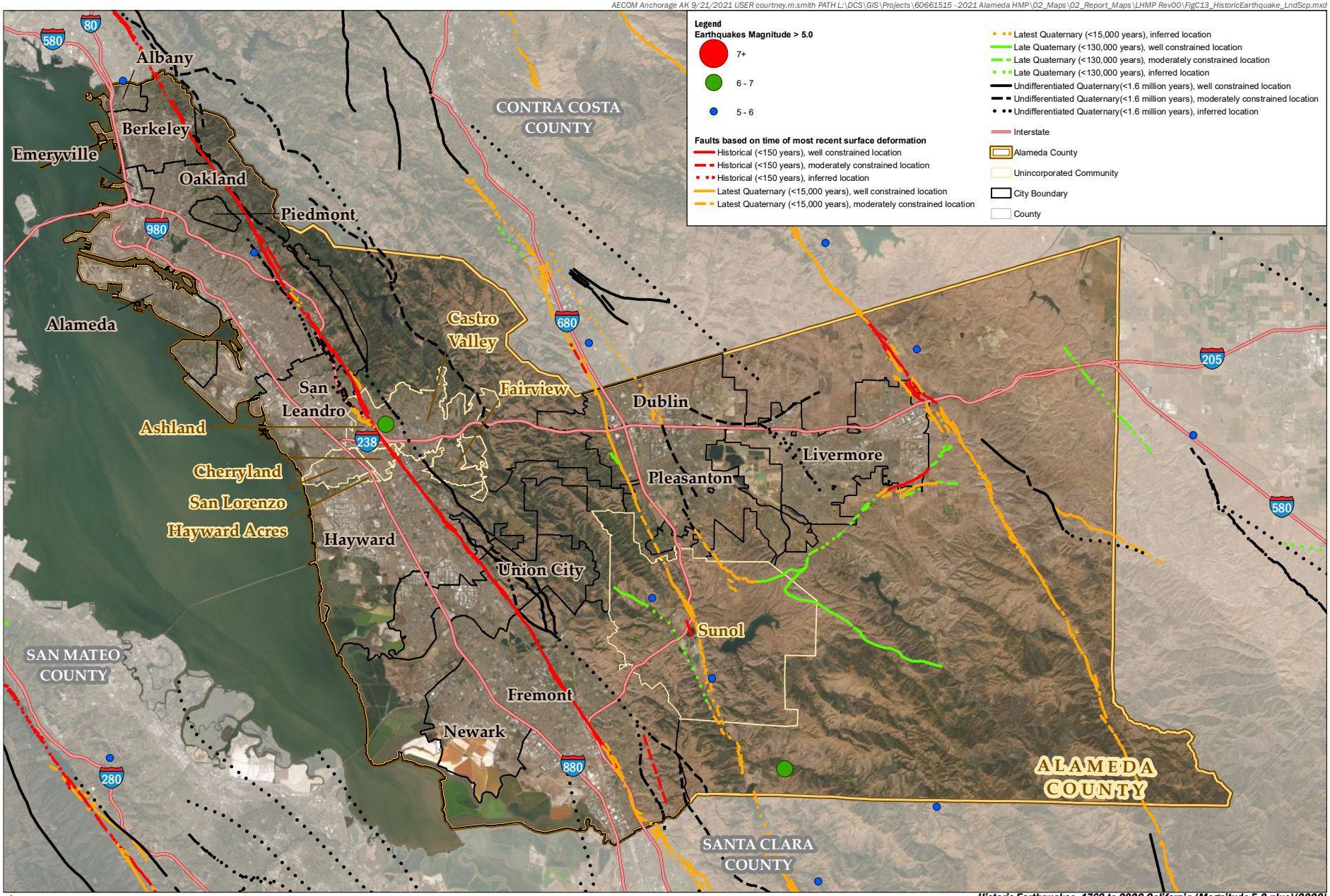
Alameda County
2021 Alameda County Local Hazard Mitigation Plan

DAM BREACH INUNDATION AREAS

Figure C-12

AECOM Anchorage AK 9/21/2021 USER courtney.m.smith PATH L:\DCS\GIS\Projects\60661515 - 2021 Alameda HMP\02_Maps\02_Report_Maps\LHMP Rev00\FigC13_HistoricEarthquake_LndScp.mxd



Historic Earthquakes, 1769 to 2020 California (Magnitude 5.0-plus)(2020)
https://hub.arcgis.com/
Quaternary Fault and Fold Database for the United States (2021)
https://www.usgs.gov/natural-hazards/earthquake-hazards/faults

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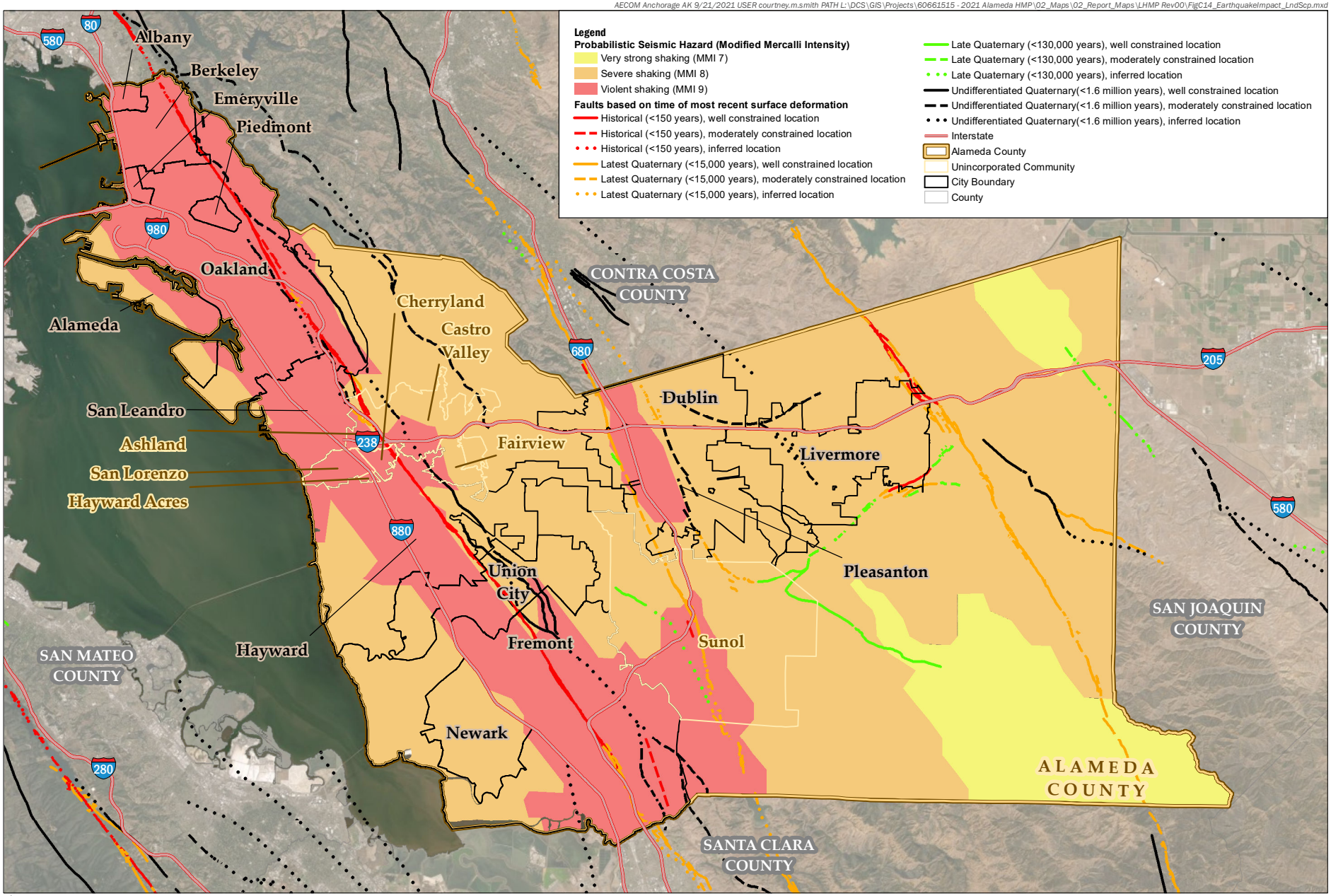
Alameda County

2021 Alameda County Local Hazard Mitigation Plan

HISTORICAL EARTHQUAKES (1769-2020)

Figure C-13



Probabilistic Seismic Hazard Assessment (2020)
https://opendata.mtc.ca.gov
Quaternary Fault and Fold Database for the United States (2021)
https://www.usgs.gov/natural-hazards/earthquake-hazards/faults

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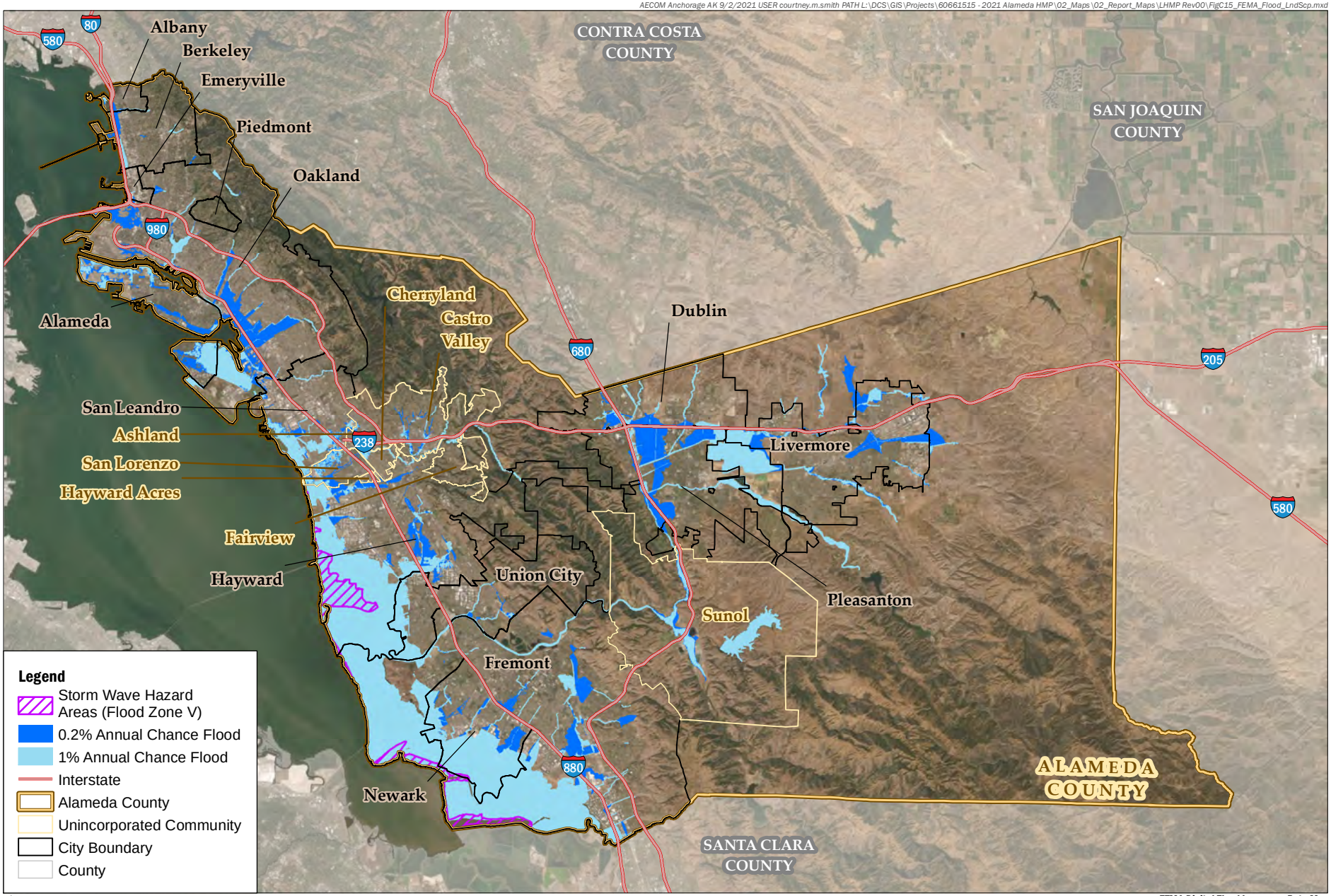
Alameda County

