City of Piedmont
Local Hazard Mitigation Plan

April 2019

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Executive Summary

The City of Piedmont prepared this Local Hazard Mitigation Plan (LHMP) to guide hazard mitigation planning to better protect the people and property of the City from the effects of natural disasters and hazard events. This plan demonstrates the community's commitment to reducing risks from hazards and serves as a tool to help decision makers direct mitigation activities and resources. This plan was also developed in order for the City to be eligible for certain federal disaster assistance, specifically, the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) Program, and the Flood Mitigation Assistance (FMA) Program.

Each year in the United States, natural disasters take the lives of hundreds of people and injure thousands more. Nationwide, taxpayers pay billions of dollars annually to help communities, organizations, businesses, and individuals recover from disasters. These monies only partially reflect the true cost of disasters, because additional expenses to insurance companies and nongovernmental organizations are not reimbursed by tax dollars. Many natural disasters are predictable, and much of the damage caused by these events can be alleviated or even eliminated. The purpose of hazard mitigation is to reduce or eliminate long-term risk to people and property from hazards

LHMP Plan Development Process

Hazard mitigation planning is the process through which hazards that threaten communities are identified, likely impacts determined, mitigation goals set, and appropriate mitigation strategies determined, prioritized, and implemented. This plan documents the hazard mitigation planning process and identifies relevant hazards and vulnerabilities and strategies the City will use to decrease vulnerability and increase resiliency and sustainability in the community.

This LHMP was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 (Public Law 106-390) and the implementing regulations set forth by the Interim Final Rule published in the Federal Register on February 26, 2002, (44 CFR §201.6) and finalized on October 31, 2007. The City followed a planning process prescribed by FEMA as detailed in Table ES-*1*.

Table ES-1 Local Hazard Mitigation Planning Process

DMA Process	Modified CRS Process
1) Organize Resources	
201.6(c)(1)	1) Organize the Planning Effort
201.6(b)(1)	2) Involve the Public
201.6(b)(2) and (3)	3) Coordinate with Other Departments and Agencies
2) Assess Risks	
201.6(c)(2)(i)	4) Identify the Hazards

DMA Process	Modified CRS Process
201.6(c)(2)(ii)	5) Assess the Risks
3) Develop the Mitigation Plan	
201.6(c)(3)(i)	6) Set Goals
201.6(c)(3)(ii)	7) Review Possible Activities
201.6(c)(3)(iii)	8) Draft an Action Plan
4) Implement the Plan and Monitor Progress	
201.6(c)(5)	9) Adopt the Plan
201.6(c)(4)	10) Implement, Evaluate, and Revise the Plan

The planning process began with the organizational phase to establish the hazard mitigation planning committee (HMPC) comprised of key City representatives, and other local and regional stakeholders; to involve the public; and to coordinate with other departments and agencies. A detailed risk assessment was then conducted followed by the development of a focused mitigation strategy for Piedmont. Once approved by Cal OES and FEMA, this plan will be adopted and implemented by the City over the next five years.

Risk Assessment

The HMPC conducted a risk assessment that identified and profiled hazards that pose a risk to the City, assessed the vulnerability of the planning area to these hazards, and examined the existing capabilities to mitigate them.

The City is vulnerable to numerous hazards that are identified, profiled, and analyzed in this plan. Dam failures, floods, earthquakes, drought, liquefaction, landslides, wildfires, and other severe weather events are among the hazards that can have a significant impact on the City. Table ES-2 details the hazards identified for the City LHMP.

Table ES-2 Piedmont Hazard Identification Assessment

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Climate Change	Extensive	Likely	Negligible	Medium	--
Dam Failure	Significant	Occasional	Limited	Medium	Medium
Drought and Water Shortage	Extensive	Occasional	Limited	Medium	Medium
Earthquake	Extensive	Highly Likely/ Occasional	Catastrophic	High	Low
Earthquake Liquefaction	Limited	Occasional	Limited	Medium	Low
Flood: (1% and 0.2% annual chance)	Limited	Unlikely	Limited	Low	Medium
Flood: Localized/Stormwater	Significant	Highly Likely	Limited	Medium	Medium
Landslide, Mudslides, Hillside Erosion, and Debris Flows	Extensive	Likely	Limited	Medium	Medium
Levee Failure	Limited	Unlikely	Negligible	Low	Medium
Severe Weather: Extreme Heat	Extensive	Highly Likely	Limited	Medium	Medium
Severe Weather: Heavy Rains and Storms	Extensive	Highly Likely	Limited	Medium	Medium
Severe Weather: High Winds	Extensive	Highly Likely	Limited	Medium	Low
Wildfire	Extensive	Highly Likely	Catastrophic	High	Medium

Geographic Extent
Limited: Less than 10% of planning area
Significant: 10-50% of planning area
Extensive: 50-100% of planning area

Likelihood of Future Occurrences
Highly Likely: Near 100% chance of occurrence in next year, or happens every year.
Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less.
Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Magnitude/Severity
Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths
Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability
Limited—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability
Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid

Significance
Low: minimal potential impact
Medium: moderate potential impact
High: widespread potential impact

Strategy

Based on the results of the risk assessment, the HMPC developed a mitigation strategy for reducing the City's risk and vulnerability to hazards. The resulting Mitigation Strategy for Piedmont is comprised of

LHMP goals and objectives and a mitigation action plan which includes a series of mitigation action projects and implementation measures.

The goals and objectives of this LHMP are:

GOAL 1: Minimize risk and vulnerability of the City of Piedmont to the impacts of natural hazards, and protect lives and reduce damages and losses to property, public health, economy, and the environment.

- Protect life and reduce exposure and hazard losses to City residents, businesses, vulnerable populations, and visitors
- Increase community resiliency to the impacts of natural hazards and promote sustainable recovery from hazard events
- Assure long term protection and resiliency of existing and future development/ redevelopment from natural hazards, to include both public and private structures
- Protect/harden critical facilities from natural hazards and minimize interruption of essential infrastructure, utilities, and services
- Provide protection for architectural resources in the City
- Plan for and prioritize measures to respond to and address potential short- and long- term hazard impacts associated with climate change

GOAL 2: Enhance public outreach, awareness, education, and preparedness for all hazards to minimize hazard related losses

- Engage the community in disaster awareness and prevention education to reduce the risk and vulnerability of natural hazard impacts
- Improve the communities' understanding of natural hazards and how to effectively be prepared and take action to mitigate the impacts of hazard events; Support and encourage public responsibility
- Develop and target outreach and education for each hazard type and risk area and all City populations (e.g., vulnerable populations, schools, etc.)

GOAL 3: Improve City's resiliency and capabilities to mitigate losses and to be prepared for, respond to, and recover from a disaster event

- Maintain current service levels related to public safety
- Maintain and improve communication capabilities to ensure redundancy
- Enhance emergency services capabilities to address evacuation planning, sheltering, and other associated efforts

Actions to support these goals are shown on Table ES-3.

Table ES-3 City of Piedmont's Mitigation Actions

Action Title	Goals Addressed	Responsible Agency(ies)	Address Current Development	Address Future Development	Mitigation Type
Multi-Hazard Actions					
Action 1.Integrate Local Hazard Mitigation Plan into Safety Element of General Plan	1, 2, 3	City of Piedmont Planning Department	X	X	Prevention
Action 2.Public Awareness, Education, Outreach, and Preparedness Program Enhancements.	1, 2, 3	Planning & Building, Public Works, and Fire Department	X	X	Public Education
Action 3.Establish Alternative EOC	1, 2, 3	Piedmont Fire	X	X	Emergency Services
Action 4.Establish Communications Redundancies	1, 2, 3	Computer Courage (Contract City IT provider), PD/Fire Command Staff	X	X	Emergency Services
Action 5.Acquire Manifolds for Hydrants	1, 2, 3	Fire Chief, Director of Public Works	X	X	Property Protection
Action 6.Identify Backup Water Sources when Water Quality Becomes an Issue Post-disaster	1, 2, 3	Fire Chief, Director of Public Works, City Engineer	X	X	Property Protection Emergency Services
Action 7.Identify Critical Facilities for Backup Generators/Fuel	1, 2, 3	Fire Chief, Director of Public Works, Police Chief	X	X	Emergency Services
Action 8.Develop and Implement an Evacuation Plan	1, 2, 3	City of Piedmont and Piedmont residents	X	X	Emergency Services

Action Title	Goals Addressed	Responsible Agency(ies)	Address Current Development	Address Future Development	Mitigation Type
Climate Change Actions					
Action 9.Implement Recommendations from Piedmont CAP (Goal of Reducing Greenhouse Emissions)	1, 2, 3	Planning, Public Works, EBMUD	X	X	Prevention Property Protection Natural Resource Protection Public Education
Dam Failure Actions					
Action 10. Develop Public Safety MOU with EBMUD for Estates Reservoir Containment Structures	1, 2, 3	Public Works, City Engineer	X	X	Prevention Property Protection
Action 11. Tyson Lake -Research Owner Responsibilities and Study Inundation/Assessment of Downstream Conditions	1, 2, 3	Public Works, City Engineer	X	X	Prevention Property Protection
Drought and Water Shortage Actions					
Action 12. Implement Cal Water Efficiency Landscape projects, with Code Enforcement Component	1, 2, 3	Planning, Public Works, EBMUD	X	X	Prevention Property Protection
Earthquake and Earthquake Liquefaction Actions					
Action 13. Conduct Study to Preserve Architectural Integrity when Structures are Retrofitted for Seismic and Fire Safety	1, 2, 3	The City of Piedmont's Planning Department is lead. Partners include the Building Department, Fire Department and the City Engineer	X		Property Protection Structural Projects
Action 14. Support and encourage Earthquake Brace and Bolt (EBB) Program in Piedmont	1, 2, 3	Public Works Department and the Building Division	X		Property Protection Structural Projects

Action Title	Goals Addressed	Responsible Agency(ies)	Address Current Development	Address Future Development	Mitigation Type
Action 15. Enhance Building Code Enforcements	1, 2, 3	Public Works Department, Building Division, Plans Examiner	X	X	Prevention
Action 16. Identify and Implement Critical Facility Retrofits	1, 2, 3	Public Works, City Engineer	X	X	Property Protection Structural Projects
Action 17. Pipe Replacement with Flexible Material in Smaller Pipe Systems	1, 2, 3	Public Works, City Engineer	X	X	Property Protection Structural Projects
Action 18. Identify and Retrofit Vulnerable Bridges	1, 2, 3	Public Works, City Engineer	X	X	Property Protection Structural Projects
Action 19. Seismic Evaluation and Prioritization of Public Buildings	1, 2, 3	Public Works,	X		Prevention Property Protection Structural Projects
Flooding and Localized Flooding Actions					
Action 20. Flood Insurance Promotion for RL Properties and Areas	1, 2, 3	The City's Public Works Department and the Building Division	X		Prevention Public Information
Action 21. Code Enforcement Related to Flood Control	1, 2, 3	Building Division	X	X	Prevention
Action 22. Develop Stormwater Master Plan	1, 2, 3	Public Works, City Engineer	X	X	Prevention Public Information
Landslide, Mudslide, Hillside Erosion, and Debris Flow Actions					
Action 23. Implementing Hillside Hazard Overlay District to Address Slope Stability Hazards/ Code Enforcement	1, 2, 3	Director of Public Works, City Engineer, Building Official		X	Prevention
Action 24. City Study to Identify and Map Potential Localized Landslide Areas	1, 2, 3	Public Works, City Engineer	X	X	Prevention

Action Title	Goals Addressed	Responsible Agency(ies)	Address Current Development	Address Future Development	Mitigation Type
Severe Weather: Heavy Rains and Storms and High Winds Actions					
Action 25. Enhance Urban Tree Program - Storm Watch Protocols, Tree Trimming and Removal	1, 2, 3	Public Works	X	X	Prevention Property Protection Natural Resource Protection
Wildfire Actions					
Action 26. Develop Landscaping Ordinance	1, 2, 3	Planning, Public Works, Building Department, Fire Department, Parks	X	X	Prevention
Action 27. Implement Piedmont Projects from Diablo CWPP for Alameda County	1, 2, 3	Diablo Fire Safe Council, Consultant, CAL FIRE, and Piedmont Fire Department	X	X	Prevention Property Protection Natural Resource Protection Public Information
Action 28. Require and/or Encourage Retrofits for Fire Safe Construction	1, 2, 3	Fire Chief, Building Official	X		Property Protection Public Education
Action 29. Obtain Backup Generators Where Lines Go Down During Wildfire	1, 2, 3	Police Department, Fire Department`	X		Property Protection Natural Resource Protection
Action 30. Undergrounding of Utilities in VHFHSZs	1, 2, 3	Public Works	X	X	Prevention Property Protection Natural Resource Protection
Action 31. Pursue FireWise Community Certification	1, 2, 3	Fire Department, Planning Departemtn	X	X	Prevention Property Protection Natural Resource Protection

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Abbreviations and Acronyms

Acronym	Definition
AB	Assembly Bill
ABAG	Association of Bay Area Governments
ADU	Accessory Dwelling Unit
AGL	Above Ground Level
AHJ	Authorities Having Jurisdiction
AHPS	Advanced Hydrologic Prediction Service
ALERT	Automated Local Evaluation in Real Time
APG	California Adaptation Planning Guide
BAM	Best Available Map
BLM	Bureau of Land Management
BMP	Best Management Practices
CA	California
CAC	Community Assistance Contact
CAV	Community Assistance Visit
CA-DWR	California Department of Water Resources
Cal OES	California Office of Emergency Services
CAP	Climate Adaptation Plan
CAS	Climate Adaptation Strategy
CBC	California Business Code
CDAA	California Disaster Assistance Act
CDBG	Community Development Block Grant
CDEC	California Data Exchange Center
CDFA	California Department of Food & Agriculture
CDFW	California Department of Fish and Wildlife
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CERT	Community Emergency Response Training
CFR	Code of Federal Regulations
CGS	California Geologic Survey
CHP	California Highway Patrol
CIP	Capital Improvements Plan
CIRA	Climate Change Impacts and Risk Analysis
CLOMR	Conditional Letter of Map Revision
COPD	Chronic Obstructive Pulmonary Disease
CNPS	California Native Plant Society
CNRA	California Natural Resource Agency
CRS	(National Flood Insurance Program's) Community Rating System

Acronym	Definition
CRV	Content Replacement Values
CVP	Central Valley Project
CWPP	Community Wildfire Protection Plan
DAC	Disadvantaged Community
DMA	Disaster Mitigation Act of 2000
DOF	Department of Finance
DOT	Department of Transportation
DSOD	Division of Safety of Dams
EAS	Emergency Alert System
EBMUD	East Bay Municipal Utility District
EF	Enhanced Fujita
EOC	Emergency Operations Center
EOP	Emergency Operations Plan
EWP	Emergency Watershed Protection Program
F	Fujita
FEMA	Federal Emergency Management Agency
FHSZ	Fire Hazard Severity Zone
FIRM	Flood Insurance Rate Map
FIS	Flood Insurance Study
FMA	Flood Mitigation Assistance Program
FRA	Federal Responsibility Area
FRAP	Fire and Resource Assessment Program
FWS	US Fish and Wildlife Service
GHG	Greenhouse Gases
GIS	Geographic Information Systems
HMGP	Hazard Mitigation Grant Program
HI	Heat Index
IBC	International Business Code
ICC	Increased Cost of Compliance
IPCC	Intergovernmental Panel on Climate Change
IRC	International Residential Code
LFPZ	Levee Flood Protection Zone
LHMP	Local Hazard Mitigation Plan
LOMA	Letter of Map Amendment
LOMR	Letter of Map Revision
LRA	Local Responsibility Area
MGD	Million Gallons per Day
MHDP	Multi Hazards Demonstration Project
MHI	Median Household Income

Acronym	Definition
MMHW	Mean Higher High Water
MMI	Modified Mercalli Intensity Scale
MSL	Mean Sea Level
NASA	National Aerospace and Science Agency
NAVD 88	North America Vertical Datum 1988
NCDC	National Climactic Data Center
NDMC	National Drought Mitigation Center
NEHRP	National Earthquake Hazards Reduction Program
NEPA	National Environmental Policy Act
NFIP	National Flood Insurance Program
NGVD 29	National Geodetic Vertical Datum 1929
NIDIS	National Integrated Drought Information System
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
NPDP	National Performance of Dams Program
NPS	National Park Service
NWS	National Weather Service
OHP	Office of Historic Preservation
PDM	Pre-Disaster Mitigation Program
PMR	Physical Map Revision
PPI	Program for Public Information
PRP	Preferred Risk Policy
RAWS	Remote Automated Weather Stations
RCP	Representative Concentration Pathway
RL	Repetitive Loss
SB	Senate Bill
SBA	Small Business Administration
SDC	Seismic Design Category
SEMS	Standardized Emergency Management System
SFHA	Special Flood Hazard Area
SGMA	Sustainable Groundwater Management Act
SHBC	State Historical Building Code
SOI	Sphere of Influence
SOP	Standardized Operations Procedures
SRA	State Responsibility Area
SRL	Severe Repetitive Loss
SWP	State Water Project
UCERF	Uniform California Earthquake Rupture Forecast
UHI	Urban Heat Island

Acronym	Definition
ULDC	Urban Levee Design Criteria
ULOP	Urban Level of Protection Criteria
USACE	US Army Corp of Engineers
USGS	United States Geologic Survey
USDA	United States Department of Agriculture
UWMP	Urban Water Management Plan
VHFHSZ	Very High Fire Hazard Severity Zone
WMP	Wildlife Hazard Management Plan
WRCC	Western Regional Climate Center
WUI	Wildland Urban Interface

Chapter 1 Introduction

1.1 Purpose

The City of Piedmont prepared this Local Hazard Mitigation Plan (LHMP) to guide hazard mitigation planning to better protect the people and property of the City from the effects of hazard events. This LHMP demonstrates the community's commitment to reducing risks from hazards and serves as a tool to help decision makers direct mitigation activities and resources. This LHMP was also developed so the City can be eligible for certain federal disaster assistance, specifically, the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program (HMGP), Pre-Disaster Mitigation (PDM) program, and the Flood Mitigation Assistance (FMA) program.

1.2 Background and Scope

Each year in the United States, natural disasters take the lives of hundreds of people and injure thousands more. Nationwide, taxpayers pay billions of dollars annually to help communities, organizations, businesses, and individuals recover from disasters. These monies only partially reflect the true cost of disasters, because additional expenses to insurance companies and nongovernmental organizations are not reimbursed by tax dollars. Many natural disasters are predictable, and much of the damage caused by these events can be alleviated or even eliminated.

Hazard mitigation is defined by FEMA as "any sustained action taken to reduce or eliminate long-term risk to human life and property from a hazard event." The results of a three-year, congressionally mandated independent study to assess future savings from mitigation activities provides evidence that mitigation activities are highly cost-effective. On average, each dollar spent on mitigation saves society an average of $6 in avoided future losses in addition to saving lives and preventing injuries (National Institute of Building Science Multi-Hazard Mitigation Council 2017 Interim Report).

Hazard mitigation planning is the process through which hazards that threaten communities are identified, likely impacts determined, mitigation goals set, and appropriate mitigation strategies determined, prioritized, and implemented. This LHMP documents the City's hazard mitigation planning process and identifies relevant hazards, vulnerabilities, and mitigation strategies the City will use to decrease vulnerability and increase resiliency and sustainability in the community.

This Piedmont LHMP is a single jurisdictional plan that geographically covers the entire area within the City's jurisdictional boundaries. This plan was prepared pursuant to the requirements of the Disaster Mitigation Act of 2000 (Public Law 106-390) and the implementing regulations set forth by the Interim Final Rule published in the Federal Register on February 26, 2002, (44 CFR §201.6) and finalized on October 31, 2007. (Hereafter, these requirements and regulations will be referred to collectively as the Disaster Mitigation Act (DMA) or DMA 2000.) This planning effort also follows FEMA's most current Plan Preparation and Review Guidance. While the DMA 2000 emphasized the need for mitigation plans and more coordinated mitigation planning and implementation efforts, the regulations established the requirements that local hazard mitigation plans must meet in order for a local jurisdiction to be eligible for certain federal disaster assistance and hazard mitigation funding under the Robert T. Stafford Disaster Relief and Emergency Act (Public Law 93-288). Because the City is subject to many kinds of hazards, access to these programs is vital.

Information in this LHMP will be used to help guide and coordinate mitigation activities and decisions for local land use policy in the future. Proactive mitigation planning will help reduce the cost of disaster response and recovery to communities and their residents by protecting critical community facilities, reducing liability exposure, and minimizing overall community impacts and disruptions. Piedmont has been affected by hazards in the past and is thus committed to reducing future impacts from hazard events and becoming eligible for mitigation-related federal funding.

1.3 Plan Organization

The City of Piedmont's Local Hazard Mitigation Plan is organized as follows:

- Chapter 1: Introduction
- Chapter 2: Community Profile
- Chapter 3: Planning Process
- Chapter 4: Risk Assessment
- Chapter 5: Mitigation Strategy
- Chapter 6: Plan Adoption
- Chapter 7: Plan Implementation and Maintenance
- Appendix A: Planning Process
- Appendix B: References
- Appendix C: Mitigation Strategy
- Appendix D: Adoption Resolution
- Appendix E: Critical Facilities
- Appendix F: Endangered Species

Chapter 2 Community Profile

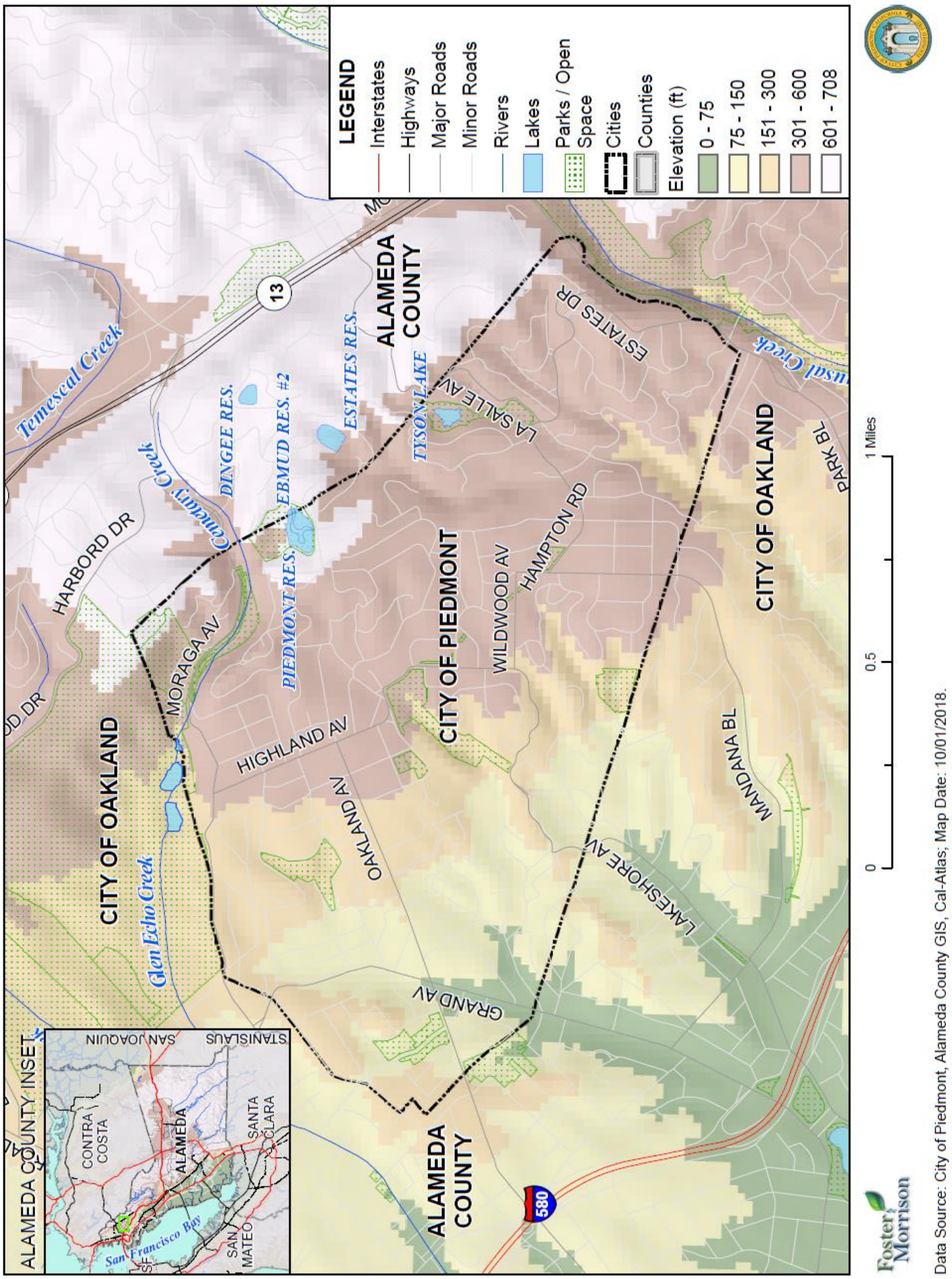
2.1 City of Piedmont Overview

The City of Piedmont is an older, well-established community located in Alameda County, approximately 10 miles east of San Francisco. The City is completely encircled by the City of Oakland and has no opportunities for annexation. This has been the case since 1909, when Oakland annexed Piedmont's north and east perimeter. Piedmont's "landlocked" setting has influenced its historic development patterns and significantly affects its potential for new housing and employment today. The City encompasses 1.78square miles—virtually all of it fully developed.

More than 90% of the City's land area is developed with housing and 9% consists of schools, parks, and churches. Piedmont has less than four acres of commercial land, consisting mostly of offices and small businesses. The City has no industrial land. Piedmont has almost no land suitable for conventional redevelopment, nor does it have public land that might be made available for future housing.

The City can be seen on Figure 2-1 below.

Figure 2-1 City of Piedmont



2.2 History

In 1820, Don Luis Peralta owned 14,330 acres of land on the east side of San Francisco Bay. His Rancho San Antonio was so big that it covered all the land that is Piedmont, Berkeley, and Oakland today. Gradually the Peralta holdings, like those of other early Californians, passed out of the hands of their original owners. Peralta had two sons – Jose Domingo and Vicente. The major portion of Jose Domingo's patrimony became the City of Berkeley while most of Vincente's land became the City of Oakland. A small portion of both these tracts is now known as the City of Piedmont.

One newcomer was a man named Walter Blair. He was born in Vermont but moved to California in 1852. He bought 600 acres of land from the Peraltas for $1.25 per acre. He built a dairy on Highland Avenue. He started a quarry where Dracena Park is now and sold the stones to the City of Oakland to pave the streets. He built a hotel in Piedmont Park and a 75 acre amusement park in Moraga Canyon which was known as Blair Park. It took 25 minutes for families in Oakland to travel up the hill by horsecar to Blair's Park. At the park you could sail small boats, ride ponies, watch acrobats hang from hot air balloons, have a picnic by one of the waterfalls and listen to music.

In 1877 James Gamble, the president of Western Union Telegraph, bought 350 acres of land from Walter Blair. He built a big house for himself on Hillside Avenue and planned to sell the rest of the land so that other people could also build homes. He called his business the "Piedmont Land Company". Piedmont means "foot of the mountain" in Italian and he thought it was a good name for the new community.

In the 1880's there were only seven houses where the City of Piedmont is now. During the same time, Piedmont had its first, and only, factory. At the top of Oakland Avenue there was a mulberry orchard with over 6,000 trees and a two-story building that was the Ladies Silk Culture Society. Over 100 women worked spinning thread from the cocoons of silk worms that grew on the mulberry trees. The silk worms were very hungry, however, and soon there were not enough mulberry trees to feed them. The Ladies Silk Culture Society closed in 1895.

The Piedmont Hotel burned down in 1892. Sparks from a chimney set the hotel roof on fire and it took more than two hours for the fire engine to come up the hills from Oakland. Frank Havens bought the property and built a new restaurant and clubhouse. He installed electric lights in the park and made beautiful paths and bridges. There was even an outdoor theater where plays and musical events could be held. Mr. Havens also built an art gallery where the Piedmont Park tennis courts are now.

While Mr. Gamble and Mr. Havens were building large houses in the middle of Piedmont, there were many artists and writers who lived in smaller houses which they built themselves on Scenic Avenue. Jack London, Xavier Martinez, and George Sterling all lived in the hills of Piedmont during the early 1900's. On the morning of April 18, 1906, there was an earthquake in San Francisco. Thousands fled across the bay to safety and many never returned to San Francisco. Piedmont grew 10 times bigger in just one year.

On January 7, 1907, Hugh Craig and James Ballentine filed papers with the State of California to incorporate a new city which was just 1.8 square miles in size. They called it Piedmont. The map they used for the new town was from the Piedmont Sanitary Sewer District and because the sewer lines were already underneath houses there are many homes which are now half in Piedmont and half in the City of Oakland.

An election was held on January 26, 1907 and 118 men who owned land in Piedmont voted to become a city. Some people were unhappy with the decision and another election was held in September of 1907. One-hundred fifty-five men voted then, and Piedmont became a city because of just 10 votes!

Piedmont City Hall was built in 1908. When it was first built it was just one-story high and had a tall bell tower. It was designed by Albert Farr, a famous architect. Mr. Farr designed many of the buildings in the civic center, including the Piedmont Community Church which was built in 1916 and the Exedra arch. The City also built a bridge across Oakland Avenue to make travel easier. In the Roaring Twenties Piedmont was known as the "City of Millionaires" because there were more millionaires per square mile than in any city in the United States.

Piedmont became a charter city under the laws of the State of California on December 18, 1922. The charter was adopted by the voters on February 27, 1923 and can only be changed by another vote of the people. In 1950 the Veteran's Building was built next door to City Hall on land that had been used as a small park. By 1976, the city needed a new middle school. The school district tore down the Leander Redmon estate on Magnolia Avenue and built the current Middle School on that property. The Redmon's tea house, which had been in the back yard, was moved to Piedmont Park and placed in the exact spot where an earlier tea house had been built by Frank Havens in 1890.

In the 1980's and 90's, Piedmont restored its existing parks and created three new ones. Over $350,000 was spent to clean up Piedmont Park and build a new overlook behind the Community Hall. There were three new parks built, Linda Park, Dracena Park, and Coaches Playfield. The newest park project is the Hampton Field Building which will be used as a pre-school and for recreation programs for Piedmont children.

2.3 Geography and Climate

Piedmont is a small, residential community located in the East Bay hills. Piedmont is surrounded on all sides by the City of Oakland's more historic residential districts. Specifically, Piedmont's northwestern border is adjacent to Oakland's Piedmont Ave commercial district. Piedmont borders Oakland's historic Grand Lake District (Lakeshore and Grand Avenue commercial districts) to the southwest, Oakland's Rockridge District to the northwest, the Montclair District on its northeastern border, and the Crocker Highlands and Glenview Districts to the south.

Piedmont's major streets include Oakland Avenue, which runs east–west through Piedmont's small city center; Highland Avenue, which divides Piedmont into upper and lower sections; Moraga Avenue, which runs along the City's northern border; and Grand Avenue, which runs near Piedmont's western border). Lots in upper Piedmont are, on average, larger than lots in lower Piedmont.

Piedmont is situated on a long west-facing ridge below the main ridgeline of the Berkeley-Oakland Hills. Elevation ranges from 40 feet above mean sea level at Wildwood Avenue and Grand Avenue to 704 feet at the northernmost point of the Corporation Yard. City Hall sits at 320 feet above sea level. The gentle terrain between 300' and 400' provided fine vantage points for the City's early estates, and helped define Piedmont's image and identity during its early years. Today, the 300' contour roughly corresponds to the perceived boundary between "upper" and "lower" Piedmont.

Most of Piedmont consists of gentle slopes between zero and 20 percent, requiring a small to moderate amount of grading to support construction. The City's vacant and undeveloped land is steeper, with slopes exceeding 50 percent in some cases.

Most of Piedmont is set on rock consisting of sandstone and shale of the Franciscan formation. The sheared clay-rich sandstone provides relatively good slope stability. In some locations, however, the bedrock is weathered and is more susceptible to landslides. The western third of the City is underlain by of more recent quaternary alluvium sand deposits.

The City is bracketed by Moraga Canyon on the north and Dimond Canyon on the south. Shallower canyons have been created by spring-fed streams that flow west to Lake Merritt. The combination of gently rising terrain, knolls, low ridges, and valleys creates scenic vistas throughout the City. These vistas take in short-range views of nearby neighborhoods as well as panoramic views of distant landmarks like the San Francisco and Oakland skylines, Lake Merritt, and the Bay and Golden Gate Bridges.

The climate in Alameda County is characterized by warm, dry summers and mild, wet winters. Average temperatures in the City range from the low 50s in the winter to the mid 60s in the summer months. Record high temperature for the City was 109°F on September 14, 1971. Record low for the city was 26°F on December 12, 1972. Days below freezing are rare in the City, with an average of 0.3 days below 32°F. Rainfall is the chief form of precipitation in the City, with most rainfall occurring from October to April. Average rainfall is 23 inches. Highest annual rainfall for the City was in 1998, when 41 inches fell, while the lowest reported annual rainfall occurred in 1976 when 9.9 inches fell. Record 24 hour precipitation was 4.74 inches on January 4 of 1982.

2.4 Economy and Tax Base

The US Census Bureau tracks economic statistics for the City of Piedmont. These are shown in Table 2-1.

Table 2-1 City of Piedmont Civilian Employed Population 16 years and Over

Industry	Estimated Employment	Percent
Agriculture, forestry, fishing and hunting, and mining	26	0.5%
Construction	254	4.8%
Manufacturing	279	5.3%
Wholesale trade	49	0.9%
Retail trade	326	6.2%
Transportation and warehousing, and utilities	57	1.1%
Information	152	2.9%
Finance and insurance, and real estate and rental and leasing	689	13.1%
Professional, scientific, and management, and administrative and waste management services	1,485	28.2%
Educational services, and health care and social assistance	1,477	28.0%

Industry	Estimated Employment	Percent
Arts, entertainment, and recreation, and accommodation and food services	238	4.5%
Other services, except public administration	111	2.1%
Public administration	129	2.4%

Source: US Census Bureau American Community Survey 2016 Estimates

The top employers in the City are:

- Piedmont City Unified School District
- City of Piedmont
- Ace Hardware

Piedmont is primarily a residential community, and as such, property tax and real property transfer tax, make up 65% of General Fund revenues. Utility users tax, business licenses, and franchise and sales taxes contribute 9% of the General Fund Revenue. As the City is largely built out, increases in revenue are driven primarily by the turnover of homes and increasing property values. In addition, The City levies a parcel tax, which needs to be approved by voters every four years, which accounts for an additional 8% of General Fund revenue. General Fund expenditures consist of the following: Public Safety 45%; Public Works 16%; Recreation 11%; Administration 10% and the remainder on maintaining our aging infrastructure. Table 2-2 shows the breakdown of the City's values by property use type from 2017-2018. The City noted that total values have increased for the 2018-2019 tax year to approximately $4.5 billion.

Table 2-2 Piedmont – Values by Property Use

Property Use Category	Total Parcels	Total Value	Percentage of Total Value
Commercial	14	$10,043,264	0.2%
Houses of Worship	11	$3,256,368	0.1%
Municipal	3	$0	0.0%
Parks / Open Space	23	$0	0.0%
Residential	3,892	$4,135,763,590	99.4%
Schools	6	$0	0.0%
Vacant	60	$12,858,921	0.3%
Grand Total	**4,009**	**$4,161,922,143**	**100.0%**

Source: Piedmont 6/19/2018 Parcel/Assessor's Data

2.5 Population and Socioeconomic Makeup

According to 2018 California Department of Finance estimates, the population of the City is 11,318. This represents a moderate increase in population from the 2000 US Census, which estimated the City population at 10,667. Select social and economic information for the City is shown in Table 2-3.

Table 2-3 Piedmont– Select Social and Economic Statistics

Statistic	Number
Populations	
Population under 5	4.8%
Population over 65	15.4%
Median Age	46.2
Racial Makeup	
White	74.2%
Black or African American	1.3%
American Indian or Alaska Native	0.1%
Asian	18.2%
Native Hawaiian or Pacific Islander	0.1%
Other Races	0.9%
Two or more races	5.2%
Income and Poverty	
Median income	202,083
Mean Income	277,597
Poverty rate	
All families	2.7%
All people	5.0%
Unemployment Rate (April 2018)	2.7%

Source: 2010 US Census, 2016 US Census American Community Survey, Bureau of Labor Statistics

Chapter 3 Planning Process

Requirements §201.6(b) and §201.6(c)(1): An open public involvement process is essential to the development of an effective plan. In order to develop a more comprehensive approach to reducing the effects of natural disasters, the planning process shall include:
1) An opportunity for the public to comment on the plan during the drafting stage and prior to plan approval;
2) An opportunity for neighboring communities, local and regional agencies involved in hazard mitigation activities, and agencies that have the authority to regulate development, as well as businesses, academia, and other private and nonprofit interests to be involved in the planning process; and
3) Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.
[The plan shall document] the planning process used to develop the plan, including how it was prepared, who was involved in the process, and how the public was involved.

The City of Piedmont recognized the importance and need of a Local Hazard Mitigation Plan (LHMP) and initiated its development. After receiving a grant from the Federal Emergency Management Agency (FEMA), which served as the primary funding source for this Plan, the City contracted with Foster Morrison Consulting, Ltd. (Foster Morrison) to facilitate and develop the LHMP. Jeanine Foster, a professional planner with Foster Morrison, was the project manager in charge of overseeing the planning process and the development of this LHMP update. Chris Morrison, also a professional planner with Foster Morrison, was the lead planner for the development of this LHMP Update. Brenna Howell, with Howell Consulting, also supported the planning effort as part of the Foster Morrison team. The Foster Morrison's team's role was to:

- Assist in establishing the Hazard Mitigation Planning Committee (HMPC) as defined by the Disaster Mitigation Act (DMA);
- Meet the DMA requirements as established by federal regulations and following FEMA's planning guidance;
- Support objectives under the National Flood Insurance Program's (NFIP) and the Flood Mitigation Assistance (FMA) program;
- Facilitate the entire planning process;
- Identify the data requirements that HMPC participants could provide and conduct the research and documentation necessary to augment that data;
- Assist in facilitating the public input process;
- Produce the draft and final plan documents; and
- Coordinate with the California Office of Emergency Services (Cal OES) and FEMA Region IX plan reviews.

3.1 Local Government Participation

Piedmont made a commitment to the development of this 2019 single-jurisdictional LHMP, as the participating jurisdiction. The DMA planning regulations and guidance stress that each local government (participating jurisdiction) seeking FEMA approval of their mitigation plan must participate in the planning effort in the following ways:

- Participate in the process as part of the HMPC;
- Detail where within the Planning Area the risk differs from that facing the entire area;
- Identify potential mitigation actions; and
- Formally adopt the plan.

For Piedmont, "participation" meant the following:

- Providing facilities for meetings;
- Providing printed materials for meeting attendees;
- Attending and participating in the HMPC meetings;
- Completing and returning the Data Collection Worksheets;
- Collecting and providing other requested data (as available);
- Coordinating information sharing between internal and external agencies;
- Managing administrative details;
- Making decisions on plan process and content;
- Identifying mitigation actions for the Plan;
- Reviewing and providing comments on drafts of the Plan;
- Providing hardcopy Draft documents of LHMP for public review;
- Informing the public, local officials, and other interested stakeholders about the planning process and providing opportunity for them to comment on the plan;
- Coordinating, and participating in the public input process; and
- Coordinating the formal adoption of the Plan by the Piedmont City Council.

Piedmont seeking FEMA approval of this LHMP met all of these participation requirements. Multiple representatives from the City attended the HMPC meetings described in Table 3-3 and also brought together an internal planning team to help collect data, identify mitigation actions and implementation strategies, and to review and provide data on plan drafts. Appendix A provides additional information and documentation of the planning process.

Specific individuals representing City departments participating in this LHMP were actively involved throughout the LHMP development process as identified in Appendix A in the sign-in sheets for the meetings and as evident through the data, information and input provided by HMPC representatives to the development of this LHMP. This Chapter 3 and Appendix A provides additional information and documentation of the planning process and participants to this LHMP, including members of the HMPC.

3.2 The 10-Step Planning Process

Foster Morrison established the planning process for the City of Piedmont 2019 LHMP using the DMA planning requirements and FEMA's associated guidance. This guidance is structured around a four-phase process:

1. Organize Resources;
2. Assess Risks;
3. Develop the Mitigation Plan; and
4. Implement the Plan and Monitor Progress.

Into this process, Foster Morrison integrated a more detailed 10-step planning process used for FEMA's CRS and FMA programs. Thus, the modified 10-step process used for this plan meets the requirements of six major programs: FEMA's Hazard Mitigation Grant Program (HMGP); Pre-Disaster Mitigation (PDM) program; CRS program; FMA Program; Severe Repetitive Loss (SRL) program; and new flood control projects authorized by the U.S. Army Corps of Engineers (USACE).

Table 3-1 shows how the modified 10-step process fits into FEMA's four-phase process. The sections that follow describe each planning step in more detail.

Table 3-1 Mitigation Planning Processes Used to Develop the Piedmont Local Hazard Mitigation Plan

DMA Process	Modified CRS Process
1) Organize Resources	
201.6(c)(1)	1) Organize the Planning Effort
201.6(b)(1)	2) Involve the Public
201.6(b)(2) and (3)	3) Coordinate with Other Departments and Agencies
2) Assess Risks	
201.6(c)(2)(i)	4) Identify the Hazards
201.6(c)(2)(ii)	5) Assess the Risks
3) Develop the Mitigation Plan	
201.6(c)(3)(i)	6) Set Goals
201.6(c)(3)(ii)	7) Review Possible Activities
201.6(c)(3)(iii)	8) Draft an Action Plan
4) Implement the Plan and Monitor Progress	
201.6(c)(5)	9) Adopt the Plan
201.6(c)(4)	10) Implement, Evaluate, and Revise the Plan

3.2.1. Phase 1: Organize Resources

Planning Step 1: Organize the Planning Effort

With Piedmont's commitment to participate in the DMA planning process, Foster Morrison worked with the Piedmont's Planning Department, as overall project lead, to establish the framework and organization for development of the Plan. An initial call was held with key City representatives in July 2018 to discuss the organizational and process aspects of this LHMP development process.

The initial kick-off meeting was held on September 6, 2018. Invitations to the kickoff meeting was extended to key City departments as well as to other federal, state, and local stakeholders that might have an interest in participating in the planning process. Representatives from the City and key community stakeholders participated in this LHMP project with additional invitations extended as appropriate throughout the planning process. The list of invitees is included in Appendix A.

The HMPC, comprising key City staff and other government and stakeholder representatives developed the plan with leadership from the Piedmont Planning Department and facilitation by Foster Morrison. Table 3-2 shows who participated on the HMPC.

Table 3-2 HMPC Participant List

Department	Name
Internal Stakeholders	
Administration	Paul Benoit, City Administrator
City Council	Jennifer Cavanaugh, Council member
City Council	Betsy Andersen, Council member
Fire	Scott Barringer
Fire	Zach Heliker
Fire	Bret Black
Planning	Kevin Jackson, Planning Director
Planning	Chris Yeager, Assistant Planner
Public Works/CIP	Chester Nakahara, Public Works Director
Engineering	Coastland - John Wanger
Recreation	Sara Lillivand, Director of Recreation
IT	Alex Yang
Police	Jeremey Bowers, Chief of Police
Police	Chris Monahan
Climate Change	Civic Spark/Climate Corp Intern - Brooke Edell
External Stakeholders	
EBMUD	Andrea Chen
EBMUD	Kin Lee
EBMUD	Steve Frew
CAL FIRE	Jeff Hakala, Captain, Land Use Planning Program
CAL FIRE	Mike Marcucci
CAL FIRE	Bryan Giambrone
Alameda County OES	Paul Hess
Alameda County OES	Domingo Cabrera
California Earthquake Authority	Janiele Maffei
Diablo Fire Safe Council	Cheryl Miller, Executive Director

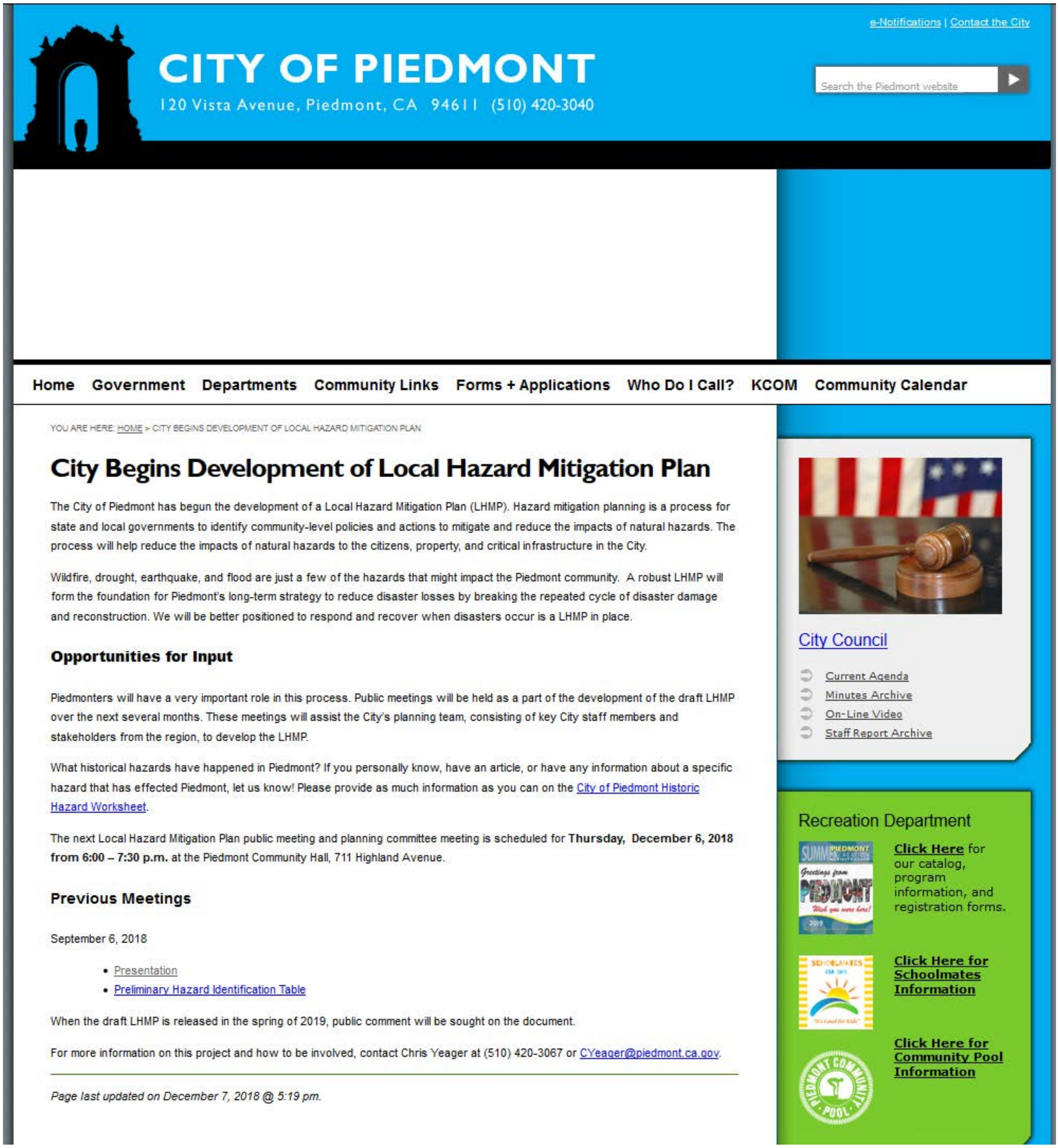
This list includes all HMPC members that attended one or more HMPC meetings detailed in Table 3-3, as well as those who provided key input into the Plan development process. In addition to providing representation on the HMPC, the City further formulated an internal planning team to collect and provide requested data and to conduct timely reviews of the draft documents. The internal planning team includes both those participating on the HMPC and other City staff.

Meetings

The planning process officially began with an internal project planning meeting held in July 2018 followed by an HMPC kick-off meeting held in Piedmont on September 6, 2018. The meetings covered the scope of work and an introduction to the DMA requirements. During the HMPC meetings, participants were provided with data collection worksheets to facilitate the collection of information necessary to support development of the LHMP. Using FEMA guidance, these worksheets were designed to capture information on past hazard events, identify hazards of concern to the City, quantify values at risk to identified hazards, inventory existing capabilities, and to identify possible mitigation actions. A copy of the worksheets for this project are included in Appendix A. The City of Piedmont seeking FEMA approval of this LHMP completed and returned the worksheets to Foster Morrison for incorporation into this LHMP.

During the planning process, the HMPC communicated through face-to-face meetings, email, telephone conversations, Dropbox websites, and through a City developed webpage dedicated to the plan development process. This later website was developed to provide information to the HMPC, the public and all other stakeholders on the LHMP process. Draft documents were also posted on this website so that the HMPC members and the public could easily access and review them. The LHMP website (shown on Figure 3-1) can be accessed at: http://www.ci.piedmont.ca.us/city-begins-development-of-local-hazard-mitigation-plan/

Figure 3-1 Piedmont Local Hazard Mitigation Plan Website



e-Notifications | Contact the City

CITY OF PIEDMONT

120 Vista Avenue, Piedmont, CA 94611 (510) 420-3040

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YOU ARE HERE: HOME > CITY BEGINS DEVELOPMENT OF LOCAL HAZARD MITIGATION PLAN

City Begins Development of Local Hazard Mitigation Plan

The City of Piedmont has begun the development of a Local Hazard Mitigation Plan (LHMP). Hazard mitigation planning is a process for state and local governments to identify community-level policies and actions to mitigate and reduce the impacts of natural hazards. The process will help reduce the impacts of natural hazards to the citizens, property, and critical infrastructure in the City.

Wildfire, drought, earthquake, and flood are just a few of the hazards that might impact the Piedmont community. A robust LHMP will form the foundation for Piedmont's long-term strategy to reduce disaster losses by breaking the repeated cycle of disaster damage and reconstruction. We will be better positioned to respond and recover when disasters occur is a LHMP in place.

Opportunities for Input

Piedmonters will have a very important role in this process. Public meetings will be held as a part of the development of the draft LHMP over the next several months. These meetings will assist the City's planning team, consisting of key City staff members and stakeholders from the region, to develop the LHMP.

What historical hazards have happened in Piedmont? If you personally know, have an article, or have any information about a specific hazard that has effected Piedmont, let us know! Please provide as much information as you can on the City of Piedmont Historic Hazard Worksheet.

The next Local Hazard Mitigation Plan public meeting and planning committee meeting is scheduled for **Thursday, December 6, 2018 from 6:00 – 7:30 p.m.** at the Piedmont Community Hall, 711 Highland Avenue.

Previous Meetings

September 6, 2018

- Presentation
- Preliminary Hazard Identification Table

When the draft LHMP is released in the spring of 2019, public comment will be sought on the document.

For more information on this project and how to be involved, contact Chris Yeager at (510) 420-3067 or CYeager@piedmont.ca.gov.

Page last updated on December 7, 2018 @ 5:19 pm.

City Council

- Current Agenda
- Minutes Archive
- On-Line Video
- Staff Report Archive

Recreation Department

Click Here for our catalog, program information, and registration forms.

Click Here for Schoolmates Information

Click Here for Community Pool Information

Source: City of Piedmont

The HMPC met formally five times during the planning period (September 2018 – April 2019) which adequately covers the four phases of DMA and the 10-Step CRS planning process. The formal meetings held and topics discussed are described in Table 3-3. Invitations, agendas and sign-in sheets for each of the meetings are included in Appendix A.

Table 3-3 HMPC Meetings

Meeting Type	Meeting Topic	Meeting Date(s)	Meeting Location(s)
HMPC #1 Kick-off Meeting	1) Introduction to DMA and the planning process 2) Overview of current LHMP; 3) Organize Resources: the role of the HMPC, planning for public involvement, coordinating with other agencies/stakeholders 4) Introduction to Hazard Identification	September 6, 2018	Piedmont Community Hall
HMPC #2	1) Risk assessment overview and work session - Assess the Hazard - Assess the Problem	December 6, 2018	Piedmont Community Hall
HMPC #3	1) Review of risk assessment summary 2) Review and update of mitigation goals 3) Intro to Mitigation Action Strategy - Set Goals - Review possible activities	January 15, 2019	Piedmont EOC
HMPC #4	1) Review of mitigation alternatives 2) Review and update of mitigation actions from the 2012 Plan 3) Identify updated list of mitigation actions by hazard 4) Review of mitigation selection criteria 5) Update and prioritize mitigation actions 6) Mitigation Action Strategy Implementation and Draft Action Development - Review possible activities - Draft an Action Plan	January 16, 2019	Piedmont EOC
HMPC #5	1) Review of final HMPC, jurisdictional and public comments and input to plan 2) Review and documentation of changed conditions, vulnerabilities and mitigation priorities 3) Draft an Action Plan 4) Plan maintenance and Implementation Procedures	April 11, 2019	Piedmont EOC

Planning Step 2: Involve the Public

Up-front coordination discussions with the City of Piedmont established the initial plan for public involvement. Public involvement activities for this LHMP included press releases, social media communications, stakeholder and public meetings, development of an LHMP webpage and associated website postings, and the solicitation of public and stakeholder comments on the draft Plan through a variety of mechanisms. Information provided to the public included an overview of the LHMP process, including a review of the hazard risk assessment and proposed mitigation strategies for this LHMP. At the planning team kick-off meeting, the HMPC discussed additional strategies for public involvement and agreed to an approach using established public information mechanisms and resources within the City.

Early Public Outreach Activities

Public outreach for this LHMP began at the beginning of the plan development process with the development of a Piedmont webpage and outreach document on the LHMP development process through a variety of mechanisms as described below:

- Early public meeting press release
- Post on nextdoor.com website
- Post on Piedmont Civic Association website
- Article inviting participation in the Piedmont Post

Information on these outreach efforts can be seen in Appendix A to this Plan.

Public Meetings

Three public meetings for the Piedmont LHMP were held during key times of the LHMP development process:

Public Meeting #1: LHMP Kickoff

Public outreach for this LHMP began at the beginning of the plan development process with an advertisement placed in the Piedmont Post and other local outreach methods to inform the public of the purpose of the DMA and the hazard mitigation planning process for the City of Piedmont. A press release was also issued at the beginning of the project to invite the public to a public meeting for the kick-off the LHMP project on September 6, 2018 at the Piedmont Community Hall in central Piedmont.

Public Meeting #2: Risk Assessment Overview

A second public meeting was held to provide an overview of the hazard risk assessment portion of the LHMP. This meeting was held the evening of the HMPC risk assessment in the Piedmont Community Hall. This meeting was advertised through the City website and through direct emails to those members of the public expressing an interest in the LHMP planning process. A post was placed on the Piedmont Civic Association website inviting participation.

Public Meeting #3: Meeting on the Draft LHMP

The first draft of the Plan was provided to the HMPC in February of 2019, with a public review draft provided in March of 2019. A public meeting was held on April 10, 2019 to present the draft LHMP and to collect public comments on the Plan prior to finalization and submittal to Cal OES/FEMA. The public meeting on the draft LHMP was advertised in a variety of ways to maximize outreach efforts to the public and included an advertisement in the local newspaper. The advertisement in the local newspaper included information on the date, location and time of the meeting, where the draft Plan could be accessed in the community, and how to provide comments on the draft Plan. In addition to a copy of the draft plan being placed on the City website in advance of these meetings (see Figure 3-1), hard copies of the draft of the Plan were made available to interested parties at the Piedmont Planning Department in City Hall and the Piedmont Public Library. This can be seen on Figure 3-2.

Figure 3-2 City of Piedmont – Plan in Piedmont City Hall

Documentation to support the public meetings can be found in Appendix A. In addition to advertisement for public participation, notices of meetings were sent directly to all persons on the HMPC contact list and also to other agency and key stakeholders with an interest in the Piedmont LHMP project. The majority of these people reside in Piedmont, Alameda County and surrounding communities. Additional outreach for review of the Draft LHMP included:

- Press release
- Two public advertisements in The Piedmonter
- Post on Piedmont Exedra website
- Post on Nextdoor.com website
- Post on Piedmont Civic Association website
- Article on Piedmont City website
- Article inviting participation in the Piedmont Post

The formal public meetings for this project are summarized in Table 3-4.

Table 3-4 Public and Stakeholder Meetings

Meeting Type	Meeting Topic	Meeting Date	Meeting Locations
Public Meeting #1	1) Intro to DMA and mitigation planning 2) The Piedmont LHMP Development Process	September 6, 2018	Piedmont Community Hall
Public Meeting #2	1)Risk Assessment Overview	December 6, 2018	Piedmont Community Hall
Public Meeting #3	1)Presentation of Draft LHMP and solicitation of public and stakeholder comments	April 10, 2019	Piedmont Community Hall

Where appropriate, stakeholder and public comments and recommendations were incorporated into the LHMP throughout the plan development process, including the sections that address mitigation goals and strategies. Several public comments were received on the Draft Plan and considered in refinements to the Risk Assessment and Mitigation Strategy sections of this Plan. Public comments received and how they were addressed is included in a comment-response summary included in Appendix A. All newspaper advertisements, website postings, and public outreach efforts are on file with Piedmont Planning Department and are also included in Appendix A.

The draft LHMP is currently available online on the Piedmont website at: http://www.ci.piedmont.ca.us/city-begins-development-of-local-hazard-mitigation-plan/

Planning Step 3: Coordinate with Other Departments and Agencies

Early in the planning process, the HMPC determined that data collection, mitigation strategy development, and plan approval would be greatly enhanced by inviting other local, state and federal agencies and organizations to participate in the process. Based on their involvement in hazard mitigation planning, their involvement in the Planning Area, and/or their interest as a neighboring jurisdiction, representatives from the following agencies were invited to participate on the HMPC:

- Association of Bay Area Governments
- Alameda County Transportation Commission
- Alameda County Fire
- Alameda County Planning
- Alameda County Sherriff
- Alameda Health Systems
- Alameda County Fire Safe Council
- City of Albany
- Bay Area Air Quality Management District
- Berkeley
- Cal DWR
- CAL FIRE
- Cal OES
- Cal Trans
- California Department of Water Resources
- CGS - Earthquake Program

- Children's Hospital
- City of Emeryville
- City of Oakland
- Diablo Fire Safe Council
- Diablo Fire Safe Council
- East Bay Municipal Utility District
- FEMA Region IX - Hazard Mitigation
- FEMA Region IX - Planning
- Fire Departments
- Fish and Wildlife
- Kaiser Hospital
- League of California Cities
- MTC
- National Weather Service
- Pacific Gas & Electric
- Red Cross
- SPUR
- Stopwaste
- United States Corps of Engineers
- USGS

Coordination with key agencies, organizations, and advisory groups throughout the planning process allowed the HMPC to review common problems, development policies, and mitigation strategies as well as identifying any conflicts or inconsistencies with regional mitigation policies, plans, programs and regulations. Coordination involved contacting these agencies and informing them on how to participate in the LHMP development process and if they had any expertise or assistance they could lend to the planning process, risk assessment, or mitigation strategy. These groups and agencies were solicited asking for their assistance and input, telling them how to become involved in the LHMP, and inviting them to HMPC meetings.

In addition, as part of the overall stakeholder and agency coordination effort, the HMPC coordinated with and utilized input to the LHMP update from the following agencies:

- Alameda County
- Association of Bay Area Governments
- Cal-Adapt
- CAL OES
- CAL FIRE
- California Department of Conservation
- California Department of Finance
- California Department of Water Resources
- California Geological Survey
- East Bay Municipal Utility District
- East Bay Regional Parks
- California Geological Survey
- FEMA Region IX
- Library of Congress
- National Oceanic and Atmospheric Association
- National Performance of Dams Program

- National Register of Historic Places
- National Resource Conservation Service
- National Response Center
- National Weather Service
- United States Army Corps of Engineers
- United States Bureau of Land Management
- United States Bureau of Reclamation
- United States Geological Survey
- Western Regional Climate Center

Several opportunities were provided for the groups listed above to participate in the planning process. At the beginning of the planning process, invitations were extended to some of these groups to actively participate on the HMPC. Others assisted in the process by providing data directly as requested in the Data Worksheets or through data contained on their websites or as maintained by their offices. Further as part of the public outreach process, all groups were invited to attend the public meeting and to review and comment on the LHMP prior to submittal to CAL OES and FEMA.

Other Community Planning Efforts and Hazard Mitigation Activities

Coordination with other community and District planning efforts is also paramount to the success of this LHMP. Hazard mitigation planning involves identifying existing policies, tools, and actions that will reduce a community's risk and vulnerability to hazards. Piedmont uses a variety of comprehensive planning mechanisms, such as general and master plans and state requirements, to guide growth and development. Integrating existing planning efforts and mitigation policies and action strategies into this LHMP establishes a credible and comprehensive plan that ties into and supports other City programs. The development of this LHMP incorporated information from the following existing plans, studies, reports, and initiatives as well as other relevant data from neighboring communities and other jurisdictions.

- Alameda County Plans
- Association of Bay Area Governments Plans
- CAL FIRE plans
- Cal OES plans
- Cal-Adapt Plans
- California DWR plans
- City of Piedmont
- City of Piedmont Climate Action Plan
- City of Piedmont Emergency Operations Plan
- City of Piedmont General Plan
- City of Piedmont Housing Element
- Community Wildfire Protection Plans
- East Bay Municipal Utility District Plans
- East Bay Regional Parks Plans
- Environmental Impact Reports
- FEMA mitigation planning documents
- Flood Insurance Studies
- National Weather Service documents
- Other Local Hazard Mitigation Plans in Los Angeles County
- US Army Corps of Engineers Reports
- US Fish and Wildlife reports

- USGS Reports

Specific source documents are referenced at the beginning of each section of Chapter 4 and in Appendix B. These and other documents were reviewed and considered, as appropriate, during the collection of data to support Planning Steps 4 and 5, which include the hazard identification, vulnerability assessment, and capability assessment. Data from these plans and studies were incorporated into the risk assessment and hazard vulnerability sections of the LHMP. In accordance with DMA requirements and guidance, Best Available Data was used throughout in the development of this LHMP. Where the data from the existing studies and reports is used in this LHMP, the source document is referenced throughout this Plan. The data was also used in determining the capability of the City in being able to implement certain mitigation strategies. Appendix B, References, provides a detailed list of references used in the preparation of this LHMP.

3.2.2. Phase 2: Assess Risks

Planning Steps 4 and 5: Identify the Hazards and Assess the Risks

Foster Morrison led the HMPC in a research effort to identify, document, and profile all the hazards that have, or could have, an impact the Piedmont Planning Area. The HMPC relied on information from the City's Safety Element to the General Plan, the 2009 General Plan Background Report, the City's initial LHMP efforts as part of the Association of Bay Area Governments (ABAG) hazard mitigation plans, the 2018 State of California Hazard Mitigation Plan, and other sources to establish the hazards list for this LHMP. Data collection worksheets were developed and used in this effort to aid in determining hazards and vulnerabilities and where the risk varies across the Planning Area. Geographic information systems (GIS) were used to display, analyze, and quantify hazards and vulnerabilities.

The HMPC also conducted a capability assessment to review and document the City's current capabilities to mitigate risk from and vulnerability to hazards. By collecting information about existing City programs, policies, regulations, ordinances, and emergency plans, the HMPC could assess those activities and measures already in place that contribute to mitigating some of the risks and vulnerabilities identified. A more detailed description of the risk assessment process, methodologies, and results are included in Chapter 4 Risk Assessment.

3.2.3. Phase 3: Develop the Mitigation Plan

Planning Steps 6 and 7: Set Goals and Review Possible Activities

Foster Morrison facilitated brainstorming and discussion sessions with the HMPC that described the purpose and process of developing planning goals and objectives, a comprehensive range of mitigation alternatives, and a method of selecting and defending recommended mitigation actions using a series of selection criteria. This information is included in Chapter 5 Mitigation Strategy. Additional documentation on the process the HMPC used to develop the goals and mitigation strategy is in Appendix C.

Planning Step 8: Draft an Action Plan

Based on input from the HMPC regarding the draft risk assessment and the goals and activities identified in Planning Steps 6 and 7, a complete first draft of the LHMP was developed. This complete draft was provided for HMPC review and comment via a Dropbox web link. HMPC comments were integrated into the second, public review draft, which was advertised and distributed to collect public input and comments. The HMPC integrated comments and issues from the public, as appropriate, along with additional internal review comments and produced a third draft for review and approval by CAL OES and FEMA Region IX, contingent upon final adoption by the Piedmont City Council.

3.2.4. Phase 4: Implement the Plan and Monitor Progress

Planning Step 9: Adopt the Plan

In order to secure buy-in and officially implement the LHMP, the Plan was adopted by the Piedmont City Council using the sample resolution contained in Appendix D.

Planning Step 10: Implement, Evaluate, and Revise the Plan

The true worth of any mitigation plan is in the effectiveness of its implementation. Up to this point in the planning process, all of the HMPC's efforts have been directed at researching data, coordinating input from participating entities, and developing appropriate mitigation actions. Each recommended action includes key descriptors, such as a lead manager and possible funding sources, to help initiate implementation. An overall implementation strategy is described in Chapter 7 Plan Implementation and Maintenance.

Finally, there are numerous organizations within the Piedmont Planning Area whose goals and interests interface with hazard mitigation. Coordination with these other planning efforts, as addressed in Planning Step 3, is paramount to the implementation and ongoing success of this LHMP and hazard mitigation in the City and is addressed further in Chapter 7.

Chapter 4 Risk Assessment

Requirement §201.6(c)(2): [The plan shall include] A risk assessment that provides the factual basis for activities proposed in the strategy to reduce losses from identified hazards. Local risk assessments must provide sufficient information to enable the jurisdiction to identify and prioritize appropriate mitigation actions to reduce losses from identified hazards.

As defined by FEMA, risk is a combination of hazard, vulnerability, and exposure. "It is the impact that a hazard would have on people, services, facilities, and structures in a community and refers to the likelihood of a hazard event resulting in an adverse condition that causes injury or damage."

The risk assessment process identifies and profiles relevant hazards and assesses the exposure of lives, property, and infrastructure to these hazards. The process allows for a better understanding of a jurisdiction's potential risk to hazards and provides a framework for developing and prioritizing mitigation actions to reduce risk from future hazard events.

This risk assessment followed the methodology described in the FEMA publication Understanding Your Risks—Identifying Hazards and Estimating Losses (FEMA 386-2, 2002), which breaks the assessment into a four-step process:

1. Identify hazards
2. Profile hazard events
3. Inventory assets
4. Estimate losses

Data collected through this process has been incorporated into the following sections of this chapter:

- **Section 4.1 Hazard Identification: Natural Hazards** identifies the natural hazards that threaten the City and describes why some hazards have been omitted from further consideration.
- **Section 4.2 Hazard Profiles** discusses the threat to the City and describes previous occurrences of hazard events and the likelihood of future occurrences.
- **Section 4.3 Vulnerability Assessment** assesses the City's total exposure to natural hazards, considering assets and values at risk, critical facilities, populations, and future development trends.
- **Section 4.4 Capability Assessment** inventories existing mitigation activities and policies, regulations, and plans that pertain to mitigation in the City and can affect net vulnerability.

This risk assessment covers the entire geographical extent of the City of Piedmont.

4.1 Hazard Identification: Natural Hazards

Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the type…of all natural hazards that can affect the jurisdiction.

The HMPC conducted a hazard identification study to determine the hazards that threaten the City. This section details the methodology and results of this effort.

Data Sources

The following data sources were used for this Hazard Identification: Natural Hazards portion of the plan:

- HMPC input
- National Oceanic and Atmospheric Administration
- City of Piedmont General Plan Safety Element
- 2018 State of California Hazard Mitigation Plan
- 2017 Association of Bay Area Governments (ABAG) Hazard Mitigation Plan
- 2015 City of Piedmont
- 2016 Alameda County Local Hazard Mitigation Plan
- FEMA Disaster Declaration Database

4.1.1. Methodology and Results

Using existing natural hazards data and input gained through the kickoff planning meeting, the HMPC agreed upon a list of natural hazards that could affect Piedmont. Hazards data from the California Office of Emergency Services (Cal OES), FEMA, the National Oceanic and Atmospheric Administration (NOAA), and many other sources were examined to assess the significance of these hazards to the City. Significance of each identified hazard was measured in general terms and focused on key criteria such as frequency and resulting damage, which includes deaths and injuries, as well as property and economic damage. The natural hazards evaluated as part of this plan include those that have occurred historically or have the potential to cause significant human and/or monetary losses in the future.

As a starting point, the updated 2018 California State Hazard Mitigation Plan was consulted to evaluate the applicability of State hazards of concern to the City. Building upon this effort, hazards from the Alameda County LHMP, ABAG LHMP, City of Piedmont Emergency Operations Plan, and the City of Piedmont Environmental Hazards Element from the General Plan were also identified and considered.

Certain hazards were excluded from consideration for this Plan Update. They are shown in Table 4-1.

Table 4-1 City of Piedmont – Excluded Hazards

Hazard Excluded	Why Excluded
Agricultural and Silvicultural Pests and Diseases	No agriculture exists in or near the City, and there are few bodies of water or rivers that exist in the City.
Air Pollution	While a hazard, the City noted that air pollution is handled through the General Plan and other City planning mechanisms

Hazard Excluded	Why Excluded
Airline Crashes	There have been no past occurrences in the City of airplane crashes.
Avalanches	The City does not have sufficient snowfall to have avalanche as a hazard.
Civil Disorder	The City did consider this a hazard, but it is dealt with in the EOP or other planning mechanisms.
Coastal Flooding, Erosion, and Sea Level Rise	The City is not on the coast.
Cyber Threats	The County did consider this a hazard, but it is dealt with in the EOP or other planning mechanisms.
Energy Shortage and Energy Resilience	While a hazard, the City noted that energy issues are handled through the General Plan and other planning documents.
Epidemic/Pandemic/Vector Borne Disease Hazards	The City did not consider this a hazard due to the low likelihood of occurrence. Further this hazard falls under the public health department.
Freeze	The City has relatively low numbers of days that fall below 32°F.
Insects Pests and Diseases	The City did not consider this a hazard due to the low likelihood of occurrence.
Natural Gas Pipeline Hazards	The City did not consider this a hazard due to the low number of gas pipelines traversing the City.
Oil Spills	The City did not consider this a hazard, as there are few pipelines or oil wells in the City and limited transportation of oil.
Radiological Accidents	There are no areas in the City at risk to this hazard.
Terrorism	The County did consider this a hazard, but it is dealt with in the EOP or other planning mechanisms.
Tornado	Tornadoes are exceedingly rare in the City and Alameda County.
Tsunami and Seiche	The City is not on the coast or next to a large body of water.
Volcano	Volcanic activity near the City is low.
Well Stimulation and Hydraulic Fracking	This is not occurring in the City.

The worksheet below was completed by the HMPC to identify, profile, and rate the significance of identified hazards. Only the more significant (or priority) hazards have a more detailed hazard profile and are analyzed further in Section 4.3 Vulnerability Assessment. Table 4-33 in Section 4.2.15 Natural Hazards Summary provides an overview of these significant hazards.

Table 4-2 City of Piedmont Hazard Identification

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Climate Change	Extensive	Likely	Negligible	Medium	--
Dam Failure	Significant	Occasional	Limited	Medium	Medium
Drought and Water Shortage	Extensive	Occasional	Limited	Medium	Medium
Earthquake	Extensive	Highly Likely/ Occasional	Catastrophic	High	Low
Earthquake Liquefaction	Limited	Occasional	Limited	Medium	Low
Flood: (1% and 0.2% annual chance)	Limited	Unlikely	Limited	Low	Medium
Flood: Localized/Stormwater	Significant	Highly Likely	Limited	Medium	Medium
Landslide, Mudslides, Hillside Erosion, and Debris Flows	Extensive	Likely	Limited	Medium	Medium
Levee Failure	Limited	Unlikely	Negligible	Low	Medium
Severe Weather: Extreme Heat	Extensive	Highly Likely	Limited	Medium	Medium
Severe Weather: Heavy Rains and Storms	Extensive	Highly Likely	Limited	Medium	Medium
Severe Weather: High Winds	Extensive	Highly Likely	Limited	Medium	Low
Wildfire	Extensive	Highly Likely	Catastrophic	High	Medium

Geographic Extent
Limited: Less than 10% of planning area
Significant: 10-50% of planning area
Extensive: 50-100% of planning area

Likelihood of Future Occurrences
Highly Likely: Near 100% chance of occurrence in next year, or happens every year.
Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less.
Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Magnitude/Severity
Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths
Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability
Limited—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability
Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid

Significance
Low: minimal potential impact
Medium: moderate potential impact
High: widespread potential impact

Source: City of Piedmont

4.1.2. Disaster Declaration History

One method to identify hazards based upon past occurrences is to look at what events triggered federal and/or state disaster declarations within the City (though disaster declarations are declared on a county basis). Disaster declarations are granted when the severity and magnitude of the event's impact surpass the ability of the local government to respond and recover. Disaster assistance is supplemental and sequential. When the local government's capacity has been surpassed, a state disaster declaration may be issued, following the local agency's declaration, allowing for the provision of state assistance. Should the disaster be so severe that both the local and state government's capacity is exceeded, a federal disaster declaration may be issued allowing for the provision of federal disaster assistance.

The federal government may issue a disaster declaration through FEMA, the U.S. Department of Agriculture (USDA), and/or the Small Business Administration (SBA). FEMA also issues emergency declarations, which are more limited in scope and without the long-term federal recovery programs of major disaster declarations. The quantity and types of damage are the determining factors. This section focuses on state and federal disasters and emergency declarations.

Alameda County has experienced 21 federal and 29 state declarations since 1950. 1 of the federal declarations was associated with drought events, 1 with earthquake, 2 from fire, 14 with flood events, 2 with freezing, and 1 with hurricane (for evacuations stemming from Hurricane Katrina in 2005). 1 of the state declarations was associated with agricultural hazards, 1 from civil unrest, one from levee break 1 from earthquake, 3 were economic, 1 was from fire, 15 from flood, 1 from landslide, 1 from road damage, and 1 from other (an oil spill). Details of federal and state disaster declarations is shown in Table 4-3. A summary of federal and state disaster declarations is shown in Table 4-4.

Table 4-3 Alameda County Disaster Declarations 1950-2018

Year	Disaster Name	Disaster Type	Disaster Cause	Disaster #	State Declaration #	Federal Declaration #
2017	Severe Winter Storms, Flooding, and Mudslides	Flood	Storms	DR-4308	3/7/2017	4/1/2017
2017	Severe Winter Storms, Flooding, and Mudslides	Flood	Storms	DR-4305	2/10/2017	3/16/2017
2017	Severe Winter Storms, Flooding, and Mudslides	Flood	Storms	DR-4301	–	2/14/2017
2014	California Drought	Drought	Drought	GP 2014-13	1/17/2014	–
2008	January Storms	Flood	Storms	GP 2008-01	1/5/2008	–
2007	Bay Area Oil Spill	Other	Accident	GP 2007-15	11/9/2007	–
2006	2006 June Storms	Flood	Storms	DR 1646	–	6/5/2006
2005/2006	2005/06 Winter Storms	Flood	Storms	DR-1628	–	2/3/2006

Year	Disaster Name	Disaster Type	Disaster Cause	Disaster #	State Declaration #	Federal Declaration #
2005	Hurricane Katrina Evacuations	Economic	Hurricane	EM-3248 2005	–	9/13/2005
2003	State Road Damage	Road Damage	Flood	GP 2003	1/1/2003	–
2001	Energy Emergency	Economic	Greed	GP 2001	1/1/2001	–
1998	1998 El Nino Floods	Flood	Storms	DR-1203	Proclaimed	2/19/1998
1997	1997 January Floods	Flood	Storms	DR-1155	1/2/97-1/31/97	1/4/1997
1995	California Severe Winter Storms, Flooding, Landslides, Mud Flows	Flood	Storms	DR-1046	–	3/12/1995
1995	1995 Severe Winter Storms	Flood	Storms	DR-1044	1/6/95-3/14/95	1/13/1995
1991	Oakland Hills Fire	Fire	Fire	DR-919	10/20/1991	10/22/1991
1990	1990 Freeze	Freeze	Freeze	DR-894	12/19/90-1/18/91	2/11/1991
1989	Loma Prieta Earthquake	Earthquake	Earthquake	DR-845	10/18/89-10/30/89	10/18/1989
1986	1986 Storms	Flood	Storms	DR-758	2/18-86-3/12/86	2/18/1986
1983	Bradford Levee Failure	Flood	Levee break	GP 83-05	12/9/1983, 1/18/1984	–
1983	Winter Storms	Flood	Flood	DR-677	12/8/82-3/21/83	2/9/1983
1982	1982 Winter Storms	Flood	Storms	DR-651	1/5/82-1/9/82	1/7/1982
1980	Mediterranean Fruit Fly Infestation	Agricultural	Insect pest	GP-1980 Medfly	12/1/1980	–
1979	Gasoline Shortage	Economic	OPEC	–	5/8/1979-11/13/79	–
1977	Drought	Drought	Drought	DR-3023	–	1/20/1977
1976	1976 Drought	Drought	Drought	–	2/9/76-7/6/76	–
1974	Gasoline Shortage	Economic	OPEC	–	2/28/1974, 3/4/1974, 3/10/1974	–
1973	Eucalyptus Tree Freeze	Freeze	Freeze	DR 373	4/4/1973	5/25/1973
1970	Forest and Brush Fires	Wildfire	Wildfire	DR-295		9/29/1970

Year	Disaster Name	Disaster Type	Disaster Cause	Disaster #	State Declaration #	Federal Declaration #
1970	1970 Northern California Flooding	Flood	Flood	DR 283	1/27/1970 - 3/2/1970	2/16/1970
1970	Oakland Landslide	Landslide	Landslide	–	2/10/1970	–
1969	Berkeley Riots	Civil Unrest	Civil Unrest	–	2/5/1969	–
1963	1963 Floods	Flood	Storms	-	2/14/1964	–
1962	1962 Floods and Rains	Flood	Storms	–	10/17/1962, 10/25/1962, 10/30/1962, 11/4/1962	–
1962	Fires and Explosions	Fire	Fire	–	9/14/1962	–
1958	1958 April Storms and Floods	Flood	Storms	DR-52	4/5/1958	4/4/1958
1958	1958 February Storms and Floods	Flood	Storms	CDO 58-03	2/26/1958	–
1955	1955 Floods	Flood	Flood	DR-47	12/22/1955	12/23/1955
1950	1950 Floods	Flood	Flood	OCD 50-01	11/21/1950	–

Source: Cal OES, FEMA

Table 4-4 Alameda County Disaster Declarations 1950-2018 Summarized by Disaster Type

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Agricultural	1	1980	0	–
Civil Unrest	1	1969	0	–
Dam/Levee Break	1	1983	0	–
Drought	2	1976, 2014	1	1977
Earthquake	1	1989	1	1989
Economic	3	1974, 1979, 2001	0	–
Fire	1	1962	2	1970, 1991
Flood (including heavy rain and storms)	15	1950, 1955, 1958 (twice), 1962, 1963, 1970, 1982, 1983, 1986, 1995, 1997, 2008, 2017 (twice)	14	1955, 1958, 1970, 1982, 1983, 1986, 1995, 1997, 1998, 2006 (twice), 2017 (three times)
Freeze	1	1973, 1990	2	1973, 1990
Hurricane	0	-	1	2005
Landslide	1	1970	0	–
Other	1	2007	0	–
Road Damage	1	2003	0	–
Totals	**29**	–	**21**	**–**

Source: Cal OES, FEMA

4.2 Hazard Profiles

Requirement §201.6(c)(2)(i): [The risk assessment shall include a] description of the…location and extent of all natural hazards that can affect the jurisdiction. The plan shall include information on previous occurrences of hazard events and on the probability of future hazard events.

The hazards identified in Section 4.1 Hazard Identification Natural Hazards, are profiled individually in this section. In general, information provided by planning team members is integrated into this section with information from other data sources. These profiles set the stage for Section 4.3 Vulnerability Assessment, where the vulnerability is quantified, as data allows, for each of the priority hazards.

Each hazard is profiled in the following format:

- **Hazard/Problem Description**—This section gives a description of the hazard and associated issues followed by details on the hazard specific to the City. Where known, this includes information on the hazard location, extent, seasonal patterns, speed of onset/duration, and magnitude and/or any secondary effects.
- **Past Occurrences**—This section contains information on historical incidents, including impacts where known. The extent or location of the hazard within or near the City is also included here. Historical incident worksheets were used to capture information from the City on past occurrences.
- **Likelihood of Future Occurrence**—The frequency of past events is used in this section to gauge the likelihood of future occurrences. Where possible, frequency was calculated based on existing data. It was determined by dividing the number of events observed by the number of years on record and multiplying by 100. This gives the percent chance of the event happening in any given year (e.g., three droughts over a 30-year period equates to a 10 percent chance of a experiencing a drought in any given year). The likelihood of future occurrences is categorized into one of the following classifications:
  - ✓ **Highly Likely**—Near 100 percent chance of occurrence in next year or happens every year
  - ✓ **Likely**—Between 10 and 100 percent chance of occurrence in next year or has a recurrence interval of 10 years or less
  - ✓ **Occasional**—Between 1 and 10 percent chance of occurrence in the next year or has a recurrence interval of 11 to 100 years
  - ✓ **Unlikely**—Less than 1 percent chance of occurrence in next 100 years or has a recurrence interval of greater than every 100 years.
- **Climate Change**—This section contains the effects of climate change (if applicable). The possible ramifications of climate change on the hazard are discussed.

Section 4.2.15 Natural Hazards Summary provides an initial assessment of the profiles and assigns a level of significance or priority to each hazard. Those hazards determined to be of medium or high significance were characterized as priority hazards that required further evaluation in Section 4.2.15 Vulnerability Assessment. Those hazards that occur infrequently or have little or no impact on the City were determined to be of low significance and not considered a priority hazard. Significance was determined based on the hazard profile, focusing on key criteria such as frequency and resulting damage, including deaths/injuries and property, crop, and economic damage. This assessment was used by the HMPC to prioritize those hazards of greatest significance to the City, enabling Piedmont to focus resources where they are most needed.

The following sections provide profiles of the natural hazards that the HMPC identified in Section 4.1 Hazard Identification. Given that most disasters that affect the City are directly or indirectly related to severe weather events, severe weather hazards begin this section, and the other individual hazard profiles follow alphabetically.

Data Sources

The following data sources formed the basis for this Hazard Profiles portion of the plan:

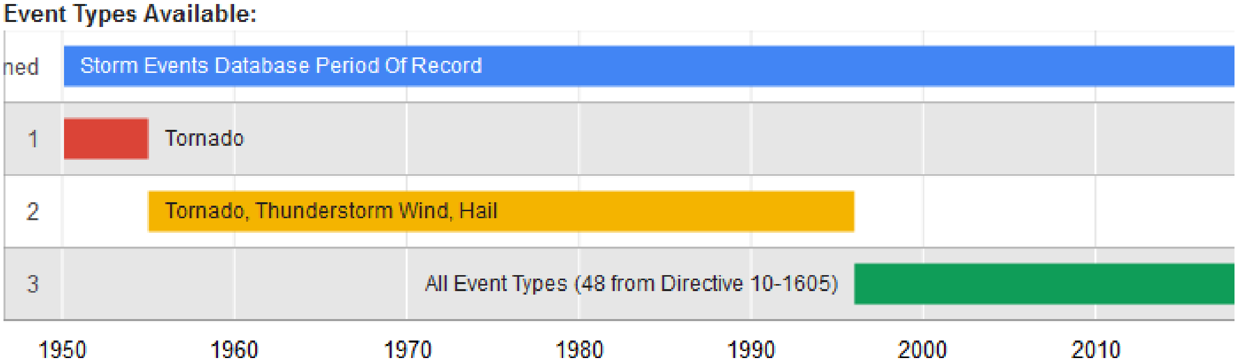
- 2014 California Climate Adaptation Strategy
- 2016 Alameda County Local Hazard Mitigation Plan
- 2017 East Bay Regional Parks Local Hazard Mitigation Plan
- Alameda County Flood Insurance Study
- Cal-Adapt – Temperature: Decadal Averages Map
- California Department of Water Resources
- California Natural Resource Agency
- California's Drought of 2007-2009, An Overview. State of California Natural Resources Agency, California Department of Water Resources
- City of Piedmont 2025 General Plan
- City of Piedmont Climate Action Plan 2.0
- Climate Change and Health Profile Report - Alameda County
- East Bay Municipal Utility District
- Federal Emergency Management Agency
- FEMA: Building Performance Assessment: Oklahoma and Kansas Tornadoes
- Intergovernmental Panel on Climate Change
- Levees in History: The Levee Challenge. Dr. Gerald E. Galloway, Jr., P.E., Ph.D., Water Policy Collaborative, University of Maryland, Visiting Scholar, USACE, IWR
- National Climate Assessment
- National Drought Mitigation Center
- National Integrated Drought Information System
- National Oceanic and Atmospheric Administration's National Climatic Data Center
- National Weather Service
- NOAA Storm Prediction Center
- NOAA's Climate Prediction Center
- Petersen, M. et al., 2018 One-Year Seismic Hazard Forecast for the Central and Eastern United States from Induced and Natural Earthquakes - Seis. Res. Lett., doi.org/10.1785/0220180005.
- Science Magazine
- Southern California Association of Governments
- U.S. Drought Monitor
- US Army Corps of Engineers
- Vaisala National Lightning Detection Network
- Western Regional Climate Center

4.2.1. Severe Weather: General

Severe weather is generally any destructive weather event, but usually occurs throughout the City Planning Area as extreme temperatures and localized storms that bring heavy rain, and strong winds, and much less frequently hail and lightning. The National Oceanic and Atmospheric Administration's (NOAA's) National Climatic Data Center (NCDC) has been tracking severe weather since 1950. Their Storm Events Database contains data on the following events shown on Figure 4-1.

Figure 4-1 NCDC Storm Events Database Period of Record

Event Types Available:



Event Types Available:
Add more info about event types here. Link to collections page/tab when referencing data collection source.

1. Tornado: From 1950 through 1954, only tornado events were recorded.

2. Tornado, Thunderstorm Wind and Hail: From 1955 through 1992, only tornado, thunderstorm wind and hail events were keyed from the paper publications into digital data. From 1993 to 1995, only tornado, thunderstorm wind and hail events have been extracted from the Unformatted Text Files.

3. All Event Types (48 from Directive 10-1605): From 1996 to present, 48 event types are recorded as defined in NWS Directive 10-1605.

Source: NCDC

This database contains 316 severe weather events that occurred in Alameda County between January 1, 1950, and May 31, 2018. Table 4-5 summarizes these events.

*Table 4-5 Alameda County NCDC Storm Events 1/1/1950-5/31/2018**

Event Type	Number of Events	Deaths	Deaths (indirect	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Debris Flows	12	0	0	0	0	$11,001,000	$0
Flash Flood	26	0	0	0	0	$701,000	$0
Flood	45	0	0	0	0	$176,475,000	$0
Frost/Freeze	2	0	0	0	0	$20,000	$400,000
Hail	14	0	0	0	0	$5,000,010	$0
Heat	10	1	0	12	5	$30,000	$0

Event Type	Number of Events	Deaths	Deaths (indirect	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Heavy Rain	8	1	0	0	0	$2,075,000	$0
High Surf	1	8	0	0	0	$0	$0
High Wind	70	1	0	0	1	$3,210,000	$0
Landslide	6	0	0	0	0	$1,874,000	$0
Lightning	1	0	0	0	0	$3,000	$0
Strong Wind	111	2	1	8	4	$3,743,000	$0
Thunderstorm Winds	5	0	0	0	0	$10,000	$0
Tornado	3	0	0	0	0	$75,250	$0
Tsunami	1	0	0	0	0	$50,000	$0
Winter Weather	1	0	0	0	0	$0	$0
Total	**316**	**13**	**1**	**20**	**10**	**$204,267,260**	**$400,000**

Source: NCDC

*Note: Losses reflect totals for all impacted areas, some of which fell outside of the City of Piedmont and outside of Alameda County.

The NCDC table above summarizes severe weather events that occurred in greater Alameda County. Only a few of the events actually resulted in state and federal disaster declarations. It is further interesting to note that different data sources capture different events during the same time period, and often display different information specific to the same events. While the HMPC recognizes these inconsistencies, they see the value this data provides in depicting the City's "big picture" hazard environment.

As previously mentioned, most all of Alameda County's state and federal disaster declarations have been a result of severe weather. For this plan, severe weather is discussed in the following subsections:

- Extreme Heat
- Heavy Rains and Storms
- High Winds

While the HMPC decided not to include cold and freeze as a hazard, cold weather does happen periodically, with little effect to the City. Record colds from the closest weather station are shown in Table 4-6.

Table 4-6 Piedmont – Record Cold Temperatures by Month from 1970 to 2012

Month	Temperature	Date	Month	Temperature	Date
January	30°	1/30/1975	July	51°	7/23/1973
February	29°	2/5/1976	August	50°	8/17/1977
March	34°	3/3/1976	September	48°	9/28/1986
April	37°	4/1/1760	October	43°	10/6/2007
May	43°	5/5/1975	November	36°	11/29/1975
June	48°	6/3/1976	December	26°	12/9/1972

Source: Western Regional Climate Center – Oakland Museum Coop Station

4.2.2. Severe Weather: Extreme Heat

Hazard/Problem Description

According to information provided by FEMA, extreme heat is defined as temperatures that hover 10 degrees or more above the average high temperature for the region and last for several weeks. Heat kills by taxing the human body beyond its abilities. In a normal year, about 175 Americans succumb to the demands of summer heat. In the 40-year period from 1936 through 1975, nearly 20,000 people were killed in the United States by the effects of heat and solar radiation. In the heat wave of 1980 more than 1,250 people died. Extreme heat can also affect the agricultural industry.

Heat disorders generally have to do with a reduction or collapse of the body's ability to shed heat by circulatory changes and sweating or a chemical (salt) imbalance caused by too much sweating. When heat gain exceeds a level at which the body can remove it, or when the body cannot compensate for fluids and salt lost through perspiration, the temperature of the body's inner core begins to rise, and heat-related illness may develop. Elderly persons, small children, chronic invalids, those on certain medications or drugs, and persons with weight and alcohol problems are particularly susceptible to heat reactions.

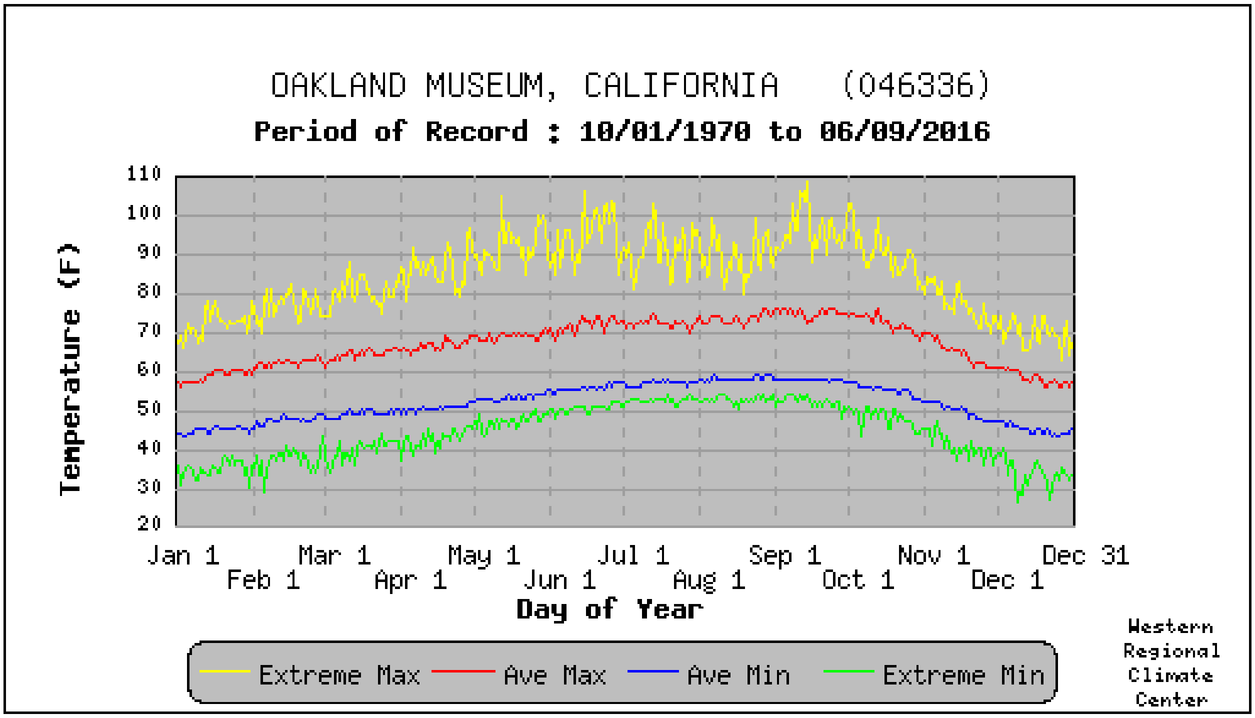
Location

Extreme heat events occur on a regional basis. The San Francisco Bay Area tends to have limited extreme heat days due to its location. Extreme heat can occur in any location of the City. All portions of the City are at risk to extreme heat. Extreme heat occurs throughout the Planning Area primarily during the summer months. The WRCC maintains data on weather normal and extremes in the western United States. WRCC data for the City is summarized below.

City of Piedmont—Oakland Museum Weather Station, Period of Record 1970 to 2016

According to the WRCC, in Piedmont, monthly average maximum temperatures in the warmest months (May through October) range from the mid-60s to the low 70s. The highest recorded daily extreme was 109°F on September 14, 1971. In a typical year, maximum temperatures exceed 90°F on 5.9 days. Figure 4-2 shows the average daily high temperatures and extremes for the City. Table 4-7 shows the record high temperatures by month for the City.

Figure 4-2 City of Piedmont — Daily Temperature Averages and Extremes



Source: Western Regional Climate Center, www.wrcc.dri.edu/

Table 4-7 City of Piedmont – Record High Temperatures

Month	Record High	Date	Month	Record High	Date
January	78°	1/8/1962	July	103°	7/14/1972
February	81°	2/14/1977	August	99°	8/9/1978
March	88°	3/31/1966	September	109°	9/2/1950
April	97°	4/21/2009	October	103°	10/2/2001
May	105°	5/31/1950	November	84°	11/27/1949
June	107°	6/15/1961	December	75°	12/26/1967

Source: Western Regional Climate Center

Extent

Heat emergencies are often slower to develop, taking several days of continuous, oppressive heat before a significant or quantifiable impact is seen. Heat waves do not strike victims immediately, but rather their cumulative effects slowly take the lives of vulnerable populations. Heat waves do not generally cause damage or elicit the immediate response of floods, fires, earthquakes, or other more "typical" disaster scenarios. While heat waves are obviously less dramatic, they are potentially deadlier. According to the 2018 California State Hazard Mitigation Plan, the worst single heat wave event in California occurred in Southern California in 1955, when an eight-day heat wave resulted in 946 deaths.

The National Weather Service (NWS) has in place a system to initiate alert procedures (advisories or warnings) when extreme heat is expected to have a significant impact on public safety. The expected severity of the heat determines whether advisories or warnings are issued. The NWS HeatRisk forecast provides a quick view of heat risk potential over the upcoming seven days. The heat risk is portrayed in a numeric (0-4) and color (green/yellow/orange/red/magenta) scale which is similar in approach to the Air Quality Index (AQI) or the UV Index. This can be seen in Table 4-8.

Table 4-8 National Weather Service HeatRisk Categories

Category	Level	Meaning
Green	0	No Elevated Risk
Yellow	1	Low Risk for those extremely sensitive to heat, especially those without effective cooling and/or adequate hydration
Orange	2	Moderate Risk for those who are sensitive to heat, especially those without effective cooling and/or adequate hydration
Red	3	High Risk for much of the population, especially those who are heat sensitive and those without effective cooling and/or adequate hydration
Magenta	4	Very High Risk for entire population due to long duration heat, with little to no relief overnight

Source: National Weather Service

The NWS office in Sacramento can issue the following heat-related advisory as conditions warrant.

- **Heat Advisories** are issued during events where the HeatRisk is on the Orange/Red threshold (Orange will not always trigger an advisory)
- **Excessive Heat Watches/Warnings** are issued during events where the HeatRisk is in the Red/Magenta output

Extreme heat is made worse when it is experienced over a longer stretch of time.

Past Occurrences

Disaster Declaration History

There have been no FEMA or Cal OES disasters related to extreme heat, as shown in Table 4-3.

NCDC Events

The NCDC has tracked heat and extreme heat events since 1996 for Alameda County. 10 events were recorded for Alameda County, as shown in Table 4-6. Specifics on damages in the City were not included in the database.

*Table 4-9 Alameda County Heat Events 1/1/1996-5/31/2018**

Event Type	Date	Deaths	Deaths (indirect	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Heat	7/21/2006	0	0	0	0	$0	$0

Event Type	Date	Deaths	Deaths (indirect	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Heat	7/21/2006	0	0	0	0	$0	$0
Heat	7/22/2006	0	0	0	0	$0	$0
Heat	7/25/2007	0	1	0	0	$0	$0
Heat	5/17/2009	0	0	0	0	$10000	$0
Heat	5/17/2009	0	0	10	0	$20000	$0
Heat	5/17/2009	0	0	1	0	$0	$0
Heat	6/27/2009	1	0	1	0	$0	$0
Heat	6/18/2017	0	0	0	0	$0	$0
Heat	6/20/2017	0	0	0	0	$0	$0
Total		**1**	**1**	**12**	**0**	**$30,000**	**$ 0**

Source: NCDC

Hazard Mitigation Planning Team Events

Though the HMPC noted that extreme heat does occur during the summer months, no specific events or damages from extreme heat could be recalled.

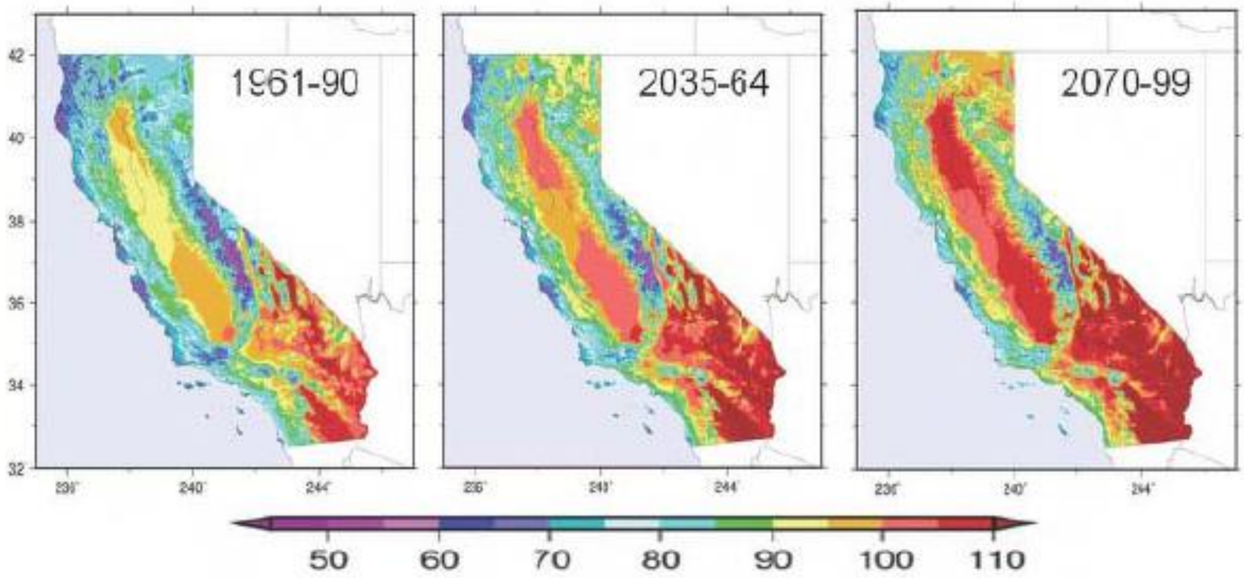
Likelihood of Future Occurrences

Highly Likely—Temperature extremes are likely to continue to occur annually in the City Planning Area. Temperatures at or above 90°F can occur, though rarely, on summer days in the City.

Climate Change and Extreme Heat

The 2014 California Climate Adaptation Strategy (CAS), citing a California Energy Commission study, states that "over the past 15 years, heat waves have claimed more lives in California than all other declared disaster events combined." This study shows that California is getting warmer, leading to an increased frequency, magnitude, and duration of heat waves. These factors may lead to increased mortality from excessive heat, as shown in Figure 4-3.

Figure 4-3 California Historical and Projected Temperature Increases – 1961 to 2099



Source: Dan Cayan; California Climate Adaptation Strategy

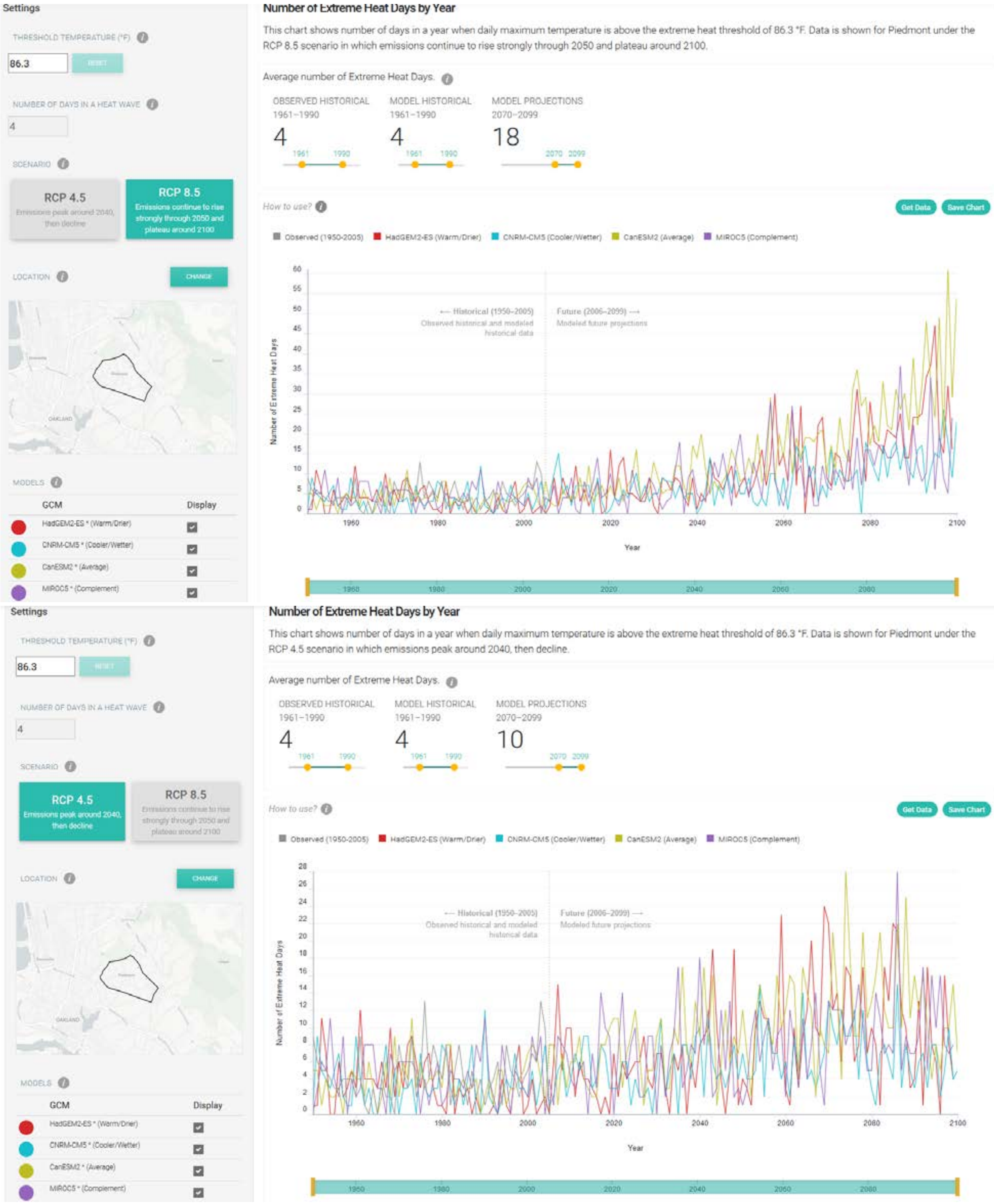
As temperatures increase, California and the City will face increased risk of death from dehydration, heat stroke, heat exhaustion, heart attack, stroke and respiratory distress caused by extreme heat. According to the 2013 California Climate Adaptation Study (CAS) report and the 2018 State of California Hazard Mitigation Plan, by 2100, hotter temperatures are expected throughout the state, with projected increases of 3-5.5°F (under a lower emissions scenario) to 8-10.5°F (under a higher emissions scenario). These changes could lead to an increase in deaths related to extreme heat in the City.

Cal Adapt also noted that overall temperatures are expected to rise substantially throughout this century. During the next few decades, scenarios project average temperature to rise between 1 and 2.3°F; however, the projected temperature increases begin to diverge at mid-century so that, by the end of the century, the temperature increases projected in the higher emissions scenario (RCP (Representative Concentration Pathway) 8.5) are approximately twice as high as those projected in the lower emissions scenario (RCP 4.5).

These projections also differ depending on the time of year and the type of measurement (highs vs. lows), all of which have different potential effects to the state's ecosystem health, agricultural production, water use and availability, and energy demand. Future temperature estimates from Cal-Adapt for the City of Piedmont are shown in Figure 4-4. It shows the following:

- The upper chart shows number of days in a year when daily maximum temperature is above the extreme heat threshold of 86.3°F. Data is shown for Piedmont under the RCP 8.5 scenario in which emissions continue to rise strongly through 2050 and plateau around 2100.
- The lower chart shows number of days in a year when daily maximum temperature is above the extreme heat threshold of 86.3 °F. Data is shown for Piedmont under the RCP 4.5 scenario in which emissions peak around 2040, then decline.

Figure 4-4 City of Piedmont – Future Temperature Estimates in High and Low Emission Scenarios



Source: Cal-Adapt – Temperature: Decadal Averages Map

4.2.3. Severe Weather: Heavy Rains and Storms

Hazard/Problem Description

Storms in the City Planning Area are generally characterized by heavy rain often accompanied by strong winds and infrequently, lightning and hail. Approximately 10 percent of the thunderstorms that occur each year in the United States are classified as severe. A thunderstorm is classified as severe when it contains one or more of the following phenomena: hail that is three-quarters of an inch or greater, winds in excess of 50 knots (57.5 mph), or a tornado. Heavy precipitation in the Piedmont area falls mainly in the fall, winter, and spring months.

Heavy Rain and Storms

The NWS reports that heavy rains, storms and thunderstorms result from the rapid upward movement of warm, moist air. They can occur inside warm, moist air masses and at fronts. As the warm, moist air moves upward, it cools, condenses, and forms cumulonimbus clouds that can reach heights of greater than 35,000 ft. As the rising air reaches its dew point, water droplets and ice form and begin falling the long distance through the clouds towards earth's surface. As the droplets fall, they collide with other droplets and become larger. The falling droplets create a downdraft of air that spreads out at Earth's surface and causes strong winds associated with thunderstorms.

According to the HMPC, short-term, heavy storms can cause both general flooding as well as localized drainage issues. With increased growth of the area, adequate drainage and conveyance systems have become an increasingly important issue. In addition to the flooding that often occurs during these storms, strong winds, when combined with saturated ground conditions, can cause power outages and down very mature trees.

Location

Heavy rain events occur on a regional basis. Rains and storms can occur in any location of the City, County, and East Bay Area. All portions of the City are at risk to heavy rains. Most of these rains occur during the winter months, as discussed below. Past event locations are shown on Figure 4-11 below.

Extent

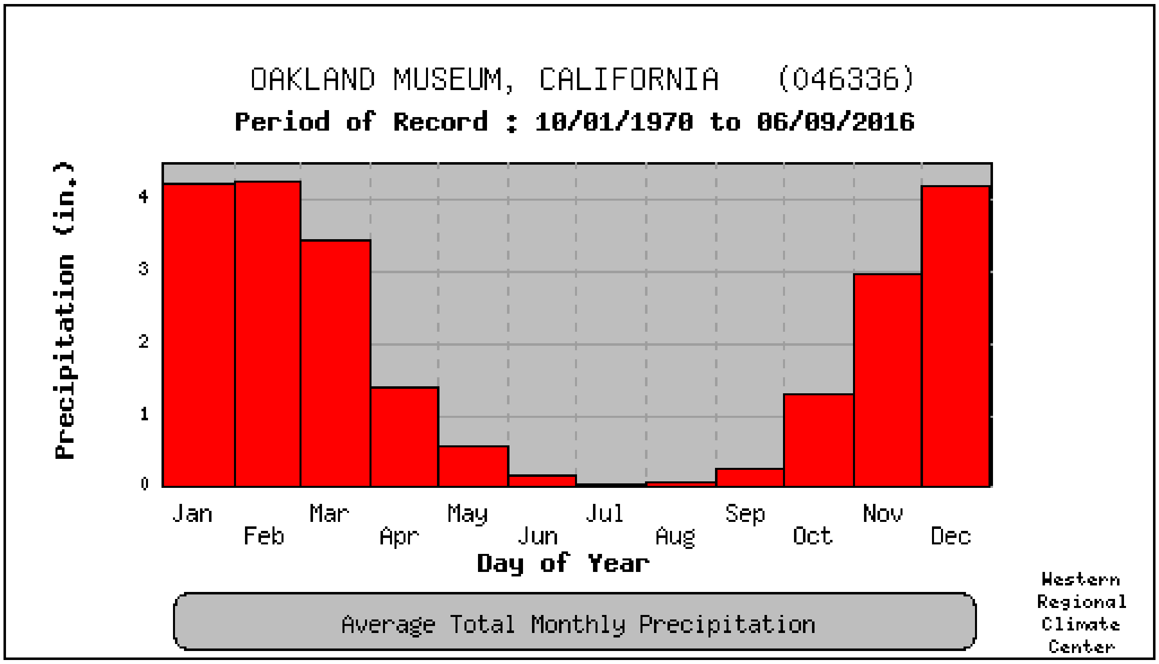
There is no scientific scale by which heavy rains and storms are measured. Magnitude of storms is measured often in rainfall and damages. The speed of onset of heavy rains can be short, but accurate weather prediction mechanisms often let the public know of upcoming events. Duration of thunderstorms in California is often short, ranging from minutes to hours. Information from the WRCC station is summarized below.

City of Piedmont—Oakland Museum Weather Station, Period of Record 1970 to 2012

According to the WRCC, average annual precipitation in Piedmont is 23.27 inches per year. The highest recorded annual precipitation is 41.07 inches in 1998; the highest recorded precipitation for a 24-hour period is 4.74 inches on January 4, 1982. The lowest recorded annual precipitation was 9.99 inches in 1976.

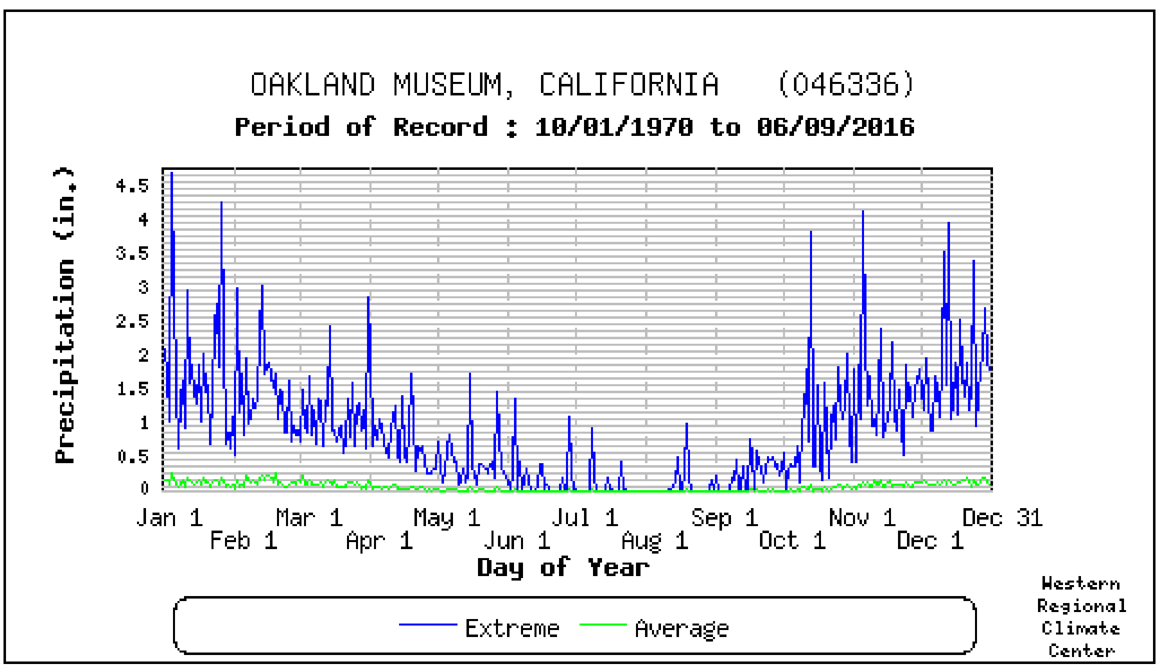
Average monthly precipitation for Piedmont is shown in Figure 4-5. Daily average and extreme precipitations are shown in Figure 4-6.

Figure 4-5 City of Piedmont – Monthly Average Total Precipitation



Source: Western Regional Climate Center, www.wrcc.dri.edu/

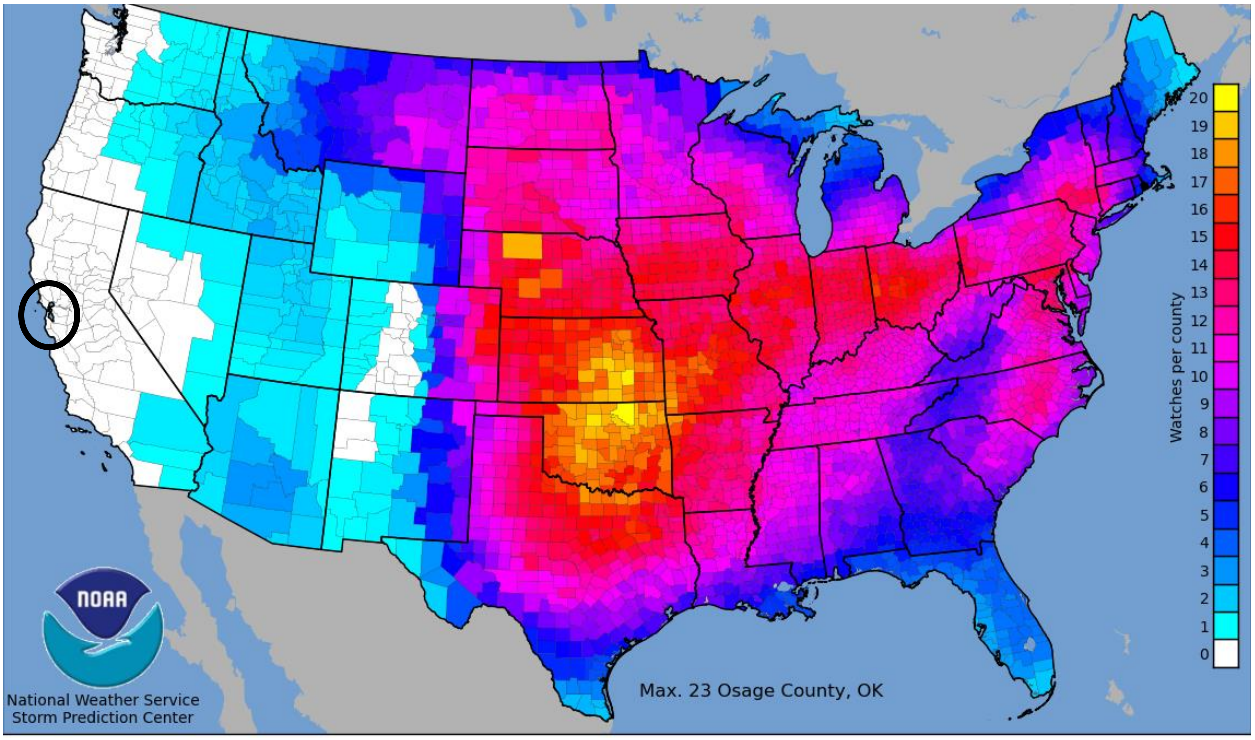
Figure 4-6 City of Piedmont – Daily Average and Extreme Precipitation



Source: Western Regional Climate Center, www.wrcc.dri.edu/

The NOAA Storm Prediction Center tracks thunderstorm watches on a county basis. Figure 4-7 shows thunderstorm watches in the City and the United States for a 20-year period between 1993 and 2012.

Figure 4-7 City of Piedmont – – Average Thunderstorm Watches per Year (1993 to 2012)



Source: NOAA Storm Prediction Center

Hail

While infrequent, hail can occur throughout the Planning Area during storm events. Hail is formed when water droplets freeze and thaw as they are thrown high into the upper atmosphere by the violent internal forces of thunderstorms. Hail, in the form of small pellets, is sometimes associated with severe storms within the City of Piedmont. Hailstones in general are usually less than two inches in diameter and can fall at speeds of 120 miles per hour (mph). Severe hailstorms can be quite destructive, causing damage to roofs, buildings, automobiles, vegetation, and crops.

The National Weather Service classifies hail by diameter size, and corresponding everyday objects to help relay scope and severity to the population. Table 4-10 indicates the hailstone measurements utilized by the National Weather Service.

Table 4-10 Hailstone Measurements

Average Diameter	Corresponding Household Object
.25 inch	Pea
.5 inch	Marble/Mothball
.75 inch	Dime/Penny

Average Diameter	Corresponding Household Object
.875 inch	Nickel
1.0 inch	Quarter
1.5 inch	Ping-pong ball
1.75 inch	Golf-Ball
2.0 inch	Hen Egg
2.5 inch	Tennis Ball
2.75 inch	Baseball
3.00 inch	Teacup
4.00 inch	Grapefruit
4.5 inch	Softball

Source: National Weather Service

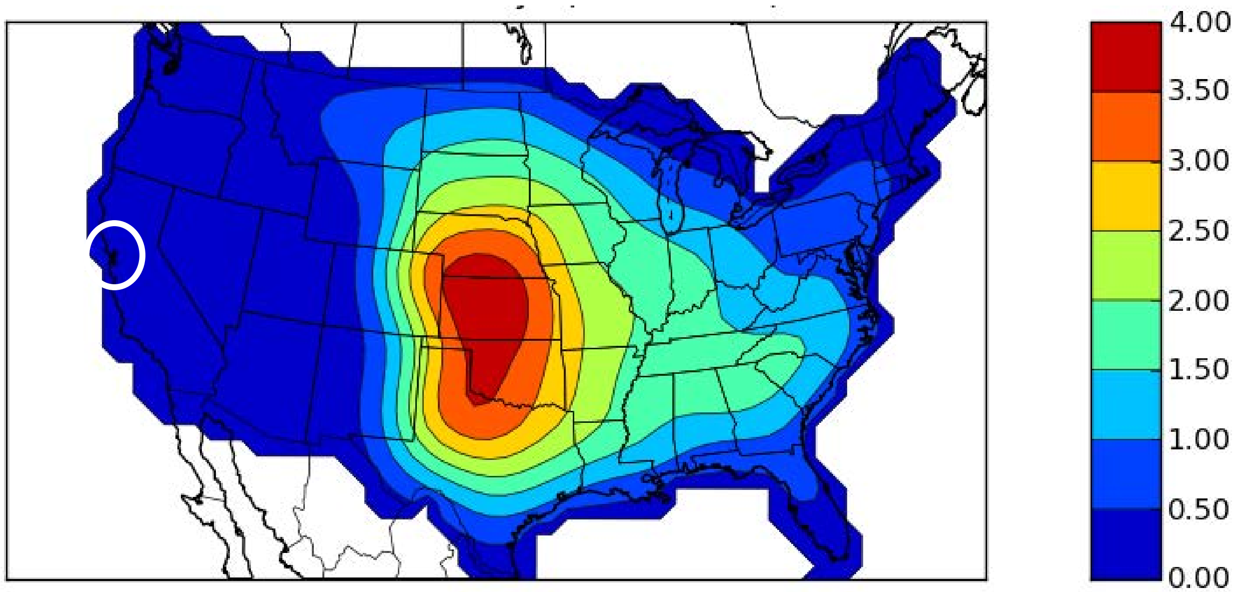
Location

Hail events can occur in any location of the City. All portions of the City are at risk to hail. Hail tends to be rare in the City and Alameda County, as discussed in the extent section below. Past event locations are shown on Figure 4-11 below.

Extent

Hail tends to be rare in California. The amount of hail that falls and the size of hailstones determines the scale of a hailstorm. The speed of onset of hail can be short, but accurate weather prediction mechanisms often let the public know of upcoming events. Duration of thunderstorms that can cause hail in California is often short, ranging from minutes to hours. Hail events last shorter than the duration of the total thunderstorm. The National Weather Service tracks hail events. Figure 4-8 shows the average days each year where hail of greater than 1" in diameter occurred during a 20-year period from 1990 to 2009.

Figure 4-8 City of Piedmont – Average Hail Days per Year (1990 to 2009)



Source: National Weather Service

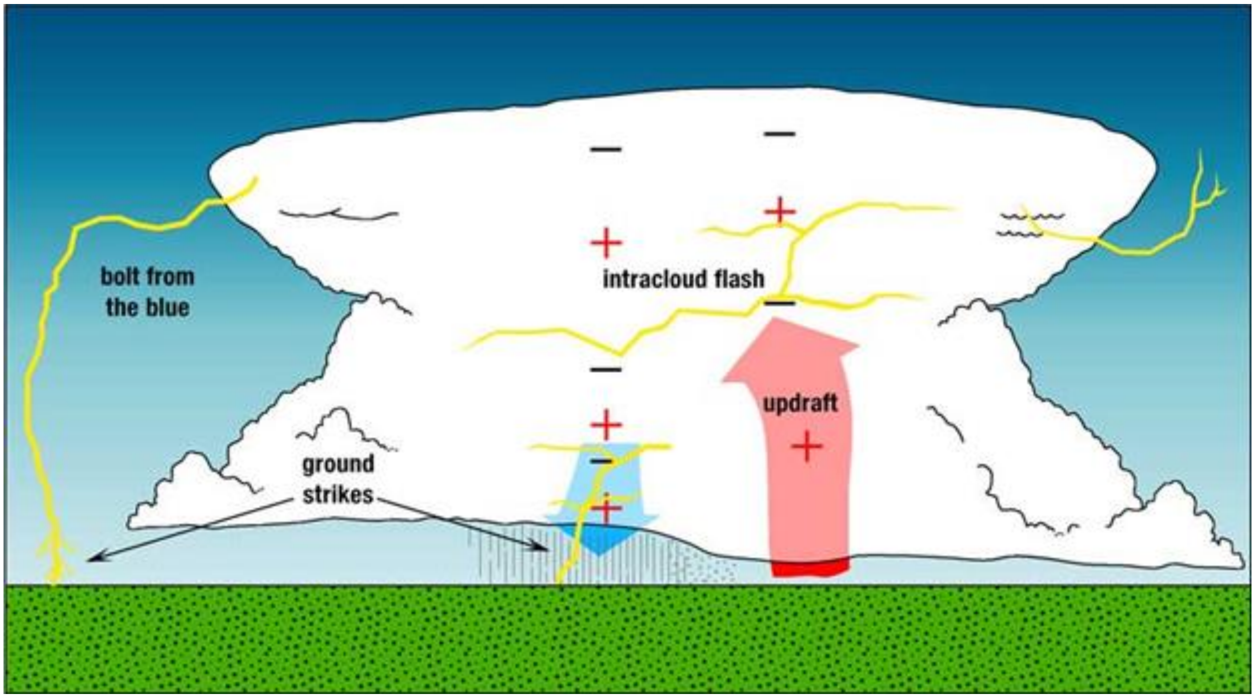
Lightning

Lightning, while rare in Piedmont, can occur throughout the City during storm events. Lightning is defined by the NWS as any and all of the various forms of visible electrical discharge caused by thunderstorms. Thunderstorms and lightning are usually (but not always) accompanied by rain. Cloud-to-ground lightning can kill or injure people by direct or indirect means. Objects can be struck directly, which may result in an explosion, burn, or total destruction. Or, damage may be indirect, when the current passes through or near an object, which generally results in less damage.

Intra-cloud lightning is the most common type of discharge. This occurs between oppositely charged centers within the same cloud. Usually it takes place inside the cloud and looks from the outside of the cloud like a diffuse brightening that flickers. However, the flash may exit the boundary of the cloud, and a bright channel, similar to a cloud-to-ground flash, can be visible for many miles.

Cloud-to-ground lightning is the most damaging and dangerous type of lightning, though it is also less common. Most flashes originate near the lower-negative charge center and deliver negative charge to earth. However, a large minority of flashes carry positive charge to earth. These positive flashes often occur during the dissipating stage of a thunderstorm's life. Positive flashes are also more common as a percentage of total ground strikes during the winter months. This type of lightning is particularly dangerous for several reasons. It frequently strikes away from the rain core, either ahead or behind the thunderstorm. It can strike as far as 5 or 10 miles from the storm in areas that most people do not consider to be a threat (see Figure 4-9). Positive lightning also has a longer duration, so fires are more easily ignited. And, when positive lightning strikes, it usually carries a high peak electrical current, potentially resulting in greater damage.

Figure 4-9 Cloud to Ground Lightning



Source: National Weather Service

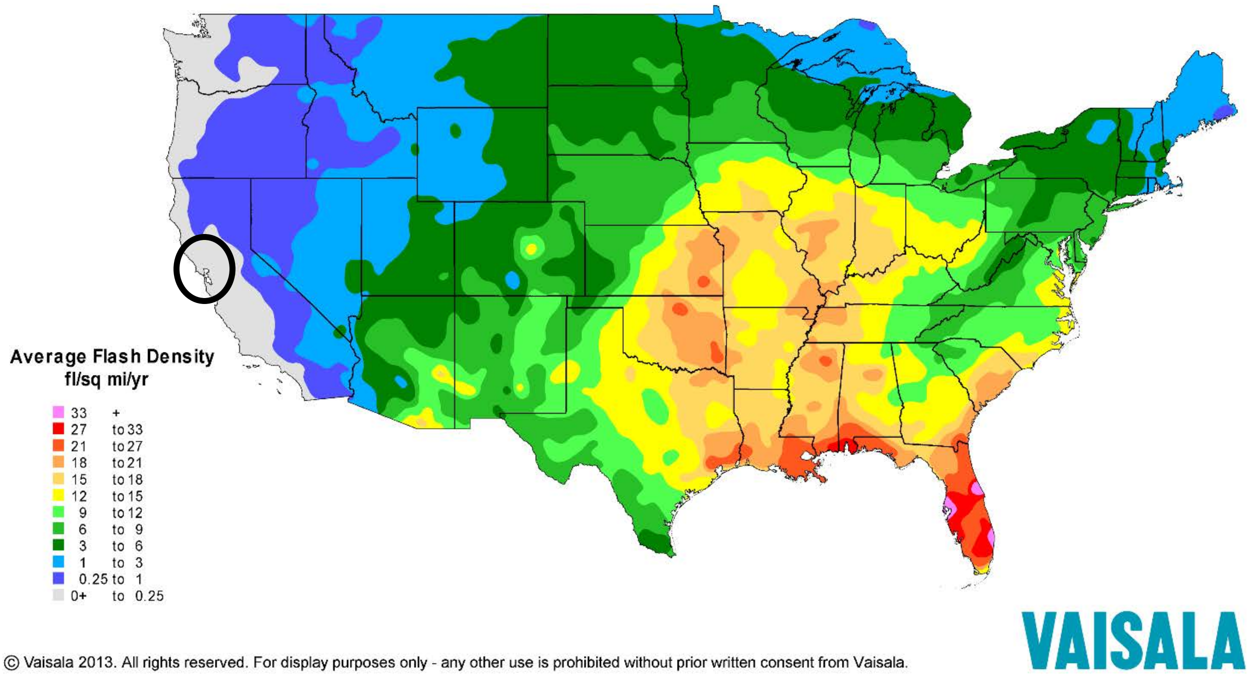
Location

Lightning events can occur in any location of the City and are often associated with thunderstorm. All portions of the City are at risk to lightning. Lightning tends to be rare in the City, as discussed in the extent section below. Past event locations are shown on Figure 4-11 below.

Extent

Lightning in the City can occur during thunderstorms. The speed of onset of thunderstorms that can cause lightning can be short, but accurate weather prediction mechanisms often let the public know of upcoming events. Duration of thunderstorms in California is often short, ranging from minutes to hours. Thunderstorms and lightning are rare in the City. Vaisala maintains the National Lightning Detection Network. It tracks cloud to ground lightning incidences in the United States. Figure 4-10 shows lightning incidences in the City and the rest of the United States from 1997 to 2012.

Figure 4-10 City of Piedmont – Lightning Incidence Map 1997 to 2012



Source: Vaisala National Lightning Detection Network

Past Occurrences

Disaster Declaration History

A search of FEMA and Cal OES disaster declarations turned up multiple events. Heavy rains and storms have caused flooding in the County and City of Piedmont Planning Area. Events where flooding resulted in a state or federal disaster declaration are shown in Table 4-11.

Table 4-11 Alameda County – Disaster Declarations from Heavy Rain and Storms (and Floods) 1950-2018

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Flood (including heavy rain and storms)	15	1950, 1955, 1958 (twice), 1962, 1963, 1970, 1982, 1983, 1986, 1995, 1997, 2008, 2017 (twice)	14	1955, 1958, 1970, 1982, 1983, 1986, 1995, 1997, 1998, 2006 (twice), 2017 (three times)

Source: FEMA, Cal OES

NCDC Events

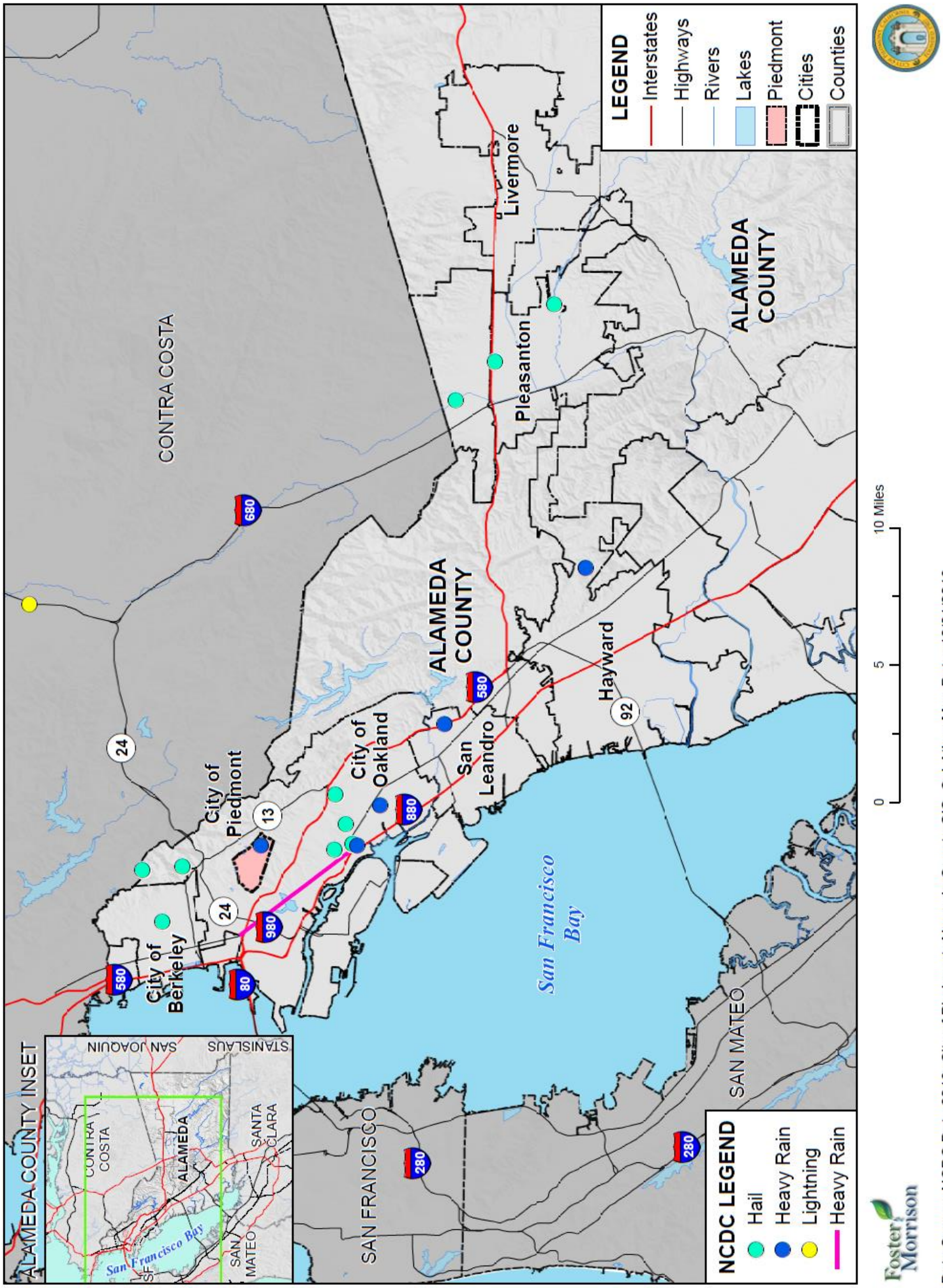
The NCDC data recorded 15 hail, heavy rain, and winter weather incidents for Alameda County since 1950. A summary of these events is shown in Table 4-12 Some of these events have mapped coordinates. Those can be seen in Figure 4-11. Events that caused flooding are discussed in greater detail in Section 4.2.10.

Table 4-12 NCDC Severe Weather Events in Alameda County 1955-5/31/2018

Event Type	Date	Deaths	Deaths (indirect	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Heavy Rain	12/5/1996	0		0		$1,000,000.00	$0.00
Heavy Rain	12/5/1996	0		0		$1,000,000.00	$0.00
Heavy Rain	1/11/1998	1		0		$0.00	$0.00
Hail	2/9/1999	0	0	0	0	$0.00	$0.00
Heavy Rain	11/1/2008	0		0		$15,000.00	$0.00
Heavy Rain	10/13/2009	0		0		$50,000.00	$0.00
Winter Weather	12/7/2009	0	0	0	0	$0.00	$0.00
Heavy Rain	10/24/2010	0		0		$0.00	$0.00
Lightning	10/6/2011	0	0	0	0	$3,000.00	$0.00
Heavy Rain	3/13/2012	0		0		$10,000.00	$0.00
Heavy Rain	2/9/2015	0		0		$0.00	$0.00
Hail	1/19/2017	0	0	0	0	$5,000,000.00	$0.00
Hail	1/22/2017	0	0	0	0	$10.00	$10.00
Hail	1/25/2018	0	0	0	0	$0.00	$0.00
Hail	3/2/2018	0	0	0	0	$0.00	$0.00
Hail	3/2/2018	0	0	0	0	$0.00	$0.00
Hail	3/2/2018	0	0	0	0	$0.00	$0.00
Hail	3/14/2018	0	0	0	0	$0.00	$0.00
Hail	3/17/2018	0	0	0	0	$0.00	$0.00
Hail	3/17/2018	0	0	0	0	$0.00	$0.00
Hail	4/16/2018	0	0	0	0	$0.00	$0.00
Hail	4/16/2018	0	0	0	0	$0.00	$0.00
Hail	4/16/2018	0	0	0	0	$0.00	$0.00
Hail	4/16/2018	0	0	0	0	$0.00	$0.00
Total	**24 Events**	**1**	**0**	**0**	**0**	**$7,078,010**	**$0**

Source: NCDC

Figure 4-11 City of Piedmont – Hail, Heavy Rain, and Lightning Event Locations



Data Source: NCDC Data 2018, City of Piedmont, Alameda County GIS, Cal-Atlas; Map Date: 10/01/2018.

Hazard Mitigation Planning Team Events

The HMPC noted that multiple events have occurred in the City. In April of 2017, rains caused a tree to fall in the Dracena Park. It fell near a children's playground in the park after a storm. This can be seen in Figure 4-12.

Figure 4-12 City of Piedmont – Downed Tree in Dracena Park

Likelihood of Future Occurrences

Highly Likely – Based on NCDC data and HMPC input, 15 heavy rain, hail, lightning, and thunderstorm wind incidents over a 69-year period (1950-2018) equates to a severe storm event every 4.53 years. As noted, this database likely doesn't capture all heavy rain, hail, lightning, and winter weather events. Severe weather is a well-documented seasonal occurrence that will continue to occur often in the City of Piedmont.

Climate Change and Heavy Rains and Storms

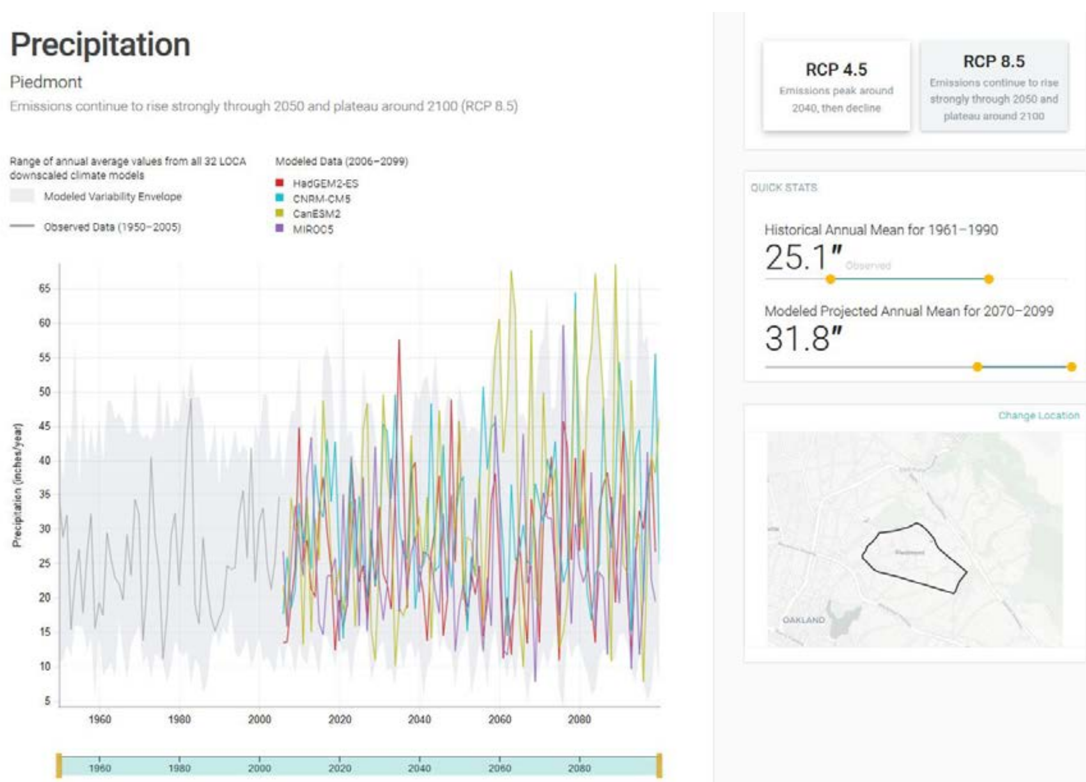
According to the CAS, while average annual rainfall may increase or decrease slightly, the intensity of individual rainfall events is likely to increase during the 21st century. It is unlikely that hail will become more common in the City. The amount of lightning is not projected to change.

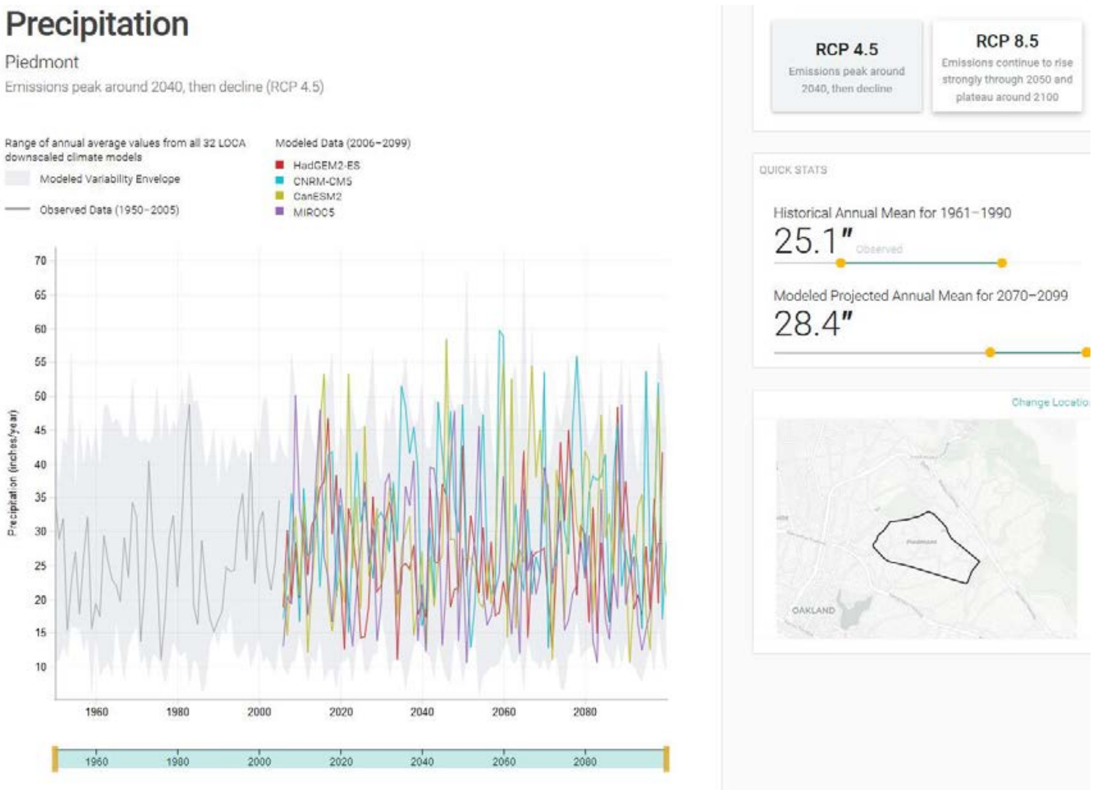
Cal-Adapt noted that, on average, the projections show little change in total annual precipitation in California. Furthermore, among several models, precipitation projections do not show a consistent trend during the next century. The Mediterranean seasonal precipitation pattern is expected to continue, with most precipitation falling during winter from North Pacific storms. One of the four climate models projects slightly wetter winters, and another projects slightly drier winters with a 10 to 20 percent decrease in total annual precipitation. However, even modest changes would have a significant impact because California ecosystems are conditioned to historical precipitation levels and water resources are nearly fully utilized. Future precipitation estimates for the City are shown in Figure 4-13. Figure 4-13 consists of two charts:

- The upper chart shows annual averages of observed and projected Precipitation values for the selected area on map under the RCP 8.5 scenario. The gray line (1950 – 2005) is observed data. The colored lines (2006 – 2100) are projections from 10 LOCA downscaled climate models selected for California. The light gray band in the background shows the least and highest annual average values from all 32 LOCA downscaled climate models.
- The lower chart shows annual averages of observed and projected Precipitation values for the selected area on map under the RCP 4.5 scenario. The gray line (1950 – 2005) is observed data. The colored lines (2006 – 2100) are projections from 10 LOCA downscaled climate models selected for California. The light gray band in the background shows the least and highest annual average values from all 32 LOCA downscaled climate models.

These models have been selected by California state agencies as priority models for research contributing to California's Fourth Climate Change Assessment.

Figure 4-13 City of Piedmont – Future Precipitation Estimates in High and Low Emission Scenarios





Source: Cal-Adapt

4.2.4. Severe Weather: High Winds

Hazard/Problem Description

High Winds

High winds, often accompanying severe storms and thunderstorms, can cause significant property damage, threaten public safety, and have adverse economic impacts from business closures and power loss. High winds, as defined by the NWS glossary, are sustained wind speeds of 40 mph or greater lasting for 1 hour or longer, or winds of 58 mph or greater for any duration. These winds may occur as part of a seasonal climate pattern or in relation to other severe weather events such as heavy rains and thunderstorms.

Straight-line winds may also exacerbate existing weather conditions by increasing the effect on temperature and decreasing visibility due to the movement of particulate matters through the air, as in dust and snow storms. The winds may also exacerbate fire conditions by drying out the ground cover, propelling fuel around the region, and increasing the ferocity of exiting fires. These winds may push automobiles off roads, damage roofs and structures, down trees, cause utility outages, and cause secondary damage due to flying debris.

Diablo Winds

There is a special type of straight line wind that affects the City known as Diablo Winds. They usually affect the City in the fall. These winds begin hundreds of miles to the south of the City, with an area of low pressure centered near San Diego. The large counter-clockwise flow around this system sends winds out of the north and east in the Bay Area. These winds come from the direction of Mt. Diablo, thus the name "Diablo Winds". As these winds descend down hills in the Bay Area and Piedmont, they actually speed up and warm up, drying out the air around us. Gusts can frequently be between 40-70 mph. The windy, warm, dry weather is perfect for fires to easily start and spread. Diablo Winds fueled the Oakland Hills Fire in 1991.

Location

The entire City is subject to significant, non-tornadic (straight-line) winds. Each area of the City is at risk to high winds. Past event locations are shown on Figure 4-16 below.

Extent

Magnitude of winds is measured often in speed and damages. The speed of onset of high winds can be short, but accurate weather prediction mechanisms often let the public know of upcoming events. Duration of thunderstorm winds in California is often short, ranging from minutes to hours. The Beaufort scale is an empirical measure that relates wind speed to observed conditions at sea or on land. Its full name is the Beaufort wind force scale. Figure 4-14 shows the Beaufort wind scale.

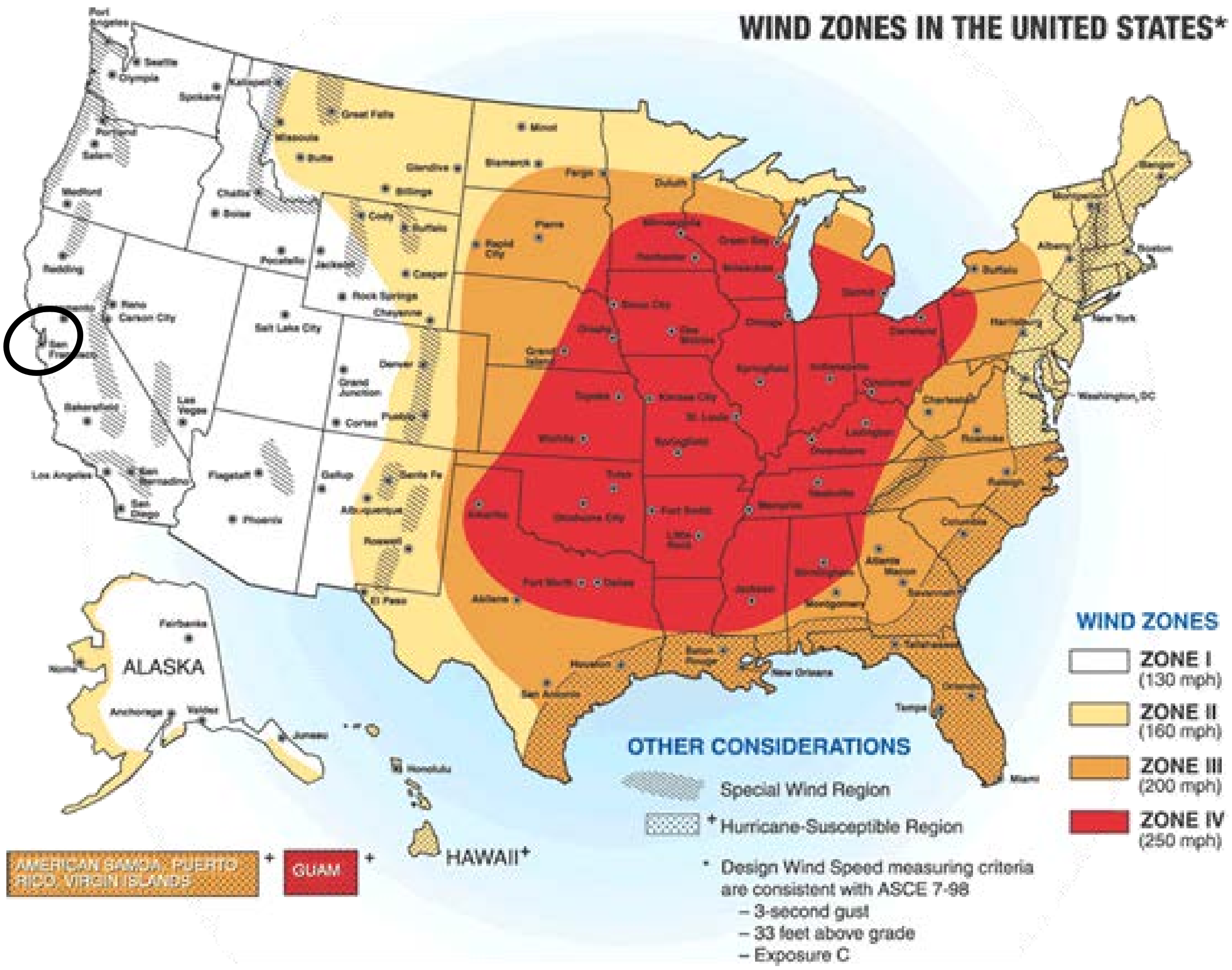
Figure 4-14 Beaufort Wind Scale

Beaufort Number	Wind Speed (miles/hour)	Wind Speed (km/hour)	Wind Speed (knots)	Description	Wind Effects on Land
0	< 1	< 1	< 1	Calm	Calm. Smoke rises vertically.
1	1-3	1-5	1-3	Light Air	Wind motion visible in smoke.
2	4-7	6-11	4-6	Light Breeze	Wind felt on exposed skin. Leaves rustle.
3	8-12	12-19	7-12	Gentle Breeze	Leaves and smaller twigs in constant motion.
4	13-18	20-28	11-16	Moderate Breeze	Dust and loose paper are raised. Small branches begin to move.
5	19-24	29-38	17-21	Fresh Breeze	Small trees begin to sway.
6	25-31	39-49	22-27	Strong Breeze	Large branches are in motion. Whistling is heard in overhead wires. Umbrella use is difficult.
7	32-38	50-61	28-33	Near Gale	Whole trees in motion. Some difficulty experienced walking into the wind.
8	39-46	62-74	34-40	Gale	Twigs and small branches break from trees. Cars veer on road.
9	47-54	75-88	41-47	Strong Gale	Larger branches break from trees. Light structural damage.
10	55-63	89-102	48-55	Storm	Trees broken and uprooted. Considerable structural damage.
11	64-72	103-117	56-63	Violent Storm	Widespread damage to structures and vegetation.
12	> 73	> 117	> 64	Hurricane	Considerable and widespread damage to structures and vegetation. Violence.

Source: National Weather Service

Figure 4-15 depicts wind zones for the United States. The map denotes that Piedmont falls into Zone I, which is characterized by high winds of up to 130 mph.

Figure 4-15 Wind Zones in the United States



Source: FEMA

Past Occurrences

Disaster Declaration History

There have been no past federal or state disaster declarations due to high winds, according to Table 4-3.

NCDC Events

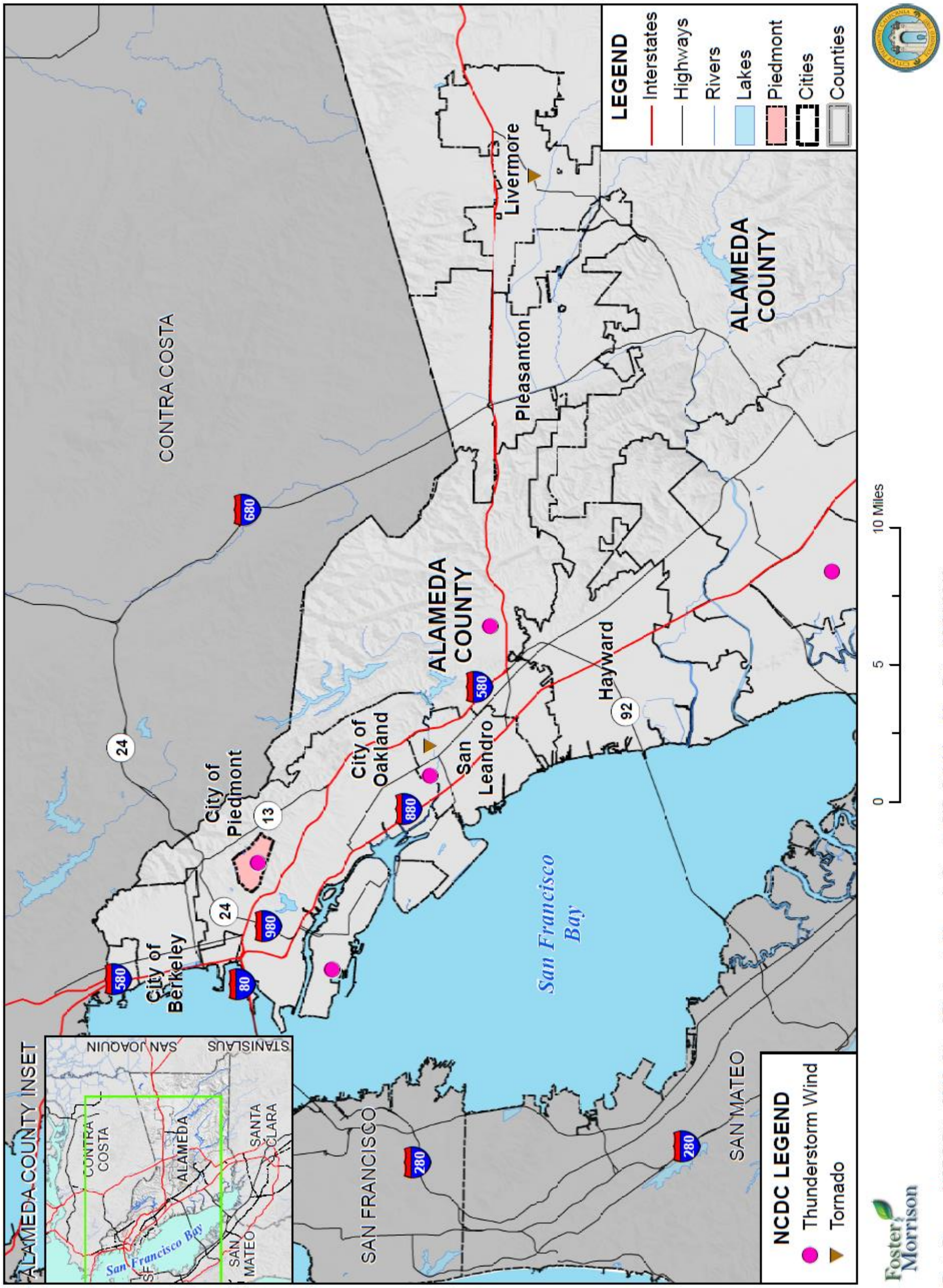
The NCDC data recorded 186 high wind incidents for Alameda County since 1955. A summary of these events is shown in Table 4-13. Some of these events have mapped coordinates. These are shown on Figure 4-16.

Table 4-13 NCDC High Wind Events in Alameda County 1955-5/31/2018

Event Type	Number of Events	Deaths	Deaths (indirect	Injuries	Injuries (indirect)	Property Damage	Crop Damage
High Wind	70	1	0	0	1	$3,210,000	$0
Strong Wind	111	2	1	8	4	$3,743,000	$0
Thunderstorm Winds	5	0	0	0	0	$10,000	$0
Total	**186**	**3**	**1**	**8**	**5**	**$6,963,000**	**$ 0**

Source: NCDC

Figure 4-16 City of Piedmont –High Wind Events



Data Source: NCDC Data 2018, City of Piedmont, Alameda County GIS, Cal-Atlas; Map Date: 10/01/2018.

Hazard Mitigation Planning Team Events

While the HMPC noted that winds are an annual occurrence, no damages, injuries, or deaths could be found to be attributed to winds.

Likelihood of Future Occurrences

Highly Likely– Based on NCDC data and HMPC input, 186 wind incidents over a 64-year period (1955-2018) equates to a severe wind event multiple times each year. However, as noted, this database likely doesn't capture all wind events. High winds are a well-documented seasonal occurrence that will continue to occur annually in City.

Climate Change and High Winds

According to the CAS, while average annual rainfall may increase or decrease slightly, the intensity of individual thunderstorm events is likely to increase during the 21st century. This may bring stronger thunderstorm winds. The CAS does not discuss non-thunderstorm winds.

4.2.5. Climate Change

Hazard/Problem Description

Climate change is the distinct change in measures of weather patterns over a long period of time, ranging from decades to millions of years. More specifically, it may be a change in average weather conditions such as temperature, rainfall, snow, ocean and atmospheric circulation, or in the distribution of weather around the average. While the Earth's climate has cycled over its 4.5-billion-year age, these natural cycles have taken place gradually over millennia, and the Holocene, the most recent epoch in which human civilization developed, has been characterized by a highly stable climate – until recently.

This LHMP is concerned with human-induced climate change that has been rapidly warming the Earth at rates unprecedented in the last 1,000 years. Since industrialization began in the 19th century, the burning of fossil fuels (coal, oil, and natural gas) at escalating quantities has released vast amounts of carbon dioxide and other greenhouse gases responsible for trapping heat in the atmosphere, increasing the average temperature of the Earth. Secondary impacts include changes in precipitation patterns, the global water cycle, melting glaciers and ice caps, and rising sea levels. According to the Intergovernmental Panel on Climate Change (IPCC), climate change will "increase the likelihood of severe, pervasive and irreversible impacts for people and ecosystems" if unchecked.

The 2017 Climate Adaptation Plan 2.0 for the City noted that in 2015, the three largest sources of GHG emissions in Piedmont were building electricity use, natural gas use for space and water heating, and petroleum-fueled personal vehicle use.

Through changes to oceanic and atmospheric circulation cycles and increasing heat, climate change affects weather systems around the world. Climate change increases the likelihood and exacerbates the severity of extreme weather – more frequent or intense storms, floods, droughts, and heat waves. Consequences for human society include loss of life and injury, damaged infrastructure, long-term health effects, loss of agricultural crops, disrupted transport and freight, and more. Climate change is not a discrete event but a long-term hazard, the effects of which communities are already experiencing.

Climate change adaptation is a key priority of the State of California. The 2018 State of California Multi-Hazard Mitigation Plan stated that climate change is already affecting California. Sea levels have risen by as much as seven inches along the California coast over the last century, increasing erosion and pressure on the state's infrastructure, water supplies, and natural resources. The State has also seen increased average temperatures, more extreme hot days, fewer cold nights, a lengthening of the growing season, shifts in the water cycle with less winter precipitation falling as snow, and earlier runoff of both snowmelt and rainwater in the year. In addition to changes in average temperatures, sea level, and precipitation patterns, the intensity of extreme weather events is also changing.

In Alameda County, the HMPC noted that each year it seems to get a bit warmer. It was also noted that 2017 was one of the wettest years ever. California's Adaptation Planning Guide: Understanding Regional Characteristics has divided California into 11 different regions based on political boundaries, projected climate impacts, existing environmental setting, socioeconomic factors and regional designations. Alameda County falls within the Bay Area Region. Table 4-14 provides a summary of Cal-Adapt Climate Projections for the Bay Area Region.

Table 4-14 Alameda County – Cal Adapt Climate Projections

Effect	Ranges
Temperature Change, 1990-2100	January: Increase in average temperature of 2°F by 2050 and up to 5°F. July: Increase in average temperatures of 4°F by 2050 and up to more than 6°F by 2100. (Modeled high temperatures – average of all models; high carbon emissions scenario)
Precipitation	Precipitation varies wildly in this region, with annual totals over 40 inches in northern Sonoma County to roughly 15 inches in eastern portions of Solano and Contra Costa counties. A moderate decline in annual rainfall, 1 to 3 inches by 2050 and 4 to 5 inches by 2090 is projected throughout the region. (Community Climate System Model Version 3 (CCSM3) climate model; high carbon emissions scenario)
Sea Level Rise	By 2100, sea levels may rise up to 66 inches, posing considerable threats to coastal areas and particularly to low-lying areas adjacent to San Francisco bay. The number of acres vulnerable to flooding is expected to increase 20 to 30 percent in most parts of the Bay Area, with some areas projected for increases over 40 percent. Coastal areas are estimated to experience an increase of approximately 15 percent in the acreage.
Heat wave	Along the coast, particularly to the south, heat wave is defined as five days over 72°F to 77°F; in other areas the threshold is in the mid- to upper 90s. Over most of the region, a limited increase in the number of heat waves is expected by 2050, with only the eastern areas expecting more than one or two more per year. By 2100, between six and 10 more heat waves can be expected per year.
Wildfire	There is little change in projected fire risk in this region, save for the slight increases expected in western Marin County. (GFDL model, high carbon emissions scenario)

Source: Cal-Adapt

The HMPC noted that temperatures have been warming. The City is seeing more applications for installation of air conditioners. The biggest issues related to climate change in the City play into drought conditions and dry vegetation creating a bigger wildfire risk. Urban trees are also being affected by climate change conditions, as climate conditions cause them to dry out and become more vulnerable to falling over during storm events. The HMPC also noted the climate change in Piedmont creates more intense rain events, affects numbers, magnitude, and severity of flooding and land movement hazards, such as localized landslides.

Location

Climate change is a global phenomenon. It is expected to affect the whole of the City, Alameda County, and State of California.

Extent

There is no one scale to measure the extent of climate change. Climate change exacerbates other hazard, such as drought, extreme heat, flooding, wildfire, and others. The speed of onset of climate change is very slow. The duration of climate change is not yet known, but is feared to be tens to hundreds of years.

Past Occurrences

Disaster Declaration History

Climate change has never been directly linked to any declared disasters, as shown in Table 4-3.

NCDC Events

The NCDC does not track climate change events.

Hazard Mitigation Planning Committee Events

While the HMPC noted that climate change is of concern, no specific impacts of climate change could be determined. The City noted that there have been an acceleration in applications to the planning department for the installation of air conditioning units. This indicates the City is getting hotter. HMPC members noted that the strength of storms does seem to be increasing and the temperatures seem to be getting hotter.

Likelihood of Future Occurrence

Highly Likely – Climate change is virtually certain to continue without immediate and effective global action. According to NASA, 2017 was on track to be one of the hottest years on record, and 15 of the 17 hottest years ever have occurred since 2000. Without significant global action to reduce greenhouse gas emissions, the IPCC concludes in its Fifth Assessment Synthesis Report (2014) that average global temperatures are likely to exceed 1.5 C by the end of the 21st century, with consequences for people, assets, economies and ecosystems, including risks from heat stress, storms and extreme precipitation, inland and coastal flooding, landslides, air pollution, drought, water scarcity, sea level rise and storm surges.

Climate Scenarios

The United Nations IPCC developed several greenhouse gas (GHG) emissions scenarios based on differing sets of assumptions about future economic growth, population growth, fossil fuel use, and other factors. The emissions scenarios range from “business-as-usual” (i.e., minimal change in the current emissions trends) to more progressive (i.e., international leaders implement aggressive emissions reductions policies). Each of these scenarios leads to a corresponding GHG concentration, which is then used in climate models to examine how the climate may react to varying levels of GHGs. Climate researchers use many global climate models to assess the potential changes in climate due to increased GHGs.

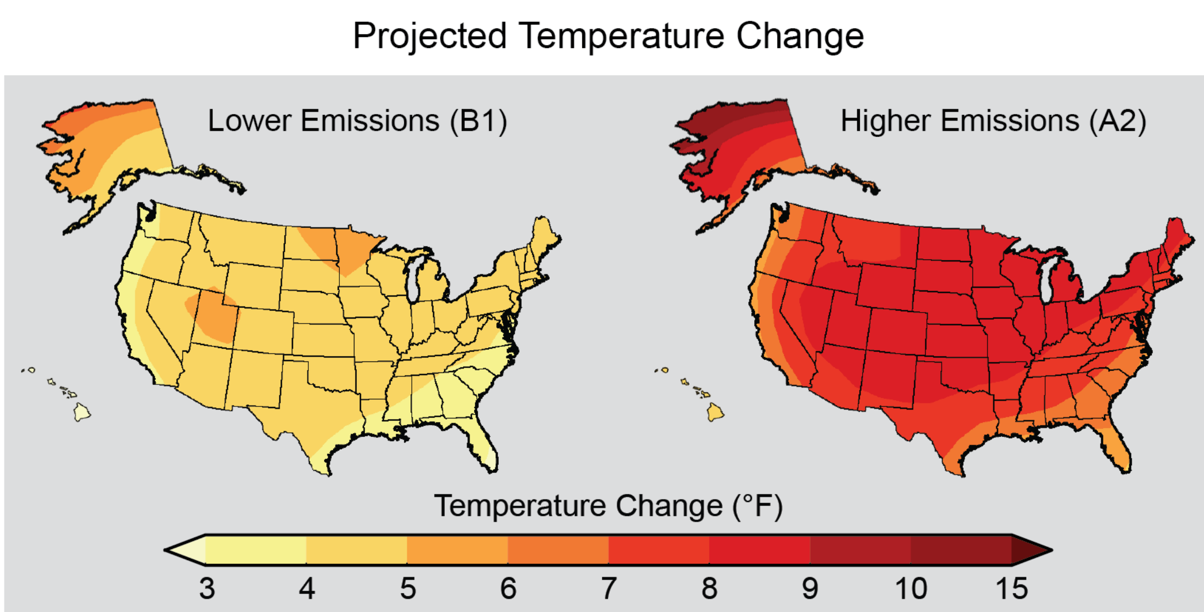
Key Uncertainties Associated with Climate Projections

- Climate projections and impacts, like other types of research about future conditions, are characterized by uncertainty. Climate projection uncertainties include but are not limited to:
  - ✓ Levels of future greenhouse gas concentrations and other radiatively important gases and aerosols,
  - ✓ Sensitivity of the climate system to greenhouse gas concentrations and other radiatively important gases and aerosols,
  - ✓ Inherent climate variability, and
  - ✓ Changes in local physical processes (such as afternoon sea breezes) that are not captured by global climate models.

Even though precise quantitative climate projections at the local scale are characterized by uncertainties, the information provided can help identify the potential risks associated with climate variability/climate change and support long term mitigation and adaptation planning.

Maps show projected change in average surface air temperature in the later part of this century (2071-2099) relative to the later part of the last century (1970-1999) under a scenario that assumes substantial reductions in heat trapping gases and a higher emissions scenario that assumes continued increases in global emissions. These are shown in Figure 4-17.

Figure 4-17 Projected Temperature Change – Lower and Higher Emissions Scenario



Source: National Climate Assessment. Map Date 2016.

According to the California Natural Resource Agency (CNRA), climate change is already affecting California and is projected to continue to do so well into the foreseeable future. Current and projected changes include increased temperatures, sea level rise, a reduced winter snowpack altered precipitation patterns, and more frequent storm events. Over the long term, reducing greenhouse gases can help make these changes less severe, but the changes cannot be avoided entirely. Unavoidable climate impacts can result in a variety of secondary consequences including detrimental impacts on human health and safety, economic continuity, ecosystem integrity and provision of basic services.

The CNRA's 2014 Climate Adaptation Strategy (CAS) delineated how climate change may impact and exacerbate natural hazards in the future, including wildfires, extreme heat, floods, and drought:

- Climate change is expected to lead to increases in the frequency, intensity, and duration of extreme heat events and heat waves in the City of Piedmont, Alameda County and the rest of California, which are likely to increase the risk of mortality and morbidity due to heat-related illness and exacerbation of existing chronic health conditions. Those most at risk and vulnerable to climate-related illness are the elderly, individuals with chronic conditions such as heart and lung disease, diabetes, and mental illnesses, infants, the socially or economically disadvantaged, and those who work outdoors.
- Higher temperatures will melt the Sierra snowpack earlier and drive the snowline higher, resulting in less snowpack to supply water to California users.
- Droughts are likely to become more frequent and persistent in the 21st century.
- Intense rainfall events, periodically ones with larger than historical runoff, will continue to affect California with more frequent and/or more extensive flooding.
- Storms and snowmelt may coincide and produce higher winter runoff from the landward side, while accelerating sea-level rise will produce higher storm surges during coastal storms. Together, these changes may increase the probability of floods and levee and dam failures, along with creating issues related to salt water intrusion.
- Warmer weather, reduced snowpack, and earlier snowmelt can be expected to increase wildfire through fuel hazards and ignition risks. These changes can also increase plant moisture stress and insect populations, both of which affect forest health and reduce forest resilience to wildfires. An increase in wildfire intensity and extent will increase public safety risks, property damage, fire suppression and emergency response costs to government, watershed and water quality impacts, vegetation conversions and habitat fragmentation.

4.2.6. Dam Failure

Hazard/Problem Description

Dams are manmade structures built for a variety of uses including flood protection, power generation, agriculture, water supply, and recreation. When dams are constructed for flood protection, they are usually engineered to withstand a flood with a computed risk of occurrence. For example, a dam may be designed to contain a flood at a location on a stream that has a certain probability of occurring in any one year. If prolonged periods of rainfall and flooding occur that exceed the design requirements, that structure may be overtopped or fail. Overtopping is the primary cause of earthen dam failure in the United States.

Dam failures can also result from any one or a combination of the following causes:

- Earthquake;
- Inadequate spillway capacity resulting in excess overtopping flows;
- Internal erosion caused by embankment or foundation leakage, or piping or rodent activity;
- Improper design;
- Improper maintenance;
- Negligent operation; and/or
- Failure of upstream dams on the same waterway.

Water released by a failed dam generates tremendous energy and can cause a flood that is catastrophic to life and property. A catastrophic dam failure could challenge local response capabilities and require evacuations to save lives. Impacts to life safety will depend on the warning time and the resources available to notify and evacuate the public. Major loss of life could result as well as potentially catastrophic effects to roads, bridges, and homes. Electric generating facilities and transmission lines could also be damaged and affect life support systems in communities outside the immediate hazard area. Associated water supply, water quality and health concerns could also be an issue. Factors that influence the potential severity of a full or partial dam failure are the amount of water impounded; the density, type, and value of development and infrastructure located downstream; and the speed of failure.

In general, there are three types of dams: concrete arch or hydraulic fill, earth and rockfill, and concrete gravity. Each type of dam has different failure characteristics. A concrete arch or hydraulic fill dam can fail almost instantaneously; the flood wave builds up rapidly to a peak then gradually declines. An earth-rockfill dam fails gradually due to erosion of the breach; a flood wave will build gradually to a peak and then decline until the reservoir is empty. And, a concrete gravity dam can fail instantaneously or gradually with a corresponding buildup and decline of the flood wave.

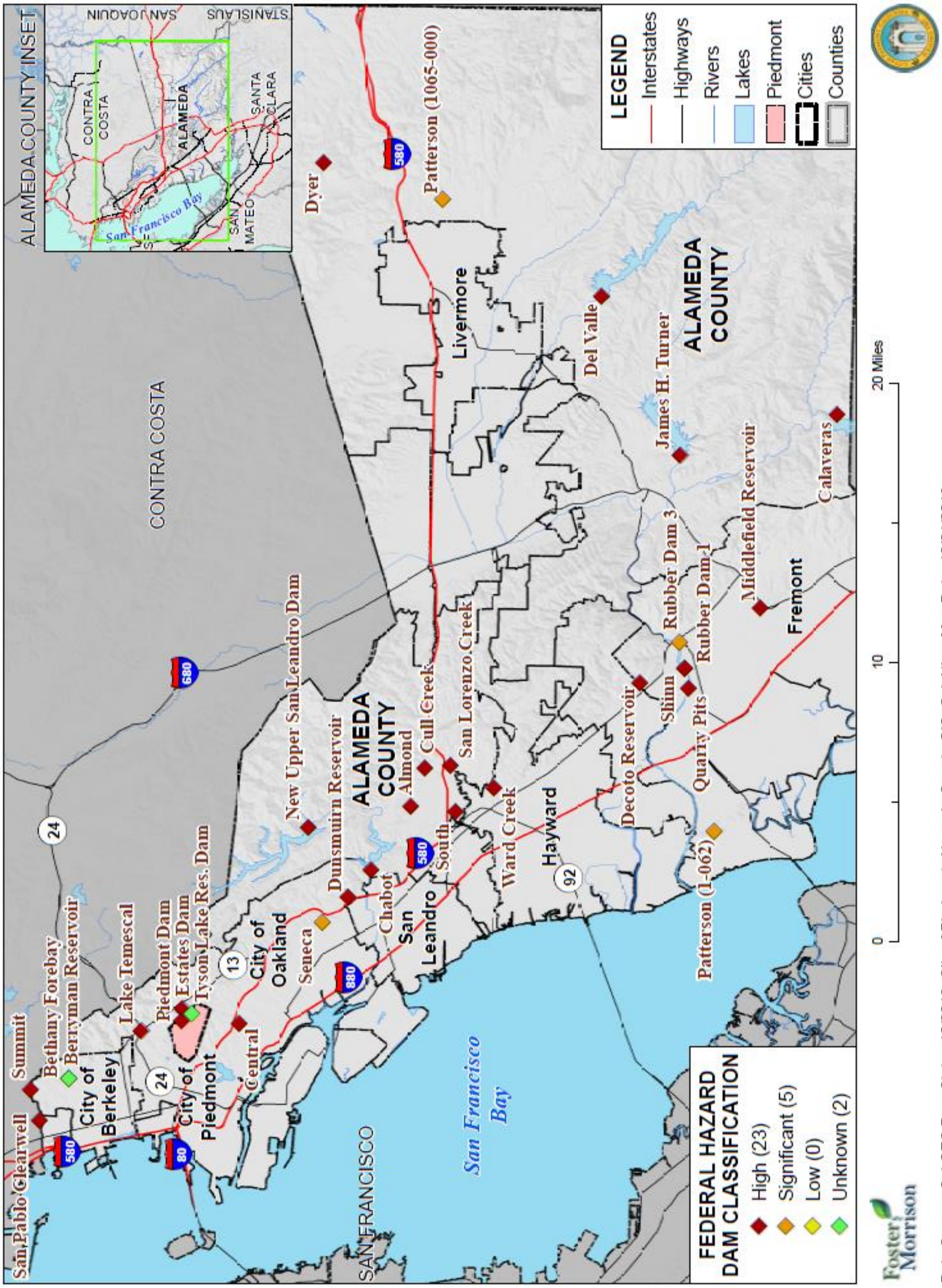
The California Department of Water Resources (Cal DWR) Division of Safety of Dams has jurisdiction over impoundments that meet certain capacity and height criteria. Embankments that are less than six feet high and impoundments that can store less than 15 acre-feet are non-jurisdictional. Additionally, dams that are less than 25 feet high can impound up to 50 acre-feet without being jurisdictional. Cal DWR, Division of Safety of Dams assigns hazard ratings to large dams within the State. The following two factors are considered when assigning hazard ratings: existing land use and land use controls (zoning) downstream of the dam. Dams are classified in three categories that identify the potential hazard to life and property:

- High hazard indicates that a failure would most probably result in the loss of life
- Significant hazard indicates that a failure could result in appreciable property damage
- Low hazard indicates that failure would result in only minimal property damage and loss of life is unlikely

Location

According to data provided by Alameda County, Cal DWR, East Bay Municipal Utility District and Cal OES, there are 35 dams in Alameda County constructed for flood control, storage, electrical generation, and recreational purposes. Figure 4-18 identifies the dams in Alameda County, which are also shown on Table 4-15.

Figure 4-18 Alameda County Dam Inventory



Data Source: Cal OES Dam Status 10/2018, City of Piedmont, Alameda County GIS, Cal-Atlas; Map Date: 10/01/2018.

Table 4-15 Alameda County Dam Inventory

Dam Name	Owner	Year Built	Capacity (acre-feet)*	Type	Dam Height	Significance
Almond**	East Bay Municipal Utility District	1954	20	Earth	30	High
Berryman Reservoir	East Bay Municipal Utility District	1905 (recently replaced)	45	Steel Water Tank (was originally earth)	61	Unknown
Bethany Forebay	California Department of Water Resources	1961	5,250	Earth	96	High
Calaveras	City & County of San Francisco	1925	100,000	Hydraulic Fill	213	High
Central**	East Bay Municipal Utility District	1910	485	Earth	56	High
Chabot	East Bay Municipal Utility District	1892	10,281	Hydraulic Fill	140	High
Cull Creek	Alameda County Flood Control & Water Conservation District	1963	310	Earth	56	High
Decoto Reservoir	Alameda County Water District	1966	46	Earth	34	High
Del Valle	California Department of Water Resources	1968	77,100	Earth	225	High
Dunsmuir Reservoir	East Bay Municipal Utility District	1968	197	Reinforced Tank	40	High
Dyer	California Department of Water Resources	2011	525	Earth	30	High
Estates Dam	East Bay Municipal Utility District	1903	56	Earth	94	High
James H. Turner	City & County of San Francisco	1964	50,500	Earth	196	High
Lake Temescal	East Bay Regional Park District	1869	200	Earth	118	High
Mayhew Reservoir	Alameda County Water District	Unknown	Unknown	Unknown	unknown	Unknown
Middlefield Reservoir	Alameda County Water District	1958	22	Earth	149	High
New Upper San Leandro Dam	East Bay Municipal Utility District	1977	42,000	Earth	185	High
Patterson (1-062)	California Department of Water Resources	1962	104	Earth	100	Significant
Patterson (1065-000)	Alameda County Water District	1962	46	Earth	35	Significant
Piedmont Dam	East Bay Municipal Utility District	1905	500	Earth	64	High

Dam Name	Owner	Year Built	Capacity (acre-feet)*	Type	Dam Height	Significance
Quarry Pits	Alameda County Water District	1977	3,360	Earth	25	High
Rubber Dam 1	Alameda County Water District	Unknown	Unknown	Unknown	12	High
Rubber Dam 3*	Alameda County Water District	1990	154	Inflatable	16	Significant
San Lorenzo Creek	Alameda County Flood Control & Water Conservation District	1964	380	Earth	65	High
San Pablo Clearwell**	East Bay Municipal Utility District	1922	17	Earth	42	High
Seneca	East Bay Municipal Utility District	1950	92 (dam has been emptied)	Earth	41	Significant (dam has been emptied – which makes it Low)
Shinn	Alameda County Water District	1987	390	Earth	25	Significant
South	East Bay Municipal Utility District	1956 (recently replaced)	156	Reinforced concrete tanks	59	High
Summit	East Bay Municipal Utility District	1891 (recently replaced)	117	Reinforced concrete tanks	62	High
Tyson Lake	Tyson Lake Homeowners Association	–	9	–	–	N/A
Ward Creek	Alameda County Flood Control & Water Conservation District	1963	130	Earth	72	High

Source: Cal OES, National Performance of Dams Program, City of Piedmont General Plan, East Bay Municipal Utility District
*One acre foot equals 325,000 gallons
**East Bay Municipal Utility District noted that these dams will be replaced with water tanks in the near future, to reduce seismic risk

Dams of Concern

Of the 32 dams, only 5 were thought to have the possibility to impact the City of Piedmont. After further study, it was shown that only the Tyson Lake Dam could currently affect the City of Piedmont. This is shown in Table 4-16.

Table 4-16 City of Piedmont – Dams of Concern

Dam Name	Why a Source of Concern	Comments
Dingee Reservoir	Noted by HMPC	Initially thought to be of concern to the City. However, the dam is located outside the City and does not have inundation in the City. It was further noted that the Reservoir has been drained and decommissioned. **This dam will not affect the City as it currently sits.**

Dam Name	Why a Source of Concern	Comments
Estates Reservoir	Noted by General Plan	EBMUD Reservoir #1 on Estates Drive has been replaced with two reinforced concrete water tanks. In the event the Estates Reservoir (or the replacement tanks) collapsed, water would follow the streambed between Glen Alpine and Sea View, cross Hampton Road, and follow St. James to Indian Gulch**. This dam will not affect the City as it currently sits.**
Lake Temescal	Noted by General Plan	This dam was thought to affect the City, but the inundation layer shows no area of Piedmont would be affected by a Temescal Dam failure. **This dam will not affect the City as it currently sits.**
Piedmont Dam	Noted by General Plan	Though initially though to affect the City, this Dam has been drained and decommissioned by EBMUD. At the Piedmont Dam, the open cut dam was removed; and containment structures to replace old dam are expected to be installed in next 10 year period, but currently no water is held in the Piedmont dam containment area. In the event the future Piedmont Reservoir tank collapsed, water would flow into Moraga Canyon. **This dam will not affect the City as it currently sits.**
Tyson Lake Reservoir	Noted by HMPC	The HMPC also noted that Tyson Lake and its associated dam are below the size threshold requiring monitoring by the State Department of Water Resources Division of Dam Safety. The dam is periodically inspected on behalf of the Tyson Lake Homeowners Association. In the event of dam failure, water would cross Hampton Field Park and then follow LaSalle to Indian Gulch, potentially damaging homes in its path. **This is the only dam of concern to the City.**

Source: City of Piedmont

The HMPC and EBMUD noted that open cut reservoirs are all being replaced and the location of the tanks used is prioritized considering redundancy and the ability to move water between pressure zones as needed, District property locations, ingress and egress, and a number of other factors. Concrete tanks are built to the latest seismic standards and are designed for far greater efficiency, excellent water storage capacity, and sized to meet or exceed to expected demand for water in the pressure zones served by those reservoirs

Extent

Dam failure is a natural disaster from two perspectives. First, the inundation from released waters resulting from dam failure is related to naturally occurring floodwaters. Second, dam failure would most probably happen in consequence of the natural disaster triggering the event. There is no scale with which to measure dam failure, only a scale to measure dam failure vulnerability based on size of dam and proximity to development. Dam failure may range from a small breach to a total failure. While a dam may fill slowly with runoff from winter storms, a dam break can have a very quick speed of onset. The duration of dam failure is not long – only as long as it takes to empty the reservoir of water the dam held back.

Dam inundation affects discrete areas of the City. No inundation maps are available for the Tyson Lake Dam, so no GIS extent analysis is included here.

Past Occurrences

Disaster Declaration History

There have been no disasters declarations related to dam failure in Alameda County, as shown in Table 4-3.

NCDC Events

There have been no NCDC dam failure events in Alameda County.

National Performance of Dams Program Events

The National Performance of Dams Program at Stanford University tracks dam failures. A search of the National Performance of Dams Program database showed no past dam failure events in or around Piedmont.

Hazard Mitigation Planning Team Events

There have been no past events of dam failure for the dams of concern for the City. The HMPC noted that the San Francisco Public Utilities Commission-owned Calaveras Dam, located in Alameda County, failed during construction in 1918. A landslide damaged the upstream shell of the dam and destroyed the dam's outlet tower. In 2015, the inflatable dam on Alameda Creek (Rubber Dam 3) failed due to vandalism, releasing a significant supply of the community's water into the San Francisco Bay. However, Alameda County, as well as the Bay Area as a whole, has not experienced dam failure of a functioning dam that has resulted in inundation. None of these events affected the City of Piedmont.

Likelihood of Future Occurrences

Unlikely – There have been no recorded events of dam failure in or around Piedmont. None of the dams of concern have ever been at risk of failure in the past. Based on past occurrences, it is unlikely a dam failure will occur in the future that would impact the City of Piedmont.

Climate Change and Dam Failure

Increases in both precipitation and heat causing snow melt in areas upstream of dams could increase the potential for dam failure and uncontrolled releases on dams that could affect the City of Piedmont.

4.2.7. Drought and Water Shortage

Hazard/Problem Description

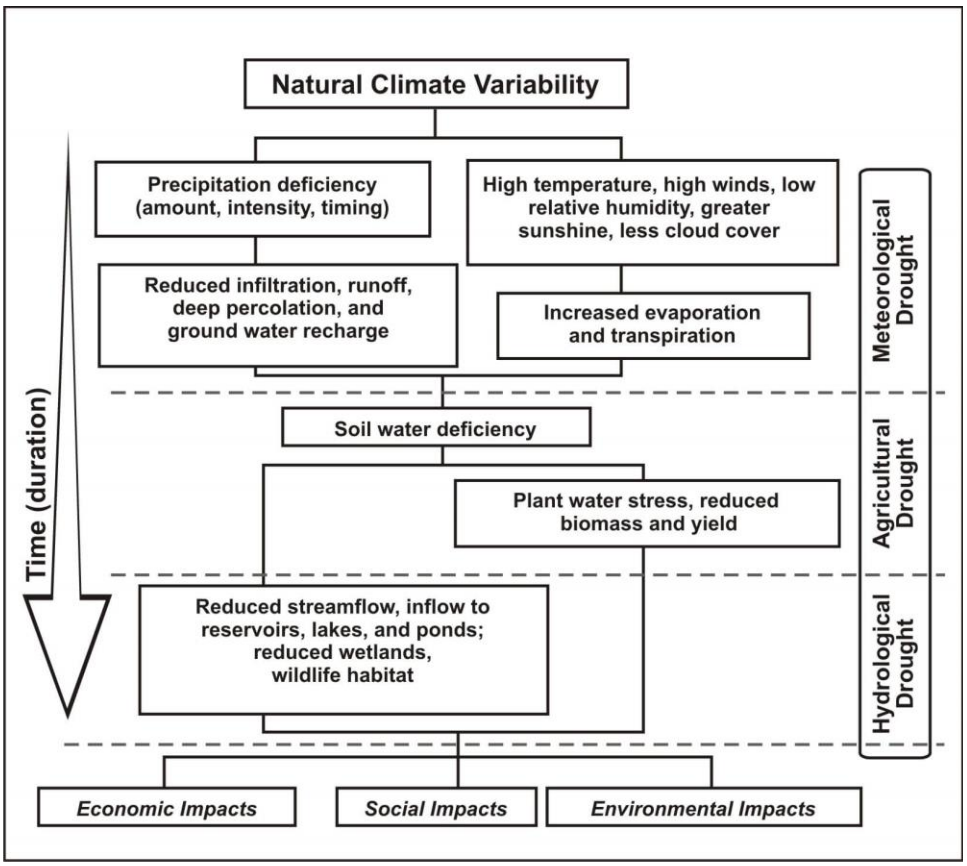
Drought

Drought is a gradual phenomenon. Although droughts are sometimes characterized as emergencies, they differ from typical emergency events. Most natural disasters, such as floods or forest fires, occur relatively rapidly and afford little time for preparing for disaster response. Droughts occur slowly, over a multi-year period, and it is often not obvious or easy to quantify when a drought begins and ends. Water districts normally require at least a 10-year planning horizon to implement a multiagency improvement project to mitigate the effects of a drought and water supply shortage.

Drought is a complex issue involving (see Figure 4-19) many factors—it occurs when a normal amount of precipitation and snow is not available to satisfy an area's usual water-consuming activities. Drought can often be defined regionally based on its effects:

- Meteorological drought is usually defined by a period of below average water supply.
- Agricultural drought occurs when there is an inadequate water supply to meet the needs of the state's crops and other agricultural operations such as livestock.
- Hydrological drought is defined as deficiencies in surface and subsurface water supplies. It is generally measured as streamflow, snowpack, and as lake, reservoir, and groundwater levels.
- Socioeconomic drought occurs when a drought impacts health, well-being, and quality of life, or when a drought starts to have an adverse economic impact on a region.

Figure 4-19 Causes and Impact of Drought



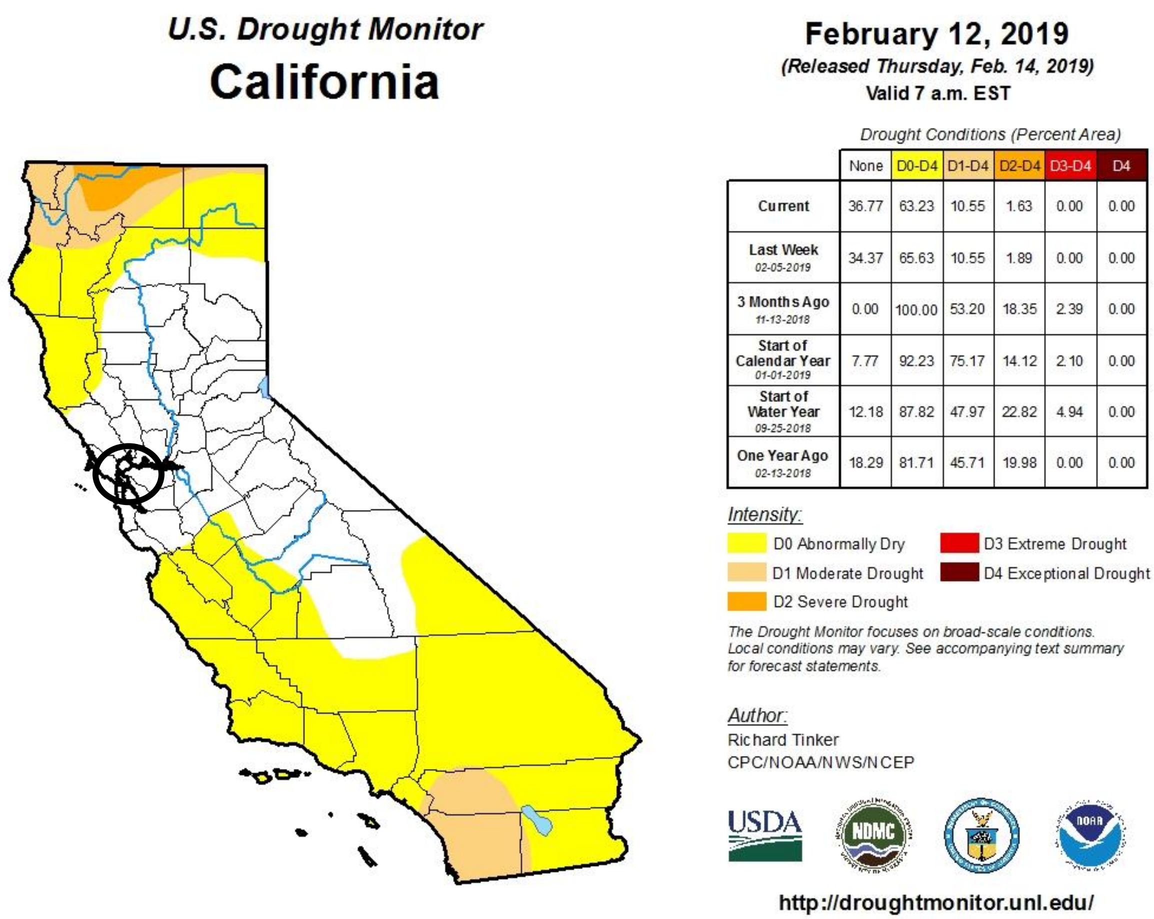
Source: National Drought Mitigation Center (NDMC)

Drought can cause increased wildfire risk. This is discussed in Section 4.2.14

Location

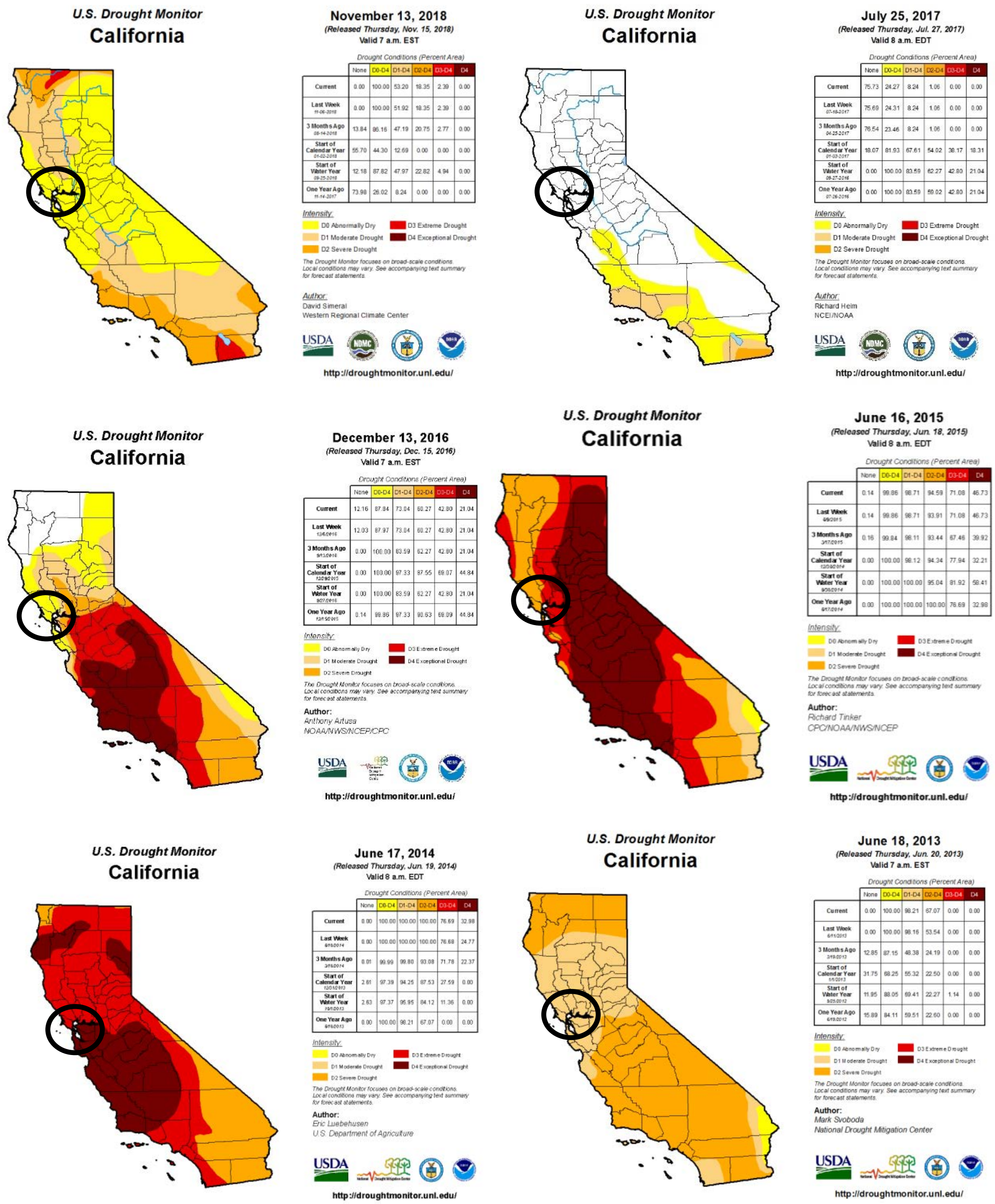
Drought is a regional phenomenon. Drought affects the whole of the City. Drought in the United States is monitored by the National Integrated Drought Information System (NIDIS). A major component of this portal is the U.S. Drought Monitor. The Drought Monitor concept was developed jointly by the NOAA's Climate Prediction Center, the NDMC, and the USDA's Joint Agricultural Weather Facility in the late 1990s as a process that synthesizes multiple indices, outlooks and local impacts, into an assessment that best represents current drought conditions. The final outcome of each Drought Monitor is a consensus of federal, state, and academic scientists who are intimately familiar with the conditions in their respective regions. A snapshot of the current 2019 drought conditions in California and the Planning Area can be found in Figure 4-20. Snapshot from 2013 to 2018 are shown in Figure 4-21.

Figure 4-20 Current Drought Status in the City of Piedmont



Source: US Drought Monitor

Figure 4-21 Previous Drought Status in the City of Piedmont



Source: US Drought Monitor

Cal DWR says the following about drought:

One dry year does not normally constitute a drought in California. California's extensive system of water supply infrastructure—its reservoirs, groundwater basins, and inter-regional conveyance facilities—mitigates the effect of short-term dry periods for most water users. Defining when a drought begins is a function of drought impacts to water users. Hydrologic conditions constituting a drought for water users in one location may not constitute a drought for water users elsewhere, or for water users having a different water supply. Individual water suppliers may use criteria such as rainfall/runoff, amount of water in storage, or expected supply from a water wholesaler to define their water supply conditions.

The drought issue in California is further compounded by water rights. Water is a commodity possessed under a variety of legal doctrines. The prioritization of water rights between farming and federally protected fish habitats in California contributes to this issue.

Extent

As shown on the previous figures, drought is tracked by the US Drought Monitor. The Drought Monitor includes a scale to measure drought intensity:

- None
- D0 (Abnormally Dry)
- D1 (Moderate Drought)
- D2 (Severe Drought)
- D3 (Extreme Drought)
- D4 (Exceptional Drought)

Drought is not initially recognized as a problem because it normally originates in what is considered good weather, which typically includes a dry late spring and summer in Mediterranean climates, such as in California. This is particularly true in Northern California where drought impacts are delayed for most of the population by the wealth of stored surface and ground water. The drought complications normally appear more than a year after a drought begins. The most direct and likely most difficult drought impact to quantify is to local economies, especially agricultural economies. The State has conducted some empirical studies on the economic effects of fallowed lands with regard to water purchased by the State's Water Bank; but these studies do not quantitatively address the situation in Alameda County. It can be assumed, however, that the loss of production in one sector of the economy would affect other sectors.

Drought has the potential to affect the entire City and Alameda County. Drought impacts are wide-reaching and may be economic, environmental, and/or societal. The most significant impacts associated with drought in the Planning Area are those related to water intensive activities such as, municipal usage, commerce, tourism, recreation, and wildfire protection. Also, during a drought, allocations go down and water costs increase, which results in reduced water availability. Voluntary conservation measures are a normal and ongoing part of system operations and actively implemented during extended droughts. A reduction of electric power generation and water quality deterioration are also potential problems. Drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding and erosion.

Water Shortage

Northern California communities, including the City of Piedmont, generally have sufficient groundwater and surface water supplies to mitigate even the severest droughts of the past century. The City of Piedmont General Plan Conservation Element noted that Piedmont is underlain by a permeable layer of water-bearing rock and soil known as an aquifer. Water is contained in scattered pockets of permeable soil called lenses. In most parts of Piedmont, the upper level of the aquifer, or water table, is more than 20 feet below the ground. Early settlers of Piedmont relied on the aquifer for farming and drinking water, and one of Piedmont's first attractions was a mineral spring in modern-day Piedmont Park. Once the area became urbanized, city wells were no longer adequate and a public water source was developed. There are still several wells in Piedmont today, but they are not used for potable water.

The City of Piedmont is served by the East Bay Municipal Utility District (EBMUD). EBMUD captures snowmelt from 575 square miles of mostly undeveloped public and private watershed lands of the Mokelumne River and collects it at Pardee Reservoir, 90 miles east of the Bay Area. EBMUD has water rights for up to 325 million gallons daily from the Mokelumne River watershed. Pardee Reservoir has a capacity of 197,950 acre-feet, which is equivalent to a 10-month supply for EBMUD's 1.4 million water customers.

Ten miles downstream from Pardee Reservoir, Camanche Reservoir stores water to meet the needs of fisheries, riparian habitat and downstream water-rights holders, and it provides flood control. Camanche Reservoir has a capacity of 417,120 acre-feet of water. Local runoff is stored in several East Bay reservoirs for treatment and delivery to customers and to assure emergency supplies are available locally. In a year of normal precipitation, EBMUD uses an average of 21 million gallons per day (MGD) of water from local watershed runoff.

In dry years, enough water can be lost through evaporation to completely offset any water gained from local runoff. EBMUD can store up to 151,670 acre-feet of water in the East Bay reservoirs. Typically, EBMUD stores a six-month emergency supply in local reservoirs. EBMUD now also has a contract with the U.S. Bureau of Reclamation for a supplemental water supply from the Sacramento River. EBMUD has rights to up to 100 MGD from the Sacramento River in dry years. When needed, the water is conveyed through the Freeport Regional Water Facility jointly owned by EBMUD and Sacramento County.

For a long term drought, the Mokelumne River and local runoff cannot meet EBMUD's projected customer demands, even with mandatory water use restrictions in place. Furthermore, EBMUD's Mokelumne River supply is expected to be reduced as demands on the Mokelumne River increase from the growing needs of users in Amador, Calaveras, and San Joaquin counties. These counties have water rights senior to those of EBMUD's.

Location

Since water shortage happens on a regional scale and water supply sources are similar throughout the City, the entirety of the City is at risk.

Extent

There is no established scientific scale to measure water shortage. The speed of onset of water shortage tends to be lengthy. The duration of water shortage can vary, depending on the severity of the drought that accompanies it.

Past Occurrences

Disaster Declaration History

There have been two state and one federal disaster declaration for Alameda County. These are shown on Table 4-17.