2021 Alameda County Local Hazard Mitigation Plan

PROBABILISTIC EARTHQUAKE SHAKING HAZARD AREAS

Figure C-14

AECOM Anchorage AK 9/2/2021 USER courtney.m.smith PATH L:\DCS\GIS\Projects\60661515 - 2021 Alameda HMP\02_Maps\02_Report_Maps\LHMP Rev00\FigC15_FEMA_Flood_LndScp.mxd



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

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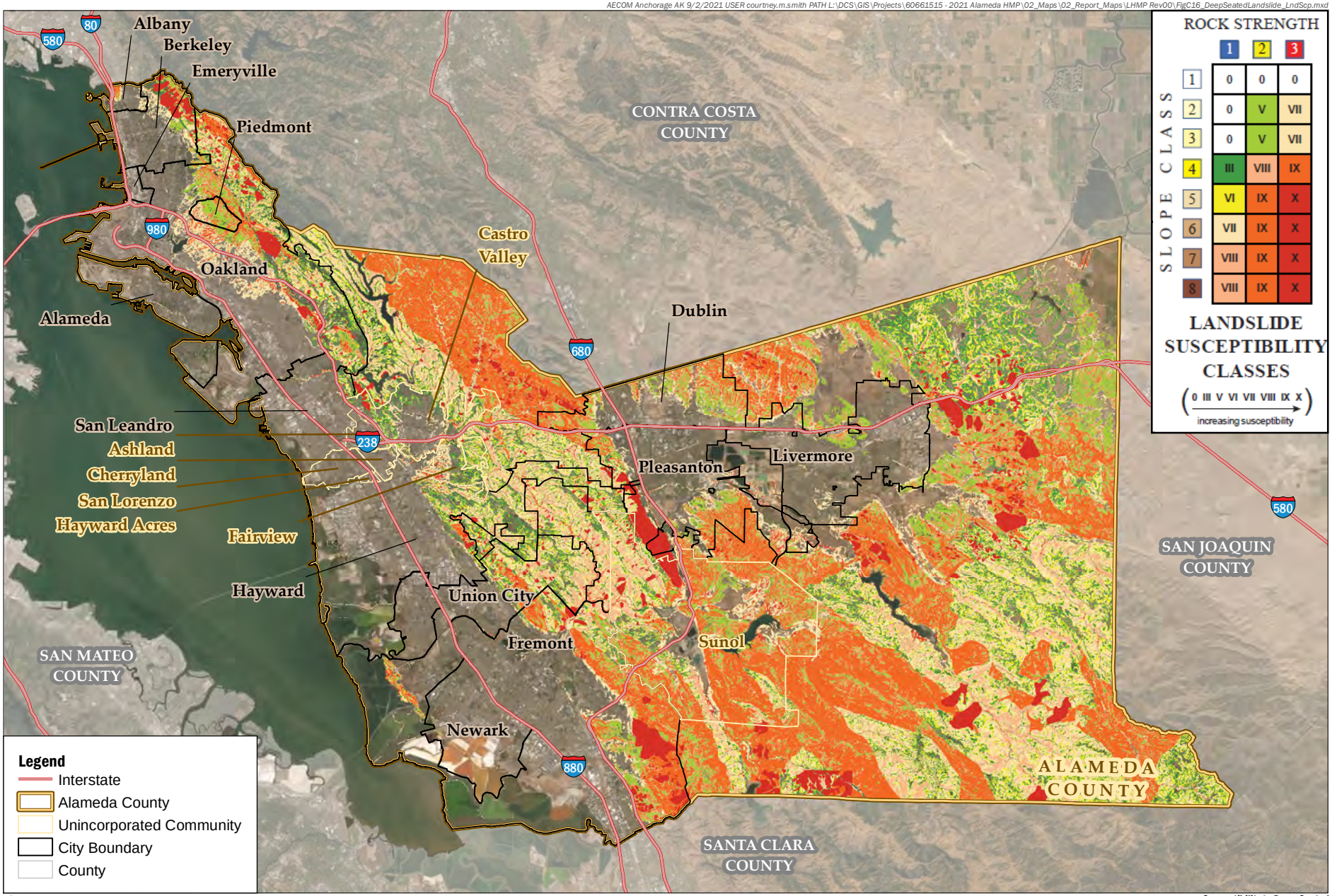
Alameda County
2021 Alameda County Local Hazard Mitigation Plan

SPECIAL FLOOD HAZARD AREAS

Figure C-15



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

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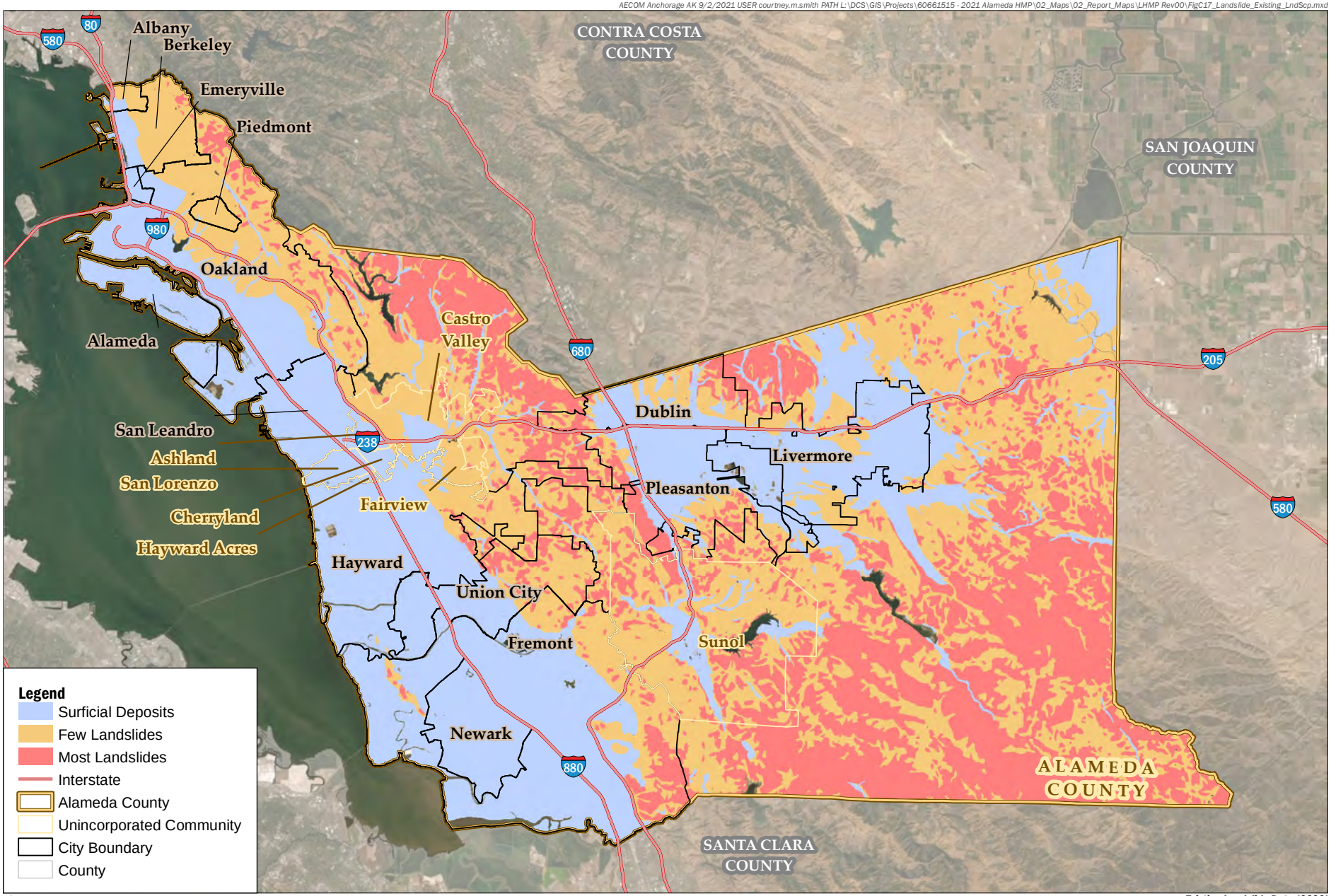
Alameda County
2021 Alameda County Local Hazard Mitigation Plan