Table 4-17 City of Piedmont – State and Federal Drought Disaster Declarations 1950-2018

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Drought	2	1976, 2014	1	1977

Source: Cal OES, FEMA

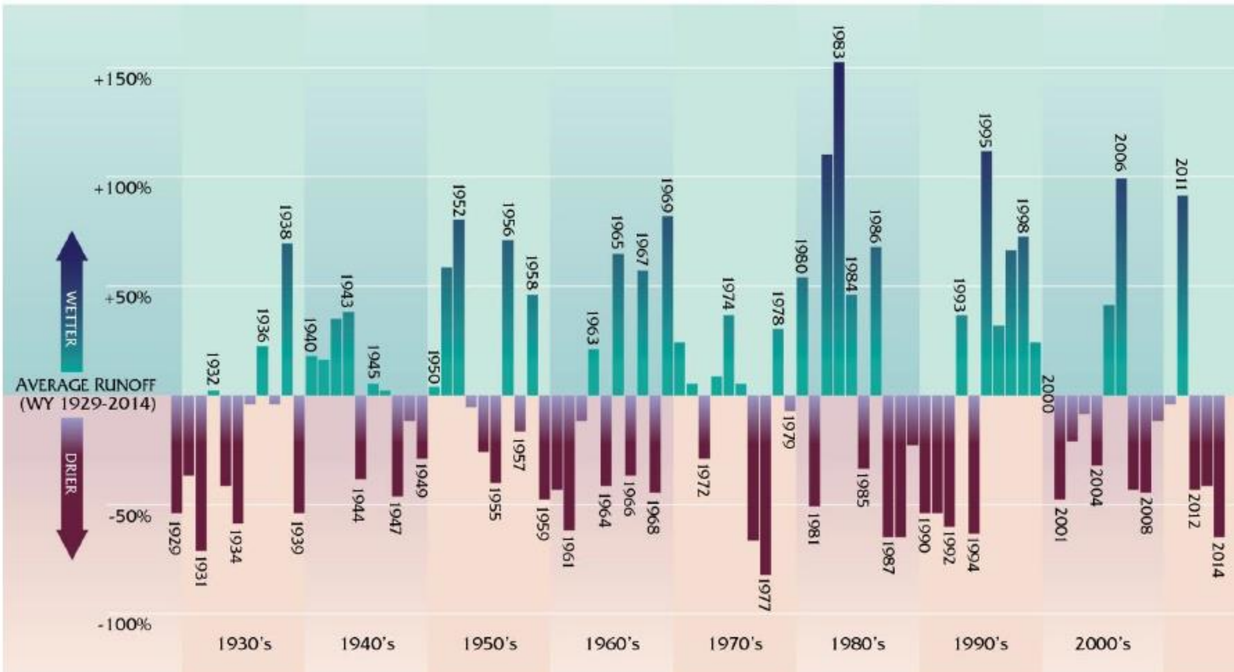
NCDC Events

There have been no NCDC drought events in Alameda County. This is most likely due to underreporting of these events in the NCDC database.

Hazard Mitigation Planning Team Events

Northern California's water resources, including EBMUD's supplies, have historically been affected by periodic drought cycles. Multi-year droughts in particular have significantly diminished the supply of water available to EBMUD's customers. However, when precipitation levels are up, these water sources can and do rebound. Figure 4-22, which includes data from the 2014-2015 drought, illustrates the variability in runoff in the Mokelumne Watershed since 1929.

Figure 4-22 Variability in Runoff in the Mokelumne Watershed



Source: East Bay Municipal Utility District

The 2018 California State Hazard Mitigation Plan discussed the major droughts from 1900 to 2017. This discussion below appends to the tables and figures above.

The 1975-1977 Drought

From November 1975 through November 1977, California experienced one of its most severe droughts. Although people in many areas of the state are accustomed to very little precipitation during the growing season (April to October), they expect it in the winter. In 1976 and 1977, the winters brought only one-half and one-third of normal precipitation, respectively. Most surface storage reservoirs were substantially drained in 1976, leading to widespread water shortages when 1977 turned out to be even drier. 31 counties were affected, resulting in $2.67 billion in crop damage.

The 1987-1992 Drought

From 1987 to 1992, California again experienced a serious drought due to low precipitation and run-off levels. The hardest-hit region was the Central Coast, roughly from San Jose to Ventura. In 1988, 45 California counties experienced water shortages that adversely affected about 30 percent of the state's population, much of the dry-farmed agriculture, and over 40 percent of the irrigated agriculture. Fish and wildlife resources suffered, recreational use of lakes and rivers decreased, forestry losses and fires increased, and hydroelectric power production decreased. In February 1991, DWR and Cal OES surveyed drought conditions in all 58 California counties and found five main problems: extremely dry rangeland, irrigated agriculture with severe surface water shortages and falling groundwater levels, widespread rural areas where individual and community supplies were going dry, urban area water rationing at 25 to 50 percent of normal usage, and environmental impacts.

Storage in major reservoirs had dropped to 54 percent of average, the lowest since 1977. The shortages led to stringent water rationing and severe cutbacks in agricultural production, including threats to survival of permanent crops such as trees and vines. Fish and wildlife resources were in critical shape as well. Not since the 1928-1934 drought had there been such a prolonged dry period. In response to those conditions, the Governor established the Drought Action Team. This team almost immediately created an emergency drought water bank to develop a supply for four critical needs: municipal and industrial uses, agricultural uses, protection of fish and wildlife, and carryover storage for 1992. The large-scale transfer program, which involved over 800,000 acre-feet of water, was implemented in less than 100 days with the help and commitment of the entire water community and established important links between state agencies, local water interests, and local governments for future programs.

The 2007-2009 Drought

Water years 2007-2009 were collectively the 15th driest three-year period for DWR's eight-station precipitation index, which is a rough indicator of potential water supply availability to the State Water Project (SWP) and Central Valley Project (CVP). Water year 2007 was the driest single year of that drought, and fell within the top 20 percent of dry years based on computed statewide runoff. In June 2008, a state emergency proclamation was issued due to water shortage in selected Central Valley counties. In February 2009, for the first time in its history, the State of California proclaimed a statewide drought. The state placed unprecedented restrictions on CVP and SWP diversions from the Delta to protect listed fish species, a regulatory circumstance that exacerbated the impacts of the drought for water users.

The greatest impacts of the 2007–2009 drought were observed in the CVP service area on the west side of the San Joaquin Valley, where hydrologic conditions combined with reduced CVP exports resulted in substantially reduced water supplies (50 percent supplies in 2007, 40 percent in 2008, and 10 percent in 2009) for CVP south-of Delta agricultural contractors. Small communities on the west side highly dependent on agricultural employment were especially affected by land fallowing due to lack of irrigation supplies, as well as by factors associated with current economic recession. The coupling of the drought and economic recession necessitated emergency response actions related to social services, such as food banks and unemployment assistance.

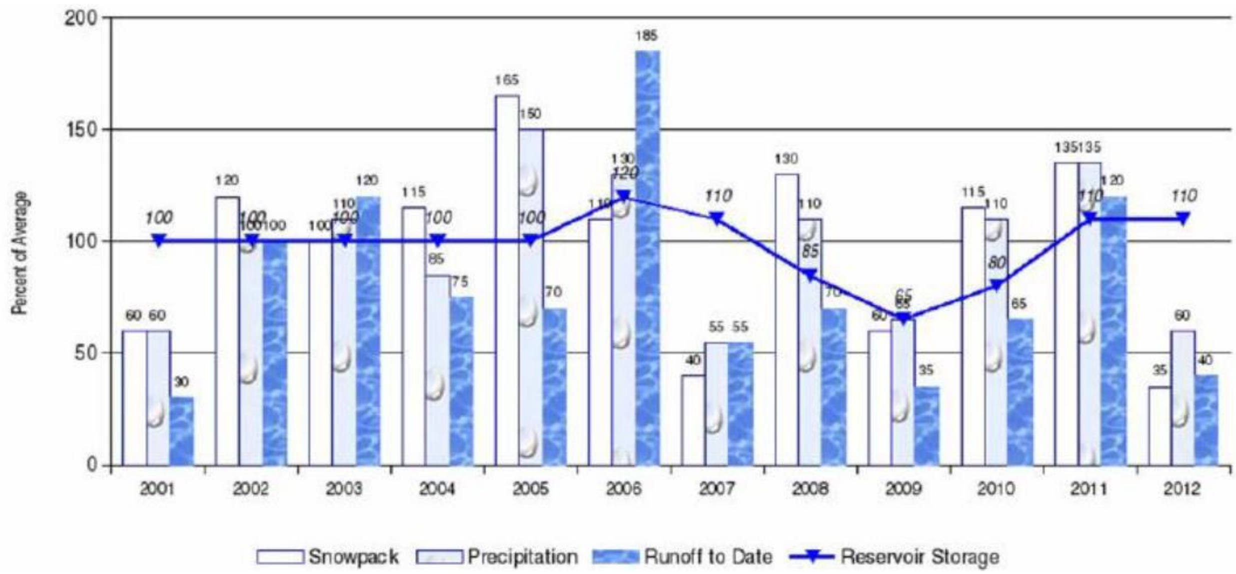
The 2012-2017 Drought

The statewide drought of 2012-2017 will be remembered as one of the most severe and costliest droughts of record in California. The drought that spanned water years 2012 through 2017 included the driest four-year statewide precipitation on record (2012-2015) and the smallest Sierra-Cascades snowpack on record (2015, with 5 percent of average). It was marked by extraordinary heat: 2014, 2015, and 2016 were California's first, second, and third warmest years in terms of statewide average temperatures. By the time the drought was declared officially over in April 2017, the state had expended $6.6 billion in drought response and mitigation programs, and had been declared a federal disaster area. The following discussion outlines the chronology of events and milestones reached during the drought as well as a summary of Executive Orders issued by the Governor, disaster assistance programs initiated, and grant programs designed to alleviate the impacts of the drought.

Water Shortage

Figure 4-23 illustrates several indicators commonly used to evaluate water conditions in California. The percent of average values are determined by measurements made in each of the ten major hydrologic regions. The chart describes water conditions in California between 2007 and 2018. The chart illustrates the cyclical nature of weather patterns in California.

Figure 4-23 Water Supply Conditions, 2007 to 2012



Source: 2018 State of California Hazard Mitigation Plan

Beginning in 2012, snowpack levels in California dropped dramatically. 2015 estimates place snowpack as 5 percent of normal levels. Snowpack measurements have been kept in California since 1950 and nothing in the historic record comes close to 2015's severely depleted level. The previous record for the lowest snowpack level in California, 25 percent of normal, was set both in 1976-77 and 2013-2014. In "normal" years, the snowpack supplies about 30 percent of California's water needs, according to the California Department of Water Resources. Snowpack levels began to increase in 2016, and in 2017 snowpack increased to the largest in 22 years, according to the State Department of Water Resources. In late 2017 and early 2018, drought conditions had begun to return to southern California.

With a reduction in water, water supply issues based on water rights becomes more evident. Drought and water supply issues will continue to be a concern to the Planning Area.

Likelihood of Future Occurrence

Drought

Occasional—Historical drought data for the Alameda County Planning Area and region indicate there have been 5 significant droughts in the last 85 years. This equates to a drought every 17 years on average or a 5.9 percent chance of a drought in any given year. However, based on this data and given the multi-year length of droughts, the HMPC determined that future drought occurrence in the Planning Area are occasional.

Water Shortage

Occasional — Recent historical data for water shortage indicates that the City may at some time be at risk to both short and prolonged periods of water shortage. Based on this it is possible that water shortages will affect the City in the future during extreme drought conditions. However, to date, Piedmont has continued to have relatively consistent water supply.

Climate Change and Drought and Water Shortage

Climate scientists studying California find that drought conditions are likely to become more frequent and persistent over the 21st century due to climate change. The experiences of California during recent years underscore the need to examine more closely the state's water storage, distribution, management, conservation, and use policies. The Climate Adaptation Strategy (CAS) stresses the need for public policy development addressing long term climate change impacts on water supplies. The CAS notes that climate change is likely to significantly diminish California's future water supply, stating that:

California must change its water management and uses because climate change will likely create greater competition for limited water supplies needed by the environment, agriculture, and cities.

Members of the HMPC noted a report published in Science magazine in 2015 that stated:

> *Given current greenhouse gas emissions, the chances of a 35+ year "megadrought" striking the Southwest by 2100 are above 80 percent.*

The HMPC also noted a report from the Public Policy Institute of California that thousands of Californians – mostly in rural, small, disadvantaged communities – already face acute water scarcity, contaminated groundwater, or complete water loss. Climate change would make these effects worse.

4.2.8. Earthquake

Hazard/Problem Description

An earthquake is caused by a sudden slip on a fault. Stresses in the earth's outer layer push the sides of the fault together. Stress builds up, and the rocks slip suddenly, releasing energy in waves that travel through the earth's crust and cause the shaking that is felt during an earthquake. Earthquakes can cause structural damage, injury, and loss of life, as well as damage to infrastructure networks, such as water, power, gas, communication, and transportation. Earthquakes may also cause collateral emergencies including dam and levee failures, seiches, hazmat incidents, fires, avalanches, and landslides. The degree of damage depends on many interrelated factors. Among these are: the magnitude, focal depth, distance from the causative fault, source mechanism, duration of shaking, high rock accelerations, type of surface deposits or bedrock, degree of consolidation of surface deposits, presence of high groundwater, topography, and the design, type, and quality of building construction. This section briefly discusses issues related to types of seismic hazards.

Ground Shaking

Ground shaking is motion that occurs as a result of energy released during faulting. The damage or collapse of buildings and other structures caused by ground shaking is among the most serious seismic hazards. Damage to structures from this vibration, or ground shaking, is caused by the transmission of earthquake vibrations from the ground to the structure. The intensity of shaking and its potential impact on buildings is determined by the physical characteristics of the underlying soil and rock, building materials and workmanship, earthquake magnitude and location of epicenter, and the character and duration of ground motion.

Actual ground breakage generally affects only those buildings directly over or nearby the fault. Ground shaking generally has a much greater impact over a greater geographical area than ground breakage. The amount of breakage and shaking is a function of earthquake magnitude, type of bedrock, depth and type of soil, general topography, and groundwater. As with most communities in Northern California near active faults, Piedmont would be susceptible to violent ground shaking.

Seismic Structural Safety

Older buildings constructed before building codes were established, and even newer buildings constructed before earthquake-resistance provisions were included in the codes, are the most likely to be damaged during an earthquake. Buildings one or two stories high of wood-frame construction are considered to be the most structurally resistant to earthquake damage. Older masonry buildings without seismic reinforcement (unreinforced masonry) and soft story buildings are the most susceptible to the type of structural failure that causes injury or death.

The susceptibility of a structure to damage from ground shaking is also related to the underlying foundation material. A foundation of rock or very firm material can intensify short-period motions which affect low-rise buildings more than tall, flexible ones. A deep layer of water-logged soft alluvium can cushion low-rise buildings, but it can also accentuate the motion in tall buildings. The amplified motion resulting from softer alluvial soils can also severely damage older masonry buildings.

Other potentially dangerous conditions include, but are not limited to: building architectural features that are not firmly anchored, such as parapets and cornices; roadways, including column and pile bents and abutments for bridges and overcrossings; and above-ground storage tanks and their mounting devices. Such features could be damaged or destroyed during strong or sustained ground shaking.

Surface Rupture

The HMPC and USGS noted that surface rupture is not regarded as a local hazard because there are no active fault lines within the City.

Liquefaction Potential

Liquefaction is a process whereby soil is temporarily transformed to a fluid formed during intense and prolonged ground shaking. Areas most prone to liquefaction are those that are water saturated (e.g., where the water table is less than 30 feet below the surface) and consist of relatively uniform sands that are loose to medium density. In addition to necessary soil conditions, the ground acceleration and duration of the earthquake must be of sufficient energy to induce liquefaction.

Liquefaction during major earthquakes has caused severe damage to structures on level ground as a result of settling, titling, or floating. Such damage occurred in San Francisco on bay-filled areas during the 1989 Loma Prieta earthquake, even though the epicenter was several miles away. If liquefaction occurs in or under a sloping soil mass, the entire mass may flow toward a lower elevation. Also of particular concern in terms of developed and newly developing areas are fill areas that have been poorly compacted. Liquefaction is discussed in greater detail in Section 4.2.9.

Settlement

Settlement can occur in poorly consolidated soils during ground shaking. During settlement, the soil materials are physically rearranged by the shaking to result in a less stable alignment of the individual minerals. Settlement of sufficient magnitude to cause significant structural damage is normally associated with rapidly deposited alluvial soils or improperly founded or poorly compacted fill. These areas are known to undergo extensive settling with the addition of irrigation water, but evidence due to ground shaking is not available.

Landslide/Debris Flows

Landslides can occur as a result of horizontal seismic inertia induced in the slopes by the ground shaking. The most common earthquake-induced landslides include shallow, disrupted landslides such as rock falls, rockslides, and soil slides. Debris flows are created when surface soil on steep slopes becomes totally saturated with water. Once the soil liquefies, it loses the ability to hold together and can flow downhill at very high speeds, taking vegetation and/or structures with it. Slide risks increase after an earthquake during a wet winter. This is discussed in greater extent in Section 4.2.12.

Location

Piedmont is located in a geologically active part of the world and is at risk to earthquakes from multiple faults. The region's geology is dominated by the intersection of the Pacific and North American tectonic plates, two components of the earth's crust that are moving in opposite directions. Large earthquake faults have developed in response to the stress between the plates. When enough strain builds up along a fault line, the plates slip and an earthquake occurs.

The City of Piedmont General Plan Environmental Hazards Element noted that since 1972, the State of California has required that earthquake fault zones with a high potential for surface rupture be officially designated on USGS maps. These areas are known as "Special Study Zones" and are subject to geotechnical study requirements and development restrictions. The Special Studies Zone associated with the Hayward Fault extends about 300-400 feet on either side of the fault trace, which places its western boundary just east of the Piedmont city limits. There are no Special Study Zones within Piedmont.

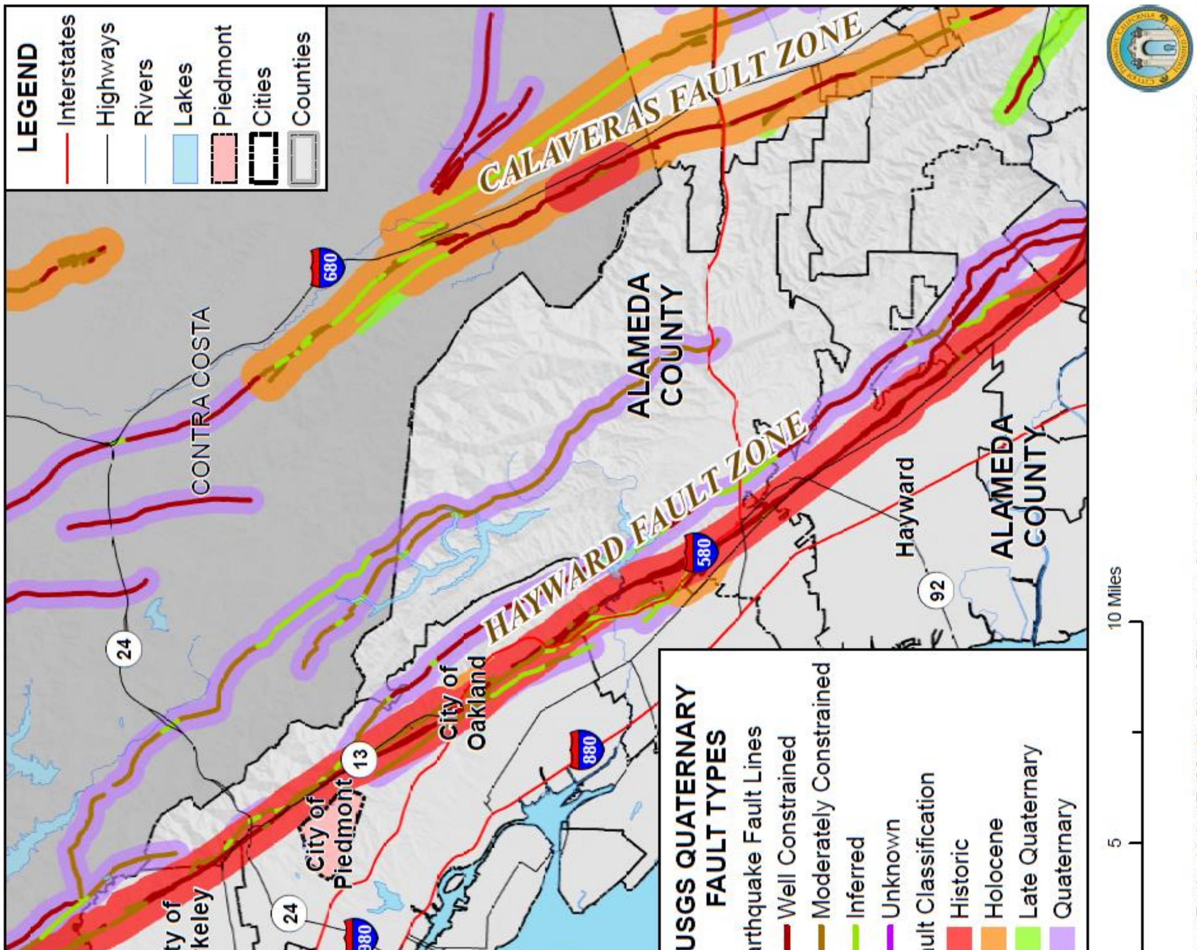
Faults

A fault is defined as "a fracture or fracture zone in the earth's crust along which there has been displacement of the sides relative to one another." For the purpose of planning there are two types of faults, active and inactive. Active faults have experienced displacement in historic time, suggesting that future displacement may be expected. Inactive faults show no evidence of movement in recent geologic time, suggesting that these faults are dormant. This does not mean, however, that faults having no evidence of surface displacement within the last 11,000 years are necessarily inactive. For example, the 1975 Oroville earthquake, the 1983 Coalinga earthquake, and the 1987 Whittier Narrows earthquake occurred on faults not previously recognized as active. Potentially active faults are those that have shown displacement within the last 1.6 million years (Quaternary). An inactive fault shows no evidence of movement in historic (last 200 years) or geologic time, suggesting that these faults are dormant.

Two types of fault movement represent possible hazards to structures in the immediate vicinity of the fault: fault creep and sudden fault displacement. Fault creep, a slow movement of one side of a fault relative to the other, can cause cracking and buckling of sidewalks and foundations even without perceptible ground shaking. Sudden fault displacement occurs during an earthquake event and may result in the collapse of buildings or other structures that are found along the fault zone when fault displacement exceeds an inch or two. The only protection against damage caused directly by fault displacement is to prohibit construction in the fault zone.

No faults are known to underlie the City of Piedmont. The City of Piedmont General Plan noted that in the Central Bay Area, most earthquakes are associated with the San Andreas, Calaveras, and Hayward Faults. The San Andreas Fault traverses San Mateo County, about 15 miles west of Piedmont. The Calaveras Fault lies on the edge of the Diablo Range, about 15 miles to the east. The main trace of the Hayward Fault runs about 0.25 miles east of Piedmont, along an alignment that roughly parallels State Highway 13. The Fault extends from Point Pinole more than 40 miles south to Milpitas. The Hayward Fault presents the greatest threat to Piedmont due to its proximity, although a large earthquake on any of the region's faults could cause significant damage to the City. This can be seen on Figure 4-24.

Figure 4-24 City of Piedmont – Active Faults in or near the City



Data Source: CGS Alquist Priolo Earthquake Fault Zones 2015, USGS Quaternary Faults (July 17, 2014), City of Piedmont, Alameda County GIS, Cal-Atlas; Map Date: 10/01/2018.

Extent

The amount of energy released during an earthquake is usually expressed as a magnitude and is measured directly from the earthquake as recorded on seismographs. An earthquake's magnitude is expressed in whole numbers and decimals (e.g., 6.8). Seismologists have developed several magnitude scales. One of the first was the Richter Scale, developed in 1932 by the late Dr. Charles F. Richter of the California Institute of Technology. The Richter Magnitude Scale is used to quantify the magnitude or strength of the seismic energy released by an earthquake. Another measure of earthquake severity is intensity. Intensity is an expression of the amount of shaking at any given location on the ground surface (see Table 4-18). Seismic shaking is typically the greatest cause of losses to structures during earthquakes.

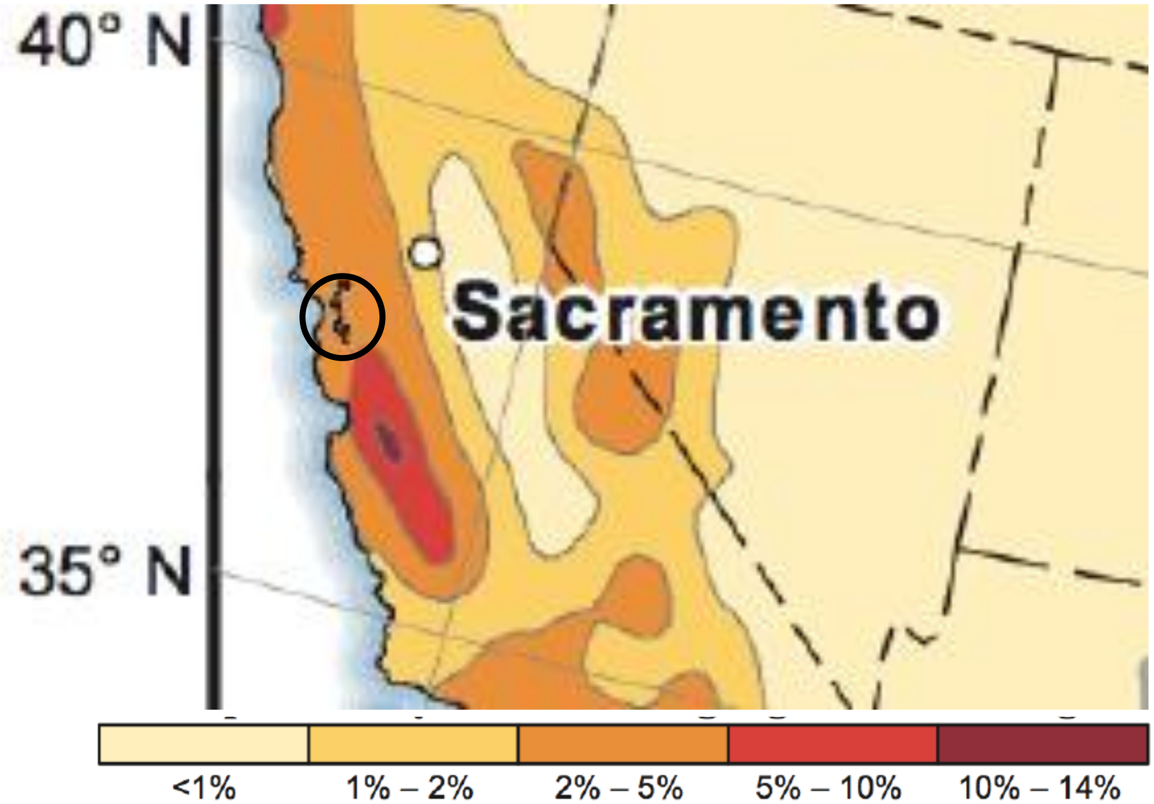
Table 4-18 Modified Mercalli Intensity (MMI) Scale

MMI	Felt Intensity
I	Not felt except by a very few people under special conditions. Detected mostly by instruments.
II	Felt by a few people, especially those on upper floors of buildings. Suspended objects may swing.
III	Felt noticeably indoors. Standing automobiles may rock slightly.
IV	Felt by many people indoors; by a few outdoors. At night, some people are awakened. Dishes, windows, and doors rattle.
V	Felt by nearly everyone. Many people are awakened. Some dishes and windows are broken. Unstable objects are overturned.
VI	Felt by everyone. Many people become frightened and run outdoors. Some heavy furniture is moved. Some plaster falls.
VII	Most people are alarmed and run outside. Damage is negligible in buildings of good construction, considerable in buildings of poor construction.
VIII	Damage is slight in specially designed structures, considerable in ordinary buildings, and great in poorly built structures. Heavy furniture is overturned.
IX	Damage is considerable in specially designed buildings. Buildings shift from their foundations and partly collapse. Underground pipes are broken.
X	Some well-built wooden structures are destroyed. Most masonry structures are destroyed. The ground is badly cracked. Considerable landslides occur on steep slopes.
XI	Few, if any, masonry structures remain standing. Rails are bent. Broad fissures appear in the ground.
XII	Virtually total destruction. Waves are seen on the ground surface. Objects are thrown in the air.

Source: Multi-Hazard Identification and Risk Assessment, FEMA 1997

The USGS has produced the 2018 one-year probabilistic seismic hazard forecast for the central and eastern United States from induced and natural earthquakes. The extent of these earthquakes can be seen on Figure 4-25.

*Figure 4-25 Chance of Potentially Minor Damage Ground Shaking in 2018**



Source: Petersen, M. et al., 2018 One-Year Seismic Hazard Forecast for the Central and Eastern United States from Induced and Natural Earthquakes - Seis. Res. Lett., doi.org/10.1785/0220180005.
* equivalent to MMI VI

Past Occurrences

Disaster Declaration History

There has been one state and one federal disaster declaration from earthquake, as shown in Table 4-19. This magnitude 6.9 earthquake, known as the Loma Prieta earthquake, had an epicenter approximately 60 miles south of San Francisco, caused 63 deaths, nearly 3,800 injuries and an estimated $6 billion in property damage. The HMPC noted that the City experienced mild damage to chimneys and personal property shifting. In Piedmont, the damages were muted due to the distance from the epicenter.

Table 4-19 Alameda County Disaster Declarations 1950-2018 from Earthquake

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Earthquake	1	1989	1	1989

Source: Cal OES, FEMA

NCDC Events

The NCDC does not track earthquakes.

USGS Events

The USGS National Earthquake Information Center database contains data on earthquakes in the Piedmont area. Table 4-20 shows the approximate distances earthquakes can be felt away from the epicenter. According to the table, a magnitude 5.0 earthquake could be felt up to 90 miles away. The USGS database was searched for magnitude 5.0 or greater on the Richter Scale within 90 miles of the City of Piedmont. These results are detailed in Table 4-21.

Table 4-20 Approximate Relationships between Earthquake Magnitude and Intensity

Richter Scale Magnitude	Maximum Expected Intensity (MM)*	Distance Felt (miles)
2.0 - 2.9	I – II	0
3.0 - 3.9	II – III	10
4.0 - 4.9	IV – V	50
5.0 - 5.9	VI – VII	90
6.0 - 6.9	VII – VIII	135
7.0 - 7.9	IX – X	240
8.0 - 8.9	XI – XII	365

*Modified Mercalli Intensity Scale.

Source: United State Geologic Survey, Earthquake Intensity Zonation and Quaternary Deposits, Miscellaneous Field Studies Map 9093, 1977.

*Table 4-21 Magnitude 5.0 Earthquakes or greater within 90 Miles of Piedmont**

Date	Richter Magnitude	Location
12/14/2016	5.01	8km NW of The Geysers, California
8/24/2014	6.02	South Napa
10/31/2007	5.45	San Francisco Bay area, California
8/12/1998	5.1	Central California
4/18/1990	5.1	Northern California
4/18/1990	5.4	Northern California
10/18/1989	5.1	Northern California
10/18/1989	6.9	Loma Prieta, California Earthquake
8/8/1989	5.4	Northern California
6/27/1988	5.3	Northern California
6/13/1988	5.3	San Francisco Bay area, California
2/20/1988	5.1	Central California
3/31/1986	5.7	Northern California
1/26/1986	5.5	Central California

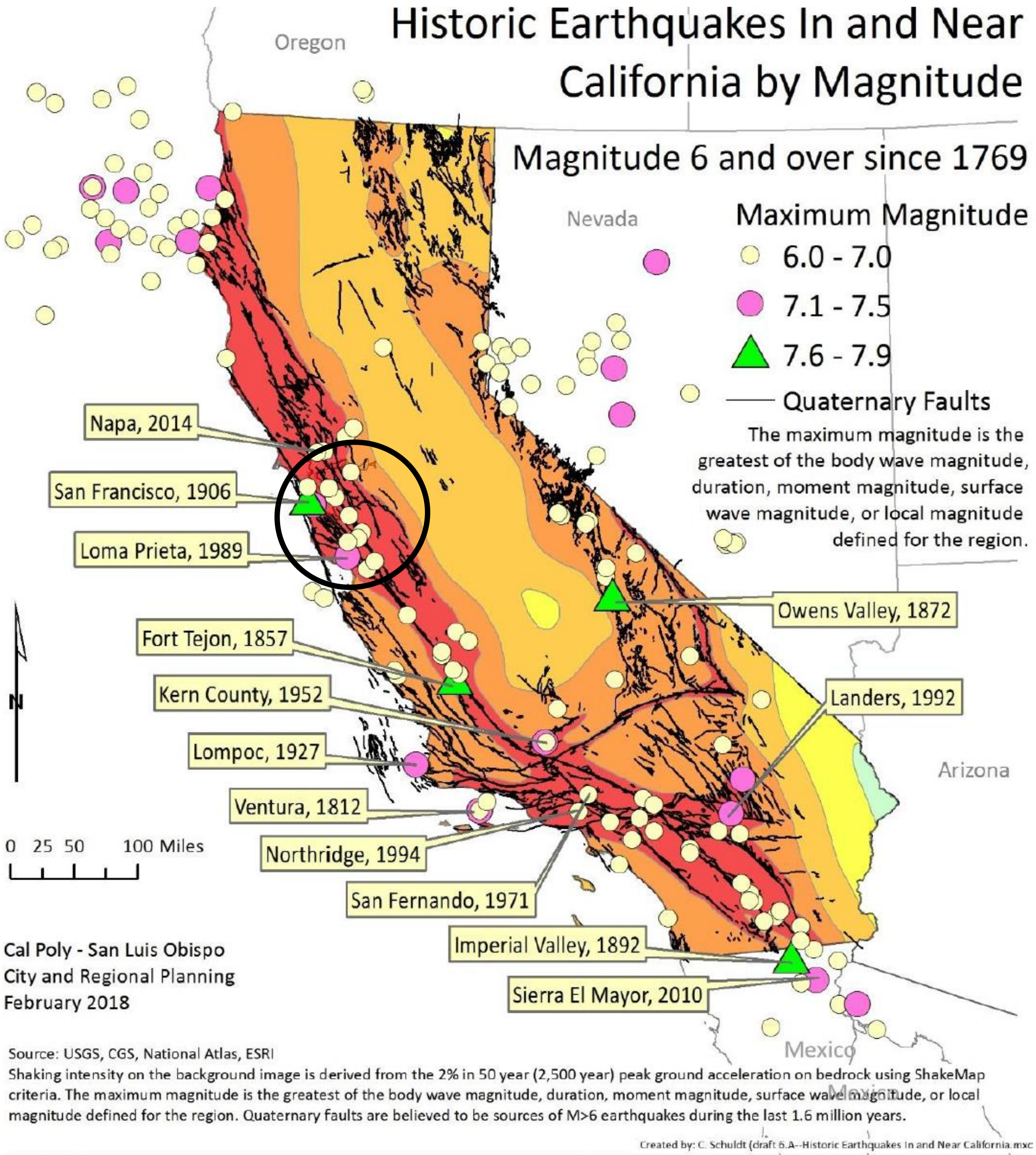
Date	Richter Magnitude	Location
4/24/1984	6.2	Northern California
1/27/1980	5.4	San Francisco Bay area, California
1/24/1980	5.1	San Francisco Bay area, California
1/24/1980	5.8	San Francisco Bay area, California
8/6/1979	5.8	Northern California
11/28/1974	5.2	Central California
3/22/1957	5.7	offshore Northern California
9/5/1955	5.8	Northern California
10/22/1926	6.3	offshore Central California
4/18/1906	7.9	The 1906 San Francisco Earthquake

Source: USGS

*Search dates 1900 – November 1, 2018

Figure 4-26 shows major historical earthquakes in California from 1769 to 2017.

Figure 4-26 Historic Earthquakes in California 1769 to 2017



	MMI	Damage	Effects
	X	Very Heavy	Some well-built, wooden structures destroyed; most masonry and frame structures destroyed with foundations. Rails bent.
	IX	Heavy	Damage considerable in specially designed structures; well-designed frame structures thrown out of plumb. Damage great in substantial buildings, with partial collapse. Buildings shifted off foundations.
	VIII	Moderate to Heavy	Damage slight in specially designed structures; considerable damage in ordinary substantial buildings with partial collapse. Damage great in poorly built structures. Fall of chimneys, factory stacks, columns, monuments, walls. Heavy furniture overturned.
	VII	Moderate	Damage negligible in buildings of good design and construction; slight to moderate in well-built ordinary structures; considerable damage in poorly-built or badly designed structures; some chimneys broken.
	VI	Light	Felt by all, many frightened. Some heavy furniture moved; a few instance of fallen plaster. Damage slight.
	V	Very Light	Felt by nearly everyone; many awakened. Some dishes, windows broken. Unstable objects overturned. Pendulum clocks may stop.

Source: 2018 State of California Multi-Hazard Mitigation Plan

Hazard Mitigation Planning Team Events

The 2016 Alameda County LHMP noted that the County and City of Piedmont sits in one of the most historically seismically active regions in the United States. The City has been subjected to numerous seismic events, originating both on faults within the County and in other parts of the region. Select events from the Alameda County LHMP and the City of Piedmont General Plan Environmental Hazards Element are discussed by fault below.

- **Hayward Fault** – These earthquakes and the originating faults include the 1836 and 1868 earthquakes on the Hayward/Rogers Creek fault. The 1836 earthquake was estimated to be a magnitude 6.3. The City of Piedmont General Plan Safety Element noted that the Hayward earthquake in 1868 and was estimated to be magnitude 7.0. Piedmont was rural at the time, but there was extensive damage in Berkeley, Oakland, San Leandro, and Hayward. At the surface, ground rupture was traced for 20 miles and in the town of Hayward nearly every building was either destroyed or significantly damaged by the earthquake.
- **Calaveras Fault** – It was noted that the 1861 earthquake was on the Calaveras fault. Earthquakes of Magnitude 5.0 or greater have occurred on the Calaveras Fault in 1984 (Morgan Hill – magnitude 6.2) and 2007 (North San Jose – magnitude 5.6).
- **San Andreas Fault** – The 1838 (estimated 6.8 to 7.2), 1906 (magnitude 8.0), and 1989 (magnitude 6.9-7.1) earthquakes originated on the San Andreas fault, west of the county near San Francisco or to the south.

Likelihood of Future Occurrences

Occasional (major earthquake); Highly Likely (minor earthquake)—It is likely that Piedmont will be subject to minor earthquakes in the future. Major earthquakes are considered to be occasional in the City. Figure 4-27 indicates the region's major faults and the earthquake probabilities for these faults. Overall, there is a 62 percent chance that the Bay Area will experience an earthquake of magnitude 6.7 or greater between 2003 and 2032 according to the City of Piedmont General Plan Environmental Hazards Report. The probability for the Hayward Fault alone is 27 percent—the single highest risk among Bay Area faults.

Figure 4-27 City of Piedmont – Likelihood of Future Earthquakes

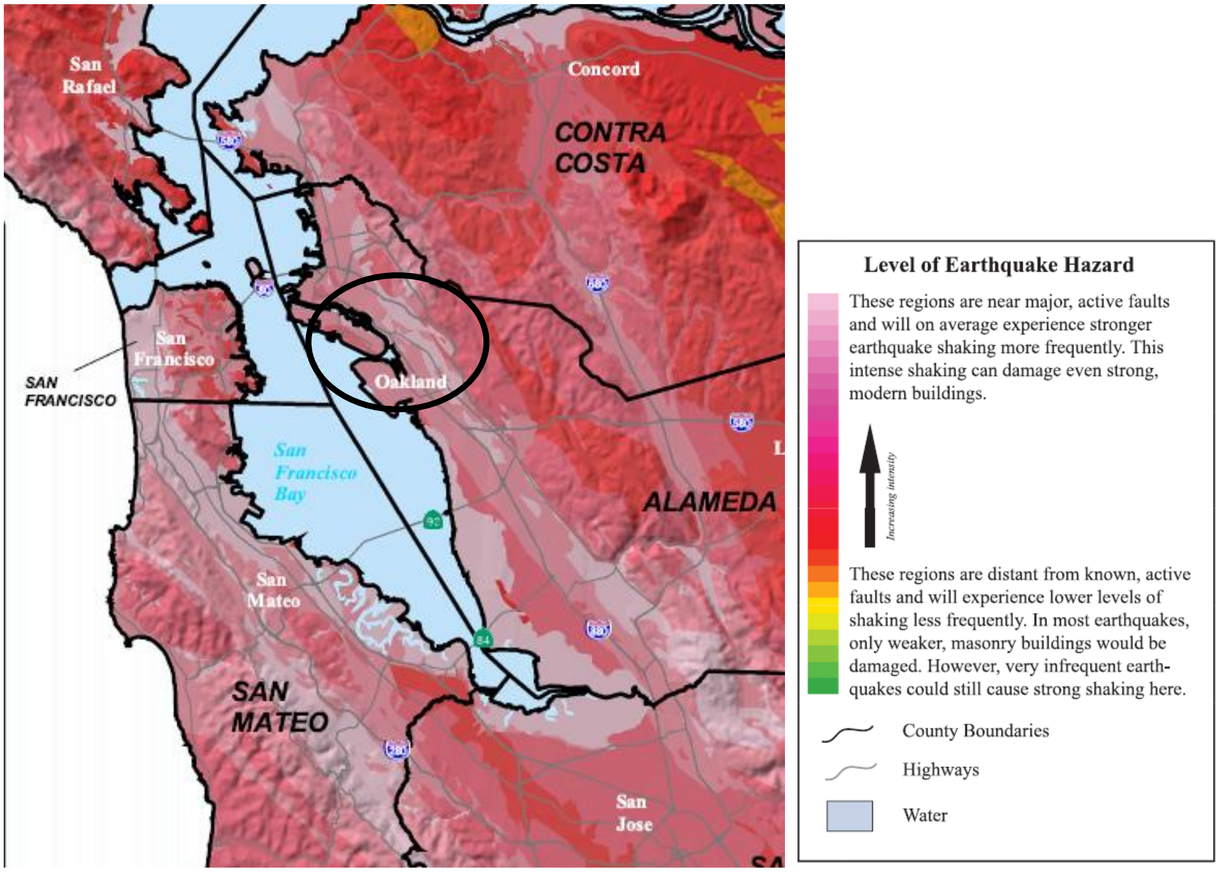
Table 6.1: Magnitude 6.7 Earthquake Probabilities for the San Francisco Bay Area, 2003-2032		
Source Fault	**Probability of a 6.7 or Greater Quake**	**Maximum Credible Earthquake**
San Francisco Bay Region	62%	--
San Andreas	21%	8.0
Hayward/ Rogers Creek	27%	7.5
Calaveras	11%	7.5
Concord/Green Valley	4%	6.75
San Gregorio	10%	7.5
Greenville	3%	7.25
Mount Diablo Thrust	3%	--
Background	14%	--

Source: City of Piedmont General Plan Environmental Hazards Report

Mapping of Future Occurrences

Maps indicating the maximum expectable intensity of ground shaking for the City are available through several sources. Figure 4-28, prepared by the California Division of Mines and Geology, shows the expected relative intensity of ground shaking and damage in California from anticipated future earthquakes. The shaking potential is calculated as the level of ground motion that has a 2% chance of being exceeded in 50 years, which is the same as the level of ground-shaking with about a 2,500-year average repeat time. Although the greatest hazard is in areas of highest intensity as shown on the map, no region is immune from potential earthquake damage.

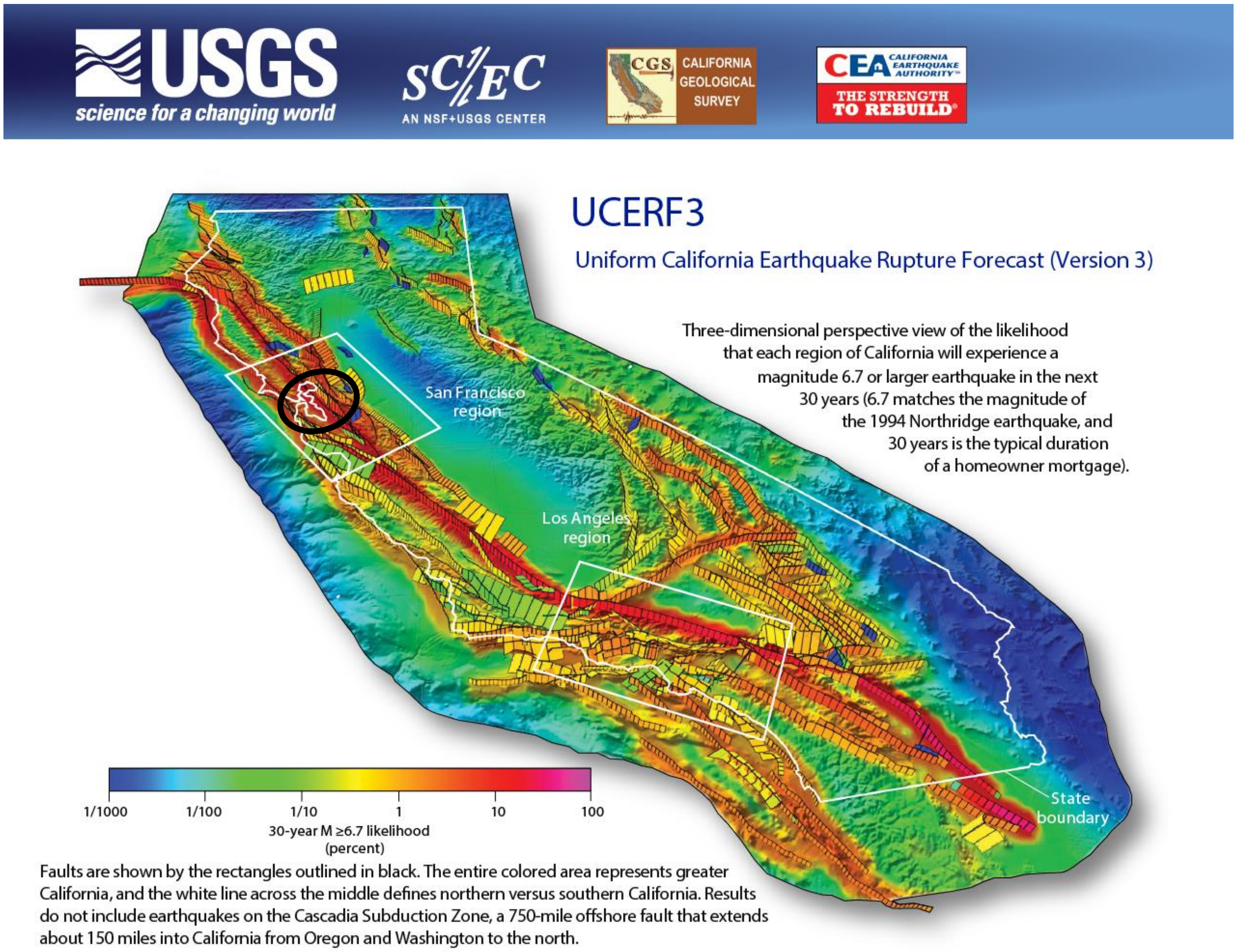
Figure 4-28 Maximum Expectable Earthquake Intensity – 2% Chance in 50 Years



Source: California Division of Mines and Geology

In 2014, the USGS and the California Geological Survey (CGS) released the time-dependent version of the Uniform California Earthquake Rupture Forecast (UCERF III) model. The UCERF III results have helped to reduce the uncertainty in estimated 30-year probabilities of strong ground motions in California. The UCERF map is shown in Figure 4-29 and indicates that Piedmont has a high risk of earthquake occurrence – a 10 percent chance in the next 30 years. This coincides with the likelihood of future occurrence rating of occasional.

Figure 4-29 Probability of Earthquake Magnitudes Occurring in 30 Year Time Frame



Source: United States Geological Survey Open File Report 2015-3009

Climate Change and Earthquake

Climate changes is unlikely to increase earthquake frequency or strength.

4.2.9. Earthquake Liquefaction

Hazard/Problem Description

Liquefaction can be defined as the loss of soil strength or stiffness due to a buildup of pore-water pressure during a seismic event and is associated primarily with relatively loose, saturated fine- to medium-grained unconsolidated soils. Areas most prone to liquefaction are those that are water saturated (e.g., where the water table is less than 30 feet below the surface) and consist of relatively uniform sands that are loose to medium density. In addition to necessary soil conditions, the ground acceleration and duration of the earthquake must be of sufficient energy to induce liquefaction. Seismic ground shaking of relatively loose, granular soils that are saturated or submerged can cause the soils to liquefy and temporarily behave as a dense fluid. If this layer is at the surface, its effect is much like that of quicksand for any structure located on it. If the liquefied layer is in the subsurface, the material above it may slide laterally depending on the confinement of the unstable mass. Liquefaction is caused by a sudden temporary increase in pore-water pressure due to seismic densification or other displacement of submerged granular soils. Liquefiable soil conditions are not uncommon in alluvial deposits in moderate to large canyons and could also be present in other areas of alluvial soils where the groundwater level is shallow (i.e., 50 feet below the surface). Bedrock units, due to their dense nature, are unlikely to present a liquefaction hazard.

Liquefaction during major earthquakes has caused severe damage to structures on level ground as a result of settling, titling, or floating. Such damage occurred in San Francisco on bay-filled areas during the 1989 Loma Prieta earthquake, even though the epicenter was several miles away. If liquefaction occurs in or under a sloping soil mass, the entire mass may flow toward a lower elevation. Also of particular concern in terms of developed and newly developing areas are fill areas that have been poorly compacted.

Typical effects of liquefaction include:

- Loss of bearing strength—the ground can liquefy and lose its ability to support structures.
- Lateral spreading—the ground can slide down very gentle slopes or toward stream banks riding on a buried liquefied layer.
- Sand boils—sand-laden water can be ejected from a buried liquefied layer and erupt at the surface to form sand volcanoes; the surrounding ground often fractures and settles.
- Flow failures—earth moves down steep slope with large displacement and much internal disruption of material.
- Ground oscillation—the surface layer, riding on a buried liquefied layer, is thrown back and forth by the shaking and can be severely deformed.
- Flotation—light structures that are buried in the ground (like pipelines, sewers and nearly empty fuel tanks) can float to the surface when they are surrounded by liquefied soil.
- Settlement—when liquefied ground re-consolidates following an earthquake, the ground surface may settle or subside as shaking decreases and the underlying liquefied soil becomes more dense.

Location

Liquefaction hazard maps indicate only one high-risk area in Piedmont, located along an old streambed that runs beneath Grand Avenue in the western portion of the City. Liquefaction maps are shown in Section 4.3.7.

Extent

Liquefaction affects discrete areas of the City. GIS analysis was performed to determine what percentages of the City would be affected by liquefaction (using USGS and CGS data). The USGS uses a scale of very low, low, moderate, or high for liquefaction. The CGS uses a scale of either in or outside a liquefaction zone. Methodologies for this analysis and maps showing extent can be found in Section 4.3.7. 1.9% of all area in Piedmont falls in the USGS moderate susceptibility areas. This can be seen in Table 4-22. 1.2% of all area in Piedmont falls in the CGS Liquefaction zones. This can be seen in Table 4-23.

Table 4-22 City of Piedmont – Liquefaction Extents in USGS Zones

USGS Liquefaction Susceptibility Area	Total Acres	Area (square feet)	% of Total Acres	% of Total Area
Moderate Susceptibility	21	909,371	1.9%	1.9%
Low Susceptibility	9	394,831	0.8%	0.8%
Very Low Susceptibility	1,061	46,233,861	97.1%	97.1%
Water	2	72,874	0.2%	0.2%
Grand Total	**1,093**	**47,610,937**	**100.0%**	**100.0%**

Source: USGS

Table 4-23 City of Piedmont – Liquefaction Extents in CGS Zones

CGS Liquefaction Zone	Total Acres	Area (square feet)	% of Total Acres	% of Total Area
Inside Liquefaction Zone	13	549,944	1.2%	1.2%
Outside of Liquefaction Zone	1,081	46,753,093	98.8%	98.8%
Grand Total	**1,094**	**47,303,038**	**100.0%**	**100.0%**

Source: CGS

The speed of onset of liquefaction is short, and often comes with little warning. The duration where the ground liquefies is also short; however, during this short period vast amounts of damage can occur.

Past Occurrences

Disaster Declaration History

There have been no federal or state disaster declaration due to earthquake liquefaction, as shown in Table 4-3.

NCDC Events

The NCDC does not track liquefaction events.

Hazard Mitigation Planning Team Events

The USGS has mapped liquefaction occurrences for parts of the Bay Area for earthquakes occurring in the following years: 1838, 1852, 1865, 1868, 1906, 1957, and 1989. Based on these maps, liquefaction has occurred along the Oakland coast, Alameda, Oakland International Airport, and Alameda Creek near Fremont. Liquefaction has not occurred within the City of Piedmont.

Likelihood of Future Occurrences

Occasional – Liquefaction is a byproduct of earthquakes and soils. The ground acceleration and duration of the earthquake must be of sufficient energy to induce liquefaction. Liquefaction can occur during periods of intense ground shaking. This happens during large earthquake events. The probabilities of these large earthquake events were shown in Figure 4-25.

Climate Change and Liquefaction

According to the CAS, climate change is unlikely to increase earthquake frequency or strength. There is no direct influence of climate change considered, however sea level rise may increase the potential for higher ground water levels and more pore water pressure in low-lying coastal areas and thus could amplify the likelihood of liquefaction in the event of an earthquake.

4.2.10. Flood: (1% and 0.2% Annual Chance)

Hazard/Problem Description

According to Cal DWR, flooding is the rising and overflowing of a body of water onto normally dry land. Floods are among the most costly natural disasters in terms of human hardship and economic loss nationwide. Floods can cause substantial damage to structures, landscapes, and utilities as well as life safety issues. Floods can be extremely dangerous, and even six inches of moving water can knock over a person given a strong current. A car will float in less than two feet of moving water and can be swept downstream into deeper waters. This is one reason floods kill more people trapped in vehicles than anywhere else. During a flood, people can also suffer heart attacks or electrocution due to electrical equipment short outs. Floodwaters can transport large objects downstream which can damage or remove stationary structures. Ground saturation can result in instability, collapse, or other damage. Objects can also be buried or destroyed through sediment deposition. Floodwaters can also break utilities lines and interrupt services. Standing water can cause damage to crops, roads, foundations, and electrical circuits. Direct impacts, such as drowning, can be limited with adequate warning and public education about what to do during floods. Where flooding occurs in populated areas, warning and evacuation will be of critical importance to reduce life and safety impacts from any type of flooding.

Health Hazards from Flooding

According to FEMA, certain health hazards are also common to flood events. While such problems are often not reported, three general types of health hazards accompany floods. The first comes from the water itself. Floodwaters carry anything that was on the ground that the upstream runoff picked up, including dirt, oil, animal waste, and lawn, farm and industrial chemicals. Pastures and areas where cattle and hogs are kept or their wastes are stored can contribute polluted waters to the receiving streams.

Floodwaters also saturate the ground, which leads to infiltration into sanitary sewer lines. When wastewater treatment plants are flooded, there is nowhere for the sewage to flow. Infiltration and lack of treatment can lead to overloaded sewer lines that can back up into low-lying areas and homes. Even when it is diluted by flood waters, raw sewage can be a breeding ground for bacteria such as e. coli and other disease causing agents.

The second type of health problem arises after most of the water has gone. Stagnant pools can become breeding grounds for mosquitoes, and wet areas of a building that have not been properly cleaned breed mold and mildew. A building that is not thoroughly cleaned becomes a health hazard, especially for small children and the elderly.

Another health hazard occurs when heating ducts in a forced air system are not properly cleaned after inundation. When the furnace or air conditioner is turned on, the sediments left in the ducts are circulated throughout the building and breathed in by the occupants. If a water system loses pressure, a boil order may be issued to protect people and animals from contaminated water.

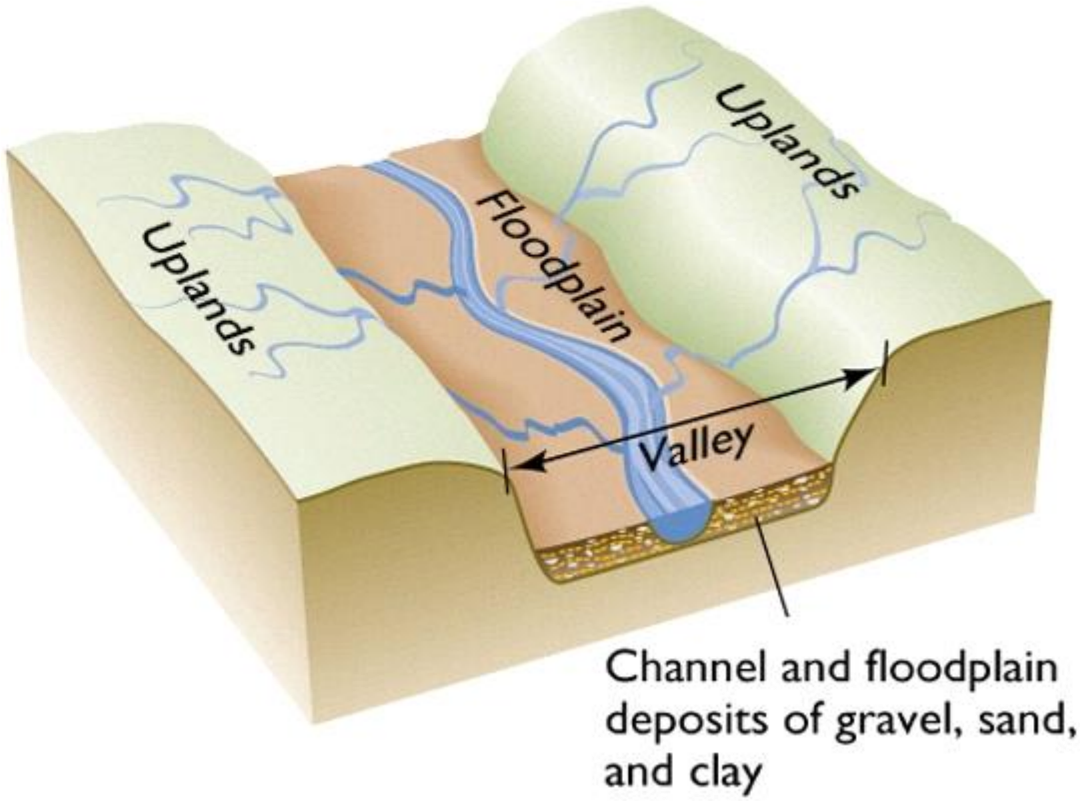
The third problem is the long-term psychological impact of having been through a flood and seeing one's home damaged and irreplaceable keepsakes destroyed. The cost and labor needed to repair a flood-damaged home puts a severe strain on people, especially the unprepared and uninsured. There is also a long-term problem for those who know that their homes can be flooded again. The resulting stress on floodplain residents takes its toll in the form of aggravated physical and mental health problems.

Location

The area adjacent to a channel is the floodplain (see Figure 4-30). Floodplains are illustrated on inundation maps, which show areas of potential flooding and water depths. In its common usage, the floodplain most often refers to that area that is inundated by the 100-year flood, the flood that has a one percent chance in any given year of being equaled or exceeded (1% annual chance flood). The 1% annual chance flood is the national minimum standard to which communities regulate their floodplains through the National Flood Insurance Program. The 500-year flood is the flood that has a 0.2 percent chance of being equaled or exceeded in any given year (0.2% annual chance flood). The potential for flooding can change and increase through various land use changes and changes to land surface, which result in a change to the floodplain. A change in environment can create localized flooding problems inside and outside of natural floodplains by altering or confining natural drainage channels. These changes are most often created by human activity.

In the City of Piedmont, no mapped floodplains exist for either 1% or 0.2% annual chance floodplains. This can be seen in Figure 4-58 in Section 4.3.8. The City is considered to be in Zone X (unshaded), which is an area outside of the Special Flood Hazard Area (SFHA) and higher than the elevation of the 0.2% annual chance flood.

Figure 4-30 Floodplain Schematic



Source: FEMA

There are three types of freshwater floods that can occur: riverine, flash, and urban stormwater. Regardless of the type of flood, the cause is often the result of severe weather and excessive rainfall, either in the flood area or upstream reaches.

- **Riverine flooding** is the most common type of flood event and occurs when a watercourse exceeds its "bank-full" capacity. Riverine flooding generally occurs as a result of prolonged rainfall, or rainfall that is combined with already saturated soils from previous rain events. The duration of riverine floods may vary from a few hours to many days. Factors that directly affect the amount of flood runoff include precipitation amount, intensity and distribution, the amount of soil moisture, seasonal variation in vegetation, snow depth, and water-resistance of the surface due to urbanization. The warning time associated with slow rise floods assists in life and property protection. These types of floods are rare in the City of Piedmont, as there are no large rivers or streams within the City, but a limited creek system that drains the City.
- The term "**flash flood**" describes localized floods of great volume and short duration. In contrast to riverine flooding, this type of flood usually results from a heavy rainfall on a relatively small drainage area. Precipitation of this sort usually occurs in the winter and spring. Flash floods often require immediate evacuation within the hour. These types of floods are rare in the City of Piedmont and are most often associated with stormwater flood events.
- **Stormwater/Urban** flood events have increased as land has been converted from fields or woodlands to roads and parking lots and lost its ability to absorb rainfall. Urbanization increases runoff by two to six times that of natural terrain. This is discussed in the Section 4.2.11 below.

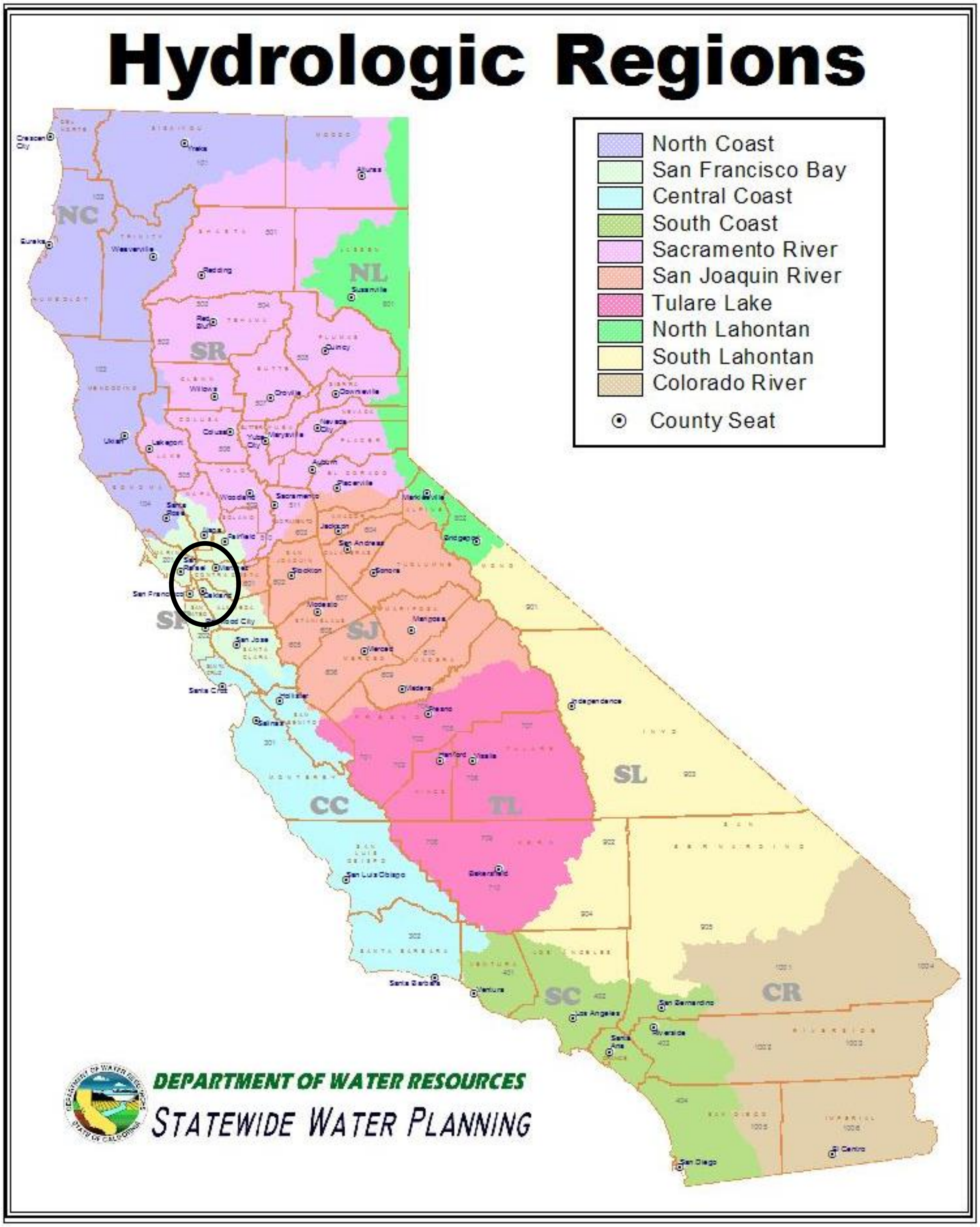
The City is also at risk to flooding resulting from dam failures. Dam failure flooding is discussed separately in Section 4.2.6 of this document. With the presence of levees throughout Alameda County, the potential for levee failure flooding in the City Planning Area is discussed separately in Section 4.2.13 of this document. Regardless of the type of flood, the cause is often the result of severe weather and excessive rainfall, either in the flood area or upstream reach.

The potential for flooding can change and increase through various land use changes and changes to land surface, resulting in a change to the floodplain. Environmental changes can create localized flooding problems in and outside of natural floodplains by altering or confining natural drainage channels. These changes are most often created by human activity.

Hydrologic Regions

According to Cal DWR, California is divided into 10 hydrologic regions. The City of Piedmont is traversed by one hydrologic region: the San Francisco Bay. A map of the California's hydrological regions is provided in Figure 4-31.

Figure 4-31 California Hydrologic Regions



Source: California Department of Water Resources

Piedmont Streams and Watersheds

The only surface water body in Piedmont is Tyson Lake, a privately-owned man-made lake near LaSalle Avenue at the Oakland city limits. Tyson Lake is in the Indian Gulch watershed. It has a mean depth of 18 feet and a volume of 3,000,000 gallons of water. Figure 4-32 shows the location of Piedmont's creeks and watersheds. The City's creeks are fed by a combination of natural springs, rain water, groundwater, and runoff from urban activities. It should be noted that some of these creeks are buried below the surface in limited areas of the City. These creeks include:

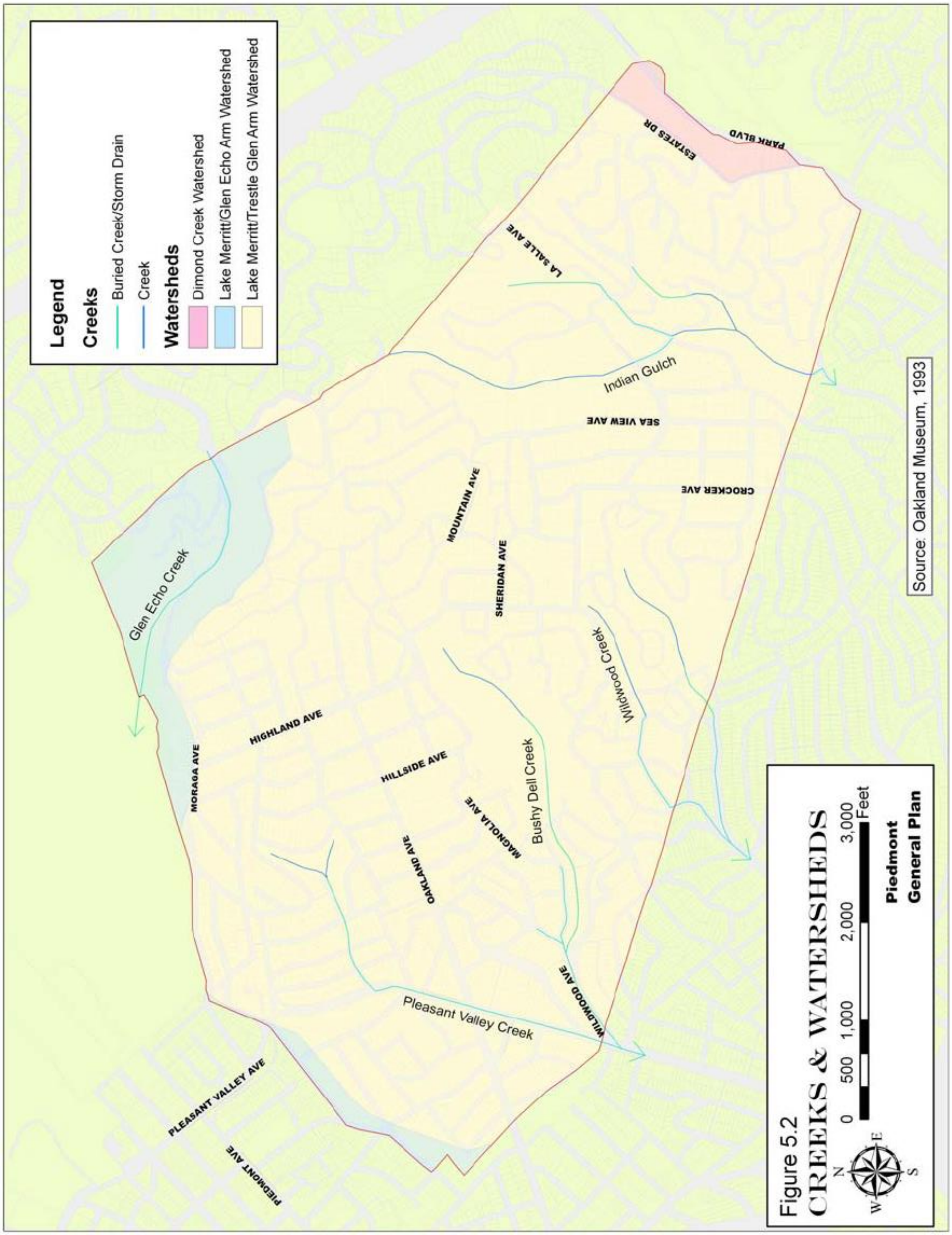
- **Indian Gulch (Trestle Glen)** originates near the Sotelo-Glen Alpine loop and flows parallel to Sea View Avenue before flowing through Crocker Highlands to Lake Merritt.
- **Wildwood Creek** flows from Wildwood Gardens to Oakmont Avenue, and continues under Lakeshore Avenue to Lake Merritt.
- **Bushy Dell Creek** begins in Piedmont Park and flows under Witter Field, then under Magnolia Avenue to Grand.
- **Pleasant Valley Creek** originates in Dracena Park and flows under Grand Avenue to Lake Merritt.
- **Cemetery Creek** follows Moraga Avenue and crosses Mountain View Cemetery, becoming Glen Echo Creek in the Piedmont Avenue neighborhood.
- **Sausal Creek** is outside Piedmont but drains a small area along Park Blvd. It flows through the Dimond and Fruitvale Districts of Oakland.

The City is traversed by the Diamond Creek, Lake Merritt/Glen Echo Arm, and Lake Merritt/Trestle Glen Arm watersheds. The entire City, with the exception of a narrow strip of land along Park Boulevard, drains to Lake Merritt. Piedmont represents about one-quarter of the Lake Merritt watershed.

The City's creeks not only carry rainwater runoff, they also support plant and animal life and provide physical beauty. Canyon bottoms contain some of Piedmont's richest natural habitat. Over the years, the integrity of Piedmont's creeks has been compromised. Much of the native vegetation has been removed and many segments have been rerouted into buried storm drains.

Untreated runoff flows to the storm drains, carrying pollutants to Lake Merritt. The City is actively involved in efforts to reduce stormwater pollution in the lake. There are limited opportunities for "daylighting" (uncovering buried creeks) in Piedmont. The City is committed to preserving the remaining unchannelized segments of creek and protecting native vegetation in these areas.

Figure 4-32 City of Piedmont – Creeks and Watersheds



Source: City of Piedmont General Plan Conservation Element

Floodplain Mapping

FEMA established standards for floodplain mapping studies as part of the National Flood Insurance Program (NFIP). The NFIP makes flood insurance available to property owners in participating communities adopting FEMA-approved local floodplain studies, maps, and regulations. Floodplain studies that may be approved by FEMA include federally funded studies; studies developed by state, city, and regional public agencies; and technical studies generated by private interests as part of property annexation and land development efforts. Such studies may include entire stream reaches or limited stream sections depending on the nature and scope of a study. A general overview of floodplain mapping and associated products is provided in the following paragraphs.

Flood Insurance Study (FIS)

The FIS develops flood-risk data for various areas of the community that will be used to establish flood insurance rates and to assist the community in its efforts to promote sound floodplain management. The current Alameda County FISs are dated August 3, 2009. A new FIS is pending for the County and is dated December 18, 2018. Both of these FIS' note that the City of Piedmont has no mapped SFHA (i.e., no mapped 1% annual chance floodplains).

Digital Flood Insurance Rate Maps (DFIRM)

As part of its Map Modernization program, FEMA is converting paper FIRMS to digital FIRMs, DFIRMS. These digital maps:

- Incorporate the latest updates (LOMRs and LOMAs);
- Utilize community supplied data;
- Verify the currency of the floodplains and refit them to community supplied basemaps;
- Upgrade the FIRMs to a GIS database format to set the stage for future updates and to enable support for GIS analyses and other digital applications; and
- Solicit community participation.

DFIRMs for Alameda County and Piedmont, dated September 16, 2018 (a 8/3/2009 DFIRM with updated LOMRs and LOMAs) are used for this Plan's flood hazard analysis. This is shown in Section 4.3.8.

Department of Water Resource (DWR) Floodplain Mapping

Also to be considered when evaluating the flood risks Alameda County are various floodplain maps developed by Cal DWR for various areas throughout California, including Alameda County and Piedmont.

DWR Best Available Maps

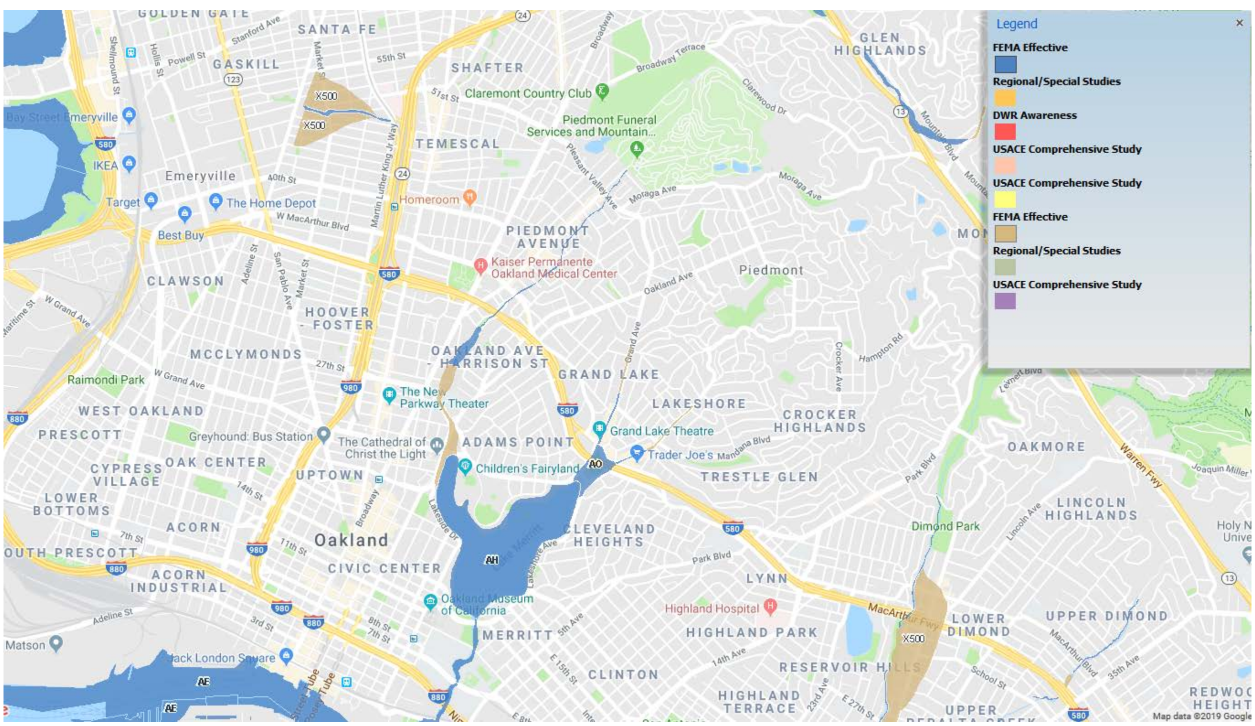
The FEMA regulatory maps provide just one perspective on flood risks in Alameda County and Piedmont. Senate Bill 5 (SB 5), enacted in 2007, authorized the California DWR to develop the Best Available Maps (BAM) displaying 100- and 200-year floodplains (i.e., 1% and 0.2% annual chance floods) for areas located within the Sacramento-San Joaquin (SAC-SJ) Valley watershed. SB 5 requires that these maps contain the best available information on flood hazards and be provided to cities and counties in the SAC-SJ Valley watershed. This effort was completed by DWR in 2008. DWR has expanded the BAM to cover all counties in the State and to include 500-year (0.2% annual chance) floodplains.

Different than the FEMA DFIRMs which have been prepared to support the NFIP and reflect only the 100-year event risk, the BAMs are provided for informational purposes and are intended to reflect current 100- and 500-year event risks using the best available data. The 100-year floodplain limits on the BAM are a composite of multiple 100-year floodplain mapping sources. It is intended to show all currently identified areas at risk for a 100-year flood event, including FEMA's 100-year floodplains. The BAM maps are comprised of different engineering studies performed by FEMA, Corps, and DWR for assessment of potential 100- and 500-year floodplain areas. These studies are used for different planning and/or regulatory applications. They are for the same flood frequency; however, they may use varied analytical and quality control criteria depending on the study type requirements.

The value in the BAMs is that they provide a bigger picture view of potential flood risk to the City of Piedmont than that provided in the FEMA DFIRMs. This provides the community and residents with an additional tool for understanding potential flood hazards not currently mapped as a regulated floodplain. Improved awareness of flood risk can reduce exposure to flooding for new structures and promote increased protection for existing development. By including the FEMA 100-year floodplain, it also supports identification of the need and requirement for flood insurance.

These floodplain maps for Piedmont can be seen in Figure 4-33.

Figure 4-33 City of Piedmont – Best Available Map



Source: California DWR

Legend explanation: Blue - FEMA 100-Year, Orange – Local 100-Year (developed from local agencies), Red – DWR 100-year (Awareness floodplains identify the 100-year flood hazard areas using approximate assessment procedures.), Pink – USACE 100-Year (2002 Sac and San Joaquin River Basins Comp Study), Yellow – USACE 200-Year (2002 Sac and San Joaquin River Basins

Comp Study), Tan – FEMA 500-Year, Grey – Local 500-Year (developed from local agencies), Purple – USACE 500-Year (2002 Sac and San Joaquin River Basins Comp Study).

Extent

In Piedmont, flood extents are usually measured in depths of flooding and extent of the floodplain. These extents are traditionally determined by FEMA DFIRM flood maps which show the extent of the 1% and 0.2% annual chance floodplains. Expected flood depths in the City vary, but are expected to be very low to negligible. As noted above, there is no mapped FEMA floodplains in the City. Flood durations in the City tend to be short to medium term, or until either the storm drainage system can catch up or flood waters move downstream.

Past Occurrences

Disaster Declaration History

There have been 15 state and 14 federal disaster declarations due to flooding, as shown in Table 4-24.

Table 4-24 Alameda County Disaster Declarations 1950-2018 from Flood

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Flood (including heavy rain and storms)	15	1950, 1955, 1958 (twice), 1962, 1963, 1970, 1982, 1983, 1986, 1995, 1997, 2008, 2017 (twice)	14	1955, 1958, 1970, 1982, 1983, 1986, 1995, 1997, 1998, 2006 (twice), 2017 (three times)

Source: Cal OES, FEMA

NCDC Events

The NCDC tracks flood events for the County since 1996. These are shown on Table 4-33. Events that damaged the City, based on available NCDC data, are discussed below the table.

*Table 4-25 Alameda County NCDC Flood Events 1/1/1996-5/31/2018**

Event Type	Number of Events	Deaths	Deaths (indirect	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Flash Flood	26	0	0	0	0	$701,000	$0
Flood	45	0	0	0	0	$176,475,000	$0
Total	**71**	**0**	**0**	**0**	**0**	**$177,176,000**	**$ 0**

Source: NCDC

*Note: Losses reflect totals for all impacted areas, some of which fell outside of the City of Piedmont and outside of Alameda County.

- **October 13, 2009** – Very bad flooding occurred on Interstate 580 near the intersection of Harrison Street due to heavy rain. No damages, injuries, or deaths were reported.

FIS Events

The FIS noted no past events of flooding for the City.

Hazard Mitigation Planning Team Events

The HMPC noted no past events of flooding in the City.

Likelihood of Future Occurrences

1% Annual Chance Flood

Unlikely—This is the flood that has a 1- percent chance of being equaled or exceeded in any given year. There is no 1% annual chance floodplain in the City.

0.2% Annual Chance Flood

Unlikely—The flood has a 0.2 percent chance of being equaled or exceeded in any given year. There is no 0.2% annual chance floodplain in the City.

Climate Change and Flood

Climate change and its effect on wildfire near the City has been discussed by three sources:

- CAS
- Cal-Adapt
- City of Piedmont CAP 2.0

CAS

According to the CAS, climate change may affect flooding in the City. While average annual rainfall may increase or decrease slightly, the intensity of individual rainfall events is likely to increase during the 21st century. It is possible that average soil moisture and runoff could decline, however, due to increasing temperature, evapotranspiration rates, and spacing between rainfall events. Reduced snowpack and increased number of intense rainfall events are likely to put additional pressure on water infrastructure which could increase the chance of flooding associated with breaches or failures of flood control structures such as levees and dams.

Cal Adapt

Cal Adapt future precipitation projections was shown in Figure 4-13 in Section 4.2.3. These could affect flooding in the City.

CAP 2.0

The City of Piedmont CAP 2.0 discussed sea level rise and flooding. It noted that while sea level will not reach the Piedmont's city limits in the near-term, sea level rise will impact the Bay Area economy, resources, and infrastructure. The Bay Area is particularly exposed to the impacts of sea level rise because of the large number of assets located along the coastline. For Piedmont, the assets most at risk from sea level rise are those outside the City, including the East Bay Municipal Utility District (EBMUD) Wastewater Treatment Plant, the Bay Bridge, and the I-880 freeway.

4.2.11. Flood: Localized/Stormwater

Hazard/Problem Description

According to the City Planning Team, localized, stormwater flooding also occurs throughout the City. Urban stormwater drainage systems have a finite capacity. When rainfall exceeds this capacity, or the system is clogged, water accumulates in the street until it reaches a level of overland release. This type of flooding may occur when intense storms occur over areas of development.

Location

According to the City, numerous parcels and roads throughout Piedmont outside of in the FEMA 1% and 0.2% annual chance floodplains are subject to flooding in heavy rains. These are delineated in Table 4-26. Flooding of these areas is the primary concern. Not much collateral damage occurs outside of flooding. Additional impacts such as pavement deterioration and other issues are limited due to the 24/7 servicing of problem areas. The frequency and type of damage or flooding that occurs varies from year to year, depending on the quantity of runoff.

Table 4-26 City of Piedmont – Localized Flooding Areas

Road Name
Creek and Trash Rack Areas
Main Park
Spring Park
178 Oak Rd
89 Oakmont Ave
1143 Harvard Rd
Hampton Sports Field
5 Hampton Ct
61 Glen Alpine
25 Valant Pl
101 Lexford Rd
3 Indian Gulch
26 Littlewood Dr
Sewer Main Line Crossings
Lower Main Park
89 Oak Rd

Road Name
178 Oak Rd
81 Wildwood Gardens
5 Hampton Ct
27 Glen Alpine
61 Glen Alpine
109 St. James Dr
135 St. James Dr
280 Indian Rd
25 Valant Pl
Catch Basin Areas
121 Ricardo
201 Ricardo
100 Lake Beach
Grand/Oakland
Grand/ Greenbank
100 Ramona/ Ronada
Blair at Reservoir
800 Magnolia
El Cerrito Gae
100 Hazel Ln
146 Caperton
Parkway/ Monticello
Oakland/ Sunnyside Ave
100 Fairview
349 Olive
Blair/Alta
150 St. James
3 Abbott
1037 Ranleigh
Dracena Trail/ Artuna

Source: City of Piedmont, 2018

The HMPC noted that Piedmont has over 8,000 street trees in addition to all of the trees located on private property. These all are a concern during heavy rains and times of localized flooding. The HMPC also noted that improved infrastructure will help minimize localized flooding issues in the City, but the ongoing accumulation of vegetation and leaves will need to be continuously addressed to alleviate localized flooding. Localized flooding issues also include excess flooding and runoff where Piedmont drains into Oakland, due to undersized pipes.

Extent

There is no established scientific scale or measurement system for localized flooding. Localized flooding is generally measured by depth of flooding, velocity of waters, and the area affected. Heavier rains lead to larger affected areas. Localized flooding often happens quickly and has a short speed of onset. Localized flooding often has a short duration.

Past Occurrences

Disaster Declaration History

There have been no state or federal disaster declarations related to localized flooding in the City of Piedmont, according to Table 4-3.

NCDC Events

The past occurrences of localized flooding are included in the 1%/0.2% annual chance flood hazard profile in Section 4.2.10.

Hazard Mitigation Planning Team Events

The HMPC noted that localized flooding occurs regularly after heavy rains, with varying effects on the City. Localized flooding has caused problems at Witter Field. The football field is designed to have a drainage system that feeds into the City storm drains. The drainage system is inadequate in handling heavy rains. The field floods two to three inches deep and stays that way until the drainage system can catch up.

Likelihood of Future Occurrences

Highly Likely— Urban storm drainage systems have a finite capacity. When rainfall exceeds this capacity or systems clog, water accumulates in the street until it reaches a level of overland release. Heavy rains causing localized flooding in the City are highly likely to occur. Although the City is considered built out, due to aging infrastructure, this type of flooding will continue to occur during heavy rains.

Climate Change and Localized Flood

While average annual rainfall may decrease slightly, the intensity of individual rainfall events is likely to increase during the 21st century, increasing the likelihood of overwhelming stormwater systems built to historical rainfall averages. This makes localized flooding more likely.

4.2.12. Landslide, Mudslides, Hillside Erosion, and Debris Flows

Hazard/Problem Description

Like its earthquake-generating faults, California's mountainous terrain is also a consequence of dynamic geologic processes in operation as the North American Plate grinds past the Pacific Plate. The 2018 State of California Hazard Mitigation Plan noted that more than one third of California is mountainous terrain that generally trends parallel to the coast, forming a barrier that captures moisture from offshore storms originating in the Gulf of Alaska and Mexico. This is true in the sloped areas of the Piedmont foothills. Steep topography, weak rocks, heavy winter rains, and occasional earthquakes all lead to slope failures more frequently than would otherwise occur under gravity alone.

According to the CGS, a landslide is a general term for a variety of mass-movement processes that generate a down-slope movement of mud, soil, rock, and/or vegetation. Landslides are classified into many different types based on form and type of movement. They range from slow-moving rotational slumps and earth flows, which can slowly distress structures but are less threatening to personal safety, to fast-moving rock avalanches and debris flows that are a serious threat to structures and have been responsible for most fatalities during landslide events. For the purposes of this plan, the term landslide includes mudslides, debris flows, and rockfalls that tend to occur suddenly; as well as hillside erosion, which is a similar process that tends to occur on smaller scales and more gradually, but can exacerbate landslide events.

Natural conditions that contribute to landslide, mudslides, hillside erosion, and debris flows include the following:

- Degree of slope
- Water (heavy rain, river flows, or wave action)
- Unconsolidated soil or soft rock and sediments
- Lack of vegetation (no stabilizing root structure)
- Previous wildfires and other disturbances (discussed in more detail in Section 4.2.14)
- Excavation and grading
- Earthquake

Landslides are relatively common in the East Bay Hills, especially during high-intensity, long duration winter rains. They generally occur along the sides of ravines where surface water and groundwater are concentrated, or on deep-seated bedrock and steep slopes with weak or shallow soils. When such soil becomes saturated with water, its weight increases and resistant forces are reduced. The risk of landslides increases where certain conditions are present, such as hillsides that have been denuded by fire.

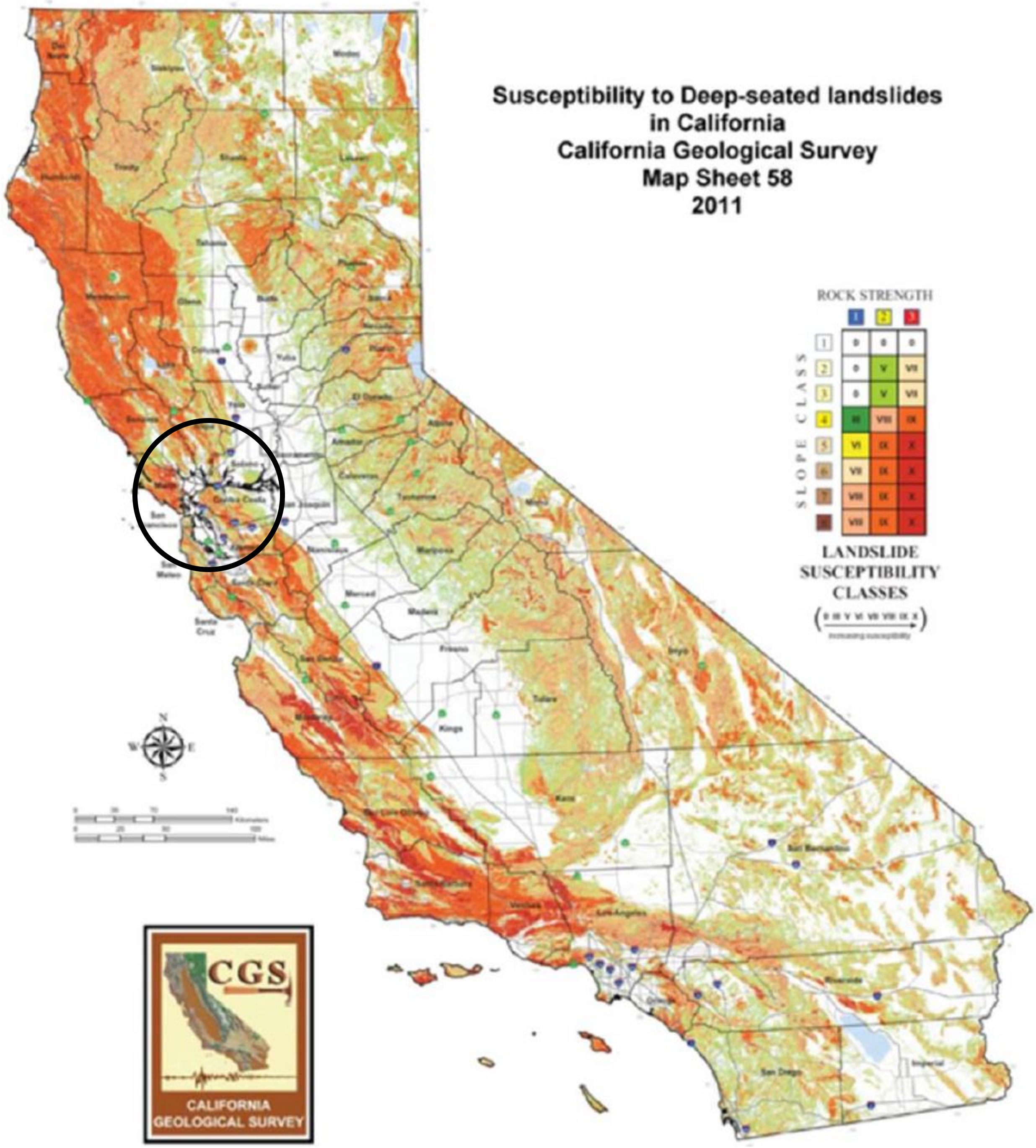
The City is at risk to two different types of landslides: rainfall induced landslides and earthquake induced landslides. These landslides have discrete hazard areas. These areas are discussed in greater detail in the vulnerability assessment in Section 4.3.10.

Location

Destructive landslides, mudslides, and debris flows usually occur very suddenly with little or no warning time and are short in duration. Slides have caused significant damage or destroyed homes, streets, and utilities from their heaving soils and slow downslope development. The 2018 State Plan noted that although the area affected by a single landslide is less than that of earthquakes, landslides are pervasive in California's mountainous terrain and occur far more often.

Figure 4-34 was included in the 2018 State of California Multi-Hazard Mitigation Plan. It indicates that portions of the City are at moderate to high risk for landslides.

Figure 4-34 Landslide Susceptibility Areas



Source: 2018 State of California Multi-Hazard Mitigation Plan

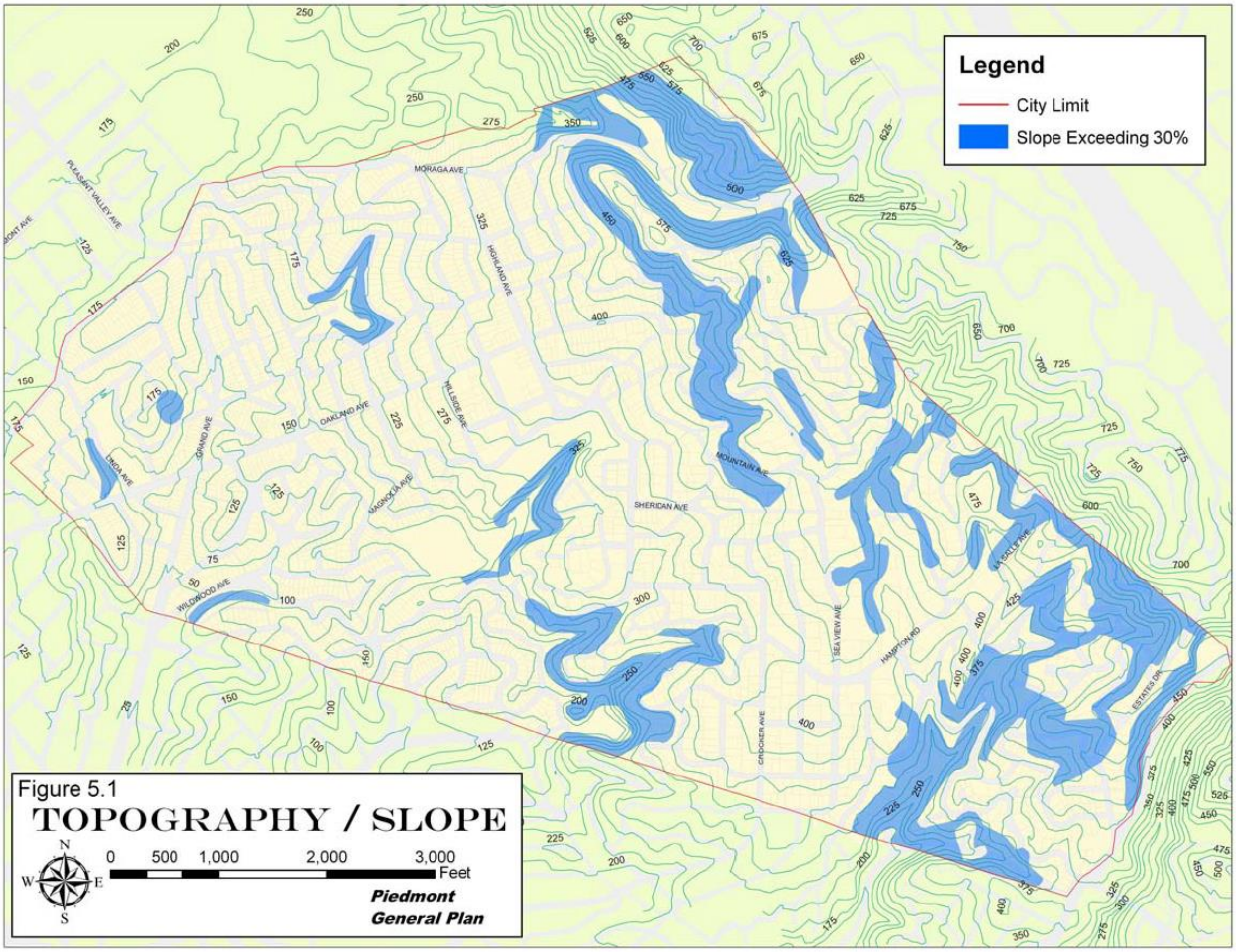
The City of Piedmont General Plan Conservation Element noted that the City's terrain rises gently from west to east, with the steepest slopes located along canyons and ravines. The combination of knolls, low ridges, and valleys creates scenic vistas throughout the City and is an important part of Piedmont's character. Most of Piedmont consists of gentle slopes between zero and 20 percent, requiring a small to moderate amount of grading to support construction. The City's vacant and undeveloped land is steeper, with slopes exceeding 50 percent in some cases. Beyond the eastern side of Piedmont, the terrain rises to a shutter ridge before dropping to the high valley formed by the Hayward Fault (roughly Highway 13) and then transitioning to more rugged terrain further east in Montclair.

The HMPC noted many steeply sloping areas in Piedmont. These include:

- Moraga Canyon (including the areas below Scenic and Alta Avenues,
- Areas along Maxwelton Road, and the adjacent Mountain View Cemetery lands)
- The Piedmont Park area,
- The canyon between Indian Road and St. James Drive
- The north side of Park Boulevard,
- The areas below Wildwood Gardens and above Davies Stadium,
- The areas between Trestle Glen Road and St. James Drive, and
- The areas around Somerset, Lexford, and Crest Roads.

The HMPC noted that in the area between Park Boulevard and Estates Drive, the rockfall issue generally falls into the Oakland areas, not within Piedmont. It was also noted that most landslides occur on private property. Much of the issues are due to lack of drainage maintenance by landowners. Slopes in all of these areas exceed 25 percent and, in some cases, exceed 50 percent. These can be seen in Figure 4-35.

Figure 4-35 City of Piedmont – Areas of Slope Exceeding 30%



Source: City of Piedmont General Plan Conservation Element

The Conservation Element also noted that there are two predominant soil types in Piedmont. The first consists of alluvial deposits created by hundreds of thousands of years of erosion from the East Bay Hills. These soils are found in the city's lower elevations and on flatter terrain. They tend to be rich in nutrients and are relatively stable. The second type consists of residual material from sandstone and shale. These soils are shallower, less fertile, and more prone to erosion. These clay-like soils are also prone to "shrinking" during dry weather and "swelling" during wet weather, affecting design requirements for foundations.

Extent

The legend on Figure 4-34 shows the measurement system that the CGS uses to show the possible magnitude of landslides. It is a combination of slope class and rock strength. The speed of onset of landslide is often short, especially in post-wildfire burn scar areas, but it can also take years for a slope to fail. Landslide duration is usually short, though digging out and repairing landslide areas can take some time.

Landslide affects discrete areas of the City. GIS analysis was performed to determine what percentages of the City would be at risk from landslide (using CGS and USS data) from both earthquake and rainfall. Methodologies for this analysis and maps showing extent can be found in Section 4.3.7. 4.3% of all area in Piedmont falls in the USGS Rainfall Induced Landslide zones. This can be seen in Table 4-27. 12.0% of all area in Piedmont falls in the CGS Earthquake Induced Landslide Zones. This can be seen in Table 4-28.

Table 4-27 City of Piedmont – Landslide Extents in USGS Zones

USGS Rainfall Induced Landslide Zone	Total Acres	Area (square feet)	% of Total Acres	% of Total Area
Potential Debris Flow Source	47	2,048,316	4.3%	4.3%
Outside of Potential Debris Flow Source	1,049	45,714,182	95.7%	95.7%
Grand Total	**1,096**	**47,762,498**	**100.0%**	**100.0%**

Source: USGS

Table 4-28 City of Piedmont – Landslide Extents in CGS Zones

CGS Earthquake Induced Landslide Zone	Total Acres	Area (square feet)	% of Total Acres	% of Total Area
Earthquake Induced Landslide Zone	131	5,704,688	12.0%	12.0%
Outside of Earthquake Induced Landslide Zone	963	41,947,241	88.0%	88.0%
Grand Total	**1,094**	**47,651,929**	**100.0%**	**100.0%**

Source: CGS

Past Occurrences

Disaster Declaration History

There has been one state declaration for landslide in Alameda County, as shown in Table 4-29. During the sustained winter storm of 1969-1970, heavy rains caused 22 homes in the Oakland Hills to slide into the canyon of Peralta Creek.

Table 4-29 Alameda County Disaster Declarations 1950-2018 from Landslides

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Landslide	1	1970	0	–

Source: Cal OES, FEMA

NCDC Events

The NCDC notes 12 occurrences of debris flows in Alameda County since 1996. These are shown on Table 4-30. The HMPC noted that none of these events directly affected the City.