DEEP-SEATED LANDSLIDE SUSPECTIBILITY AREAS

Figure C-16



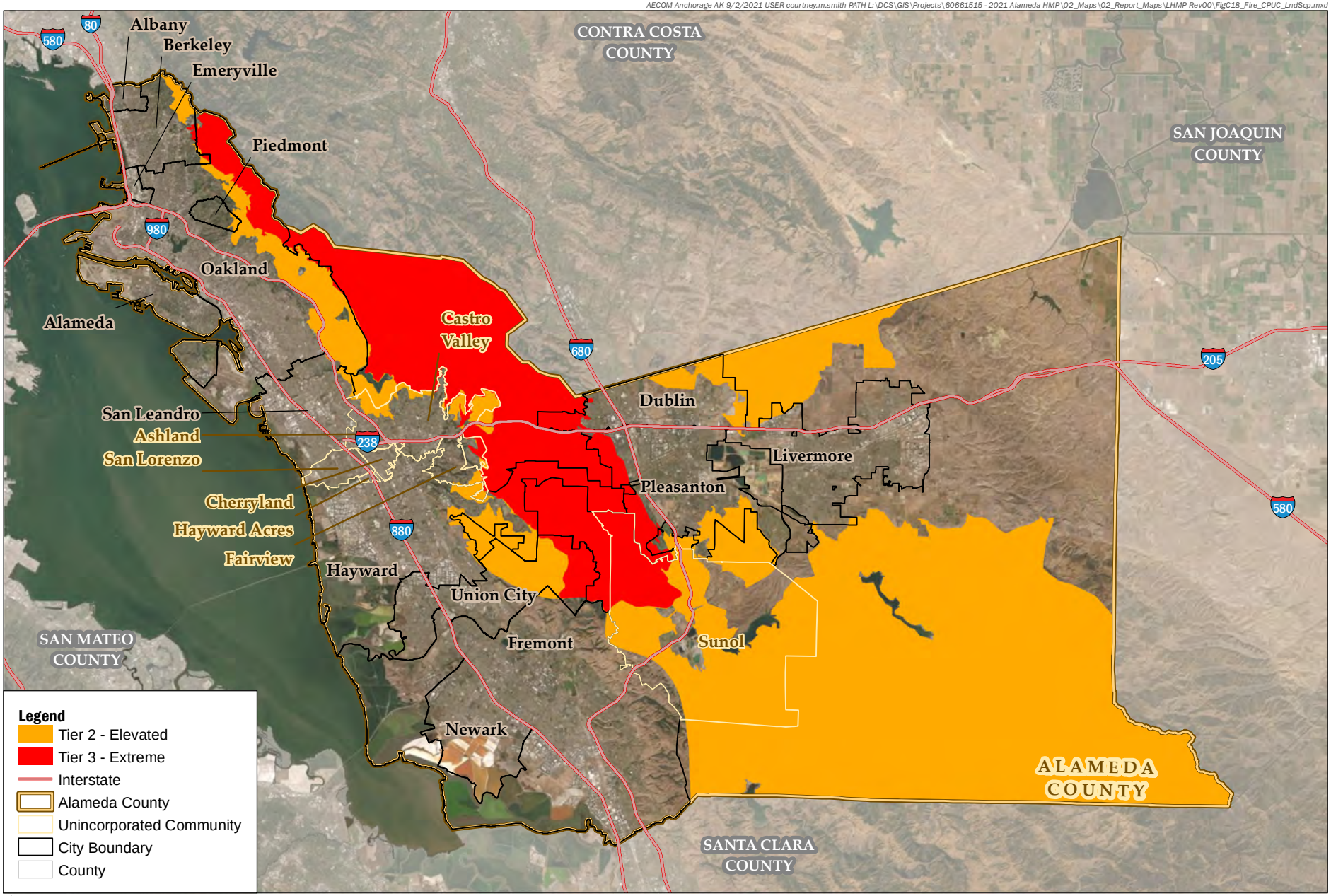
Existing Landslide Data (2020)
https://pubs.usgs.gov/

AECOM

Alameda County
2021 Alameda County Local Hazard Mitigation Plan

EXISTING LANDSLIDE AREAS

Figure C-17



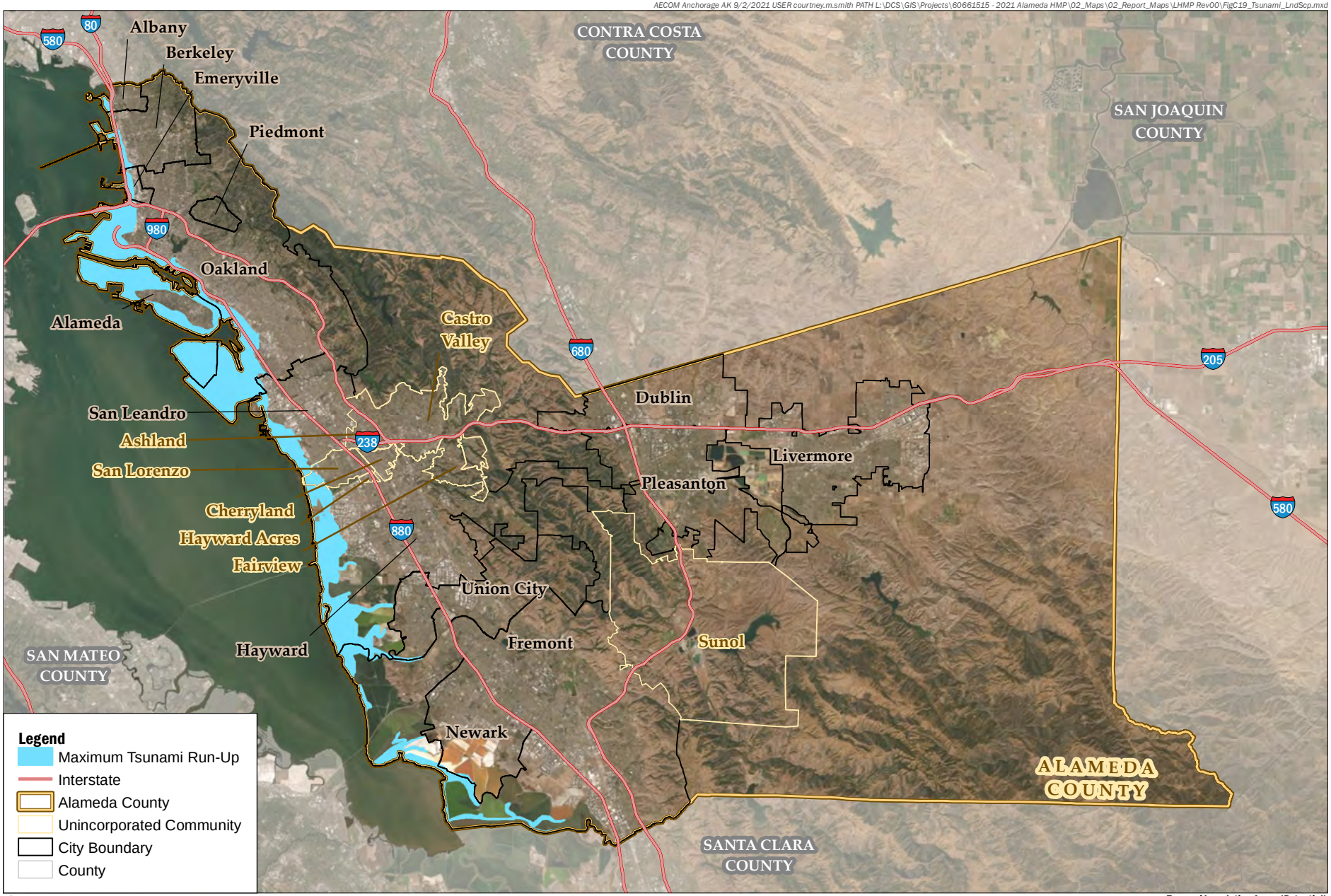
California Public Utilities Commission
Fire-Threat (2020)
https://www.cpuc.ca.gov/

AECOM

Alameda County
2021 Alameda County Local Hazard Mitigation Plan

CALIFORNIA PUBLIC UTILITIES COMMISSION FIRE-THREAT AREAS

Figure C-18



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

AECOM

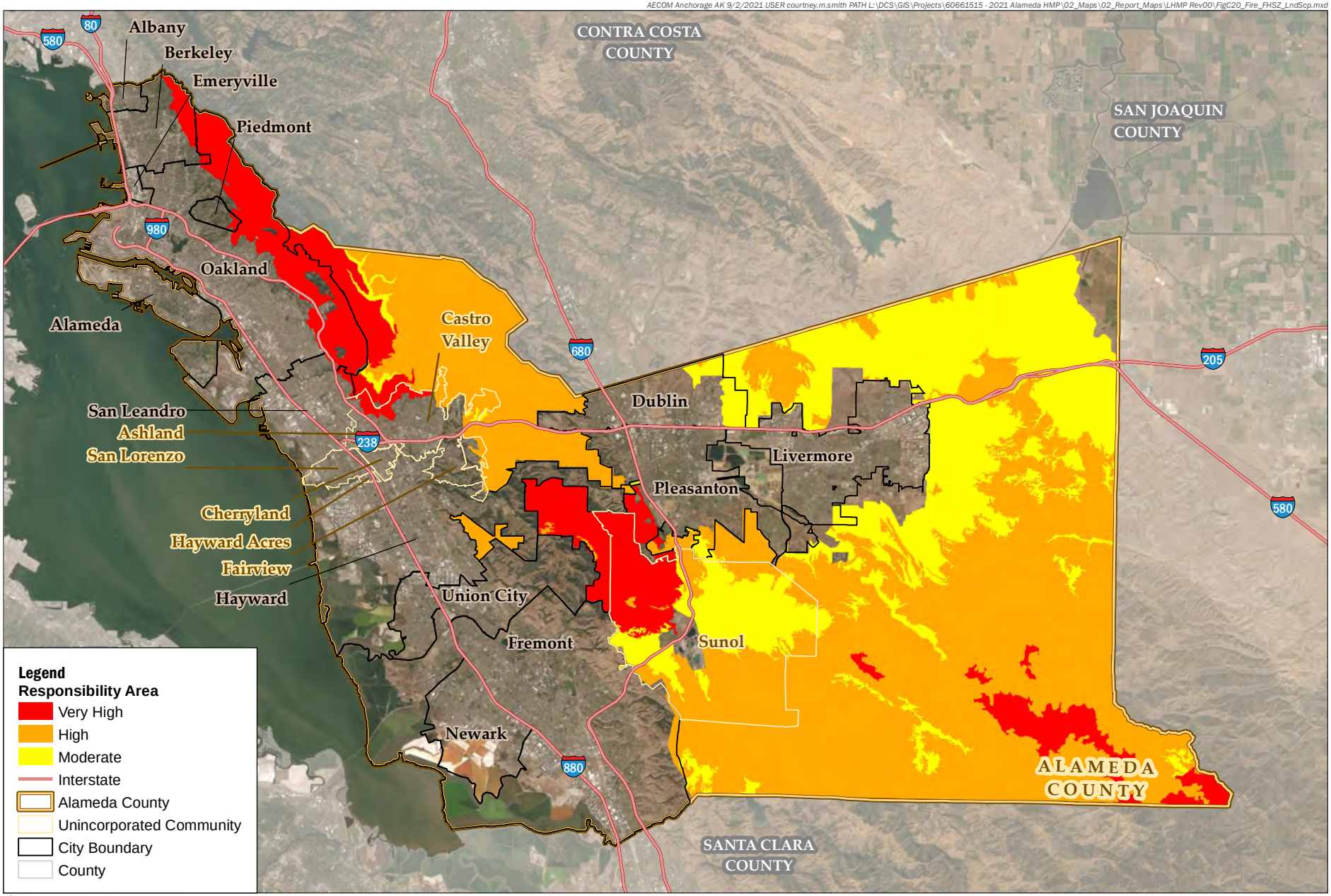
Alameda County

2021 Alameda County Local Hazard Mitigation Plan

TSUNAMI RUN-UP AREAS

Figure C-19

AECOM Anchorage AK 9/2/2021 USER courtney.m.smith PATH L:\DCS\GIS\Projects\60661515 - 2021 Alameda HMP\02_Maps\02_Report_Maps\LHMP Rev00\FigC20_Fire_FHSZ_LndScp.mxd



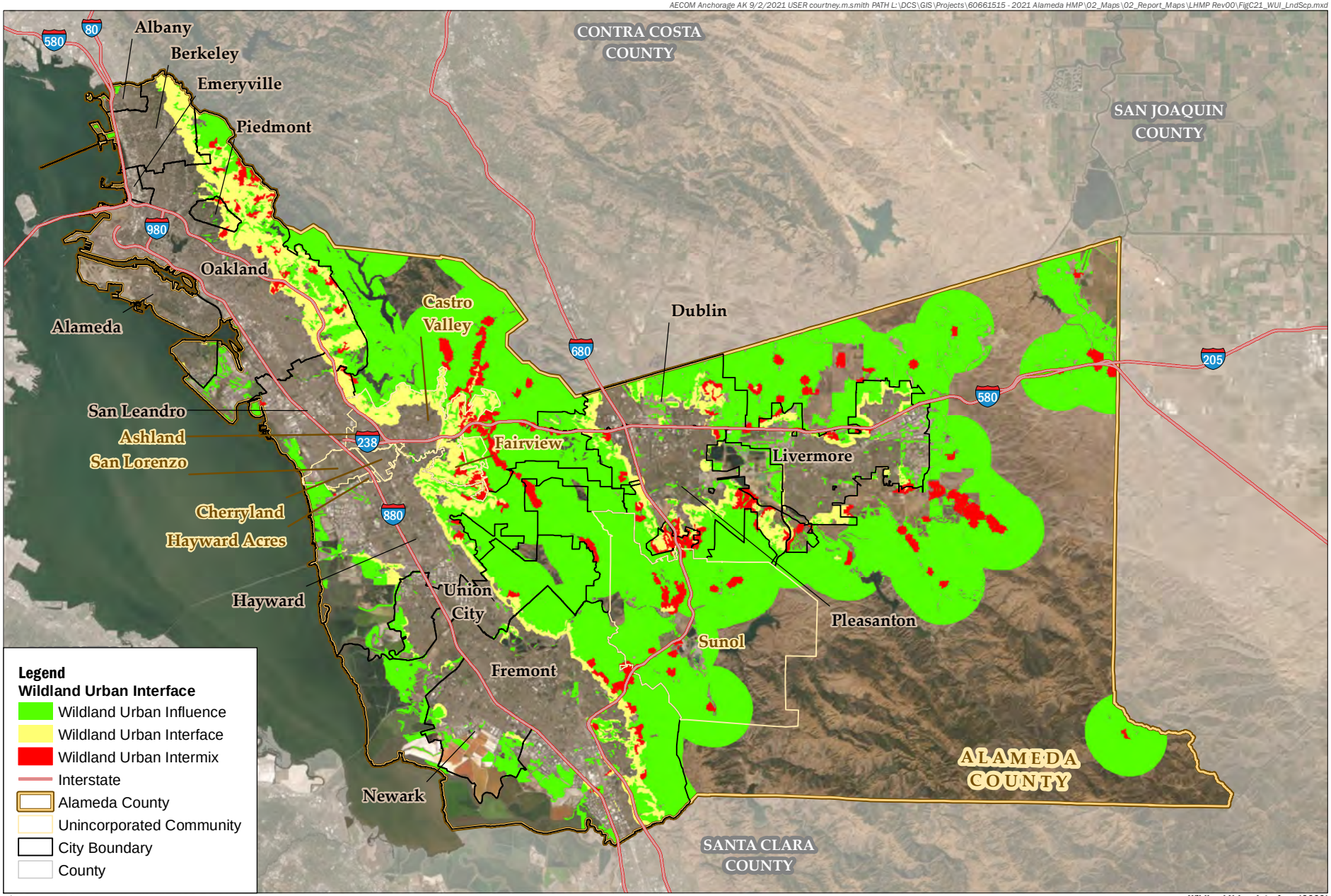
Fire Hazard Severity Zone (2020)
https://gis.data.ca.gov/
https://frap.fire.ca.gov

AECOM

Alameda County
2021 Alameda County Local Hazard Mitigation Plan

FIRE HAZARD SEVERITY ZONES

Figure C-20



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

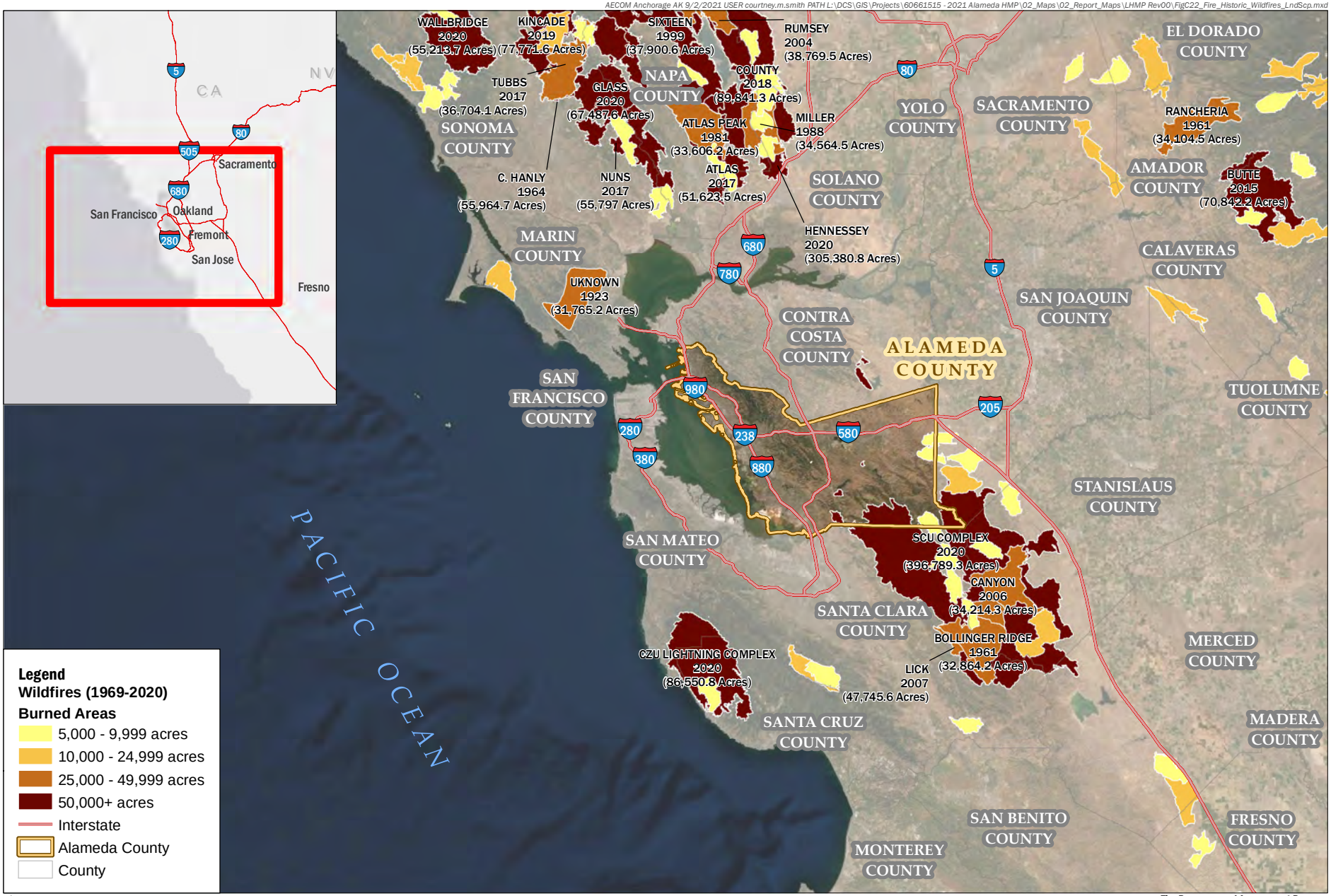
AECOM

Alameda County
2021 Alameda County Local Hazard Mitigation Plan

WILDLAND URBAN INTERFACE

Figure C-21

AECOM Anchorage AK 9/2/2021 USER courtney.m.smith PATH L:\DCS\GIS\Projects\60661515 - 2021 Alameda HMP\02_Maps\02_Report_Maps\LHMP Rev00\FigC22_Fire_Historic_Wildfires_LndScp.mxd



AECOM

Alameda County

2021 Alameda County Local Hazard Mitigation Plan

HISTORICAL WILDFIRES (1969-2020)

Figure C-22

APPENDIX D—ALAMEDA COUNTY

Table D-1: Alameda County—Hazard Impacts on Critical Facilities

Hazard Area	# of Facilities Impacted	
	# of Facilities (Total Facility Count: 118)	# of Bridges (Total Bridge Count: 48)
Sea Level Rise Inundation Area—3 Ft.	1	1
Sea Level Rise Inundation Area—6 Ft.	5	1
Dam Breach Inundation Area—High Hazard and Extremely High Hazard	29	12
Probabilistic Earthquake Shaking Area—Severe	42	26
Probabilistic Earthquake Shaking Area—Violent	75	12
Special Flood Hazard Area—0.2% Annual Chance Flood	6	1
Special Flood Hazard Area—1% Annual Chance Flood	1	10
Deep-Seated Landslide Class IX and X Area	0	3
Existing Landslides Area—Few	34	13
Existing Landslides Area—Most	0	4
CPUC—Fire Threat Area—Tier 2 Elevated	7	8
CPUC—Fire Threat Area—Tier 3 Extreme	0	9
Maximum Tsunami Run-Up Area	13	0
Fire Hazard Severity Zones—High	0	8
Fire Hazard Severity Zones—Very High	8	3
Wildland Urban Interface—Urban Influence	3	8
Wildland Urban Interface—Urban Intermix	0	6
Wildland Urban Interface—Urban Influence	27	8