*Table 4-30 Alameda County NCDC Landslide and Debris Flow Events 1/1/1996-5/31/2018**

Event Type	Number of Events	Deaths	Deaths (indirect	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Debris Flows	12	0	0	0	0	$11,001,000	$0

Source: NCDC

Hazard Mitigation Planning Team Events

The HMPC noted that most landslides in Piedmont occur on private property in sloped areas. These are mostly smaller, localized events. In addition to damage to structures and property, they have created partial road closures and have damaged utilities. Problem landslide areas in the City include Moraga Road, La Salle Avenue, and the Zion Lutheran Church property. The church and its school were built in a former quarry where debris from the former quarry walls have damaged the facility. Past landslide events on Moraga Road damaged PG&E utilities and affected numerous trees. City parks such as Blair Park and Dracena Park have are also landslide prone, and have experienced sloughing in the past

Likelihood of Future Occurrences

Likely—Landslides in the form of debris flow, or mudslides, have occurred in the past in and near Piedmont. Landslides occur more frequently in the winter and spring months, when high levels of precipitation and runoff combine with saturated soils, which leads to general slope instability. Landslides often can occur as a result of other hazard events, such as severe storms, floods, wildfires, or earthquakes. Due to the topography in and around Piedmont and the rainfall the City receives during the winter, it is likely future occurrences of landslide, mudslide, and debris flow will occur.

Climate Change and Landslides

According to the CAS and Cal-Adapt, increased precipitation may result from climate change. Increased precipitation makes areas more vulnerable to landslide potential. More information on precipitation increases can be found in Section 4.2.3.

The City of Piedmont CAP 2.0 noted that as high-intensity rainfall events increase in frequency the risk of inland flooding increases. Impacts associated with flooding include landslides, subsidence, slippage, creep, or sinkholes. Cities with hilly terrain such as Piedmont can experience increased risk of these events, and both landslides and liquefaction during earthquakes are more likely and more severe if the ground is wet or saturated when the shaking occurs. The entire city of Piedmont is in a zone identified as experiencing “few landslides” and therefore is at a mid-level risk for landslides. However, during extreme rainfall events, the City has already experienced small landslides in its hilly, residential zones.

Earthquake induced landslide is not expected to be affected by climate change.

4.2.13. Levee Failure

Hazard/Problem Description

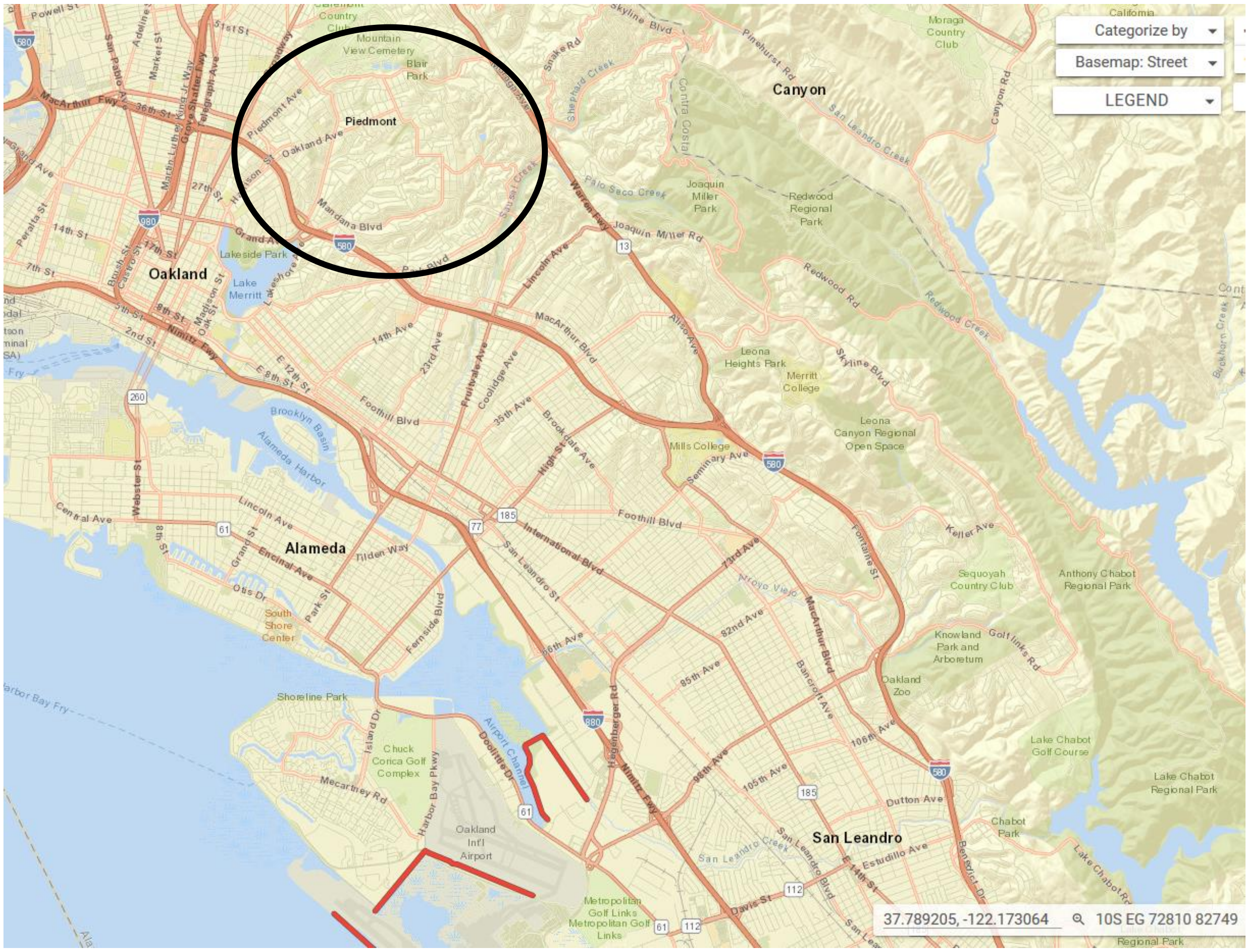
A levee is a raised area that runs along the banks of a stream or canal. Levees reinforce the banks and help prevent flooding by containing higher flow events to the main stream channel. By confining the flow to a narrower steam channel, levees can also increase the speed of the water. Levees can be natural or man-made. A natural levee is formed when sediment settles on the stream bank, raising the level of the land around the stream. To construct a man-made levee, workers place dirt or concrete along the stream banks, creating an embankment. This embankment is flat at the top, and slopes at an angle down to the water. For added strength, sandbags are sometimes placed over dirt embankments.

Levees provide strong flood protection, but they are not failsafe. Levees are designed to protect against a specific flood level and could be overtopped during severe weather events or dam failure. Levees reduce, not eliminate, the risk to individuals and structures located behind them. A levee system failure or overtopping can create severe flooding and high-water velocities. It's important to remember that no levee provides protection from events for which it was not designed, and proper operation and maintenance are necessary to reduce the probability of failure.

Location

The National Levee Database and the Alameda County Flood Insurance Study (FIS) were searched for levee locations in the City. No levees exist in the City. Levees exists to the south of the City, but not in the City limits. This can be seen in Figure 4-36.

Figure 4-36 City of Piedmont – Levees in the Planning Area



Source: National Levee Database

Extent

Since no levees protect the City, nor in areas of the County that would affect the City, extent of levee failure in the City would be negligible.

Past Occurrences

There are no levees in the City, therefore there have been no past occurrences of levee failure.

Likelihood of Future Occurrences

Unlikely – Due to the lack of levees in or near the City, the likelihood of levee failure is unlikely.

Climate Change and Levee Failure

Climate change is unlikely to affect levee failure, since no levees exist in the City.

4.2.14. Wildfire

Hazard/Problem Description

California is recognized as one of the most fire-prone and consequently fire-adapted landscapes in the world. The combination of complex terrain, Mediterranean climate, and productive natural plant communities, along with ample natural and aboriginal ignition sources, has created conditions for extensive wildfires. Wildland fire is an ongoing concern for Alameda County and the City of Piedmont. Historically in California, the fire season extended from early spring through late fall of each year during the hotter, dryer months. However, in recent years, wildfire season is more of a year around event. Fire conditions arise from a combination of high temperatures, low moisture content in the air and fuel, an accumulation of vegetation, and high winds.

Potential losses from wildfire include human life, structures and other improvements, natural and cultural resources, quality and quantity of water supplies, cropland, timber, and recreational opportunities. Economic losses could also result. Smoke and air pollution from wildfires can be a severe health hazard. In addition, catastrophic wildfire can create favorable conditions for other hazards such as flooding, landslides and mudflows, and erosion during the rainy season.

Wildland fires affect grass, forest, and brushlands, as well as any structures located within them. Where there is human access to wildland areas the risk of fire increases due to a greater chance for human carelessness and historical fire management practices. Generally, there are four major factors that sustain wildfires and allow for predictions of a given area's potential to burn. These factors include fuel, topography, weather, and human actions.

Fuel

Fuel is the material that feeds a fire and is a key factor in wildfire behavior. Fuel is generally classified by type and by volume. Fuel sources are diverse and include everything from dead tree leaves, twigs, and branches to dead standing trees, live trees, brush, and cured grasses. The native vegetation of the East Bay Hills near Piedmont evolved with the presence of occasional wildfires. These wildfires generally promoted the health and regeneration of a mosaic of native grasslands, oak woodlands, and forests. Low intensity and frequent wildfires are generally considered beneficial, leading to an expansion of native grasslands and an increase in the bio-diversity and productivity of chaparral and north coastal scrub ecosystems. Similar to fuels in the Oakland Hills areas, the City has some pockets of eucalyptus. Also to be considered as a fuel source are manmade structures, such as homes and other associated combustibles. The type of prevalent fuel directly influences the behavior of wildfire. Fuel is the only factor that is under human control.

Topography

An area's terrain and land slopes affect its susceptibility to wildfire spread. Both fire intensity and rate of spread increase as slope increases due to the tendency of heat from a fire to rise via convection. The arrangement of vegetation throughout a hillside can also contribute to increased fire activity on slopes. The hilly topography of the City contributes to the spread of fire. The 2015 Alameda County Community

Wildfire Protection Plan (CWPP) noted that westward facing slopes are more arid (due to long exposure to the afternoon sun) and thus more combustible. The difficulty of building roads in the steep areas makes ingress or egress difficult and delays fire fighter response time.

Weather

Weather components such as temperature, relative humidity, wind, and lightning also affect the potential for wildfire. High temperatures and low relative humidity dry out fuels that feed wildfires, creating a situation where fuel will ignite more readily and burn more intensely. Thus, during periods of drought, the threat of wildfire increases. The 2015 Alameda County CWPP noted that the weather in the County is generally warm and dry during the day with a slight relative humidity recovery at night. During most of the year, temperatures in the East Bay are moderate, and vegetation is relatively moist and fire-safe. Summers bring overnight and morning fog along the hills until around noon, with moist midday winds blowing westerly in from the coast.

However, on occasion, a phenomenon known as foehn or Diablo winds turns these conditions around. These hot, dry winds blow from the east, often in the early morning when major fires are least expected. They can fan the flames of small sparks into wildfires that have been observed to move down from a ridge top in 30 minutes, expand to one square mile in an hour, and consume hundreds of residences in one day. The few days each year when all of the high fire danger conditions—low humidity, high temperatures, and hot, dry Diablo winds blowing in from the east—are extreme are labeled Red Flag days, and usually occur in the fall months.

These winds are the most treacherous weather factor. The greater a wind, the faster a fire will spread and the more intense it will be. In addition to wind speed, wind shifts can occur suddenly due to temperature changes or the interaction of wind with topographical features such as slopes or steep hillsides. These winds can occur at any time of year, but are especially dangerous in the driest months of summer and fall. During these times, fighting a fire becomes far more difficult. Lightning also ignites wildfires, often in difficult to reach terrain for firefighters.

Human Actions

Most wildfires are ignited by human action, the result of direct acts of arson, carelessness, or accidents. Many fires originate in populated areas along roads and around homes, and are often the result of arson or careless acts such as the disposal of cigarettes, use of equipment or debris burning. Recreation areas that are located in high fire hazard areas also result in increased human activity that can increase the potential for wildfires to occur.

Location

Wildfire is part of California's natural ecology. However, its danger and cost have increased as fire-prone areas across the state have seen more development. The City of Piedmont General Plan Environmental Hazards Element noted that homes have been built on steep scrub-covered hillsides throughout the East Bay hills, creating an interface between urban uses and open space that has increased the risk of fire. Over the years, fire suppression and invasive plants have contributed to fuel build-up and increased the risk of more catastrophic fire events. The HMPC noted that, although maps show discrete hazard risk across the

City, these maps understate the actual fire risk within the City. The HMPC noted that the entire City is at risk to wildfire. As noted above, areas where fuels, topography, and wildfire come together area areas of greatest concern. Grizzly Peak Road and Fish Ranch Road are a couple key areas of concern; however this can happen at most places in the City. It should be noted that Grizzly Peak and Fish Ranch roads are outside of Piedmont, but wildfires that originate in these areas are of high concern to the City of Piedmont.

Post-Wildfire Landslides and Debris Flows

Post-wildfire landslides and debris flows are a concern in the City, though the fires usually burn in areas that are less populated. Fires that burn in hilly areas, which comprise the eastern portion of the City, remove vegetation that holds hillsides together during rainstorms. Once that vegetation is removed, the hillside may be compromised, resulting in landslides and debris flows, especially during heavy rains. Mapping of these areas has begun to occur in post-wildfire burn scars.

Extent

Again, the HMPC noted that while CAL FIRE has mapped areas, these maps understate the fire risk in the City. Fires can have a quick speed of onset, especially during periods of drought. Fires can burn for a short period of time, or may have durations lasting for a week or more. Wildfire can affect any area of the City, however CAL FIRE has mapped areas in California that are at greater risk to wildfire. Methodologies for this analysis and maps showing extent can be found in Section 4.3.14. GIS analysis was performed to determine what percentages of the City would be at risk to wildfire (using CAL FIRE Fire Hazard Severity Zone data). 9.2% of all parcels in the Piedmont Planning Area fall in the CAL FIRE Very High Fire Hazard Severity Zones. This can be seen in Table 4-31.

Table 4-31 City of Piedmont – Wildfire Extents

Fire Hazard Severity Zones	Total Acres	Area (square feet)	% of Total Acres	% of Total Area
Very High	101	4,388,971	9.2%	9.2%
Non-Very High	995	43,322,954	90.8%	90.8%
Grand Total	**1,095**	**47,711,925**	**100.0%**	**100.0%**

Source: Cal FIRE

Past Occurrences

Disaster Declaration History

There have been two federal and one state disaster declarations due to fire in Alameda County. These were from the 1962 Fires and Explosion, 1970 California Forest and Brush Fires, and the 1991 Oakland Hills Fire. This can be seen in Table 4-33.

Table 4-32 Alameda County Disaster Declarations 1950-2018 from Wildfire

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Fire	1	1962	2	1970, 1991

Source: Cal OES, FEMA

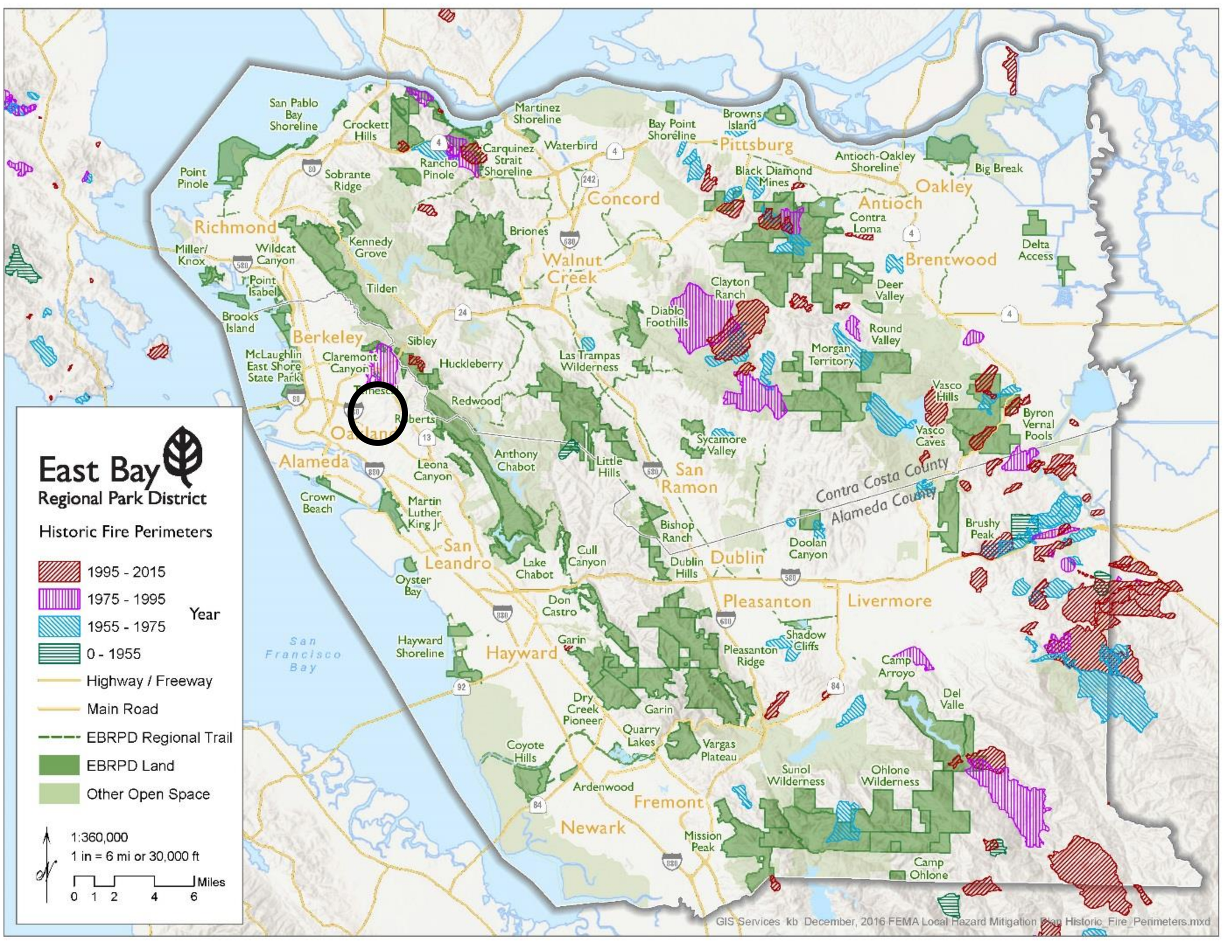
NCDC Events

The NCDC does not contain any wildfire events for the County or City.

Alameda County CWPP Events

The East Bay Regional Park District LHMP noted that there have been multiple fires in the East Bay area. The only fire that would have directly threatened the City of Piedmont is the Oakland Hills Fire of 1991. It can be seen on Figure 4-37.

Figure 4-37 City of Piedmont – Fires from East Bay Regional Park District



Source: 2015 Alameda County CWPP

Hazard Mitigation Planning Team Events

The HMPC noted that parts of Piedmont have similar landscape character as the area burned in the devastating 1991 Oakland Hills Fire. The 1991 Fire destroyed more than 3,000 homes in Oakland and Berkeley, caused 23 deaths, burned 2,000 acres, and resulted in $3 billion in property damage. Although there were no casualties or damage in Piedmont; the fire did not extend into the City.

In 2018, the City received two alerts that power would be shut down in certain Grid Areas within the Very High Fire Hazard Severity Zone – but no shut downs occurred. This was an Operational Area alert, not specific to Piedmont, and was really just an early warning measure that never realized.

Likelihood of Future Occurrences

Highly Likely — From May to October of each year, Piedmont faces a serious wildland fire threat. The threat of wildfire and potential losses are constantly increasing as human development and population increase and the wildland urban interface areas expand. Due to its topography and long summers, portions of the City continue to be at risk from wildfire. Due to the high value of homes in the City, wildfire could cause very costly amounts of damage.

Climate Change and Wildfire

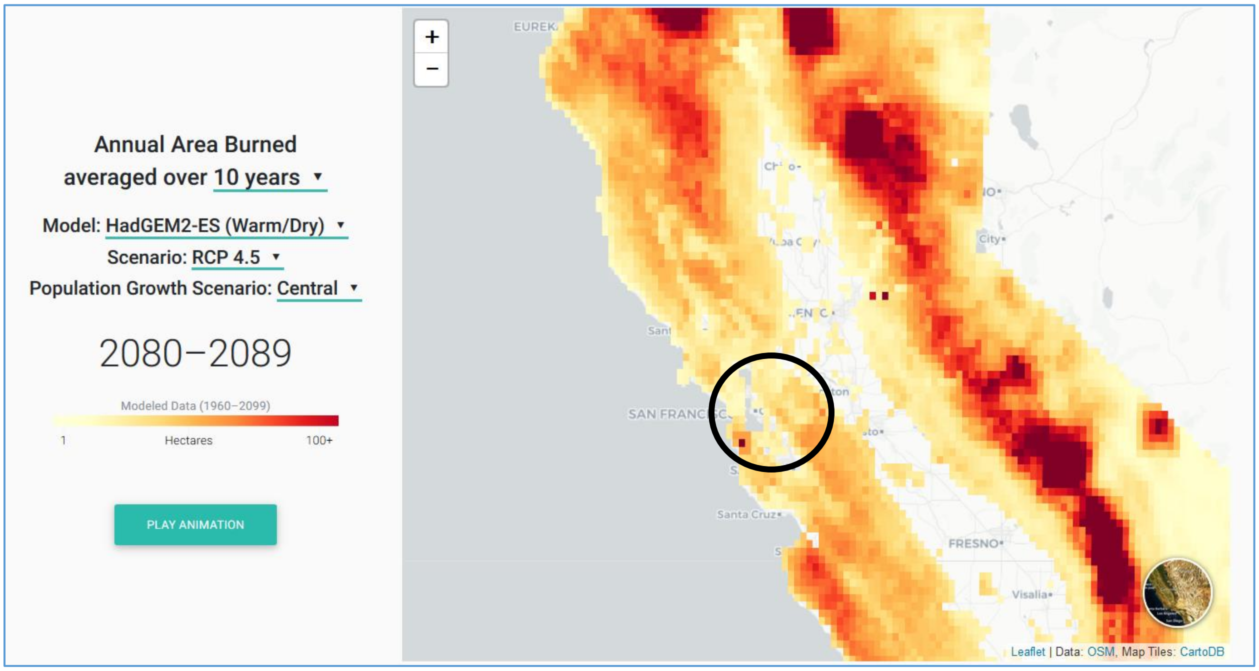
Climate change and its effect on wildfire near the City has been discussed by three sources:

- Cal-Adapt
- City of Piedmont CAP 2.0
- Climate Change and Health Report for Alameda County

Cal-Adapt Predictions

Warmer temperatures can exacerbate drought conditions. Drought often kills plants and trees, which serve as fuel for wildfires. Warmer temperatures could increase the number of wildfires and pest outbreaks, such as the western pine beetle. Cal-Adapt's wildfire tool predicts the potential increase in the amount of burned areas for the year 2080-2089, as compared to recent (2010) conditions. This is shown in Figure 4-38. Based on this model, Cal-Adapt predicts that wildfire risk in Alameda County will increase slightly (and much less than other California counties) in the near term and subside during mid-to late-century. However, wildfire models can vary depending on the parameters used. Cal-Adapt does not take landscape and fuel sources into account in their model. In all likelihood, in Piedmont, precipitation patterns, high levels of heat, topography, and fuel load will determine the frequency and intensity of future wildfire.

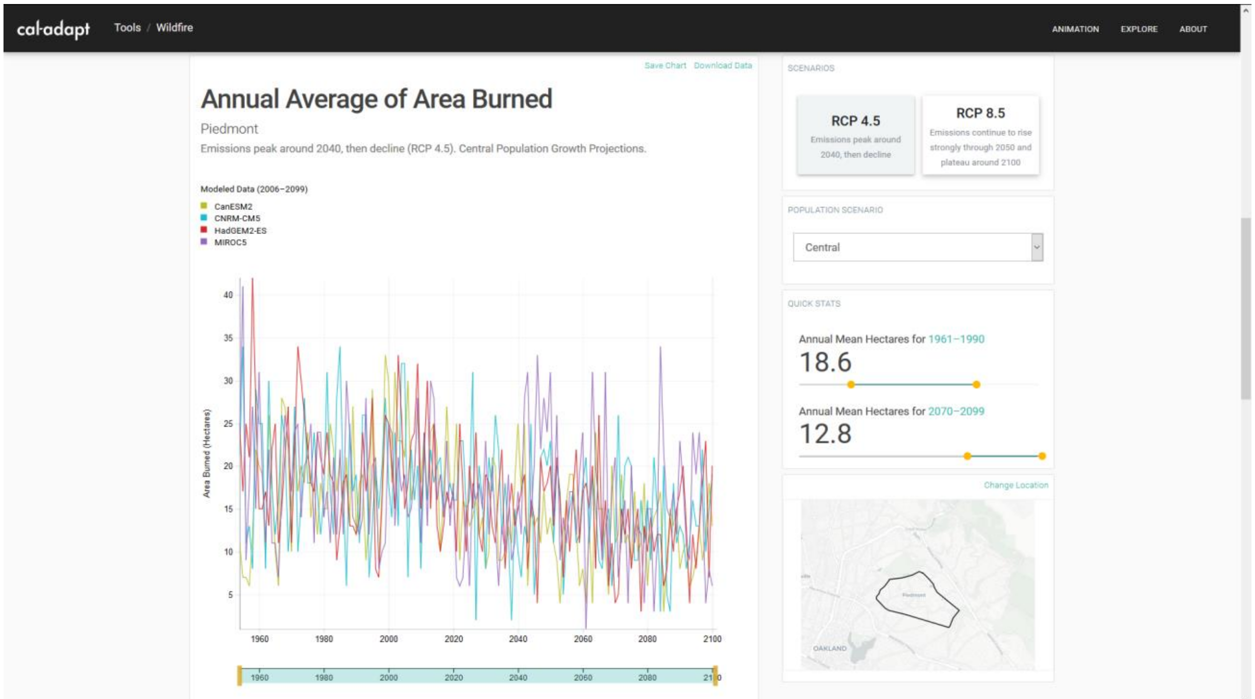
Figure 4-38 City of Piedmont– Projected Increase in Wildfire Burn Areas

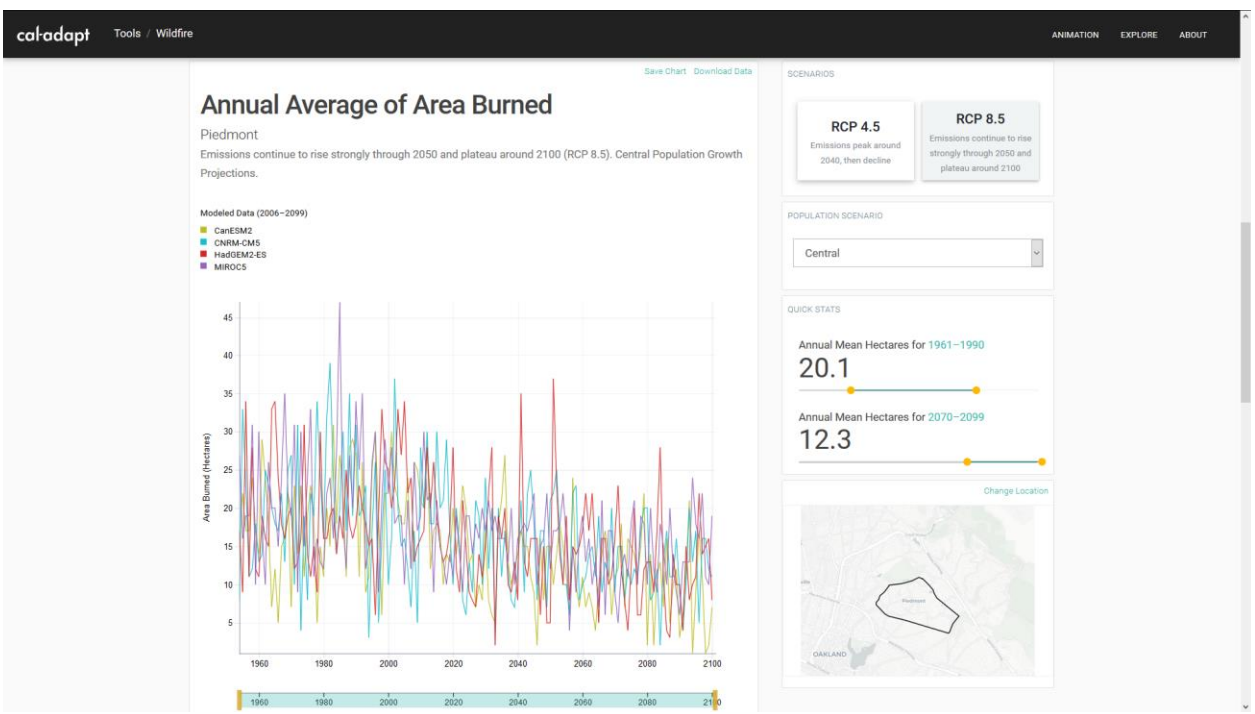


Source: Cal-Adapt

Wildfire scenario projections were done by Cal-Adapt, based on statistical modeling from historical data of climate, vegetation, population density, and fire history. The fire modeling ran simulations on five variables on a monthly time step - Large fire presence/absence, Number of fires given presence, Area burned in a grid cell given a fire, High severity burned area given a fire and emissions. These are shown on Figure 4-39. The upper chart shows modeled annual averages of area burned for Piedmont under the RCP 4.5 scenario, while the lower chart shows modeled annual averages of area burned for Piedmont under the RCP 8.5 scenario.

Figure 4-39 City of Piedmont – Future Annual Averages of Acres Burned under RCP 4.5 and 8.5 Scenarios





Source: Cal-Adapt

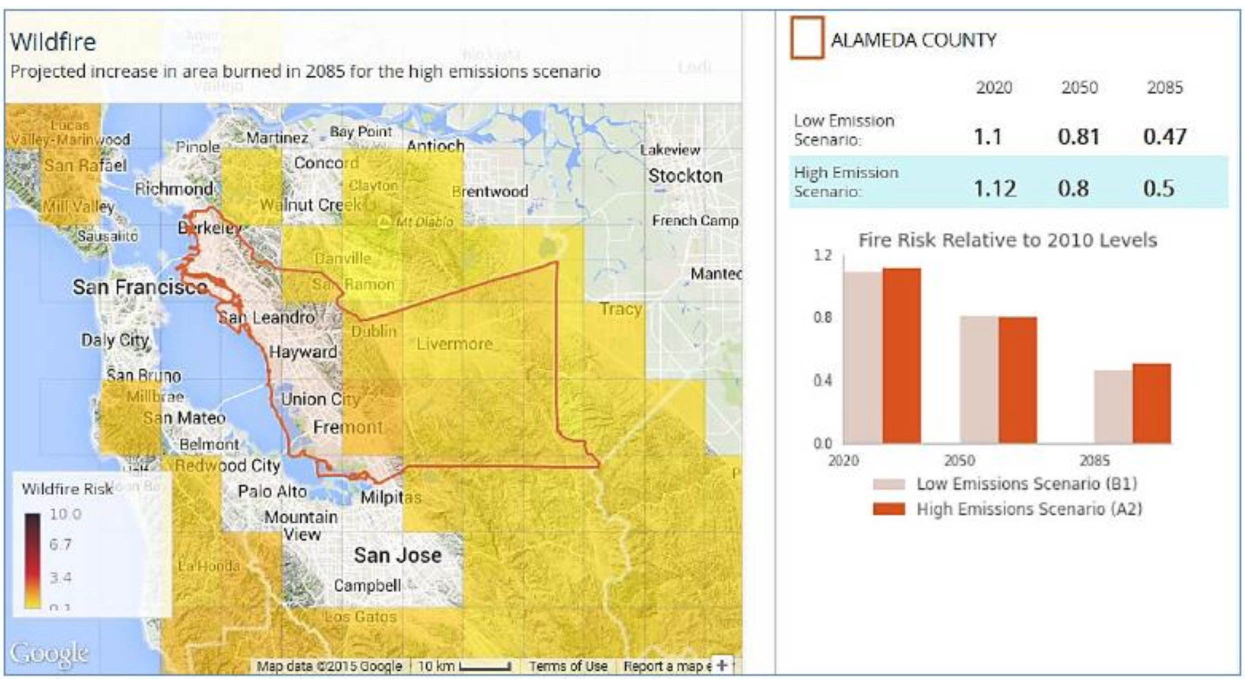
City of Piedmont CAP 2.0 Predictions

The City of Piedmont CAP 2.0 noted that extreme temperatures and increased variability in rainfall will likely cause dry conditions in California, exacerbating the risk of wildfire throughout the state. Piedmont has large areas that are at risk of high hazard severity in the event of a wildfire, with increased exposure in the southeast where part of the City is in a very high hazard severity zone. The most significant implication of fire hazard severity levels in Piedmont is the exposure of the City's residential housing stock. Over a third of the residential area in the city is located in a moderate to very high hazard severity zone. In addition, community assets at risk of wildfire damage include Zion Lutheran Church, the Renaissance International School, and Corpus Christi School and Church.

Climate Change and Health Report for Alameda County Predictions

The map below (Figure 4-40) displays the projected increase or decrease in potential area burned based on projections of the Coupled Global Climate Model (version 3) for the high carbon emissions scenario in 2085. The bar graphs to the right of the map in Figure 4-40 illustrate the projected time trend over the 21st century for both the high and low emissions scenarios. Please note that these data are modeled solely on climate projections and do not take landscape and fuel sources into account. The projections of acreage burned are expressed in terms of the relative increase or decrease (greater or less than 1) from a 2010 baseline for fires that consume at least 490 acres. The 2010 baseline reflects historic data from 1980 to 1989 and trends through 2010.

Figure 4-40 Alameda County – Increase in Wildfire Acreage in Future Carbon Emissions Scenarios



Source: Climate Change and Health Report for Alameda County

4.2.15. Natural Hazards Summary

Table 4-33 summarizes the results of the hazard identification and hazard profile for the City based on the hazard identification data and input from the HMPC. For each hazard profiled in Section 4.2, this table includes the likelihood of future occurrence and whether the hazard is initially considered a priority hazard for the City based on the hazard profiles.

Table 4-33 Hazard Identification and Initial Determination of Priority Hazards

Hazard	Likelihood of Future Occurrence	Priority Hazard
Climate Change	Likely	Y
Dam Failure	Unlikely	Y
Drought and Water Shortage	Occasional	Y
Earthquake	Highly Likely/ Occasional	Y
Earthquake Liquefaction	Occasional	Y
Flood: (100/500 year)	Unlikely	N
Flood: Localized/Stormwater	Highly Likely	Y
Landslide, Mudslides, Hillside Erosion, and Debris Flows	Likely	Y
Levee Failure	Unlikely	N
Severe Weather: Extreme Heat	Highly Likely	Y
Severe Weather: Heavy Rains and Storms	Highly Likely	Y
Severe Weather: High Winds	Highly Likely	Y
Wildfire	Highly Likely	Y

4.3 Vulnerability Assessment

Requirement §201.6(c)(2)(ii): [The risk assessment shall include a] description of the jurisdiction's vulnerability to the hazards described in paragraph (c)(2)(i) of this section. This description shall include an overall summary of each hazard and its impact on the community.

Requirement §201.6(c)(2)(ii)(A): The plan should describe vulnerability in terms of the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the identified hazard areas.

Requirement §201.6(c)(2)(ii)(B): [The plan should describe vulnerability in terms of an] estimate of the potential dollar losses to vulnerable structures identified in paragraph (c)(2)(i)(A) of this section and a description of the methodology used to prepare the estimate.

Requirement §201.6(c)(2)(ii)(C): [The plan should describe vulnerability in terms of] providing a general description of land uses and development trends within the community so that mitigation options can be considered in future land use decisions.

With Piedmont's hazards identified and profiled, the HMPC conducted a vulnerability assessment to describe the impact that each priority hazard would have on the City. The vulnerability assessment quantifies, to the extent feasible using best available data, assets at risk to natural hazards and estimates potential losses.

This vulnerability assessment followed the methodology described in the FEMA publication *Understanding Your Risks—Identifying Hazards and Estimating Losses*. The vulnerability assessment first describes the total vulnerability of the City and values at risk and then discusses vulnerability by hazard.

Data Sources

Data used to support this vulnerability assessment included the following:

- 2014 California Climate Adaptation Strategy
- 2016 Alameda County Local Hazard Mitigation Plan
- 2017 East Bay Regional Parks Local Hazard Mitigation Plan
- ArkStorm at Tahoe - Stakeholder Perspectives on Vulnerabilities and Preparedness for an Extreme Storm Event in the Greater Lake Tahoe, Reno and Carson City Region. 2014.
- Alameda County Assessor's Data
- Alameda County Climate and Health Profile Report
- Alameda County Digital Flood Insurance Rate Map
- Alameda County Flood Insurance Study
- CAL FIRE
- Cal OES Dam Inundation Data
- Cal-Adapt – Temperature: Decadal Averages Map
- Cal-Adapt
- Cal Atlas
- California Adaptation Planning Guide

- California Department of Conservation
- California Department of Finance, E-1 Report
- California Department of Finance, E-4 Report
- California Department of Finance, P-1 Report
- California Department of Water Resources
- California Department of Water Resources Disadvantaged Community Mapping Tool
- California Geological Survey
- California Natural Diversity Database
- California Natural Resource Agency
- California Office of Historic Preservation
- California's Drought of 2007-2009, An Overview. State of California Natural Resources Agency, California Department of Water Resources
- City of Piedmont 2025 General Plan
- City of Piedmont Climate Action Plan 2.0
- City of Piedmont General Plan Conservation Element
- City of Piedmont General Plan Environmental Hazards Element
- City of Piedmont General Plan Land Use Element
- City of Piedmont GIS
- City of Piedmont Parcel Data
- City staff
- Climate Change and Health Profile Report - Alameda County
- East Bay Municipal Utility District
- Existing plans and studies
- Federal Emergency Management Agency
- FEMA Hazus 4.2
- FEMA: Building Performance Assessment: Oklahoma and Kansas Tornadoes
- Intergovernmental Panel on Climate Change
- Levees in History: The Levee Challenge. Dr. Gerald E. Galloway, Jr., P.E., Ph.D., Water Policy Collaborative, University of Maryland, Visiting Scholar, USACE, IWR
- National Climate Assessment
- National Drought Mitigation Center
- National Integrated Drought Information System
- National Oceanic and Atmospheric Administration's National Climatic Data Center
- National Weather Service
- NOAA Storm Prediction Center
- NOAA's Climate Prediction Center
- Petersen, M. et al., 2018 One-Year Seismic Hazard Forecast for the Central and Eastern United States from Induced and Natural Earthquakes - Seis. Res. Lett., doi.org/10.1785/0220180005.
- Proceedings of the National Academy of Sciences
- Public Health Alliance of Southern California
- San Francisco Bay Conservation and Development Commission
- Science Magazine
- Statewide GIS datasets from other agencies such as Cal OES, FEMA, USGS, CGS, Cal Atlas, and others
- Southern California Association of Governments
- University of California

- US Army Corps of Engineers
- US Census Bureau 2010 Household Population Estimates
- US Drought Monitor
- US Fish and Wildlife Service National Wetlands Inventory
- US Geological Survey
- USGS Haywired Earthquake Scenario, Scientific Investigations Report 2017-5013-A-H
- Vaisala National Lightning Detection Network
- Western Regional Climate Center

4.3.1. Piedmont's Vulnerability and Assets at Risk

As a starting point for analyzing the City's vulnerability to identified hazards, the HMPC used a variety of data to define a baseline against which all disaster impacts could be compared. If a catastrophic disaster was to occur in the City, this section describes significant assets at risk. Data and analysis used in this baseline assessment included:

- Total values at risk;
- City critical facilities;
- Natural, cultural, and historical resources; and
- Growth and development trends.

Total Values at Risk

Parcel Inventory and Assessed Values

This analysis captures the values associated with assessed assets located within the City of Piedmont. The 2018 GIS parcel layer and the Alameda County Assessor data (Parcel Quest), dated 6/19/2018, obtained from the City of Piedmont, was used for the basis of this analysis. This data provided by Piedmont represents best available data.

Understanding the total assessed value of Piedmont is a starting point to understanding the overall value of identified assets at risk in the City. When the total assessed values are combined with potential values associated with other community assets such as area populations, public and private critical infrastructure, historic and cultural resources, and natural resources, the big picture emerges as to what is potentially at risk and vulnerable to the damaging effects of natural hazards within the City.

Methodology

Alameda County's Assessor Data for the City of Piedmont dated 6/19/2018 and the City's GIS parcel data were used as the basis for the inventory of assessed values for both improved and unimproved parcels within the City. This data provides the land and improved values assessed for each parcel. Other GIS data, such as jurisdictional boundaries, roads, streams, and area features, was also obtained from Piedmont and Alameda County to support citywide mapping and analysis of values at risk. The citywide Piedmont GIS parcel data contained 7,309 parcels, including areas of the City of Oakland. This Plan focuses on the Piedmont area as the Planning Area for this effort, and therefore the GIS parcel data specific to the Piedmont Planning Area contained 4,009 parcels.

Data Limitations & Notations

Although based on best available data, the resulting information should only be used as an initial guide to overall values in the City. In the event of a disaster, structures and other infrastructure improvements are at the greatest risk of damage. Depending on the type of hazard and resulting damages, the land itself may not suffer a significant loss. For that reason, the values of structures and other infrastructure improvements are of greatest concern. Also, it is critical to note a specific limitation to the assessed values data within the City, created by Proposition 13. Instead of adjusting property values annually, no adjustments are made until a property transfer occurs. As a result, overall property value information is significantly low and does not reflect current market or true potential loss values for properties within the City.

The 2018 GIS parcel and Assessor data (PQuest Data) was obtained to perform the spatial analysis. The initial PQuest Data table contained 3,790 records. The initial GIS parcel data contained 4,009 records. When the assessor table was linked to the GIS parcel attribute table, there were 3,790 successful record matches. The remaining 219 GIS parcels did not match and therefore do not contain assessor data. GIS was used to compare parcel polygons and parcel centroids, or points, representing the center of each parcel polygon. For the purposes of this analysis, the centroids which were not coincident in locations were re-positioned to overlay on the corresponding polygons, and in most cases re-positioned to overlay on the primary structure on the parcel, so that each assessor record (with a unique assessor parcel number) was spatially positioned on the corresponding parcel. The data did not contain duplicate records. In total, 4,009 records were utilized for the analysis.

The parcel and assessor data contained 5 records with supplemental values noted in the Other Values field. The Other Values in the 5 records, with a summation of $134,526, were not factored into the Total Values.

Property Use Categories

Piedmont provided a General Plan dataset containing a base planning code which provided detailed descriptive information about how each property is generally used, such as residential, commercial, or industrial. The planning codes were refined and categorized into the following property use categories and linked back to the Piedmont Assessor data. The final property use categories for the City of Piedmont include:

- Commercial
- Houses of Worship
- Municipal
- Parks / Open Space
- Residential
- Schools
- Vacant

Once Property Use Codes were grouped into categories, the number of total and improved parcels and land and improved values were inventoried for the City by property use.

Estimated Content Replacement Values

Piedmont's assigned property use categories were used to develop estimated content replacement values (CRVs) that are potentially at loss from hazards. FEMA's standard CRV factors were utilized to develop more accurate loss estimates for all mapped hazard analyses. FEMA's CRV factors estimate value as a percent of improved structure value by property use. Table 4-34 shows the breakdown of the different property uses in Piedmont and their estimated CRV factors.

Table 4-34 Piedmont – Content Replacement Factors by Property Use

Piedmont Property Use Categories	Hazus Property Use Categories	Hazus Content Replacement Values
Commercial	Commercial	100%
Houses of Worship	Institutional	100%
Municipal	Government	100%
Parks / Open Space*	Miscellaneous	50%
Residential	Residential	50%
Schools	Institutional	100%
Vacant	Miscellaneous	0%

Source: Hazus 4.2

* Hazus CRV % modified to better reflect Piedmont Property Use category (Parks/Open Space from 100% to 50%)

Piedmont Values at Risk Results

Values at Risk without Contents

Values associated with land, and improved structure values were identified and summed to determine total assessed values at risk in the Piedmont Planning Area. Together, the land value and improved structure value make up the majority of assessed values associated with each identified parcel or asset. Improved parcel counts were based on the assumption that a parcel was improved if a structure value was present. Information on other values such as personal property values were not readily available for inclusion in this effort.

Table 4-35 shows the total values or exposure for the entire Piedmont geographic area. Table 4-36 breaks down Table 4-35, and gives detail about how the property use category is broken down. The values for the Piedmont Planning Area are broken out by property use type and are provided in Table 4-34.

Table 4-35 City of Piedmont – Count and Values of Parcels at Risk by Summary Property Use

Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Total Value
Commercial	14	6	$5,157,495	$4,885,769	$10,043,264
Houses of Worship	11	2	$724,183	$2,532,185	$3,256,368
Municipal	3	0	$0	$0	$0
Parks / Open Space	23	0	$0	$0	$0

Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Total Value
Residential	3,892	3,729	$1,328,232,002	$2,807,531,588	$4,135,763,590
Schools	6	0	$0	$0	$0
Vacant	60	6	$3,379,591	$9,479,330	$12,858,921
Grand Total	**4,009**	**3,743**	**$1,337,493,271**	**$2,824,428,872**	**$4,161,922,143**

Source: Piedmont 6/19/2018 Parcel/Assessor's Data

Table 4-36 City of Piedmont – Count and Value of Parcels at Risk by Detailed Property Use

Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Total Value
Commercial					
AUTOMOTIVE USES					
Commercial	2	2	$1,249,034	$209,694	$1,458,728
BANK					
Commercial	1	1	$540,511	$934,359	$1,474,870
CHURCH					
Commercial	1	1	$1,261,029	$1,200,980	$2,462,009
OFFICE					
Commercial	1	1	$2,000,000	$2,000,000	$4,000,000
RETAIL SALES					
Commercial	1	1	$106,921	$540,736	$647,657
Commercial	8	**0**	$0	$0	$0
Commercial Total	**14**	**6**	**$5,157,495**	**$4,885,769**	**$10,043,264**
Houses of Worship					
CHURCH					
Houses of Worship	1	1	$539,546	$1,296,994	$1,836,540
SCHOOLS					
Houses of Worship	1	1	$184,637	$1,235,191	$1,419,828
Houses of Worship	9	0	$0	$0	$0
Houses of Worship Total	**11**	**2**	**$724,183**	**$2,532,185**	**$3,256,368**
Municipal					
Municipal	3	0	$0	$0	$0
Municipal Total	**3**	**0**	**$0**	**$0**	**$0**
Parks / Open Space					
Parks and Private Open Space	21	0	$0	$0	$0
Utility Open Space	2	0	$0	$0	$0

Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Total Value
Parks / Open Space Total	**23**	**0**	**$0**	**$0**	**$0**
Residential					
RESID. MULTIPLE FAMILY					
Multi-Family Residential	14	14	$5,017,102	$12,140,806	$17,157,908
Single Family Residential	25	25	$8,249,180	$18,861,727	$27,110,907
RESID. SINGLE FAMILY					
Multi-Family Residential	5	5	$890,295	$2,047,616	$2,937,911
Single Family Residential	3,685	3,684	$1,313,671,561	$2,774,069,944	$4,087,741,505
VACANT					
Single Family Residential	1	1	$403,864	$411,495	$815,359
Multi-Family Residential	3	0	$0	$0	$0
Single Family Residential	159	0	$0	$0	$0
Residential Total	**3,892**	**3,729**	**$1,328,232,002**	**$2,807,531,588**	**$4,135,763,590**
Schools					
Schools	6	**0**	$0	$0	$0
Schools Total	**6**	**0**	**$0**	**$0**	**$0**
Vacant					
RESID. SINGLE FAMILY					
Vacant	6	6	$3,379,591	$9,479,330	$12,858,921
Vacant	54	0	$0	$0	$0
Vacant Total	**60**	**6**	**$3,379,591**	**$9,479,330**	**$12,858,921**
Grand Total	**4,009**	**3,743**	**$1,337,493,271**	**$2,824,428,872**	**$4,161,922,143**

Source: Piedmont 6/19/2018 Parcel/Assessor's Data

Values at Risk with Contents

Table 4-37 shows the total values of the Piedmont Planning Area as shown in Table 4-35, but with estimated content replacement values (CRVs) included (using CRV multipliers from Table 4-34). This table is important as potential losses to the City include structure contents. In addition, loss estimates contained in the hazard vulnerability sections of this Chapter will use calculations based on the total values, including content replacement values. Table 4-38 breaks down Table 4-37, and gives detail about how the property use category is broken down.

Table 4-37 City of Piedmont – Count and Value of Parcels at Risk by Summary Property Use with Content Replacement Values

Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Estimated Contents Value	Total Value
Commercial	14	6	$5,157,495	$4,885,769	$4,885,769	$14,929,033
Houses of Worship	11	2	$724,183	$2,532,185	$2,532,185	$5,788,553
Municipal	3	0	$0	$0	$0	$0
Parks / Open Space	23	0	$0	$0	$0	$0
Residential	3,892	3,729	$1,328,232,002	$2,807,531,588	$1,403,765,794	$5,539,529,384
Schools	6	0	$0	$0	$0	$0
Vacant	60	6	$3,379,591	$9,479,330	$0	$12,858,921
Grand Total	4,009	3,743	$1,337,493,271	$2,824,428,872	$1,411,183,748	$5,573,105,891

Source: Piedmont 6/19/2018 Parcel/Assessor's Data

Table 4-38 City of Piedmont – Count and Value of Parcels at Risk by Detailed Property Use with Content Replacement Values

Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Estimated Contents Value	Total Value
Commercial						
AUTOMOTIVE USES						
Commercial	2	2	$1,249,034	$209,694	$209,694	$1,668,422
BANK						
Commercial	1	1	$540,511	$934,359	$934,359	$2,409,229
CHURCH						
Commercial	1	1	$1,261,029	$1,200,980	$1,200,980	$3,662,989
OFFICE						
Commercial	1	1	$2,000,000	$2,000,000	$2,000,000	$6,000,000
RETAIL SALES						
Commercial	1	1	$106,921	$540,736	$540,736	$1,188,393
Commercial	8	**0**	$0	$0	$0	$0
Commercial Total	**14**	**6**	**$5,157,495**	**$4,885,769**	**$4,885,769**	**$14,929,033**
Houses of Worship						
CHURCH						
Houses of Worship	1	1	$539,546	$1,296,994	$1,296,994	$3,133,534
SCHOOLS						
Houses of Worship	1	1	$184,637	$1,235,191	$1,235,191	$2,655,019
Houses of Worship	9	0	$0	$0	$0	$0
Houses of Worship Total	**11**	**2**	**$724,183**	**$2,532,185**	**$2,532,185**	**$5,788,553**

Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Estimated Contents Value	Total Value
Municipal						
Municipal	3	0	$0	$0		
Municipal Total	**3**	**0**	**$0**	**$0**		
Parks / Open Space						
Parks and Private Open Space	21	0	$0	$0	$0	$0
Utility Open Space	2	0	$0	$0	$0	$0
Parks / Open Space Total	**23**	**0**	**$0**	**$0**	**$0**	**$0**
Residential						
RESID. MULTIPLE FAMILY						
Multi-Family Residential	14	14	$5,017,102	$12,140,806	$6,070,403	$23,228,311
Single Family Residential	25	25	$8,249,180	$18,861,727	$9,430,864	$36,541,771
RESID. SINGLE FAMILY						
Multi-Family Residential	5	5	$890,295	$2,047,616	$1,023,808	$3,961,719
Single Family Residential	3,685	3,684	$1,313,671,561	$2,774,069,944	$1,387,034,972	$5,474,776,477
VACANT						
Single Family Residential	1	1	$403,864	$411,495	$205,748	$1,021,107
Multi-Family Residential	3	0	$0	$0	$0	$0
Single Family Residential	159	0	$0	$0	$0	$0
Residential Total	**3,892**	**3,729**	**$1,328,232,002**	**$2,807,531,588**	$1,403,765,794	$5,539,529,384
Schools						
Schools	6	**0**	$0	$0	$0	$0
Schools Total	**6**	**0**	**$0**	**$0**	**$0**	**$0**
Vacant						
RESID. SINGLE FAMILY						
Vacant	6	6	$3,379,591	$9,479,330	$0	$12,858,921
Vacant	54	0	$0	$0	$0	$0
Vacant Total	**60**	**6**	**$3,379,591**	**$9,479,330**	$0	$12,858,921
Grand Total	**4,009**	**3,743**	**$1,337,493,271**	**$2,824,428,872**	**$1,411,183,748**	**$5,573,105,891**

Source: Piedmont 6/19/2018 Parcel/Assessor's Data

Other Values

The HMPC noted that the values of schools are not included in the Parcel/Assessor's data. The Piedmont School District noted that the 2018 valuation of school facilities total $103.2 million in real property and $10.1 million in personal property. It should be noted that these facility valuations are not included in the vulnerability analysis in Sections 4.3.2 thought 4.3.14 below.

Critical Facilities

For purposes of this plan, a critical facility is defined as:

> *Any facility, including without limitation, a structure, infrastructure, property, equipment or service, that if adversely affected during a hazard event may result in severe consequences to public health and safety or interrupt essential services and operations for the community at any time before, during and after the hazard event.*

A critical facility is classified by the following categories: (1) Essential Services Facilities: (2) At-risk Populations Facilities, (3) Hazardous Materials Facilities.

- **Essential Services Facilities** include, without limitation, public safety, emergency response, emergency medical, designated emergency shelters, communications, public utility plant facilities and equipment, and government operations. Sub-Categories:
  - ✓ Public Safety - Police stations, fire and rescue stations, emergency operations centers
  - ✓ Emergency Response - Emergency vehicle and equipment storage and essential governmental work centers for continuity of government operations.
  - ✓ Emergency Medical - Hospitals, emergency care, urgent care, ambulance services.
  - ✓ Designated Emergency Shelters.
  - ✓ Communications - Main hubs for telephone, main broadcasting equipment for television systems, radio and other emergency warning systems.
  - ✓ Public Utility Plant Facilities - including equipment for treatment, generation, storage, pumping and distribution (hubs for water, wastewater, power and gas).
  - ✓ Essential Government Operations - Public records, courts, jails, building permitting and inspection services, government administration and management, maintenance and equipment centers, and public health.
  - ✓ Transportation Lifeline Systems - Airports, helipads, and critical highways, roads, bridges and other transportation infrastructure (Note: Critical highways, roads, etc. will be determined during any hazard-specific evacuation planning and are not identified in this plan).
- **At Risk Population Facilities** include, without limitation, pre-schools, public and private primary and secondary schools, before and after school care centers with 12 or more students, daycare centers with 12 or more children, group homes, and assisted living residential or congregate care facilities with 12 or more residents.
- **Hazardous Materials Facilities** include, without limitation, any facility that could, if adversely impacted, release of hazardous material(s) in sufficient amounts during a hazard event that would create harm to people, the environment and property.

A summary of critical facilities in the City can be found in Figure 4-41 and Table 4-39. Table 4-40 gives details of critical facilities in the City by category. Details of individual critical facilities can be found in Appendix E of this Plan.

Figure 4-41 City of Piedmont – Critical Facilities

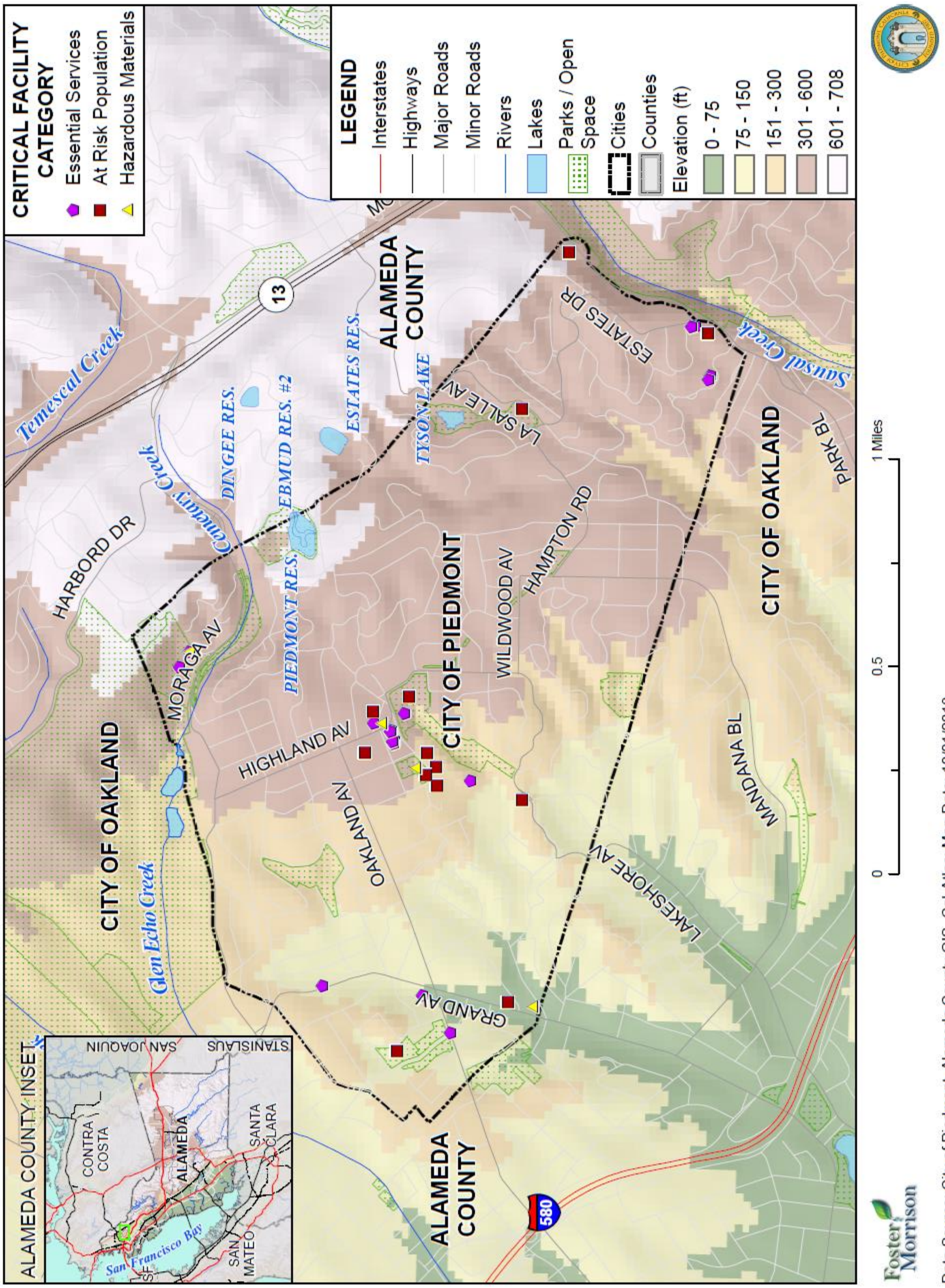


Table 4-39 City of Piedmont – Critical Facility Summary by Category

Critical Facility Category	Facility Count
Essential Services Facilities	20
At Risk Population Facilities	13
Hazardous Materials Facilities	4
Grand Total	**37**

Source: City of Piedmont GIS

Table 4-40 City of Piedmont – Critical Facility Detail by Category and Facility Type

Critical Facility Category	Facility Type	Facility Count
Essential Services Facilities	Communication	7
	EOC	1
	Essential Gov Operations	1
	Fire Department	1
	Police Station	1
	Response Center	2
	Staging Facility	1
	Transmission Towers	4
	Transportation Life System	1
	Utility	1
	Total	**20**
At Risk Population Facilities	Child Facility	1
	Day Care	1
	Day Care / School	2
	Day Care Facility	2
	School	7
	Total	**13**
Hazardous Materials Facilities	Gas Station	2
	Pool	1
	Response Center	1
	Total	**4**
Grand Total		**37**

Source: City of Piedmont GIS

Natural, Historical, and Cultural Resources

Assessing the vulnerability of the City to disaster also involves inventorying the natural, historic, and cultural assets of the area. This step is important for the following reasons:

- The community may decide that these types of resources warrant a greater degree of protection due to their unique and irreplaceable nature and contribution to the overall economy.
- If these resources are impacted by a disaster, knowing so ahead of time allows for more prudent care in the immediate aftermath, when the potential for additional impacts are higher.
- The rules for reconstruction, restoration, rehabilitation, and/or replacement are often different for these types of designated resources.
- Natural resources can have beneficial functions that reduce the impacts of natural hazards, such as wetlands and riparian habitat, which help absorb and attenuate floodwaters.

Natural Resources

Piedmont's natural landscape has been twice transformed in the past two centuries. In the 1800s, its rolling hills were converted to ranches, orchards, and dairies. Cattle grazing eliminated most native species and invasive European grasses took root. In the 1900s, the agricultural landscape was urbanized with homes and gardens. Ornamental trees were planted along streets, flowering plants and shrubs were planted in private yards, and exotic plants such as eucalyptus and Himalayan blackberry appeared along streambeds.

Despite the altered state of Piedmont's landscape, the City still has many natural open spaces and distinct ecological communities. Piedmont's flora provides important aesthetic, environmental, and psychological benefits. The principal habitat types in Piedmont are:

- **Woodlands**. These areas are generally located in Piedmont Park, along creeks and ravines, and on larger lots in the Estate Zone. Common trees include live oak, black oak, redwood, bay laurel, buckeye, alder, willow, and sycamore. An understory of shrubs such as poison oak, blackberry, and English ivy is often present. In Piedmont, these areas support deer, opossums, skunks, raccoons, squirrels, and many types of birds.
- **Grasslands**. These areas occur in the small portion of Mountain View Cemetery within the Piedmont city limits. A variety of oat grasses, rye grasses, herbs, forbs, and bromes are common. Wildlife is similar to woodland species, but also includes snakes, lizards, wild turkeys, and raptors such as turkey vultures and red-tailed hawks.
- **Urban**. Piedmont's urban habitat consists of a mosaic of lawns, gardens, backyards, street trees, and parks. This "urban forest" provides nesting areas for birds, moderates temperatures, enhances property values, stabilizes slopes, reduces noise, absorbs air pollutants, and is a source of inspiration and beauty. Urban habitat in the city supports many of the species found in woodland and grassland areas.
- **Wetlands**. The US Fish and Wildlife Service (USFWS) maintains an inventory of wetlands across the United States. Their data base shows a freshwater forested shrub wetland on a linear five-acre area along Indian Gulch to the rear of residences in the 100 block of St. James Drive, the unit block of LaSalle, and the 200 block of Indian Road. No other areas in the City of Piedmont appear in the inventory. One could expect to find frogs, newts, snails, water insects, and turtles in freshwater wetland areas. Wetlands are governed by a complex set of state and federal regulations designed to discourage their alteration and mitigate impacts of their disturbance.

Wetlands: Natural and Beneficial Functions

Wetlands are habitats in which soils are intermittently or permanently saturated or inundated. Wetland habitats vary from rivers to seasonal ponding of alkaline flats and include swamps, bogs, marshes, vernal pools, and riparian woodlands. Wetlands are considered to be waters of the United States and are subject to the jurisdiction of the U.S. Army Corps of Engineers as well as the California Department of Fish and Wildlife (CDFW). Where the waters provide habitat for federally endangered species, the U.S. Fish and Wildlife Service may also have authority.

Wetlands are a valuable natural resource for communities providing beneficial impact to water quality, wildlife protection, recreation, and education, and play an important role in hazard mitigation. Wetlands provide drought relief in water-scarce areas where the relationship between water storage and streamflow regulation is vital, and reduce flood peaks and slowly release floodwaters to downstream areas. When surface runoff is dampened, the erosive powers of the water are greatly diminished. Furthermore, the reduction in the velocity of inflowing water as it passes through a wetland helps remove sediment being transported by the water.

Wetlands are often found in floodplains and depressional areas of a watershed. Many wetlands receive and store floodwaters, thus slowing and reducing downstream flow. Wetlands perform a variety of ecosystem functions including food web support, habitat for insects and other invertebrates, fish and wildlife habitat, filtering of waterborne and dry-deposited anthropogenic pollutants, carbon storage, water flow regulation (e.g., flood abatement), groundwater recharge, and other human and economic benefits.

Wetlands, and other riparian and sensitive areas, provide habitat for insects and other invertebrates that are critical food sources to a variety of wildlife species, particularly birds. There are species that depend on these areas during all parts of their lifecycle for food, overwintering, and reproductive habitat. Other species use wetlands and riparian areas for one or two specific functions or parts of the lifecycle, most commonly for food resources. In addition, these areas produce substantial plant growth that serves as a food source to herbivores (wild and domesticated) and a secondary food source to carnivores.

Wetlands slow the flow of water through the vegetation and soil, and pollutants are often held in the soil. In addition, because the water is slowed, sediments tend to fall out, thus improving water quality and reducing turbidity downstream.

These natural floodplain functions associated with the natural or relatively undisturbed floodplain that moderates flooding, such as wetland areas, are critical for maintaining water quality, recharging groundwater, reducing erosion, redistributing sand and sediment, and providing fish and wildlife habitat. Preserving and protecting these areas and associated functions are a vital component of sound floodplain management practices for the City.

Natural site features such as wetlands with native plants and hydric soils have long disappeared and they no longer can function as they should. Landowners are encouraged to plant native plants on their property. These plants will assist with absorption and filtration of water. They will help to hold soils to keep erosion and siltation from occurring in the waterway. Landowners are also encouraged to remove any obstructions which might restrict water conveyance during high water events. The National Wetlands inventory indicates that small wetland areas are located within the City. Wetlands in Piedmont are shown in Figure 4-42. Details of the type of wetlands are shown in Table 4-41.

Figure 4-42 City of Piedmont – Wetland Locations

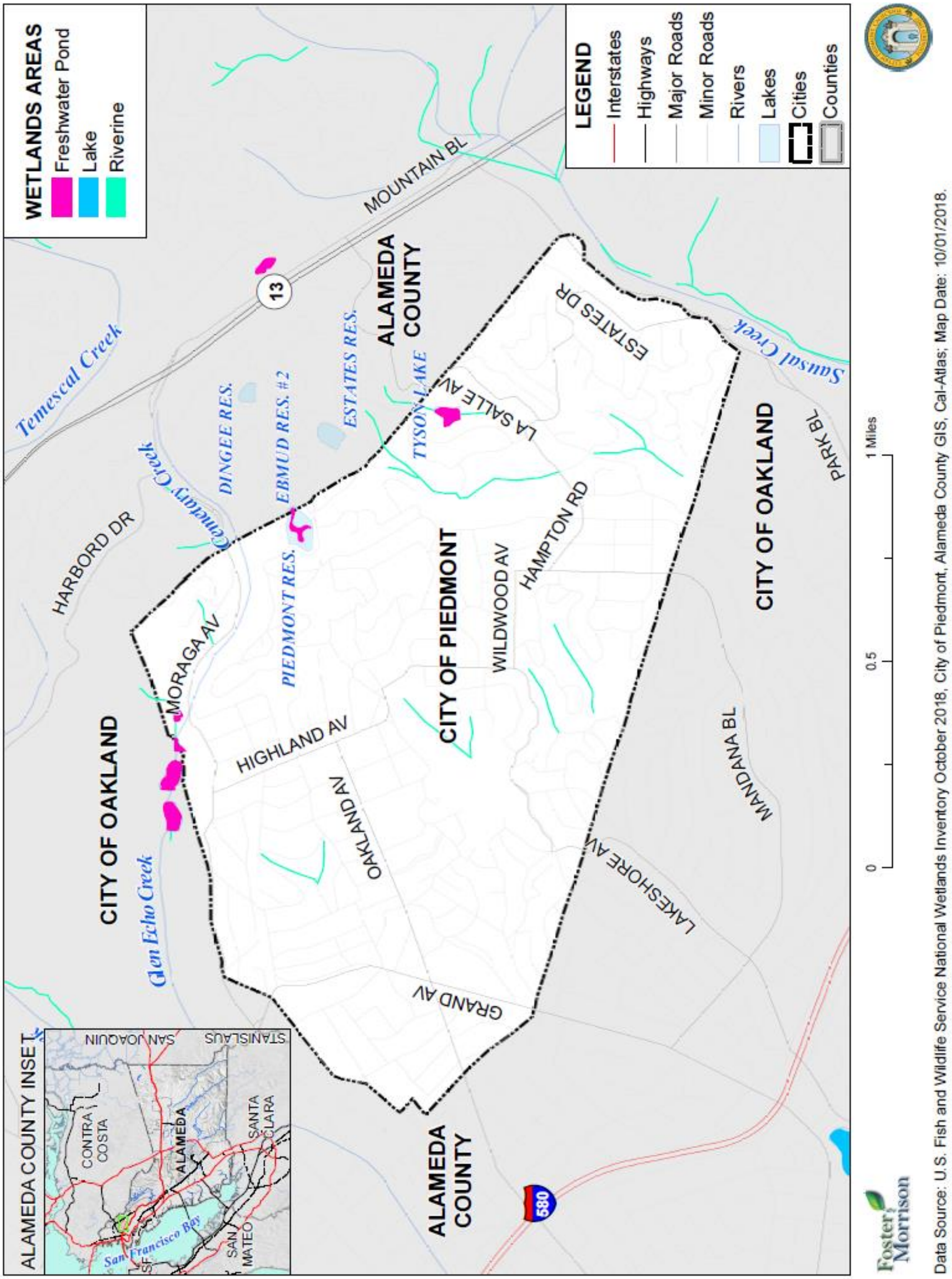


Table 4-41 City of Piedmont – Wetlands Types, Counts, and Area

Wetlands Area Type	Wetlands Count	Wetlands Area (in Acres)
Freshwater Pond	4.0	2.5
Riverine	13.0	5.4
Grand Total	17.0	7.9

Source: US Fish and Wildlife Service

Critical Species

To further understand natural resources that may be particularly vulnerable to a hazard event, as well as those that need consideration when implementing mitigation activities, it is important to identify at-risk species (i.e., endangered species) in the City. An endangered species is any species of fish, plant life, or wildlife that is in danger of extinction throughout all or most of its range. A threatened species is a species that is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range. Both endangered and threatened species are protected by law and any future hazard mitigation projects are subject to these laws. Candidate species are plants and animals that have been proposed as endangered or threatened but are not currently listed.

There are many federal endangered, threatened, or candidate species in or near Piedmont. The California Natural Diversity Database was searched for listed species. The quad that contains the City of Piedmont contained 73 species. These species are listed in Table 4-42.

Table 4-42 City of Piedmont – Threatened and Endangered Species

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	CA Rare Plant Rank
Animals - Amphibians					
Ambystoma californiense	California tiger salamander	Threatened	Threatened	WL	-
Rana draytonii	California red-legged frog	Threatened	None	SSC	-
Animals - Birds					
Accipiter cooperii	Cooper's hawk	None	None	WL	-
Circus hudsonius	northern harrier	None	None	SSC	-
Elanus leucurus	white-tailed kite	None	None	FP	-
Ardea alba	great egret	None	None	-	-
Ardea herodias	great blue heron	None	None	-	-
Botaurus lentiginosus	American bittern	None	None	-	-
Egretta thula	snowy egret	None	None	-	-
Nycticorax nycticorax	black-crowned night heron	None	None	-	-
Charadrius alexandrinus nivosus	western snowy plover	Threatened	None	SSC	-
Pica nuttalli	yellow-billed magpie	None	None	-	-
Falco peregrinus anatum	American peregrine falcon	Delisted	Delisted	FP	-

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	CA Rare Plant Rank
Lanius ludovicianus	loggerhead shrike	None	None	SSC	-
Sternula antillarum browni	California least tern	Endangered	Endangered	FP	-
Baeolophus inornatus	oak titmouse	None	None	-	-
Geothlypis trichas sinuosa	saltmarsh common yellowthroat	None	None	SSC	-
Setophaga petechia	yellow warbler	None	None	SSC	-
Ammodramus savannarum	grasshopper sparrow	None	None	SSC	-
Melospiza melodia pusillula	Alameda song sparrow	None	None	SSC	-
Passerculus sandwichensis alaudinus	Bryant's savannah sparrow	None	None	SSC	-
Pelecanus occidentalis californicus	California brown pelican	Delisted	Delisted	FP	-
Phalacrocorax auritus	double-crested cormorant	None	None	WL	-
Coturnicops noveboracensis	yellow rail	None	None	SSC	-
Laterallus jamaicensis coturniculus	California black rail	None	Threatened	FP	-
Rallus obsoletus obsoletus	California Ridgway's rail	Endangered	Endangered	FP	-
Asio flammeus	short-eared owl	None	None	SSC	-
Athene cunicularia	burrowing owl	None	None	SSC	-
Selasphorus rufus	rufous hummingbird	None	None	-	-
Animals - Fish					
Eucyclogobius newberryi	tidewater goby	Endangered	None	SSC	-
Hypomesus transpacificus	Delta smelt	Threatened	Endangered	-	-
Spirinchus thaleichthys	longfin smelt	Candidate	Threatened	SSC	-
Oncorhynchus mykiss irideus pop. 11	steelhead - Central Valley DPS	Threatened	None	-	-
Oncorhynchus mykiss irideus pop. 8	steelhead - central California coast DPS	Threatened	None	-	-
Oncorhynchus tshawytscha pop. 13	chinook salmon - Central Valley fall / late fall-run ESU	None	None	SSC	-
Animals - Insects					
Bombus caliginosus	obscure bumble bee	None	None	-	-
Bombus occidentalis	western bumble bee	None	None	-	-
Cicindela hirticollis gravida	sandy beach tiger beetle	None	None	-	-
Trachusa gummifera	San Francisco Bay Area leaf-cutter bee	None	None	-	-
Danaus plexippus pop. 1	monarch - California overwintering population	None	None	-	-
Animals - Mammals					
Nyctinomops macrotis	big free-tailed bat	None	None	SSC	-

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	CA Rare Plant Rank
Reithrodontomys raviventris	salt-marsh harvest mouse	Endangered	Endangered	FP	-
Scapanus latimanus parvus	Alameda Island mole	None	None	SSC	-
Antrozous pallidus	pallid bat	None	None	SSC	-
Corynorhinus townsendii	Townsend's big-eared bat	None	None	SSC	-
Lasiurus cinereus	hoary bat	None	None	-	-
Animals - Mollusks					
Tryonia imitator	mimic tryonia (=California brackishwater snail)	None	None	-	-
Animals - Reptiles					
Phrynosoma blainvillii	coast horned lizard	None	None	SSC	-
Community - Terrestrial					
–	Northern Coastal Salt Marsh	None	None	-	-
Plants - Vascular					
Sanicula maritima	adobe sanicle	None	Rare	-	1B.1
Hemizonia congesta ssp. congesta	congested-headed hayfield tarplant	None	None	-	1B.2
Holocarpha macradenia	Santa Cruz tarplant	Threatened	Endangered	-	1B.1
Layia carnosa	beach layia	Endangered	Endangered	-	1B.1
Amsinckia lunaris	bent-flowered fiddleneck	None	None	-	1B.2
Plagiobothrys chorisianus var. chorisianus	Choris' popcornflower	None	None	-	1B.2
Viburnum ellipticum	oval-leaved viburnum	None	None	-	2B.3
Extriplex joaquinana	San Joaquin spearscale	None	None	-	1B.2
Suaeda californica	California seablite	Endangered	None	-	1B.1
Carex comosa	bristly sedge	None	None	-	2B.1
Astragalus tener var. tener	alkali milk-vetch	None	None	-	1B.2
Trifolium hydrophilum	saline clover	None	None	-	1B.2
Castilleja ambigua var. ambigua	johnny-nip	None	None	-	4.2
Chloropyron maritimum ssp. palustre	Point Reyes salty bird's-beak	None	None	-	1B.2
Erythranthe laciniata	cut-leaved monkeyflower	None	None	-	4.3
Gilia capitata ssp. chamissonis	blue coast gilia	None	None	-	1B.1
Gilia millefoliata	dark-eyed gilia	None	None	-	1B.2
Leptosiphon grandiflorus	large-flowered leptosiphon	None	None	-	4.2
Leptosiphon rosaceus	rose leptosiphon	None	None	-	1B.1
Chorizanthe cuspidata var. cuspidata	San Francisco Bay spineflower	None	None	-	1B.2

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	CA Rare Plant Rank
Chorizanthe robusta var. robusta	robust spineflower	Endangered	None	-	1B.1
Polygonum marinense	Marin knotweed	None	None	-	3.1
Heteranthera dubia	water star-grass	None	None	-	2B.2
Horkelia cuneata var. sericea	Kellogg's horkelia	None	None	-	1B.1

Source: California Natural Diversity Database

Legend: CDFW: WL – Watch List; SSC – Species of Special Concern; FP – Fully Protected

Legend: CA Rare Plan Rank:

1A Plants presumed extinct in California and rare/extinct elsewhere
1B.1 Plants rare, threatened, or endangered in California and elsewhere; seriously threatened in California
1B.2 Plants rare, threatened, or endangered in California and elsewhere; fairly threatened in California
1B.3 Plants rare, threatened, or endangered in California and elsewhere; not very threatened in California
2A Plants presumed extirpated in California, but more common elsewhere
2B.1 Plants rare, threatened, or endangered in California, but more common elsewhere; seriously threatened in California
2B.2 Plants rare, threatened, or endangered in California, but more common elsewhere; fairly threatened in California
2B.3 Plants rare, threatened, or endangered in California, but more common elsewhere; not very threatened in California
3.1 Plants about which we need more information; seriously threatened in California
3.2 Plants about which we need more information; fairly threatened in California
3.3 Plants about which we need more information; not very threatened in California
4.1 Plants of limited distribution; seriously threatened in California
4.2 Plants of limited distribution; fairly threatened in California
4.3 Plants of limited distribution; not very threatened in California

Historical and Cultural Resources

Piedmont has historically significant homes, public buildings, and landmarks. To inventory these resources, information was collected from a number of sources. The California Department of Parks and Recreation Office of Historic Preservation (OHP) was the primary source of information. The OHP is responsible for the administration of federally and state mandated historic preservation programs to further the identification, evaluation, registration, and protection of California's irreplaceable archaeological and historical resources. OHP administers the National Register of Historic Places, the California Register of Historical Resources, California Historical Landmarks, and the California Points of Historical Interest programs. Each program has different eligibility criteria and procedural requirements.

- The **National Register of Historic Places** is the nation's official list of cultural resources worthy of preservation. The National Register is part of a national program to coordinate and support public and private efforts to identify, evaluate, and protect historic and archeological resources. Properties listed include districts, sites, buildings, structures, and objects that are significant in American history, architecture, archeology, engineering, and culture. The National Register is administered by the National Park Service, which is part of the U.S. Department of the Interior.
- The **California Register of Historical Resources** program encourages public recognition and protection of resources of architectural, historical, archeological, and cultural significance and identifies historical resources for state and local planning purposes; determines eligibility for state historic preservation grant funding; and affords certain protections under the California Environmental Quality Act. The Register is the authoritative guide to the state's significant historical and archeological resources.

- **California Historical Landmarks** are sites, buildings, features, or events that are of statewide significance and have anthropological, cultural, military, political, architectural, economic, scientific or technical, religious, experimental, or other value. Landmarks #770 and above are automatically listed in the California Register of Historical Resources.
- **California Points of Historical Interest** are sites, buildings, features, or events that are of local (city or county) significance and have anthropological, cultural, military, political, architectural, economic, scientific or technical, religious, experimental, or other value. Points designated after December 1997 and recommended by the State Historical Resources Commission are also listed in the California Register.

Historical resources included in the programs above are identified in Table 4-43.

Table 4-43 City of Piedmont – Historic Properties

Name/Landmark Plaque Number	National Register	State Landmark	California Register	Point of Interest	Date Listed	Town
Wetmore House	X				4/14/1978	Piedmont

Source: California Office of Historic Preservation

It should be noted that as defined by the National Environmental Policy Act (NEPA), any property over 50 years of age is considered a historic resource and is potentially eligible for the National Register. Thus, in the event that the property is to be altered, or has been altered, as the result of a major federal action, the property must be evaluated under the guidelines set forth by NEPA. Structural mitigation projects are considered alterations for the purpose of this regulation.

Growth and Development Trends

As part of the planning process, the HMPC looked at changes in growth and development, both past and future, and examined these changes in the context of hazard-prone areas, and how the changes in growth and development affect loss estimates and vulnerability. Information from the 2015-2023 City of Piedmont Housing Element, City of Piedmont General Plan Land Use Element, the US Census Bureau, and the California Department of Finance (DOF) form the basis of this discussion.

Past Growth and Current Population

The City of Piedmont was incorporated in 1907. At the time, the population was a little more than 100 families. By 1910, Piedmont's population had grown to 1,719. The rapid increase continued through 1930 when the population reached 9,333. Population growth slowed considerably after 1930 as the supply of vacant land in the City dwindled.

Between 1930 and 1960, the City's population increased by another 20%, peaking at 11,117 in 1960. Between 1960 and 1980, Piedmont's population declined by almost 6% as households became smaller and the pace of new construction slowed. Population increased by 4% during the 1980s and 1990s, largely due to increases in household size. The 2000 Census reported the City's population at 10,952. In 2010, the population was 10,687, a decrease of about 3% from 2000. The California Department of Finance estimated the 2018 population to be 11,318.

Future Populations

The City of Piedmont Housing Element noted that due to the City being built out, future population changes are expected to be minimal. However, there will be a change in the makeup of the City populations. Projections for the future indicate a rapid increase in the over-65 population during the next two decades. Those of the age of 65 represented 11 percent of the Bay Area's population in 2000. It is projected to be 25 percent of the population by 2035.

Land Use

While the popular image of Piedmont is one of large homes on large lots, the City is relatively dense compared to many Bay Area suburbs. Much of Piedmont was developed during the streetcar era, a time when neighborhoods were designed for walkability rather than auto convenience. Parts of the City are developed on a rectangular street grid, with lots more typical of a mature urban neighborhood than a post-war suburb.

In general, Piedmont's higher elevations are less dense than its lower elevations. This contributes to the perception that Piedmont is divided into "upper" and "lower" sections, with the dividing line roughly formed by Highland Avenue. Indeed, the areas around Glen Alpine Road, Sotelo Avenue, and Sea View Avenue are substantially less dense than the rest of the City, with most lots exceeding 20,000 square feet and densities around 1-2 units per acre.

The City of Piedmont General Plan Land Use Element noted that Piedmont's land use pattern will remain essentially unchanged through 2030. The number of households and jobs is projected to increase by only about 1 percent between 2010 and 2030. Future development will reinforce existing patterns, and the City will remain almost entirely residential.

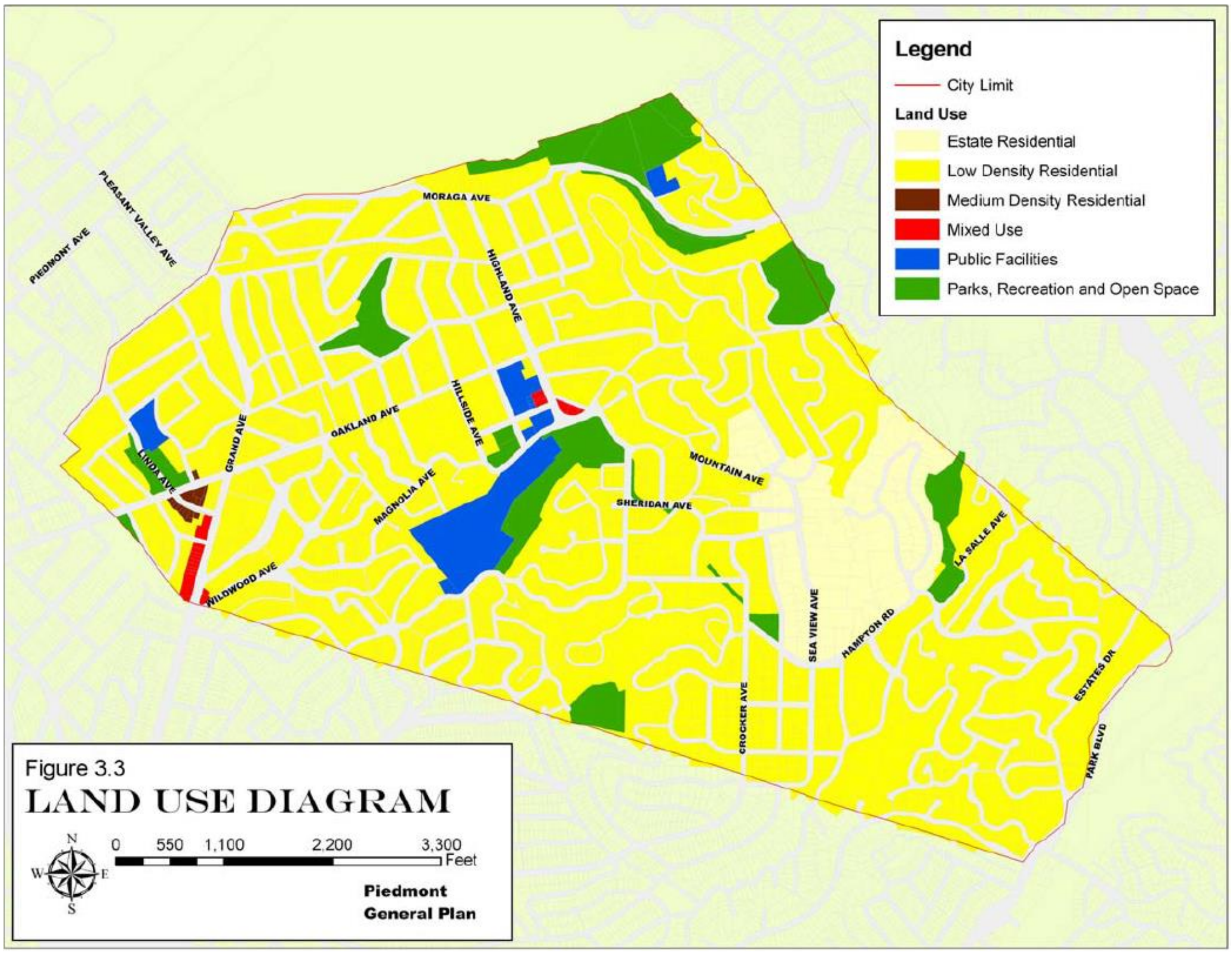
Between 2010 and 2025, the City's remaining buildable lots are projected to develop incrementally with single family residences, much as they have for the past 30 years. The pace of development is expected to remain slow, with an average of two homes added each year. Given the environmental constraints associated with most of the City's vacant lots and the sensitivity to new construction in established neighborhoods, each new home will receive close attention as it proceeds through the planning and design review processes.

As in the past, most future construction in the City will consist of improvements to existing homes. Piedmont residents spend tens of millions of dollars each year on additions and major remodels. The City maintains design guidelines to ensure that these improvements maintain neighborhood character and preserve architectural integrity. There are also zoning requirements for setbacks, lot coverage, hardscape surface coverage, building height, and floor area ratio which effectively limit the square footage that may be constructed on each site. The City further limits home expansions through parking requirements related to the number of bedrooms.

One objective of the City's zoning standards is to discourage "teardowns" – that is, the replacement of small older homes with large, modern homes. The City has worked instead to preserve the diversity of its housing stock and retain the scale of existing construction. Piedmont's older homes are part of the City's cultural heritage, and their conservation is an important public goal. The City strongly supports the improvement of all homes, regardless of size, however. Enhancements are necessary to upgrade aging or outdated building components, and respond to housing market trends.

The Land Use Diagram uses six categories to describe the general types of uses allowed in the City. Land Use in the City is shown in Figure 4-43.

Figure 4-43 City of Piedmont – Land Use Diagram



Source: City of Piedmont General Plan Land Use Element

Vulnerable Populations

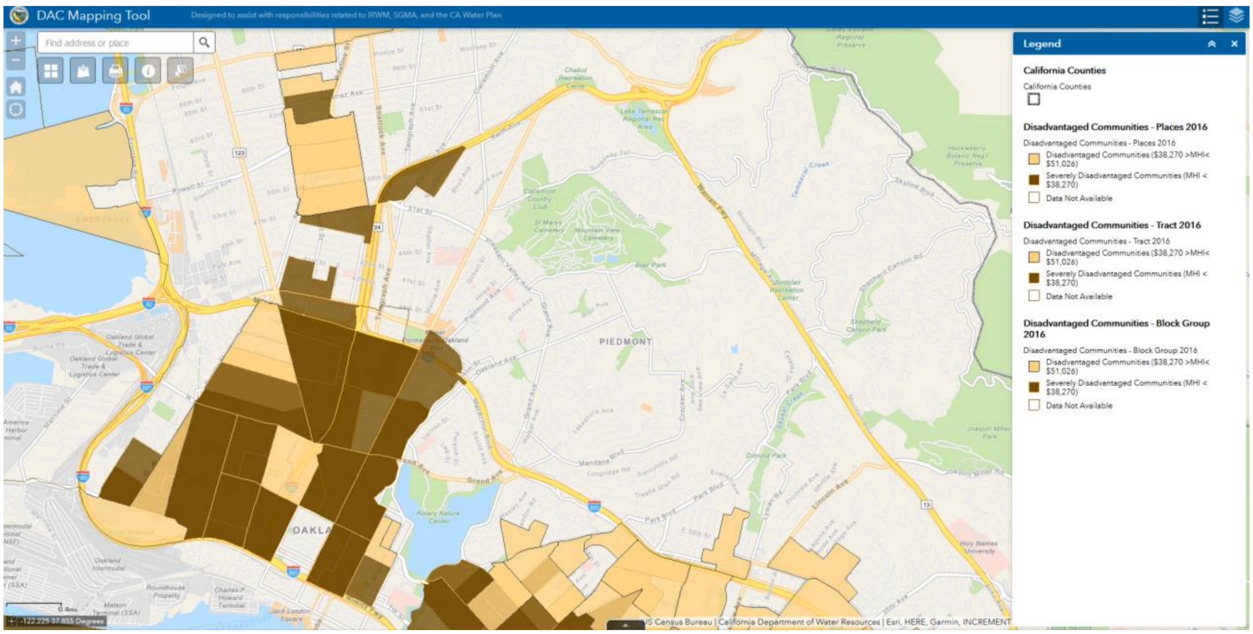
The vulnerable populations discussion is based on the following three sources:

- Cal-DWR Disadvantaged Community Mapping Tool
- HMPC Input

California DWR Disadvantaged Community Mapping Tool

The State of California's Proposition 1 Disadvantaged Community (DAC) Involvement Program is designated to ensure the involvement of DACs as well as Economically Distressed Areas and Underrepresented Communities, which DWR collectively refers to as DACs. The Cal DWR definition for a Disadvantaged Community is a community with an annual median household income (MHI) that is less than 80% of the Statewide annual MHI (PRC Section 75005(g)), and those census geographies with an annual MHI less than 60% of the Statewide annual MHI are considered "Severely Disadvantaged Communities". Those areas in and around Piedmont considered disadvantaged are shown in Figure 4-44.

Figure 4-44 City of Piedmont Disadvantaged Communities



Source: Cal DWR DAC Mapping Tool

HMPC Input

The HMPC noted that the City of Piedmont General Plan Housing Element discusses homelessness in the City. The City's observation is that there is not a quantifiable homeless population in Piedmont, while recognizing that the County Homeless Management Information System used a pro-rated population-based formula to estimate that the City had 15 homeless residents. The City of Piedmont has estimated that there is a need to assist three extremely low-income households in the City during for 2010-2014 (based on the Regional Housing Needs Allocation), which could include homeless residents.

The HMPC noted other concerns within the City are those associated with the aging population and also those that rely on Durable Medical Equipment. These populations become especially vulnerable during any power outages including those initiated by PG&E during red flag events or periods of extreme heat. Also of concern is the evacuation issues associated with aging populations and those with high medical needs.

Despite the absence of a visible homeless population in Piedmont, the City is located in an urban area where homelessness is a serious issue. Piedmont currently provides financial assistance to Alameda County to fund countywide programs which meet the needs of homeless persons and persons at risk of becoming homeless. The beneficiaries of these programs may include Piedmont residents as well as those in other cities. However, according to the City, the homeless population is intermittent and not a significant issue. While one of the concerns is that the homeless can accidently cause a fire, it was noted that local children and others spending time in vegetative, fire-prone areas can also contribute to incidental fire incidents.

Future Development

Very modest increases in density may take place in the future due to the addition of second units to some Piedmont homes. A large number of the City's homes are ideally configured for second units, with multi-level living areas, multiple entrances, second kitchens, detached studios or guest cottages, and so on. These are known as additional accessory dwelling units (ADUs). Piedmont also has many "empty nester" households who may wish to downsize without leaving the City. The rental income from a second unit can be helpful for retirees, and having someone else in the house may bring real benefits to frail elderly residents living alone. At the same time, there is a need for rental units in the City for college-age students, young professionals, and other moderate income workers.

GIS Analysis

While it is anticipated that additional ADUs will be constructed throughout the City, it is impossible to determine where they will be constructed. The City has no direct plans for redevelopment, but noted that there are two potential redevelopment areas in the City.

- The Mixed use area on Grand Avenue is a potential area for redevelopment, however, with the high housing prices in the Bay Area and Piedmont, it is unlikely for the lots to be reconstructed into Mixed use development in the near future.
- While no projects are planned, there is question over the future of and the potential for redevelopment at the Shell Station at 29 Wildwood Ave and the Valero Station at 340 Highland near the Civic Center.

Figure 4-45 shows these locations in the City of Piedmont. Figure 4-46 zooms in to show these locations in greater detail. Table 4-44 shows the redevelopment areas with their existing land use.

Figure 4-45 City of Piedmont – Redevelopment Areas

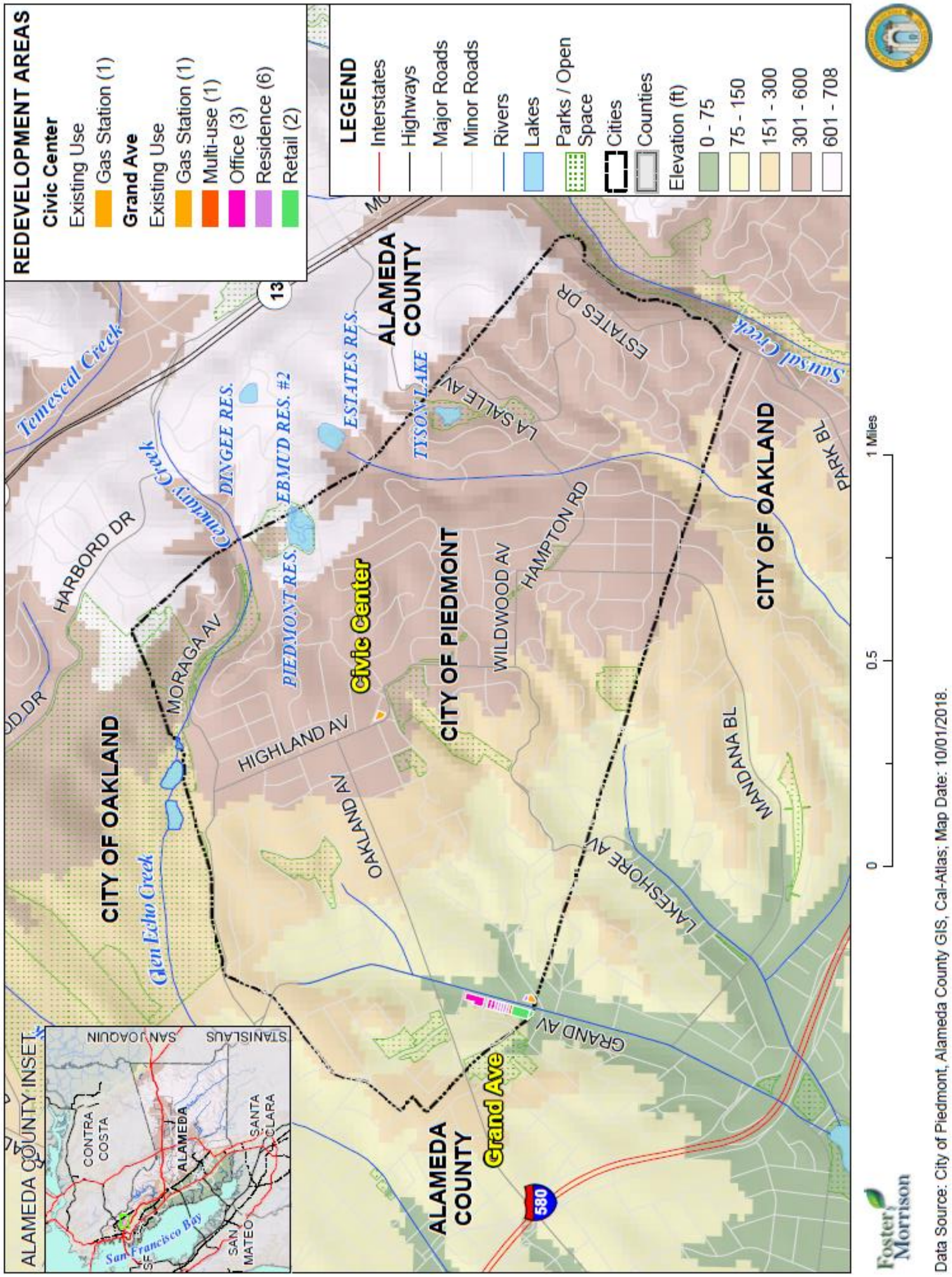


Figure 4-46 City of Piedmont – Redevelopment Areas

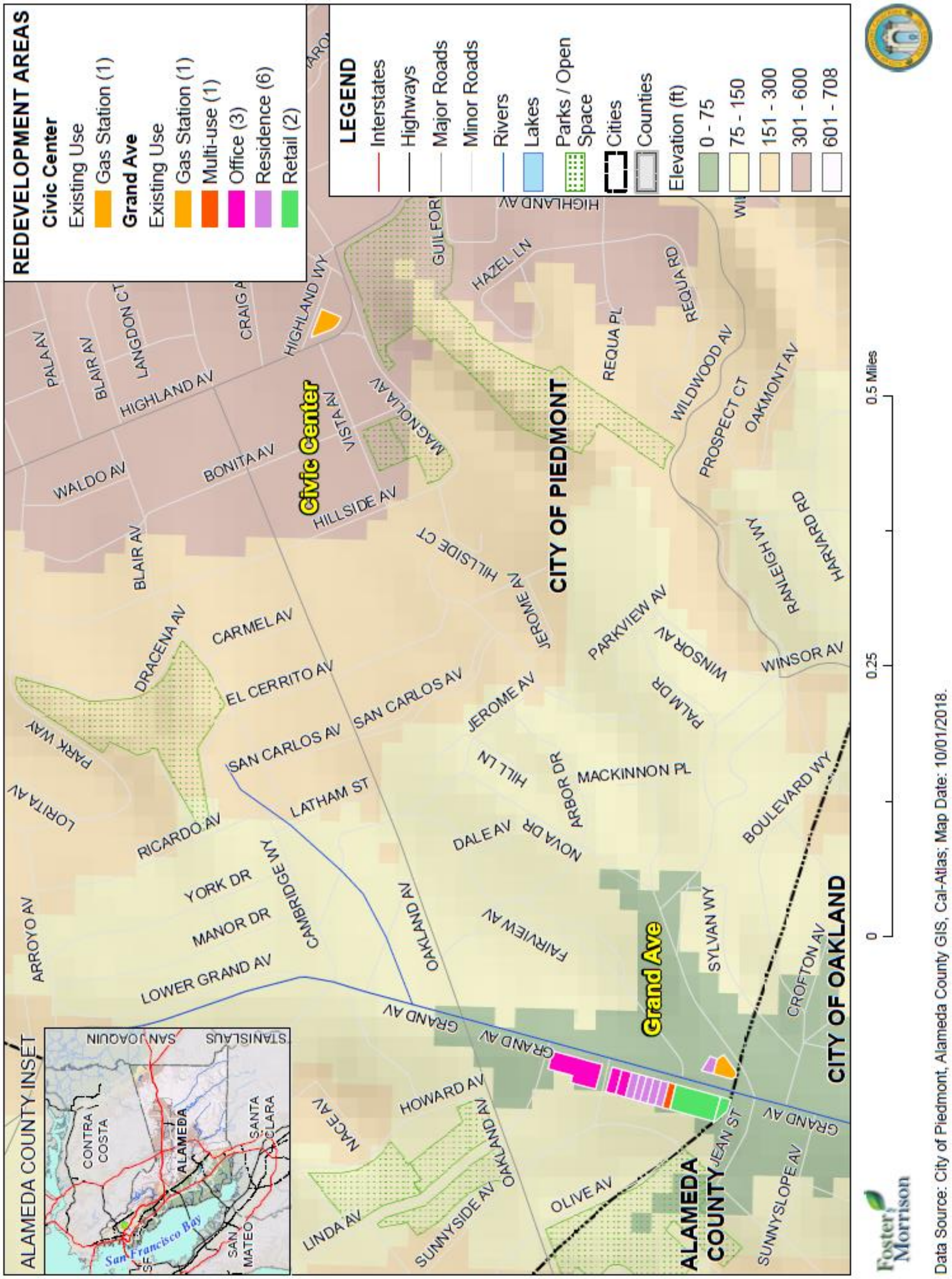


Table 4-44 City of Piedmont – Redevelopment Areas by Existing Use

Redevelopment Areas / Existing Use	Total Parcel Count	Improved Parcel Count	Total Acres
Civic Center			
Gas Station	1	1	0.24
Civic Center Total	**1**	**1**	**0.24**
Grand Ave			
Gas Station	1	1	0.18
Multi-use	1	1	0.11
Office	3	3	0.91
Residence	6	6	0.63
Retail	2	2	0.76
Grand Ave Total	**13**	**13**	**2.59**
Grand Total	**14**	**14**	**2.83**

Source: City of Piedmont GIS

4.3.2. Piedmont's Vulnerability to Specific Hazards

The Disaster Mitigation Act regulations require that the HMPC evaluate the risk and vulnerability associated with priority hazards identified in the planning process. This section summarizes the possible impacts and quantifies, where data permits, the City's vulnerability to each of the hazards identified as a priority hazard in Section 4.2.15 Natural Hazards Summary. The priority hazards evaluated further as part of this vulnerability assessment include:

- Climate Change
- Dam Failure
- Drought and Water Shortage
- Earthquake
- Earthquake Liquefaction
- Flood: (100/500 year)*
- Flood: Localized/Stormwater
- Landslide, Mudslides, Hillside Erosion, and Debris Flows
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rains and Storms
- Severe Weather: High Winds
- Wildfire

*Though a low priority hazard for the City, due to its significance in California, flood vulnerability is detailed here.

An estimate of the vulnerability of the City to each identified hazard, in addition to the estimate of likelihood of future occurrence, is provided in each of the hazard-specific sections that follow. Vulnerability is measured in general, qualitative terms and is a summary of the potential impact based on past occurrences, spatial extent, and damage and casualty potential. It is categorized into the following classifications:

- **Extremely Low**—The occurrence and potential cost of damage to life and property is very minimal to nonexistent.
- **Low**—Minimal potential impact. The occurrence and potential cost of damage to life and property is minimal.
- **Medium**—Moderate potential impact. This ranking carries a moderate threat level to the general population and/or built environment. Here the potential damage is more isolated and less costly than a more widespread disaster.
- **High**—Widespread potential impact. This ranking carries a high threat to the general population and/or built environment. The potential for damage is widespread. Hazards in this category may have occurred in the past.
- **Extremely High**—Very widespread with catastrophic impact.

Vulnerability can be quantified in those instances where there is a known, identified hazard area, such as a mapped floodplain. In these instances, the numbers and types of buildings subject to the identified hazard can be counted and their values tabulated. Other information can be collected in regard to the hazard area, such as the location of City critical facilities, historic structures, and valued natural resources (e.g., an identified wetland or endangered species habitat). Together, this information conveys the impact, or vulnerability, of an area to that hazard.

The HMPC identified six hazards in the City for which specific geographical hazard areas have been defined and for which sufficient data exists to support a quantifiable vulnerability analysis. These six hazards are dam failure, earthquake, flood, landslide, liquefaction, and wildfire. Because these hazards have discrete hazard risk areas, their risk varies throughout the City. For dam failure, flood, landslide, liquefaction, and wildfire, the HMPC inventoried the following, to the extent possible, to quantify vulnerability in identified hazard areas:

- General hazard-related impacts, including impacts to life, safety, and health
- Values at risk (i.e., types, numbers, and value of land and improvements)
- Population at risk
- Critical facilities at risk
- Overall community impact
- Future development/redevelopment trends within the identified hazard area

HMPC used FEMA's loss estimation software, HAZUS-MH, to analyze the City's vulnerability to earthquakes.

The vulnerability and potential impacts from priority hazards that do not have specific mapped areas nor the data to support additional vulnerability analysis are discussed here in more general terms.

4.3.3. Climate Change Vulnerability Assessment

Likelihood of Future Occurrence—Likely
Vulnerability—Medium

According to the Alameda County CCHPR, all Californians are vulnerable to the health impacts of climate change. Even if one is fortunate to live, work, study, or play in a place without direct contact with wildfires, flooding, or sea level rise, no one can entirely avoid excessive heat or the indirect effects of extreme weather events. Based on medical reviews of individuals who died during heat waves and other extreme weather events, those who are particularly vulnerable to the direct effects of climate change include the very old and very young, individuals who have chronic medical conditions and psychiatric illness, people taking multiple medications, people without means for evacuation (no access to public transit or private cars), people who are socially isolated, medically fragile people, and people living in institutions. Acclimatization to heat may help reduce risks from heat waves in the healthy general population, but may not be sufficient to protect those with underlying medical conditions.

The California Adaptation Planning Guide (APG) prepared by California OES and CNRA was developed to provide guidance and support for local governments and regional collaboratives to address the unavoidable consequences of climate change.

The APG: Defining Local and Regional Impacts focuses on understanding the ways in which climate change can affect a community. According to this APG, climate change impacts (temperature, precipitation, sea level rise, ocean acidification, and wind) affect a wide range of community structures, functions and populations. These impacts further defined by regional and local characteristics are discussed by secondary impacts and seven sectors found in local communities: Public Health, Socioeconomic, and equity impacts; Ocean and Coastal Resources; Water Management; Forest and Rangeland; Biodiversity and Habitat; Agriculture; and Infrastructure.

City of Piedmont Climate Change Impacts

The discussion on impacts to Piedmont and Alameda County come from four sources:

- Alameda County Climate Change and Health Profile Report
- California Adaptation Planning Guide
- Proceedings of the National Academy of Sciences
- City of Piedmont Climate Adaptation Plan 2.0

Alameda County Climate Change and Health Profile Report Impacts

Researchers have examined the pathways in which increased temperatures and hydrologic extremes can impact health and generally recognize three main pathways: direct exposures, indirect exposures, and socioeconomic disruption. Based on the review of weather-related natural disasters and historical patterns and scientific judgment, public health researchers have suggested the nature and direction of health harms or benefits.

- **Extreme Weather-Related Injury, Mental Health, and Displacement Extreme weather events (storms, flooding)** – These events can cause fatal and nonfatal injuries from drowning, being struck by objects, fire, explosions, electrocution, or exposure to toxic materials. A widespread weather-related natural disaster may destroy or ruin housing, schools and businesses and cause temporary or permanent displacement. Individuals and families may experience post-traumatic stress, depression, and increased risk of suicide.
- **Vector-borne Illnesses** – Climatic changes alter the range, biogeography, and growth of microbes and the vectors of food, water, and vector-borne illnesses. This includes the changes in aquatic

environments that could increase harmful algal blooms and lead to increases in foodborne and waterborne illnesses.

- **Food Insecurity** – Climate change is expected to have global impacts on food production and distribution systems. This can cause food prices to increase, which makes food less affordable and increases food insecurity, obesity, and malnutrition in economically constrained households.
- **Sea Level Rise, Mold, and Indoor Air Quality** – Through sea level rise, salt water may intrude into coastal aquifers thus reducing quality and quantity of water supply. Coastal erosion can contribute to the loss of recreational venues and pose a variety of hazards to infrastructure and public safety. Water intrusion into buildings can result in mold contamination leading to indoor air quality problems.
- **Socioeconomic Disruption** – Widespread social and economic disruption includes damage to the infrastructure for the delivery of health services and for general economic well-being. Health care facilities, water treatment plants, and roads for emergency responders and transportation for health care personnel can be damaged in climate-related extreme weather events. Increased burden of disease and injury will test the surge capacity of health care facilities. Economic disruption can lead to income loss, income insecurity, food insecurity, housing insecurity, and mental health problems, which in turn may increase substance abuse, suicide and other health problems. Energy production and distribution is also threatened by heat and wildfires through loss of efficiency, generating capacity, and fires disrupting transmission lines. California's ports that provide the gateway to goods for California, national, and international markets are at risk from sea level rise and coastal storms.

In addition to the bulleted points above, drought and extreme heat are also exacerbated by climate change. This will be discussed further in Section 4.3.4 (Drought) and Section 4.3.11 (Extreme Heat). All Californians are vulnerable to the health impacts of climate change. Even if one is fortunate to live, work, study, or play in a place without direct contact with wildfires, flooding, or sea level rise, no one can entirely avoid excessive heat or the indirect effects of extreme weather events.

Adaptation Planning Guide Impacts

The APG: Understanding Regional Characteristics identified the following impacts specific to the Bay Area region in which the Alameda County and the City of Piedmont part of:

- Temperature increases – particularly nighttime temperature
- Reduced precipitation
- Sea level rise – coastal inundation and erosion
- Public health – heat and air pollution
- Reduced agricultural productivity (e.g., wine grapes)
- Inland flooding
- Reduced tourism

Large urban areas are prone to specific secondary climate-change impacts due to population density and urban settlement patterns. In the Bay Area region, the location of the urbanized area near a bay that serves as the mouth of two major river networks creates the potential for additional impacts. Outside of the urbanized region, ecosystem shifts and impacts on agriculture, specifically wine grapes, may be experienced.

California’s Adaptation Guide: Understanding Regional Characteristics provides input on adaptation considerations for the Northern Central Valley Region. As detailed in this guide, climate change has the potential to disrupt many features that characterize the region, including ecosystems health, snowpack, and the tourist economy. Specific regional impacts include the following:

Agriculture. Alteration of temperature and precipitation regimes changes the seasons as experienced by plants and animals. These changes are expected to affect the wine industry because the wine grape is a crop that requires a fairly narrow range of climate conditions (Todorov, 2011). These changes might affect not only wine grape growers, but also the businesses and residents dependent on this industry. Communities reliant on the wine industry as an employment based tourist attraction, or local economic base should closely collaborate with vintner associations and other local agricultural organizations to best understand the risk and support grower efforts to adapt. Communities also may need to plan for a future in which wine grapes and associated activities make up a smaller part of their local economy.

Flooding. The risk of flooding is highest for the inland, low-lying areas in the eastern part of the region. Reduced snowpack and increased number of intense rainfall events in the Northern Sierra are likely to put additional pressure on water infrastructure, including the Delta levees, which are already vulnerable. These impacts increase the chance of flooding associated with breached levees or dams (e.g., in the Sacramento-San Joaquin Delta). Flooding and damage to infrastructure can put large populations in adjacent regions at risk, including:

- The elderly and children less than five years of age, who are isolated or dependent on others for evacuation.
- Populations that may lack the resources or knowledge to prepare or respond to disaster due to language or economic status, including having access to transportation, which would allow them to escape flooding, at least temporarily.
- Vulnerable populations living in institutional settings who are particularly vulnerable during evacuations from disasters. For instance, Solano, and Marin counties have a high proportion of elderly living in nursing homes that could be affected.

Public Health, Socioeconomic, and Equity Impact. Some of the state's highest percentages of impervious surfaces are in the urban areas of the San Francisco Bay Area, increasing the potential impacts of heat islands. Santa Clara, Alameda, San Francisco, and Contra Costa counties rank fifth, sixth, ninth, and tenth in the absolute numbers of the elderly and children less than five years of age. These two populations are most likely to suffer from heat-related illnesses and heat events. The highest risk of heat-related illness occurred in the usually cooler regions found in coastal counties and not in the Central Valley where the highest actual temperatures were experienced.

Because of a lack of acclimatization, the largest mortality rate percent increases in California are expected in coastal cities such as San Francisco. Lodging and food services are among the top five employment sectors in Napa, San Francisco, and Solano counties, indicating that may be a significant number of employees who work in the tourism industry/outdoors. Sea level rise may impact employees in the tourism industry. Air quality and heat events may impact outdoor workers, including agricultural and dairy workers.

The higher cost of living in some areas of this region (i.e. San Francisco, Silicon Valley, Marin County) means low-income families pay a high percentage of their income on housing and transportation. Increases in food and energy costs may impact low-income residents.

Sea Level Rise. Since much of the urbanized part of the region is near the ocean or bay, sea level rise will significantly affect development and infrastructure. This is likely to be the greatest threat from climate change to the Bay Area. A 1.4-meter rise in sea level will increase the population vulnerable to a 100-year coastal storm from 10,610 to 13,730. The San Francisco Bay Conservation and Development Commission (BCDC) evaluated vulnerability to sea level rise in the region and potential adaptation strategies. Key issues identified by BCDC for the region include the following:

- A 55-inch rise in sea level would place an estimated 270,000 people in the Bay Area at risk from flooding, 98 percent more than are currently at risk. The economic value of Bay Area shoreline development (buildings and their contents) at risk from a 55-inch rise in sea level is estimated at $62 billion.
- Coastal flooding presents a risk to major transportation infrastructure in the region including freeways, rail lines, ports, and airports (especially San Francisco and Oakland).
- The impacts of climate change are expected to substantially alter the Bay ecosystem by inundating or eroding wetlands and transitional habitats, altering species composition, changing freshwater inflow, and impairing water quality. Changes in salinity from reduced freshwater inflow may adversely affect fish, wildlife and other aquatic organisms in intertidal and subtidal habitats. The highly developed Bay shoreline constrains the ability of tidal marshes to migrate landward, while the declining sediment supply in the Bay reduces the ability of tidal marshes to grow upward as sea level rises.

Alameda and San Mateo counties could see significant increases in the number of United States Environmental Protection Agency (U.S. EPA)-regulated sites at risk for sea level rise, including Superfund sites, hazardous waste generators, facilities required to report emissions for the Toxics Release Inventory, facilities regulated under the National Pollutant Discharge Elimination System (NPDES), major dischargers of air pollutants with Title V permits, and brownfield properties.

Vulnerable populations living in institutional settings are disproportionately vulnerable during evacuations from disasters. For instance, Solano and Marin counties have a high proportion of elderly living in nursing homes that could be affected.

Water Supply. Approximately 70 percent of the water used in the region is imported, with another 15 percent supplied via groundwater. The imported water comes from a variety of sources, including the Russian River (4 percent); the Delta (approximately 32 percent, via San Luis Reservoir, North Bay Aqueduct, Contra Costa Canal, South Bay Aqueduct); Lake Berryessa (5 percent); Mokelumne River (25 percent); and Tuolumne River (33 percent). The vast majority of these water sources (e.g., Delta sources, Mokelumne River, Tuolumne River) originate in the Sierra Nevada, meaning that climate change impacts on snowpack may have a dramatic impact on the Bay Area water supply. Total reservoir storage capacity in the Bay Area is 746,000 acre-feet.

Shorter rainfall events and rapid snowmelt will reduce the region's water supply by making water more difficult to capture in reservoirs or retain for groundwater recharge. Recreation and tourism in the region are also likely to suffer due to lower water levels in waterways and reservoirs and declining snowpack. Agriculture will also be impacted due to reduced or altered precipitation. Water supply (for irrigation) can alleviate some of the other climate stresses (altered temperature or precipitation) or, in the case of reduced water supply, exacerbate them. The challenge of climate change is that water supply is projected to be reduced and water that is available will be more costly for users. Employees of water-reliant industries such as agriculture may become more economically vulnerable because of unstable working conditions.

Wildfire. A slight increase in fire occurrence is projected for the region. This increase is projected to be largest in the northeastern part of the region. Despite moderate increases in fire risk, huge increases in fire damages are projected due to high population in fire-vulnerable areas. Along with impacts associated with temporary and/or permanent displacement, longterm impacts on the elderly and children under the age of five are of concern. Eye and respiratory illnesses due to air pollution resulting from wildfires, and exacerbation of asthma, allergies, chronic obstructive pulmonary disease (COPD), and other cardiovascular diseases, are likely to increase.

Proceedings of National Academy of Sciences Impacts

In addition to the APG, the HMPC provided a report from the Proceedings of the National Academy of Sciences (PNAS) stating that some of the recent fire impacts may have been attributed to climate change. The PNAS report posits that climate influences wildfire potential primarily by modulating fuel abundance in fuel-limited environments, and by modulating fuel aridity in flammability-limited environments. Increased forest fire activity across the western United States in recent decades has contributed to widespread forest mortality, carbon emissions, periods of degraded air quality, and substantial fire suppression expenditures. Those most vulnerable to high levels of ozone and particulate matter include people who work or spend a lot of time outdoors, such as residents of this region who are employees of the tourist industry. Households eligible for energy utility financial assistance programs are an indicator of potential impacts. These households may be more at risk of not using cooling appliances, such as air conditioning, due to associated energy costs.

Piedmont Climate Adaptation Plan Impacts

The City of Piedmont Climate Action Plan (CAP) noted that Piedmont will also experience harmful impacts of climate change, such as temperature change, rain pattern change, regional sea level rise, and an increased risk of wildfires and the resultant poor air quality. These changes will alter the demands on Piedmont's infrastructure and buildings. As more days become hotter than recent historical averages, Piedmont's heating demand will be reduced and its cooling demand will grow. High temperatures and shifts in rainfall patterns will cause dry conditions throughout California, elevating the risk of wildfire in Piedmont. These effects will change the experience of living in Piedmont.

The CAP also noted that sea level rise will alter the landscape of the Bay Area, as well as Piedmont's access to regional resources. Infrastructure is at risk if there is not climate mitigation. Four Twenty Seven, a climate resiliency consulting firm, identified Piedmont's regional assets at risk if sea levels rise 48 inches. In this scenario, the East Bay Municipal Utility District wastewater treatment plant, access to the Bay Bridge, the Union Pacific railroad, and sections of the I-880 freeway would be impacted.

Climate change will have a negative impact on human health in Piedmont. Globally, climate change is already impacting human health in extreme weather events and in everyday life. The U.S. EPA project, Climate Change Impacts and Risk Analysis (CIRA), estimates that without climate mitigation, health costs associated with climate change will rise dramatically. Warmer temperatures and increased levels of CO2 have been linked with increased pollen count and longer pollen seasons, which will directly affect those suffering from allergies and asthma. Warm temperatures increase ground level ozone which can damage lungs and lead to asthma. This can be harmful to public health, especially the health of those at risk for respiratory conditions. Climate change is projected to substantially increase human exposure to ozone as soon as 2050. In fact, CIRA estimates that mitigating climate change in the U.S. is estimated to prevent "…13,000 premature deaths in 2050." Local air quality suffers from global climate change and from localized ground level pollutants associated with burning fossil fuels. Alameda County currently receives an "F" on its Air Quality Report Card for High Ozone Days. Climate change could exacerbate existing air pollution issues. A warmer climate also puts the Bay Area at greater risk of extreme weather events, which can have acute, damaging impacts to health.

Future Development/Redevelopment

Alameda County and the City of Piedmont in general could see population fluctuations as a result of climate impacts relative to those experienced in other regions, and these fluctuations are expected to impact demand for housing and other development. Other interior western states may experience an exodus of population due to challenges in adapting to heat even more extreme than that which is projected to occur here. While there are currently no formal studies of specific migration patterns expected to impact the Bay Area region, climate-induced migration was recognized within the UNFCCC Conference of Parties Paris Agreement of 2015 and is expected to be the focus of future studies.

Climate change, coupled with shifting demographics and market conditions, could impact both the location of desired developments and the nature of development. Demand may increase for smaller dwellings that are less resource intensive, more energy efficient, easier to maintain and can be more readily adapted or even moved in response to changing conditions. Compact, mixed-use and infill developments that can help residents avoid long commutes and vulnerabilities associated with the transportation system will likely continue to grow in popularity. The value of open space and pressure to preserve it will likely increase, due in part to its restorative, recreational, environmental and habitat benefits but also for its ability to sequester carbon, help mitigate the accumulation of greenhouse gas in the atmosphere and slow down the global warming trend. Higher flood risks, especially if coupled with increased federal flood insurance rates, may decrease market demand for housing and other types of development in floodplains, while increased risk of wildfires may do the same for new developments in the urban-wildland interface. Flood risks may also inspire new development and building codes that elevate structures while maintaining streetscapes and neighborhood characteristics.

Climate change will stress water resources. Water is an issue in every region, but the nature of the potential impacts varies. Drought, related to reduced precipitation, increased evaporation, and increased water loss from plants, is an important issue in many U.S. regions, especially in the West. Floods, water quality problems, and impacts on aquatic ecosystems and species are likely to be amplified by climate change. Declines in mountain snowpack are important in the Sierra Nevada Mountains and across the state, where snowpack provides vital natural water storage and supply. The ability to secure and provide water for new development requires on-going monitoring and assurances. It is recommended that the ability to provide a reliable water supply from the appropriate water purveyor, continue to be in the conditions for project approval, and such assurances shall be verified and in place prior to issuing building permits.

Similarly, protecting and enhancing water supply will also need to be addressed. California's Sustainable Groundwater Management Act (SGMA) will contribute to addressing groundwater and aquifer recharge needs. Good groundwater management will provide a buffer against drought and climate change, and contribute to reliable water supplies regardless of weather patterns. California depends on groundwater for a major portion of its annual water supply, and sustainable groundwater management is essential to a reliable and resilient water system. Protection of critical recharge areas should be addressed across the County in the respective Groundwater Management Plans. Further, these plans should include provisions that guide development or curtail development in areas that would harm or compromise recharge areas.

Climate change will affect transportation. The transportation network is vital to the county and the region's economy, safety, and quality of life. While it is widely recognized that emissions from transportation have impacts on climate change, climate will also likely have significant impacts on transportation infrastructure and operations. Examples of specific types of impacts include softening of asphalt roads and warping of railroad rails; damage to roads; flooding of roadways, rail routes, and airports from extreme events; and interruptions to flight plans due to severe weather. Climate change impacts considered in the plan include: extreme temperatures; increased precipitation, runoff and flooding; increased wildfires; and landslides. Although landslides are not a direct result of climate change, these events are expected to increase in frequency due to increased rainfall, runoff, and wildfire. These events have the potential to cause injuries or fatalities, environmental damage, property damage, infrastructure damage, and interruption of operations. During flood events, these trails serve as secondary transportation facilities when roadways are blocked or otherwise impassible. During Hurricane Sandy, bicycles were one of the primary modes used to deliver food and water to residents stranded in their homes due to flood. Including dual or multi-purpose facilities and amenities as part of all new development provides not just desirable community amenities but critical infrastructure for climate resiliency.

Climate change will affect land uses and planning. Climate change coupled with shifting demographics and market conditions, could impact both the location of desired developments and the nature of development. Demand may increase for smaller dwellings that are less resource intensive, more energy efficient, easier to maintain and can be more readily adapted or even moved in response to changing conditions. Compact, mixed-use and infill developments that can help residents avoid long commutes and vulnerabilities associated with the transportation system will likely continue to grow in popularity. The value of open space, urban greening, green infrastructure, tree canopy expansion and pressure to preserve it will likely increase, due in part to its restorative, recreational, environmental, and habitat, and physical and mental health benefits but also for its ability to sequester carbon and cool the surrounding environment.

Climate change will affect Utilities. California is already experiencing impacts from climate change such as an increased number of wildfires, sea level rise and severe drought. Utility efforts to deal with these impacts range from emergency and risk management protocols to new standards for infrastructure design and new resource management techniques. Utilities are just beginning to build additional resilience and redundancy into their infrastructure investments from a climate adaptation perspective, but have been doing so from an overall safety and reliability perspective for decades. Significant efforts are also being made in those areas that overlap with climate change mitigation such as diversification of resources, specifically the addition of more renewables to the portfolio mix, as well as implementation of demand response efforts to curb peak demand. Efforts are also under way to upgrade the distribution grid infrastructure, which should add significant resilience to the grid as well. Next, they will issue a guidance document that expands upon the vulnerability assessments phase and includes plans for resilience solutions including cost/benefit analysis methodologies. The outcomes of this work will help to inform next steps on how infrastructure, the grid and other related operations will be modified to address climate change. New development will have to adapt and incorporate these new approaches as they evolve. Existing and new development will be affected from impacts that include not only diminished capacity from all of the utility assets from generation to transmission and distribution, but also the cost consequences resulting from prevention, replacement, outage, and energy loss. These have the potential for greatly impacting not just residential development but commercial and industrial and all utility users.

Addressing Heat Events. During heat waves in Alameda County, a heat alert is issued and news organizations are provided with tips on how vulnerable people can protect themselves. Programs used by health departments to engage with thousands of block captains to check on elderly and other vulnerable residents, along with public cooling places extending their hours, or local businesses welcoming residents into their businesses for purposes of staying cool are examples of programs and services that will be necessary. Other programs to consider that could further involve hospitals and clinics are operating a "heatline" with nurses or other healthcare professionals ready to assist callers with heat-related health problems. In addition, continued funding for weatherization, reduced utility rates and similar programs that offers assistance to elderly, low-income residents to install roof insulation, solar, trees and cool surfaces to save energy and lower indoor temperatures.

The City of Piedmont CAP 2.0 noted that climate change will displace many people from their homes, and Piedmont may have to consider how to address climate migrants and refugees. An estimated 13.1 million people could be displaced by sea level rise in the United States. As coastal zones in other parts of the Bay Area flood, there will be substantial impacts on the Bay Area's population and economy. Disasters, like extreme flooding, could generate a massive shift in Bay Area cities' populations.

4.3.4. Dam Failure Vulnerability Assessment

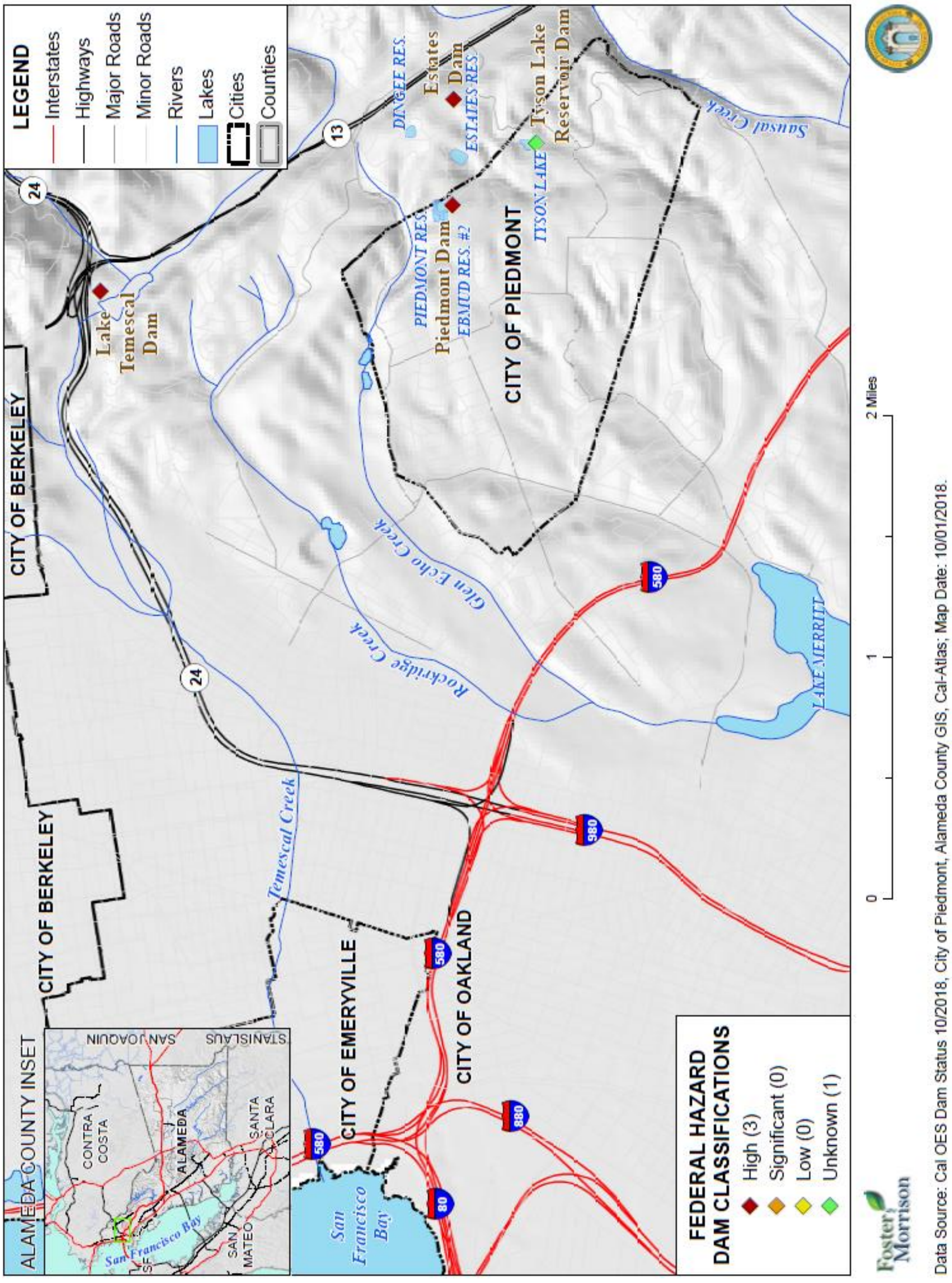
Likelihood of Future Occurrence—Unlikely
Vulnerability—Medium

Dam failure flooding can occur as the result of partial or complete collapse of an impoundment. Dam failures often result from prolonged rainfall and flooding. The primary danger associated with dam failure is the high velocity flooding of those properties downstream of the dam. A dam failure can range from a small, uncontrolled release to a catastrophic failure. Vulnerability to dam failures is confined to the areas subject to inundation downstream of the facility. Secondary losses would include loss of the multi-use functions of the facility and associated revenues that accompany those functions. Impacts include loss of life, damages to homes, critical facilities, and transportation infrastructure.

Dam failure flooding would vary by community depending on which dam fails and the nature and extent of the dam failure and associated flooding. Based on the risk assessment, it is apparent that a major dam failure could have a devastating impact on the Planning Area. Dam failure flooding presents a threat to life and property, including buildings, their contents, and their use. Large flood events can affect lifeline utilities (e.g., water, sewerage, and power), transportation, jobs, tourism, the environment, and the local and regional economies.

Only one dam of concern was delineated by the City: the Tyson Lake Reservoir. Figure 4-47 shows the location of the Tyson Lake Reservoir, as well as the location of the Lake Temescal Dam. Due to its size, the Tyson Lake Reservoir is not required to map possible inundation areas. The depth of flooding due to the failure of Tyson Lake dam is unknown.

Figure 4-47 City of Piedmont – Dam Locations



Future Development/Redevelopment

Given the limited development occurring in the City, combined with the limited chance of dam failure, future development is unlikely to be affected by dam failure flooding.

GIS Analysis

The GIS analysis determined that no development/redevelopment areas would fall into any dam failure inundation zone.

4.3.5. Drought and Water Shortage Vulnerability Assessment

Likelihood of Future Occurrence—Occasional
Vulnerability—Medium

Drought is different than many of the other natural hazards in that it is not a distinct event and usually has a slow onset. Drought can severely impact a region both physically and economically. Drought affects different sectors in different ways and with varying intensities. Adequate water is the most critical issue for agricultural, manufacturing, tourism, recreation, and commercial and domestic use. As the population in the area continues to grow, so will the demand for water.

Based on historical information, the occurrence of drought in California, including Alameda County and the City of Piedmont, is cyclical, driven by weather patterns. Drought has occurred in the past and will occur in the future. Periods of actual drought with adverse impacts can vary in duration, and the period between droughts is often extended. Although an area may be under an extended dry period, determining when it becomes a drought is based on impacts to individual water users. The vulnerability of Piedmont to drought is citywide, but impacts vary and may include reduction in water supply and an increase in dry fuels. Impacts to the City would be mostly from secondary risks to drought and water shortage – mostly from wildfires and their related impacts to property damage and life security. Additionally, impacts to their urban trees (estimated to be over 8,000) would occur. These trees then become more vulnerable during high wind and severe storm events, which can result in property damage, loss of utilities, and transportation issues.

Drought impacts are wide-reaching and may be economic, environmental, and/or societal. Tracking drought impacts can be difficult. The Drought Impact Reporter from the NDMC is a useful reference tool that compiles reported drought impacts nationwide. Table 4-45 show drought impacts for Alameda County from 1850 to October 2018. It would be assumed that the City Planning Area would experience similar impacts, due to the regional nature of drought impacts. The data represented is skewed, with the majority of these impacts from records within the past ten years.

Table 4-45 Alameda County Drought Impacts 1850-10/1/2018

Category	Number of Impacts
General Awareness	96
Agriculture	135

Category	Number of Impacts
Business and Industry	14
Energy	5
Fire	47
Plants & Wildlife	77
Relief, Response, and Restrictions	351
Society and Public Health	125
Tourism and Recreation	15
Water Supply and Quality	382
Total	**1247**

Source: National Drought Mitigation Center

The most significant qualitative impacts associated with drought in the Planning Area are those related to water intensive activities such as wildfire protection, municipal usage, commerce, tourism, recreation, and wildlife preservation. Mandatory conservation measures are typically implemented during extended droughts. A reduction of electric power generation and water quality deterioration are also potential problems. Drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding.

The CCHPR for Alameda County also discussed how climate change may increase the impact of drought. Lack of moisture, already at a severe level in California due to a current multi-year drought and decades of fuel accumulation from historical forestry and fire suppression practices, increases the risk of wildfires. Devastating wildfires like the Rim Fire of 2013 impact watersheds and increase the risk of landslides or mudslides, and sediment in run-off that reduce water quality. In addition to fire related injuries, local and regional transport of smoke, ash, and fine particles increases respiratory and cardiovascular risks. Increasing temperatures and changes in precipitation may lead to intensified drought conditions. Drought decreases the availability and quality of water for humans. This includes reduced water levels to fight wildfires. Drought may increase exposure to health hazards including wildfires, dust storms, extreme heat events, flash flooding, degraded water quality, and reduced water quantity. Dust storms associated with drought conditions have been associated with increased incidents of Valley fever, a fungal pathogen.

Future Development/Redevelopment

According to the HMPC, Piedmont has access to large quantities of water through EBMUD. However, population growth in the City and EMBUD service area will add additional pressure to EMBUD during periods of drought and water shortage. Civic projects have ordinances to consider the drought and water efficiency landscaping but not for residential properties.

4.3.6. Earthquake Vulnerability Assessment

Likelihood of Future Occurrence—Highly Likely (minor earthquake)/Occasional (major earthquake)
Vulnerability—Extremely High

The City of Piedmont General Plan Environmental Hazards element noted that earthquakes pose a substantial danger to property and human safety. Ground shaking is typically the greatest hazard and major cause of damage. The transmission of earthquake waves can cause buildings to collapse, streets to crack, and utility lines to rupture. Strong ground shaking can also cause damage due to falling objects such as bookcases or water heaters, chemical spills, and secondary effects such as fire or explosion. Impacts from earthquake include property damage, critical facility damage, injury, and loss of life.

On any given site, the degree of shaking tends depends on the magnitude of the earthquake, distance to the fault, property of the underlying soils, building design and construction, and building materials. Shaking tends to be strongest on filled soils and in areas where soil depth and moisture content are high.

It was noted by the HMPC that a majority of buildings in Piedmont are one- and two-story early to mid-20th century wood-frame houses. While such structures generally perform well in an earthquake, they pre-date the current seismic requirements of the California Building Code. Certain types of construction, such as homes that are not bolted to their foundations or homes with living areas over crawl spaces without substantial lateral strength, are more vulnerable than others. Tall brick chimneys and unrestrained water heaters are also a source of potential damage.

Over the last 50 years, many Piedmont residences have been retrofitted with shear walls, cross-bracing, and foundation reinforcements. Structural hazards in the city are also somewhat reduced due to the stability of the soil, the absence of large multi-family buildings, the relatively small number of commercial buildings, and the limited number of structures where large numbers of people congregate. Piedmont does not have "tilt-up" structures, soft-story buildings (apartments with tuck-under parking), mid-rise or high-rise buildings, elevated tanks, or unreinforced masonry buildings.

It was noted in the City of Piedmont General Plan that a number of other earthquake hazards are present in the East Bay, although limited in Piedmont itself. For example, surface rupture is a serious hazard in the Montclair District of Oakland, since it is bisected by the Hayward Fault. Differential settlement and lateral spreading are hazards along the Bay shoreline and in large areas of Oakland, Alameda, Berkeley, and Emeryville where tidal flats have been filled to accommodate development. Piedmont is also not vulnerable to tsunamis, as the city is located two miles from the shoreline at an elevation of over 25 feet.

The HMPC noted that water and sewer infrastructure and supply is a primary impact during a large earthquake affecting the City. There is concern that EBMUD lines would be ruptured, interrupting water supply for drinking, as well as for fire suppression. In addition, PG&E services could be an issue should power be cut off to City. Communications also a significant concern during a large earthquake event.

There is also concern about wastewater services for the City during an earthquake event. East Bay Municipal Utility District has recently upgraded the water pipeline conveyance that goes below Caldecott tunnel, called the Clairmont tunnel. This should ensure services during a hazard event.

Hazus Earthquake Scenarios

Methodologies

Hazus-MH 4.2 was utilized to model earthquake losses for the City. Level 1 analyses were run, meaning that only the default data was used and not supplemented with local building inventory or hazard data. There are certain data limitations when using the default data, so the results should be interpreted accordingly; this is a planning level analysis. Four Hazus scenarios were created for this Plan:

- A Hayward Fault 7.5 magnitude event
- A San Andreas Fault 8.0 magnitude event
- A Calaveras Fault 7.5 magnitude event
- A simultaneous event on all three faults.

The methodology for running the probabilistic earthquake scenario used probabilistic seismic hazard contour maps developed by the U.S. Geological Survey (USGS) for the 2002 update of the National Seismic Hazard Maps that are included with HAZUS-MH. The USGS maps provide estimates of potential ground acceleration and spectral acceleration at periods of 0.3 second and 1.0 second, respectively. The 2,500 year return period analyzes ground shaking estimates with a 2 percent probability of being exceeded in 50 years, from the various seismic sources in the area. The International Building Code uses this level of ground shaking for building design in seismic areas and is more of a worst case scenario.

Of the three earthquake faults that can affect the City, the Hayward Fault is the one likeliest to cause the greatest damage.

Hayward Fault

The Piedmont General Plan noted that such a scenario would produce very strong to violent shaking in most of the City. Significant structural damage could occur, including failure of stucco and masonry walls, collapse of chimneys and tanks, unbolted houses moving off of their foundations, and cracks in wet ground and on steep slopes.

The results of the probabilistic scenario for the Hayward fault are captured in Table 4-46. Maps showing total losses by census tract for this scenario are shown in Figure 4-48. Key losses included the following:

- Total economic loss estimated for the earthquake was $428.09 million, which includes building losses and lifeline losses based on the HAZUS-MH inventory.
- Building-related losses, including direct building losses and business interruption losses, totaled $395.59 million.
- Over 41 percent of the buildings in the City were at least moderately damaged. 139 buildings were completely destroyed.
- Over 77 percent of the building- and income-related losses were residential structures.
- 10 percent of the estimated losses were related to business interruptions.
- The mid-day earthquake caused the most casualties: 21
- 77 percent households experienced a loss of electricity the first day after the earthquake.
- No households experienced a loss of potable water the first day after the earthquake.

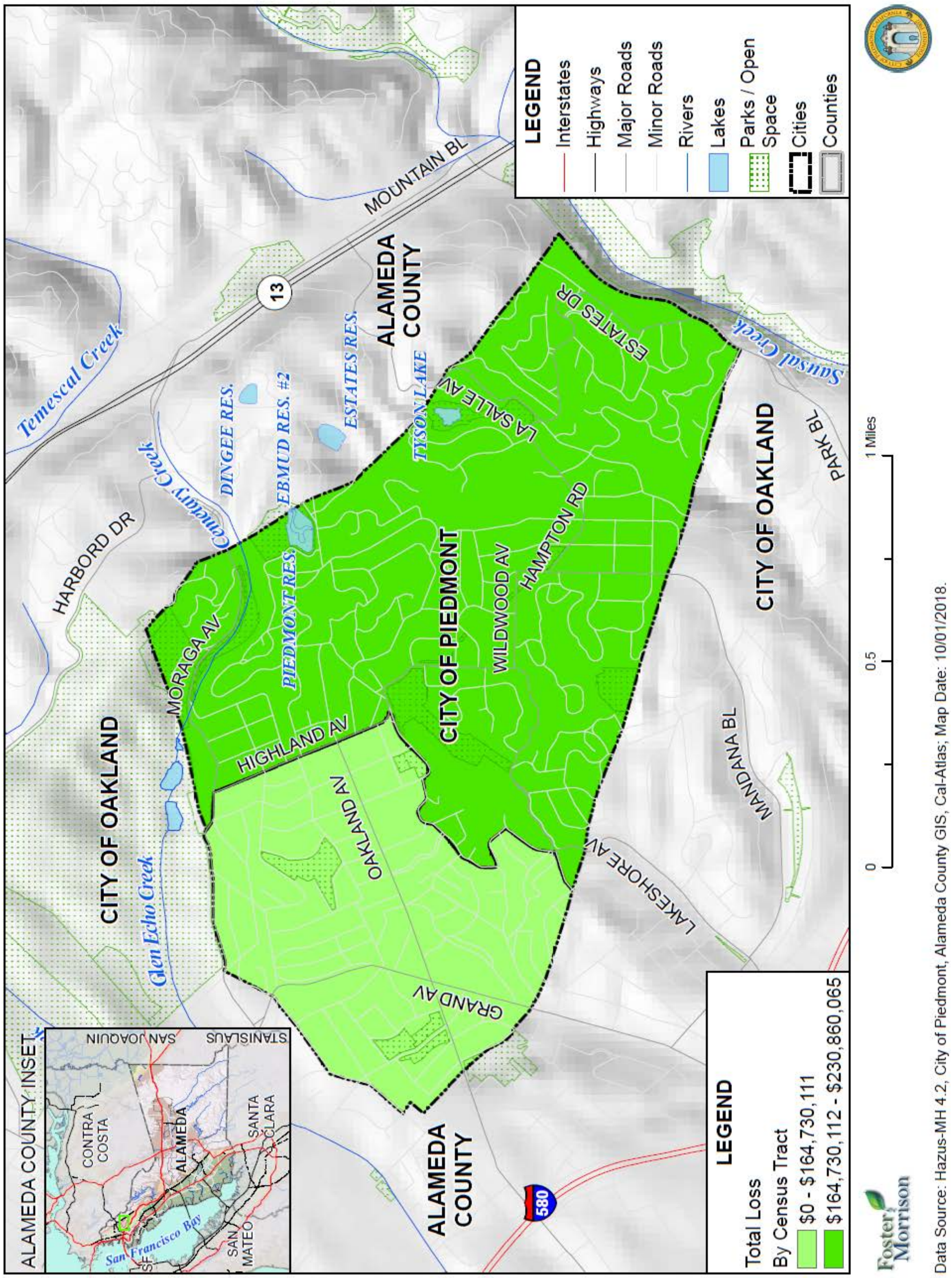
Table 4-46 City of Piedmont – HAZUS-MH 2,500-year Hayward Fault Earthquake Scenario Results

Impacts/Earthquake	7.5 Magnitude Earthquake	
Residential Buildings Damaged (Based upon 4,000 buildings)	Slight: 1,629 Moderate: 1,267 Extensive: 254 Complete: 139	
Building Related Loss	$395,590,000	
Total Economic Loss	$428,090,000	
Injuries (Based upon 2am time of occurrence)	Without requiring hospitalization: 33 Requiring hospitalization: 6 Life Threatening: 1 Fatalities: 1	
Injuries (Based upon 2pm time of occurrence)	Without requiring hospitalization: 202 Requiring hospitalization: 63 Life Threatening:11 Fatalities: 21	
Injuries (Based upon 5pm time of occurrence)	Without requiring hospitalization: 114 Requiring hospitalization: 35 Life Threatening: 6 Fatalities: 11	
Essential Facility Damage (Based upon 10 buildings)	None with at least moderate damage.	
Transportation and Utility Lifeline Damage	1 wastewater plant with at least moderate damage. 76 potable water leaks, and 19 breaks 38 wastewater leaks and 10 breaks 13 natural gas leaks and 3 breaks.	
Households w/out Power & Water Service (Based upon 3,801 households)	Water loss @ Day 1: 0 Water loss @ Day 3: 0 Water loss @ Day 7: 0 Water loss @ Day 30: 0 Water loss @ Day 90: 0	Power loss @ Day 1: 2,931 Power loss @ Day 3: 1,921 Power loss @ Day 7: 853 Power loss @ Day 30: 177 Power loss @ Day 90: 4
Displaced Households	107 displaced households	
Shelter Requirements	53 persons	
Debris Generation	41,000	

Source: Hazus-MH 4.2

Fires often occur after an earthquake. Because of the number of fires and the lack of water to fight the fires, they can often burn out of control. Hazus uses a Monte Carlo simulation model to estimate the number of ignitions and the amount of burnt area. For this scenario, the model estimates that there will be ignitions that will burn about 0.04 sq. mi 2.36 % of the region's total area.) The model also estimates that the fires will displace about 354 people and burn about 70 (millions of dollars) of building value.

Figure 4-48 City of Piedmont – Hazus Total Loss Areas from Hayward Quake Scenario



San Andreas Fault

The Piedmont General Plan noted that an earthquake on the San Andreas Fault would produce moderate to strong ground shaking in Piedmont.

The results of the probabilistic scenario are captured in Table 4-47. Maps showing total losses by census tract for this scenario are shown in Figure 4-49. Key losses included the following:

- Total economic loss estimated for the earthquake was $79.92 million, which includes building losses and lifeline losses based on the HAZUS-MH inventory.
- Building-related losses, including direct building losses and business interruption losses, totaled $71.16 million.
- Over 7 percent of the buildings in the City were at least moderately damaged. 7 buildings were completely destroyed.
- Over 77 percent of the building- and income-related losses were residential structures.
- 9 percent of the estimated losses were related to business interruptions.
- The mid-day earthquake caused the most casualties: 1
- None of the households experienced a loss of potable water or electricity the first day after the earthquake.

Table 4-47 City of Piedmont – HAZUS-MH 2,500-year San Andreas Earthquake Scenario Results

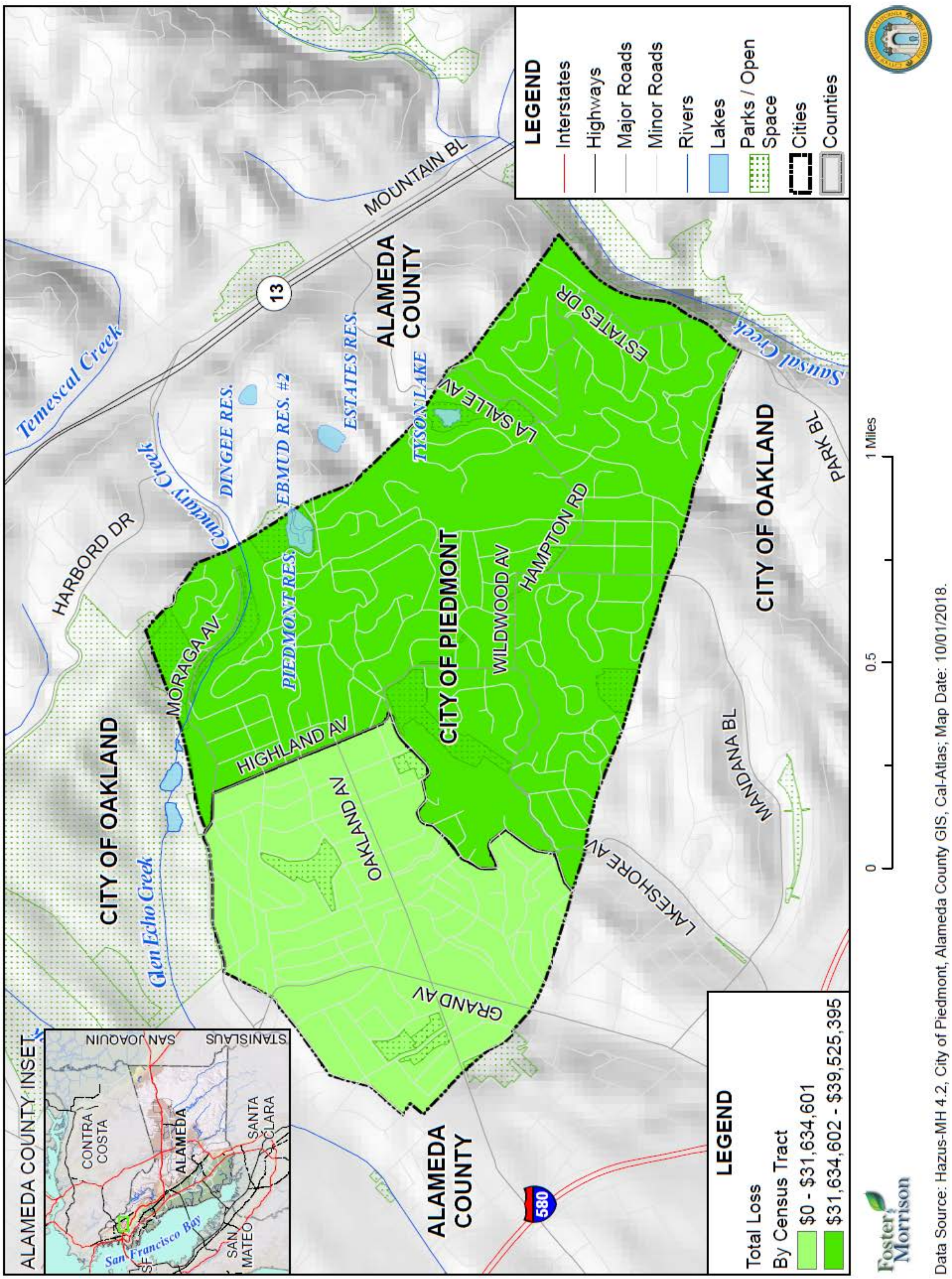
Impacts/Earthquake	8.0 Magnitude Earthquake
Residential Buildings Damaged (Based upon 4,000 buildings)	Slight: 1,054 Moderate: 242 Extensive: 26 Complete: 7
Building Related Loss	$71,160,000
Total Economic Loss	$79,920,000
Injuries (Based upon 2am time of occurrence)	Without requiring hospitalization: 4 Requiring hospitalization: 0 Life Threatening: 0 Fatalities: 0
Injuries (Based upon 2pm time of occurrence)	Without requiring hospitalization: 21 Requiring hospitalization: 5 Life Threatening: 1 Fatalities: 1
Injuries (Based upon 5pm time of occurrence)	Without requiring hospitalization: 12 Requiring hospitalization: 3 Life Threatening: 0 Fatalities: 1
Essential Facility Damage (Based upon 10 buildings)	None with at least moderate damage.
Transportation and Utility Lifeline Damage	13 potable water leaks and 3 breaks 7 wastewater leaks and 2 breaks 2 natural gas leaks and 1 break

Impacts/Earthquake	8.0 Magnitude Earthquake	
Households w/out Power & Water Service (Based upon 3,801 households)	Water loss @ Day 1: 0 Water loss @ Day 3: 0 Water loss @ Day 7: 0 Water loss @ Day 30: 0 Water loss @ Day 90: 0	Power loss @ Day 1: 0 Power loss @ Day 3: 0 Power loss @ Day 7: 0 Power loss @ Day 30: 0 Power loss @ Day 90: 0
Displaced Households	7 displaced households	
Shelter Requirements	3 people seeking shelter	
Debris Generation	6,000 tons	

Source: HAZUS-MH 4.2

For this scenario, the model estimates that there will be ignitions that will burn about 0.04 sq. mi (2.36 % of the region's total area.) The model also estimates that the fires will displace about 333 people and burn about 66 (millions of dollars) of building value.

Figure 4-49 City of Piedmont – Hazus Total Loss Areas from San Andreas Quake Scenario



Calaveras Fault

The Piedmont General Plan noted that a 6.2 quake on the Calaveras Fault would produce light to moderate shaking. Both scenarios create a high probability for structural damage in the City.

- The results of the probabilistic scenario are captured in Table 4-48. Maps showing total losses by census tract for this scenario are shown in Figure 4-50. Key losses included the following:
- Total economic loss estimated for the earthquake was $107.93 million, which includes building losses and lifeline losses based on the HAZUS-MH inventory.
- Building-related losses, including direct building losses and business interruption losses, totaled $97.02 million.
- Over 10 percent of the buildings in the City were at least moderately damaged. 12 buildings were completely destroyed.
- Over 77 percent of the building- and income-related losses were residential structures.
- 9 percent of the estimated losses were related to business interruptions.
- The mid-day earthquake caused the most casualties: 22
- None of the households experienced a loss of potable water or electricity the first day after the earthquake.

Table 4-48 City of Piedmont – HAZUS-MH 2,500-year Calaveras Fault Earthquake Scenario Results

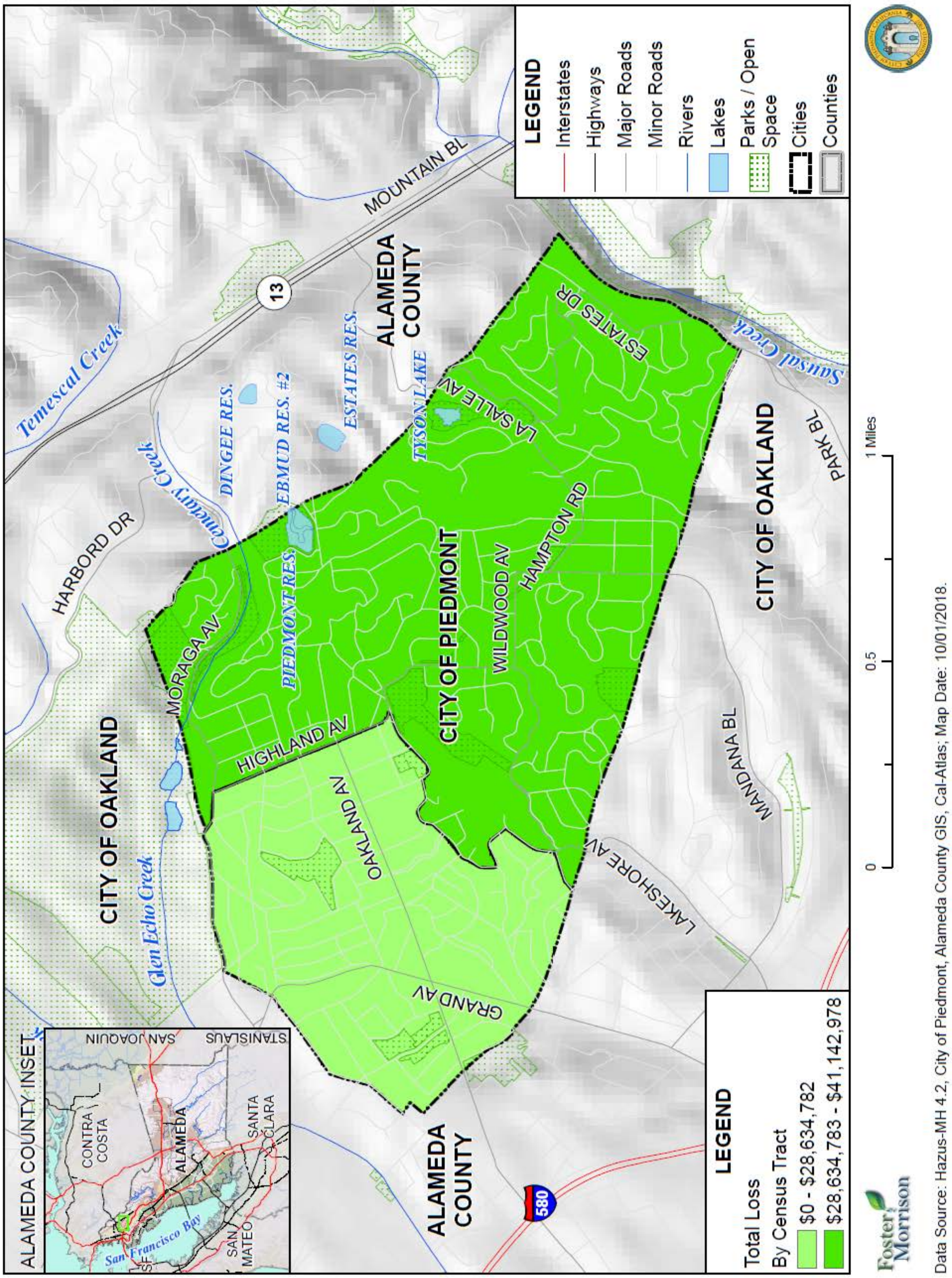
Impacts/Earthquake	7.5 Magnitude Earthquake
Residential Buildings Damaged (Based upon 4,000 buildings)	Slight: 1,241 Moderate: 337 Extensive: 39 Complete: 12
Building Related Loss	$97,020,000
Total Economic Loss	$107,930,000
Injuries (Based upon 2am time of occurrence)	Without requiring hospitalization: 6 Requiring hospitalization: 1 Life Threatening: 0 Fatalities: 0
Injuries (Based upon 2pm time of occurrence)	Without requiring hospitalization: 32 Requiring hospitalization: 8 Life Threatening:1 Fatalities: 2
Injuries (Based upon 5pm time of occurrence)	Without requiring hospitalization: 18 Requiring hospitalization: 4 Life Threatening: 1 Fatalities: 1
Essential Facility Damage (Based upon 10 buildings)	None with at least moderate damage
Transportation and Utility Lifeline Damage	17 potable water leaks and 4 breaks 9 wastewater leaks and 2 breaks 3 natural gas leaks and 1 break

Impacts/Earthquake	7.5 Magnitude Earthquake	
Households w/out Power & Water Service (Based upon 3,801 households)	Water loss @ Day 1: 0 Water loss @ Day 3: 0 Water loss @ Day 7: 0 Water loss @ Day 30: 0 Water loss @ Day 90: 0	Power loss @ Day 1: 0 Power loss @ Day 3: 0 Power loss @ Day 7: 0 Power loss @ Day 30: 0 Power loss @ Day 90: 0
Displaced Households	11 displaced households	
Shelter Requirements	5 persons seeking shelter	
Debris Generation	8,000 tons	

Source: HAZUS-MH 4.2

For this scenario, the Monte Carlo simulation model estimates that there will be ignitions that will burn about 0.04 sq. mi 2.36 % of the region's total area.) The model also estimates that the fires will displace about 333 people and burn about 66 (millions of dollars) of building value.

Figure 4-50 City of Piedmont – Hazus Total Loss Areas from Calaveras Quake Scenario



Comparison of Hayward, San Andreas, and Calaveras Fault Events

The three Hazus earthquake scenarios for the City of Piedmont show different amounts of damages and losses. In order to compare these events for the City, Table 4-49 combines the information shown in Table 4-46, Table 4-47, and Table 4-48. As shown below, the Hayward Fault poses the greatest risk to the City of Piedmont.

Table 4-49 Comparison of Earthquake Fault Scenarios

Impacts	Count Type	7.5 Hayward	8.0 San Andreas	7.5 Calaveras
Residential Buildings Damaged (Based upon 4,000 buildings)	Slight: Moderate: Extensive: Complete:	1,629 1,267 254 139	1,054 242 26 7	1,241 337 39 12
Building Related Loss	$	$395,590,000	$71,160,000	$97,020,000
Total Economic Loss	$	$428,090,000	$79,920,000	$107,930,000
Injuries (Based upon 2am time of occurrence)	Without requiring hospitalization: Requiring hospitalization: Life Threatening: Fatalities:	33 6 1 1	4 0 0 0	6 1 0 0
Injuries (Based upon 2pm time of occurrence)	Without requiring hospitalization: Requiring hospitalization: Life Threatening: Fatalities:	202 63 11 21	21 5 1 1	32 8 1 2
Injuries (Based upon 5pm time of occurrence)	Without requiring hospitalization: Requiring hospitalization: Life Threatening: Fatalities:	114 35 6 11	12 3 0 1	18 4 1 1
Essential Facility Damage (Based upon 10 buildings)	–	None with at least moderate damage	None with at least moderate damage	None with at least moderate damage
Transportation and Utility Lifeline Damage	–	76 potable water leaks, and 19 breaks 38 wastewater leaks and 10 breaks 13 natural gas leaks and 3 breaks.	13 potable water leaks and 3 breaks 7 wastewater leaks and 2 breaks 2 natural gas leaks and 1 break	17 potable water leaks and 4 breaks 9 wastewater leaks and 2 breaks 3 natural gas leaks and 1 break

Impacts	Count Type	7.5 Hayward	8.0 San Andreas	7.5 Calaveras
Households w/out Power & Water Service (Based upon 3,801 households)	–	Power loss @ Day 1: 2,931 Power loss @ Day 3: 1,921 Power loss @ Day 7: 853 Power loss @ Day 30: 177 Power loss @ Day 90: 4	No power or water losses	No power or water losses
Displaced Households	–	107 displaced households	7 displaced households	11 displaced households
Shelter Requirements	–	53 persons	3 people seeking shelter	5 persons seeking shelter
Debris Generation	–	41,000 tons	6,000 tons	8,000 tons

Source: HAZUS-MH 4.2

Hayward-San Andreas-Calaveras Faults Simultaneous Event

HAZUS-MH 4.2 was utilized to model earthquake losses for the City. For this Hazus run, it was assumed that all three faults that affect the City would have strike-slips at the same time. This is considered a worst-case type of event. An 8.0 earthquake shaking event was selected for this simultaneous event. Level 1 analyses were run, meaning that only the default data was used and not supplemented with local building inventory or hazard data. There are certain data limitations when using the default data, so the results should be interpreted accordingly; this is a planning level analysis.

The methodology for running the probabilistic earthquake scenario used probabilistic seismic hazard contour maps developed by the U.S. Geological Survey (USGS) for the 2002 update of the National Seismic Hazard Maps that are included with HAZUS-MH. The USGS maps provide estimates of potential ground acceleration and spectral acceleration at periods of 0.3 second and 1.0 second, respectively. The 2,500 year return period analyzes ground shaking estimates with a 2 percent probability of being exceeded in 50 years, from the various seismic sources in the area. The International Building Code uses this level of ground shaking for building design in seismic areas and is more of a worst case scenario.

The results of this probabilistic scenario are captured in Table 4-50. Key losses included the following:

- Total economic loss estimated for the earthquake was $458.71 million, which includes building losses and lifeline losses based on the HAZUS-MH inventory.
- Building-related losses, including direct building losses and business interruption losses, totaled $424.96 million.
- Over 43 percent of the buildings in the City were at least moderately damaged. 160 buildings were completely destroyed.
- Over 76 percent of the building- and income-related losses were residential structures.
- 10 percent of the estimated losses were related to business interruptions.
- The mid-day earthquake caused the most casualties: 24

- None of the households experienced a loss of potable water the first day after the earthquake.
- 2,980 households experienced a loss of electricity the first day after the earthquake.

Table 4-50 City of Piedmont – HAZUS-MH 2,500-year Hayward-San Andreas-Calaveras Faults Simultaneous Event Earthquake Scenario Results

Impacts/Earthquake	8.0 Magnitude Earthquake	
Residential Buildings Damaged (Based upon 4,000 buildings)	Slight: 1,600 Moderate: 1,321 Extensive: 274 Complete: 160	
Building Related Loss	$424,960,000	
Total Economic Loss	$458,710,000	
Injuries (Based upon 2am time of occurrence)	Without requiring hospitalization: 36 Requiring hospitalization: 7 Life Threatening: 1 Fatalities: 1	
Injuries (Based upon 2pm time of occurrence)	Without requiring hospitalization: 228 Requiring hospitalization: 72 Life Threatening: 12 Fatalities: 24	
Injuries (Based upon 5pm time of occurrence)	Without requiring hospitalization: 128 Requiring hospitalization: 40 Life Threatening: 7 Fatalities: 13	
Essential Facility Damage (Based upon 10 buildings)	None with at least moderate damage.	
Transportation and Utility Lifeline Damage	1 wastewater plan with moderate damage/ 94 potable water leaks and 24 potable water breaks 47 wastewater leaks and 12 wastewater breaks 16 nautral gas leaks and 4 natural gas breaks	
Households w/out Power & Water Service (Based upon 3,801 households)	Water loss @ Day 1: 0 Water loss @ Day 3: 0 Water loss @ Day 7: 0 Water loss @ Day 30: 0 Water loss @ Day 90: 0	Power loss @ Day 1: 2,980 Power loss @ Day 3: 1,986 Power loss @ Day 7: 908 Power loss @ Day 30: 193 Power loss @ Day 90: 4
Displaced Households	230 households	
Shelter Requirements	60 people	
Debris Generation	45,000 tons	

Source: HAZUS-MH 4.2

For this scenario, the Monte Carlo simulation model estimates that there will be ignitions that will burn about 0.04 sq. mi 2.36 % of the region's total area.) The model also estimates that the fires will displace about 354 people and burn about 70 (millions of dollars) of building value.

HayWired Scenario

The 1906 Great San Francisco earthquake (magnitude 7.8) and the 1989 Loma Prieta earthquake (magnitude 6.9) each motivated residents of the San Francisco Bay region to build countermeasures to earthquakes into the fabric of the region. Since Loma Prieta, bay-region communities, governments, and utilities have invested tens of billions of dollars in seismic upgrades and retrofits and replacements of older buildings and infrastructure. Innovation and state-of-the-art engineering, informed by science, including novel seismic-hazard assessments, have been applied to the challenge of increasing seismic resilience throughout the bay region. However, as long as people live and work in seismically vulnerable buildings or rely on seismically vulnerable transportation and utilities, more work remains to be done.

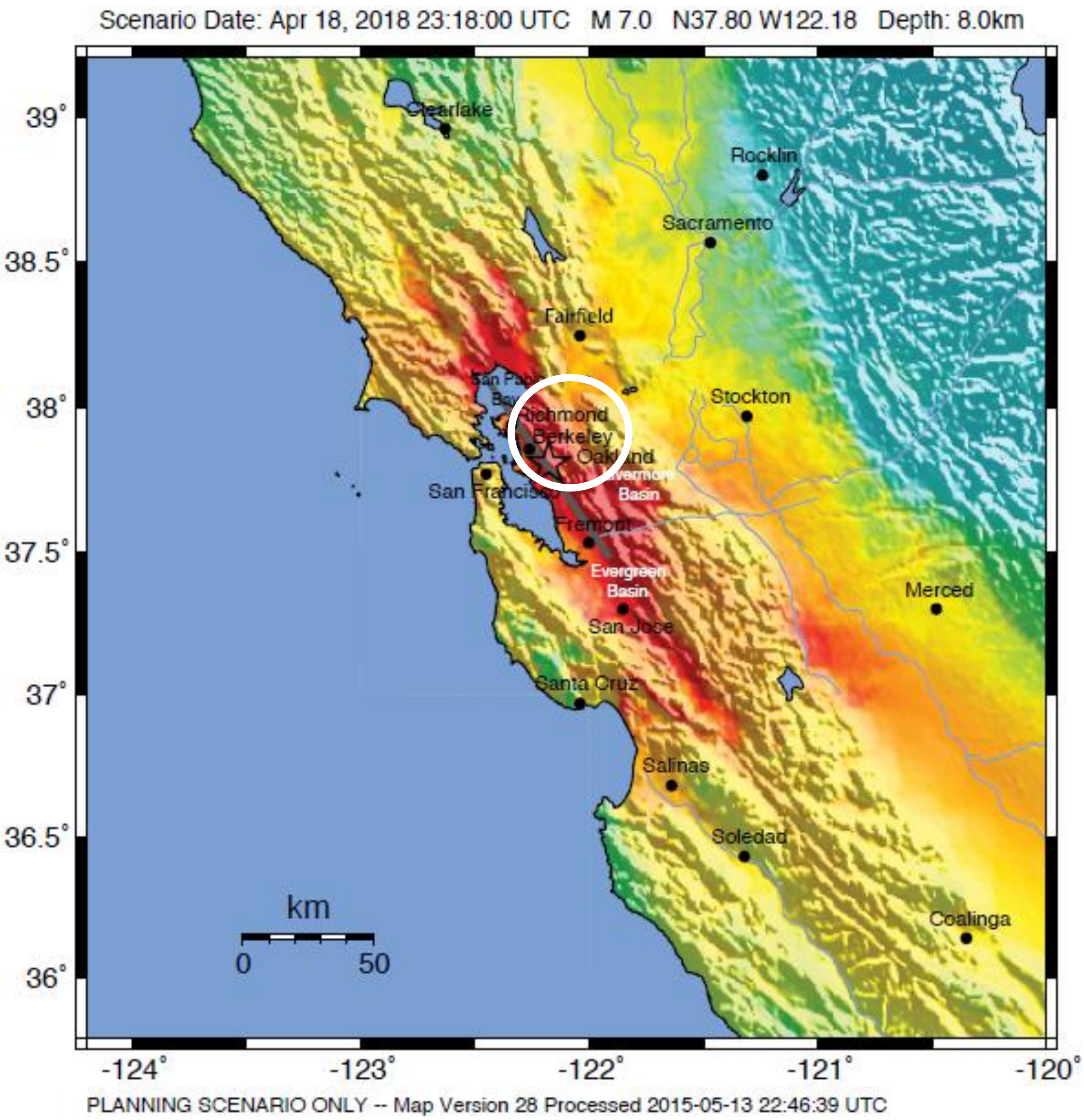
With that in mind, the U.S. Geological Survey (USGS) and its partners developed the HayWired scenario as a tool to enable further actions that can change the outcome when the next major earthquake strikes. By illuminating the likely impacts to the present-day built environment, well-constructed scenarios can and have spurred officials and citizens to take steps that change the outcomes the scenario describes, whether used to guide more realistic response and recovery exercises or to launch mitigation measures that will reduce future risk.

The HayWired scenario is the latest in a series of like-minded efforts to bring a special focus onto potential impacts when the Hayward Fault again ruptures through the east side of the San Francisco Bay region as it last did in 1868. Cities in the east bay along the Richmond, Oakland, and Fremont corridor would be hit hardest by earthquake ground shaking, surface fault rupture, aftershocks, and fault afterslip, but the impacts would reach throughout the bay region and far beyond.

The area of present-day Contra Costa, Alameda, and Santa Clara Counties contended with a magnitude-6.8 earthquake in 1868 on the Hayward Fault. Although sparsely populated then, about 30 people were killed and extensive property damage resulted. The question of what an earthquake like that would do today has been examined before and is now revisited in the HayWired scenario. Scientists have documented a series of prehistoric earthquakes on the Hayward Fault and are confident that the threat of a future earthquake, like that modeled in the HayWired scenario, is real and could happen at any time. The team assembled to build this scenario has brought innovative new approaches to examining the natural hazards, impacts, and consequences of such an event. Such an earthquake would also be accompanied by widespread liquefaction and landslides, which are treated in greater detail than ever before.

In the HayWired scenario earthquake, the rupture of the Hayward Fault starts beneath southeast Oakland and, in less than a minute, travels along more than 52 miles of its length, both northward toward Richmond and San Pablo Bay and southward toward Fremont, at speeds as great as 7,000 miles per hour. As the fault break reaches the Earth's surface, it damages roads and buried pipelines and electrical conduits that cross the fault north of Hayward. In Berkeley, for example, the ground shifts by as much as 1 to 1.5 meters (about 3 to 5 feet) in a matter of seconds. As the USGS map of expected ground shaking (called a scenario ShakeMap) for the HayWired mainshock shows the earthquake produces severe shaking and moderate to heavy damage in the east bay and Silicon Valley (roughly the part of the bay area at the southern end of San Francisco Bay) and widespread strong shaking throughout the region. This map is shown in Figure 4-51.

Figure 4-51 Haywired Scenario – Shakemap for 7.0 Event



PERCEIVED SHAKING	Not felt	Weak	Light	Moderate	Strong	Very Strong	Severe	Violent	Extreme
POTENTIAL DAMAGE	none	none	none	Very light	Light	Moderate	Mod./Heavy	Heavy	Very Heavy
PEAK ACC.(%g)	<0.05	0.3	2.8	6.2	12	22	40	75	>139
PEAK VEL.(cm/s)	<0.02	0.1	1.4	4.7	9.6	20	41	86	>178
INSTRUMENTAL INTENSITY	I	II-III	IV	V	VI	VII	VIII	IX	X+

Source: USGS Haywired Earthquake Scenario, Scientific Investigations Report 2017-5013-A-H

San Francisco Bay region residents feel ground shaking that lasts 30 seconds or longer, and many people have difficulty walking and standing. Effects and destruction from the fault rupture and ground shaking are severe, but adding to this are a cascade of other hazards, including liquefaction, landslides, and fire following earthquake.

The hypothetical HayWired mainshock disrupts lifelines, supply chains, and the economy not only in the San Francisco Bay region but also disrupts the U.S. economy because of the economic importance of the region, particularly Silicon Valley (see Joint Ventures Silicon Valley, 2017). Dozens of significant aftershocks and fault afterslip (the Hayward Fault continues to creep in the weeks and months after the mainshock) will cause additional damage, requiring repeated repairs. Water supplies could be impaired for months, hindering household and business recovery even in undamaged buildings. The effects on the region's and the Nation's economy will continue for years and will be costly and wide reaching. Because relatively few buildings are insured for earthquakes, owners will face challenges financing repairs. Occupants will have to find alternative housing or business space, and some people might be forced to move away from the region for at least some period of time and possibly not return.

Because our lives and economy are now fully intertwined with the Internet, the hypothetical disruption from the HayWired scenario is compounded. Our society takes for granted that information, goods, and services are available at a moment's notice through the Internet. A large earthquake on the Hayward Fault could be the first major U.S. earthquake for which much of our commerce ("e-commerce," including shipping and distribution management) and our daily interactions happen online.

Overall Community Impact

The overall impact to the community from earthquake includes:

- Commercial and residential structural and property damage;
- Damage to natural resource habitats and other natural resources;
- Disruption of and damage to public infrastructure and services;
- Loss of water, power, roads, phones, and transportation, which could impact, strand, and/or impair mobility for emergency responders and/or area residents;
- Economic losses (jobs, sales, tax revenue) associated with loss of commercial structures;
- Loss of churches, which could severely impact the social fabric of the community;
- Loss of schools, which could severely impact the entire school system and disrupt families and teachers, as temporary facilities and relocations would likely be needed;
- Impact on the overall mental health of the community;
- Injury and loss of life; and
- Negative impact on commercial and residential property values.

Future Development/Redevelopment

The City of Piedmont General Plan noted that all construction and rehabilitation projects in Piedmont must conform to building codes which take seismic forces into account. The Building Code assigns a seismic design category (SDC) to each type of structure based on its occupancy, soil profile, acceleration parameters, and other factors. The SDC affects the type of structure that may be developed on a given site, as well its design, height, and detail requirements. Adherence to seismic building standards for future development will limit structure impacts from future earthquake events.

4.3.7. Earthquake Liquefaction Vulnerability Assessment

Likelihood of Future Occurrence—Occasional
Vulnerability—Medium

Earthquake is discussed in the Section 4.3.6, but is primarily focused on the vulnerability of buildings and people from earthquake shaking. This section deals with a secondary hazard associated with earthquake – the possible collapse of structural integrity of the ground in liquefaction prone areas. Impacts from liquefaction include property damage, critical facility damage, and life safety issues. The HMPC noted that areas prone to liquefaction will create an amplification of ground shaking resulting in more damage in these areas during an earthquake event.

Total Values at Risk

The City of Piedmont identified two types of liquefaction zone studies of concern to the Planning Area. Liquefaction susceptibility zones are areas identified by the USGS to have very high, moderate, low, and very low susceptibility to earthquake shaking and liquefaction and therefore have been considered to be potentially hazardous and at risk to property. Liquefaction zones determined by the CGS further identify State regulatory zone that show “Zones of Required Investigation” for liquefaction (and landslide) hazard which categorizes areas as either being in or outside of the Zone of Required Investigation. The liquefaction vulnerability assessment focuses on understanding the potential impacts to Piedmont properties.

Methodology

Two liquefaction analyses were performed for the Piedmont Planning Area:

- USGS liquefaction susceptibility zone
- CGS liquefaction zone analysis.

These two layers, while different have almost the same results. The City only falls in the moderate zone which has the same vulnerability as the “inside” zone.

USGS Liquefaction Susceptibility Zones

The 2006 USGS liquefaction susceptibility zone data was obtained for the Alameda County area to analyze the Piedmont Planning Area. Areas of liquefaction susceptibility exist throughout the entire Piedmont area. The Alameda County parcel layer was used as the basis for the inventory of all parcels within Piedmont. GIS was used to overlay the liquefaction susceptibility zones layer onto the parcel layer centroids, and where the liquefaction zones intersected a parcel centroid, it was assigned with that liquefaction susceptibility zone for the entire parcel. Note that the value of the improved land is also included in the total of values at risk as the land itself is at risk to liquefaction.

According to the USGS, The USGS data contains a GIS database of Quaternary deposits and liquefaction susceptibility for the urban core of the San Francisco Bay region. It supersedes the equivalent area of U.S. Geological Survey Open-File Report 00-444 (Knudsen and others, 2000), which covers the larger 9-county San Francisco Bay region. The nine counties surrounding San Francisco Bay straddle the San Andreas fault system, which exposes the region to serious earthquake hazard (Working Group on California Earthquake Probabilities, 1999). Much of the land adjacent to the Bay and the major rivers and streams is underlain by unconsolidated deposits that are particularly vulnerable to earthquake shaking and liquefaction of water-saturated granular sediment. This new map provides a consistent detailed treatment of the central part of the 9-county region in which much of the mapping of Open-File Report 00-444 was either at smaller (less detailed) scale or represented only preliminary revision of earlier work. Like Open-File Report 00-444, the current mapping uses geomorphic expression, pedogenic soils, inferred depositional environments, and geologic age to define and distinguish the map units. Further scrutiny of the factors controlling liquefaction susceptibility has led to some changes relative to Open-File Report 00-444: particularly the reclassification of San Francisco Bay mud (Qhbm) to have only MODERATE susceptibility and the rating of artificial fills according to the Quaternary map units inferred to underlie them (other than dams). The two colored maps provide a regional summary of the new mapping at a scale of 1:200,000, a scale that is sufficient to show the general distribution and relationships of the map units but not to distinguish the more detailed elements that are present in the database. The report is the product of cooperative work by the National Earthquake Hazards Reduction Program (NEHRP) and National Cooperative Geologic Mapping Program of the U.S. Geological Survey, William Lettis and & Associates, Inc. (WLA), and the California Geological Survey. The mapping has been carried out by WLA geologists under contract to the NEHRP Earthquake Program (Grant 99-HQ-GR-0095) and by the California Geological Survey. For detailed information about the map the USGS has an open report, "Maps of Quaternary Deposits and Liquefaction Susceptibility in the Central San Francisco

CGS Liquefaction Zones

The 2015 CGS liquefaction zone data was obtained for the Alameda County area to analyze the Piedmont Planning Area. Similar to the USGS data, areas of liquefaction exist throughout the entire Piedmont area. The Alameda County parcel layer was used as the basis for the inventory of all parcels within Piedmont. GIS was used to overlay the liquefaction zones layer onto the parcel layer centroids, and where the liquefaction zones intersected a parcel centroid, it was assigned as inside or outside of the liquefaction zone for the entire parcel. Note that the value of the improved land is also included in the total of values at risk as the land itself is at risk to liquefaction.

The 2015 CGS data represents State regulated areas where liquefaction and landslides may occur during a strong earthquake and show “Zones of Required Investigation” for liquefaction hazard. They do not depict different degrees of hazard, rather they identify zones within which site specific studies will be required for new construction. More information is included in the metadata. Developers of properties falling within these zones may be required to investigate the potential hazard and mitigate its threat during the local permitting process.

The map is used by cities and counties to regulate development and by property owners selling property within areas where seismic hazard zones have been identified. Local governments can withhold development permits until geologic or soils investigations are conducted for specific sites and mitigation measures are incorporated into development plans. Sellers of property use the maps to check the location of their specific site and, if applicable, disclose to the buyer that the property lies within a seismic hazard zone as required by the Seismic Hazards Mapping Act of 1990 (Public Resources Code, Division 2, Chapter 7.8). For information regarding the scope and recommended methods to be used in conducting the required site investigations, see California Geological Survey Special Publication 117A, Guidelines for Evaluating and Mitigating Seismic Hazards in California.

Supplemental Information

This map may not show all areas that have potential for liquefaction. Also, a single earthquake capable of causing liquefaction will not uniformly affect the entire area zoned. The identification and location of liquefaction zones are based on the best available data. However, the quality of data used is varied. Zone boundaries have been drawn as accurately as possible at the map scale (1:24,000).

These data do not include Alquist-Priolo Earthquake Fault Zones, if any, that may exist in this area. For more information on this subject see California Geological Survey Special Publication 42.

The original mapping was conducted on an earlier version of the USGS 7.5-minute topographic quadrangle map, utilizing California State Plane (Lambert Conformal Conic) projection (feet) and North American Datum of 1927. These data are currently maintained and distributed in a California Albers projection (meters) and North American Datum of 1983. It should be noted that the same geographic coordinate (e.g. -120.00 degrees longitude; 39.00 degrees latitude) will fall in a different location on the earth's surface when datums are changed.

Limitations

It should be noted that maps and analysis represent best available data. There have been past occurrences of liquefaction in areas not shown to be at risk to liquefaction. The resulting information should only be used as an initial guide to overall values in the City. In the event of a disaster, structures and other infrastructure improvements are at the greatest risk of damage. Depending on the type of hazard and resulting damages, the land itself may not suffer a significant loss. For that reason, the values of structures and other infrastructure improvements are of greatest concern. Also, it is critical to note a specific limitation to the assessed values data within the City, created by Proposition 13. Instead of adjusting property values annually, no adjustments are made until a property transfer occurs. As a result, overall property value information is significantly low and does not reflect current market or true potential loss values for properties within the City.

Values at Risk Results: Liquefaction Susceptibility Zones

USGS Liquefaction Susceptibility Zones

The USGS liquefaction susceptibility zones were overlaid with the City of Piedmont 2018 GIS parcel layer and the Alameda County Assessor data in GIS to obtain results. For the purposes of this analysis, if the liquefaction susceptibility zone intersected a parcel centroid, the entire parcel was considered to be in the liquefaction susceptibility zone. The parcels were segregated and analyzed in this fashion for the Piedmont Planning Area. Once completed, the parcel boundary layer was joined to the centroid layer and values were transferred based on the identification number in the Assessors database and the GIS parcel layer. Areas of liquefaction susceptibility in the Piedmont Planning Area are shown in Figure 4-52. Table 4-51 illustrates the potential estimated damages to Piedmont from liquefaction susceptibility, including FEMA contents replacement values as previously described. Table 4-52 breaks down Table 4-51 to show potential damages by property use type in the City.

Figure 4-52 Piedmont – USGS Liquefaction Susceptibility Zones

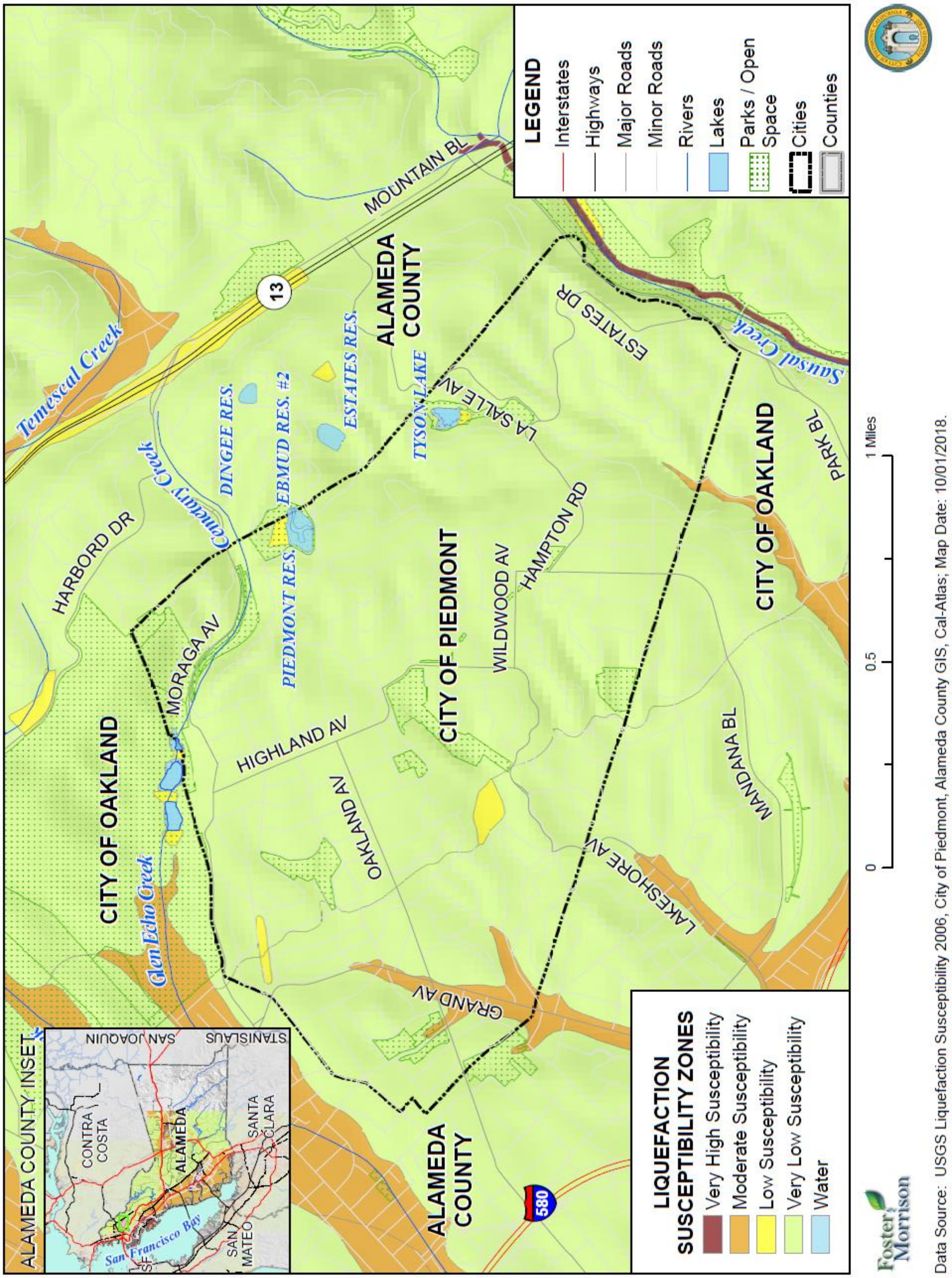


Table 4-51 City of Piedmont– Count and Value of Parcels in USGS Liquefaction Susceptibility Zones

Liquefaction Susceptibility Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Estimated Contents Value	Total Value
Very High Susceptibility						
Total	0	0	$0	$0	$0	$0
Moderate Susceptibility						
Total	91	80	$19,118,762	$35,785,165	$19,813,116	$74,717,043
Low Susceptibility						
Total	19	18	$4,654,820	$11,020,926	$5,510,463	$21,186,209
Very Low Susceptibility						
Total	3,898	3,645	$1,313,719,689	$2,777,622,781	$1,385,860,170	$5,477,202,640
Water						
Total	1	0	$0	$0	$0	$0
Grand Total	**4,009**	**3,743**	**$1,337,493,271**	**$2,824,428,872**	**$1,411,183,748**	**$5,573,105,891**

Source: USGS, Piedmont 6/19/2018 Parcel/Assessor's Data

Table 4-52 City of Piedmont–Count and Value of Parcels in USGS Liquefaction Susceptibility Zones by Property Use

Liquefaction Susceptibility Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Estimated Contents Value	Total Value
Very High Susceptibility						
Commercial	0	0	$0	$0	$0	$0
Houses of Worship	0	0	$0	$0	$0	$0
Municipal	0	0	$0	$0	$0	$0
Parks / Open Space	0	0	$0	$0	$0	$0
Residential	0	0	$0	$0	$0	$0
Schools	0	0	$0	$0	$0	$0
Vacant	0	0	$0	$0	$0	$0
Very High Susceptibility Total	**0**	**0**	**$0**	**$0**	**$0**	**$0**
Moderate Susceptibility						
Commercial	8	4	$3,765,350	$3,841,066	$3,841,066	$11,447,482

Liquefaction Susceptibility Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Estimated Contents Value	Total Value
Houses of Worship	1	0	$0	$0	$0	$0
Municipal	0	0	$0	$0	$0	$0
Parks / Open Space	1	0	$0	$0	$0	$0
Residential	79	76	$15,353,412	$31,944,099	$15,972,050	$63,269,561
Schools	0	0	$0	$0	$0	$0
Vacant	2	0	$0	$0	$0	$0
Moderate Susceptibility Total	**91**	**80**	**$19,118,762**	**$35,785,165**	**$19,813,116**	**$74,717,043**
Low Susceptibility						
Commercial	0	0	$0	$0	$0	$0
Houses of Worship	0	0	$0	$0	$0	$0
Municipal	0	0	$0	$0	$0	$0
Parks / Open Space	1	0	$0	$0	$0	$0
Residential	18	18	$4,654,820	$11,020,926	$5,510,463	$21,186,209
Schools	0	0	$0	$0	$0	$0
Vacant	0	0	$0	$0	$0	$0
Low Susceptibility Total	**19**	**18**	**$4,654,820**	**$11,020,926**	**$5,510,463**	**$21,186,209**
Very Low Susceptibility						
Commercial	6	2	$1,392,145	$1,044,703	$1,044,703	$3,481,551
Houses of Worship	10	2	$724,183	$2,532,185	$2,532,185	$5,788,553
Municipal	3	0	$0	$0	$0	$0
Parks / Open Space	20	0	$0	$0	$0	$0
Residential	3,795	3,635	$1,308,223,770	$2,764,566,563	$1,382,283,282	$5,455,073,615
Schools	6	0	$0	$0	$0	$0
Vacant	58	6	$3,379,591	$9,479,330	$0	$12,858,921
Very Low Susceptibility Total	3,898	3,645	$1,313,719,689	$2,777,622,781	$1,385,860,170	$5,477,202,640
Water						
Commercial	0	0	$0	$0	$0	$0

Liquefaction Susceptibility Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Estimated Contents Value	Total Value
Houses of Worship	0	0	$0	$0	$0	$0
Municipal	0	0	$0	$0	$0	$0
Parks / Open Space	1	0	$0	$0	$0	$0
Residential	0	0	$0	$0	$0	$0
Schools	0	0	$0	$0	$0	$0
Vacant	0	0	$0	$0	$0	$0
Water Total	**1**	**0**	**$0**	**$0**	**$0**	**$0**
Grand Total	**4,009**	**3,743**	**$1,337,493,271**	**$2,824,428,872**	**$1,411,183,748**	**$5,573,105,891**

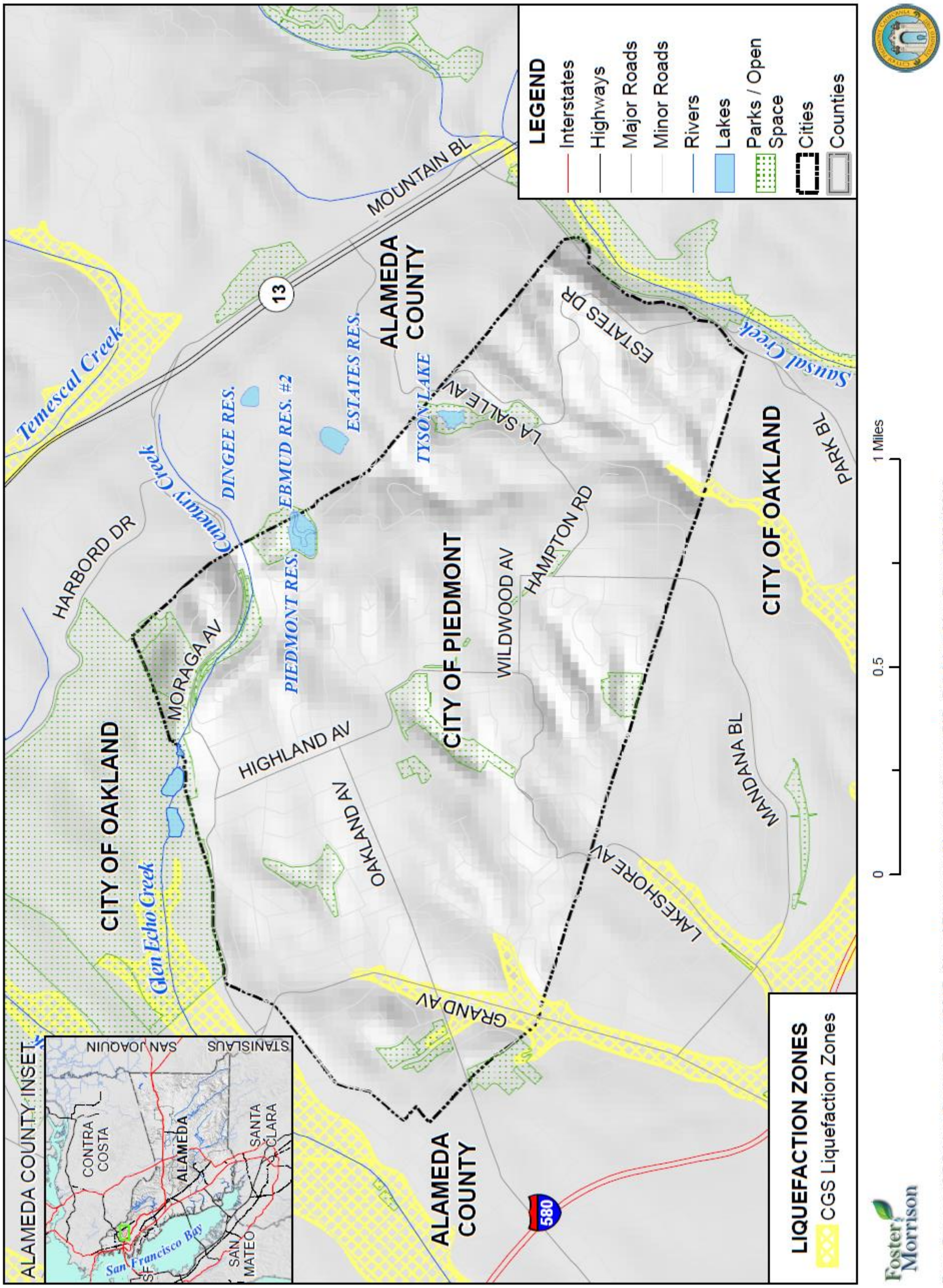
Source: USGS, Piedmont 6/19/2018 Parcel/Assessor's Data

Values at Risk Results: Liquefaction Zones

CGS Liquefaction Zones

The CGS liquefaction zones were overlaid with the Piedmont parcel layer in GIS to obtain results. In a similar analysis process, if the liquefaction zones intersected a parcel centroid, the entire parcel was considered to be in the liquefaction zones. The parcels were segregated and analyzed in this fashion for the Piedmont Planning Area. Once completed, the parcel boundary layer was joined to the centroid layer and values were transferred based on the identification number in the Assessors database and the GIS parcel layer. Areas of liquefaction are shown in Figure 4-53. Table 4-53 illustrates the potential estimated damages to Piedmont from liquefaction, including FEMA contents replacement values as previously described. Table 4-54 breaks down Table 4-53 to show potential damages by property use type in the City.

Figure 4-53 Piedmont – CGS Liquefaction Zones



Data Source: CGS Liquefaction Zones 2015, City of Piedmont, Alameda County GIS, Cal-Atlas; Map Date: 10/01/2018.

Table 4-53 City of Piedmont – Count and Value of Parcels in CGS Liquefaction Zones

Liquefaction Susceptibility Zone	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Estimated Contents Value	Total Value
Inside Liquefaction Zone						
Total	91	80	$19,118,762	$35,785,165	$19,813,116	$74,717,043
Outside Liquefaction Zone						
Total	3,918	3,663	$1,318,374,509	$2,788,643,707	$1,391,370,633	$5,498,388,849
Grand Total	**4,009**	**3,743**	**$1,337,493,271**	**$2,824,428,872**	**$1,411,183,748**	**$5,573,105,891**

Source: CGS, Piedmont 6/19/2018 Parcel/Assessor's Data

Table 4-54 City of Piedmont – Count and Value of Parcels in CGS Liquefaction Zones by Property Use

Liquefaction Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Estimated Contents Value	Total Value
Inside Liquefaction Zone						
Commercial	8	4	$3,765,350	$3,841,066	$3,841,066	$11,447,482
Houses of Worship	1	0	$0	$0	$0	$0
Municipal	0	0	$0	$0	$0	$0
Parks / Open Space	1	0	$0	$0	$0	$0
Residential	79	76	$15,353,412	$31,944,099	$15,972,050	$63,269,561
Schools	0	0	$0	$0	$0	$0
Vacant	2	0	$0	$0	$0	$0
Inside Liquefaction Zone Total	**91**	**80**	**$19,118,762**	**$35,785,165**	**$19,813,116**	**$74,717,043**
Outside of Liquefaction Zone						
Commercial	6	2	$1,392,145	$1,044,703	$1,044,703	$3,481,551
Houses of Worship	10	2	$724,183	$2,532,185	$2,532,185	$5,788,553
Municipal	3	0	$0	$0	$0	$0
Parks / Open Space	22	0	$0	$0	$0	$0
Residential	3,813	3,653	$1,312,878,590	$2,775,587,489	$1,387,793,745	$5,476,259,824
Schools	6	0	$0	$0	$0	$0
Vacant	58	6	$3,379,591	$9,479,330	$0	$12,858,921

Liquefaction Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Estimated Contents Value	Total Value
Outside of Liquefaction Zone Total	**3,918**	**3,663**	**$1,318,374,509**	**$2,788,643,707**	**$1,391,370,633**	**$5,498,388,849**
Grand Total	**4,009**	**3,743**	**$1,337,493,271**	**$2,824,428,872**	**$1,411,183,748**	**$5,573,105,891**

Source: CGS, Piedmont 6/19/2018 Parcel/Assessor's Data

Population at Risk

A separate analysis was performed to determine population in liquefaction areas. Using GIS, the USGS and CGS liquefaction zone datasets were overlayed on the improved residential parcel data. Those parcel centroids that intersect an inundation area were counted and multiplied by the Census Bureau average household size for the City of Piedmont (2.58). Results were tabulated and are shown in Table 4-55. According to this analysis, for the City there is a population of 196 in the USGS moderate or above liquefaction zones, and 196 in the CGS liquefaction zones.

Table 4-55 City of Piedmont – Improved Residential Parcels and Population at Risk in USGS and CGS Liquefaction Zones

Jurisdiction	USGS Zones		CGS Zones (moderate or above)	
	Improved Residential Parcels	Population	Improved Residential Parcels	Population
City of Piedmont	76	196	76	196

Source: USGS, CGS; US Census Bureau 2010 Estimates, Piedmont 6/19/2018 Parcel/Assessor's Data

Critical Facilities at Risk

A separate analysis was performed on the critical facility inventory in the City of Piedmont to determine critical facilities in the USGS and CGS liquefaction zones. Using GIS, the USGS and CGS layers were overlayed on the City of Piedmont critical facility GIS layer. Figure 4-54 shows critical facilities in the USGS liquefaction zones. Table 4-56 details critical facilities by facility type and count by USGS liquefaction zone. Figure 4-55 shows critical facilities in the CGS liquefaction zones. Table 4-57 details critical facilities by facility type and count by USGS liquefaction zone. Details of critical facility definition, type, name and address in USGS and CGS liquefaction zones are listed in Appendix E.