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

Table D-2: Alameda County—Human and Technical Resources for Hazard Mitigation

Staff/Personnel	Department/Agency	Principal Activities Related to Hazard Mitigation
Planner(s), engineer(s), and technical staff with knowledge of land development, land management practices, human-caused hazards, and natural hazards	Alameda County Community Development Agency (Planning Department)	Develops and maintains the 2017 Safety Element. Anticipates and acts on the need for new plans, policies, and code changes. Applies the approved plans, policies, code provisions, and other regulations to proposed land uses.
Engineer(s), building inspectors / code enforcement officers or other professional(s), and technical staff trained in construction requirements	Alameda County Public Works Agency (Building Inspection Division)	Oversees the effective, efficient, fair, and safe enforcement of the Alameda County Building Code.
Engineers, construction project managers, and supporting technical staff	Alameda County Public Works Agency/Alameda County GSA	Provides direct or contract civil, structural, and mechanical engineering services, including contract, project, and construction management.
Engineer(s), project manager(s), technical staff, equipment operators, and maintenance and construction staff	Alameda County Public Works Agency	Maintains and operates of a wide range of local equipment and facilities and assists members of the public. This includes providing sufficient clean fresh water, reliable sewer services, street maintenance, storm drainage systems, street cleaning, street lights, and traffic signals.
Floodplain Administrator	Alameda County Public Works Agency	Enforces its floodplain requirements through the County's Flood Prevention Ordinance.
Emergency Manager	Alameda County Office of Emergency Services	Maintains and updates the Alameda County Emergency Operations Plan. In addition, 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.
Procurement Services Manager	Alameda County GSA	Provides a full range of municipal financial services and administers several licensing measures.
Fire Chief	ACFD	Provides fire protection services including response, fire prevention, and mitigation activities for the county.
Sheriff	Alameda County Sheriff's Office	Provides law enforcement services in the county.

Notes:
SFHA = Special Flood Hazard Area

Table D-3: Alameda County—Financial Resources for Hazard Mitigation

Type	Administrator	Purpose	Amount
General Fund	Alameda County Board of Supervisors	Program operations and specific projects.	Variable
General Obligation Bonds	Alameda County Board of Supervisors	General obligation bonds are appropriately used for the construction and/or acquisition of improvements to real property broadly available to residents and visitors. Such facilities include but are not limited to: libraries, hospitals, parks, public safety facilities, and cultural and educational facilities.	Variable
Lease Revenue Bonds	Alameda County Board of Supervisors	Revenue bonds are used to finance capital projects that: 1) have an identified budgetary stream for repayment (e.g., specified fees, tax receipts); 2) generate project revenue but rely on a broader pledge of general fund revenues to reduce borrowing costs; or 3) finance the acquisition and installation of equipment for the local jurisdiction's general governmental purposes.	Variable
Defensible Space Fuel Reduction Program	Diablo Fire Safe Council	Sponsorship program for defensible space fuel reduction projects. Cost-share assistance of up to $5,000 per project in 2020-2021 is available to groups or groups of individuals to hire contractors to reduce fuel loads and create defensible space.	Project-specific
Vegetation Management Program	Cal FIRE	Cost-sharing program between Cal FIRE and private land owners, which focuses on the use of prescribed fire, mechanical, biological, and chemical means addressing wildland fire fuel hazards and other resource management issues on SRA and LRA lands	Project-specific
Wildfire Emergency and Mitigation Funds	Cal FIRE	Administers funding from the FEMA, Bureau of Land Management, and U.S. Forest Service for certain types of wildfire emergency and mitigation funding.	Project-specific
Cal Water Firefighter Grant Program	Cal Water Service	Funds the purchase of personal protective equipment, firefighting or communications equipment, training and prerequisites material, and educational materials used to support fire protection efforts.	Project-specific
California Residential Mitigation Program	California Earthquake Authority	Created by the California Earthquake Authority and the Governor's Office of Emergency Services, Earthquake Brace + Bolt: Funds to Strengthen Your Foundation is the first incentive program offered by the California Residential Mitigation Program.	Project-specific
HMA: Hazard Mitigation Grant Program	FEMA	Supports pre- and post-disaster mitigation plans and projects. Available to California communities after a presidentially declared disaster has occurred in California, administered by Cal OES.	Project-specific

Table D-3: Alameda County—Financial Resources for Hazard Mitigation

Type	Administrator	Purpose	Amount
HMA: Building Resilient Infrastructure and Communities	FEMA	Focuses on reducing the nation's risk by funding public infrastructure projects that increase a community's resilience before a disaster affects an area. Administered by Cal OES.	Project-specific
HMA: Flood Mitigation Assistance	FEMA	Funds projects that reduce or eliminate the risk of repetitive flood damage to buildings insured by the NFIP.	Project-specific
Homeland Security Preparedness Technical Assistance Program	FEMA/Department of Homeland Security	Build and sustain preparedness technical assistance activities in support of the four homeland security mission areas (i.e., prevention, protection, response, recovery) and homeland security program management.	Project-specific
Assistance to Firefighters Grant Program	FEMA/U.S. Fire Administration	Provides equipment, protective gear, emergency vehicles, training, and other resources needed to protect the public and emergency personnel from fire and related hazards. Available to fire departments and nonaffiliated emergency medical services providers.	Project-specific
The National Dam Rehabilitation Program	FEMA	Allow communities to make the preemptive investment into aging infrastructure and in the process make the communities below a dam safer. Eligible projects include dams determined to have high-hazard potential by the State Dam Safety Program, have an Emergency Action Plan approved by the State Dam Safety Program, and fail to meet minimum dam safety standards or pose an unacceptable risk to the public.	Project-specific
Community Action for a Renewed Environment	U.S. Environmental Protection Agency	Through financial and technical assistance, this program offers an innovative way for a community to organize and take action to reduce toxic pollution (e.g., stormwater) in its local environment. Through this program, a community creates a partnership that implements solutions to reduce releases of toxic pollutants and minimize exposure to them.	Project-specific
Community Block Grant Program Entitlement Communities Grants	U.S. Department of Housing and Urban Development	Acquisition of real property; relocation and demolition; rehabilitation of residential and nonresidential structures; construction of public facilities and improvements, such as water and sewer facilities, streets, neighborhood centers; and the conversion of school buildings for eligible purposes.	Project-specific

Notes:
FEMA = Federal Emergency Management Agency
HMA = Hazard Mitigation Assistance
Cal OES = California Governor's Office of Emergency Services

Table D-4: Alameda County—Planning and Policy Resources for Hazard Mitigation

Name	Description	Hazards Addressed	Emergency Management
Safety Element of the Alameda County General Plan (2014)	Describes hazard areas and lists goals and policies to reduce the potential risk of death, injuries, and economic damage resulting from natural and human-caused hazards.	Fire, Flood, Earthquake, Landslide, Hazardous Materials, Aviation Hazards	Mitigation, Preparedness, Response
Alameda County Emergency Operations Plan (2012)	The plan describes the County's organizational structures, roles, and responsibilities; protocols for providing emergency response and short--term recovery; the purpose, situation, and assumptions; concept of operations, organization, assignment of responsibilities, and plan development and maintenance; authorities; and references. The plan includes a hazard assessment. This Emergency Operations Plan is an extension of the California Emergency Plan. Alameda County will review and exercise the plan periodically and revise as necessary to meet changing conditions.	All Hazards	Response, Recovery
Alameda County CWPP (2012)	A CWPP is a community-based plan focused on identifying and addressing local hazards and risks from wildfire. It determines what is at risk and provides a road map of actions for a community to address the wildfire threat. It may also open up federal funding opportunities to implement the plan. CCWPPs are authorized and defined in Title I of the 2003 Healthy Forests Restoration Act.	Wildfire	Mitigation
Alameda County Building Codes and Ordinances (2019)	Promotes public health, safety, and general welfare through laws enforced locally. Building permits are issued and based on the current edition of the California Building Codes (2019) and local amendments, which encompass building, electrical, mechanical, plumbing, state energy requirements, and state accessibility laws. Alameda County can update and revise local amendments, as needed or required.	Flood, Earthquake, Landslide, Tsunami, and Wildfire	Mitigation
Alameda County Green Building Ordinance (2009)	Promotes practices that will reduce water and resource usage, reduce waste, and increase energy efficiency in the construction or remodeling of residential and nonresidential structures. By setting standards beyond state standards, our communities will enjoy buildings that provide a healthy and productive environment for workers, residents, and visitors and are economical to own and operate.	Climate Change	Mitigation

Table D-4: Alameda County—Planning and Policy Resources for Hazard Mitigation

Name	Description	Hazards Addressed	Emergency Management
Alameda County Community Climate Action Plan (2020-2021)	Addresses the reduction of greenhouse gas emissions through a series of 37 local programs and policy measures related to transportation, land use, building energy, water, waste, and green infrastructure.	Climate Change, Wildfire	Mitigation
NFIP / CRS	Makes affordable flood insurance available to homeowners, business owners, and renters in participating communities. In exchange, those communities must adopt and enforce minimum floodplain management regulations to reduce the risk of damage from future floods. Alameda County joined the NFIP in 1981. Alameda County also participates in the CRS Program, which offers discounted flood insurance premium rates as a result of the community's efforts to exceed the minimum requirements of the NFIP.	Flood	Mitigation
Cool Counties Program (2007)	Works with other regional leaders to reduce local global warming emissions 80% by 2050, an achievable average annual reduction of 2%.	Climate Change	Mitigation

Notes:
CWPP = Community Wildfire Protection Plan

Table D-5: Alameda County—Ability to Expand Resources

Capability	Type/Description	Expansion
Human and Technical	Mitigation Specialist	Appoint or assign someone with the County to oversee hazard mitigation grant opportunities, including notifying County departments/agencies of upcoming grant cycles, and spearheading Notice of Intents applications, grant applications, and grant management requirements.
Financial	HMA funding	Apply for Building Resilient Infrastructure and Communities and Hazard Mitigation Grant Program funding as it becomes available. The focus should be on projects that mitigate critical infrastructure, provide protection for disadvantaged communities, and address climate change, including sea level rise, drought, and wildfire.
Planning and Policy	Safety Element update	Conduct a comprehensive update of the Safety Element to include hazards and mitigation strategies addressed in the 2021 LHMP. The Alameda County Safety Element does not currently address climate change, drought, infectious disease, or public safety power shutoff.
Planning and Policy	Environmental Justice Element	Prepare an Environmental Justice Element for the County General Plan to respond to impacts of environmental factors on disadvantaged and low-income communities in Unincorporated Alameda County. The Environmental Justice Element will address the requirements of Senate Bill 1000, including impacts related to climate change (heat, smoke, drought, flooding) and how these disproportionality impact Environmental Justice communities.
Planning and Policy	Alameda County government climate action plan	Develop a climate action plan for government services and operations that includes actions to reduce the County's contributions to climate emissions as well as to prepare for and address climate hazards such as smoke and fire which regularly affect County residents. (Actions will be carried out by relevant agencies.)
Planning and Policy	Carbon mitigation energy policy	Develop a comprehensive carbon mitigation energy policy ordinance for adoption by the County Board of Supervisors that sets all electric design, energy efficiency and renewables as a priority, requires the development of design standards, and requires development of a strategic implementation plan for County owned, constructed, and leased facilities.