Figure 4-54 City of Piedmont – Critical Facilities in USGS Liquefaction Susceptibility Zones

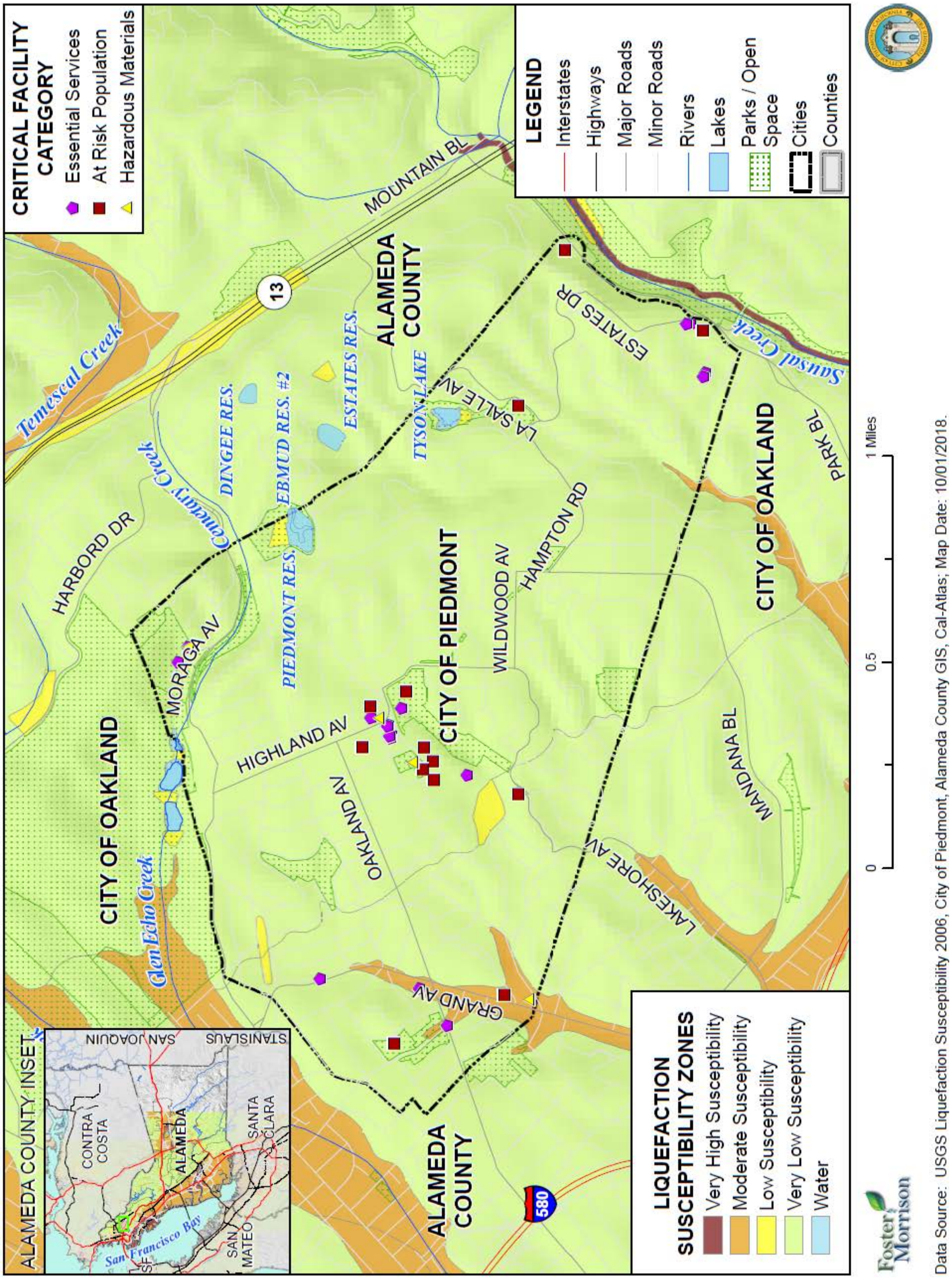


Table 4-56 City of Piedmont – Critical Facilities in USGS Liquefaction Susceptibility Zones

Liquefaction Zone / Critical Facility Category	Facility Type	Facility Count
Moderate Susceptibility		
Essential Services Facilities	Transportation Life System	1
	Utility	1
	Total	**2**
At Risk Population Facilities	School	1
	Total	**1**
Hazardous Materials Facilities	Gas Station	1
	Total	**1**
Inside Liquefaction Zone Total		**4**

Source: USGS, City of Piedmont GIS

Figure 4-55 City of Piedmont – Critical Facilities in CGS Liquefaction Zones

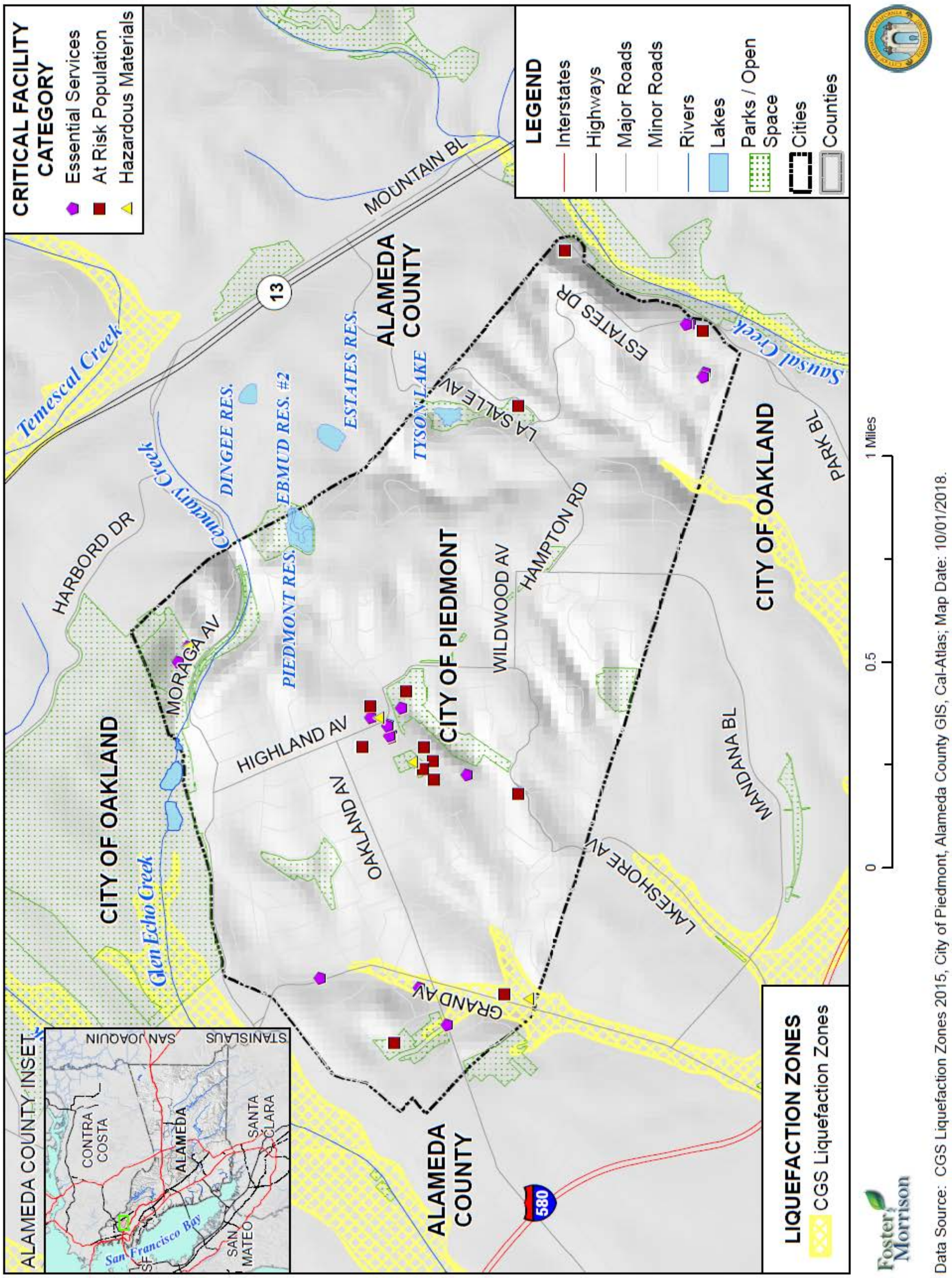


Table 4-57 City of Piedmont – Critical Facilities in CGS Liquefaction Zone

Liquefaction Zone / Critical Facility Category	Facility Type	Facility Count
Inside Liquefaction Zone		
Essential Services Facilities	Transportation Life System	1
	Utility	1
	Total	**2**
At Risk Population Facilities	School	1
	Total	**1**
Hazardous Materials Facilities	Gas Station	1
	Total	1
Inside Liquefaction Zone Total		**4**

Source: CGS, City of Piedmont GIS

Overall Community Impact

The overall impact to the community from earthquake induced liquefaction includes:

- Commercial and residential structural and property damage;
- Damage to natural resource habitats and other resources, such as timber and rangeland;
- Disruption of and damage to public infrastructure and services;
- Loss of water, power, roads, phones, and transportation, which could impact, strand, and/or impair mobility for emergency responders and/or area residents;
- Economic losses (jobs, sales, tax revenue) associated with loss of commercial structures;
- Loss of churches, which could severely impact the social fabric of the community;
- Loss of schools, which could severely impact the entire school system and disrupt families and teachers, as temporary facilities and relocations would likely be needed;
- Impact on the overall mental health of the community;
- Injury and loss of life; and
- Negative impact on commercial and residential property values.

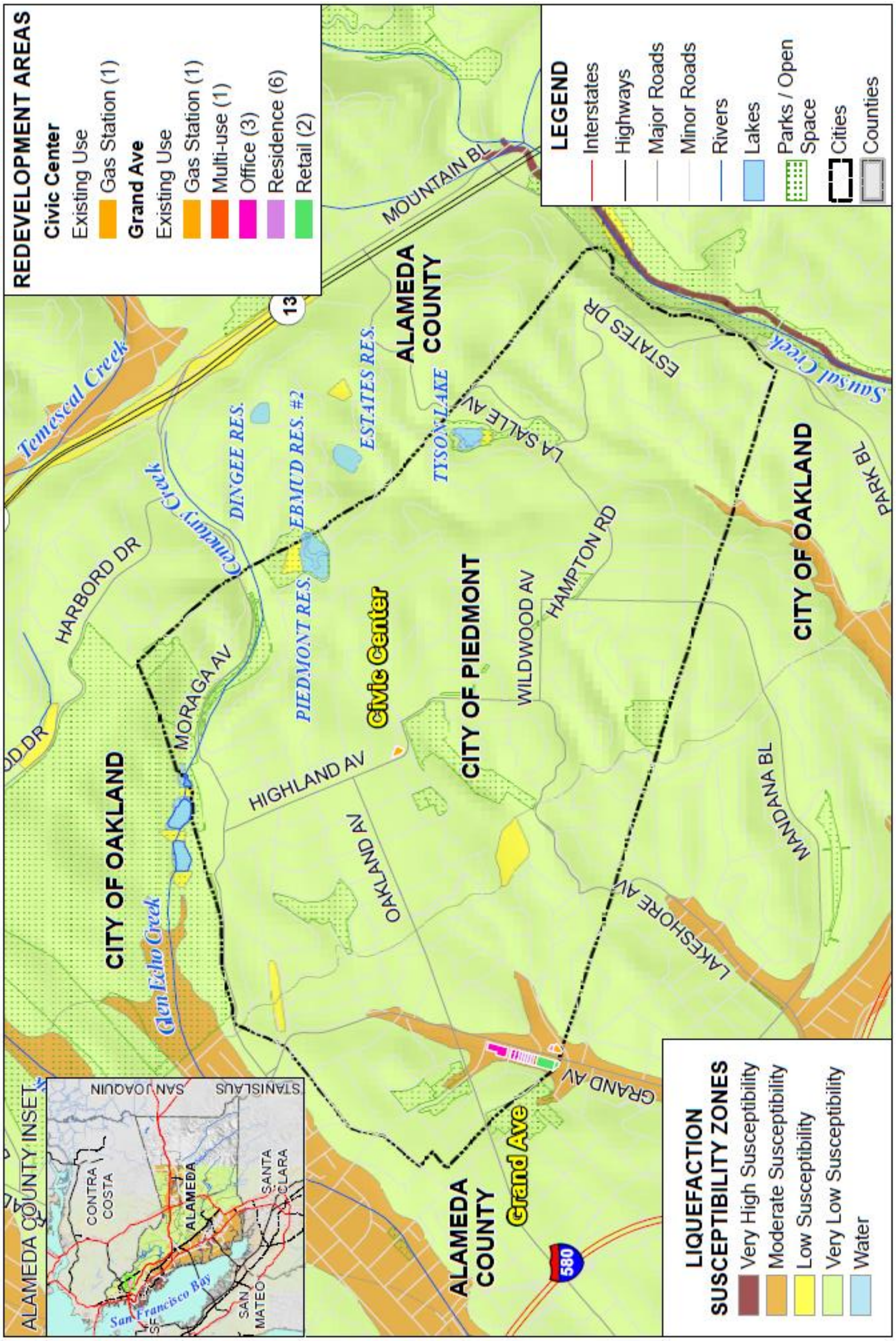
Future Development/Redevelopment

The City of Piedmont General Plan note that all construction and rehabilitation projects in Piedmont must conform to building codes which take seismic forces into account. The Building Code assigns a seismic design category (SDC) to each type of structure based on its occupancy, soil profile, acceleration parameters, and other factors. The SDC affects the type of structure that may be developed on a given site, as well its design, height, and detail requirements. Given the small amount of liquefaction area in the City and limited areas for development, future development is unlikely to be affected by liquefaction.

Future Development GIS Analysis

Possible future redevelopment areas for the City are broken out into two areas: Civic Center and Grand Avenue. GIS data is maintained by the City of Piedmont and was made available for this plan. An analysis was performed to quantify parcels within these areas that are also in USGS and CGS earthquake liquefaction zones. GIS was used to create a centroid, or point representing the center of the parcel polygon. Those parcels centroids that fall inside the possible future redevelopment areas and that were within the USGS liquefaction zones are shown on Figure 4-56 and detailed in Table 4-58. . Those parcels centroids that fall inside the possible future redevelopment areas and that were within the CGS liquefaction zones are shown on Figure 4-57 and detailed in Table 4-59.

Figure 4-56 City of Piedmont – Redevelopment Areas in USGS Liquefaction Zones



Data Source: USGS Liquefaction Susceptibility 2006, City of Piedmont, Alameda County GIS, Cal-Atlas; Map Date: 10/01/2018.

Table 4-58 City of Piedmont – Redevelopment Areas by USGS Liquefaction Zone by Existing Land Use

Liquefaction Zone / Redevelopment Areas / Existing Use	Total Parcel Count	Improved Parcel Count	Total Acres
Moderate Susceptibility			
Grand Ave			
Gas Station	1	1	0.18
Multi-use	1	1	0.11
Office	3	3	0.91
Residence	6	6	0.63
Retail	2	2	0.76
Grand Ave Total	**13**	**13**	**2.59**
Moderate Susceptibility Total	**13**	**13**	**2.59**

Source: City of Piedmont GIS, USGS

Figure 4-57 City of Piedmont – Redevelopment Areas in CGS Liquefaction Zones

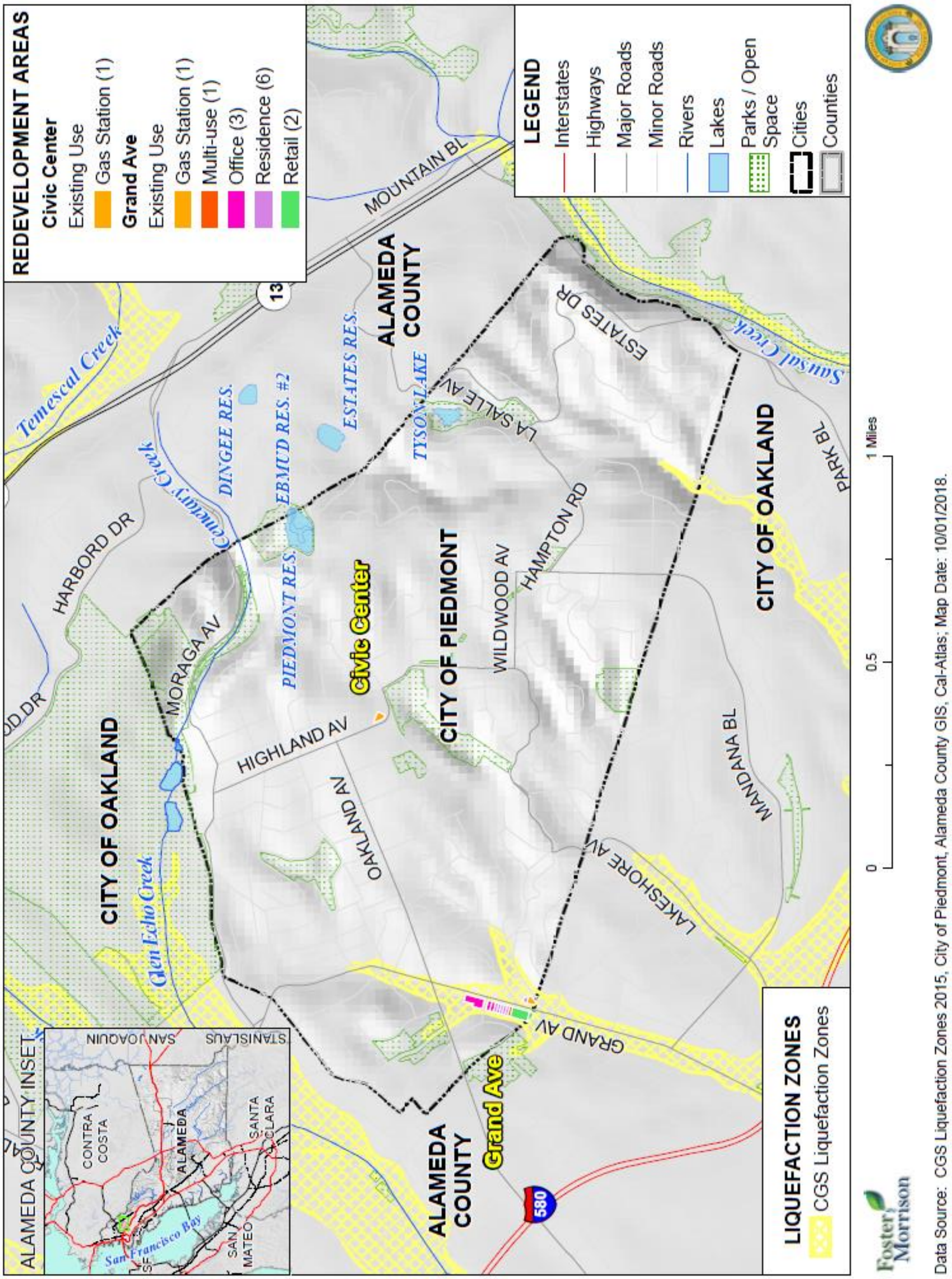


Table 4-59 City of Piedmont – Redevelopment Areas by CGS Liquefaction Zone by Existing Land Use

Liquefaction Zone / Redevelopment Areas / Existing Use	Total Parcel Count	Improved Parcel Count	Total Acres
Inside Liquefaction Zone			
Grand Ave			
Gas Station	1	1	0.18
Multi-use	1	1	0.11
Office	3	3	0.91
Residence	6	6	0.63
Retail	2	2	0.76
Grand Ave Total	**13**	**13**	**2.59**
Inside Liquefaction Zone Total	**13**	**13**	**2.59**

Source: City of Piedmont GIS, CGS

4.3.8. Flood: (1% and 0.2% Annual Chance) Vulnerability Assessment

Likelihood of Future Occurrence—Unlikely
Vulnerability—Low

Though a low priority hazard for the City of Piedmont, due to its significance in California, flood vulnerability is discussed in this Plan.

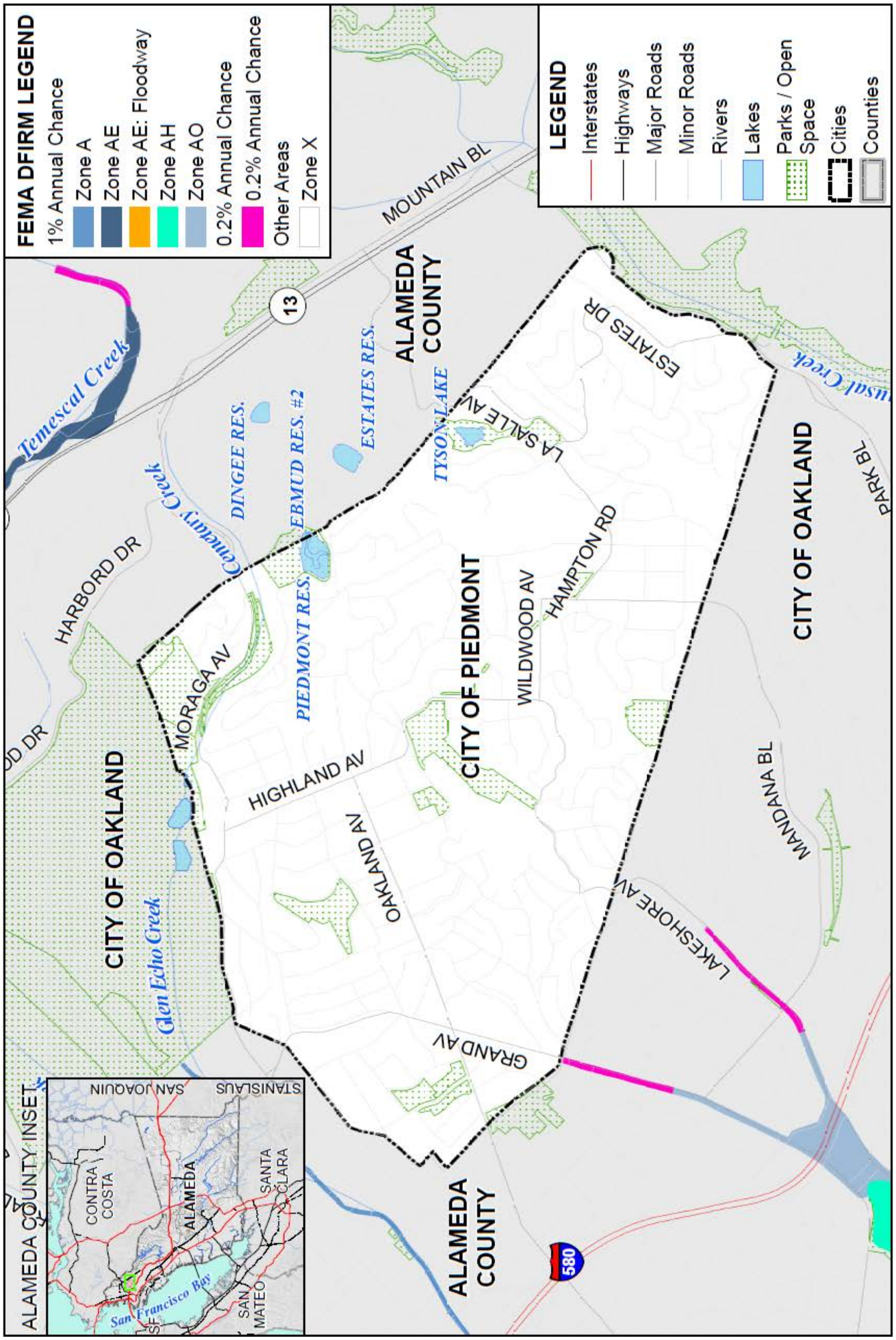
The City of Piedmont General Plan Environmental Hazards Element note that the maps published by the Federal Emergency Management Agency (FEMA) indicate the extent of flooding in the event of a 100-year storm (e.g., the "100-year flood plain"). Such a storm is defined as having a one percent chance of occurring in any given year. The extent of flooding is determined based on engineering and hydrologic studies that consider the capacity of streams, the extent of paved surfaces within watersheds, constraints to water movement (such as narrow culverts), and other factors.

There are no FEMA-designated 1% or 0.2% floodplains in Piedmont. The City's creeks carry relatively small volumes of runoff. Heavy rains may produce ponding around storm drains but these events are short in duration and do not typically cause property damage. The City adopted a floodplain ordinance in 2006, but its intent was to ensure continued eligibility for federal disaster relief funds rather than to address imminent flood hazards.

Total Values at Risk

The City of Piedmont has no FEMA 1% or 0.2% annual chance flood zones in the City. This can be seen in Figure 4-58. As such, no values are at risk in the City.

Figure 4-58 City of Piedmont – FEMA DFIRM Flood Hazard Zones



Data Source: FEMA Effective DFIRM 8/3/2009 (NFHL 8/16/2018 database), City of Piedmont, Alameda County GIS, Cal-Atlas; Map Date: 10/01/2018.
* No mapped FEMA floodplains within the City of Piedmont

Population at Risk

No improved residential parcels are located in a 1% or 0.2% annual chance flood zone.

Critical Facilities at Risk

No critical facilities are located in a 1% or 0.2% annual chance flood zone.

NFIP Insurance Analysis

The City of Piedmont joined the NFIP on November 15, 1979. The City does not participate in the CRS program. NFIP insurance data indicates that as of July 19, 2018, there were 24 policies in force in the City, resulting in $8,085,000 of insurance in force. All 24 policies are for residential parcels in the B, C, or X zones. There have been 3 closed paid losses totaling $10,217.37. Of the 3 claims, all claims were associated with pre-FIRM structures. There have been no substantial damage claims since 1978. There are no repetitive loss (RL) properties or severe repetitive loss (SRL) properties in the City.

Overall Community Impact

No improved or unimproved parcels are located in a 1% or 0.2% annual chance flood zone, so no community impact is expected.

Future Development/Redevelopment

Limited development is expected in the City, and no 1% or 0.2% annual chance flood zones exist. Future development is unlikely to be affected by 1% or 0.2% annual chance flood zone.

Future Development: GIS Analysis

No analysis on future development was performed, due to the fact that no 1% or 0.2% annual chance flood zones exist in the City.

4.3.9. Flood: Localized/Stormwater Vulnerability Assessment

Likelihood of Future Occurrence—Highly Likely
Vulnerability—Medium

Historically, the Piedmont Planning Area has been at risk to flooding primarily during the winter and spring months when heavy rainfall occurs. Localized flooding also occurs throughout the City at various times throughout the year with several areas of primary concern. In addition to flooding, damage to these areas during heavy storms includes pavement deterioration, washouts, landslides/mudslides, debris areas, and downed trees. The amount and type of damage or flooding that occurs varies from year to year, depending on the quantity of runoff. These areas and the types of damage were presented in Table 4-26.

The HMPC noted that heavy rains may produce ponding around storm drains but these events are short in duration and do not typically cause property damage. Impacts include damages to infrastructure, roads, bridges, and public property. Impacts to property and life safety would be low.

The HMPC also noted that localized flooding is a concern for East Bay Municipal Utility District wastewater systems. There is concern that excessive stormwater could overwhelm the stormwater system which would cause inundation of the wastewater system.

Future Development/Redevelopment

The risk of stormwater/localized flooding to future development can be minimized by accurate recordkeeping of repetitive localized storm activity. Mitigating the root causes of the localized stormwater or choosing not to develop in areas that often are subject to localized flooding will reduce future risks of losses due to stormwater/localized flooding. Due to the developed nature of the City, future development will not substantially alter the drainage pattern of the area, and will not substantially increase the rate of surface run-off that will cause flooding on or off site.

4.3.10. Landslide, Mudslides, Hillside Erosion, and Debris Flows Vulnerability Assessment

Likelihood of Future Occurrence—Likely
Vulnerability—Medium

Landslides in Piedmont include a wide variety of processes resulting in downward and outward movement of soil, rock, and vegetation. Common names for landslide types include slumps, rockslides, debris slides, lateral spreading, debris avalanches, earth flows, and soil creep. Although landslides are primarily associated with slopes greater than 15 percent, they can also occur in relatively flat areas and as cut-and-fill failures, river bluff failures, lateral spreading landslides, collapse of wine-waste piles, failures associated with quarries, and open-pit mines. Landslides may be triggered by both natural- and human-caused activity. Impacts from landslides include damage to property, critical facilities, transportation routes, and risk of injuries and death.

The City of Piedmont General Plan noted that landslides are relatively common in the East Bay Hills, especially during rainstorms of high intensity and long duration. They generally occur along the sides of ravines where surface water and groundwater are concentrated, or on deep-seated bedrock and steep slopes with weak or shallow soils. The risk of landslides increases when certain conditions are present, including hillsides that have been denuded by fire.

Total Values at Risk

The City of Piedmont identified two types of landslide zone studies of concern to the Planning Area: rainfall induced landslides and earthquake induced landslides. Rainfall induced landslide areas are areas which have been historically documented by the USGS to have experienced landslides, mudslides, or debris/earth flows and therefore have been considered to be potentially hazardous and at risk to property. Earthquake induced landslide zones determined by the CGS further identify zones where weak soil and/or rock may be present underneath a property and are considered to be in a seismic hazard zone prone to liquefaction and landslide activity during an earthquake event. The landslide vulnerability assessment focuses on understanding the potential impacts to Piedmont properties.

Methodology

Two landslide analyses were performed for the Piedmont Planning Area: a rainfall induced landslide areas and an earthquake induced landslide zone analysis.

Rainfall Induced Landslide Areas

The 1997 USGS Rainfall Induced Landslides: Principal Debris-Flow Source Areas data was obtained for the Piedmont Planning Area. The Alameda County parcel layer was used as the basis for the inventory of all parcels within Piedmont. GIS was used to overlay the landslide areas layer onto the parcel layer centroids, and where the landslide area intersected a parcel centroid, it was assigned with that landslide area for the entire parcel. Note that the value of the improved land is also included in the total of values at risk as the land itself is at risk to landslide.

According to the USGS data, it is often hard to identify exactly where shallow landslides and debris flows will occur. Instead, researchers use models to develop debris flow susceptibility maps that are, in turn, based on measurements of soil type and depth, and topographic slope and shape. Debris flow source area maps based on measured topographic parameters are available for the entire San Francisco Bay area (see San Francisco Bay Region Landslide Folio Part E – Map of debris-flow source areas in the San Francisco Bay Region, California - USGS Open File Report 97-745E) – these indicate areas with hazard potential for debris flows should seasonal cumulative rainfall and storm rainfall intensity thresholds be exceeded.

Earthquake Induced Landslide Zones

The 2016 CGS Seismic Hazard Zones/Earthquake Induced Landslide Zones data was obtained for the Piedmont Planning Area. The Alameda County parcel layer was used as the basis for the inventory of all parcels within Piedmont. GIS was used to overlay the landslide areas layer onto the parcel layer centroids, and where the landslide area intersected a parcel centroid, it was assigned with that landslide area for the entire parcel. Note that the value of the improved land is also included in the total of values at risk as the land itself is at risk to landslide.

The Earthquake Induced Landslide Zones data presents areas where landslides may occur during a strong earthquake. Three types of geological hazards, referred to as seismic hazard zones, may be featured on the map: 1) liquefaction, 2) earthquake-induced landslides, and 3) overlapping liquefaction and earthquake-induced landslides. In addition, a fourth feature may be included representing areas not evaluated for liquefaction or earthquake-induced landslides. Developers of properties falling within any of the three zones may be required to investigate the potential hazard and mitigate its threat during the local permitting process. This hazard layer relates State-mandated regulatory maps that show "Zones of Required Investigation" for landslide hazard areas. It does not depict different degrees of hazard, rather it identifies zones within which site specific studies will be required for new construction. This information is also used in real estate transactions where sellers of property within a "Zone of Required Investigation" must disclose that fact to prospective buyers.

Limitations

It should be noted that maps and analysis represent best available data. There have been past occurrences of landslides in areas not shown to be at risk to landslide. Generally, landslide risk maps detail areas prone to slope failure; the maps rarely include the runout areas where the failed slope will go.

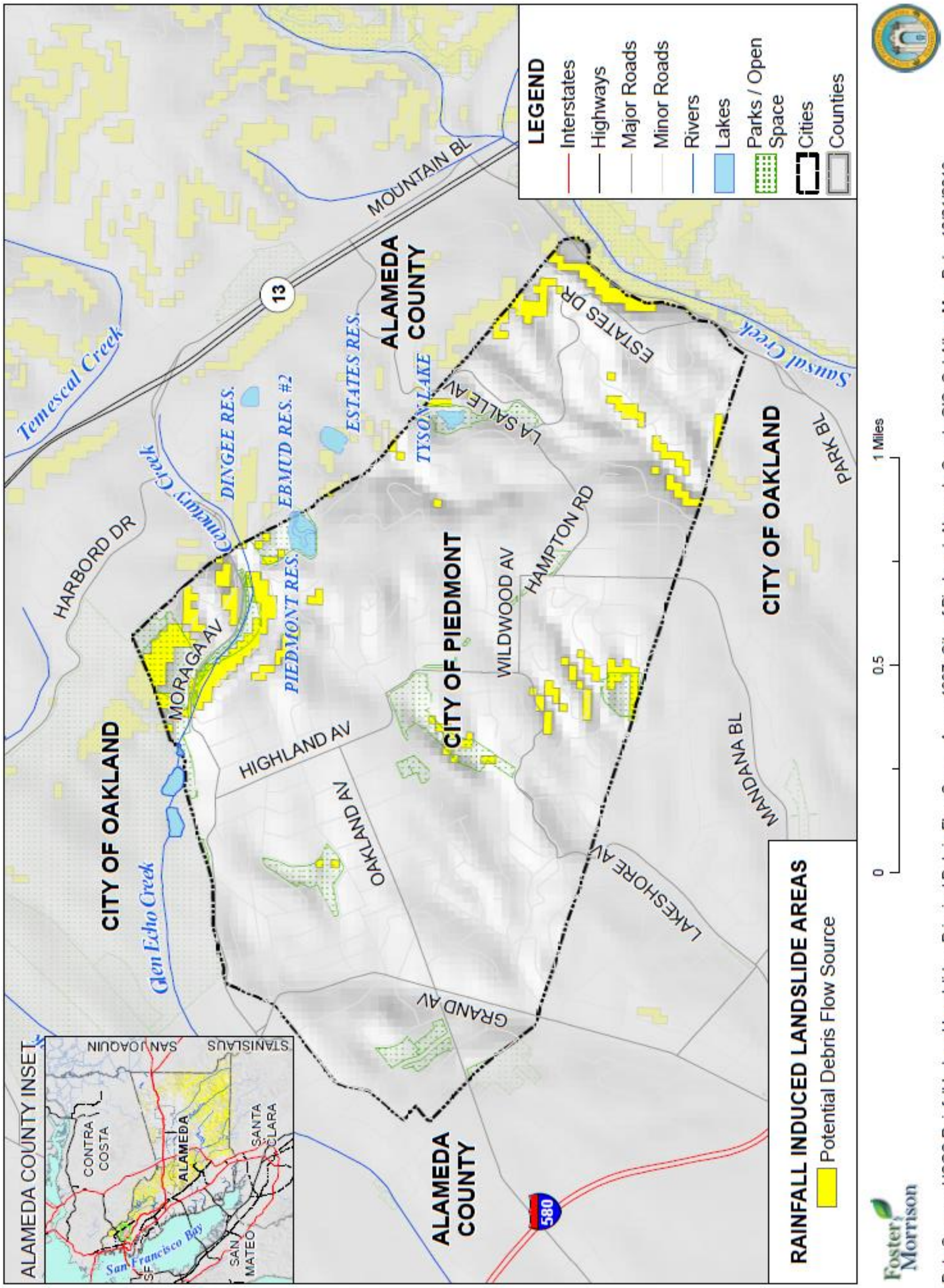
Although based on best available data, the resulting information should only be used as an initial guide to overall values in the City. In the event of a disaster, structures and other infrastructure improvements are at the greatest risk of damage. Depending on the type of hazard and resulting damages, the land itself may not suffer a significant loss. For that reason, the values of structures and other infrastructure improvements are of greatest concern. Also, it is critical to note a specific limitation to the assessed values data within the City, created by Proposition 13. Instead of adjusting property values annually, no adjustments are made until a property transfer occurs. As a result, overall property value information is significantly low and does not reflect current market or true potential loss values for properties within the City.

Values at Risk Results

Rainfall Induced Landslide Areas

The USGS landslide zones were overlaid with the City of Piedmont 2018 GIS parcel layer and the Alameda County Assessor data in GIS to obtain results. For the purposes of this analysis, if the rainfall induced landslide area intersected a parcel centroid, the entire parcel was considered to be in the rainfall induced landslide area. The parcels were segregated and analyzed in this fashion for the Piedmont Planning Area. Once completed, the parcel boundary layer was joined to the centroid layer and values were transferred based on the identification number in the Assessors database and the GIS parcel layer. Areas of rainfall induced landslide in the Piedmont Planning Area are shown in Figure 4-59. Table 4-60 illustrates the potential estimated damages to Piedmont from rainfall induced landslides, including FEMA contents replacement values as previously described.

Figure 4-59 City of Piedmont – Rainfall Induced Landslide Areas



Data Source: USGS Rainfall Induced Landslides: Principal Debris-Flow Source Areas 1997, City of Piedmont, Alameda County GIS, Cal-Atlas; Map Date: 10/01/2018.

Table 4-60 City of Piedmont – Count and Value of Parcels at Risk in the Rainfall Induced Landslide Areas

Landslide Area / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Estimated Contents Value	Total Value
Commercial	0	0	$0	$0	$0	$0
Houses of Worship	0	0	$0	$0	$0	$0
Municipal	0	0	$0	$0	$0	$0
Parks / Open Space	1	0	$0	$0	$0	$0
Residential	106	96	$31,322,208	$67,959,594	$33,979,797	$133,261,599
Schools	0	0	$0	$0	$0	$0
Vacant	14	3	$1,653,337	$5,963,228	$0	$7,616,565
Grand Total	**121**	**99**	**$32,975,545**	**$73,922,822**	**$33,979,797**	**$140,878,164**

Source: USGS, Piedmont 6/19/2018 Parcel/Assessor's Data

Earthquake Induced Landslide Areas

The CGS earthquake induced zones were overlaid with the Piedmont parcel layer in GIS to obtain results. In a similar analysis process, if the earthquake induced landslide zone intersected a parcel centroid, the entire parcel was considered to be in the earthquake induced landslide zone. The parcels were segregated and analyzed in this fashion for the Piedmont Planning Area. Once completed, the parcel boundary layer was joined to the centroid layer and values were transferred based on the identification number in the Assessors database and the GIS parcel layer. Areas of earthquake induced landslide zones are shown in Figure 4-60. Table 4-61 illustrates the potential estimated damages to Piedmont from earthquake induced landslides, including FEMA contents replacement values as previously described.

Figure 4-60 City of Piedmont – Earthquake Induced Landslide Areas

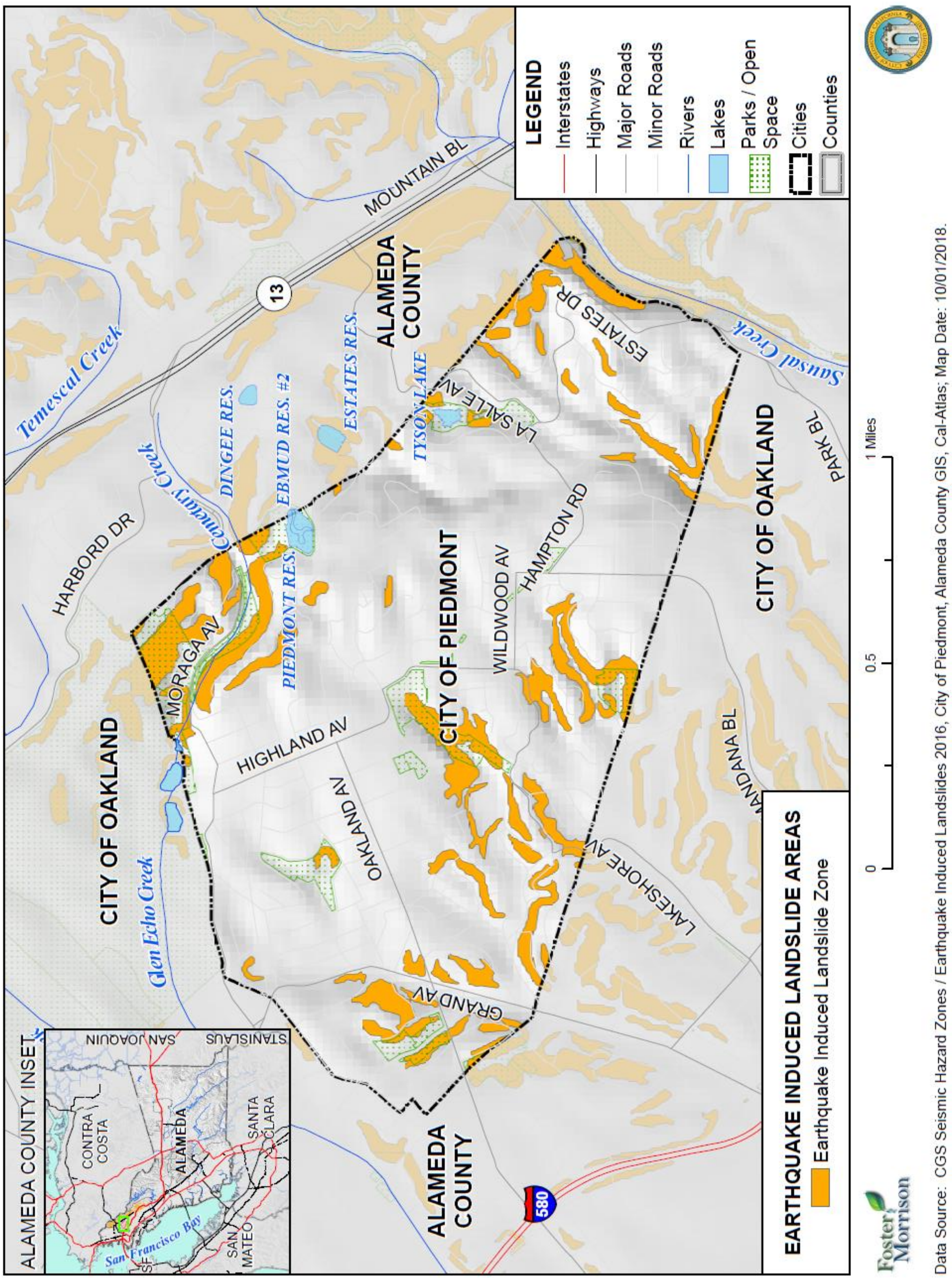


Table 4-61 City of Piedmont – Count and Value of Parcels at Risk in the Earthquake Induced Landslide Areas

Landslide Area / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Estimated Contents Value	Total Value
Earthquake Induced Landslide Area						
Commercial	0	0	$0	$0	$0	$0
Houses of Worship	1	1	$184,637	$1,235,191	$1,235,191	$2,655,019
Municipal	1	0	$0	$0	$0	$0
Parks / Open Space	5	0	$0	$0	$0	$0
Residential	468	439	$121,532,139	$255,309,678	$127,654,839	$504,496,656
Schools	1	0	$0	$0	$0	$0
Vacant	24	3	$1,653,337	$5,963,228	$0	$7,616,565
Grand Total	**500**	**443**	**$123,370,113**	**$262,508,097**	**$128,890,030**	**$514,768,240**

Source: USGS, Piedmont 6/19/2018 Parcel/Assessor's Data

Population at Risk

Those residential parcel centroids that intersect the landslide risk areas were counted and multiplied by the 2010 Census Bureau average household factors for the City (2.58). According to this analysis, there is a total population of 248 and 1,133 residents in Piedmont at risk in rainfall and earthquake induced landslide areas, respectively. This is shown in Table 4-62.

Table 4-62 City of Piedmont – Count of Improved Residential Parcels and Population at Risk by Rainfall and Earthquake Induced Landslide Areas

Landslide Area	Improved Residential Parcels	Population*
Rainfall Induced	96	248
Earthquake Induced	439	1,133
Total	**535**	**1,381**

Source: USGS, US Census Bureau 2010 Estimates, Piedmont 6/19/2018 Parcel/Assessor's Data

Critical Facilities at Risk

A separate analysis was performed on the critical facility inventory in the City of Piedmont to determine critical facilities in the rainfall and earthquake induced landslide areas. Using GIS, the USGS rainfall and CGS earthquake layers were overlayed on the City of Piedmont critical facility GIS layer. Figure 4-61 shows critical facilities in the USGS rainfall induced landslide areas. Table 4-63 details critical facilities by facility type and count by USGS rainfall induced landslide areas. Figure 4-62 shows critical facilities in the CGS earthquake induced landslide areas. Table 4-64 details critical facilities by facility type and count by USGS earthquake induced landslide areas. Details of critical facility definition, type, name and address in USGS rainfall induced and CGS earthquake induced landslide are listed in Appendix E.

Figure 4-61 City of Piedmont – Critical Facilities in USGS Rainfall Induced Landslide Areas

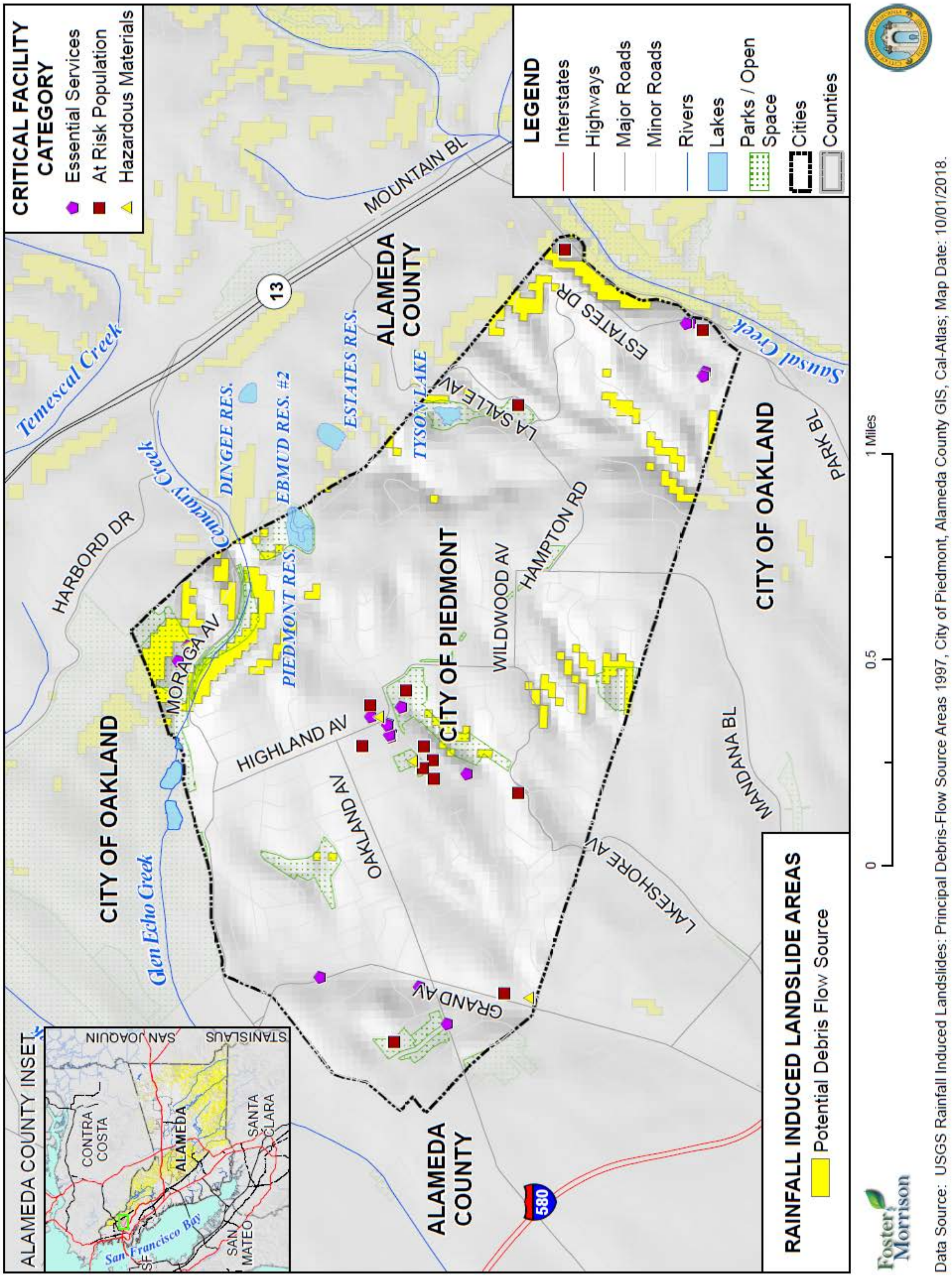


Table 4-63 City of Piedmont – Critical Facilities in USGS Rainfall Induced Landslide Areas

Landslide Area/ Critical Facility Category	Facility Type	Facility Count
Essential Services Facilities	Staging Facility	1
	Total	**1**
At Risk Population Facilities	Day Care Facility	1
	Total	**1**
Grand Total		**2**

Source: USGS, City of Piedmont GIS

Figure 4-62 City of Piedmont – Critical Facilities in CGS Earthquake Induced Landslide Areas

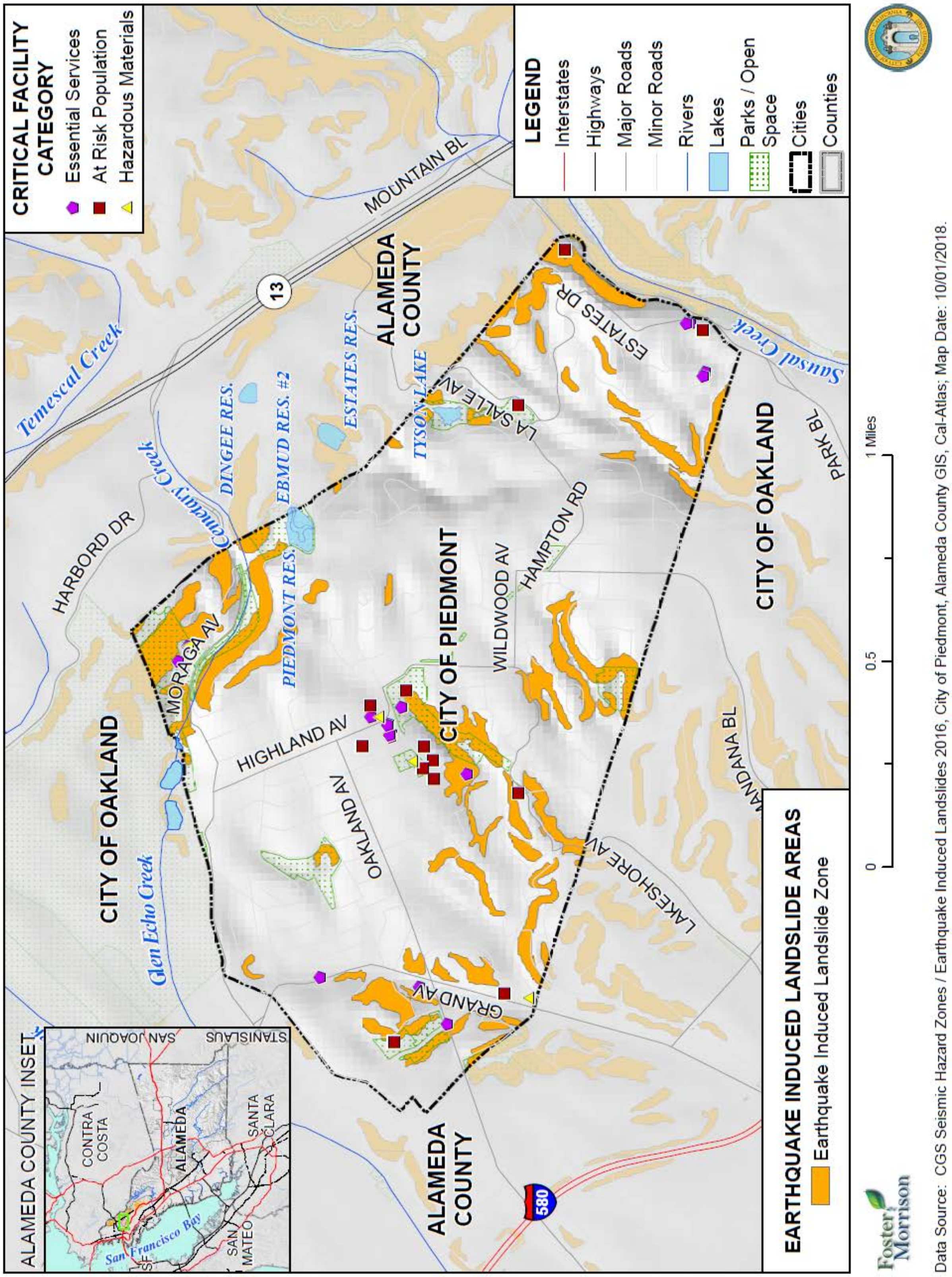


Table 4-64 City of Piedmont – Critical Facilities in CGS Earthquake Induced Landslide Zones

Landslide Zone / Critical Facility Category	Facility Type	Facility Count
Earthquake Induced Landslide Zone		
Essential Services Facilities	Communication	1
	Response Center	2
	Staging Facility	1
	Total	**4**
At Risk Population Facilities	Day Care / School	1
	Day Care Facility	1
	School	3
	Total	**5**
Hazardous Materials Facilities	Response Center	1
	Total	**1**
Grand Total		**10**

Source: CGS, City of Piedmont GIS

Overall Community Impact

Landslides, debris flows, and mud flow impacts vary by location and severity of any given event and will likely only affect certain areas of the Planning Area during specific times. Based on the risk assessment, it is evident that landslides may have potentially economic impacts to certain areas of the City. Impacts that are not quantified, but can be anticipated in large future events, include:

- Injury and loss of life;
- Commercial and residential structural and property damage;
- Disruption of and damage to public infrastructure, utilities, and services;
- Damage to roads/bridges resulting in loss of mobility;
- Significant economic impact (jobs, sales, tax revenue) to the community; and
- Negative impact on commercial and residential property values

Future Development/Redevelopment

Piedmont requires a soils report for development on sites with slopes exceeding 20 percent, and on any site—regardless of slope—for a new residence. The Municipal Code also includes subdivision regulations that require soil and geologic reports with any application for a tentative subdivision map. The Code includes requirements for grading, drainage, and erosion control to reduce the risk of landslides and slope failure.

Future Development GIS Analysis

The GIS analysis of future development/redevelopment areas determined that these areas lie outside of the mapped USGS and CGS landslide risk areas.

4.3.11. Severe Weather: Extreme Heat Vulnerability Assessment

Likelihood of Future Occurrence—Highly Likely
Vulnerability—Medium

Extreme heat happens in Piedmont each year. Limited data on temperature extreme impacts in the City Planning Area was available during the development of this hazard's profile. Extreme heat normally does not impact structures as there may be a limited number of days where the temperatures stay high which gives the structure periodic relief between hot and cool temperature cycles. Areas prone to excessively high temperatures are identified normally on a nation-wide assessment scale, which doesn't allow detailed results on specific structures. However, the HMPC did noted that more permits are being pulled for the installation of air conditioners in homes. The HMPC also noted that the population of those over 65, which are extremely vulnerable to sustained heat events, continues to grow. The City is considering developing a heat contingency plan and implementing the use of cooling centers.

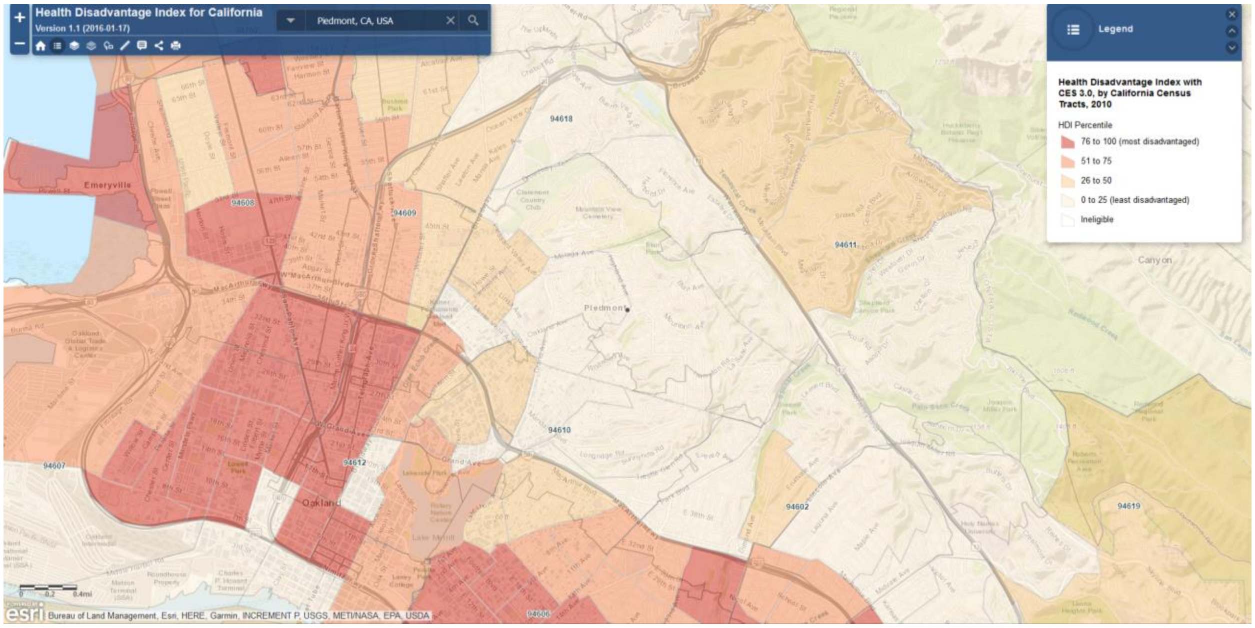
Recent research indicates that the impact of extreme temperatures, particularly on populations, has been historically under-represented. The risks of extreme temperatures are often profiled as part of larger hazards, such as severe winter storms or drought (see Section 4.3.4). However, as temperature variances may occur outside of larger hazards or outside of the expected seasons but still incur large costs, it is important to examine them as stand-alone hazards. Extreme heat may overload demands for electricity to run air conditioners in homes and businesses during prolonged periods of exposure and presents health concerns to individuals outside in the temperatures. Extreme heat may also be a secondary effect of droughts, or may cause drought-like conditions in a temporary setting. For example, several weeks of extreme heat increases evapotranspiration and reduces moisture content in vegetation, leading to higher wildfire vulnerability for that time period even if the rest of the season is relatively moist. Extreme heat and drought also make urban trees more vulnerable, which can cause issues during other severe weather events.

Vulnerable populations to extreme heat include:

- Homeless
- Infants and children under age five
- Elderly (65 and older)
- Individuals with disabilities
- Individuals dependent on medical equipment
- Individuals with impaired mobility

The Public Health Alliance has developed a composite index to identify cumulative health disadvantage in California. Factors such as those bulleted above were combined to show what areas are at greater risk to hazards like extreme heat. This is shown on Figure 4-63.

Figure 4-63 Health Disadvantage Index by California Census Tract



Source: Public Health Alliance of Southern California

In addition to vulnerable populations, pets are also at risk to extreme heat.

Future Development/Redevelopment

As the City shifts in demographics, more residents will become senior citizens. The residents of nursing homes and elder care facilities, as well as elderly individuals who live alone, are especially vulnerable to extreme temperature events. It is encouraged that such facilities generally have emergency plans or backup power to address power failure during times of extreme heat. Low income residents and homeless populations are also vulnerable.

4.3.12. Severe Weather: Heavy Rains and Storms Vulnerability Assessment

Likelihood of Future Occurrence—Highly Likely
Vulnerability—Medium

According to historical hazard data, severe weather is an annual occurrence in the City of Piedmont. Damage and disaster declarations related to severe weather have occurred and will continue to occur in the future. Heavy rain and are the most frequent type of severe weather occurrences in the City. Wind and lightning sometimes accompany these storms and have caused damage in the past. Heavy rain and storms can cause power outages and downed trees. The topography in the City makes storms a challenge. Many houses have sump pumps that are used during storms. Generally, everything drains to the lowest structure on the block. While damage to structures is limited, it is a constant battle to keep water out of homes. Hail is rare in the City.

Actual damage associated with the primary effects of severe weather has been limited. It is the secondary hazards caused by heavy rains and storms, such as localized floods that have had the greatest impact on the

City. The risk and vulnerability associated with these secondary hazards are discussed in other sections of this plan (Section 4.3.8 Flood: 1%/0.2% Annual Chance, Section 4.3.9 Flood: Localized Stormwater, and Section 4.3.2 Dam Failure).

Future Development/Redevelopment

New critical facilities should be built to withstand heavy rains and storms. While minimal damages have occurred to critical facilities in the past due to lightning, hail, or heavy rains, there still remains future risk. With some development occurring in the City, future losses may occur.

4.3.13. Severe Weather: High Winds Vulnerability Assessment

Likelihood of Future Occurrence—Highly Likely
Vulnerability—Medium

The City of Piedmont is subject to potentially destructive straight-line winds. High winds and diablo winds are common throughout the area and can happen during most times of the entire year. Tornadoes are less common, but can occur in any area of the City. Straight line and tornadoes winds are primarily a public safety and economic concern. Windstorms and tornadoes can cause damage to structures and power lines which in turn can create hazardous conditions for people. Debris flying from high wind or tornado events can shatter windows in structures and vehicles and can harm people that are not adequately sheltered.

Future losses from straight line winds and tornadoes include:

- Increased wildfire risk
- Erosion (soil loss)
- Downed trees
- Power line impacts and economic losses from power outages
- Occasional building damage, primarily to roofs

Outbuildings, "mother-in-low dwellings, and their occupants are particularly vulnerable as windstorm events in the region can be sufficient in magnitude to overturn these lighter structures. Overhead power lines are vulnerable and account for some historical damages. This is especially true for power lines running through very high Fire Severity Zones in the City. The greatest threat to the City from wind is not from damage from the winds themselves, but from the spread of wildfires during windy days.

Future Development/Redevelopment

Future development projects should consider windstorm hazards at the planning, engineering and architectural design stage with the goal of reducing vulnerability. Whether high winds will occur, where, when, and of what intensity are all factors that evolve over the days and hours before they form and after they do. Development trends in the City are not expected to increase vulnerability to the hazard.

4.3.14. Wildfire Vulnerability Assessment

Likelihood of Future Occurrence—Highly Likely
Vulnerability—High

Risk and vulnerability to the City of Piedmont from wildfire is of significant concern, with some areas of the Piedmont Planning Area being at greater risk than others as described further in this section. Fuel loads in the City and adjacent lands, along with geographical and topographical features, create the potential for both natural and human-caused fires that can result in loss of life and property. The threat of catastrophic wildfires under Diablo wind conditions presents significant risks and impacts to public health and safety, homes, and property along the wildland-urban interface. The hot and dry periods of late summer and fall in the Bay Area, the steep topography of the East Bay Hills, seasonal wind patterns, flammable vegetation, dense development patterns adjacent to parklands, and limited firefighting access all contribute to creating a substantial regional fire threat. The continued increase in development along the wildland-urban interface and sustained development of communities in and adjacent to open space areas also put an increasing number of people at risk from wildfires. The HMPC noted that the greatest threat to the City is from a fire coming from the Oakland Hills into the City of Piedmont. The HMPC also noted there are other fire problem areas around Moraga Avenue, and near Blair Park. The types of trees should be assessed along with their arrangement and maintenance practices following industry best practices.

Although the physical damages and casualties arising from wildfires may be severe, it is important to recognize that they also cause significant economic impacts by resulting in a loss of function of buildings and infrastructure. In some cases, the economic impact of this loss of services may be comparable to the economic impact of physical damages or, in some cases, even greater. Economic impacts of loss of transportation and utility services may include traffic delays/detours from road and bridge closures and loss of electric power, potable water, and wastewater services. Fires can also cause major damage to power plants and power lines needed to distribute electricity to operate facilities.

The City noted that there can be problems associated with the mitigation that PG&E performs to reduce wildfire risk. When PG&E cuts power for a regional high wind event during fire season, the water system for the City is impacted. The pumps that pressurize the water system lose power, which in turn causes issues with water from the fire hydrants. The water authority has a plan to supply the pumps with generators but they need to be brought to the pump sites and connected, which could take hours. This could cause issues with firefighting in the City.

The HMPC noted that an Oakland Hills-type fire is the City's worst wildfire concern. Under normal conditions, most fires that start in the East Bay Hills around Piedmont are efficiently controlled by firefighters with no loss of life or structures. Evacuation out of Piedmont neighborhoods is one of the biggest concerns. The HMPC noted that there is not much room for two way traffic, which can impede emergency vehicles and fire engines.

Communities at Risk to Wildfire

The National Fire Plan is a cooperative, long-term effort between various government agency partners with the intent of actively responding to severe wildland fires and their impacts to communities while ensuring sufficient firefighting capacity for the future. For purposes of the National Fire Plan, the California Department of Forestry and Fire Protection (CAL FIRE) generated a list of California communities at risk for wildfire. The intent of this assessment was to evaluate the risk to a given area from fire escaping off federal lands. Three main factors were used to determine the wildfire threat in the wildland-urban interface areas of California: fuel hazards, probability of fire, and areas of suitable housing density that could create wildland urban interface fire protection strategy situations. The preliminary criteria and methodology for evaluating wildfire risk to communities is published in the Federal Register, January 4, 2001.

The City of Piedmont is considered a Community at Risk.

Total Values at Risk

The City of Piedmont has mapped CAL FIRE data which provides a variety of fire hazard information for California communities. Utilizing this data from CAL FIRE, GIS was used to determine the possible impacts of wildfire within Piedmont and how the wildfire risk varies across the Planning Area. Two primary CAL FIRE datasets and associated analysis was used for this plan:

- Fire Responsibility Areas
- Fire Hazard Severity Zones

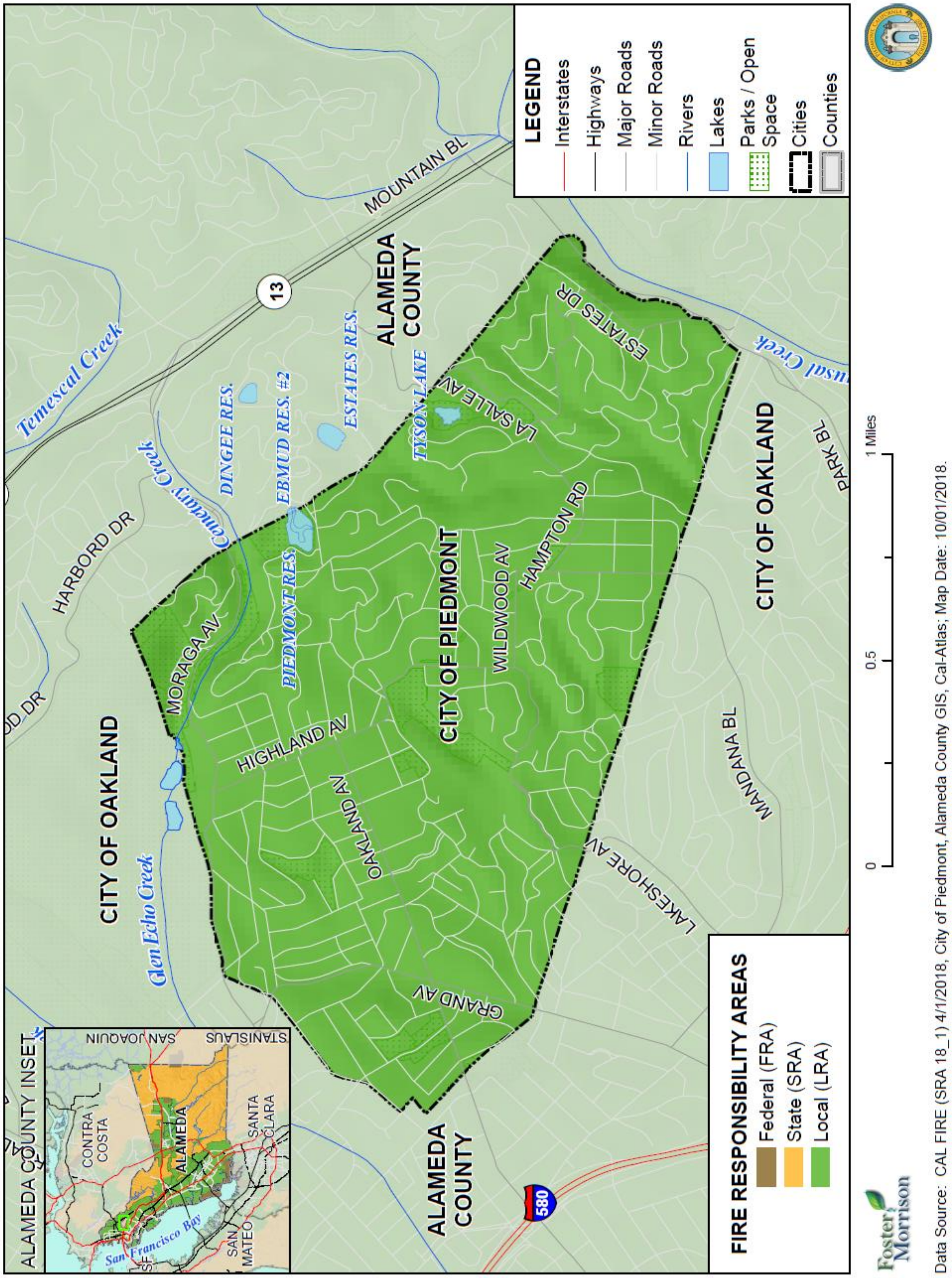
Fire Responsibility Areas

There are numerous wildland fire protection agencies that have responsibility statewide, Countywide, and Citywide, including the USDA Forest Service (FS), the Bureau of Land Management (BLM), and CAL FIRE. CAL FIRE has a legal responsibility to provide fire protection on all SRA lands, which are defined based on land ownership, population density and land use. There are also numerous fire departments and fire protection districts that serve local areas, many of whom have mutual aid agreements with each other as well as state and federal agencies for fire suppression and protection. Fire Responsibility areas are generally categorized by Federal Responsibility Areas (FRA), State Responsibility Areas (SRA) and Local Responsibility Areas (LRA). The Piedmont Planning Area falls entirely within the Local Responsibility Area.

Methodology

CAL FIRE's Fire Responsibility Area layer was used in this analysis to show Piedmont's FRA, SRA, and LRA areas. GIS was used to create a centroid, or point representing the center of the Piedmont parcel polygon. The FRA, SRA, LRA areas were then overlaid on the parcel centroids. For the purposes of this analysis, the wildfire responsibility area that intersected a parcel centroid was assigned for the entire parcel. The Piedmont Planning Area falls entirely within the Local Responsibility Area and is shown in Figure 4-64. All of the City's assets as shown in Table 4-37 in Section 4.3.1 are located in the Local Responsibility Area.

Figure 4-64 City of Piedmont – FRA, SRA, and LRA



Fire Hazard Severity Zone Analysis

As part of the Fire and Resource Assessment Program (FRAP), CAL FIRE was mandated to map areas of significant fire hazards based on fuels, terrain, weather, and other relevant factors. These zones, referred to as Fire Hazard Severity Zones (FHSZ), then define the application of various mitigation strategies to reduce risk associated with wildland fires.

Fire hazard is a way to measure the physical fire behavior so that people can predict the damage a fire is likely to cause. Fire hazard measurement includes the speed at which a wildfire moves, the amount of heat the fire produces, and most importantly, the burning fire brands that the fire sends ahead of the flaming front.

The fire hazard model developed by CAL FIRE considers the wildland fuels. Fuel is that part of the natural vegetation that burns during the wildfire. The model also considers topography, especially the steepness of the slopes. Fires burn faster as they burn up-slope. Weather (temperature, humidity, and wind) has a significant influence on fire behavior. The model recognizes that some areas of California have more frequent and severe wildfires than other areas. Finally, the model considers the production of burning fire brands (embers) how far they move, and how receptive the landing site is to new fires.

In 2007, CAL FIRE updated its Fire Hazard Severity Zone (FHSZ) maps for the State of California to provide updated map zones, based on new data, science, and technology that will create more accurate zone designations such that mitigation strategies are implemented in areas where hazards warrant these investments. The zones will provide specific designation for application of defensible space and building standards consistent with known mechanisms of fire risk to people, property, and natural resources. The program is still ongoing with fire hazard severity zone maps being updated based on designated responsibility areas: FRA, SRA, and LRA. New maps are due out in 2019.

Very High Fire Hazard Severity Zone Mapping

In addition to the mapping of FHSZs as described above, Government Code 51175-89 directs the CAL FIRE to identify areas of Very High Fire Hazard Severity Zones (VHFHSZ) within the LRA. Mapping of these VHFHSZ areas is based on data and models of potential fuels over a 30-50 year time horizon and their associated expected fire behavior, and expected burn probabilities to quantify the likelihood and nature of vegetation fire exposure (including firebrands) to buildings. Details on the project and specific modeling methodology can be found at http://frap.cdf.ca.gov/projects/hazard/methods.htm. The VHFHSZs will be used by building officials for new building permits in LRA. These zones will also be used to identify property whose owners must comply with natural hazards disclosure requirements at time of property sale and defensible space clearance requirements. The process of developing these maps involved an extensive local review process. Local government can add additional VHFHSZs.

The CAL FIRE data, detailing VHFHSZs within the Piedmont Planning Area, was utilized to determine the locations, numbers, types, and values of land and structures falling within these mapped areas. The following sections provide details on the methodology and results for this analysis.

Methodology

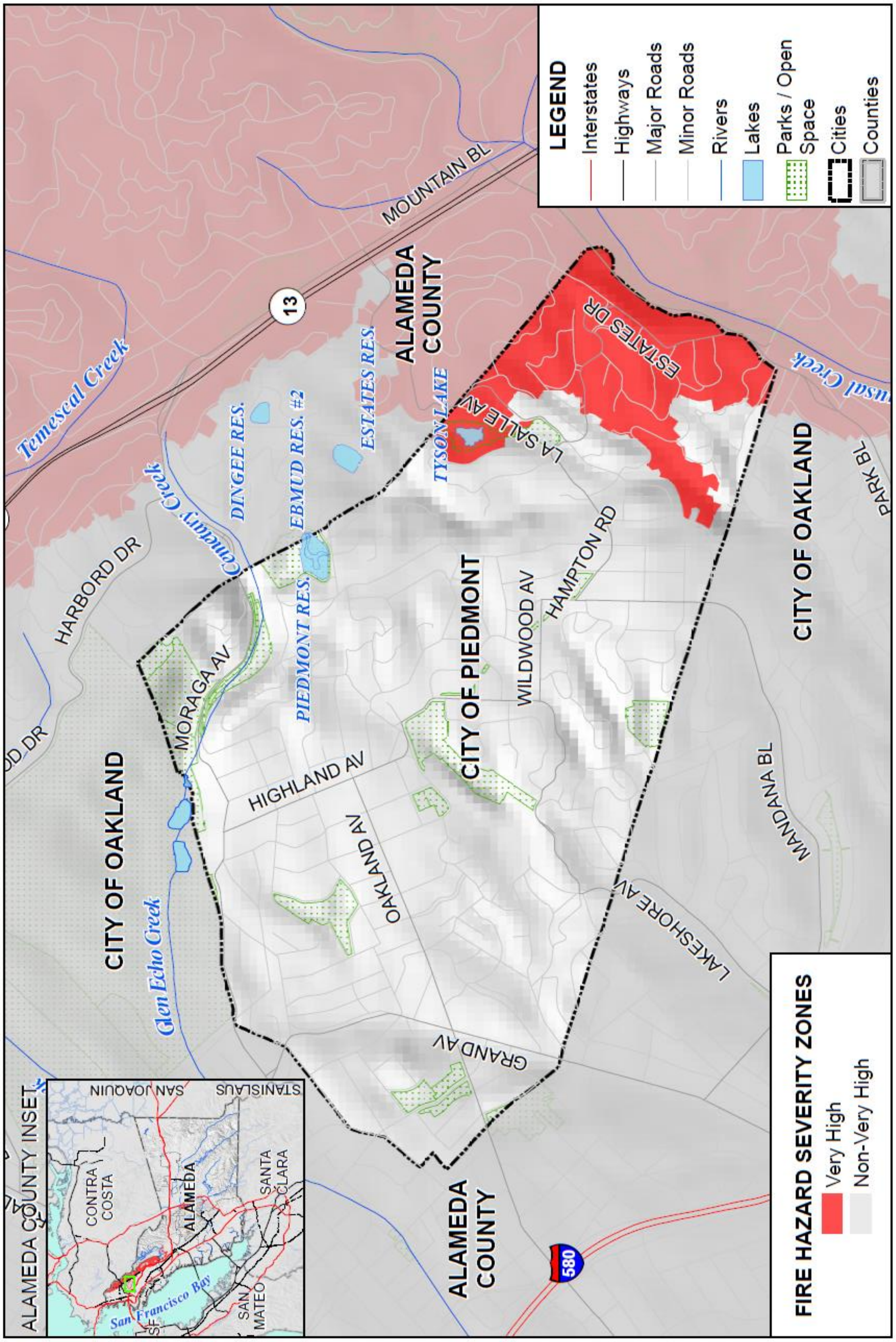
As previously described, CAL FIRE mapped the VHFHSZs, or areas of significant fire hazard, based on fuels, terrain, weather, and other relevant factors. Zones are designated with Very High and Non-Very High hazard categories. The Recommended LRA FHSZ (c1fhszl06_3) dated September 2008 layer was used to get a complete coverage of Fire Hazards for the City of Piedmont Planning Area.

Analysis was performed using the VHFHSZ dataset, and using GIS, the parcel layer was overlaid on these layers. Since it is possible for any given parcel to intersect with multiple categories for purposes of this analysis, the parcel centroid was used to determine which FHSZ to assign to each parcel. Once completed, the parcel boundary layer was joined to the centroid layer and values were transferred based on the identification number in the Assessor's database and the parcel layer. Based on this approach, the FHSZs for the Piedmont Planning Area were determined and further broken out by property use and included information on both land and improved values.

Very High Fire Hazard Severity Zones and Values at Risk

The City's Very High Fire Hazard Severity Zones are shown in Figure 4-65. Analysis results for the Piedmont Planning Area is summarized in Table 4-65, which summarizes by total parcel counts, improved parcel counts, and their improved and land values and the estimated contents replacement values based on the CRV factors detailed in Table 4-34.

Figure 4-65 City of Piedmont – Fire Hazard Severity Zones



Foster Morrison

Data Source: CAL FIRE (LRA Recommended 9/2008 c1fhszl06_3), City of Piedmont, Alameda County GIS, Cal-Atlas; Map Date: 10/01/2018.

Table 4-65 City of Piedmont – Count and Value of Parcels by Fire Hazard Severity Zone and Property Use

Fire Hazard Severity Zone / Property Use	Total Parcel Count	Improved Parcel Count	Total Land Value	Improved Structure Value	Estimated Contents Value	Total Value
Very High						
Commercial	0	0	$0	$0	$0	$0
Houses of Worship	4	1	$184,637	$1,235,191	$1,235,191	$2,655,019
Municipal	0	0	$0	$0	$0	$0
Parks / Open Space	3	0	$0	$0	$0	$0
Residential	314	293	$119,964,857	$269,496,760	$134,748,380	$524,209,997
Schools	0	0	$0	$0	$0	$0
Vacant	15	4	$2,083,254	$6,015,102	$0	$8,098,356
Very High Total	**336**	**298**	**$122,232,748**	**$276,747,053**	**$135,983,571**	**$534,963,372**
Non-Very High						
Commercial	14	6	$5,157,495	$4,885,769	$4,885,769	$14,929,033
Houses of Worship	7	1	$539,546	$1,296,994	$1,296,994	$3,133,534
Municipal	3	0	$0	$0	$0	$0
Parks / Open Space	20	0	$0	$0	$0	$0
Residential	3,578	3,436	$1,208,267,145	$2,538,034,828	$1,269,017,414	$5,015,319,387
Schools	6	0	$0	$0	$0	$0
Vacant	45	2	$1,296,337	$3,464,228	$0	$4,760,565
Non-Very High Total	**3,673**	**3,445**	**$1,215,260,523**	**$2,547,681,819**	**$1,275,200,177**	**$5,038,142,519**
Grand Total	**4,009**	**3,743**	**$1,337,493,271**	**$2,824,428,872**	**$1,411,183,748**	**$5,573,105,891**

Source: CAL FIRE, Piedmont 6/19/2018 Parcel/Assessor's Data

Population at Risk

A separate analysis was performed to determine population in fire hazard severity zones. Using GIS, the CAL FIRE Fire Hazard Severity Zones datasets were overlayed on the improved residential parcel data. Those parcel centroids that intersect each fire severity zone were counted and multiplied by the Census Bureau average household size (2.58) for the City; results were tabulated by jurisdiction and fire severity zone. According to this analysis shown in Table 4-66, there is a population of 756 in the very high fire hazard severity zone in the City.

Table 4-66 City of Piedmont – Improved Residential Parcels and Populations at Risk in Very High Fire Hazard Severity Zones

Fire Hazard Severity Zone	Improved Residential Parcels	Population
Very High	293	756
Total	**293**	**756**

Source: CAL FIRE, US Census Bureau, Piedmont 6/19/2018 Parcel/Assessor's Data

Critical Facilities at Risk

A separate analysis was performed on the critical facility inventory in the City of Piedmont to determine critical facilities in the Fire Hazard Severity Zones. Using GIS, the CAL FIRE Fire Hazard Severity Zones were overlayed on the City of Piedmont critical facility GIS layer. Figure 4-66 shows critical facilities by Fire Hazard Severity Zone. Table 4-67 details critical facilities by facility type and count by Fire Hazard Severity Zone. Details of critical facility definition, type, name and address in Fire Hazard Severity Zones are listed in Appendix E.

Figure 4-66 City of Piedmont - Critical Facilities in Fire Hazard Severity Zones

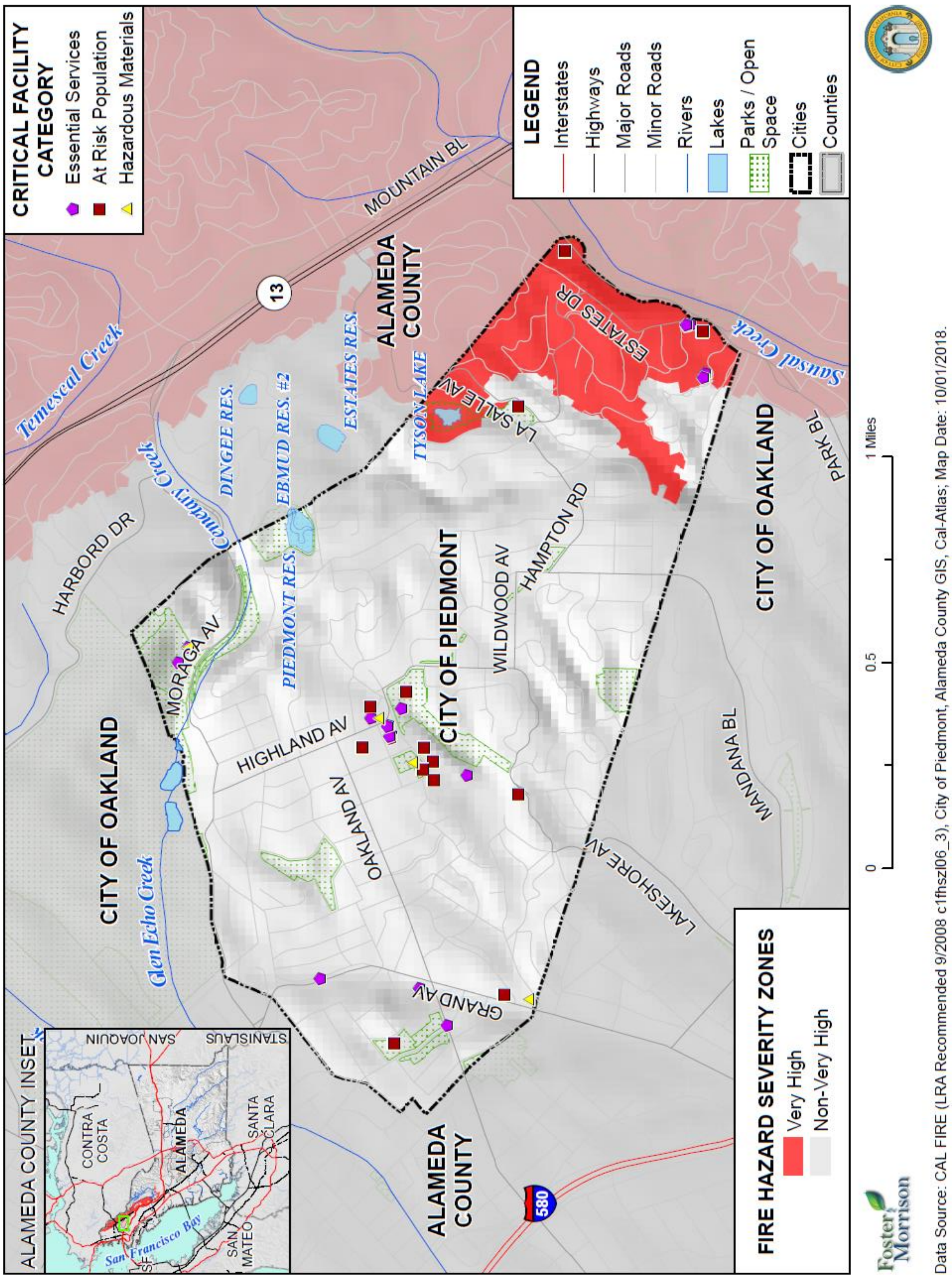


Table 4-67 City of Piedmont – Critical Facilities in Fire Hazard Severity Zones

Fire Hazard Severity Zone / Critical Facility Category	Facility Type	Facility Count
Very High		
Essential Services Facilities	Communication	2
	Transmission Towers	4
	Total	**6**
At Risk Population Facilities	Day Care / School	2
	Total	**2**
Very High Total		**8**

Source: CAL FIRE, City of Piedmont GIS

Overall Community Impact

The overall impact to the community from a severe wildfire includes:

- Injury and loss of life;
- Commercial and residential structural and property damage;
- Decreased water quality in area watersheds;
- Increase in post-fire hazards such as flooding, sedimentation, and mudslides;
- Damage to natural resource habitats and other resources;
- Loss of water, power, roads, phones, and transportation, which could impact, strand, and/or impair mobility for emergency responders and/or area residents;
- Economic losses (jobs, sales, tax revenue) associated with loss of commercial structures;
- Negative impact on commercial and residential property values;
- Air quality can be affected (both with local fires and with fires in the area – the fires in Butte County in 2018 caused air quality issues in the City and the greater Bay Area)
- Loss of churches, which could severely impact the social fabric of the community;
- Loss of schools, which could severely impact the entire school system and disrupt families and teachers, as temporary facilities and relocations would likely be needed; and
- Impact on the overall mental health of the community.

Future Development/Redevelopment

As previously stated, population growth in the City is expected to be minimal. However, the addition of ADUs on properties would add values at risk to wildfire. If homes are expanded and remodeled, additional values will be at risk to wildfires. The development of the few vacant parcels would add building density and to additional value in the City.

Future Development GIS Analysis

The GIS analysis of future development/redevelopment areas determined that these areas lie in the Non-Very High FHSZ.

4.4 Capability Assessment

Thus far, the planning process has identified the natural hazards posing a threat to the City Planning Area and described, in general, the vulnerability of the City to these risks. The next step is to assess what loss prevention mechanisms are already in place. This part of the planning process is the mitigation capability assessment. Combining the risk assessment with the mitigation capability assessment results in the City's net vulnerability to disasters, and more accurately focuses the goals, objectives, and proposed actions of this plan.

This section presents the City's mitigation capabilities and resources. These are in addition to, and supplement, the many plans, reports, and technical information reviewed and used for this LHMP Update as identified in Chapter 3 and in Chapter 4. Similar to the HMPC's effort to describe hazards, risks, and vulnerability of the City, this mitigation capability assessment describes the City's existing capabilities, programs, and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. This assessment is divided into four sections: regulatory mitigation capabilities are discussed in Section 4.4.1; administrative and technical mitigation capabilities are discussed in Section 4.4.2; fiscal mitigation capabilities are discussed in Section 4.4.3; and mitigation education, outreach, and partnerships are discussed in Section 4.4.4. A discussion of other mitigation efforts follows in Section 4.4.5.

4.4.1. City of Piedmont Regulatory Mitigation Capabilities

Table 4-68 lists planning and land management tools typically used by local jurisdictions to implement hazard mitigation activities and indicates those that are in place in the City. Excerpts from applicable policies, regulations, and plans and program descriptions follow to provide more detail on existing mitigation capabilities.

Table 4-68 City of Piedmont Regulatory Mitigation Capabilities

Plans	Y/N Year	Does the plan/program address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
General Plan	Y/2009	Contains Environmental Hazards chapter. The policies and actions include general mitigation measures.
Capital Improvements Plan	Y	Plan addresses hazards indirectly. No projects to add to this mitigation strategy and not usable to implement mitigation actions.
Economic Development Plan	N	
Local Emergency Operations Plan	Y	Plan addresses hazards. It is comprised of a general overview of hazards and not designed for project mitigation strategies. It is NIMS/SEMS based operations plan with a command structure for management of local events and disasters. Also has the continuity of government. Piedmont EOP is due to be updated in 2020.
Continuity of Operations Plan	Y	This is part of the EOP as described above.

Transportation Plan	Y/2014 Y/2009	The Pedestrian and Bicycle Master Plan was adopted in 2014 but it is not very useful as a hazard mitigation plan. Measures to increase the use of alternative modes of transportation in the Plan could cut down on the among of GHG emissions, which in turn would reduce the risks of climate change. The General Plan, adopted in 2009, includes a Transportation Element, but the only policy in it that hints at hazard mitigation is Policy 12.3 Emergency Vehicle Access.
Stormwater Management Plan/Program	Y	
Engineering Studies for Streams	N	
Community Wildfire Protection Plan	Y	Part of Alameda County CWPP
Other special plans (e.g., brownfields redevelopment, disaster recovery, coastal zone management, climate change adaptation)	Y/2017	Piedmont's Climate Action Plan 2.0 was adopted in 2017 and includes a section on adaptation. Projects are listed related to hazards and mitigation. The Pedestrian and Bicycle Master Plan was adopted in 2014 and included measures to increase the use of alternative modes of transportation in the Plan could cut down on the among of GHG emissions, which in turn would reduce the risks of climate change.
Building Code, Permitting, and Inspections	**Y/N**	**Are codes adequately enforced?**
Building Code	Y	Version/Year: 2016 CBC is strictly enforced.
Building Code Effectiveness Grading Schedule (BCEGS) Score		Score: Unknown
Fire department ISO rating:		Rating: Reconfirmed as 3.0. Issues preventing a 2.0 score include items related to water systems, dispatch, and auto aid agreements.
Site plan review requirements	Y	Adequately enforced
Land Use Planning and Ordinances	**Y/N**	**Is the ordinance an effective measure for reducing hazard impacts?** **Is the ordinance adequately administered and enforced?**
Zoning ordinance	Y	Adequately enforced.
Subdivision ordinance	Y	Adequately enforced.
Floodplain ordinance	Y	
Natural hazard specific ordinance (stormwater, steep slope, wildfire)	Y	City Code Chapter 30 is Stormwater Ordinance.
Flood insurance rate maps	Y	We have copy of map but no floodplains in City limits.
Elevation Certificates	N	Has not been necessary since no mapped floodplains in City.
Acquisition of land for open space and public recreation uses	N	Piedmont is built out.
Erosion or sediment control program	Y	May be part of stormwater or capital improvement programs
Other		
How can these capabilities be expanded and improved to reduce risk?		
Perhaps the building code could be modified to require retrofit upgrades to mitigate earthquake and wildfire hazards. Continue to evaluate enhancements and enforcement of existing building codes. Continue to maintain and update local planning efforts. Possible development of City-specific CWPP. Implement the mitigation actions identified in this LHMP.		

Source: City of Piedmont

As indicated in the tables above, Piedmont has several plans and programs that guide the City's mitigation of development of hazard-prone areas. Starting with the City of Piedmont General Plan, which is the most comprehensive of the City's plans when it comes to mitigation, some of these are described in more detail below.

City of Piedmont General Plan (2012)

A general plan is a legal document, required by state law, that serves as a community's "constitution" for land use and development. The plan must be a comprehensive, long-term document, detailing proposals for the "physical development of the county or city, and of any land outside its boundaries which in the planning agency's judgment bears relation to its planning" (Government Code §65300 et seq.). Time horizons vary, but the typical general plan looks 10 to 20 years into the future. The law specifically requires that the general plan address seven topics or "elements." These are land use, circulation (transportation), housing, conservation, open space, noise, and safety. The plan must analyze issues of importance to the community, set forth policies in text and diagrams for conservation and development, and outline specific programs for implementing these policies

Goals and policies related to mitigation from the General Plan are the following:

Goal 13: Natural Features	Protect and enhance Piedmont's natural features, including its hillsides, creeks, and woodlands.
Policy 13.1: Respecting Natural Terrain	Maintain the natural topography of Piedmont by avoiding lot splits and subdivisions that would lead to large-scale grading and alteration of hillsides. Planning and building regulations should ensure that any construction on steep slopes is sensitively designed and includes measures to stabilize slopes, reduce view blockage, and mitigate adverse environmental impacts.
Policy 13.2: Erosion Control	Reduce soil loss and erosion by following proper construction and grading practices, using retaining walls and other soil containment structures, and development control measures on very steep hillsides.
Policy 13.3: Creek Protection	Retain creeks in their natural condition rather than diverting them into manmade channels or otherwise altering their flow. Riparian vegetation and habitat along the city's creeks should be protected by requiring setbacks for any development near creek banks. These setbacks should be consistent with state and federal laws governing stream alteration.

Goal 18: Geologic Hazards	Minimize the loss of life, personal injury, and property damage resulting from earthquakes, landslides, unstable soils, and other geologic hazards.
Policy 18.1: Restricting Development on Unstable Sites	Permit development only in those areas where potential danger to the health, safety, and welfare of Piedmont residents can be adequately mitigated.
Policy 18.2: Seismic Design Standards	Maintain and enforce seismic design and construction standards which meet or exceed the standards established by the Building Code. Piedmont's Municipal Code should be periodically reviewed, updated, and amended to incorporate the most current knowledge and highest standards of seismic safety.
Policy 18.3: Infrastructure Reliability	Maintain road and infrastructure design standards which address geologic conditions in Piedmont, including the potential for earthquakes and landslides. Infrastructure should be retroffited where necessary to improve reliability during and after an earthquake.

Goal 18: Geologic Hazards	Minimize the loss of life, personal injury, and property damage resulting from earthquakes, landslides, unstable soils, and other geologic hazards.
Policy 18.4: Soil and Geologic Reports	Require site-specific soils reports and geologic studies in instances where development may be exposed to substantial geologic or seismic hazards, including ground shaking and landslides. Ensure that any identified hazards are appropriately mitigated.
Policy 18.5: Seismic Upgrades	Encourage the upgrading and reinforcement of homes, businesses, schools, and other public buildings to protect against future damage, injury, and loss of life in the event of a major earthquake. The City will encourage the mitigation of seismic deficiencies through bolting of structures to their foundations, lateral bracing of cripple walls, bracing of water heaters and potential falling objects, and similar measures. Structural hazards in public buildings should be mitigated based on the severity of risk and the type of occupancy.
Policy 18.6: Siting of Critical Facilities	Design and locate new critical facilities, including schools, municipal offices, disaster supply containers, and emergency shelters, in a manner which maximizes their ability to remain functional after a major earthquake.
Policy 18.7: Earthquake Safety Education	Provide earthquake safety information to citizens, property owners, and volunteer groups.

Goal 19: Wildfire and Flooding Hazards	Reduce exposure to wildfire, flooding, and other climate-related hazards
Policy 19.1: Reducing Fire Hazards	Maintain building and development regulations that minimize the potential for damage, injury, or loss of life due to fire. Where appropriate, this should include the use of fire-resistant building materials, fire sprinklers, noncombustible roofing materials, and other fire suppression and risk-reduction measures.
Policy 19.2: Fuel Management	Implement vegetation management programs which reduce the fuel load and potential for wildfire. This should include the removal of invasive fire-prone vegetation and the use of less flammable plants for landscaping, especially on hillside sites. Public education on "defensible space" and good vegetation management practices should be strongly promoted.
Policy 19.3: Fire-Fighting Water Flow	Ensure that Piedmont's water system remains adequate for fire-fighting purposes. As funding allows, undertake improvements for areas where capacity is determined to be deficient.
Policy 19.4: Fire Department Review of Development Applications	Ensure that the Piedmont Fire Department reviews proposed development applications to verify that response times will be acceptable, emergency access will be adequate, water supply and fire flow will be sufficient, vegetation clearances will be maintained, and appropriate construction materials will be used.
Policy 19.5: Keeping Flood Hazards Low	Maintain Piedmont's low potential for flooding through storm drain maintenance, preservation of creeks and drainage courses in their natural state, and periodic clearing of debris from storm drains and catchment basins. Ensure that new development does not increase the risk of off-site flooding, either in Piedmont or downstream in Oakland.
Policy 19.6: Managing Runoff	Ensure that runoff from individual properties is directed in a way that does not threaten adjacent properties. Runoff should be directed to places where it can be absorbed into the ground, detained in rain barrels or cisterns, or directed toward storm drains.

Goal 21: Emergency Preparedness	Ensure that the City, the School District, and Piedmont residents and businesses are prepared for natural and man-made disasters.
Policy 21.1: Preparedness and the Community	Recognize the importance of communication and full community engagement to the success of all emergency preparedness strategies.

Goal 21: Emergency Preparedness	Ensure that the City, the School District, and Piedmont residents and businesses are prepared for natural and man-made disasters.
Policy 21.2: Emergency Preparedness Plan	Use the Standardized Emergency Management System as the basis for emergency planning. The City will maintain an emergency preparedness plan that identifies a chain of command and outlines the actions to be taken in the event of a disaster.
Policy 21.3: Preparedness Education and Citizen Training	Promote and coordinate public education on earthquake hazards and emergency preparedness. The City will continue to implement programs that advise the public of preparedness and post-disaster recovery measures, and will encourage volunteer citizen participation in disaster response.
Policy 21.4: Intergovernmental Preparedness Planning	Cooperate with other cities, regional organizations, and other public agencies to undertake emergency preparedness planning.

Goal 37: Infrastructure	Provide water, sewer, storm drainage, energy, and telecommunication services in the most efficient, cost-effective, and environmentally sound manner possible.
Policy 37.1: Water and Sewer Investments	Provide sustained capital investment in Piedmont's water, sewer and storm drainage facilities to replace deteriorated components, enhance system performance and efficiency, ensure public safety, and improve environmental quality.
Policy 37.5: Storm Drainage Improvements	Monitor and assess the need for storm drainage improvements to ensure adequate system capacity and respond to Countywide Clean Water objectives.

Other City Plans/Studies/Programs

City of Piedmont Emergency Operations Plan (2015)

The City of Piedmont Emergency Operations Plan addresses the City's planned response to extraordinary emergency situations associated with natural disasters, technological incidents and national security emergencies in or affecting the City of Piedmont. This plan does not apply to normal day-to-day emergencies or the established departmental procedures used to cope with such emergencies. Rather, this plan focuses on operational concepts and would be implemented relative to large-scale disasters, which can pose major threats to life, property and the environment requiring unusual emergency responses.

This plan accomplishes the following:

- Establishes the Emergency Management Organization required to mitigate any significant emergency or disaster affecting the City of Piedmont.
- Identifies the roles and responsibilities required to protect the health and safety of Piedmont residents, public and private property and the environmental effects of natural, technological and human-caused emergencies and disasters.
- Establishes the operational concepts associated with a field response to emergencies, the City of Piedmont Emergency Operations Center activities and the recovery process.

City of Piedmont Climate Adaptation Plan 2.0 (2018)

Piedmont has been a leader in recognizing the need to address climate change and the need for local action. In 2017, Piedmont City Council passed a resolution expressing Piedmont's commitment to the goals of the

Paris Agreement and also approved joining the Global Covenant of Mayors. As a signatory, Piedmont is committed to creating an updated Climate Action Plan (CAP) and providing periodic progress reports in the form of GHG inventories that are made available to the public. This CAP, or CAP 2.0, provides this update to the City's 2010 plan and sets GHG emissions reduction targets consistent with California targets of 40% below 2005 levels by 2030 and 80% below 2005 levels by 2050. This reflects Piedmont's ongoing commitment to addressing climate change, building on past success, and supporting state efforts.

However, policies, regulations and actions taken outside of Piedmont will play a significant role in reducing Piedmont's GHG emissions. It is estimated that State and Federal actions will provide approximately 85% of the reductions needed and Piedmont will need to provide only the additional 15% necessary to meet the GHG reduction targets set out in this plan. Thus, Piedmont's influence on actions outside of the City's borders are at least as important for addressing climate change as actions taken within the City, particularly given the relatively limited amount of GHG emissions associated with a small, residential community. The one probable exception to this is the imbedded or lifecycle emissions associated with our community's consumption of goods and services, which given Piedmont's affluent residents, is relatively high.

CAP Objectives were developed in response to the results of Piedmont's GHG inventory. Measures were developed to support the objectives of the CAP and include action items the City and community can take to achieve their goals. CAP measures are focused on taking positive actions that are both accessible to all community members and economically beneficial. Actions include providing infrastructure for low carbon transportation and water conservation, incentivizing and requiring efficient building design, providing education on GHG emissions sources, and reducing climate hazards.

Alameda County Climate Change and Health Profile Report (2017)

The Climate Change and Health Profile Report seeks to provide a county-level summary of information on current and projected risks from climate change and potential health impacts. This report represents a synthesis of information on climate change and health for California communities based on recently published reports of state agencies and other public data.

The content of this report was guided by a cooperative agreement between CDPH and the CDC Climate-Ready States and Cities Initiative's program Building Resilience Against Climate Effects (BRACE). The goals of BRACE are to assist state health departments to build capacity for climate and health adaptation planning. This includes using the best available climate science to project likely climate impacts, identifying climate-related health risks and populations vulnerable to these impacts, assessing the added burden of disease and injury that climate change may cause, identifying appropriate interventions, planning more resilient communities, and evaluating to improve the planning effort. Communities with economic, environmental, and social disadvantages are likely to bear disproportionate health impacts of climate change.

This Climate Change and Health Profile Report is intended to inform, empower, and nurture collaboration that seeks to protect and enhance the health and well-being of all California residents. This report is part of a suite of tools that is being developed by the California Department of Public Health to support local, regional, and statewide efforts of the public health sector to build healthy, equitable, resilient, and adaptive communities ready to meet the challenges of climate change. Along with a county-level climate change and health vulnerability assessment and state guidance documents, such as Preparing California for Extreme Heat: Guidance and Recommendations, the profile provides a knowledge base for taking informed action to address climate change.

Alameda County Community Wildfire Protection Plan (2015)

Fire records for Alameda County document an active, damaging and costly fire history. There is little question that the area's unique ecology – particularly the topography, climate and vegetation – provides the setting for catastrophic fire to strike. While large-scale fires do not occur every year, fire incidents driven by extreme wind conditions have repeatedly been difficult to contain. Contemporary population growth leading to residential development in the wildland urban interface (WUI) along with the introduction and proliferation of exotic plant species exacerbates this problem by putting more people, property, critical infrastructure and natural resources in harm's way.

The scope of this Plan is Countywide and encompasses the following:

- Describes the fire environment of Alameda County.
- Identifies values at risk as defined by the stakeholders.
- Provides maps that show high fire hazard areas, as defined by Federal, State and local authorities.
- Establishes the rationale for prioritization of fuel management projects and treatment methods, as well as outlines principles for selection of projects when funding is available.
- Describes measures communities and homeowners can take to reduce the ignitability of structures.
- Identifies sources for Best Management Practices for fuel reduction treatments included in the plan.
- Identifies federal, state and local resources (fire, wildlife, regulatory agencies, landscape groups, etc.)
- Provides a progress update of activities throughout Alameda County.

City of Piedmont Storm Watch Protocol Program

The City through their storm watch protocol implements a variety of maintenance during the storm season. Street sweeping and drain cleaning is ongoing. Through their waste collector – Republic – they have established a gree waste recycling program. During high storm season, 4-5 compact dumpsters of compacted green waste are removed each day. The City of Piedmont Department of Public Works has a storm watch protocol. It is as follows.

Fall & Winter Storm Preparation & Operational Duties - Before Storm Event Preparations

Storm Sewer System

1. Vactor out all storm water catch basins (500+-) in October
2. Clean out Bubble Drain Basins
3. Hydro flush problematic storm drain lines

Sanitary Sewer System

Inspect 11 Sewer Creek Crossings to examining stability of trestle crossings that support the sanitary sewer pipe, as well as potential erosion risk at buttress ends. Also, tree canopy observed for potential tree fall zone intrusion into creek crossing trestle. Manhole access points cleared of vegetation and debris.

1. Lower Main Park
2. 89 Oak Rd
3. 178OakRd
4. 81 Wildwood Gardens
5. 5 Hampton Court
6. 27 Glen Alpine Rd
7. 61 Glen Alpine Rd
8. 109 St James Dr
9. 135 St James Dr
10. 280 Indian Rd
11. 25 Valant. Place

Trees - Parks

1. Inspect and if needed remove problematic park trees e.g., Monterey Pines in Main Park.

2. We inspect all large park trees after every heavy storm looking for issues that should be dealt with immediately.

Street Sweeping

1.Regularly scheduled street sweeping from September to February employing a minimum of 2 sweepers.

2. Extra street sweeping performed targeting leaf drop of specific trees

3. Inspect and provide as necessary any extra sweeping as needed prior to and after storm events to prevent Flooding in the streets

Creeks

1. Clean out every creek outflow area including every trash rack prior to storm events.

Emergency Vehicles & Equipment Maintenance

1. Bumper to bumper inspection and maintenance performed on every emergency response vehicle for readiness.

2. Inspect and repair all storm related equipment and sharpen chain saws,

Corporation Yard

1. Make and distribute sandbags. Deliver to elderly residents as requested. Create surplus and stockpile on pallets for availability to residents to pick up at the Corporation yard. (Last year the City made 2,500 in a 36 hour period.)

2. Initiate our Corporation Yard Storm Water Pollution Control Plan including covering the materials storage areas, covering all garbage and recycling bins, closing the wash down pad valve, and clearing out on-site storm drains.

During Storm Event Assignments

Storm Event Coordination

Prior to predicted storms, Public Works Director Chester Nakahara meets with Public Works Supervisor Dave Frankel as many times as necessary to assess risk factors of each storm, timing of predicted storms, and related personnel needs. Decisions are made regarding after-hours and overnight manpower needs. Dave Frankel oversees all team formation and assignments, contract maintenance coordination and assignments, and overall allocation of resources for emergency response as events warrant.

Hot Spot Patrol Team

A two (2) person team will be dedicated to handle the Hot Spot list. The Hot Spot list consists of known catch basin grates that are prone flooding if not monitored and cleared at a much higher frequency than all other areas during moderate to heavy rain events. If rains are heavy, this can occur on an hourly basis. If not monitored, local homes will be impacted. These following (22) locations make up our current Hot Spot list:

1. 201 Ricardo Ave.
2. Dracaena Park Dog Run Trail to A.rtlma Ave
3. 100 Lake - Beach School
4. 100 Ramona at Ronada intersection
5. Grand/ Oakland Ave
6. Grand/ Greenbank Ave.
7. Blair Ave. at the EBMUD Reservoir
8. Blair/ Alta Aves.
9. 800 Magnolia - PHS & PMS
10. 612 Magnolia Ave. - slot drain
11. Park Way at Monticello Ave
12. 340 Olive Ave.
13. 100 Hazel Lane
14. 146 Caperton Ave.
15. El Cerrito Gate-Piedmont High School
16. Oakland / Sunnyside Aves.
17. 100 Fairview Ave.
18. 1037 Ranleigh Way
19. Abbott Way
20. 54 St James Place
21. 150 St James Dr
22. Hillside Court

Hot Spot Patrol Team is to re-visit all identified hot-spots AFTER the storm has passed to clear any accumulated debris, assess damage, and identify if increased manpower or equipment is required for post-storm clean up.

Creek Patrol Team

A two (2) person team will be dedicated to handle the Creek Patrol duties. The duties of this team consists of monitoring and clearing out 11 creek inlets and 17 debris/trash racks during storm events. This can occur hourly depending on rainfall totals.

1. Main Park- 3 racks- Bushy Dell
2. 178 Oak Road. -7 racks - Wildwood Creek
3. 1143 Harvard Road- Wildwood Creek
4. 89 Oakmont Ave. -1 rack - Wildwood Creek
5. Hampton Sports Field -1 rack-Tyson Lake drainage
6. 61 Glen Alpine Road -2 racks- Indian Gulch Creek
7. 5 Hampton Court - 1 rack - Indian Gulch Creek
8. 3 Indian Gulch - 1 rack- Indian Gulch Creek
9. Spring Path - 1 rack- Glen Echo Creek
10. 101 Lexford Road -Drains to Trestle Glen
11. 25 Valant Place - Trestle Glen Creek

The Creek Patrol Team is to re-visit all identified locations AFTER the storm has passed to clear any accumulated debris, assess damage, and identify if increased manpower or equipment is required for post-storm clean up.

EMERGENCY RESPONSE TEAM

A two (2) person team will be dedicated to handle all random emergency calls from dispatch or Public Works, and generally be available to assist on an as-needed basis.

City of Piedmont Ordinances

Ordinances related to mitigation in the City of Piedmont are as follows:

Building Code (Chapter 5)

The following building codes are adopted by the City.

- The 2016 California Residential Code, California Code of Regulations, Title 24, Part 2.5, including Appendices K&V, prepared by the California Building Standards Commission, and as amended in sections 5.2 of this code, is hereby adopted by reference as the Piedmont Residential Code.
- The 2016 California Building Code of Regulations, Parts 1 and 2 of Title 24, including the California Building Code, Volumes 1 and 2 and Appendices D, F, G, H, I, & J, prepared by the California Building Standards Commission, and as amended in sections 5.4 of this code, is hereby adopted by reference as the Piedmont Building Code.

- The 2016 California Mechanical Code, Part 4 of Title 24 and its appendices, prepared by the California Building Standards Commission, is adopted by reference, subject to any changes, additions or deletions set forth in this chapter.
- The 2016 California Plumbing Code, Part 5 of Title 24, and its appendices, prepared by the California Building Standards Commission, is adopted by reference, subject to any changes, additions or deletions set forth in this chapter.
- The 2016 California Electrical Code, Part 3 of Title 24, and its annexes, prepared by the California Building Standards Commission, is adopted by reference, subject to any Building Code changes, additions or deletions set forth in this chapter.
- The 2016 California Energy Code, Title 24, Part 6 including all of its appendices is hereby adopted by reference.
- The 2016 California Green Building Standards Code, Title 24, Part 11 is hereby adopted by reference, subject to any changes, additions or deletions set forth in this chapter.
- The 2016 California Referenced Standards Code, Part 12 of Title 24, including all of its appendices is hereby adopted by reference.
- The 2016 California Administrative Code, Part 1 of Title 24, and its appendices, prepared by the California Building Standards Commission, is adopted by reference, subject to any changes, additions or deletions set forth in this chapter.
- The 2016 California Historical Building Code, Part 8 of Title 24, including all of its appendices is hereby adopted by reference.
- The 2016 California Existing Building Code Part 10, Title 24, and its appendices, prepared by the California Building Standards Commission, is adopted by reference, subject to any changes, additions or deletions set forth in this chapter.

Disasters and Emergencies (Chapter 5A)

The declared purposes of this chapter are to provide for the preparation and carrying out of plans for the protection of persons and property within this City in the event of any emergency, the direction of the emergency organization, and the coordination of the emergency functions of this City with all other public agencies, corporations, organizations and affected private persons.

It shall be the duty of the City Disaster Council, and it is hereby empowered, to develop and recommend for adoption by the City Council, emergency and mutual aid plans and agreements and such ordinances and resolutions and rules and regulations as are necessary to implement such plans and agreements. The disaster council shall meet upon call of the chairman or, in his absence from the City or inability to call such meeting, upon call of the vice-chairman.

The City Disaster Council shall be responsible for the development of the City emergency plan, which plan shall provide for the effective mobilization of all the resources of this City, both public and private, to meet any condition constituting a local emergency, state or emergency or state of war emergency, and shall provide for the organization, powers, and duties, services and staff of the emergency organization. Such plan shall take effect upon adoption by resolution of the City Council.

This Chapter 5A also includes the Floodplain Management Ordinance:

A development permit shall be obtained for all proposed construction or other development in the community, including the placement of manufactured homes, so that it may be determined whether such construction or other development is within flood-prone areas.

If a proposed building site is in a flood-prone area, all new construction and substantial improvements, including manufactured homes, shall:

- Be designed (or modified) and adequately anchored to prevent flotation, collapse or lateral movement of the structure resulting from hydrodynamic and hydrostatic loads, including the effects of buoyancy.
- Be constructed:
  - ✓ with materials and utility equipment resistant to flood damage;
  - ✓ using methods and practices that minimize flood damage;
  - ✓ with electrical, heating, ventilation, plumbing and air conditioning equipment and other service facilities that are designed and/or located so as to prevent water from entering or accumulating within the components during conditions of flooding.

Standards for Subdivisions or Other Proposed New Development. If a subdivision proposal or other proposed new development, including manufactured home parks or subdivisions, is in a flood-prone area, any such proposals shall be reviewed to assure that:

- All such proposals are consistent with the need to minimize flood damage within the floodprone area;
- All public utilities and facilities such as sewer, gas, electrical, and water systems are located and constructed to minimize or eliminate flood damage; and
- Adequate drainage is provided to reduce exposure to flood hazards.

Standards for Utilities.

- All new and replacement water supply and sanitary sewage systems shall be designed to minimize or eliminate:
  - ✓ infiltration of flood waters into the systems, and
  - ✓ discharge from the systems into flood waters.
- On-site waste disposal systems shall be located to avoid impairment to them, or contamination from them during flooding. (Ord. 665 N.S. 07/06)

Fire Prevention (Chapter 8)

The 2016 California Fire Code, based on the 2015 International Fire Code, as adopted and/or amended by the office of the California State Fire Marshal, including Appendices A through K, is hereby adopted by reference, subject to any changes set forth in the chapter. The Council, by resolution, may from time to time designate which edition of the California Fire Code is currently revised, and the edition so designated by Council resolution shall be the one referred to throughout this Code.

Fire hazard abatement in the City of Piedmont may be enforced pursuant to the California Fire Code or its successor codes.

Planning & Land Use (Chapter 17)

This chapter 17, Planning and Land Use, is also known as the zoning ordinance. The City of Piedmont consists primarily of unique single-family residences set among mature trees and other vegetation. The residents wish to:

- preserve the architectural heritage and beauty of the city's homes, the mature vegetation, the tranquility and privacy that now exist, and significant views;
- reduce on-street parking and traffic in the neighborhood streets and facilitate pedestrian and bicycle activity;
- avoid overcrowding and its detrimental effects on city schools and other services and facilities;
- preserve the city's historical heritage;
- preserve the existing stock of small homes and otherwise allow for a variety of housing types for all income levels, including single-family and multi-family dwellings;
- ensure excellence of architectural design, and compliance with the Piedmont Design Guidelines;
- allow retail, office, and service commercial uses that primarily serve city residents; and
- promote property improvements without sacrificing the goals already mentioned.

These zoning regulations are designed to implement these purposes.

The City Council shall adopt, and may from time to time, modify a general plan setting forth policies to govern the development of the City. Such plan may cover the entire City and all of its functions and services or may consist of a combination of plans governing specific functions and services or specific geographic areas which together cover the entire City and all of its functions and services. The plan shall also serve as a guide to Council action concerning such City planning matters as land use, development regulations and capital improvements.

The City of Piedmont is primarily a residential city, and the City Council shall have the power to establish a zoning system within the City as may in its judgment be most beneficial. The Council may classify and reclassify the zones established, but no existing zones shall be reduced or enlarged with respect to size or area, and no zones shall be reclassified without submitting the question to a vote at a general or special election. No zone shall be reduced or enlarged and no zones reclassified unless a majority of the voters voting upon the same shall vote in favor thereof; provided that any property which is zoned for uses other than or in addition to a single-family dwelling maybe voluntarily rezoned by the owners thereof filing a written document executed by all of the owners thereof under penalty of perjury stating that the only use on such property shall be a single-family dwelling, and such rezoning shall not require a vote of the electors as set forth above.

Zoning regulations apply to all land within the city, including land owned by the city and other local, state, or federal agencies to the extent allowed by law.

Subdivisions (Chapter 19)

The purposes of this chapter and any rules, regulations and specifications adopted under it are (1) to regulate and control the division of land within the city and (2) to supplement the State Subdivision Map Act concerning the design, improvement and survey data of subdivisions, the form and content of all required maps, and the procedure to be followed in securing the official approval of the city regarding the maps. The regulations in this chapter are necessary to implement the city's general plan and to preserve the public health, safety and general welfare.

The regulations in this chapter apply to the subdivision of land within the city and to the preparation, approval and filing of subdivision maps. If there is a conflict between this chapter and the State Subdivision Map Act, the Map Act prevails.

Storm Water Management and Discharge Control (Chapter 30)

The purpose of this Chapter is to ensure the future health, safety, and general welfare of Piedmont residents by:

- eliminating non-storm water discharges into the City's municipal storm drain system.
- controlling the discharge into the City's municipal storm drain system from spills, dumping or disposal of materials other than storm water.
- reducing pollutants in storm water discharges to the maximum extent practicable.

The intent of this ordinance is to protect and enhance the water quality in the City's watercourses, water bodies, and wetlands in a manner pursuant to and consistent with the Porter-Cologne Water Quality Control Act and the Federal Clean Water Act and any acts amendatory thereof or supplementary thereto.

4.4.2. City of Piedmont Administrative/Technical Mitigation Capabilities

Table 4-69 identifies the City personnel responsible for activities related to mitigation and loss prevention in the City.

Table 4-69 City of Piedmont Administrative/Technical Mitigation Capabilities

Administration	Y/N	Describe capability Is coordination effective?
Planning Commission	Y	Enforces zoning regulations, but there is no history of the Commission's review of hazard mitigation or prevention.
Mitigation Planning Committee	Y	Formed for this planning process.
Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems)	Y	Maintenance programs within the City are ongoing and effective. The City has a robust 24/7 drainage clearing program that limits issues associated with localized flooding. Tree trimming and other vegetation abatement activities occur as needed on an annual basis.
Mutual aid agreements	Y	Every year, the Alameda County Sheriff's Office, Office of Emergency Services sends out an Operational Area Agreement. The City participates with the County when appropriate. City also participates in the State Master Mutual Aid.
Other		

Staff	Y/N FT/PT	Is staffing adequate to enforce regulations? Is staff trained on hazards and mitigation? Is coordination between agencies and staff effective?
Chief Building Official	Y	Staffing is adequate and well trained in mitigation. Coordination is effective.
Floodplain Administrator	Y	Staffing is adequate since we have no floodplains. No training or coordination has been necessary because there are no floodplains in Piedmont
Emergency Manager	Y	Director of Emergency Services line of succession per municipal code: 1. City Administrator 2. Fire Chief 3. Police Chief or other department head
Community Planner	Y	Planning Director and staff are adequate for enforcement. Training could be useful. Fairly coordinated between agencies.
Civil Engineer	Y	Staffing is adequate and well trained in mitigation. Coordination is effective.
GIS Coordinator	Y	Staffing is adequate and well trained in mitigation. Coordination is effective.
Other		
Technical	**Y/N**	**Describe capability Has capability been used to assess/mitigate risk in the past?**
Warning systems/services (Reverse 911, outdoor warning signals)	Y	Alameda County (AC) Alert has been used to relay information regarding weather / air quality advisories. It has not been used in an emergency yet, however it has been used to locate missing persons. This system has reverse 911 capability as well as other methods of distributing emergency communications to residents and staff. This system is operational and is updated regularly.
Hazard data and information	Y	This information is available as part of the City's General Plan Safety Element, the City EOP, and as part of this LHMP.
Grant writing	Y	Either through staff or consultants
Hazus analysis	N	Will City staff does not have this capability, Earthquake scenarios were analyzed as part of this LHMP.
Other		
How can these capabilities be expanded and improved to reduce risk?		
Improve on grant identification and writing capabilities; consider a contract grant writer to support this effort city-wide. With establishment of HMPC for this planning effort, annual maintenance meetings should also evaluate the need for additional staff, cross-training, and/or working with other local agencies to continue to enhance staffing capabilities for emergency management and mitigation programs.		

Source: City of Piedmont

4.4.3. City of Piedmont Fiscal Mitigation Capabilities

Table 4-70 identifies financial tools or resources that the City could potentially use to help fund mitigation activities.

Table 4-70 City of Piedmont Fiscal Mitigation Capabilities

Funding Resource	Access/ Eligibility (Y/N)	Has the funding resource been used in past and for what type of activities? Could the resource be used to fund future mitigation actions?
Capital improvements project funding	Y	Facilities, parks and infrastructure improvements
Authority to levy taxes for specific purposes	Y	Requires 67% voter approval
Fees for water, sewer, gas, or electric services	Y	Piedmont receives utility users taxes that are used for general purposes.
Impact fees for new development	N	Piedmont doesn't have any impact fees currently.
Storm water utility fee	N	None
Incur debt through general obligation bonds and/or special tax bonds	Y	Available, but never used.
Incur debt through private activities	Y	Used to fund pension needs
Community Development Block Grant	Y	Piedmont is eligible for CDBG at around $22,000 annually
Other federal funding programs	N	Piedmont finds it impossible to compete for federal grant programs because if its size and the type of development.
State funding programs	Y	Used to fund street and parks related projects.
Other		
How can these capabilities be expanded and improved to reduce risk?		
The City will be more proactive in searching for funding sources for mitigation related activities.		

Source: City of Piedmont

4.4.4. City of Piedmont Mitigation Education, Outreach, and Partnerships

Table 4-71 identifies education and outreach programs and methods already in place that could be/or are used to implement mitigation activities and communicate hazard-related information.

Table 4-71 City of Piedmont Mitigation Education, Outreach, and Partnerships

Program/Organization	Yes/No	Describe program/organization and how relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	Y	Piedmont Connect is a local sustainability group that works on local issues. The City also has a Public Safety Committee that is focused on disaster preparedness and safety, and enhancement of neighborhood capabilities (i.e., Map your Neighborhood)
Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Y	The City currently has public educational programs that include: responsible water use, environmental education, City beautification program, stormwater management, and fire safety.
Natural disaster or safety related school programs	Y	The school does include safety related programs in their curriculum. Examples include the FICE Program – Fire Safety and Public Safety in schools.
StormReady certification	N	
Firewise Communities certification	N	
Public-private partnership initiatives addressing disaster-related issues	Y	The City has been successful partnering with the private sector. A primary example includes the private assistance in the seismic retrofitting of some school facilities.
Other		
How can these capabilities be expanded and improved to reduce risk?		
A multi-hazard public education program to include multi-media outreach and identification of local and regional partners as identified in the mitigation projects will contribute to the expansion of these above capabilities. Also need to identify additional staff and funding in order to implement and maintain these programs over the long term.		

4.4.5. Other Mitigation Efforts

The City has many other mitigation efforts that are being worked towards that have not been previously captured in this capability assessment. They are discussed in detail below by hazard.

Multi-Hazard

Roads must be sufficiently wide for emergency vehicles to reach the site of a fire or other emergency. Engineering standards in most California cities generally require at least 10-12 feet of lane width and two lanes in each direction on all streets (20-24 feet curb to curb). As noted in the City of Piedmont General Plan Transportation Element, some of the city's roads do not meet these standards. Because widening such roads is not feasible in most instances, the City implements parking restrictions and other requirements to keep such roads passable. Piedmont also maintains overhead clearances to keep local streets free of low hanging branches and other obstructions.

The County Fire/Sherriff and other neighboring fire/police have assisted the City on as needed projects in the past.

Earthquake

Piedmont is also working proactively to reduce seismic hazards in public assembly places, especially schools. In March 2006, Piedmont voters approved a bond measure which authorized the Piedmont Unified School District to sell up to $56 million in general obligation bonds to seismically retrofit buildings on its five campuses. In 2010, the District conducted seismic improvements and modernization projects: $56 million was spent on seismic retrofit and another $13 million modernization. 3 elementary schools have completed seismic retrofits, the high school seismic project is in process, and the middle school will be next.

The City is also coordinating with EBMUD and PG&E to retrofit water, sewer, and gas lines to minimize the service disruption that could occur after an earthquake. EBMUD is upgrading its entire East Bay water storage and conveyance system, improving post-earthquake fire fighting capacity, and ensuring the reliability of the drinking water supply. For its part, the City of Piedmont is exploring undergrounding of electric lines, in part to reduce hazards and outages from falling utility lines and power poles. The City's sewer replacement program also will help reduce the risk of failure during a major earthquake. Retrofits involved bracing the buildings wherein the foundation was tied to the roof through the walls to create an integrated system to resist the effects of multiple types of movement.

In addition, there is available to Piedmont the Earthquake Bracebolt project. This is seismic retrofit program for private residents. To date, 46 Piedmont residents have participated.

Wildfire

Piedmont also participates in the Alameda County Operational Area Emergency Management Organization, part of the standard emergency management system established after the Oakland Hills Fire. Its agreement with the organization ensures mutual aid assistance during emergencies, cooperative training and exercise, and sharing of resources. The City has Mutual Response Area (MRA) agreements with Oakland during the fire season. Piedmont also serves on an Operational Area Council that reviews and approves countywide disaster preparedness policies and programs.

Peakload water supply requirements refer to the water supply and pressure that would be needed to fight a major wildfire in the city. These requirements should be assessed city-wide in collaboration with EBMUD, and could be targeted for future improvements.

Fire safety considerations have influenced the placement of fire hydrants, the prioritization of capital improvements, and the approval process for new homes. Applications for new homes are typically reviewed by the Piedmont Fire Department to ensure adequate access and water supply.

Fuel reduction and vegetation management are high priorities in Piedmont. The Piedmont Fire Department enforces weed abatement regulations as outlined in City Ordinance #505, Chapter 6.1. These regulations aim to reduce the loss of life and property by controlling fuels that could cause or support wildfire.

Piedmont property owners are required to keep weeds and grass to within two inches of the ground, keep vacant lots cleared of debris, remove dead branches from trees and shrubs, remove piles of trimmings and trash, and keep roofs free of fallen branches. Homeowners on steep hillside lots must maintain a 100-foot buffer around any structure free of dry grass, brush and dead leaves. The requirement is 30 feet in non-hillside settings.

Other measures to reduce wildfire include requirements for noncombustible roofing, fire breaks, one-hour rated exterior walls, spark arresters on chimneys, sufficient clearance between structures, and firebreaks. Piedmont also requires fire sprinklers in new residential construction.

The Hills Emergency Forum is an emergency forum that meets locally to discuss fire issues in the City of Piedmont. Eucalyptus trees mitigation and vegetation cleanup are recent topics that have been discussed and addressed.

The City enforces protection requirements in the Piedmont building code for any new or rebuilt deck or porch. It was noted that the City used to require fire sprinklers in new homes in its building code. A few years ago the state building code started requiring fire sprinklers for all new homes so the City dropped that provision from its building code.

Chapter 5 Mitigation Strategy

Requirement §201.6(c)(3): [The plan shall include] a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs and resources, and its ability to expand on and improve these existing tools.

This section describes the mitigation strategy process and mitigation action plan for this 2019 City of Piedmont Local Hazard Mitigation Plan (LHMP). It describes how the City met the following requirements from the 10-step planning process:

- Planning Step 6: Set Goals
- Planning Step 7: Review Possible Activities
- Planning Step 8: Draft an Action Plan

5.1 Mitigation Strategy: Overview

The results of the planning process, the risk assessment, the goal setting, the identification of mitigation actions, and the hard work of the Hazard Mitigation Planning Committee (HMPC) led to the mitigation strategy and mitigation action plan for this LHMP.

Taking all of the above into consideration, the HMPC developed the following umbrella mitigation strategy for this LHMP:

- **Communicate** the hazard information collected and analyzed through this planning process as well as HMPC success stories so that the community better understands what can happen where and what they themselves can do to be better prepared.
- **Implement** the action plan recommendations of this Plan.
- **Use/enforce** existing rules, regulations, policies, and procedures already in existence.
- **Monitor** multi-objective management opportunities so that funding opportunities may be shared and packaged, and broader constituent support may be garnered.

5.1.1. Continued Compliance with NFIP

To participate in the National Flood Insurance Program (NFIP), a community must adopt and enforce floodplain management regulations that meet or exceed the minimum requirements of the Program. These requirements are intended to prevent loss of life and property and to reduce taxpayer's costs for disaster relief as well as minimize economic and social hardships that result from flooding. Participation in the NFIP provides a community with access to flood insurance.

Although the City of Piedmont does not have any areas mapped within the Special Flood Hazard Area (SFHA), the City still participates in the NFIP and has FEMA mapped floodplains and a flood ordinance. As such, an emphasis will be placed on continued compliance with the NFIP by the City of Piedmont. Detailed below is a description of the City's flood management program to ensure continued compliance with the NFIP. Also to be considered are the flood mitigation actions contained in this LHMP that support the ongoing efforts by the City to minimize the risk and vulnerability of the community to the flood hazard and to enhance their overall floodplain management program.

Piedmont's Flood Management Program

The City of Piedmont has participated in the Regular Phase of the NFIP since November 15, 1979. Since then, the City has administered floodplain management regulations that meet the minimum requirements of the NFIP. Under that arrangement, residents and businesses paid the same flood insurance premium rates as most other communities in the country.

The Community Rating System (CRS) was created in 1990. It is designed to recognize floodplain management activities that are above and beyond the NFIP's minimum requirements. If a community implements public information, mapping, regulatory, loss reduction and/or flood preparedness activities and submits the appropriate documentation to the FEMA, then its residents can qualify for a flood insurance premium rate reduction. The City does not currently participate in the CRS program, and with no areas of the City located within a 1% or 0.2% annual chance floodplain, future participation in CRS is unlikely as there are no identifiable benefits to the City from the CRS program.

Presently, the City manages its floodplains in compliance with NFIP requirements and implements a floodplain management program designed to protect the people and property of the City. Floodplain regulations are a critical element in local floodplain management and are a primary component in the City's participation in the NFIP. As well, the City's floodplain management activities apply to existing and new development areas, implementing flood protection measures for structures and maintaining drainage systems to help reduce the potential of flooding within the City.

The City will continue to manage their floodplains in continued compliance with the NFIP. An overview of the City's NFIP status and floodplain management program are discussed on Table 5-1.

Table 5-1 City of Piedmont NFIP Status

NFIP Topic	Comments
Insurance Summary	
How many NFIP policies are in the community? What is the total premium and coverage?	24 policies $9,277 annual premiums $8,085,000 insurance in force
How many claims have been paid in the community? What is the total amount of paid claims? How many of the claims were for substantial damage?	5 paid losses $14,784 0 substantial damage claims
How many structures are exposed to flood risk within the community?	0 improved residential parcels (1%) 0 improved residential parcels (0.2%)
Describe any areas of flood risk with limited NFIP policy coverage	No areas with limited policy coverage.
Community Floodplain Administration	
Is the Community Floodplain Administrator or NFIP Coordinator certified?	N

NFIP Topic	Comments
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	No floodplains, so no associate permit reviews have been performed.
What are the barriers to running an effective NFIP program in the community, if any?	None.
Compliance History	
Is the community in good standing with the NFIP?	Y
Are there any outstanding compliance issues (i.e., current violations)?	No
When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC)?	2/28/2018 CAC
Is a CAV or CAC scheduled or needed?	No
Regulation	
When did the community enter the NFIP?	11/15/1979
Are the FIRMs digital or paper?	Digital
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	Meet
Provide an explanation of the permitting process.	
Community Rating System (CRS)	
Does the community participate in CRS?	No
What is the community's CRS Class Ranking?	N/A
What categories and activities provide CRS points and how can the class be improved?	N/A
Does the plan include CRS planning requirements?	N/A

Source: FEMA/San Rafael

5.1.2. Integration of Mitigation with Post Disaster Recovery and Mitigation Strategy Funding Opportunities

Hazard Mitigation actions are essential to weaving long-term resiliency into all community and City recovery efforts so that at-risk infrastructure, development, and other City assets are stronger and more resilient for the next severe storm event. Mitigation measures to reduce the risk and vulnerability of a community to future disaster losses can be implemented in advance of a disaster event and also as part of post-disaster recovery efforts.

Mitigation applied to recovery helps jurisdictions become more resilient and sustainable. It is often most efficient to fund all eligible infrastructure mitigation through FEMA's Public Assistance mitigation program if the asset was damaged in a storm or other hazard event. Mitigation work can be added to project worksheets if they can be proven to be cost-beneficial. Integration of mitigation into post disaster recovery efforts should be considered by as part of post disaster redevelopment and mitigation policies and procedures.

The City's EOP, through its policies and procedures, seek to mitigate the effects of hazards, prepare for measures to be taken which will preserve life and minimize damage, enhance response during emergencies and provide necessary assistance, and establish a recovery system in order to return Piedmont to its normal state of affairs. Mitigation is emphasized as a major component of recovery efforts.

Mitigation Strategy Funding Opportunities

An understanding of the various funding streams and opportunities will enable the City to match identified mitigation projects with the grant programs that are most likely to fund them. Additionally, some of the funding opportunities can be utilized together. Mitigation grant pre- and post-funding opportunities include the following.

FEMA HMA Grants

Cal OES administers three main types of HMA grants: (1) Hazard Mitigation Grant Program, (2) Pre-Disaster Mitigation Program, and (3) Flood Mitigation Assistance Program. Eligible applicants for the HMA include state and local governments, certain private non-profits, and federally recognized Indian tribal governments. While private citizens cannot apply directly for the grant programs, they can benefit from the programs if they are included in an application sponsored by an eligible applicant.

FEMA Public Assistance Section 406 Mitigation

The Robert T. Stafford Disaster Relief and Emergency Assistance Act provides FEMA the authority to fund the restoration of eligible facilities that have sustained damage due to a presidentially declared disaster. The regulations contain a provision for the consideration of funding additional measures that will enhance a facility's ability to resist similar damage in future events.

Community Development Block Grants

The California Department of Housing and Community Development administers the State's Community Development Block Grant (CDBG) program with funding provided by the U.S. Department of Housing and Urban Development. The program is available to all non-entitlement communities that meet applicable threshold requirements. All projects must meet one of the national objectives of the program – projects must benefit 51 percent low- and moderate-income people, aid in the prevention or clearance of slum and blight, or meet an urgent need. Grant funds can generally be used in federally declared disaster areas for CDBG eligible activities including the replacement or repair of infrastructure and housing damaged during, or as a result of, the declared disaster.

Small Business Loans

SBA offers low-interest, fixed-rate loans to disaster victims, enabling them to repair or replace property damaged or destroyed in declared disasters. It also offers such loans to affected small businesses to help them recover from economic injury caused by such disasters. Loans may also be increased up to 20 percent of the total amount of disaster damage to real estate and/or leasehold improvements to make improvements that lessen the risk of property damage by possible future disasters of the same kind.

Increased Cost of Compliance

Increased Cost of Compliance (ICC) coverage is one of several resources for flood insurance policyholders who need additional help rebuilding after a flood. It provides up to $30,000 to help cover the cost of mitigation measures that will reduce flood risk. ICC coverage is a part of most standard flood insurance policies available under NFIP.

5.2 Goals and Objectives

Requirement §201.6(c)(3)(i): [The hazard mitigation strategy shall include a] description of mitigation goals to reduce or avoid long-term vulnerabilities to the identified hazards.

Up to this point in the planning process, the HMPC has organized resources, assessed hazards and risks, and documented mitigation capabilities. The resulting goals, objectives, and mitigation actions were developed based on these tasks. The HMPC held a series of meetings and exercises designed to achieve a collaborative mitigation strategy as described further throughout this section. Appendix C documents the information covered in these mitigation strategy meetings, including information on goals development and the identification and prioritization of mitigation alternatives by the HMPC.

During the initial goal-setting meeting, the HMPC reviewed the results of the hazard identification, vulnerability assessment, and capability assessment. This analysis of the risk assessment identified areas where improvements could be made and provided the framework for the HMPC to formulate planning goals and objectives and to develop the mitigation strategy for the City of Piedmont Planning Area.

Goals were defined for the purpose of this mitigation plan as broad-based public policy statements that:

- Represent basic desires of the City;
- Are nonspecific, in that they refer to the quality (not the quantity) of the outcome;
- Are future-oriented, in that they are achievable in the future; and
- A time-independent, in that they are not scheduled events.

Goals are stated without regard to implementation. Implementation cost, schedule, and means are not considered. Goals are defined before considering how to accomplish them so that they are not dependent on the means of achievement. Goal statements form the basis for objectives and actions that will be used as means to achieve the goals. Objectives define strategies to attain the goals and are more specific and measurable.

HMPC members were provided with the list of sample goals to consider. They were told that they could use, combine, or revise the statements provided or develop new ones, keeping the risk assessment in mind. Each member was given three index cards and asked to write a goal statement on each. Goal statements were collected and grouped into similar themes during the meeting. The goal statements were then grouped into similar topics. New goals from the HMPC were discussed until the team came to consensus. Some of the statements were determined to be better suited as objectives or actual mitigation actions and were set aside for later use. Next, the HMPC developed objectives that summarized strategies to achieve each goal.

Based on the risk assessment review and goal setting process, the HMPC identified the following goals and objectives, which provide the direction for reducing future hazard-related losses within the City of Piedmont Planning Area.

GOAL 1: Minimize risk and vulnerability of the City of Piedmont to the impacts of natural hazards, and protect lives and reduce damages and losses to property, public health, economy, and the environment.

- Protect life and reduce exposure and hazard losses to City residents, businesses, vulnerable populations, and visitors
- Increase community resiliency to the impacts of natural hazards and promote sustainable recovery from hazard events
- Assure long term protection and resiliency of existing and future development/ redevelopment from natural hazards, to include both public and private structures
- Protect/harden critical facilities from natural hazards and minimize interruption of essential infrastructure, utilities, and services
- Provide protection for architectural resources in the City
- Plan for and prioritize measures to respond to and address potential short- and long- term hazard impacts associated with climate change

GOAL 2: Enhance public outreach, awareness, education, and preparedness for all hazards to minimize hazard related losses

- Engage the community in disaster awareness and prevention education to reduce the risk and vulnerability of natural hazard impacts
- Improve the communities' understanding of natural hazards and how to effectively be prepared and take action to mitigate the impacts of hazard events; Support and encourage public responsibility
- Develop and target outreach and education for each hazard type and risk area and all City populations (e.g., vulnerable populations, schools, etc.)

GOAL 3: Improve City's resiliency and capabilities to mitigate losses and to be prepared for, respond to, and recover from a disaster event

- Maintain current service levels related to public safety
- Maintain and improve communication capabilities to ensure redundancy
- Enhance emergency services capabilities to address evacuation planning, sheltering, and other associated efforts

5.3 Identification and Analysis of Mitigation Actions

Requirement §201.6(c)(3)(ii): [The mitigation strategy shall include a] section that identifies and analyzes a comprehensive range of specific mitigation actions and projects being considered to reduce the effects of each hazard, with particular emphasis on new and existing buildings and infrastructure.

In order to identify and select mitigation actions to support the mitigation goals, each hazard identified in Section 4.1 was evaluated. Only those hazards that were determined to be a priority hazard for purposes of mitigation action development were considered further in the development of hazard-specific mitigation actions.

These priority hazards (in alphabetical order) are:

- Climate Change
- Dam Failure
- Drought and Water Shortage
- Earthquake
- Earthquake Liquefaction
- Flood: Localized/Stormwater
- Landslide, Mudslide, Hillside Erosion, and Debris Flows
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rains and Storms (winds, hail, lightning)
- Severe Weather: High Winds
- Wildfire

The HMPC eliminated the hazards identified below from further consideration in the development of mitigation actions because the risk of a hazard event in the City is unlikely or nonexistent, the vulnerability of the City is low, capabilities are already in place to mitigate negative impacts, or the City does not have the authority or control over mitigation of the hazard. The eliminated hazards are:

- Flood: 1%/0.2% Annual Chance
- Levee Failure

It is important to note, however, that **all the hazards addressed in this plan are included in the City's multi-hazard public education mitigation action as well as in other multi-hazard, emergency management actions.**

Once it was determined which hazards warranted the development of specific mitigation actions, the HMPC analyzed viable mitigation options that supported the identified goals and objectives. The HMPC was provided with the following list of categories of mitigation actions, which originate from the NFIP's Community Rating System:

- Prevention
- Property protection
- Structural projects
- Natural resource protection
- Emergency services
- Public information

The HMPC was provided with examples of potential mitigation actions for each of the above categories. The HMPC was also instructed to consider both future and existing buildings in considering possible mitigation actions. A facilitated discussion then took place to examine and analyze the options. Appendix C provides a detailed review and discussion of the six mitigation categories to assist in the review and identification of possible mitigation activities or projects. Also utilized in the review of possible mitigation measures is FEMA's publication on Mitigation Ideas, by hazard type. Prevention type mitigation alternatives were discussed for each of the priority hazards. This was followed by a brainstorming session that generated a list of preferred mitigation actions by hazard.

5.3.1. Prioritization Process

Once the mitigation actions were identified, the HMPC was provided with several decision-making tools, including FEMA's recommended prioritization criteria, STAPLEE sustainable disaster recovery criteria; Smart Growth principles; and others, to assist in deciding why one recommended action might be more important, more effective, or more likely to be implemented than another. STAPLEE stands for the following:

- Social: Does the measure treat people fairly? (e.g., different groups, different generations)
- Technical: Is the action technically feasible? Does it solve the problem?
- Administrative: Are there adequate staffing, funding, and other capabilities to implement the project?
- Political: Who are the stakeholders? Will there be adequate political and public support for the project?
- Legal: Does the jurisdiction have the legal authority to implement the action? Is it legal?
- Economic: Is the action cost-beneficial? Is there funding available? Will the action contribute to the local economy?
- Environmental: Does the action comply with environmental regulations? Will there be negative environmental consequences from the action?

In accordance with the DMA requirements, an emphasis was placed on the importance of a benefit-cost analysis in determining action priority. Other criteria used to assist in evaluating the benefit-cost of a mitigation action includes:

- Contribution of the action to save life or property
- Availability of funding and perceived cost-effectiveness
- Available resources for implementation
- Ability of the action to address the problem

The Mitigation Strategy Meeting Handout, which included hazard summaries, mitigation action categories, sample hazard actions, and prioritization criteria is included in Appendix C.

With these criteria in mind, HMPC members were each given a set of nine colored dots, three each of red, blue, and green. The dots were assigned red for high priority (worth five points), blue for medium priority (worth three points), and green for low priority (worth one point). The team was asked to use the dots to prioritize actions with the above criteria in mind. The point score for each action was totaled. Appendix C contains the total score given to each identified mitigation action.

The process of identification and analysis of mitigation alternatives allowed the HMPC to come to consensus and to prioritize recommended mitigation actions. During the voting process, emphasis was placed on the importance of a benefit-cost review in determining project priority; however, this was not a quantitative analysis. The team agreed that prioritizing the actions collectively enabled the actions to be ranked in order of relative importance and helped steer the development of additional actions that meet the more important objectives while eliminating some of the actions which did not garner much support.

Benefit-cost was also considered in greater detail in the development of the Mitigation Action Plan detailed below in Section 5.4. The cost-effectiveness of any mitigation alternative will be considered in greater detail through performing benefit-cost project analyses when seeking FEMA mitigation grant funding for eligible actions associated with this plan.

Recognizing the limitations in prioritizing actions from multiple jurisdictions and departments and the regulatory requirement to prioritize by benefit-cost to ensure cost-effectiveness, the HMPC decided to pursue actions that contributed to saving lives and property as first and foremost, with additional consideration given to the benefit-cost aspect of a project. This process drove the development of a determination of a high, medium, or low priority for each mitigation action, and a comprehensive prioritized action plan for the City of Piedmont Planning Area.

5.4 Mitigation Action Plan

Requirement §201.6(c)(3)(iii): [The mitigation strategy section shall include] an action plan describing how the actions identified in section (c)(3)(ii) will be prioritized, implemented, and administered by the local jurisdiction. Prioritization shall include a special emphasis on the extent to which benefits are maximized according to a cost benefit review of the proposed projects and their associated costs.

This action plan was developed to present the recommendations developed by the HMPC for how the City of Piedmont Planning Area can reduce the risk and vulnerability of people, property, infrastructure, and natural and cultural resources to future disaster losses. Emphasis was placed on both future and existing development. The action plan summarizes who is responsible for implementing each of the prioritized actions as well as when and how the actions will be implemented. Each action summary also includes a discussion of the benefit-cost review conducted to meet the regulatory requirements of the Disaster Mitigation Act.

Table 5-2 identifies the mitigation actions, the goals addressed by each action, the lead agency or department for each action whether the action protects existing or future development, and the mitigation type or category. Following this summary table of mitigation actions, a detailed implementation description is included for each mitigation action identified in the table. The implementation of any mitigation action in this Plan is subject to available funding and partnership of the City as the primary implementing agency for this LHMP.

As described throughout this LHMP Update, Piedmont has many risks and vulnerabilities to identified hazards. Although many possible mitigation actions, as detailed in Appendix C, were brainstormed and prioritized during the mitigation strategy meetings, the resulting mitigation strategy presented in this Chapter 5 of this LHMP focuses only on those mitigation actions that are both reasonable and realistic for the City to consider for implementation over the next 5-years covered by this Plan. Thus, only a portion of the actions identified in Appendix C have been carried forward into the mitigation strategy presented in Table 5-2. Although many good ideas were developed during the mitigation action brainstorming process, the reality of determining which priority actions to develop and include in this Plan came down to the actual priorities of the City, individuals and departments based in part on department direction, staffing, and available funding. The overall value of the mitigation action table in Appendix C is that it represents a wide-range of mitigation actions that can be consulted and developed for this LHMP Update during annual plan reviews and the formal 5-year update process.

It is also important to note that the City has numerous existing, detailed action descriptions, which include benefit-cost estimates, in other planning documents and programs, such as community wildfire protection plan/fire plans, climate change plans, and capital improvement budgets and reports. These actions are considered to be part of this Plan, and the details, to avoid duplication, should be referenced in their original source document. The HMPC also realizes that new needs and priorities may arise as a result of a disaster or other circumstances and reserves the right to support new actions, as necessary, as long as they conform to the overall goals of this LHMP.

Further, it should be clarified that the actions included in this mitigation strategy are subject to further review and refinement; alternatives analyses; reprioritization due to funding availability and/or other criteria; and City Council approval. The City is not obligated by this document to implement any or all of these projects. Rather this mitigation strategy represents the desires of the City to mitigate the risks and vulnerabilities from identified hazards. The actual selection, prioritization, and implementation of these actions will also be further evaluated in accordance with the mitigation categories and criteria contained in Appendix C, and as always the availability of funding.

It should be noted that some of these mitigation efforts are collaborative efforts among multiple local, state, and federal agencies. **In addition, the public outreach and education action, as well as many of the emergency services and other multi-hazard actions, apply to all hazards regardless of hazard priority.** Collectively, this Piedmont multi-hazard mitigation strategy includes only those actions and projects which reflect the actual priorities and capacity of the City to implement over the next 5-years covered by this Plan.

Table 5-2 City of Piedmont's Mitigation Actions

Action Title	Goals Addressed	Responsible Agency(ies)	Address Current Development	Address Future Development	Mitigation Type
Multi-Hazard Actions					
Action 1.Integrate Local Hazard Mitigation Plan into Safety Element of General Plan	1, 2, 3	City of Piedmont Planning Department	X	X	Prevention
Action 2.Public Awareness, Education, Outreach, and Preparedness Program Enhancements.	1, 2, 3	Planning & Building, Public Works, and Fire Department	X	X	Public Education
Action 3.Establish Alternative EOC	1, 2, 3	Piedmont Fire	X	X	Emergency Services
Action 4.Establish Communications Redundancies	1, 2, 3	Computer Courage (Contract City IT provider), PD/Fire Command Staff	X	X	Emergency Services
Action 5.Acquire Manifolds for Hydrants	1, 2, 3	Fire Chief, Director of Public Works	X	X	Property Protection
Action 6.Identify Backup Water Sources when Water Quality Becomes an Issue Post-disaster	1, 2, 3	Fire Chief, Director of Public Works, City Engineer	X	X	Property Protection Emergency Services
Action 7. Identify Critical Facilities for Backup Generators/Fuel	1, 2, 3	Fire Chief, Director of Public Works, Police Chief	X	X	Emergency Services
Action 8.Develop and Implement an Evacuation Plan	1, 2, 3	City of Piedmont and Piedmont residents	X	X	Emergency Services

Action Title	Goals Addressed	Responsible Agency(ies)	Address Current Development	Address Future Development	Mitigation Type
Climate Change Actions					
Action 9.Implement Recommendations from Piedmont CAP (Goal of Reducing Greenhouse Emissions)	1, 2, 3	Planning, Public Works, EBMUD	X	X	Prevention Property Protection Natural Resource Protection Public Education
Dam Failure Actions					
Action 10. Develop Public Safety MOU with EBMUD for Estates Reservoir Containment Structures	1, 2, 3	Public Works, City Engineer	X	X	Prevention Property Protection
Action 11. Tyson Lake -Research Owner Responsibilities and Study Inundation/Assessment of Downstream Conditions	1, 2, 3	Public Works, City Engineer	X	X	Prevention Property Protection
Drought and Water Shortage Actions					
Action 12. Implement Cal Water Efficiency Landscape projects, with Code Enforcement Component	1, 2, 3	Planning, Public Works, EBMUD	X	X	Prevention Property Protection
Earthquake and Earthquake Liquefaction Actions					
Action 13. Conduct Study to Preserve Architectural Integrity when Structures are Retrofitted for Seismic and Fire Safety	1, 2, 3	The City of Piedmont's Planning Department is lead. Partners include the Building Department, Fire Department and the City Engineer	X		Property Protection Structural Projects
Action 14. Support and encourage Earthquake Brace and Bolt (EBB) Program in Piedmont	1, 2, 3	Public Works Department and the Building Division	X		Property Protection Structural Projects

Action Title	Goals Addressed	Responsible Agency(ies)	Address Current Development	Address Future Development	Mitigation Type
Action 15. Enhance Building Code Enforcements	1, 2, 3	Public Works Department, Building Division, Plans Examiner	X	X	Prevention
Action 16. Identify and Implement Critical Facility Retrofits	1, 2, 3	Public Works, City Engineer	X	X	Property Protection Structural Projects
Action 17. Pipe Replacement with Flexible Material in Smaller Pipe Systems	1, 2, 3	Public Works, City Engineer	X	X	Property Protection Structural Projects
Action 18. Identify and Retrofit Vulnerable Bridges	1, 2, 3	Public Works, City Engineer	X	X	Property Protection Structural Projects
Action 19. Seismic Evaluation and Prioritization of Public Buildings	1, 2, 3	Public Works,	X		Prevention Property Protection Structural Projects
Flooding and Localized Flooding Actions					
Action 20. Flood Insurance Promotion for RL Properties and Areas	1, 2, 3	The City's Public Works Department and the Building Division	X		Prevention Public Information
Action 21. Code Enforcement Related to Flood Control	1, 2, 3	Building Division	X	X	Prevention
Action 22. Develop Stormwater Master Plan	1, 2, 3	Public Works, City Engineer	X	X	Prevention Public Information
Landslide, Mudslide, Hillside Erosion, and Debris Flow Actions					
Action 23. Implementing Hillside Hazard Overlay District to Address Slope Stability Hazards/ Code Enforcement	1, 2, 3	Director of Public Works, City Engineer, Building Official		X	Prevention
Action 24. City Study to Identify and Map Potential Localized Landslide Areas	1, 2, 3	Public Works, City Engineer	X	X	Prevention

Action Title	Goals Addressed	Responsible Agency(ies)	Address Current Development	Address Future Development	Mitigation Type
Severe Weather: Heavy Rains and Storms and High Winds Actions					
Action 25. Enhance Urban Tree Program - Storm Watch Protocols, Tree Trimming and Removal	1, 2, 3	Public Works	X	X	Prevention Property Protection Natural Resource Protection
Wildfire Actions					
Action 26. Develop Landscaping Ordinance	1, 2, 3	Planning, Public Works, Building Department, Fire Department, Parks	X	X	Prevention
Action 27. Implement Piedmont Projects from Diablo CWPP for Alameda County	1, 2, 3	Diablo Fire Safe Council, Consultant, CAL FIRE, and Piedmont Fire Department	X	X	Prevention Property Protection Natural Resource Protection Public Information
Action 28. Require and/or Encourage Retrofits for Fire Safe Construction	1, 2, 3	Fire Chief, Building Official	X		Property Protection Public Education
Action 29. Obtain Backup Generators Where Lines Go Down During Wildfire	1, 2, 3	Police Department, Fire Department`	X		Property Protection Natural Resource Protection
Action 30. Undergrounding of Utilities in VHFHSZs	1, 2, 3	Public Works	X	X	Prevention Property Protection Natural Resource Protection
Action 31. Pursue FireWise Community Certification	1, 2, 3	Fire Department, Planning Departemtn	X	X	Prevention Property Protection Natural Resource Protection

Multi-Hazard Actions

Action 1. Integrate Local Hazard Mitigation Plan into Safety Element of General Plan

Hazards Addressed: Climate Change, Dam Failure, Drought and Water Shortage, Earthquake, Earthquake: Liquefaction, Localized Flood, Landslide, Severe Weather (Heat, Heavy Rains, Storms, High Winds), and Wildfire

Goals Addressed: 1, 2, 3

Issue/Background: Local jurisdictional reimbursement for mitigation projects and cost recovery after a disaster is guided by Government Code Section 8685.9 (AB 2140).

Project Description: Specifically, AB 2140 requires that each jurisdiction adopt a local hazard mitigation plan (LHMP) in accordance with the federal Disaster Mitigation Act of 2000 as part of the Safety Element of its General Plan. Adoption of the LHMP into the Safety Element of the General Plan may be by reference or incorporation.

Other Alternatives: No action

Existing Planning Mechanisms through which Action will be Implemented: Safety Element of General Plan

Responsible Office/Partners: City of Piedmont Planning Department

Project Priority: High

Cost Estimate: City Staff Time

Benefits (avoided Losses): Incorporation of an adopted LHMP into the Safety Element of the General Plan will help jurisdictions maximize the cost recovery potential following a disaster.

Potential Funding: General Fund

Timeline: As soon as possible

Action 2. Public Awareness, Education, Outreach, and Preparedness Program Enhancements.

Hazards Addressed: Climate Change, Dam Failure, Drought and Water Shortage, Earthquake, Earthquake: Liquefaction, Localized Flood, Landslide, Severe Weather (Heat, Heavy Rains, Storms, High Winds), and Wildfire

Goals Addressed: 1, 2, 3

Issue/Background: Educate the community on how to seek information before, during, and after a disaster.

Project Description: Improve/Enhance public education, engagement, and preparedness, mitigation, response, and recovery programs for all hazards using multi-media, educate, messaging, target audiences; promote self-responsibility; sustainability. Public awareness activities foster changes in behavior leading towards a culture of risk reduction.

Other Alternatives: Continue with limited hazard-based public outreach efforts

Existing Planning Mechanism(s) through which Action Will Be Implemented: Existing public outreach efforts.

Responsible Office/Partners: Planning & Building, Public Works, and Fire Department

Project Priority: High

Cost Estimate: City Staff Time

Benefits (Losses Avoided): Protect Life and Property, Public Awareness, Community Involvement

Potential Funding: FEMA/State Grants, City of Piedmont General Fund

Timeline: Immediate/On-going

Action 3. Establish Alternative EOC

Hazards Addressed: Climate Change, Dam Failure, Drought and Water Shortage, Earthquake, Earthquake: Liquefaction, Localized Flood, Landslide, Severe Weather (Heat, Heavy Rains, Storms, High Winds), and Wildfire

Goals Addressed: 1, 2, 3

Issue/Background: Alternate EOC has been designated as the Corporation Yard, 898 Redrock Rd. However, no further infrastructure has been established to create a functional EOC. At this time the City is currently undergoing a project to upgrade our phone service to AT&T's IP Flex technology to allow designated city phone/data lines to be transferred to the alternate EOC in an emergency.

Project Description: Establish a dedicated location hardwired and outfitted with necessary equipment to be used as an alternate EOC. This would include an update to City of Piedmont Emergency Operations Plans identifying the Corp Yard as an alternate EOC.

Other Alternatives: Identifying location outside of the City to act as an Alternate EOC. Establish MOU with an agency that possesses a mobile command vehicle.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Existing EOP cites alternate EOC location.

Responsible Office/Partners: Piedmont Fire

Project Priority: Medium

Cost Estimate: $100,000

Benefits (Losses Avoided): If the main Emergency Operations Center is destroyed or not operational, the city has identified and outfitted an alternate location that can be stood up and utilized by City staff and first responders.

Potential Funding: General fund, possible homeland security grants

Timeline: 1-3 years

Action 4. Establish Communications Redundancies

Hazards Addressed: Climate Change, Dam Failure, Drought and Water Shortage, Earthquake, Earthquake: Liquefaction, Localized Flood, Landslide, Severe Weather (Heat, Heavy Rains, Storms, High Winds), and Wildfire

Goals Addressed: 1, 2, 3

Issue/Background:

- (911) Piedmont PD has an existing agreement with Emeryville PD to act as our alternate PSAP for 911 calls in the case that our 911 center is unable to take calls.
- (Police/Fire Radio) EBRCSA has several layers of redundancy, the communications center has backup radio controllers for both Police and Fire that can function as backup consoles in an emergency and facilitate communications with field units using portable radios.
- (Non-emergency phones) 2 IP Flex lines- one primary that all city phone lines come in on and one secondary to act as backup that could be configured to handled designated lines in an emergency. Need to establish plan and purchase equipment to allow for those lines to be answered at alternate location (CorpYard) in an emergency. The Emergency Operation Center also has 1MB phone lines that analog phones can dial out from in an emergency.
- (Computer network and data connections) Police and Fire computers/MDTS do not have existing redundancy for the existing private network.
- (City owned cell phones/tablets) Selected public safety personnel and city staff have city issued cell phones and lists of contact phone numbers.
- (Social Media) City uses AC Alert as mass notification system for emergency notifications. We have also established profiles on both Nextdoor and Facebook to act as redundancy for public notification.

Project Description: Establish a backup Public Safety Answering Point at the Corp Yard to facilitate answering 911 lines and 420-3000 lines including computer hardware/software to assist with call taking and dispatching of fire/police units. Establish a redundant private network connection for emergency mobile devices including tablets that can be deployed to both fire and police units in an emergency.

Other Alternatives: MOU with another Alameda/Contra Costa County Communications Center to staff our primary radio channels both Fire/Police in case of emergency, (EBRCSA).

Existing Planning Mechanism(s) through which Action Will Be Implemented: The City is currently undergoing an IP Flex project with AT&T to replace existing PRI connections. This project will give us the redundancy needed to explore a bank of backup phone lines.

Issue city cell phones to all department personnel to create another layer of communication during emergency.

Responsible Office/Partners: Computer Courage (Contract City IT provider), PD/Fire Command Staff

Project Priority: Medium

Cost Estimate: $100,000

Benefits (Losses Avoided): Ongoing Emergency Communications with little or no interruption during an emergency

Potential Funding: City of Piedmont General Fund

Timeline: 1-3 years

Action 5. Acquire Manifolds for Hydrants

Hazards Addressed: Lack of potable water for residents post disaster (Climate Change, Dam Failure, Drought and Water Shortage, Earthquake, Earthquake: Liquefaction, Localized Flood, Landslide, Severe Weather (Heat, Heavy Rains, Storms, High Winds), and Wildfire)

Goals Addressed: 1, 2, 3

Issue/Background: Potential disruption of water service to homes post disaster.

Project Description: Working with EBMUD, coordinate access to special post-disaster manifolds that can be attached to specific hydrants to facilitate access to potable water for residents.

Other Alternatives: No action

Existing Planning Mechanism(s) through which Action Will Be Implemented:

Responsible Office/Partners: Fire Chief; Director of Public Works

Project Priority: Medium

Cost Estimate: unknown

Benefits (Losses Avoided): Provide potable water for residents post disaster

Potential Funding: unknown

Timeline: 1-5 years

Action 6. Identify Backup Water Sources when Water Quality Becomes an Issue Post-disaster

Hazards Addressed: Lack of potable water post disaster (Climate Change, Dam Failure, Drought and Water Shortage, Earthquake, Earthquake: Liquefaction, Localized Flood, Landslide, Severe Weather (Heat, Heavy Rains, Storms, High Winds), and Wildfire)

Goals Addressed: 1, 2, 3

Issue/Background: Disasters can affect potable water delivery systems. If the damage is extensive, adequate potable water for residents can become a health issue. There is a need to identify all potential backup systems, storage and maintenance of access for emergency supply. Water is also needed for fire suppression activities.

Project Description: Work with EBMUD to identify all possible sources of emergency potable water sources, and investigate all potential local storage solutions.

Other Alternatives:

Existing Planning Mechanism(s) through which Action Will Be Implemented: Fire Department, Public Works

Responsible Office/Partners: Fire Chief, Director of Public Works, City Engineer

Project Priority: Medium

Cost Estimate: Unknown

Benefits (Losses Avoided): Provide potable water for residents post-disaster

Potential Funding: unknown

Timeline: 1-5 years

Action 7. Identify Critical Facilities for Backup Generators/Fuel

Hazards Addressed: Lack of electrical power post disaster (Climate Change, Dam Failure, Drought and Water Shortage, Earthquake, Earthquake: Liquefaction, Localized Flood, Landslide, Severe Weather (Heat, Heavy Rains, Storms, High Winds), and Wildfire)

Goals Addressed: 1, 2, 3

Issue/Background: It is highly probably that electrical power will be interrupted post disaster, and its duration cannot be predicted. Critical facilities and functions within the City needing power must operate despite this interruption.

Project Description: Identify the critical facilities needing power post-disaster and design a backup generator system for each with redundancy to ensure that critical City functions will operate after a disaster.

Other Alternatives: No action.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Facilities Maintenance division of Public Works along with the Police and Fire Departments.

Responsible Office/Partners: Director of Public Works, Fire Chief, Police Chief

Project Priority: Medium

Cost Estimate: Unknown

Benefits (Losses Avoided): Assurance of emergency power after a major disaster for critical City functions.

Potential Funding: Unknown

Timeline: 1 to 5 years

Action 8. Develop and Implement an Evacuation Plan

Hazards Addressed: Multi-hazard (Climate Change, Dam Failure, Drought and Water Shortage, Earthquake, Earthquake: Liquefaction, Localized Flood, Landslide, Severe Weather (Heat, Heavy Rains, Storms, High Winds), and Wildfire)

Goals Addressed: 1, 2, 3

Issue/Background: The City of Piedmont is characterized by narrow winding streets that do not facilitate easy transportation in, out, and throughout town. In the event of a disaster, residents would likely encounter traffic jams on the major arterial roads that would lead toward safety.

Project Description: The City plans to pursue the feasibility of an evacuation plan using the CWPP and other risk assessment strategies. Collaboration with other local agencies will also be included in the project.

Other Alternatives: No Action

Existing Planning Mechanism(s) through which Action Will Be Implemented: Building Code, General Plan Safety Element

Responsible Office/Partners: The City of Piedmont, Piedmont residents

Project Priority: High

Cost Estimate: 50,000

Benefits (Losses Avoided): Make the City safer by reducing the potential loss of life in a quick moving disaster.

Potential Funding: Existing budgets

Timeline: 1 to 5 years

Climate Change Actions

Action 9. Implement Recommendations from Piedmont CAP (Goal of Reducing Greenhouse Emissions)

Hazards Addressed: Climate Change and associated air quality hazards

Goals Addressed: 1, 2, 3

Issue/Background: Increases in greenhouse gas usage by humans as well as large scale deforestation are creating global crises that will affect everyone. While Piedmont is a very small city, it will still feel the effects of climate change like potential flooding, more intense and frequent fires, worse air quality, and drought.

Project Description: The City adopted the second version of the Climate Action Plan in March of 2018. This plan includes objectives, strategies, and actions that were put in place to reach Piedmont's goal of reducing greenhouse gas emission 40% by 2030 as well as to be on track to reduce emissions 80% by 2050.

Other Alternatives: No Action

Existing Planning Mechanism(s) through which Action Will Be Implemented: Climate Action Plan 2.0, Pedestrian and Master Bike Plan, Framework for Green Infrastructure Plan Development

Responsible Office/Partners:

- The City of Piedmont- Responsible
- The Residents- Responsible
- Piedmont Unified School District- Partner

Project Priority: To combat climate change by reducing greenhouse gas emissions city wide,

Cost Estimate: Millions of dollars

Benefits (Losses Avoided): Make the environment safer to live in through cleaner air, less fatal natural disasters, and more water. Putting money into mitigating climate change is economical and efficient. As a comparison, the U.S. and the world will have to spend billions, if not trillions, of dollars to clean up the effects climate change presently has as well as in the future.

Potential Funding: PG&E offers dozens of rebates to residents for energy efficiency, EBMUD offers rebates for water conservation techniques, BAAQMD offers grants like the EV Charge! Program for EV Chargers

Timeline: By 2030

Dam Failure Actions

Action 10. Develop Public Safety MOU with EBMUD for Estates Reservoir Containment Structures

Hazards Addressed: Potential containment failure and subsequent flooding

Goals Addressed: 1, 2, 3

Issue/Background: EBMUD owns and operates water storage facilities for distribution of potable water to the regional area, including Piedmont. These reservoirs have been recently converted to storage of water in tanks. Piedmont needs to work with EBMUD to ensure that their safety containment features are adequate to withstand any potential seismic activity.

Project Description: Develop an MOU with EBMUD outlining the inspection and maintenance protocol required to ensure adequate containment in the event of a seismic occurrence.

Other Alternatives:

Existing Planning Mechanism(s) through which Action Will Be Implemented:

Responsible Office/Partners: Director of Public Works; City Engineer

Project Priority: Medium

Cost Estimate: Unknown

Benefits (Losses Avoided): Mitigation of potential flooding

Potential Funding: To be determined

Timeline: 1-5 years

Action 11. Tyson Lake –Research Owner Responsibilities and Study Inundation/Assessment of Downstream Conditions

Hazards Addressed: Potential dam failure and subsequent flooding

Goals Addressed: 1, 2, 3

Issue/Background: Tyson Lake is a privately owned and maintained body of water. The City currently has no responsibilities with respect to inspection of the dam. However, if the dam should be breeched, the path of the spill will inundate Hampton Park where many younger aged children congregate for organized and informal play.

Project Description: Develop a plan to research what the Tyson Lake Homeowners Association do to regularly inspect the condition of the dam and lake, and what State or local standards they are regulated by.

Then, cooperatively develop a strategy to ensure that the dam and lake are maintained to a reasonable standard for public safety.

Other Alternatives: No action

Existing Planning Mechanism(s) through which Action Will Be Implemented:

Responsible Office/Partners: Director of Public Works, City Engineer

Project Priority: Medium

Cost Estimate: Unknown

Benefits (Losses Avoided): Mitigation of potential flooding

Potential Funding: Unknown

Timeline: 1 to 5 years

Drought and Water Shortage Actions

Action 12. Implement Cal Water Efficiency Landscape projects, with Code Enforcement Component

Hazards Addressed: Drought, Water Shortage

Goals Addressed: 1, 2, 3

Issue/Background: Cal requires all landscape projects involving 500 square feet or more of new landscaping or 2,500 of renovated landscaping to follow strict water usage requirements. The City does not have a way of capturing all landscape projects to determine if they need to follow WELO requirements.

Project Description: Develop a permit process for landscaping projects to determine if WELO needs to be followed. Develop code enforcement mechanisms to guarantee compliance for projects not requiring a building permit or planning approval.

Other Alternatives: No action, Local Landscape Ordinance

Existing Planning Mechanism(s) through which Action Will Be Implemented: Building Permits, Planning Applications

Responsible Office/Partners: Planning, Public Works, EBMUD

Project Priority: Low

Cost Estimate: Staff time – 5,000 – 25,000

Benefits (Losses Avoided): Reduced water usage, local vegetation,

Potential Funding: General Funds, Permitting Fees

Timeline: 6 months

Earthquake and Earthquake: Liquefaction Actions

Action 13. Conduct Study to Preserve Architectural Integrity when Structures are Retrofitted for Seismic and Fire Safety

Hazards Addressed: Earthquake and Wildfire

Goals Addressed: 1, 2, 3

Issue/Background: Piedmont's building stock, particularly its residential structures, are a historic resource. Projects to modify the buildings for seismic or wildfire safety. Such projects include modifications to or removal of chimneys and fireproofing eaves. These modifications might be detrimental to the architectural integrity of the building.

Project Description: Conduct a study involving the expertise of architects and engineers that would generate methods to upgrade buildings for seismic and wildfire safety without comprising the building's architectural integrity. For example, rather than removing or truncating a masonry chimney (an integral building element in Tudor Revival architecture) to meet seismic safety standards, generate methods that property owners could employ to improve safety without chimney removal, or through chimney replication.

Other Alternatives: No Action

Existing Planning Mechanism(s) through which Action Will Be Implemented: Results from the study would be incorporated into information made available to the public, particularly property owners. The City could develop an incentive program for seismic and wildfire upgrade projects that do not jeopardize a building's architectural integrity. The City's Design Guidelines can be modified to address this concern.

Responsible Office/Partners: The City of Piedmont's Planning Department is lead. Partners include the Building Department, Fire Department and the City Engineer.

Project Priority: Low

Cost Estimate: $100,000

Benefits (Losses Avoided): To preserve the value of Piedmont's building stock while addressing seismic and wildfire safety.

Potential Funding: General Fund or Grant opportunities.

Timeline: 1 to 2 years

Action 14. Support and Encourage Earthquake Brace and Bolt (EBB) Program in Piedmont

Hazards Addressed: Earthquake risk from lack of sill plate anchorage and cripple wall bracing on single-family houses

Goals Addressed: 1, 2, 3

Issue/Background: Older homes (pre-1980), constructed before seismic codes were adopted for single-family dwellings, often lack adequate sill plate anchorage and cripple wall bracing. These houses have been known to slide or topple off of their foundations in earthquakes. The damage can be in the hundreds of thousands of dollars to repair and can render the house uninhabitable for as much as two years. The retrofit costs on average between $6,000 and $8,000 in the East Bay and can be completed in less than one week.

Project Description: EBB provides grants of up to $3000 to homeowners who complete a code-compliant retrofit of their crawlspaces. The program is managed jointly by the California Earthquake Authority and the California Office of Emergency Services. Piedmont could partner with the EBB program to publicize the program when registration is open.

Other Alternatives: Homeowners can elect to do a voluntary seismic retrofit of their home.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Marketing materials can be ordered from EBB for free for use by Piedmont City departments. EBB also has social media and printed media language available for use with email lists. The registration could be publicized at City Council and planning meetings. Materials could be available in all Departments. Information could go out through City email/newsletter services.

Responsible Office/Partners: Building, Planning, Public Works, Mayor's Office

Project Priority: High. Critical project with nominal costs to the City of Piedmont.

Cost Estimate: Staff time.

Benefits (Losses Avoided): Significant damage repair costs could be avoided

Potential Funding: Minimal funding required

Timeline: Registration for first round of grants in 2019 is closed. However, registration is likely to reopen in 2019.

Action 15. Enhance Building Code Enforcements

Hazards Addressed: Earthquake and Liquefaction (Maximize seismic resistance of private homes)

Goals Addressed: 1, 2, 3

Issue/Background: Many of Piedmont's private homes were built in the early 20th century and do not conform to modern building codes for seismic resistance.

Project Description: Through the Building Department, enhance enforcement of required seismic resistance of private homes when building permits are issued for remodeling and/or additions.

Other Alternatives:

Existing Planning Mechanism(s) through which Action Will Be Implemented: Building Department

Responsible Office/Partners: Director of Public Works, Building Official, Plans Examiner

Project Priority: Medium

Cost Estimate: Unknown

Benefits (Losses Avoided): Greater strengthening of private home to resist seismic activity and increase safety for occupants.

Potential Funding: Unknown

Timeline: 1 to 5 years

Action 16. Identify and Implement Critical Facility Retrofits

Hazards Addressed: Earthquake and Liquefaction

Goals Addressed: 1, 2, 3

Issue/Background: The City of Piedmont's public buildings were constructed many years ago prior to modern seismic resistance code requirements. To the extent that these buildings operate as public buildings, the City needs to evaluate each building to meet modern requirements, and based on these evaluations and determination of essential services, prioritize the construction related to adequately retrofit them to meet current building codes.

Project Description: Pursuant to the seismic evaluation and prioritization of public buildings, create a funding plan to implement the recommendations.

Other Alternatives: Demolish and build new buildings in place of existing buildings.

Existing Planning Mechanism(s) through which Action Will Be Implemented: This action can be coordinated through the Facilities Maintenance division of Public Works

Responsible Office/Partners: Director of Public Works, City Engineer

Project Priority: Medium

Cost Estimate: Unknown

Benefits (Losses Avoided): Retrofitting of existing public building for public safety. Life safety related to potential damage from seismic activity

Potential Funding: Unknown

Timeline: 1 to 5 years

Action 17. Pipe Replacement with Flexible Material in Smaller Pipe Systems

Hazards Addressed: Earthquake and Liquefaction damage to underground infrastructure during seismic events

Goals Addressed: 1, 2, 3

Issue/Background: During a seismic event, underground infrastructure is subject to damage. This would affect system reliance and cause potential hazards post disaster.

Project Description: Whenever possible, the City will install new, modern, and more flexible delivery systems with minimal joints to mitigate the potential damage during a seismic event.

Other Alternatives: No action

Existing Planning Mechanism(s) through which Action Will Be Implemented: Public Works

Responsible Office/Partners: Director of Public Works, City Engineer

Project Priority: Medium

Cost Estimate: Unknown

Benefits (Losses Avoided): Prevention of service interruption and mitigation of potential hazards caused by failing delivery systems.

Potential Funding: Unknown

Timeline: 1 to 5 years

Action 18. Identify and Retrofit Vulnerable Bridges

Hazards Addressed: Earthquake – seismic resistance of a bridge that is part of a major arterial in Piedmont.

Goals Addressed: 1, 2, 3

Issue/Background: The Oakland Ave. Bridge is a major arterial in and out of Piedmont to the west. The ability of this bridge to withstand a seismic event will provide access for, if needed, evacuations as well as delivery of materials and emergency supplies into Piedmont.

Project Description: Caltrans inspects this bridge every other year. Working with Caltrans, the City will have an independent structural evaluation performed to identify if additional retrofitting is needed to maximize the seismic resistance of this bridge.

Other Alternatives: No action

Existing Planning Mechanism(s) through which Action Will Be Implemented: Facilities Maintenance division of Public Works.

Responsible Office/Partners: Director of Public Works, City Engineer

Project Priority: Medium

Cost Estimate: Unknown

Benefits (Losses Avoided): Increased life safety and maintenance of evacuation and delivery route.

Potential Funding: Unknown

Timeline: 1 to 5 years

Action 19. Seismic Evaluation and Prioritization of Public Buildings

Hazards Addressed: Earthquake and liquefaction

Goals Addressed: 1, 2, 3

Issue/Background: The City of Piedmont's public buildings were constructed many years ago prior to modern seismic resistance code requirements. To the extent that these buildings operate as public buildings, the City needs to evaluate each building to meet modern requirements, and based on these evaluations and determination of essential services, prioritize the construction related to adequately retrofit them to meet current building codes.

Project Description: Obtain a complete seismic resistance evaluation of each public building with recommendations to retrofitting to meet current building codes.

Other Alternatives: Demolish and build new buildings in place of existing buildings.

Existing Planning Mechanism(s) through which Action Will Be Implemented: This action can be coordinated through the Facilities Maintenance division of Public Works

Responsible Office/Partners: Director of Public Works

Project Priority: Medium

Cost Estimate: Unknown

Benefits (Losses Avoided): Property damage reduction. Life safety related to potential damage from seismic activity.

Potential Funding: Unknown

Timeline: 1 to 5 years

Flood and Localized/Stormwater Flood Actions

Action 20. Flood Insurance Promotion for RL Properties and Areas

Hazards Addressed: Flood

Goals Addressed: 1, 2, 3

Issue/Background: The Flood Insurance Rate Map for the City of Piedmont indicates that there are no flood hazard areas in the City. However, there are properties in the City that may be subject to local flooding from time to time, usually from groundwater seepage into basement areas. It may be beneficial to some property owners to carry flood insurance due to these circumstances.

Project Description: Conduct a public information campaign to private property owners promoting the benefits of maintaining flood insurance.

Other Alternatives: No Action

Existing Planning Mechanism(s) through which Action Will Be Implemented: The distribution of information on the City's website, over the phone and at the service counter at City Hall.

Responsible Office/Partners: The City's Public Works Department and the Building Division

Project Priority: Low

Cost Estimate: Less than $5,000

Benefits (Losses Avoided): Makes insurance funds available to property owners so that they can more easily afford to recover from flood damage to buildings.

Potential Funding: City General Funds will cover cost of public information campaign.

Timeline: 6 months

Action 21. Code Enforcement related to Flood Control

Hazards Addressed: Flooding

Goals Addressed: 1, 2, 3

Issue/Background: The City of Piedmont is comprised of predominantly single family detached homes built in the early 20th century. Many of these homes do not have adequate provisions for the discharge of stormwater.

Project Description: Create protocols for increased enforcement of regulations related to the discharge of stormwater from private homes.

Other Alternatives: No action

Existing Planning Mechanism(s) through which Action Will Be Implemented: Building Department

Responsible Office/Partners: Craig Griffin, Building Official; Paki Muthig, Plans Examiner

Project Priority: Medium

Cost Estimate: Unknown

Benefits (Losses Avoided): Mitigation of localized flooding

Potential Funding: Unknown

Timeline: 1-5 years.

Action 22.   Develop Stormwater Master Plan

Hazards Addressed: Flood and localized flooding

Goals Addressed: 1, 2, 3

Issue/Background: The City of Piedmont's storm sewer system was designed and installed many years ago. Although it adequately discharges current day storm water loads, there are hot-spots where localized flooding does occur

Project Description: Create all new mapping of the existing storm sewer system and identification of the drainage areas.

Other Alternatives:

Existing Planning Mechanism(s) through which Action Will Be Implemented: Public Works – Streets & Sewers Division

Responsible Office/Partners: Director of Public Works, City Engineer

Project Priority: Medium

Cost Estimate: Unknown

Benefits (Losses Avoided): Knowledge of existing conditions will promote better understanding of potential flooding probability and allow for re-design of specific components for greater flood control.

Potential Funding: Unknown

Timeline: 1 to 5 years

Landslide, Mudslide, Hillside Erosion, and Debris Flows Actions

Action 23. Implementing Hillside Hazard Overlay District to Address Slope Stability Hazards/ Code Enforcement

Hazards Addressed: Landslide

Goals Addressed: 1, 2, 3

Issue/Background: The City of Piedmont is generally a hillside community, as its name suggests. There has been some localized landslides on private residential properties located on sloping sites. Pursuant to the mapping of potential landside areas, the Building Department will have additional tools to enforce stricter mitigation measures for development in these overlay districts

Project Description: Based on the overlay districts identifying potential slope stability hazards, the City can develop enhanced building standards and code enforcement to mitigate and prevent future landslides during the development of the parcels.

Other Alternatives: No action

Existing Planning Mechanism(s) through which Action Will Be Implemented: Public Works, Building Department

Responsible Office/Partners: Director of Public Works, City Engineer, Building Official

Project Priority: Medium

Cost Estimate: Unknown

Benefits (Losses Avoided): Increase knowledge and awareness of potential areas for localized landslides promoting pro-active mitigation measures for prevention of landslides.

Potential Funding: Unknown

Timeline: 1 to 5 years

Action 24. City Study to Identify and Map Potential Localized Landslide Areas

Hazards Addressed: Landslide

Goals Addressed: 1, 2, 3

Issue/Background: The City of Piedmont is generally a hillside community, as its name suggests. There has been some localized landslides on private residential properties located on sloping sites.

Project Description: This project would encompass researching potential areas for localized landslides and creating a map that increases awareness of these potential hazards.

Other Alternatives: No action

Existing Planning Mechanism(s) through which Action Will Be Implemented: Public Works

Responsible Office/Partners: Director of Public Works, City Engineer

Project Priority: Medium

Cost Estimate: Unknown

Benefits (Losses Avoided): Increase knowledge and awareness of potential areas for localized landslides promoting pro-active mitigation measures for prevention of landslides.

Potential Funding: Unknown

Timeline: 1 to 5 years

Severe Weather: Heavy Rains and Storms and High Winds Actions

Action 25. Enhance Urban Tree Program – Storm Watch Protocols, Tree Trimming and Removal

Hazards Addressed: Damage caused by City owned street trees subjected to storms with heavy rain and high winds.

Goals Addressed: 1, 2, 3

Issue/Background: The City manages a robust urban forest that contains approximately 7,000 street trees. These trees in the public right-of-way have the potential of branch drop or total toppling over during heavy storms. Managing the health of this urban forest with minimize the potential damage to public and private property.

Project Description: Develop of program that continues the current practices of managing the urban forest with enhancements for additional trimming, removal and replacement of compromised street trees. Additionally, enhance current street sweeping protocols to minimize storm drain backups and localized flooding.

Other Alternatives: No action

Existing Planning Mechanism(s) through which Action Will Be Implemented: Public Works

Responsible Office/Partners: Director of Public Works

Project Priority: Medium

Cost Estimate: Unknown

Benefits (Losses Avoided): Minimize damage caused by City owned street trees subjected to storms with heavy rain and high winds.

Potential Funding: Unknown

Timeline: 1 to 5 years

Wildfire (and Extreme Heat) Actions

Action 26. Develop Ordinance

Hazards Addressed: Wildfire, Drought, Water Shortage, Extreme Heat

Goals Addressed: 1, 2, 3

Issue/Background: Fire safe planting practices, drought resistant vegetation, Bay-Friendly landscaping best practices. The way that the environment is manipulated can have a large effect on the amount of water that is used as well as the possibility for fire to spread.

Project Description: Create a landscape ordinance to direct landscaping practices in the City. Create a framework for staff including what landscape practices should be followed, permitting requirements, and enforcement measures.

Other Alternatives: No Action

Existing Planning Mechanism(s) through which Action Will Be Implemented: Building Permit, Planning Permits

Responsible Office/Partners: Planning, Public Works, Building Department, Fire Department, Parks

Project Priority: Medium

Cost Estimate: Staff time $5,000 - $25,000

Benefits (Losses Avoided): Reduced water usage, reduced risk of wildfire

Potential Funding: General Fund

Timeline: 6 months

Action 27. Implement Piedmont Projects from Diablo CWPP for Alameda County

Hazards Addressed: Wildfire (Fuel mitigation)

Goals Addressed: 1, 2, 3

Issue/Background: Allows for potential funding of fuel modification projects within Piedmont.

Project Description: Fuel mitigation projects identified within Piedmont can be added to the CWPP or an appendix in the future. Projects would need to be identified in cooperation with Piedmont FD and the Diablo Fire Safe Council.

Other Alternatives: None

Existing Planning Mechanism(s) through which Action Will Be Implemented: The current CWPP should be reviewed to understand how the process works. Meeting with the Diablo Fire Safe Council would also assist in the process.

Responsible Office/Partners: Diablo Fire Safe Council, Cheryl Miller - Consultant. CAL FIRE and Piedmont FD

Project Priority: Low

Cost Estimate: Potentially some fees for studying projects to be done

Benefits (Losses Avoided): Being awarded fuel modification grants and funding from various sources

Potential Funding: Unknown

Timeline: Within in the next 6 months and then ongoing

Action 28. Require and/or Encourage Retrofits for Fire Safe Construction

Hazards Addressed: Wildfire

Goals Addressed: 1, 2, 3

Issue/Background: In a predominantly single family residential community such as Piedmont, the use of proper, fire-safe building materials and construction methods impacts fire prevention and helps mitigate the spread of fires.

Project Description: This project would encompass a comprehensive review of the Piedmont Building Code to enhance the requirements for fire safe building materials and construction. It will also examine the potential for incentivizing the use of increased fire safe building materials and construction methods to encourage greater participation.

Other Alternatives: No action

Existing Planning Mechanism(s) through which Action Will Be Implemented: Fire and Building Department plans and ordinances

Responsible Office/Partners: Fire Chief, Building Official

Project Priority: Medium

Cost Estimate: Unknown

Benefits (Losses Avoided): Reduced risk of property damage and increased life safety.

Potential Funding: Unknown

Timeline: 1 to 5 years

Action 29. Obtain Backup Generators Where Lines Go Down During Wildfire

Hazards Addressed: Wildfire and Extreme Heat – Emergency Services

Goals Addressed: 1, 2, 3

Issue/Background: Need for emergency electrical power when PGE power lines are affected by wildfires.

Project Description: Provide diesel powered generators in select locations throughout the City for electrical power for essential services.

Other Alternatives: None

Existing Planning Mechanism(s) through which Action Will Be Implemented: Coordination with Public Works Maintenance Staff and Public Safety.

Responsible Office/Partners: Public Works in cooperation with Police and Fire

Project Priority: Medium

Cost Estimate: Unknown

Benefits (Losses Avoided): Reduced risk of property damage and increased life safety.

Potential Funding: Unknown

Timeline: 1 to 5 years

Action 30. Undergrounding of Utilities in VHFHSZs

Hazards Addressed: Heavy Rain and Storms with High Winds causing Wildfire

Goals Addressed: 1, 2, 3

Issue/Background: Overhead utility wires and poles have been associated with causing fires when knocked down when subjected to storms with high winds and heavy rains.

Project Description: In cooperation and partnership with PG & E, the project would encompass the undergrounding of all utilities in the VHFHSZs

Other Alternatives: No action

Existing Planning Mechanism(s) through which Action Will Be Implemented: Public Works

Responsible Office/Partners: Director of Public Works

Project Priority: Medium

Cost Estimate: Unknown

Benefits (Losses Avoided): Elimination of potential source of fire ignition in VHFHSZs.

Potential Funding: Unknown

Timeline: 1 to 5 years

Action 31. Pursue FireWise Community Certification

Hazards Addressed: Wildfire

Goals Addressed: 1, 2, 3

Issue/Background: The City of Piedmont has areas of high wildfire risk. Due to the high value of properties in the City, even small fires can have a large financial impact to the City.

Project Description: Firewise is a cooperative effort among local, state, federal and private agencies and organizations to promote fire safety in the wildland/urban interface. Firefighters do not have the resources to defend every home during a wildfire. When adequately prepared, a house can withstand a wildland fire without the intervention of the fire service. The goal of this program is to encourage and acknowledge action that minimizes home loss due to wildfire. It teaches residents how to prepare for a fire before it occurs.

Other Alternatives: No action

Existing Planning Mechanism(s) through which Action Will Be Implemented: There is currently no existing planning mechanism that this action would fall under.

Responsible Office/Partners: Fire Department in coordination with Planning Department

Project Priority: Medium

Cost Estimate: Staff time to join program. Once the program in joined, Firewise Communities are able to quantify their concern about the wildfire issue. To this end, they are willing to invest $2/capita in Firewise projects each year. For the City, this equates to roughly $20,000 per year. Volunteer hours, use of equipment, and time spent by agency fire staff can be included in this figure, as can state or federal grant dollars. A permanent Firewise board is created that will maintain the program into the future. A mitigation project (reduction of risks to homes) must be completed during the year for recertification.

Benefits (Losses Avoided): Once implemented, the project would help increase defensible space, reducing risk to homeowners in the City. In addition, the FireWise certification would help the City in applying for wildfire grant funds.

Potential Funding: Existing City budgets.

Timeline: 1 to 5 years

Chapter 6 Plan Adoption

Requirement §201.6(c)(5): [The local hazard mitigation plan shall include] documentation that the plan has been formally approved by the governing body of the jurisdiction requesting approval of the plan (e.g., City Council, county commissioner, Tribal Council).

The purpose of formally adopting this plan is to secure buy-in from the City of Piedmont, raise awareness of the plan, and formalize the plan's implementation. The adoption of this LHMP completes Planning Step 9 of the 10-step planning process: Adopt the Plan, in accordance with the requirements of DMA 2000. This adoption also establishes compliance with AB 2140 requiring adoption by reference or incorporation into the Safety Element of the Piedmont General Plan.

The Piedmont City Council has adopted this Local Hazard Mitigation Plan by passing a resolution. A copy of the intended resolution and the executed copy for the City (pending) are included in Appendix D: Adoption Resolution.

Chapter 7 Plan Implementation and Maintenance

Requirement §201.6(c)(4): [The plan maintenance process shall include a] section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a five-year cycle.

Implementation and maintenance of this 2019 LHMP is critical to the overall success of hazard mitigation planning. This is Planning Step 10 of the 10-step planning process. This chapter provides an overview of the overall strategy for plan implementation and maintenance and outlines the method and schedule for monitoring, updating, and evaluating the Plan. The chapter also discusses incorporating the Plan into existing planning mechanisms and how to address continued public involvement.

7.1 Implementation

Once adopted, this Plan faces the truest test of its worth: implementation. While this Plan contains many worthwhile actions, the City will need to decide which action(s) to undertake first. Two factors will help with making that decision: the priority assigned the actions in the planning process and funding availability. Low or no-cost actions most easily demonstrate progress toward successful plan implementation.

An important implementation mechanism that is highly effective and low-cost is incorporation of the LHMP recommendations and their underlying principles into other plans and mechanisms, such as strategic plans, earthquake and stormwater plans, Emergency Operations Plans (EOPS), evacuation plans, and other hazard and emergency management planning efforts for Piedmont. The City already implements policies and programs to reduce losses to life and property from hazards. This Plan builds upon the momentum developed through previous and related planning efforts and mitigation programs and recommends implementing actions, where possible, through these other program mechanisms.

Mitigation is most successful when it is incorporated into the day-to-day functions and priorities of the City of Piedmont. Implementation can be accomplished by adhering to the schedules identified for each action and through constant, pervasive, and energetic efforts to network and highlight the multi-objective, win-win benefits to each program and the Piedmont community and its stakeholders. This effort is achieved through the routine actions of monitoring agendas, attending meetings, and promoting a safe, sustainable community. Additional mitigation strategies could include consistent and ongoing enforcement of existing policies and vigilant review of programs for coordination and multi-objective opportunities.

Simultaneous to these efforts, it is important to maintain a constant monitoring of funding opportunities that can be leveraged to implement some of the more costly recommended actions. This could include creating and maintaining a bank of ideas on how to meet local match or participation requirements. When funding does become available, the City will be in a better position to capitalize on the opportunity. Funding opportunities to be monitored include special pre- and post-disaster funds, state and federal programs and earmarked funds, benefit assessments, and other state and federal grant programs, including those that can serve or support multi-objective applications.

Responsibility for Implementation of Goals and Activities

The appointed officials and staff appointed to head each department within the City are charged with implementation of various activities in this LHMP. During the annual reviews as described later in this section, an assessment of progress on each of the goals and activities in this LHMP should be determined and noted. At that time, recommendations were made to modify timeframes for completion of activities, funding resources, and responsible entities. On an annual basis, the priority standing of various activities may also be changed. Some activities that are found not to be doable may be deleted from this LHMP entirely and activities addressing problems unforeseen during development of the Plan may be added.

7.1.1. Role of Hazard Mitigation Planning Committee (HMPC) in Implementation and Maintenance

With adoption of this plan, Piedmont will be responsible for the plan implementation and maintenance. The HMPC identified in Appendix A (or a similar committee) will reconvene annually each year to ensure mitigation strategies are being implemented and the City continues to maintain compliance with the NFIP and other applicable mitigation programs. As such, Piedmont will continue its relationship with the HMPC, and:

- Act as a forum for hazard mitigation issues;
- Disseminate hazard mitigation ideas and activities to all participants;
- Pursue the implementation of high-priority, low/no-cost recommended actions;
- Ensure hazard mitigation remains a consideration for City decision makers;
- Maintain a vigilant monitoring of multi-objective cost-share opportunities to help the City implement the Plan's recommended actions for which no current funding exists;
- Monitor and assist in the implementation and update of this LHMP;
- Report on Plan progress and recommended changes to the City governing board; and
- Inform and solicit input from the public.

The primary duty of the City is to see this LHMP successfully carried out and to report to their governing board and the public on the status of plan implementation and mitigation opportunities. Other duties include reviewing and promoting mitigation proposals, considering stakeholder concerns about hazard mitigation, passing concerns on to appropriate entities, and posting relevant information on the City website.

7.2 Maintenance

Plan maintenance implies an ongoing effort to monitor and evaluate plan implementation and to update this Plan as progress, roadblocks, or changing circumstances are recognized.

7.2.1. Maintenance Schedule

The Piedmont Planning Department is responsible for initiating plan reviews. In order to monitor progress and update the mitigation strategies identified in the mitigation action plan, the Piedmont Planning Department and the HMPC will revisit this Plan annually each year and following a hazard event. The HMPC will meet annually to review progress on plan implementation. The HMPC will also submit a five-year written update to the State and FEMA Region IX, unless disaster or other circumstances (e.g., changing regulations) require a change to this schedule. With this LHMP anticipated to be fully approved and adopted in mid-2019, the next LHMP Update for the City of Piedmont will occur in 2024.

7.2.2. Maintenance Evaluation Process

Evaluation of progress can be achieved by monitoring changes in vulnerabilities identified in this LHMP. Changes in vulnerability can be identified by noting:

- Decreased vulnerability as a result of implementing recommended actions;
- Increased vulnerability as a result of failed or ineffective mitigation actions; and/or
- Increased vulnerability as a result of new development (and/or annexation).
- Increased vulnerability resulting from unforeseen or new circumstances.

Updates to this Plan will:

- Consider changes in vulnerability due to action implementation;
- Document success stories where mitigation efforts have proven effective;
- Document areas where mitigation actions were not effective;
- Document any new hazards that may arise or were previously overlooked;
- Incorporate new data or studies on hazards and risks;
- Incorporate new capabilities or changes in capabilities;
- Incorporate growth and development-related changes to infrastructure inventories; and
- Incorporate new action recommendations or changes in action prioritization.

Changes will be made to this LHMP to accommodate actions that have failed or are not considered feasible after a review of their consistency with established criteria, time frame, City priorities, and/or funding resources. All mitigation actions will be reviewed as well during the monitoring and update of this LHMP to determine feasibility of future implementation. Updating of this Plan will be by written changes and submissions, as the HMPC deems appropriate and necessary, and as approved by the City governing board. In keeping with the five-year update process, the HMPC will convene public meetings to solicit public input on this LHMP and its routine maintenance and the final product will be again adopted by the City Council.

Annual Plan Review Process

For this LHMP review process, Piedmont Planning Department, as lead will be responsible for facilitating, coordinating, and scheduling reviews and maintenance of this LHMP. The LHMP is intended to be a living document. The review of this 2019 LHMP will normally occur on an annual basis each year and will be conducted by the HMPC as follows:

- The Piedmont Planning Department will place an advertisement in the local newspaper advising the public of the date, time, and place for each annual review of the LHMP and will be responsible for leading the meeting to review this LHMP.
- Notices will be mailed to the members of the HMPC, federal, state, and local agencies, non-profit groups, local planning agencies, representatives of business interests, neighboring communities, and others advising them of the date, time, and place for the review.
- City officials will be noticed by email and telephone or personal visit and urged to participate.

- Prior to the review, department heads and others tasked with implementation of the various activities will be queried concerning progress on each activity in their area of responsibility and asked to present a report at the review meeting.
- The local news media will be contacted, and a copy of the current Plan will be available for public comment on the Piedmont LHMP website.
- After the review meeting, minutes of the meeting and an annual report will be prepared by the HMPC and forwarded to the news media (public) and all City departments. The report will also be presented to the Piedmont City Council for review, and a request will be made that the City Council take action to recognize and adopt any changes resulting from the review.
- A copy of the 2019 LHMP will be continually posted on the City's website as will the annual status report.

Criteria for Annual Reviews

The criteria recommended in 44 CFR 201 and 206 will be utilized in reviewing and updating this LHMP. More specifically, the reviews should include the following information:

- City growth or change in the past year.
- The number of substantially damaged or substantially improved structures by flood zone.
- The renovations to City infrastructure including water, sewer, drainage, roads, bridges, gas lines, and buildings.
- Natural hazard occurrences that required activation of the Emergency Operations Center (EOC) and whether or not the event resulted in a presidential disaster declaration.
- Natural hazard occurrences that were not of a magnitude to warrant activation of the EOC or a federal disaster declaration but were severe enough to cause damage in the City or closure of offices, schools, or public services.
- The dates of hazard events descriptions.
- Documented damages due to the event.
- Closures of places of employment or schools and the number of days closed.
- Road or bridge closures and other school access routes due to the hazard and the length of time closed.
- Assessment of the number of City buildings damaged and whether the damage was minor, substantial, major, or if buildings were destroyed.
- Review of any changes in federal, state, and local policies to determine the impact of these policies on the City and how and if the policy changes can or should be incorporated into the LHMP.
- Review of the status of implementation of projects and actions (mitigation strategies) including projects completed will be noted. Projects behind schedule will include a reason for delay of implementation.

7.2.3. Incorporation into Existing Planning Mechanisms

Another important implementation mechanism that is highly effective and low-cost is incorporation of these 2019 LHMP recommendations and their underlying principles into other City plans and mechanisms. Where possible, the City will use existing plans and/or programs to implement hazard mitigation actions. As previously stated in Section 7.1 of this plan, mitigation is most successful when it is incorporated into the day-to-day functions and priorities of government and development. The point is re-emphasized here. As described in this Plan's capability assessment, the City already implements policies and programs to reduce losses to life and property from hazards. This LHMP builds upon the momentum developed through previous and related planning efforts and mitigation programs and recommends implementing actions, where possible, through these other program mechanisms. These existing mechanisms include:

- City General and strategic plans
- City Emergency Operations Plans and other emergency management efforts
- City regulations and requirements
- Earthquake Plans
- Flood/stormwater, and Fire protection plans
- Capital improvement plans and budgets
- Other plans and policies outlined in the capability assessment
- Other plans, regulations, and practices with a mitigation focus

HMPC members involved in these other planning mechanisms will be responsible for integrating the findings and recommendations of this LHMP with these other plans, programs, etc., as appropriate. As described in Section 7.1 Implementation, incorporation into existing planning mechanisms will be done through the routine actions of:

- monitoring other planning/program agendas;
- attending other planning/program meetings;
- participating in other planning processes; and
- monitoring community budget meetings for other City program opportunities.

The successful implementation of this mitigation strategy will require constant and vigilant review of existing plans and programs for coordination and multi-objective opportunities that promote a safe, sustainable community.

Examples of incorporation of the LHMP into existing programs and planning mechanisms include:

1. As recommended by Assembly Bill 2140, the City should adopt (by reference or incorporation) this LHMP into the Safety Element of their General Plan. Evidence of such adoption (by formal, certified resolution) shall be provided to CAL OES and FEMA.
2. Integration of wildfire actions identified in this mitigation strategy and those established in existing and in process CWPPs and other City fire mitigation plans and programs. Key people responsible for mitigation of the wildfire hazard in the City participated on the HMPC. City wildfire projects were identified and integrated into this LHMP. Actual implementation of these projects will likely occur through existing fire department plans and programs and as part of the City-specific CWPP to be developed.
3. Integration of this LHMP into future updates of the City's Climate Adaptation Plan 2.0 (CAP). It is anticipated that this LHMP will be used to inform any CAP updates and conversely risk and vulnerability data and climate adaptation strategies developed for future CAP updates will be integrated into future updates of this LHMP for the City.
4. Use of the LHMP risk assessment and other information to update the hazard analysis in future updates of the City's Emergency Operations Plans and other emergency planning efforts for the City.

Efforts should continuously be made to monitor the progress of mitigation actions implemented through these other program and planning mechanisms and, where appropriate, their priority actions should be incorporated into updates of this hazard mitigation plan.

7.2.4. Continued Public Involvement

Continued public involvement is imperative to the overall success of this LHMP's implementation. The update process provides an opportunity to solicit participation from new and existing stakeholders and to publicize success stores from the plan implementation and seek additional public comment. The LHMP maintenance and update process will include continued public and stakeholder involvement and input through attendance at designated City meetings, web postings, press releases to local media, and through public hearings.

Public Involvement Process for Annual Reviews

The public will be noticed by placing an advertisement in the newspaper specifying the date and time for the review and inviting public participation. The HMPC, local, state, and regional agencies will be notified and invited to attend and participate.

Public Involvement for Five-year Update

When the HMPC reconvenes for the update, they will coordinate with all stakeholders participating in the planning process—including those that joined the committee since the planning process began—to update and revise this LHMP. In reconvening, the HMPC will identify a public outreach strategy involving the greater public. The strategy will include a plan for public involvement and will be responsible for disseminating information through a variety of media channels detailing the plan update process. As part of this effort, public meetings will be held and public comments will be solicited on the next plan update draft.