Table D-6: Alameda County—Prioritized Action Plan

No.	Project Name	Priority	Potential Funding Source	Responsibility	Timing
1.	After-action report	High	Alameda County general funds	Alameda County Sheriff's Office	Ongoing
2.	Standby contracts	High	Alameda County general funds	Alameda County GSA	0 to 5 years
3.	Owner/operator roles and responsibilities	High	Alameda County general funds	Alameda County GSA	0 to 5 years
4.	Hazard assessment	High	Alameda County general funds, FEMA - HMA	Alameda County GSA	0 to 5 years
5.	Alameda County government climate action plan	High	Alameda County general funds	Alameda County GSA Office of Sustainability	0 to 5 years
6.	Carbon mitigation ordinance	High	Alameda County general funds	Alameda County GSA Office of Sustainability	0 to 5 years
7.	Global warming public education	High	FEMA – HMA	Alameda County Sustainability	0 to 5 years
8.	Cool pavement	High	FEMA – HMA	Alameda County GSA, Alameda County Public Works Agency	0 to 5 years
11.	Critical facility system elevation	High	FEMA – HMA	Alameda County Public Works Agency	0 to 5 years
13.	NFIP outreach	High	FEMA – HMA	Alameda County Public Works Agency	0 to 5 years
14.	Green infrastructure / low-impact development	High	FEMA – HMA	Alameda County GSA, Alameda County Public Works Agency	0 to 5 years
15.	Safety Element update	High	Alameda County general funds	Alameda County Community Development Agency	0 to 5 years
16.	Standby power systems / generators	High	FEMA – HMA	Alameda County GSA	0 to 5 years

Table D-6: Alameda County—Prioritized Action Plan

No.	Project Name	Priority	Potential Funding Source	Responsibility	Timing
17.	Fuel storage capacity / contingency	High	Alameda County general funds	Alameda County Public Works Agency	0 to 5 years
21.	Cooling Our Communities / Heat Preparedness Program expansion	High	FEMA – Homeland Security Preparedness Technical Assistance Program	Alameda County Sheriff's Office of Emergency Services in partnership with ACFD	0 to 5 years
23.	Retrofits/upgrades of critical facilities	High	FEMA – HMA	Alameda County Public Works Agency, Alameda County GSA	0 to 5 years
25.	Earthquake-resistant pipes replacement	High	FEMA – HMA	Alameda County Public Works Agency	0 to 5 years
32.	Goat grazing	High	FEMA – HMA	Alameda County in partnership with ACFD and ACFCWCD	0 to 5 years
33.	Hillside protection	Medium	FEMA – HMA	Alameda County Public Works Agency	0 to 5 years
35.	Ignition-resistant retrofits	High	FEMA – HMA	Alameda County Public Works Agency	0 to 5 years
37.	Defensible space	High	FEMA – HMA, Diablo Fire Safe Council funds	Alameda County in partnership with ACFD	0 to 5 years

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

Table D-7: Alameda County—Integration of 2021 LHMP

LHMP Section	Existing Plan/Policy/Program	Process / Timeframe
Section 4—Hazard Identification & Risk Assessment	Safety Element of the Alameda County General Plan	Conduct a comprehensive update of the Safety Element of the Alameda County Plan because it does not currently address climate change, drought, infectious disease, or public safety power shutoff. The last update occurred in three phases including information collection, plan and policy evaluation, and public outreach. Alameda County Community Development Agency is the lead agency for this plan.
Section 5—Mitigation Strategy	Safety Element of the Alameda County General Plan	Update the Safety Element to include hazards and mitigation strategies addressed in the 2021 LHMP. The last update occurred in three phases including information collection, plan and policy evaluation, and public outreach. Alameda County Community Development Agency is the lead agency for this plan.

Notes:
LHMP = Local Hazard Mitigation Plan

Table D-8: Alameda County—Progress in Local Mitigation Efforts

Action #	Action	Status
1.	Develop and implement a methodology to systematically assess all hazards outlined in this plan (including—but not limited to—sea level rise, seismic risk, flood risk, and protective design) and climate impacts (such as access to public transit) in considering building acquisitions and sales, portfolio planning, major retrofits, capital improvement planning, and master planning for County-owned and leased facilities.	Deferred, action modified and provided in **Table 5-1**.
2.	Continue the County's effort to enhance pre-disaster planning through development of plans such as Continuity of Government and Continuity of Operations Plans, Department Operation Center Plans, and Emergency Public Information Plans.	Ongoing, not included in the 2021 LHMP as action as it is considered more preparedness/response focused.
3.	Educate community-based organizations and other agencies that support vulnerable populations about personal preparedness and continuity of operation planning to ensure that these organizations continue to serve their constituents in disasters. This will reduce the health impacts for vulnerable populations (such as seniors, those with physical and/or development disabilities, and the visually or hearing impaired).	Ongoing, action modified and provided in **Table 5-1**.
4.	Continue to support medical countermeasures operational and logistics plans for optimal use in public health emergencies; this includes strengthening the capability to respond to emerging infectious disease through detection, surveillance, and disease containment (i.e., community mitigation strategies and post exposure prophylaxis).	Ongoing with COVID-19.
5.	Develop a comprehensive energy policy for adoption by the County board of supervisors that establishes energy efficiency and renewables as a priority, requires the development of design standards, and requires development of a strategic implementation plan for County--owned, constructed, and leased facilities.	Ongoing, action modified and provided in **Table 5-1**.
8.	Conduct comprehensive building performance evaluations and implement projects that ensure consistency with the County's green building and energy policies, while also demonstrating technologies that ensure energy effectiveness and independence.	Ongoing, action to be considered for climate action plan / carbon mitigation ordinance in **Table 5-1**.
9.	Update the County's green building policies to ensure the use of the latest environmental standards for materials and systems, as well as prioritize energy efficiency and renewables in new construction and renovations of private facilities.	Ongoing, action to be considered for climate action plan / carbon mitigation ordinance in **Table 5-1**.
14.	Identify, retrofit, upgrade, or replace deficient or vulnerable government facilities.	Ongoing, action provided in **Table 5-1**.
15.	Seismically retrofit or replace county and local ramps and bridges that are categorized as structurally deficient by Caltrans, in high ground shaking areas, and/or necessary for first responders to use during and/or immediately after a disaster or emergency (projects include Fruitvale Avenue Bridge Lifeline Project).	Ongoing, action provided in **Table 5-1**.

Table D-8: Alameda County—Progress in Local Mitigation Efforts

Action #	Action	Status
16.	Develop and implement plans to increase the building owner's general knowledge of and appreciation for the value of seismic upgrading of the building's structural and nonstructural elements.	Ongoing, action provided in **Table 5-1**.
20.	Implement landslide stabilization and/or protection measures. Stabilization measures include grading the unstable portion of the slope to a lower gradient, construction of rock buttresses and retaining walls, and drainage improvements. Protection measures include containment and/or diversion of the moving debris (e.g., walls, berms, ditches, and catchment basins).	Ongoing, action provided in **Table 5-1**.
23.	Encourage farmers to cultivate and maintain a variety of crops in rural areas to increase agricultural diversity and crop resiliency.	Ongoing, action to be considered in Community Climate Action Plan update.
24.	Establish and implement design standards, guidelines, and setback requirements for development on properties that abut creeks and waterways; require the replanting and restoration of riparian vegetation as part of any discretionary permit.	Ongoing, action provided in **Table 5-1**.

Notes:
Caltrans = California Department of Transportation
LHMP = Local Hazard Mitigation Plan

APPENDIX E—ALAMEDA COUNTY FIRE DEPARTMENT

Table E-1: ACFD—Hazard Impacts on Critical Facilities

Hazard Area	# of Facilities Impacted (Total Facility Count: 48)
Sea Level Rise Inundation Area—3 Ft.	0
Sea Level Rise Inundation Area—6 Ft.	2
Dam Breach Inundation Area—High Hazard and Extremely High Hazard	16
Probabilistic Earthquake Shaking Area—Severe	19
Probabilistic Earthquake Shaking Area—Violent	29
Special Flood Hazard Area—0.2% Annual Chance Flood	4
Special Flood Hazard Area—1% Annual Chance Flood	3
Deep-Seated Landslide Class IX and X Area	0
Existing Landslides Area—Few	7
Existing Landslides Area—Most	0
CPUC—Fire Threat Area—Tier 2 Elevated	2
CPUC—Fire Threat Area—Tier 3 Extreme	0
Maximum Tsunami Run-Up Area	1
Fire Hazard Severity Zones—High	1
Fire Hazard Severity Zones—Very High	1
Wildland Urban Interface—Urban Influence	3
Wildland Urban Interface—Urban Intermix	0
Wildland Urban Interface—Urban Influence	8

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

Table E-2: ACFD—Human and Technical Resources for Hazard Mitigation

Type	Branch / Division / Position	Principal Activities Related to Hazard Mitigation
Code Enforcement	Fire Prevention Division	Enforces all applicable State and local fire codes and standards, and fire investigations. Code enforcement is accomplished through the review and approval of building and facility plans, inspection of completed work, and certification of occupancy
General Services	Fleet Management Division	Maintains the operational readiness of the Department's fleet of apparatus and support vehicles. Performing routine and emergency repairs, safety inspections, preventative maintenance, communications equipment installation, and emergency apparatus outfitting are among a few of the countless duties.
	Facilities Division	Responsible for the general maintenance of all the ACFD's fire stations and division offices, the project management of the building processes for new Department facilities and restoration of existing facilities.
Training	Training Division	Provides support, oversight and coordination of training plans, exercises, curriculum and delivery methods that are in accordance with the National Fire Protection Association (NFPA), Occupational Safety and Health Administration (OSHA), National Institute for Occupational Safety and Health (NIOSH), the California State Fire Marshal's Office, the California Code of Regulations, FIRESCOPE and National Wildfire Coordinating Group (NWCG) standards and recommendations.
Operations	Special Operations Division	Trains personnel and maintains equipment to provide hazardous material and water rescue response capabilities.
Information Technology	Information Technology Division	Maintains, develops, monitors and supports several information systems and providing network infrastructure and technical support for the Department
Procurement Services	Finance Services Division	Provides a full range of financial services and administers several licensing measures.
Public Outreach	Public Affairs Division	Engages stakeholders in order to explain organizational policies and views on public policy issues, assisting policy makers and legislators in amending or laying down better policy and legislation. Provides statistical and factual information on issues which could impact upon the organization's ability to operate successfully.

Table E-3: ACFD—Financial Resources for Hazard Mitigation

Type	Administrator	Purpose	Amount
Unincorporated Alameda County Property Taxes & Emergency Medical Services Assessments	ACFD	Property tax and special tax for Unincorporated Alameda County for services provided by ACFD.	Variable
Charge for Services	ACFD	Charge for services contracts with the fire service contracts for the cities of San Leandro, Dublin, Newark, Union City and Emeryville and the Lawrence Berkeley National Laboratory and the Lawrence Livermore National Laboratory.	Variable
Measure X – Fire Safety Bond	ACFD	The adoption of Measure X authorizes the ACFD to issue up to $90,000,000 in bonds to repair, upgrade, and replace outdated fire stations in order to maintain fire and emergency medical services in Unincorporated Alameda County	Variable
Defensible Space Fuel Reduction Program	Diablo Fire Safe Council	Sponsorship program for defensible space fuel reduction projects. Cost-share assistance of up to $5,000 per project in 2020-2021 is available to groups or groups of individuals to hire contractors to reduce fuel loads and create defensible space.	Project-specific
Vegetation Management Program	Cal FIRE	Cost-sharing program between Cal FIRE and private land owners, which focuses on the use of prescribed fire, mechanical, biological, and chemical means addressing wildland fire fuel hazards and other resource management issues on SRA and LRA lands	Project-specific
Wildfire Emergency and Mitigation Funds	Cal FIRE	Administers funding from the FEMA, Bureau of Land Management, and U.S. Forest Service for certain types of wildfire emergency and mitigation funding.	Project-specific
Cal Water Firefighter Grant Program	Cal Water Service	Funds the purchase of personal protective equipment, firefighting or communications equipment, training and prerequisites material, and educational materials used to support fire protection efforts.	Project-specific
HMA: Hazard Mitigation Grant Program	FEMA	Supports pre- and post-disaster mitigation plans and projects. Available to California communities after a presidentially declared disaster has occurred in California, administered by Cal OES.	Project-specific
HMA: Building Resilient Infrastructure and Communities	FEMA	Focuses on reducing the nation's risk by funding public infrastructure projects that increase a community's resilience before a disaster affects an area. Administered by Cal OES.	Project-specific

Table E-3: ACFD—Financial Resources for Hazard Mitigation

Type	Administrator	Purpose	Amount
Assistance to Firefighters Grant Program	FEMA/U.S. Fire Administration	Provides equipment, protective gear, emergency vehicles, training, and other resources needed to protect the public and emergency personnel from fire and related hazards. Available to fire departments and nonaffiliated emergency medical services providers.	Project-specific

Notes:
ACFD = Alameda County Fire Department
FEMA = Federal Emergency Management Agency
HMA = Hazard Mitigation Assistance
Cal OES = California Governor's Office of Emergency Services

Table E-4: ACFD—Planning and Policy Resources for Hazard Mitigation

Name	Description	Hazards Addressed	Emergency Management
ACFD Fire & Emergency Services Strategic Business Plan (2015-2019)	Serves as a blueprint for the ACFD by outlining goals and initiatives to providing high quality fire and emergency services throughout Alameda County and to their contract agencies.	Fire	Mitigation, Preparedness, Response
Safety Element of the Alameda County General Plan (2014)	Describes hazard areas and lists goals and policies to reduce the potential risk of death, injuries, and economic damage resulting from natural and human-caused hazards.	Fire, Flood, Earthquake, Landslide, Hazardous Materials, Aviation Hazards	Mitigation, Preparedness, Response
Alameda County Emergency Operations Plan (2012)	The plan describes the County's organizational structures, roles, and responsibilities; protocols for providing emergency response and short-term recovery; the purpose, situation, and assumptions; concept of operations, organization, assignment of responsibilities, and plan development and maintenance; authorities; and references. The plan contains includes a hazard assessment. This Emergency Operations Plan is an extension of the California Emergency Plan. Alameda County will review and exercise the plan periodically and revise as necessary to meet changing conditions.	All Hazards	Response, Recovery
Alameda County CWPP (2012)	A CWPP is a community-based plan focused on identifying and addressing local hazards and risks from wildfire. It determines what is at risk and provides a road map of actions for a community to address the wildfire threat. It may also open up federal funding opportunities to implement the plan. CCWPPs are authorized and defined in Title I of the 2003 Healthy Forests Restoration Act.	Wildfire	Mitigation
Alameda County Building Codes and Ordinances (2019)	Promotes public health, safety, and general welfare through laws enforced locally. Building permits are issued and based on the current edition of the California Building Codes (2019) and local amendments, which encompass building, electrical, mechanical, plumbing, state energy requirements, and state accessibility laws. Alameda County can update and revise local amendments, as needed or required.	Flood, Earthquake, Landslide, Tsunami, and Wildfire	Mitigation

Table E-4: ACFD—Planning and Policy Resources for Hazard Mitigation

Name	Description	Hazards Addressed	Emergency Management
Alameda County Green Building Ordinance (2009)	Promotes practices that will reduce water and resource usage, reduce waste, and increase energy efficiency in the construction or remodeling of residential and nonresidential structures. By setting standards beyond state standards, our communities will enjoy buildings that provide a healthy and productive environment for workers, residents, and visitors and are economical to own and operate.	Climate Change	Mitigation
Alameda County Community Climate Action Plan (2020-2021)	Addresses the reduction of greenhouse gas emissions through a series of 37 local programs and policy measures related to transportation, land use, building energy, water, waste, and green infrastructure.	Climate Change, Wildfire	Mitigation

Notes:
ACFD = Alameda County Fire Department
CWPP = Community Wildfire Protection Plan

Table E-5: ACFD—Ability to Expand Resources

Capability	Type/Description	Expansion
Human and Technical	Mitigation Specialist	Appoint or assign someone with the ACFD to oversee hazard mitigation grant opportunities, including notifying the ACFD upcoming grant cycles, and spearheading Notice of Intents applications, grant applications, and grant management requirements.
Financial	HMA Funding	Apply for Building Resilient Infrastructure and Communities and Hazard Mitigation Grant Program funding as it becomes available. The focus should be on projects that mitigate critical infrastructure, provide protection for disadvantaged communities, and address climate change, drought, and wildfire.
Planning and Policy	Safety Element Update	Participate in the Alameda County Safety Element Update by providing relevant input on climate change, public safety power shutoff and wildfire.
Planning and Policy	Personal Emergency Preparedness Workshop	Expand ACFD's existing Personal Emergency Preparedness Workshop program to address various hazards and help families/individuals prepare for and recover from disasters. Consider including discussions around climate change and wildfires in addition to earthquakes.

Notes:
ACFD = Alameda County Fire Department
HMA = Hazard Mitigation Assistance

Table E-6: ACFD—Prioritized Action Plan

No.	Project Name	Priority	Potential Funding Source	Responsibility	Timing
11.	Critical utility system elevation	Medium	FEMA – HMA, Measure X – Fire Safety Bond	Facilities Division	0 to 5 years
12.	Passive floodproofing measures	Medium	FEMA – HMA, Measure X – Fire Safety Bond	Facilities Division	0 to 5 years
16.	Standby power systems / generators	High	FEMA – HMA, Measure X – Fire Safety Bond	Facilities Division	0 to 5 years
21.	Cooling Our Communities / Heat Preparedness Program expansion	High	FEMA – Homeland Security Preparedness Technical Assistance Program	Alameda County Sheriff's Office in partnership with ACFD	0 to 5 years
22.	Water storage tanks	High	FEMA – U.S. Fire Administration Assistance to Firefighters Grant Program	Fire Prevention Division	0 to 5 years
23.	Retrofits/upgrades of critical facilities	High	FEMA – HMA, Measure X – Fire Safety Bond	Facilities Division	0 to 5 years
24.	Seismic upgrade guide	High	FEMA – HMA	Fire Prevention Division	0 to 5 years
35.	Ignition-resistant retrofits	High	FEMA – HMA	Facilities Division	0 to 5 years
37.	Defensible space (Chipper Program)	High	FEMA – HMA, Diablo Fire Safe Council	Fire Emergency Management Division	0 to 5 years
38.	Fireproof coating of critical assets	High	FEMA – HMA, Measure X – Fire Safety Bond	Facilities Division	0 to 5 years
40.	Hazardous fuel reduction	High	FEMA – HMA, Cal FIRE Vegetation Management Program	Fire Prevention Division	0 to 5 years

Notes:
ACFD = Alameda County Fire Department
FEMA = Federal Emergency Management Agency
HMA = Hazard Mitigation Assistance

Table E-7: ACFD—Integration of 2021 LHMP

LHMP Section	Existing Plan/Policy/Program	Process / Timeframe
Section 4—Hazard Identification & Risk Assessment	Safety Element of the Alameda County General Plan	Conduct a comprehensive update of the Safety Element of the Alameda County Plan because it does not currently address climate change, drought, infectious disease, or public safety power shutoff. The last update occurred in three phases including information collection, plan and policy evaluation, and public outreach. Alameda County Community Development Agency is the lead agency for this plan. ACFD can provide additional input regarding climate change, public safety power shutoff and wildfires.
Section 5—Mitigation Strategy	Safety Element of the Alameda County General Plan	Update the Safety Element to include hazards and mitigation strategies addressed in the 2021 LHMP. The last update occurred in three phases including information collection, plan and policy evaluation, and public outreach. Alameda County Community Development Agency is the lead agency for this plan. ACFD can provide additional input regarding climate change, public safety power shutoff, and wildfires.

Notes:
ACFD = Alameda County Fire Department
LHMP = Local Hazard Mitigation Plan

Table E-8: ACFD—Progress in Local Mitigation Efforts

Action #	Action	Status
16.	Develop and implement plans to increase the building owner's general knowledge of and appreciation for the value of seismic upgrading of the building's structural and nonstructural elements.	Ongoing, action provided in **Table 5-1**.
22.	County staff in conjunction with state agencies will continue to support vegetation management strategies and programs to address the changing vegetation management needs in the county.	Ongoing, action revised and provided in **Table 5-1**.

Notes:
ACFD = Alameda County Fire Department

APPENDIX F—ALAMEDA COUNTY FLOOD CONTROL AND WATER CONSERVATION DISTRICT

Table F-1: ACFCWCD—Hazard Impacts on Critical Facilities

Hazard Area	# of Facilities Impacted	
	# of Facilities (Total Facility Count: 36)	# of Channels (Total Channel Count: 42)
Sea Level Rise Inundation Area—3 Ft.	5	27
Sea Level Rise Inundation Area—6 Ft.	17	32
Dam Breach Inundation Area—High Hazard and Extremely High Hazard	16	31
Probabilistic Earthquake Shaking Area—Severe	14	13
Probabilistic Earthquake Shaking Area—Violent	22	39
Special Flood Hazard Area—0.2% Annual Chance Flood	7	29
Special Flood Hazard Area—1% Annual Chance Flood	8	41
Deep-Seated Landslide Class IX and X Area	0	16
Existing Landslides Area—Few	5	11
Existing Landslides Area—Most	2	2
CPUC—Fire Threat Area—Tier 2 Elevated	3	0
CPUC—Fire Threat Area—Tier 3 Extreme	1	0
Maximum Tsunami Run-Up Area	6	17
Fire Hazard Severity Zones—High	2	0
Fire Hazard Severity Zones—Very High	2	0
Wildland Urban Interface—Urban Influence	3	24
Wildland Urban Interface—Urban Intermix	0	4
Wildland Urban Interface—Urban Influence	5	14

Notes:
ACFCWCD = Alameda County Flood Control and Water Conservation District
CPUC = California Public Utilities Commission
Ft. = foot/feet

Table F-2: ACFCWCD—Human and Technical Resources for Hazard Mitigation

Type	Branch / Division / Position	Principal Activities Related to Hazard Mitigation
Engineering	Engineering	• Upgrades and repairs to older facilities. • Restores and enhances natural creeks, flood control channels and reservoirs. • Plans, designs and implements new infrastructure. • Reviews preliminary FEMA's Flood Insurance Studies and FIRMs.
Emergency Services	Maintenance and Operations	• Responds to hazardous spills. • Inspects damaged trees and reducing fire hazards. • Provides sand bag supplies. • Serves as an emergency response unit during natural disasters. • Inspects conduits, channels, and natural creeks and inlets. • Clears excess vegetation, sediment, and debris and keeps fences intact. • Inspects and repairs pump stations. • Inspecting and maintaining tide gates. • Plans flood control infrastructure upgrades.
Planning	Construction and Development	• Reviews all proposed private and public developments in Unincorporated Alameda County for compliance with accepted engineering standards, environmental requirements, and district ordinances. • Reviews design documents and issue permits for new developments in the unincorporated areas. • Inspects all flood control related construction in unincorporated areas to ensure that facilities are constructed in accordance with engineered plans. Laboratory testing and contract administration are also managed by this division.
Human Resources, Accounting, Information Technology, and other Administrative Services	Management Services	Handles ACFCWCD's human resources, accounting, information technology, and other administrative services.

Notes:
ACFCWCD = Alameda County Flood Control and Water Conservation District
FEMA = Federal Emergency Management Agency
FIRM = Flood Insurance Rate Map

Table F-3: ACFCWCD—Financial Resources for Hazard Mitigation

Type	Administrator	Purpose	Amount
Taxes and Assessments	ACFCWCD	Receives a very small portion of the county-wide 1% property tax.	Variable
Benefit Assessment Review	ACFCWCD	Based on predictions of the quantity of stormwater and runoff from each parcel of property, the assessment rate-per-acre depends on the land use and the land zone.	Variable
Other Revenue	ACFCWCD	Earns revenue from permitting fees paid by developers and builders, among other small sources of revenue.	Variable
HMA: Hazard Mitigation Grant Program	FEMA	Supports pre- and post-disaster mitigation plans and projects. Available to California communities after a presidentially declared disaster has occurred in California, administered by Cal OES.	Project-specific
HMA: Building Resilient Infrastructure and Communities	FEMA	Focuses on reducing the nation's risk by funding public infrastructure projects that increase a community's resilience before a disaster affects an area. Administered by Cal OES.	Project-specific

Notes:
ACFCWCD = Alameda County Flood Control and Water Conservation District
Cal OES = California Governor's Office of Emergency Services
FEMA = Federal Emergency Management Agency
HMA = Hazard Mitigation Assistance

Table F-4: ACFCWCD—Planning and Policy Resources for Hazard Mitigation

Name	Description	Hazards Addressed	Emergency Management
Safety Element of the Alameda County General Plan (2014)	Describes hazard areas and lists goals and policies to reduce the potential risk of death, injuries, and economic damage resulting from natural and human-caused hazards.	Fire, Flood, Earthquake, Landslide, Hazardous Materials, Aviation Hazards	Mitigation, Preparedness, Response
Alameda County Building Codes and Ordinances (2019)	Promotes public health, safety, and general welfare through laws enforced locally. Building permits are issued and based on the current edition of the California Building Codes (2019) and local amendments, which encompass building, electrical, mechanical, plumbing, state energy requirements, and state accessibility laws. Alameda County can update and revise local amendments, as needed or required. Codes relevant to ACFCWD include: Chapter 6.36; Chapter 6.88; Chapter 12.11; Chapter 13.08; Chapter 13.12; Chapter 15.36; and Chapter 15.40.	Flood, Earthquake, Landslide, Tsunami, and Wildfire	Mitigation
NFIP / CRS	Makes affordable flood insurance available to homeowners, business owners, and renters in participating communities. In exchange, those communities must adopt and enforce minimum floodplain management regulations to reduce the risk of damage from future floods. Alameda County joined the NFIP in 1981. Alameda County also participates in the CRS Program, which offers discounted flood insurance premium rates as a result of the community's efforts to exceed the minimum requirements of the NFIP.	Flood	Mitigation

Notes:
ACFCWCD = Alameda County Flood Control and Water Conservation District
CRS = Community Rating System
NFIP = National Flood Insurance Program

Table F-5: ACFCWCD—Ability to Expand Resources

Capability	Type/Description	Expansion
Human and Technical	Mitigation Specialist	Appoint or assign someone with the ACFCWCD to oversee hazard mitigation grant opportunities, including upcoming grant cycles, Notice of Intents applications, grant applications, and grant management requirements.
Financial	HMA Funding	Apply for Building Resilient Infrastructure and Communities and Hazard Mitigation Grant Program funding as it becomes available. The focus should be on projects that mitigate critical infrastructure, provide protection for disadvantaged communities, and address climate change, including sea level rise.
Planning and Policy	Safety Element Update	Participate in the Alameda County Safety Element Update by providing relevant input on climate change and flood.
Planning and Policy	NFIP	Expand NFIP outreach efforts to include those living in sea level rise inundation areas.

Notes:
ACFCWCD = Alameda County Flood Control and Water Conservation District
HMA = Hazard Mitigation Assistance
NFIP = National Flood Insurance Program

Table F-6: ACFCWCD—Prioritized Action Plan

No.	Project Name	Priority	Potential Funding Source	Responsibility	Timing
26.	Creek restoration	High	FEMA – HMA	Engineering	0 to 5 years
27.	Storm drains, channels, levees, and pump station improvements	High	FEMA – HMA	Maintenance and Operation	0 to 5 years
29.	Zone 5 and 12 improvements	High	FEMA – HMA	Engineering	0 to 5 years
30.	Zone 6 Capacity improvements	High	FEMA – HMA	Engineering	0 to 5 years
31.	Estudillo Canal	High	FEMA – HMA	Engineering	0 to 5 years

Notes:
ACFCWCD = Alameda County Flood Control and Water Conservation District
FEMA = Federal Emergency Management Agency
HMA = Hazard Mitigation Assistance

Table F-7: ACFCWCD—Integration of 2021 LHMP

LHMP Section	Existing Plan/Policy/Program	Process / Timeframe
Section 4—Hazard Identification & Risk Assessment	Safety Element of the Alameda County General Plan	Conduct a comprehensive update of the Safety Element of the Alameda County Plan because it does not currently address climate change, drought, infectious disease, or public safety power shutoff. The last update occurred in three phases including information collection, plan and policy evaluation, and public outreach. Alameda County Community Development Agency is the lead agency for this plan. ACFCWCD can provide additional input regarding climate change and flood.
Section 5—Mitigation Strategy	Safety Element of the Alameda County General Plan	Update the Safety Element to include hazards and mitigation strategies addressed in the 2021 LHMP. The last update occurred in three phases including information collection, plan and policy evaluation, and public outreach. Alameda County Community Development Agency is the lead agency for this plan. ACFCWCD can provide additional input regarding climate change and flood.
Section 5—Mitigation Strategy	ACFCWCD Capacity Improvement Projects	Incorporate the mitigation actions provided in **Table F-6** into the ACFCWCD's Capacity Improvement Projects list by further studying and evaluating the underlying problem or if studies exist that outline potential solutions, begin the design stage to develop a plan for the project, the actions to be taken, engineering and construction required, schedule, and estimated cost.

Notes:
ACFCWCD = Alameda County Flood Control and Water Conservation District
LHMP = Local Hazard Mitigation Plan

Table F-8: ACFCWCD—Progress in Local Mitigation Efforts

Action #	Action	Status
25.	Zone 12 Drainage Study to identify potential deficiencies in various open channels and underground flood control drainage facilities.	To be completed, action provided in **Table 5-1**.
26.	Zone 5 Drainage Study to identify potential deficiencies in various flood control open channels.	To be completed, action provided in **Table 5-1**.
27.	Zone 6 Capacity Improvements.	Two of the six sub-projects identified in the Zone 6 Capacity Improvements have been completed. The remaining for have been included as one master project in **Table 5-1**.
28.	Estudillo Canal Tidegate Structure Upgrade.	To be completed, action provided in **Table 5-1**.
29.	Estudillo Canal South Levee Lowering.	To be completed, action provided in **Table 5-1**.

Notes:
ACFCWCD = Alameda County Flood Control and Water Conservation District
LHMP = Local Hazard Mitigation Plan