Appendix A Planning Process

A.1 Lists of HMPC Invites/Stakeholders

Table A-1 Initial LHMP Invite List

Department	Name and Title	Email
Administration	Paul Benoit, City Administrator	pbenoit@piedmont.ca.gov
City Council	Jennifer Cavanaugh, Council member	jcavenaugh@piedmont.ca.gov
City Council	Betsy Andersen, Council member	bandersen@piedmont.ca.gov
Fire	Scott Barringer	sbarringer@piedmont.ca.gov
Fire	Bud McLeran, Interim Fire Chief	bmcleran@piedmont.ca.gov
Fire	Jon Fitzpatrick, Fire Captain	jfitzpatrick@piedmont.ca.gov
Fire	Scott Barringer	sbarringer@piedmont.ca.gov
Fire Marshall		
Planning	Kevin Jackson, Planning Director	kjackson@piedmont.ca.gov
Planning	Chris Yeager, Assistant Planner	cyeager@piedmont.ca.gov
Planning	Mira Hahn, Assistant Planner	mhahn@piedmont.ca.gov
Planning	Pierce MacDonald-Powell, Senior Planner	pmacdonald@piedmont.ca.gov
Parks	Nancy Kent, Parks Project Manager	nkent@piedmont.ca.gov
Public Works/CIP	Chester Nakahara, Public Works Director	cnakahara@piedmont.ca.gov
Building Official	Craig Griffin, Building Official	cgriffin@piedmont.ca.gov
Public Works Supervisor/Maintenance	Dave Frankle	dfrankle@piedmont.ca.gov
Engineering	Coastland - John Wanger	wanger@coastlandcivil.com
Recreation	Sara Lillivand, Director of Recreation	slillivand@piedmont.ca.gov
IT	Alex Yang	ayang@piedmont.ca.gov
Police	Jeremey Bowers, Chief of Police	jbowers@piedmont.ca.gov
Police	C. Monahan	cmonahan@piedmont.ca.gov
PIO	John Tulloch, City Clerk	jtulloch@piedmont.ca.gov
Climate Change	Civic Spark/Climate Corp Intern - Brooke Edell	
City Attorney	Sergio Rudin	SRudin@bwslaw.com
PUSD	Randall Booker, Superintendent	rbooker@piedmont.k12.ca.us
AC Sherriff	Pace Stokes, Captain OES	PStokes@acgov.org
AC Fire Department		

Department	Name and Title	Email
StopWaste	Tom Padia, Deputy Executive Director	tpadia@stopwaste.org
PGE	Elena Trujillo, Customer Relationship Manager	emti@pge.com
EBMUD	Charles Bohlig	charles.bohlig@ebmud.com
EBMUD	Clifford Chan, Director of Operations and Maintance	
EBMUD	Andrea Chen	Andrea.chen@embud.com
EBMUD	Kin Lee	Kin.lee@ebmud.com
EBMUD	Steve Frew	Steve.frew@ebmud.com
FEMA Region IX - Haz Mit	Sarah Owen	sarah.owen@fema.dhs.gov
FEMA Region IX - Planning	Alison Kearns	alison.kearns@fema.dhs.gov
Cal OES	Victoria LaMar-Haas	Victoria.LaMar-Haas@CalOES.ca.gov
CalOES	Matt Medland	matt.medland@CalOES.ca.gov
Cal DWR		
CAL FIRE	Jeff Hakala, Captain, Land Use Planning Program	jeff.hakala@fire.ca.gov
CAL FIRE	Carmel Mitchell, Battalion Chief, Land Use Planning Program	carmel.mitchell@fire.ca.gov
CAL FIRE	Mike Marcucci	Mike.marcucci@fire.ca.gov
CAL FIRE	Bryan Giambrone	Bryan.giambrone@fire.ca.gov
Diablo Fire Safe Council	Cheryl Miller, Executive Director	DFSCMiller@comcast.net
CGS - Earthquake Program		
Fish and Wildlife	Marcia Grefsrud	marcia.grefsrud@wildlife.ca.gov
National Weather Service	Brian Garcia	brian.garcia@noaa.gov
Red Cross		
U.S. Army Corp of Engineers	Will Connor	william.m.connor@usace.army.mil
Alameda Health Systems		
Kaiser Hospital		
Childrens Hospital		
Oakland	Devan Reiff, Strategic Planning	dreiff@oaklandnet.com
Berkeley	Timothy Burroughs, Director of Planning	tburroughs@cityofberkeley.info
Emeryville	Charles Bryant, Planning and Building Director	cbryant@emeryville.org
Albany	Jeff Bond, Community Development Director	jbond@albanyca.org
Alameda County Planning	Albert Lopez	albert.lopez@acgov.org
SPUR		
MTC	Harold Brazil	hbrazil@bayareametro.gov

Department	Name and Title	Email
ACTC	Saravana Suthanthira	ssuthanthira@alamedactc.org
ABAG	Dana Brechwald, Regional Resilience Specialist	danab@abag.ca.gov
Alameda County OES	Paul Hess	phess@acgov.org
Alameda County OES	Domingo Cabrera	dcabrerajr@ac.gov
California Earthquake Authority	Janiele Maffei	jmaffei@calquake.com
League of California Cities	Samantha Caygill	scaygill@cacities.org
BAAQMD	Abby Young	ayoung@baaqmd.gov
Foster Morrison	Jeanine Foster	jeanine.foster@fostermorrison.com
Foster Morrison	Chris Morrison	chris.morrison@fostermorrison.com
Howell Consulting	Brenna Howell	brenna@brennahowell.com

Table A-2 HMPC Participant List

Department	Name and Title	Email
Internal Stakeholders		
Administration	Paul Benoit, City Administrator	pbenoit@piedmont.ca.gov
City Council	Jennifer Cavanaugh, Council member	jcavenaugh@piedmont.ca.gov
City Council	Betsy Andersen, Council member	bandersen@piedmont.ca.gov
Fire	Scott Barringer	sbarringer@piedmont.ca.gov
Fire	Zach Heliker	zheliker@piedmont.ca.gov
Fire	Bret Black	bblack@piedmont.ca.gov
Planning	Kevin Jackson, Planning Director	kjackson@piedmont.ca.gov
Planning	Chris Yeager, Assistant Planner	cyeager@piedmont.ca.gov
Public Works/CIP	Chester Nakahara, Public Works Director	cnakahara@piedmont.ca.gov
Engineering	Coastland - John Wanger	wanger@coastlandcivil.com
Recreation	Sara Lillivand, Director of Recreation	slillivand@piedmont.ca.gov
IT	Alex Yang	ayang@piedmont.ca.gov
Police	Jeremey Bowers, Chief of Police	jbowers@piedmont.ca.gov
Police	C. Monahan	cmonahan@piedmont.ca.gov
Climate Change	Civic Spark/Climate Corp Intern - Brooke Edell	bedell@piedmont.ca.gov
External Stakeholders		
EBMUD	Andrea Chen	Andrea.chen@embud.com
EBMUD	Kin Lee	Kin.lee@ebmud.com
EBMUD	Steve Frew	Steve.frew@ebmud.com

Department	Name and Title	Email
CAL FIRE	Jeff Hakala, Captain, Land Use Planning Program	jeff.hakala@fire.ca.gov
CAL FIRE	Mike Marcucci	Mike.marcucci@fire.ca.gov
CAL FIRE	Bryan Giambrone	Bryan.giambrone@fire.ca.gov
Alameda County OES	Paul Hess	phess@acgov.org
Alameda County OES	Domingo Cabrera	dcabrerajr@ac.gov
California Earthquake Authority	Janiele Maffei	jmaffei@calquake.com
Diablo Fire Safe Council	Cheryl Miller, Executive Director	DFSCMiller@comcast.net

A.2 Website for Hazard Mitigation Plan

A.3 Kickoff Meeting

A.3.1. Kickoff Meeting Invite to Stakeholders

Note: the HMPC Initial Invite List was bcc'd on the following email.

From: Chris Yeager <CYeager@piedmont.ca.gov>
Sent: Wednesday, August 1, 2018 5:34 PM
To: Chris Yeager <CYeager@piedmont.ca.gov>
Cc: Kevin Jackson <kjackson@piedmont.ca.gov>
Subject: City of Piedmont Local Hazard Mitigation Plan: Kickoff meeting

Greetings:

The City of Piedmont is kicking off efforts to develop a Local Hazard Mitigation Plan (LHMP) for the City. The purpose of the LHMP process is to help reduce the impacts of natural hazards to the citizens, property, and critical infrastructure in the City. The Disaster Mitigation Act of 2000 (DMA 2000) requires that local governments have a FEMA-approved Hazard Mitigation Plan in place in order to be eligible for certain pre- and post-disaster mitigation funding utilized to protect communities from future disaster-related losses. You are receiving this notice because we would like to invite you to take part in this plan update as a member of the Hazard Mitigation Planning Committee (HMPC).

City and agency participation and coordination is a requirement of an approved plan, as is the inclusion of any hazard data, information, and mitigation projects your department or agency may want to see included in the plan. Thus, your participation in this process is important and encouraged. Your input will be critical to the success of this project. Participation includes:

- Attending and participating in the HMPC meetings (5 anticipated over the next 7-8 months)
- Providing available data/information requested of the HMPC
- Reviewing and providing comments on the plan drafts

The City of Piedmont, Planning Department is taking the lead on coordinating this project for the City. A project kickoff meeting will be held at the following location and time:

September 6, 2018, 1:00 p.m. to 3:30 p.m.
Piedmont Community Hall
711 Highland Ave, Piedmont, CA 94611

The kickoff meeting will explain the process and how you can be involved. A public stakeholder meeting will also be held the evening of the same day of the kickoff meeting in the same location at 6:00 p.m.

Please RSVP and plan on attending or delegating attendance to this important meeting. If you are aware of other parties that may be interested, please forward this email or let me know and I will send them the invitation.

Let me know if you have any questions.

Sincerely,

Chris Yeager
Assistant Planner
City of Piedmont
120 Vista Avenue
Piedmont, CA 94611
Tel: (510) 420-3067

A.3.2. Kickoff Meeting Reminder Email to Stakeholders

Note: the HMPC Initial Invite List was bcc'd on the following email.

Good Morning:

I am sending a reminder of our kick-off meeting next week for the development of a Local Hazard Mitigation Plan. If you have not already done so, please RSVP.

The kickoff meeting will be held at the following location and time:

September 6, 2018, 1:00 p.m. to 3:30 p.m.
Piedmont Community Hall
711 Highland Ave, Piedmont, CA 94611

Thank you in advance and have a wonderful holiday weekend!

Chris Yeager
Assistant Planner
City of Piedmont
120 Vista Avenue
Piedmont, CA 94611
Tel: (510) 420-3067

A.3.3. Kickoff Meeting Agenda

CITY OF PIEDMONT
LOCAL HAZARD MITIGATION PLAN (LHMP)
HMPC MEETING #1
September 6, 2018

1. Introductions
2. Hazard Mitigation & the Disaster Mitigation Act Planning Requirements
3. The Role of the Hazard Mitigation Planning Committee (HMPC)
4. Planning for Public Input
5. Coordinating with other Agencies
6. Hazard Identification
7. Schedule
8. Data Needs
9. Questions and Answers

A.3.4. Kickoff Meeting Sign-in Sheets

SIGN-IN SHEET
City of Piedmont
LOCAL HAZARD MITIGATION PLANNING PROJECT
HMPC Kickoff Meeting #1
September 6, 2018

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
Jeanine Foster	jeanine.foster@fostermorrison.com	303 717 7171	Foster Morrison
Chris Yeager / Assistant Planner	cyeager89@gmail.com	510-420-3067	Piedmont Planning
Brenna Howell	brenna@brennahowell.com	916 202-2635	Howell Consulting
John Wanger	wanger@coastlandcivil.com jwanger@piedmont.gov	(707) 495-5201	City Engineer/Piedmont
mike Marcucci	mike.marcucci@fire.ca.gov	408 472 1603	CAL FIRE
SCOTT BARRINGER	SBARRINGER@PIEDMONT.CA.GOV	510-653-4372	PIEDMONT FIRE
Alex Yang	ayang@piedmont.ca.gov	510-833-2410	PIEDMONT IT
JEFF HAKALA	JEFF.HAKALA@FIRE.CA.GOV	530 410-5592	CAL FIRE LAND USE SAC
C. MONAHAN	CMONAHAN@PIEDMONT.CA.GOV	510 420 3012	PPD
Sara Lillevand	SLillevand@piedmont.ca.gov	420 3073	Piedmont Recreation Dept
Kevin Jackson	kjackson@piedmont.ca.gov	420 3037	Piedmont Planning Dept
CHESTER NAKAHARA	CNAKAHARA@PIEDMONT.CA.GOV	510-420-3061	PUBLIC WORKS

A.4 Risk Assessment Meetings

A.4.1. Emailed Invites to Risk Assessment Meetings

From: Chris Yeager <CYeager@piedmont.ca.gov>
Sent: Friday, November 30, 2018 5:06 PM
To: Chris Yeager; Paul Benoit; Bret Black; Mike Carlisle; Scott Barringer; Jon Fitzpatrick; Kevin Jackson; Mira Hahn; Pierce Macdonald-Powell; Nancy Kent; Chester Nakahara; Craig Griffin; David Frankel; John Wanger; Sara Lillevand; Alex Yang; Jeremy Bowers; Chris Monahan; Lisa Douglas; John O. Tulloch; Brooke Edell; SRudin@bwslaw.com; ppalmer@piedmont.k12.ca.us; rbooker@piedmont.k12.ca.us; pstokes@acgov.org; tlangdon@acgov.org; phess@acgov.org; tpadia@stopwaste.org; emti@pge.com; steven.frew@ebmud.com; charles.bohlig@ebmud.com; clifford.chan@ebmud.com; sarah.owen@fema.dhs.gov; alison.kearns@fema.dhs.gov; Victoria.LaMar-Haas@CalOES.ca.gov; matt.medland@CalOES.ca.gov; Janiene.Friend@water.ca.gov; jeff.hakala@fire.ca.gov; carmel.mitchell@fire.ca.gov; DFSCMiller@comcast.net; cgshq@conservation.ca.gov; marcia.grefsrud@wildlife.ca.gov; brian.garcia@noaa.gov; arcbainfo@redcross.org; william.m.connor@usace.army.mil; tburroughs@cityofberkeley.info; cbryant@emeryville.org; jbond@albanyca.org; albert.lopez@acgov.org; hbrazil@bayareametro.gov; ssuthanthira@alamedactc.org; danab@abag.ca.gov; scaygill@cacities.org; ayoung@baaqmd.gov; Jeanine Foster; Chris Morrison; brenna@brennahowell.com; rluna@oaklandca.gov
Subject: Piedmont Local Hazard Mitigation Planning Committee meeting
When: Thursday, December 6, 2018 1:00 PM-4:00 PM (UTC-08:00) Pacific Time (US & Canada).
Where: Piedmont Community Hall 711 Highland Avenue Piedmont, CA 94611

Dear Hazard Mitigation Committee Member,

This is a reminder of the upcoming Piedmont Local Hazard Mitigation Planning Committee meeting. City and agency participation and coordination is a requirement of an approved plan, as is the inclusion of any hazard data, information, and mitigation projects your department or agency may want to see included in the plan. Thus, your participation in this process is important and encouraged. Your input will be critical to the success of this project. This Risk Assessment meeting will examine the hazards that pose a risk to the City. A public meeting will also be held during the evening in the same location at 6:00 p.m.

Our risk assessment meeting will be held at the Piedmont Community Hall located at 711 Highland Ave, Piedmont, CA 94611.

Parking is available around Piedmont Park. Parking enforcement has been notified of the meeting and they will not be enforcing the 2-hour time limit. You should not be ticketed, however, if you are, please provide me the ticket and I will make sure it gets expunged.

Let me know if you have questions prior to the meeting.

Thank you,

Chris Yeager
Associate Planner
City of Piedmont
120 Vista Avenue
Piedmont, CA 94611
Tel: (510) 420-3067

A.4.2. Risk Assessment Meeting Agenda

City of Piedmont
Local Hazard Mitigation Plan (LHMP) Update
Risk Assessment Meeting
December 6, 2018

1. Introductions
2. Status of the DMA Planning Process
3. Review (and discussions/input) of the Risk Assessment
4. Review of Data Needs
5. Questions
6. Next Steps

A.4.3. Risk Assessment Meeting Sign in Sheets

SIGN-IN SHEET
City of Piedmont
LOCAL HAZARD MITIGATION PLANNING PROJECT
~~**Public**~~ HMPC **Risk Assessment Meeting #2**
December 6, 2018

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
Chris Yeager	cyeager@piedmont.ca.gov	510-420-3067	City of Piedmont
C Monahan	CMonahan@Piedmont.CA.GOV	510 420 3012	Piedmont PD
Bret Black	bblack@piedmont.ca.gov	510-~~[illegible]~~ 693-4172	Piedmont Fire
Bryan Giambrone	Bryan.Giambrone@fire.ca.gov	[illegible]-4721616	CAL FIRE
Zach Heliker	Zheliker@piedmont.ca.gov	510-919-1398	Piedmont Fire
CHESTER NAKAHARA	CNAKAHARA@PIEDMONT.CA.GOV	510-420-3061	PUBLIC WORKS
JOHN WANGER	Jwanger@piedmont.ca.gov	(707)495-5201	City Engineer
Paul Benoit	pbenoit@piedmont.ca.gov		City Administrator
Jeremy Bowers	jbowers@piedmont.ca.gov	(510)420-3010	PPD
Paul Hess	phess@acgov.org	925-803-7904	ACSO OES
STEVE FRANO	steven.frano@ebmud.com	510-867-5292	EBMUD
Brooke Edell	b.edell@piedmont.ca.gov		Climate Corps Fellow Piedmont
Alex Yang	ayang@piedmont.ca.gov		Piedmont IT

SIGN-IN SHEET
City of Piedmont
LOCAL HAZARD MITIGATION PLANNING PROJECT
~~Public~~ Risk Assessment Meeting #2
HMPC **December 6, 2018**

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
SARA LILLEVAND / Recreation Director	Slillevand@piedmont.ca.gov	510 420 3070	City of Piedmont
Kevin Jackson	Kjackson@piedmont.ca.gov	510-420-3039	Planning Dir Piedmont
Jeanine Foster			Consultant
Brenna Howell			Consultant

A.5 Mitigation Strategy Meetings

A.5.1. Email Invites to Mitigation Strategy Meetings

From: Chris Yeager <CYeager@piedmont.ca.gov>
Sent: Thursday, December 13, 2018 12:35 PM
To: Chris Yeager; Paul Benoit; Bret Black; Mike Carlisle; Scott Barringer; Jon Fitzpatrick; Kevin Jackson; Mira Hahn; Pierce Macdonald-Powell; Nancy Kent; Chester Nakahara; Craig Griffin; David Frankel; John Wanger; Sara Lillevand; Alex Yang; Jeremy Bowers; Chris Monahan; Lisa Douglas; John O. Tulloch; Brooke Edell; SRudin@bwslaw.com; ppalmer@piedmont.k12.ca.us; rbooker@piedmont.k12.ca.us; pstokes@acgov.org; tlangdon@acgov.org; phess@acgov.org; tpadia@stopwaste.org; emti@pge.com; steven.frew@ebmud.com; charles.bohlig@ebmud.com; clifford.chan@ebmud.com; sarah.owen@fema.dhs.gov; alison.kearns@fema.dhs.gov; Victoria.LaMar-Haas@CalOES.ca.gov; matt.medland@CalOES.ca.gov; Janiene.Friend@water.ca.gov; jeff.hakala@fire.ca.gov; carmel.mitchell@fire.ca.gov; DFSCMiller@comcast.net; cgshq@conservation.ca.gov; marcia.grefsrud@wildlife.ca.gov; brian.garcia@noaa.gov; arcbainfo@redcross.org; william.m.connor@usace.army.mil; tburroughs@cityofberkeley.info; cbryant@emeryville.org; jbond@albanyca.org; albert.lopez@acgov.org; hbrazil@bayareametro.gov; ssuthanthira@alamedactc.org; danab@abag.ca.gov; scaygill@cacities.org; ayoung@baaqmd.gov; Jeanine Foster; Chris Morrison; brenna@brennahowell.com; rluna@oaklandca.gov; JMaffei@calquake.com; bgiambrone@fire.ca.gov
Subject: Piedmont Local Hazard Mitigation Committee Meeting 1
When: Tuesday, January 15, 2019 1:00 PM-4:00 PM (UTC-08:00) Pacific Time (US & Canada).
Where: Piedmont EOC, 403 Highland Avenue, Piedmont, CA 94611

You are invited to the 3rd and 4th planning team meetings for the development of the City of Piedmont's Local Hazard Mitigation Plan (LHMP). In September of 2018, Piedmont kicked-off its hazard mitigation planning effort. A 2nd risk assessment meeting was held last week on December 6.

These upcoming meetings will be held on January 15 & 16, and will begin the most important phase of our LHMP planning process – the Mitigation Strategy. During the first meeting, we will be briefly revisiting the risk assessment data developed to date and will again be looking for your feedback in refining and adding to this in-process Risk Assessment Chapter. We will also be establishing plan goals and objectives. During the second meeting, the planning team will be working to identify and evaluate potential mitigation actions for reducing the community's risk and vulnerability to identified hazards and disasters.

The meetings will be held as follows:

Tuesday, January 15 from 1:00 p.m. - 4:00 p.m.
Wednesday, January 16 from 9:00 a.m. - 12:00 p.m.

Both meetings will be in the EOC which is located within the Police Department at 403 Highland Avenue, Piedmont, CA 94611. Please enter the PD front doors and it is the only room to the left.

Please RSVP and plan on attending or delegating attendance to these important meetings. Everyone with mitigation project ideas should attend. City and agency participation and coordination is a requirement of an approved plan, as is the inclusion of any hazard data, information, and mitigation projects your department or agency may want to see included in the plan. Your continued participation and input is critical to the success of this project.

A.5.2. Mitigation Strategy Meeting Agenda

City of Piedmont
Local Hazard Mitigation Plan (LHMP)
Mitigation Strategy Meetings
January 15 & 16, 2019

HMPC Meeting #3:

1. Introductions
2. Status of the DMA Planning Process
3. Risk Assessment Update
4. Develop Plan Goals and Objectives
5. Identify and Review Mitigation Alternatives/Projects

HMPC Meeting #4:

1. Introductions
2. Identify and discuss Mitigation Alternatives/Projects
3. Review Mitigation Selection Criteria
4. Prioritize Mitigation Projects
5. Review of Schedule/Next Steps

A.5.3. Mitigation Strategy Meeting Sign in Sheets

SIGN-IN SHEET
City of Piedmont
LOCAL HAZARD MITIGATION PLANNING PROJECT
HMPC Risk Assessment Meeting #3
January 15, 2019

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
Jeanine Foster	jeanine.foster@fostermorrison.com	303 717-7171	Foster Morrison
Cheryl Mills	DRSC mills@ [illegible] net	510-282-1265	DRSC + HEF
DOMINGO CABRERA	DCABRERAJR @ ACGOV.ORG	510 504 1950	ACSO OES
KEVIN JACKSON	kjackson@piedmont.ca.gov	510 420 3039	City of Piedmont
BreT Black	bblack@piedmonT.CA.gov	510-693-4172	"
CHRIS MONAHAN	cmonahan@piedmont.ca.gov	510 420 3012	"
Jeremy Bowers	jbowers@piedmont.ca.gov	510-420-3010	"
JEFF HAKALA	JEFF.HAKALA@FIRE.CA.GOV	530 410-5592	CAL FIRE LAND USE
JANIELE MAFFEI	jmaffei@calquake.com	916 606 7505	Calif Earthquake Authority
CHESTER NAKAHARA	CNAKAHARA@PIEDMONT.CA.GOV	510 420 3061	CITY OF PIEDMONT
STEVE FREW	steven.frew@ebmud.com	510-867-5292	EBMUD
Kin Lee	kin.lee@ebmud.com	510-287-0448	EBMUD
Chris Yeager	cyeager@piedmont.ca.gov	510-420-3067	City of Piedmont

SIGN-IN SHEET
City of Piedmont
LOCAL HAZARD MITIGATION PLANNING PROJECT
HMPC Risk Assessment Meeting #3
January 15, 2019

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
Mike Marcucci ASST. Chief	Mike.Marcucci@fire.ca.gov	408 4721603	CAL FIRE

SIGN-IN SHEET
City of Piedmont
LOCAL HAZARD MITIGATION PLANNING PROJECT
HMPC Risk Assessment Meeting #4
January 16, 2019

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
Jeanne foster	jeanine.foster@fostermorrison.com	303 717-7171	Foster Morrison
DOMINGO CABRERA	DCABRERAJR@ACGOV.ORG	510 504 1950	ACSO OES
JEFF HAKALA	JEFF.HAKALA@FIRE.CA.GOV	530 410-5592	CAL FIRE LAND USE PLANNING
Kin Lee	kin.lee@ebmud.com	510-287-0448	EBMUD
andrea chen	andrea.chen@ebmud.com	510.287.7046	EBMUD
STEVE FREW	steven.frew@ebmud.com	510-867-5292	EBMUD
Chris Yeager	cyeager@piedmont.ca.gov	510-420-3067	Piedmont
Kevin Jackson	kjackson@piedmont.ca.gov	510 420 3051	City of Piedmont
Zach Helker	Zhelker@piedmont.CA.gov	510-919 1398	Piedmont Fire Department
mike Marcucci	Mike.Marcucci@fire.ca.gov	408 4721603	Mike.Marcucci@fire.ca.gov
JANIELE MAFFEI	jmaffei@calquake.com	916 606 7505	CALIF EQ AUTHORITY

SIGN-IN SHEET
City of Piedmont
LOCAL HAZARD MITIGATION PLANNING PROJECT
HMPC Risk Assessment Meeting #4
January 16, 2019

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
andrea chen / associate civil engineer	andrea.chen@ebmud.com	510.287.7046	EBMUD
Chris Monahan	CMonahan@Piedmont.CA.gov	510 420 3012	PPD

A.6 Final Team Meeting

A.6.1. Final Team Meeting Invite

From: Chris Yeager <CYeager@piedmont.ca.gov>
Sent: Monday, April 1, 2019 4:21 PM
To: Chris Yeager; Kevin Jackson
Cc: Paul Benoit; Bret Black; Mike Carlisle; Scott Barringer; Jon Fitzpatrick; Mira Hahn; Pierce Macdonald-Powell; Nancy Kent; Chester Nakahara; Craig Griffin; David Frankel; John Wanger; Sara Lillevand; Alex Yang; Jeremy Bowers; Chris Monahan; Lisa Douglas; John O. Tulloch; Brooke Edell; 'SRudin@bwslaw.com'; 'ppalmer@piedmont.k12.ca.us'; 'rbooker@piedmont.k12.ca.us'; 'pstokes@acgov.org'; 'tlangdon@acgov.org'; 'phess@acgov.org'; 'msoll@stopwaste.org'; 'emti@pge.com'; 'steven.frew@ebmud.com'; 'charles.bohlig@ebmud.com'; 'clifford.chan@ebmud.com'; 'sarah.owen@fema.dhs.gov'; 'alison.kearns@fema.dhs.gov'; 'Victoria.LaMar-Haas@CalOES.ca.gov'; 'matt.medland@CalOES.ca.gov'; 'Janiene.Friend@water.ca.gov'; 'jeff.hakala@fire.ca.gov'; 'carmel.mitchell@fire.ca.gov'; 'DFSCMiller@comcast.net'; 'cgshq@conservation.ca.gov'; 'marcia.grefsrud@wildlife.ca.gov'; 'brian.garcia@noaa.gov'; 'arcbainfo@redcross.org'; 'william.m.connor@usace.army.mil'; 'tburroughs@cityofberkeley.info'; 'cbryant@emeryville.org'; 'jbond@albanyca.org'; 'albert.lopez@acgov.org'; 'hbrazil@bayareametro.gov'; 'ssuthanthira@alamedactc.org'; 'mgermeraad@bayareametro.gov'; 'scaygill@cacities.org'; 'ayoung@baaqmd.gov'; 'jeanine.foster@fostermorrison.com'; 'chris.morrison@fostermorrison.com'; 'brenna@brennahowell.com'; 'rluna@oaklandca.gov'; 'JMaffei@calquake.com'; 'bgiambrone@fire.ca.gov'; 'mike.marcucci@fire.ca.gov'; 'dcabrerajr@acgov.org'; 'kin.lee@ebmud.com'; 'andrea.chen@ebmud.com'; Zach Heliker
Subject: Final Hazard Mitigation Planning Committee Meeting
When: Thursday, April 11, 2019 9:00 AM-12:00 PM (UTC-08:00) Pacific Time (US & Canada).
Where: Council Chambers

Hello Everyone,

Please see below information on the final steps for the City of Piedmont LHMP:

LHMP Public Review Draft and Public Meeting. The LHMP Public Review Draft is up on the City website for public review and comment. A hard copy of the LHMP has also been placed at Piedmont City Hall for review. A public meeting on the Draft LHMP Update will be held Wednesday, April 10 from 6-7:30 pm at the Piedmont EOC, Police Department, 403 Highland Avenue. A press release is being issued by the City. Please help get the word out to the public.

Final HMPC Meeting. Our final planning team meeting is scheduled for Thursday, April 11 from 9:00 a.m. – 11:00 a.m., in the Council Chambers at 120 Vista Avenue. It is important that everyone attend this final meeting to address any public comments received and to finalize all input to the plan. A calendar invite will follow.

Final LHMP Input. All final planning team input to the Draft LHMP needs to be provided **no later than April 11, the date of our final meeting.** Please take this time to download and review the document from the City website or from the project Dropbox. You will see the Public Review Draft folder.

Also included on the Dropbox is a master items to complete document that will assist in locating the yellow highlighted areas in the document where we still need planning team input. The green highlighted areas will be filled in by Foster Morrison. This information is critical to ensure our plan will be approved by Cal OES and FEMA.

If you have any questions, please contact myself or Jeanine.foster@fostermorrison.com or 303.717.7171.

Thank you for your continued engagement in the process.

Chris Yeager

Chris Yeager
Associate Planner
City of Piedmont
120 Vista Avenue
Piedmont, CA 94611
Tel: (510) 420-3067

A.6.2. Final Team Meeting Agenda

AGENDA
City of Piedmont
Local Hazard Mitigation Plan (LHMP)
Final Public Meeting
April 10, 2019

1. Introductions
2. Status of the LHMP Update Process
3. Addressing Public Comments
4. Public Input: Data/Projects
5. Next Steps

A.6.3. Final Team Meeting Sign in Sheet

SIGN-IN SHEET
City of Piedmont
LOCAL HAZARD MITIGATION PLANNING PROJECT
HMPC Final Meeting #5
April 11, 2019

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
Chris Yeager - Associate Planner	cyeager@piedmont.ca.gov	510-420-3067	Planning
JEFF HAKALA	JEFF.HAKALA@FIRE.CA.GOV	530-410-5592	CAL FIRE LU PP
Mike Marcucci	mike.marcucci@fire.ca.gov	4084721603	CAL FIRE SCU
Bret Black	bblack@piedmont.ca.gov	559-260-5437	Piedmont
Sara Lillevand	SLillevand@piedmont.ca.gov	420-3070	Pied.
CHESTER NAKAHARA	CNAKAHARA@PIEDMONT.CA.GOV	510-420-3061	CITY
KEVIN JACKSON	kjackson@piedmont.ca.gov	510 420 3039	City of Piedmont
CARL MONAHAN	CMONAHAN@PIEDMONT.CA.GOV	510 420 3012	"
Jeremy Bowers	jbowers@piedmont.ca.gov	510 420 3010	"

A.7 Public Involvement

A.7.1. Kickoff Meeting Press Release

CITY OF PIEDMONT
120 Vista Avenue, Piedmont, CA 94611 (510) 420-3040

Get Involved!

HELP YOUR COMMUNITY BE HAZARD-READY!

City of Piedmont, CA: A Local Hazard Mitigation Plan is being developed by the City of Piedmont. Fires, drought, earthquakes, and severe weather are just a few of the hazards to be addressed in the plan. While hazards such as these cannot be prevented, a Hazard Mitigation Plan forms the foundation for a community's long-term strategy to reduce disaster losses by breaking the repeated cycle of disaster damage and reconstruction. Additionally, only communities with a FEMA-approved Hazard Mitigation Plan are eligible to apply for both pre- and post-disaster mitigation grant funding.

Nationwide, taxpayers pay billions of dollars annually helping communities, organizations, businesses, and individuals recover from disaster. Some disasters are predictable and, in many cases, much of the damage can be reduced or even eliminated through hazard mitigation planning.

The people most aware of potential hazards are the people that live and work in the affected community. In addition to plan participation by local, state and federal agencies, the community is seeking all interested community members to hear more about our Local Hazard Mitigation Planning project. We encourage attendance and participation from the general public at our upcoming public meeting to kick off the project:

September 6, 2018
Public Meeting: 6:00 p.m. - 7:30 p.m.
Piedmont Community Hall
711 Highland Avenue
Piedmont, CA 94611

For additional information, please contact Chris Yeager at (510) 420-3067 or email at CYeager@piedmont.ca.gov.

A.7.2. Kickoff Meeting Article – Piedmont Post 8/18/2018

City to present Hazard Prevention Plan on Sept. 6

By Barry Eitel

The City of Piedmont announced on August 2 that it is developing a local hazard mitigation plan which it will describe at a public meeting on Thursday, September 6.

The plan will focus on planning for natural disasters, ranging from fires to long-lasting droughts to earthquakes. The plan will provide community-wide strategies for dealing with each.

"While hazards such as these cannot be prevented, a Hazard Mitigation Plan forms the foundation for a community's long-term strategy to reduce disaster losses by breaking the repeated cycle of disaster damage and reconstruction," Assistant Planner Chris Yeager said in a statement.

Yeager also noted that communities with Hazard Mitigation Plans approved by Federal Emergency Management Agency (FEMA) are eligible to apply for disaster mitigation grant funding both before and after hazards strike.

"Nationwide, taxpayers pay billions of dollars annually helping communities, organizations, businesses and individuals recover from disaster," Yeager continued. "Some disasters are predictable and, in many cases, much of the damage can be reduced or even eliminated through planning."

The Hazard Mitigation Plan will go beyond *Get Ready, Piedmont*, a disaster preparedness guide spearheaded by Lyman Shaffer and published by the City in 2016 when he was Chair of the Public Safety Committee.

The goal of that guide was that one member from each Piedmont household would be trained in disaster preparedness for their families, neighbors and communities. Copies of *Get Ready, Piedmont* are available for free at City Hall, 120 Vista Avenue.

The Hazard Mitigation Plan will be officially submitted to FEMA, unlike *Get Ready, Piedmont.*

The public meeting for the Hazard Mitigation Plan will take place at 6 p.m. to 7:30 p.m. at the Community Hall. It will be led by

See PLAN on page 3

INSIDE

Plan

Continued from page 3

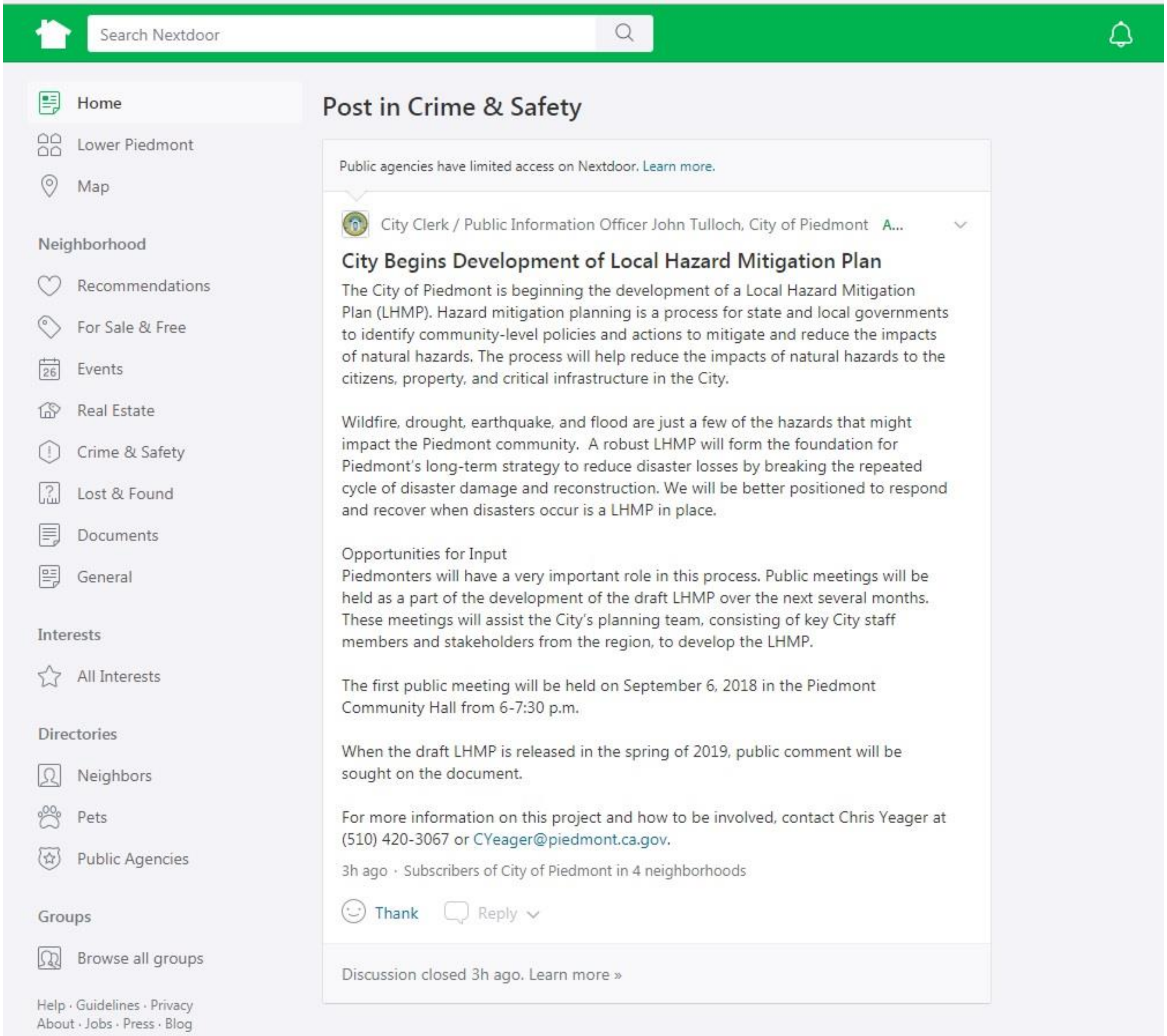
representatives from the Planning Department.

The City is interested in hearing from residents because they are often extremely concerned about how natural disaster would impact them.

"The people most aware of potential hazards are the people that live and work in the affected community," Yeager explained. "In addition to participation by local, state and federal agencies, the community is seeking all interested community members to hear more about our Local Hazard Mitigation Planning project."

For additional information, residents may contact him at 420-3067 or cyeager@piedmont.ca.gov.

A.7.3. Kickoff Meeting Post on Nextdoor.com



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Groups
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Post in Crime & Safety

Public agencies have limited access on Nextdoor. Learn more.

City Clerk / Public Information Officer John Tulloch, City of Piedmont A...

City Begins Development of Local Hazard Mitigation Plan

The City of Piedmont is beginning the development of a Local Hazard Mitigation Plan (LHMP). Hazard mitigation planning is a process for state and local governments to identify community-level policies and actions to mitigate and reduce the impacts of natural hazards. The process will help reduce the impacts of natural hazards to the citizens, property, and critical infrastructure in the City.

Wildfire, drought, earthquake, and flood are just a few of the hazards that might impact the Piedmont community. A robust LHMP will form the foundation for Piedmont's long-term strategy to reduce disaster losses by breaking the repeated cycle of disaster damage and reconstruction. We will be better positioned to respond and recover when disasters occur is a LHMP in place.

Opportunities for Input
Piedmonters will have a very important role in this process. Public meetings will be held as a part of the development of the draft LHMP over the next several months. These meetings will assist the City's planning team, consisting of key City staff members and stakeholders from the region, to develop the LHMP.

The first public meeting will be held on September 6, 2018 in the Piedmont Community Hall from 6-7:30 p.m.

When the draft LHMP is released in the spring of 2019, public comment will be sought on the document.

For more information on this project and how to be involved, contact Chris Yeager at (510) 420-3067 or CYeager@piedmont.ca.gov.

3h ago · Subscribers of City of Piedmont in 4 neighborhoods

Thank Reply

Discussion closed 3h ago. Learn more »

A.7.4. Kickoff Meeting Public Meeting – Piedmont Civic Association Website


Piedmont Civic Association
Piedmont, California

The Piedmont Civic Association is a volunteer organization dedicated to providing community news on local civic topics.

News | Opinion | About Us | Donate | FAQs | Participate

PCA

Click here to SUBMIT OPINION or ARTICLES

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Current Topics

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*Opinion Ltrs from Readers
Editorials from the PCA
Election News
Events
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News – City Budget
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News – Parks
News – Planning/Environ.
News – Police & Fire Safety
News – Pool
News – Recreation
News – School Budget
News – Schools
News – Sewer Funding
news – Taxes
News – Undergrounding
Other
Topics of Good Governance

Piedmont Hazard Mitigation Plan: Sept. 6 – 6:00 -7:30 PM

Aug 30 2018

Get involved! Piedmont begins process.

HELP PIEDMONT BE HAZARD-READY !

A Local Hazard Mitigation Plan is being developed by the City of Piedmont. Fires, drought, earthquakes, and severe weather are just a few of the hazards to be addressed in the plan. While hazards such as these cannot be prevented, a Hazard Mitigation Plan forms the foundation for a community's long-term strategy to reduce disaster losses by breaking the repeated cycle of disaster damage and reconstruction. Additionally, **only communities with a FEMA-approved Hazard Mitigation Plan are eligible to apply for both pre- and post-disaster mitigation grant funding.**

Nationwide, taxpayers pay billions of dollars annually helping communities, organizations, businesses, and individuals recover from disaster. Some disasters are predictable and, in many cases, much of the damage can be reduced or even eliminated through hazard mitigation planning.

The people most aware of potential hazards are the people that live and work in the affected community. In addition to plan participation by local, state and federal agencies, the community is seeking all interested community members to hear more about our Local Hazard Mitigation Planning project.

Piedmont encourages attendance and participation from the general public at our upcoming public meeting to kick off the project:

Thursday, September 6, 2018

Public Meeting: 6:00 p.m. – 7:30 p.m. Piedmont Community Hall

A.7.5. Kickoff Meeting – Public Agenda

CITY OF PIEDMONT
LOCAL HAZARD MITIGATION PLAN (LHMP)
PUBLIC MEETING #1
SEPTEMBER 6, 2018

1. Introductions
2. Hazard Mitigation & the Disaster Mitigation Act Planning Requirements
3. Hazard Identification and Profiles
4. Opportunities for Public Participation and Input
5. Schedule
6. Questions and Answers

A.7.6. Kickoff Meeting – Public Sign in Sheets

SIGN-IN SHEET
City of Piedmont
LOCAL HAZARD MITIGATION PLANNING PROJECT
Public Meeting #1
September 6, 2018

Name/Title	Email Address	Phone	Organization/ Affiliation
Chris Yeager/Assistant Planner	cyeager@piedmont.ca.gov	510-420-3067	Piedmont Planning
KEVIN JACKSON	kjackson@piedmont.ca.gov	510 420 3039	City of Piedmont, Planning
Jen Cavenaugh	jcavenaugh@ "	510.428.1442	City Council
Betsy Andersen	bandersen@ "	510-985-0498	City Council
Brenna Howell	brenna@brennahowell.com	(916)202-2635	Consultant.
Jeanine Foster	jeanine.foster@fostermorrison	303 717 7771	Foster Morrison

A.7.7. Risk Assessment Meeting Invitation to Public on Piedmont Civic Association Website


Piedmont Civic Association

Piedmont, California

The Piedmont Civic Association is a volunteer organization dedicated to providing community news on local civic topics.

PCA

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Help with the Piedmont Hazard Mitigation Plan

Nov 28 2018

Get involved! Public participation is needed.
HELP PIEDMONT BE HAZARD-READY!
A Local Hazard Mitigation Plan is currently being developed by the City of Piedmont.

Fires, drought, earthquakes, and severe weather are just a few of the hazards to be addressed in the plan.

While hazards such as these cannot be prevented, a Hazard Mitigation Plan forms the foundation for a community's long-term strategy to reduce disaster losses by breaking the repeated cycle of disaster damage and reconstruction. Additionally, **only communities with a FEMA-approved Hazard Mitigation Plan are eligible to apply for both pre- and post-disaster mitigation grant funding.**

Nationwide, taxpayers pay billions of dollars annually helping communities, organizations, businesses, and individuals recover from disaster. Some disasters are predictable and, in many cases, much of the damage can be reduced or even eliminated through hazard mitigation planning.

The people most aware of potential hazards are the people that live and work in the affected community. In addition to plan participation by local, state and federal agencies, the community is seeking all interested community members to hear more about our Local Hazard Mitigation Planning project. The City encourages attendance and participation from the general public at an upcoming public meeting:

Thursday, December 6, 2018
Public Meeting: 6:00 p.m. – 7:30 p.m.
Piedmont Community Hall
711 Highland Avenue
Piedmont, CA 94611

For additional information, please contact Chris Yeager at (510) 420-3067 or email at

A.7.8. Public Outreach for Risk Assessment Meeting

Volume 21, No. 7 Piedmont, California December 5, 2018 $1.00

CELEBRATING 21 YEARS

PIEDMONT POST

A COMMUNITY NEWSPAPER SERVING THE CITIZENS

Public meeting tomorrow on new Hazard Mitigation Plan

Plan required to receive FEMA disaster mitigation project grants

By Barry Eitel

The City is hosting a public meeting to provide input for Piedmont's Hazard Mitigation Plan tomorrow, Thursday, December 6 at 6:00 p.m. at the Community Hall, 711 Highland Avenue.

The Hazard Mitigation Plan and the meeting are aimed at preparing the City for future emergencies, to include fires, droughts and earthquakes.

"The goal of the meeting is to involve the people of Piedmont in the development of the plan," said Associate Planner Chris Yeager, who is helping guide the process. "The residents know this town better than anyone and it is important for them to share these insights about their neighborhoods and historic hazards so they can be incorporated into the plan. Together, we want to create a safer Piedmont."

The City currently does not have a Hazard Mitigation Plan. A plan is crucial for receiving project grants from the Federal Emergency Management Agency (FEMA).

"Once it is adopted, it allows the City to become eligible for both pre- and post-disaster funding for hazard mitigation projects from FEMA," Yeager continued.

Once adopted, the plan will need to be updated every five years.

The plan will focus on a plethora of disasters, with a particular focus on earthquakes and wildfires considering Piedmont's Northern California location.

"We will also be addressing mitigation measures for other hazards including climate change, dam failure [at nearby Tyson Lake], drought and water shortage, flooring, landslide, extreme heat, high winds, heavy rains and storms," noted Yeager.

The Hazard Mitigation Plan

See MITIGATION on page 32

Mitigation—

Continued from page 3

will go beyond *Get Ready, Piedmont*, a disaster preparedness guide published by the City in 2016. The goal of that guide was that one member from each Piedmont household would be trained in disaster preparedness for their families, neighbors and communities.

The Hazard Mitigation Plan will be officially submitted to FEMA.

Yeager noted that the Public Safety Committee has been discussing potential updates to *Get Ready, Piedmont*, the 52-page booklet produced several years ago by Lyman Shaffer and members of the Public Safety Committee. Copies of it are available at City Hall, 120 Vista Avenue.

> "Together, we want to create a safer Piedmont."
>
> --Chris Yeager
> Associated City Planner

The new Hazard Mitigation Plan will be added to other City documents.

"The Hazard Mitigation Plan will be integrated in the General Plan, and all plans and preparation documents going forward after its adoption," said Yeager.

The City encourages residents to attend the meeting. There was a successful first meeting regarding the plan in September.

"It is inevitable that a hazard will effect Piedmont at some point in the future and it is important that all residents are ready," according to Yeager. We will be better positioned to respond and recover when disasters occur with a hazard mitigation plan in place. Implementation of the plan will help reduce the impacts of natural hazards to the citizens, property and critical infrastructure in the City."

Anyone with questions or desiring more information should contact Yeager at (510) 420-3067 or CYeager@piedmont.ca.gov.

A.7.9. Risk Assessment Meeting – Public Agenda

CITY OF PIEDMONT
LOCAL HAZARD MITIGATION PLAN (LHMP)
PUBLIC MEETING #2
December 6, 2018

1. Introductions
2. LHMP Project Overview and Status
3. Risk Assessment Overview
4. Next Steps/Schedule
5. Questions and Answers

A.7.10. Risk Assessment Meeting – Public Sign in Sheets

SIGN-IN SHEET
City of Piedmont
LOCAL HAZARD MITIGATION PLANNING PROJECT
~~HMPC~~ Public Risk Assessment Meeting #2
December 6, 2018

Name/Title	Email Address	Phone	Department/Organization/ Affiliation
Jen Cavenaugh/Council Member			
Betsy Andersen/Councilmember			
Jim Crawford-Johnbiol Resident WWG			
Chris Yeager			Assoc. Planner
Kevin Jackson			
~~Ret~~ Jeanine Foster			
Brenna Howell			

A.7.11. Advertisement to Comment on Final Review of Plan in The Piedmonter on March 29, 2019 – Public

INSIDE THIS WEEK

Piedmont welcomes input on Hazard Mitigation Plan. Page A7

Is Jason Kidd a fit to replace Wyking Jones at Cal? Page B1

THE Piedmonter

FRIDAY, MARCH 29, 2019 $1.00 PIEDMONT'S COMMUNITY NEWSPAPER SINCE 1916 402

IN BRIEF

PIEDMONT

Public comment is welcomed on draft Hazard Mitigation Plan

The community is invited to review and comment on the draft Local Hazard Mitigation Plan being developed by the city of Piedmont.

Communities with a FEMA-approved plan are eligible to apply for pre- and post-disaster mitigation grant funding. The plan is scheduled to be finalized in April.

A final public meeting will be held to gather feedback and comments at 6 p.m. April 10 at the EOC at the police department, 403 Highland Ave., Piedmont. You may also send comments to cyeager@piedmont.ca.gov or call 510-420-3067.

A.7.12. Advertisement to Comment on Final Review of Plan in The Piedmonter on April 5, 2019 – Public

THE Piedmonter

FRIDAY, APRIL 5, 2019 $1.00 PIEDMONT'S COMMUNITY NEWSPAPER SINCE 1916 BayArea NewsGroup 402

Comment on Hazard Mitigation Plan

The community is invited to review and comment on the draft Local Hazard Mitigation Plan being developed by the city of Piedmont. Communities with a FEMA-approved plan are eligible to apply for pre- and post-disaster mitigation grant funding. The plan is scheduled to be finalized in April. A final public meeting will be held to gather feedback and comments at 6 p.m. April 10 at the EOC at the police department, 403 Highland Ave., Piedmont. You may also send comments to cyeager@piedmont.ca.gov or call 510-420-3067.

A.7.13. Article on Final Meeting from Piedmont Post on April 10, 2019

Volume 21, No. 24 Piedmont, California April 10, 2019 $1.00

CELEBRATING 21 YEARS

PIEDMONT POST

A COMMUNITY NEWSPAPER SERVING THE CITIZENS OF PIEDMONT

Final public meeting on Hazard Mitigation Plan tonight

Plan required to be eligible for FEMA grants

By Barry Eitel

Piedmont residents will have a chance to offer public comment on a proposed Hazard Mitigation Plan at a public meeting tonight, Wednesday, April 10 at 6 p.m. in the Police Department meeting room at 403 Highland Avenue.

The plan has been in the works for many months and the City has hosted public meetings on it since September.

The Hazard Mitigation Plan and the meeting are aimed at preparing the City for future emergencies, including fires, earthquakes and even droughts.

"The goal is to involve the people of Piedmont in the development of the plan," said Associate Planner Chris Yeager, who is helping guide the process. "The residents know this town better than anyone. It is important for them to share these insights about their neighborhoods and historic hazards so they can be incorporated into the plan. Together, we want to create a safer Piedmont."

The City currently does not have a Hazard Mitigation Plan. Such a plan is crucial to be eligible for grants from the Federal Emergency Management Agency (FEMA). Once adopted, the plan will need to be updated every five years.

The plan focuses particularly on earthquake and wildfires.

"We will also be addressing mitigation measures for other hazards including climate change, dam failure [at nearby Tyson Lake], drought and water shortage, flooding, landslide, extreme heat, high winds, heavy rains and storms," noted Yeager.

In all, the draft plan is

Hazard

Continued from page 1

402 pages. It is available to view online at www.ci.piedmont.ca.us/local-hazard-mitigation-plan-draft-available-for-comment/. Physical copies are available for review at City Hall.

Several hazards deemed "likely" to occur in Piedmont by the document include earthquakes, storm water flooding, mudslides, extreme heat, heavy storms, damaging winds and wildfires. The plan provides a detailed examination of preparing and dealing with these and other hazards, including climate change.

The Hazard Mitigation Plan will go beyond *Get Ready, Piedmont*, a disaster preparedness guide created by Lyman Schafer and published by the City in 2016. The Hazard Mitigation Plan will be officially submitted to FEMA, unlike *Get Ready, Piedmont*.

The goal of that guide was to train Piedmont families in disaster preparedness.

Copies of *Get Ready, Piedmont* are available for free at City Hall, 120 Vista Avenue.

Yeager noted the approved Hazard Mitigation Plan will be added to other City documents.

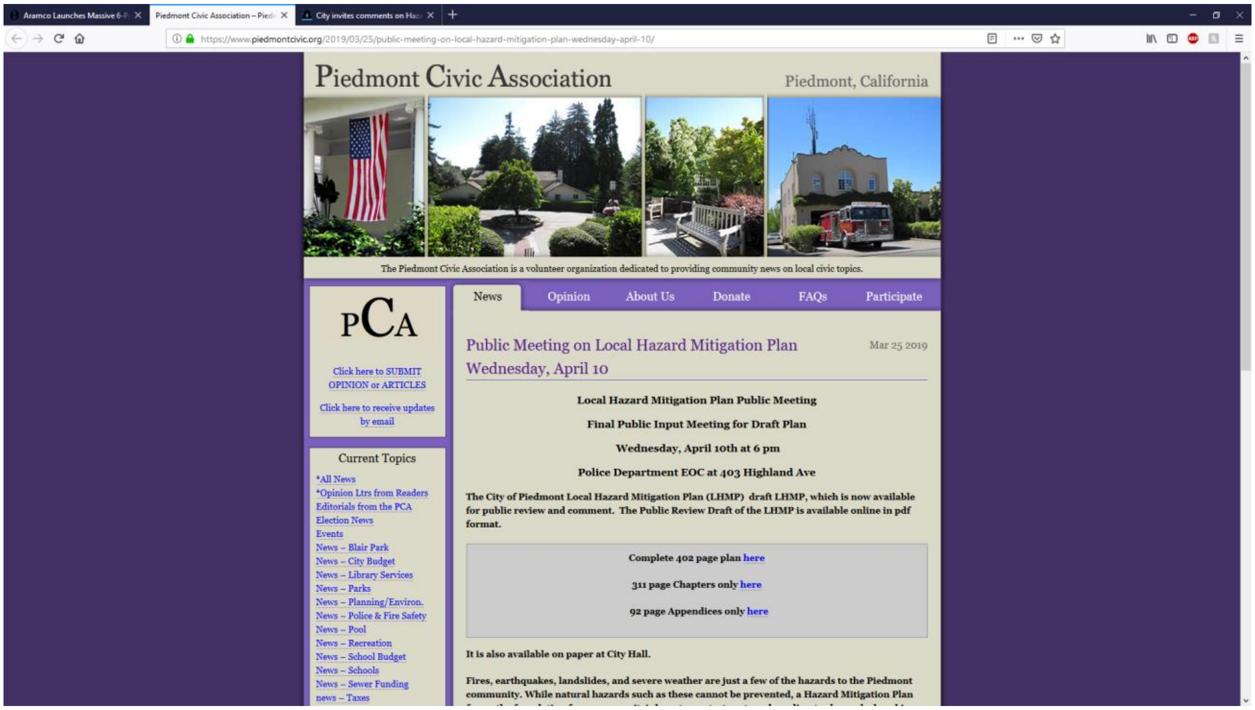
The Hazard Mitigation Plan will be integrated into Piedmont's General Plan, as well as all plans and preparation documents going forward after its adoption.

The City encourages residents to attend the meeting. Meetings in September and December of 2018 were very successful.

"Fires, earthquakes, landslides, and severe weather are just a few of the hazards to the Piedmont community," Yeager said in a statement. "While natural hazards such as these cannot be prevented, a Hazard Mitigation Plan forms the foundation for a community's long-term strategy to reduce disaster losses by breaking the repeated cycle of disaster damage and reconstruction."

Questions may be directed to Yeager at cyeager@piedmont.ca.gov, tel. 420-3067.

A.7.14. Final Meeting Article – Post on Piedmont Civic Association Website



https://www.piedmontcivic.org/2019/03/25/public-meeting-on-local-hazard-mitigation-plan-wednesday-april-10/

Piedmont Civic Association

Piedmont, California

The Piedmont Civic Association is a volunteer organization dedicated to providing community news on local civic topics.

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News – City Budget
News – Library Services
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News – Pool
News – Recreation
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Public Meeting on Local Hazard Mitigation Plan Wednesday, April 10

Mar 25 2019

Local Hazard Mitigation Plan Public Meeting

Final Public Input Meeting for Draft Plan

Wednesday, April 10th at 6 pm

Police Department EOC at 403 Highland Ave

The City of Piedmont Local Hazard Mitigation Plan (LHMP) draft LHMP, which is now available for public review and comment. The Public Review Draft of the LHMP is available online in pdf format.

Complete 402 page plan here

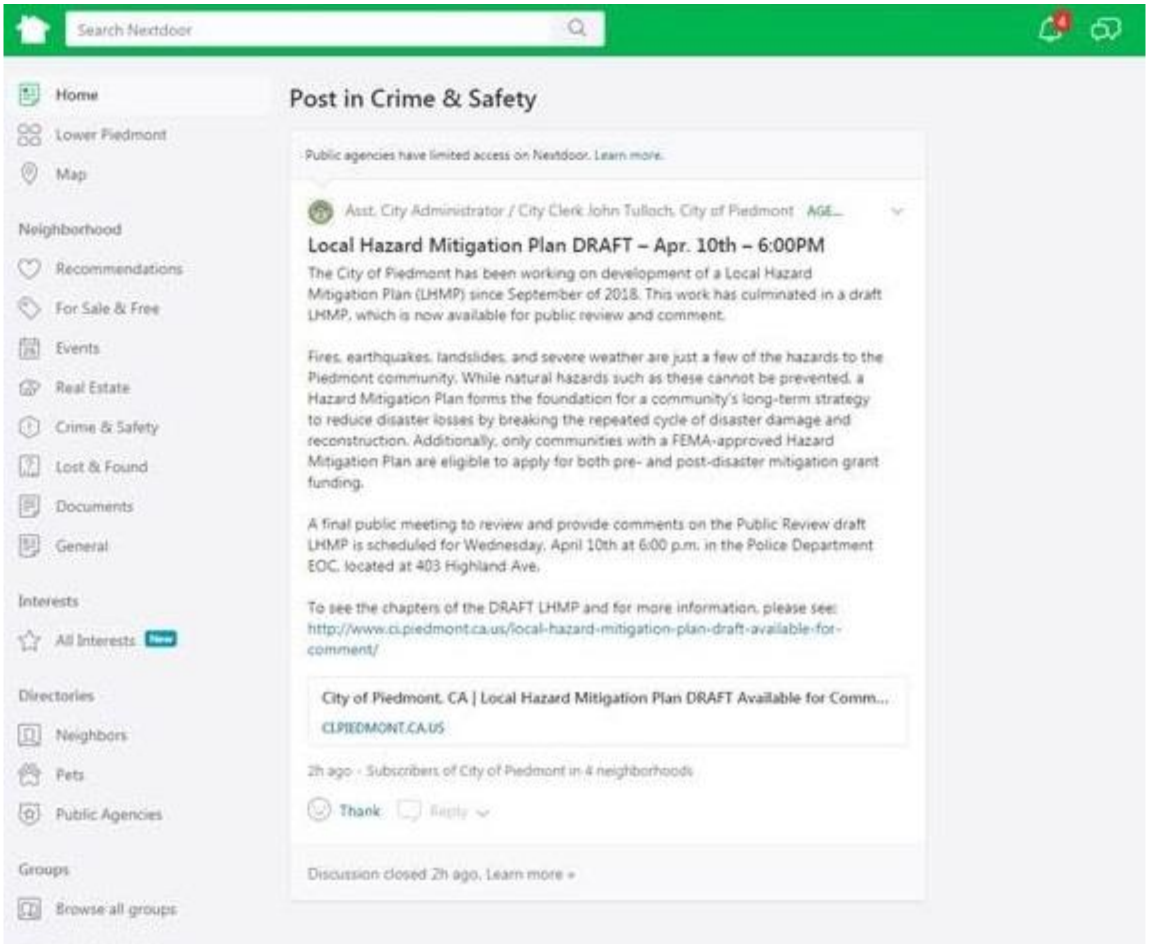
311 page Chapters only here

92 page Appendices only here

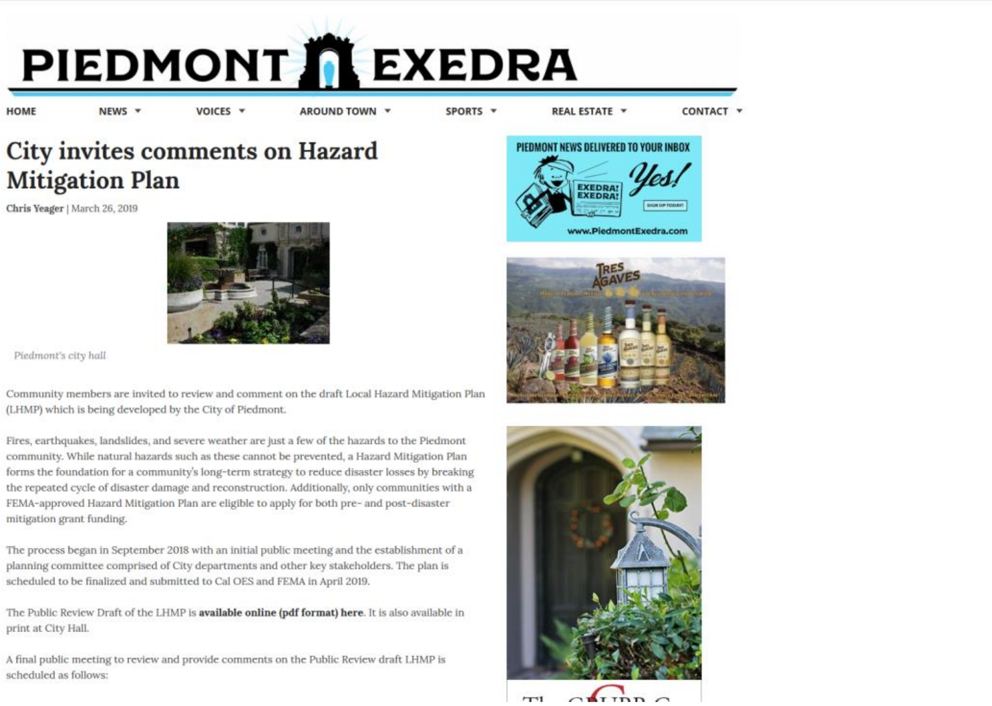
It is also available on paper at City Hall.

Fires, earthquakes, landslides, and severe weather are just a few of the hazards to the Piedmont community. While natural hazards such as these cannot be prevented, a Hazard Mitigation Plan

A.7.15. Final Meeting Post on Nextdoor.com



A.7.16. Final Meeting Article on Piedmont Exedra Website



PIEDMONT EXEDRA

HOME NEWS VOICES AROUND TOWN SPORTS REAL ESTATE CONTACT

City invites comments on Hazard Mitigation Plan

Chris Yeager | March 26, 2019

Piedmont's city hall

Community members are invited to review and comment on the draft Local Hazard Mitigation Plan (LHMP) which is being developed by the City of Piedmont.

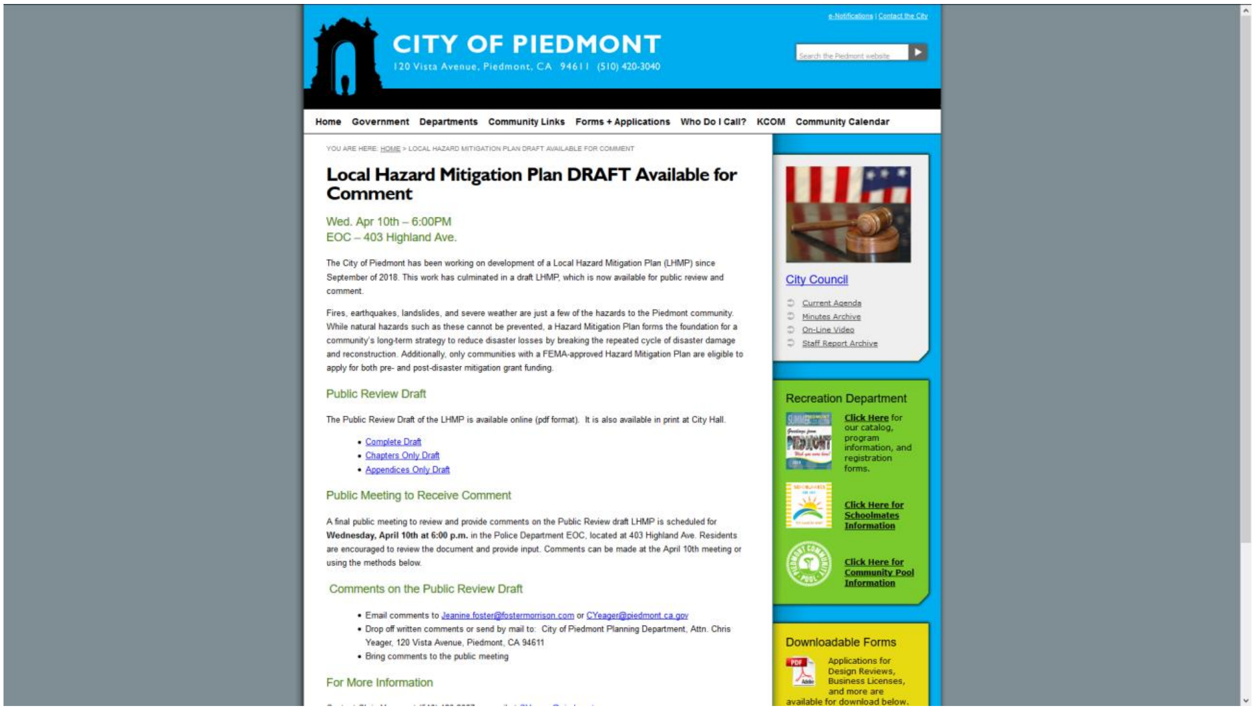
Fires, earthquakes, landslides, and severe weather are just a few of the hazards to the Piedmont community. While natural hazards such as these cannot be prevented, a Hazard Mitigation Plan forms the foundation for a community's long-term strategy to reduce disaster losses by breaking the repeated cycle of disaster damage and reconstruction. Additionally, only communities with a FEMA-approved Hazard Mitigation Plan are eligible to apply for both pre- and post-disaster mitigation grant funding.

The process began in September 2018 with an initial public meeting and the establishment of a planning committee comprised of City departments and other key stakeholders. The plan is scheduled to be finalized and submitted to Cal OES and FEMA in April 2019.

The Public Review Draft of the LHMP is **available online (pdf format) here**. It is also available in print at City Hall.

A final public meeting to review and provide comments on the Public Review draft LHMP is scheduled as follows:

A.7.17. Final Meeting Invite on City Website



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CITY OF PIEDMONT

120 Vista Avenue, Piedmont, CA 94611 (510) 420-3040

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YOU ARE HERE: HOME > LOCAL HAZARD MITIGATION PLAN DRAFT AVAILABLE FOR COMMENT

Local Hazard Mitigation Plan DRAFT Available for Comment

Wed. Apr 10th – 6:00PM
EOC – 403 Highland Ave.

The City of Piedmont has been working on development of a Local Hazard Mitigation Plan (LHMP) since September of 2018. This work has culminated in a draft LHMP, which is now available for public review and comment.

Fires, earthquakes, landslides, and severe weather are just a few of the hazards to the Piedmont community. While natural hazards such as these cannot be prevented, a Hazard Mitigation Plan forms the foundation for a community's long-term strategy to reduce disaster losses by breaking the repeated cycle of disaster damage and reconstruction. Additionally, only communities with a FEMA-approved Hazard Mitigation Plan are eligible to apply for both pre- and post-disaster mitigation grant funding.

Public Review Draft

The Public Review Draft of the LHMP is available online (pdf format). It is also available in print at City Hall.

- Complete Draft
- Chapters Only Draft
- Appendices Only Draft

Public Meeting to Receive Comment

A final public meeting to review and provide comments on the Public Review draft LHMP is scheduled for **Wednesday, April 10th at 6:00 p.m.** in the Police Department EOC, located at 403 Highland Ave. Residents are encouraged to review the document and provide input. Comments can be made at the April 10th meeting or using the methods below.

Comments on the Public Review Draft

- Email comments to Jeanine.foster@fostermorrison.com or CYeager@piedmont.ca.gov
- Drop off written comments or send by mail to: City of Piedmont Planning Department, Attn. Chris Yeager, 120 Vista Avenue, Piedmont, CA 94611
- Bring comments to the public meeting

For More Information

City Council

- Current Agenda
- Minutes Archive
- On-Line Video
- Staff Report Archive

Recreation Department

Click Here for our catalog, program information, and registration forms.

Click Here for Schoolmates Information

Click Here for Community Pool Information

Downloadable Forms

Applications for Design Reviews, Business Licenses, and more are available for download below.

A.7.18. Final Review of Plan – Public Agenda

AGENDA
City of Piedmont
Local Hazard Mitigation Plan (LHMP)
Final Public Meeting
April 10, 2019

1. Introductions
2. Status of the LHMP Update Process
3. Addressing Public Comments
4. Final HMPC Input: Data/Projects
5. Next Steps

A.7.19. Final Review of Plan – Public Sign in Sheets

SIGN-IN SHEET
City of Piedmont
LOCAL HAZARD MITIGATION PLANNING PROJECT
Final Public Meeting #3
April 10, 2019

Name/Title	Email Address	Phone	Organization/ Affiliation
Chris Yeager Associate Planner	cyeager@piedmont.ca.gov	510-420-3067	City of Piedmont
Jeanine Foster	jeanine.foster@fostermorrison	303717-7171	foster Morrison
Betsy Andersen	bandersen@piedmont.ca.gov		City of Piedmont
KEVIN JACKSON	kjackson@piedmont.ca.gov	510 420 3039	City of Piedmont
Jennifer Cavenaugh	jcavenaugh@piedmont "	510.428.1442	City of Piedmont

A.7.20. Public Comments Received During the Planning Process

Comment Date	Person Commenting	Comments	How addressed?
Dec 6, 2018	Citizen at Risk Assessment Meeting	It had been requested and discussed by several individuals that the LHMP should include information on the fair market value (FMV) of existing development with the City of Piedmont, instead of using the assessed values of property which are significantly lower than FMVs due to limitations imposed by Proposition 13.	The Alameda County Assessor data represents Best Available Data for the estimate of land and improved values for all parcels and structures within the City of Piedmont. In order to determine better values, the Zillow real estate site was reviewed to see if FMV estimates on a Citywide basis could be established. It was determined that values specific to the City of Piedmont, on a city-wide basis could not be readily extracted from the Zillow data due to various limitations in how their data is derived and presented. Another source of this information was explored through an expansion of data offered through Parcel Quest, the company that manages the parcel and assessor data for the City. While this information could be viewed on a parcel by parcel basis, it could only be obtained through Parcel Quest on a City-wide basis at a significant cost that was determined not worth the cost for this planning level document which is only required to rely on Best Available Data.

Comment Date	Person Commenting	Comments	How addressed?
Emailed on 4/11/2019	Rajeev Bhatia	Fire is correctly noted as a potentially catastrophic hazard in the draft plan. Having watched but escaped the devastating Oakland Hills fire and being aware of the potential dangers, please consider two suggestions to mitigating fire risks: • Very High Fire Hazard Severity Zone. A portion of Piedmont (see map attached from the Draft Plan) is in this zone. Please note that the City is required to implement several requirements in this area as per Government Code Section 51182, including vegetation clearance. City of Oakland does this achieving 98% compliance, and this requirement should be implemented in Piedmont as well, in consultation with the City's Fire Department. In addition, requirements for fire retardant construction for remodels should be adopted (fire rated roofs, walls, sprinklers for any additions that will increase home area to say beyond 3,000 s.f.) • Some cities require annual building code/fire inspections of all rented properties, with a fee for this charged as part of the business license. In Oakland, an owner is required to annually replace all fire alarm batteries, instruct renters, and provide certification to that effect. See Section15.64.300 - Rental property installation maintenance log of Oakland's code. Not sure if Piedmont is doing this, but if not, this should be a fairly easy/no cost to the City requirement for Piedmont to adopt.	The City does enforce vegetation clearances around structures as mandated by code. The City also inspects rental properties annually as mandated by code.
Emailed 4/10/2019	Betsy Andersen	appreciated the opportunity to review the draft Hazard Mitigation Plan in advance of the meeting tonight. I will bring my questions and comments to the meeting, but wanted to ask in advance about the omission of any monetary estimate related to our school district buildings/facilities. As a community, via bond measures, we have spent over a hundred million dollars on our PUSD buildings/ facilities in the last 20-30 years. So I am puzzled as to why the valuation of our PUSD buildings/facilities is not included in the calculation of possible damages from earthquakes, fire, etc.	The reason the information was not initially included is that the valuation date used in the plan is based on the assessed values for the City. Public facilities which are not part of the City's taxable base do not include values for schools and other public buildings. To augment this information, a representative from the local school district was contacted to obtain information on the values of schools that will be included in the LHMP Vulnerability Assessment. In addition, additional information will be included on the cost and nature of recent seismic retrofit projects that have been conducted on City schools. This will be included in the Capabilities section of the LHMP documenting past and ongoing mitigation efforts undertaken in the City.

Comment Date	Person Commenting	Comments	How addressed?
Emailed 3/19/2019	Michael Germeraad	Just wanted to say good job on this! I've been unable to review earlier versions and just got around to catching up on your plan. You've got a number of great actions at the end – I hope you're able to use the plan to go after FEMA grants in the upcoming years to support this work. Also, super excited to see you working with EBMUD on a few – they seem like great partners for a handful of your projects. Keep up the good work!	Thank you. It is great to see positive feedback on this LHMP project. The City also hopes to capitalize on the information, mitigation actions, and mitigation partners identified through this planning effort.

Emailed 3/3/2019	Sherry Marcus	We had an informative meeting with Chester several weeks ago to discuss two projects that have been proposed by the Wildwood Gardens (WWG) community that would improve the safety of our neighborhood. One of the primary concerns raised is that in the event of an emergency, residents of the lower circle have no ability to exit the neighborhood if access to the upper circle becomes blocked or if the lower circle itself has any obstruction. This is especially of concern if the event in question is one that happens with little to no advanced notice. The fact that we would have no ability to make a rapid and orderly exit from our neighborhood during a catastrophic event (especially during an earthquake or fire) if our single means of egress is blocked is frightening. The recent California fires have elevated these concerns. In several communications with the city, we have noted that there is an undeveloped city owned piece of land, connecting WWG and Oak, that historically was likely previously designated to be developed as a stairway, which could still be developed. Developing this piece of land into a stairway/path connecting these two streets would create the necessary second means of emergency egress that our residents need. We are open to any solution which provides the residents of the lower circle of WWG an ability to get out if our primary means of egress is blocked. The second concern is a response to the fact that our street, which has historically always allowed two-way traffic everywhere, is no longer safe to remain entirely two-way. The amount of traffic on WWG has increased significantly over the past few years, particularly due to increased traffic involving drivers from "outside" our neighborhood (e.g. Uber, Amazon, Caviar, construction workers etc.) There is very significant pedestrian traffic on WWG, including many children. Our lack of sidewalks forces all walkers to share the street with cars, often with little room to get off the street quickly due to parked cars. The unusual shape of our street, and the odd numbering scheme can create confusion for drivers not familiar with our street, and increases chances for distracted driving. Virtually all traffic currently travels in a counter-clockwise manner on the "lower circle" and in the vast majority travels in a "westward" manner on the northern segment of the upper circle. When vehicles drive in the "wrong" or an "unexpected" direction on these parts of WWG, the risk for a car crash or pedestrian injury increases. There has been at least one head on collision in the lower circle recently, and a number of "near misses" involving both cars and pedestrians.	As part of the mitigation strategy for this Local Hazard Mitigation Plan, the City is including the development of an Evacuation plan for the City. Evacuation planning would include the Wildwood Gardens Community.

Comment Date	Person Commenting	Comments	How addressed?
		The neighborhood has requested that the lower circle be formally designated one-way in counter clockwise direction and the northern segment of the upper circle be formally designated one-way in a west bound direction. The neighborhood has been surveyed and strongly supports both of these proposed safety improvements. We are providing Chester with the individual responses in support of addressing both safety concerns. We are also sharing this information with CIP and others in the community. Our hope is that you will include these two WWG issues (need for second means of egress from WWG and new one-way designations on WWG) as a formal part of the City of Piedmont's Hazard Mitigation plan. We would also like to find out how we could potentially access any available grant funding related to Hazard mitigation as we work to develop the safety projects we've described. Please let us know if there is anything else we can do to ensure inclusion of the Wildwood Gardens projects in your work with FEMA. We are planning to attend the next Hazard Mitigation meeting and would appreciate details of the next meeting's agenda if it is available.	

Source: City of Piedmont

A.8 Meeting Handouts

Below are the handouts for each meeting. Handouts specific to the Risk Assessment Meeting can be found in Appendix C.

A.8.1. Kickoff Meeting Handouts

Piedmont Hazard Identification and Profiles – 2018/2019

Alameda County Disaster Declarations

Year	Disaster Name	Disaster Type	Disaster Cause	Disaster #	State Declaration #	Federal Declaration #
2017	Severe Winter Storms, Flooding, and Mudslides	Flood	Storms	DR-4308	3/7/2017	4/1/2017
2017	Severe Winter Storms, Flooding, and Mudslides	Flood	Storms	DR-4305	2/10/2017	3/16/2017

Year	Disaster Name	Disaster Type	Disaster Cause	Disaster #	State Declaration #	Federal Declaration #
2017	Severe Winter Storms, Flooding, and Mudslides	Flood	Storms	DR-4301	–	2/14/2017
2014	California Drought	Drought	Drought	GP 2014-13	1/17/2014	–
2008	January Storms	Flood	Storms	GP 2008-01	1/5/2008	–
2007	Bay Area Oil Spill	Other	Accident	GP 2007-15	11/9/2007	–
2006	2006 June Storms	Flood	Storms	DR 1646	–	6/5/2006
2005/2006	2005/06 Winter Storms	Flood	Storms	DR-1628	–	2/3/2006
2005	Hurricane Katrina Evacuations	Economic	Hurricane	EM-3248 2005	–	9/13/2005
2003	State Road Damage	Road Damage	Flood	GP 2003	1/1/2003	–
2001	Energy Emergency	Economic	Greed	GP 2001	1/1/2001	–
1998	1998 El Nino Floods	Flood	Storms	DR-1203	Proclaimed	2/19/1998
1997	1997 January Floods	Flood	Storms	DR-1155	1/2/97-1/31/97	1/4/1997
1995	California Severe Winter Storms, Flooding, Landslides, Mud Flows	Flood	Storms	DR-1046	–	3/12/1995
1995	1995 Severe Winter Storms	Flood	Storms	DR-1044	1/6/95-3/14/95	1/13/1995
1991	Oakland Hills Fire	Fire	Fire	DR-919	10/20/1999	10/22/1991
1990	1990 Freeze	Freeze	Freeze	DR-894	12/19/90-1/18/91	2/11/1991
1989	Loma Prieta Earthquake	Earthquake	Earthquake	DR-845	10/18/89-10/30/89	10/18/1989
1986	1986 Storms	Flood	Storms	DR-758	2/18-86-3/12/86	2/18/1986
1983	Bradford Levee Failure	Flood	Levee break	GP 83-05	12/9/1983, 1/18/1984	–
1983	Winter Storms	Flood	Flood	DR-677	12/8/82-3/21/83	2/9/1983
1982	1982 Winter Storms	Flood	Storms	DR-651	1/5/82-1/9/82	1/7/1982
1980	Mediterranean Fruit Fly Infestation	Agricultural	Insect pest	GP-1980 Medfly	12/1/1980	–
1979	Gasoline Shortage	Economic	OPEC	–	5/8/1979-11/13/79	–

Year	Disaster Name	Disaster Type	Disaster Cause	Disaster #	State Declaration #	Federal Declaration #
1977	Drought	Drought	Drought	DR-3023	–	1/20/1977
1976	1976 Drought	Drought	Drought	–	2/9/76-7/6/76	–
1974	Gasoline Shortage	Economic	OPEC	–	2/28/1974, 3/4/1974, 3/10/1974	–
1973	Eucalyptus Tree Freeze	Freeze	Freeze	DR 373	4/4/1973	5/25/1973
1970	Forest and Brush Fires	Wildfire	Wildfire	DR-295		9/29/1970
1970	1970 Northern California Flooding	Flood	Flood	DR 283	1/27/1970 - 3/2/1970	2/16/1970
1970	Oakland Landslide	Landslide	Landslide	–	2/10/1970	–
1969	Berkeley Riots	Civil Unrest	Civil Unrest	–	2/5/1969	–
1963	1963 Floods	Flood	Storms	-	2/14/1964	–
1962	1962 Floods and Rains	Flood	Storms	–	10/17/1962, 10/25/1962, 10/30/1962, 11/4/1962	–
1962	Fires and Explosions	Fire	Fire	–	9/14/1962	–
1958	1958 April Storms and Floods	Flood	Storms	DR-52	4/5/1958	4/4/1958
1958	1958 February Storms and Floods	Flood	Storms	CDO 58-03	2/26/1958	–
1955	1955 Floods	Flood	Flood	DR-47	12/22/1955	12/23/1955
1950	1950 Floods	Flood	Flood	OCD 50-01	11/21/1950	–

Alameda County NCDC Storm Events 1/1/1950-5/31/2018

Event Type	Number of Events	Deaths	Deaths (indirect	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Debris Flows	12	0	0	0	0	$11,001,000	$0
Flash Flood	26	0	0	0	0	$701,000	$0
Flood	45	0	0	0	0	$176,475,000	$0
Frost/Freeze	2	0	0	0	0	$20,000	$400,000
Hail	14	0	0	0	0	$5,000,010	$0
Heat	10	1	0	12	5	$30,000	$0
Heavy Rain	8	1	0	0	0	$2,075,000	$0

Event Type	Number of Events	Deaths	Deaths (indirect	Injuries	Injuries (indirect)	Property Damage	Crop Damage
High Surf	1	8	0	0	0	$0	$0
High Wind	70	1	0	0	1	$3,210,000	$0
Landslide	6	0	0	0	0	$1,874,000	$0
Lightning	1	0	0	0	0	$3,000	$0
Strong Wind	111	2	1	8	4	$3,743,000	$0
Thunderstorm Winds	5	0	0	0	0	$10,000	$0
Tornado	3	0	0	0	0	$75,250	$0
Tsunami	1	0	0	0	0	$50,000	$0
Winter Weather	1	0	0	0	0	$0	$0
Total	**316**	**13**	**1**	**20**	**10**	**$204,267,260**	**$400,000**

Hazards Comparison List

Alameda County LHMP	2018 State of California Plan Applicable Hazards	Proposed 2018/2019 Hazards
Climate Change*	Climate Change & Related Hazards	Climate Change
Dam Failure	Dam Failure	Dam Failure
Drought	Droughts and Water Shortage	Drought and Water Shortage
Earthquake	Earthquake	Earthquake
Flood	Riverine, Stream, and Alluvial Flood	Flood: (100/500 year)
–	–	Flood: Localized/Stormwater
Landslide	Landslide and Other Earth Movements	Landslides, Mudslides, Hillside Erosion, And Debris Flows
		Levee Failure
Liquefaction	Included in Earthquake	Earthquake: Liquefaction
–	Severe Weather and Storms	Severe Weather: Heavy Rains and Storms
	Extreme Heat/Freeze	Severe Weather: Extreme Temperatures?
	----	Severe Weather: Fog?
	Severe Weather and Storms	Severe Weather: High Winds
Tsunami	Tsunami and Seiche	–
Wildfire	Wildfire	Wildfire

* Alameda County LHMP did not use climate change as a stand alone hazard, but profiled it as part of each hazard

City of Piedmont Hazard Identification Table

Hazard	Geographic Extent	Probability of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Climate Change					
Dam Failure					
Drought and Water Shortage					
Earthquake					
Earthquake Liquefaction					
Flood: (100/500 year)					
Flood: Localized/Stormwater					
Landslide, Mudslides, Hillside Erosion, and Debris Flows					
Levee Failure					
Severe Weather: Extreme Temperatures					
Severe Weather: Fog					
Severe Weather: Heavy Rains and Storms					
Severe Weather: High Winds					
Wildfire					

Geographic Extent
Limited: Less than 10% of planning area
Significant: 10-50% of planning area
Extensive: 50-100% of planning area

Probability of Future Occurrences
Highly Likely: Near 100% chance of occurrence in next year, or happens every year.
Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less.
Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Magnitude/Severity
Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths
Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability
Limited—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability
Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid

Significance
Low: minimal potential impact
Medium: moderate potential impact
High: widespread potential impact

City of Piedmont
2018/2019 Local Hazard Mitigation Plan
Participating Jurisdiction: Vulnerability & Capability Worksheets

Risk and Vulnerability Questions

Localized/Stormwater Flooding

1. Please describe the localized/stormwater flood issue specific to your jurisdiction in paragraph form. In addition, please complete a table similar to the below example detailing types and location of localized/stormwater flooding problems. If available, also attach a map of problem areas.

Text Description

Localized Flooding Areas

Road Name	Flooding	Pavement Deterioration	Washouts	High Water/ Creek Crossing	Landslides/ Mudslides	Debris	Downed Trees

Earthquake Vulnerability

1. Number of unreinforced masonry buildings. If available, please provide an inventory of URM buildings specific to your jurisdiction. Include any tables and/or maps. Is this a layer available in GIS?

Special Populations

1. Describe any hazard-related concerns or issues regarding the vulnerability of special needs populations, such as the elderly, disabled, low-income, or migrant farm workers.

Development Trends

1. Describe development trends and expected growth areas and how they relate to hazard areas and vulnerability concerns/issues. Please provide zoning maps and maps and tables detailing areas targeted for future development within your jurisdiction.

CAPABILITY ASSESSMENT

Capabilities are the programs and policies currently in use to reduce hazard impacts or that could be used to implement hazard mitigation activities. Please complete the tables and questions in the worksheet as completely as possible.

Planning and Regulatory

The following planning and land management tools are typically used by local jurisdictions to implement hazard mitigation activities. Please indicate which of the following your jurisdiction has in place. If your jurisdiction does not have this capability or authority, please indicate in the comments column if a higher level of government has the authority.

Plans	Y/N Year	Does the plan/program address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
General Plan		
Capital Improvements Plan		
Economic Development Plan		
Local Emergency Operations Plan		
Continuity of Operations Plan		
Transportation Plan		
Stormwater Management Plan/Program		
Engineering Studies for Streams		
Community Wildfire Protection Plan		
Other special plans (e.g., brownfields redevelopment, disaster recovery, coastal zone management, climate change adaptation)		
Building Code, Permitting, and Inspections	**Y/N**	**Are codes adequately enforced?**
Building Code		
Building Code Effectiveness Grading Schedule (BCEGS) Score		
Fire department ISO rating:		
Site plan review requirements		
Land Use Planning and Ordinances	**Y/N**	**Is the ordinance an effective measure for reducing hazard impacts? Is the ordinance adequately administered and enforced?**
Zoning ordinance		
Subdivision ordinance		
Floodplain ordinance		

Natural hazard specific ordinance (stormwater, steep slope, wildfire)	
Flood insurance rate maps	
Elevation Certificates	
Acquisition of land for open space and public recreation uses	
Erosion or sediment control program	
Other	
How can these capabilities be expanded and improved to reduce risk?	

Administrative/Technical

Identify the technical and personnel resources responsible for activities related to hazard mitigation/loss prevention within your jurisdiction. For smaller jurisdictions without local staff resources, if there are public resources at the next higher level government that can provide technical assistance, please indicate so in the comments column.

Administration	**Y/N**	**Describe capability Is coordination effective?**
Planning Commission		
Mitigation Planning Committee		
Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems)		
Mutual aid agreements		
Other		
Staff	**Y/N FT/PT**	**Is staffing adequate to enforce regulations? Is staff trained on hazards and mitigation? Is coordination between agencies and staff effective?**
Chief Building Official		
Floodplain Administrator		
Emergency Manager		
Community Planner		
Civil Engineer		
GIS Coordinator		
Other		
Technical	**Y/N**	**Describe capability Has capability been used to assess/mitigate risk in the past?**
Warning systems/services (Reverse 911, outdoor warning signals)		

Hazard data and information
Grant writing
Hazus analysis
Other
How can these capabilities be expanded and improved to reduce risk?

Fiscal

Identify whether your jurisdiction has access to or is eligible to use the following financial resources for hazard mitigation

Funding Resource	Access/ Eligibility (Y/N)	Has the funding resource been used in past and for what type of activities? Could the resource be used to fund future mitigation actions?
Capital improvements project funding		
Authority to levy taxes for specific purposes		
Fees for water, sewer, gas, or electric services		
Impact fees for new development		
Storm water utility fee		
Incur debt through general obligation bonds and/or special tax bonds		
Incur debt through private activities		
Community Development Block Grant		
Other federal funding programs		
State funding programs		
Other		
How can these capabilities be expanded and improved to reduce risk?		

Education and Outreach

Identify education and outreach programs and methods already in place that could be/or are used to implement mitigation activities and communicate hazard-related information.

Program/Organization	Yes/No	Describe program/organization and how relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?
Local citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.		
Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)		
Natural disaster or safety related school programs		
StormReady certification		
Firewise Communities certification		
Public-private partnership initiatives addressing disaster-related issues		
Other		
How can these capabilities be expanded and improved to reduce risk?		

National Flood Insurance Program (NFIP) Worksheet

Use this worksheet to collect information on your community's participation in and continued compliance with the NFIP, as well as identify areas for improvement that could be potential mitigation actions.

NFIP Topic	Comments
Insurance Summary	
How many NFIP policies are in the community? What is the total premium and coverage?	41 policies FM TO GET PREMIUMS $10,798,700 coverage
How many claims have been paid in the community? What is the total amount of paid claims? How many of the claims were for substantial damage?	1 paid claim $750.00 No substantial damage claims
How many structures are exposed to flood risk within the community?	FM to complete
Describe any areas of flood risk with limited NFIP policy coverage	
Staff Resources	
Is the Community Floodplain Administrator or NFIP Coordinator certified?	
Provide an explanation of NFIP administration services (e.g., permit review, GIS, education or outreach, inspections, engineering capability)	
What are the barriers to running an effective NFIP program in the community, if any?	
Compliance History	
Is the community in good standing with the NFIP?	
Are there any outstanding compliance issues (i.e., current violations)?	
When was the most recent Community Assistance Visit (CAV) or Community Assistance Contact (CAC)?	
Is a CAV or CAC scheduled or needed?	
Regulation	
When did the community enter the NFIP?	FM to complete
Are the FIRMs digital or paper?	FM to complete
Do floodplain development regulations meet or exceed FEMA or State minimum requirements? If so, in what ways?	
Provide an explanation of the permitting process.	
Community Rating System	
Does the community participate in CRS?	
What is the community's CRS Class Ranking?	
What categories and activities provide CRS points and how can the class be improved?	
Does the plan include CRS planning requirements?	

Prepared by:	Date	Email	Phone

HISTORIC HAZARD EVENTS WORKSHEET

Please fill out one sheet for each significant hazard event with as much detail as possible. Attach supporting documentation, photocopies of newspaper articles, or other original sources.

Type of event	
Nature and magnitude of event	
Location	
Date of event	
Injuries	
Deaths	
Property damage	
Infrastructure damage	
Crop damage	
Business/economic impacts	
Road/school/other closures	
Other damage	
Insured losses	
Federal/state disaster relief funding	
Opinion on likelihood of occurring again	
Source of information	
Comments	

	Please return worksheets by mail, email, or fax to: Jeanine Foster, Foster Morrison 5628 West Long Place Littleton, CO 80123 fax: (720) 893-0863 email: jeanine.foster@fostermorrison.com
Prepared by:	
Phone:	
Email:	
Date:	

A.8.2. Risk Assessment Meeting Handouts

Hazard Identification & Profiles

Table 3 Piedmont Hazard Identification

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Climate Change	Extensive	Likely	Negligible	Medium	--
Dam Failure	Significant	Unlikely	Limited	Medium	Medium
Drought and Water Shortage	Extensive	Likely	Limited	Medium	Medium
Earthquake	Extensive	Likely/Occasional	Catastrophic	High	Low
Earthquake Liquefaction	Limited	Occasional	Limited	Medium	Low
Flood: (1% and 0.2% annual chance)	Limited	Unlikely	Limited	Low	Medium
Flood: Localized/Stormwater	Significant	Highly Likely	Limited	Medium	Medium
Landslide, Mudslides, Hillside Erosion, and Debris Flows	Extensive	Likely	Limited	Medium	Medium
Levee Failure	Limited	Unlikely	Negligible	Low	Medium
Severe Weather: Extreme Heat	Extensive	Highly Likely	Limited	Medium	Medium
Severe Weather: Heavy Rains and Storms	Extensive	Highly Likely	Limited	Medium	Medium
Severe Weather: High Winds	Extensive	Highly Likely	Limited	Medium	Low
Wildfire	Extensive	Highly Likely	Catastrophic	High	Medium

Geographic Extent
Limited: Less than 10% of planning area
Significant: 10-50% of planning area
Extensive: 50-100% of planning area

Likelihood of Future Occurrences
Highly Likely: Near 100% chance of occurrence in next year, or happens every year.
Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less.
Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Magnitude/Severity
Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths
Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability
Limited—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability
Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid

Significance
Low: minimal potential impact
Medium: moderate potential impact
High: widespread potential impact

Risk Assessment Methodology

Calculating Likelihood of Future Occurrence

The frequency of past events is used in this section to gauge the likelihood of future occurrences. Based on historical data, the likelihood of future occurrence is categorized into one of the following classifications:

- **Highly Likely**: Near 100% chance of occurrence in next year, or happens every year.
- **Likely**: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less.
- **Occasional**: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
- **Unlikely**: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Calculating Vulnerability

Vulnerability is measured in general, qualitative terms, and is a summary of the potential impact based on past occurrences, spatial extent, and damage and casualty potential:

- **Extremely Low**: The occurrence and potential cost of damage to life and property is very minimal to non-existent.
- **Low**: Minimal potential impact. The occurrence and potential cost of damage to life and property is minimal.
- **Medium**: Moderate potential impact. This ranking carries a moderate threat level to the general population and/or built environment. Here the potential damage is more isolated and less costly than a more widespread disaster.
- **High**: Widespread potential impact. This ranking carries a high threat to the general population and/or built environment. The potential for damage is widespread. Hazards in this category may have already occurred in the past.
- **Extremely High**: Very widespread and catastrophic impact.

Defining Significance (Priority) of a Hazard

Defining the significance or priority of a hazard to a community is based on a subjective analysis of several factors. This analysis is used to focus and prioritize hazards and associated mitigation measures for the plan. These factors include the following:

- **Past Occurrences**: Frequency, extent, and magnitude of historic hazard events.
- **Likelihood of Future Occurrences**: Based on past hazard events.
- **Ability to Reduce Losses through Implementation of Mitigation Measures**: This looks at both the ability to mitigate the risk of future occurrences as well as the ability to mitigate the vulnerability of a community to a given hazard event.

Risk Assessment Summary: City of Piedmont Planning Area

Climate Change

- The 2018 State of California Multi-Hazard Mitigation Plan stated that climate change is already affecting California. Sea levels have risen by as much as seven inches along the California coast over the last century, increasing erosion and pressure on the state's infrastructure, water supplies, and natural resources. The State has also seen increased average temperatures, more extreme hot days, fewer cold nights, a lengthening of the growing season, shifts in the water cycle with less winter precipitation falling as snow, and both snowmelt and rainwater running off sooner in the year. Climate Change has the potential to alter the nature and frequency of most hazards.
- In Piedmont, each year it seems to get a bit warmer. Rain events also seem to be of greater intensity. TRUE?
- ANY HMPC INPUT ON CLIMATE CHANGE ISSUES IN PIEDMONT?
- Likelihood of Future Occurrence: Likely
- Vulnerability: Medium
- Priority Hazard

Dam failure

- According to data provided by Cal OES and National Performance of Dam's data, there are 30 dams in Alameda County constructed for flood control, storage, electrical generation, and recreational purposes. Of these, 23 are high hazard, 5 are significant hazard, and 2 are unknown.
- Of these 30 dams, 3 were identified of concern to the City (Estates Dam, Lake Temescal, Piedmont Dam); only Piedmont dam is location within City limits (updated in Chapter 4 to reflect changes in City dams).
- Only Estates Dam and Piedmont Dam have inundation areas that intersect into Piedmont.
- ARE THERE ANY PAST OCCURRENCES OF DAM FAILURES, OVERTOPPING, OTHER?
- Likelihood of Future Occurrence: Unlikely
- Vulnerability: High
- Priority Hazard

Drought and Water Shortage

- Historical drought data for the City of Piedmont and region indicate there have been 5 significant droughts in the last 84 years.
- Since 2012, snowpack levels in California had dropped dramatically. 2015 estimates place snowpack at 5 percent of normal levels. However, snowpack levels increased in 2016 and in 2017 snowpack levels were the highest they've been in 22 years. But then back down again in 2018.
- 2 state and 1 federal disaster declaration (1977 and 2014) for Alameda County since 1950. There have been no NCDC drought events in Piedmont. This is likely due to underreporting of drought events to this database.
- HMPC – CAN YOU PROVIDE DAMAGES OR RESTRICTIONS THAT HAVE OCCURRED IN THE CiTY RECENTLY DUE TO THE MOST RECENT DROUGHT. WHAT HAS BEEN IMPACTED THE MOST? WHAT IS THE PRIMARY SOURCE OF WATER AND HOW HAS WATER SUPPLY BEEN AFFECTED IN THE CITY?
- Likelihood of Future Occurrence: Drought - Likely/Water shortage - Occasional

- Vulnerability: High
- Priority Hazard

Earthquake

- The General Plan Background Report noted that there are no known active faults within the City; however, the area could experience considerable ground shaking generated by regional nearby faults: According to the General Plan, the three primary faults of concern include: Hayward, San Andreas, Calaveras
- The USGS National Seismic Hazard Maps provides acceleration and probabilities for various time periods. This data indicates that the expected severity of earthquakes in the region is high to very high.
- There has been 1 disaster declarations in Alameda County associated with the 1989 Loma Prieta earthquake. No major earthquakes have been recorded within the City; although the City has felt ground shaking from earthquakes with epicenters located elsewhere. HMPC – WERE THERE ISSUES IN THE CiTY FROM HISTORICAL EARTHQUAKES? LOMA PRIETA?
- Likelihood of Future Occurrence: occasional – large, damaging earthquake; Likely – minor earthquake
- Vulnerability: Extremely High
- Priority Hazard

Earthquake - Liquefaction

- Liquefaction hazard maps indicate only one high-risk area in Piedmont, located along an old streambed that runs beneath Grand Avenue.
- There have been no disaster declarations in Alameda County or any identified past issues of liquefaction within Piedmont.
- ANY PAST LIQUEFACTION ISSUES TO NOTE IN THE CITY?
- Likelihood of Future Occurrence: Unlikely
- Vulnerability: Medium
- Priority Hazard

Flood Hazards

100/500 year

- The City of Piedmont does not have any mapped 1% or 0.2% annual chance floodplains. While they are part of the Alameda County DFIRM map, all areas within the City are in the X Zone, indicating areas of minimal flood hazard, which are the areas outside the SFHA and higher than the elevation of the 0.2-percent-annual-chance flood.
- Of the 22 state and 23 federal declarations from 1950-present– 18 state and 13 federal declarations were for heavy rains and flooding. Flooding is an ongoing issue for the planning area.
- HMPC - REVIEW RISK ASSESSMENT AND ADD INFORMATION ON MAJOR FLOOD EVENTS
- Likelihood of Future Occurrence: 100-Occasional; 500-Unlikely; but with no floodplain=Unlikely
- Vulnerability: Low
- Non-Priority Hazard

Localized/Stormwater flooding

- Localized flood history in the City – occurs annually
- CAN THE HMPC PROVIDE DETAILS ON THESE AREAS? PICTURES/DESCRIPTIONS
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: Medium
- Priority Hazard

Landslides, Mudslides, Hillside Erosion and Debris Flows

- Three general causes of landslides: heavy rains, earthquakes, post fire areas
- There have been one disaster declarations associated with landslides in Alameda County where 22 homes were affected in the Oakland Hills. The NCDC contains 12 records of debris flows in the County; one of these detailed specific issues in Piedmont in February 2017.
- Landslide mapping indicate that portions of the City are at moderate to high risk for landslides.
- WHAT SPECIFIC AREAS ARE AT RISK TO LANDSLIDES?
- CAN THE CITY PROVIDE INFORMATION ON PAST LANDSLIDE EVENTS?
- Likelihood of Future Occurrence: Likely
- Vulnerability: Medium
- Priority Hazard

Levee Failure

- While a few levees exist in Alameda County, there are no levees in or near the City that would be of concern to Piedmont.
- Likelihood of Future Occurrence: Unlikely
- Vulnerability: Extremely Low
- Non-Priority Hazard

Severe weather

Extreme Heat

- Annual occurrences of hot temperatures. The highest recorded daily extreme was 109°F on September 14, 1971. In a typical year, maximum temperatures exceed 90°F on 5.9 days.
- 10 extreme heat events (NCDC) from 1993-2018; No state or federal disaster declarations
- PLEASE PROVIDE DETAILS ON EXTREME HEAT EVENTS IN THE CITY.
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: Medium
- Non-Priority Hazard

Heavy rains and storms (Hail, Lightning, Wind)

- Significant City history: annual occurrences.
- The NCDC data recorded 13 hail, 1 lightning, and 1 winter weather incidents for Alameda County since 1950.
- There have been 15 federal and 14 state declarations since 1950 for flooding and severe storms.

- CAN THE HMPC PROVIDE DETAILS ON HEAVY RAIN AND STORM EVENTS IN THE CITY. JANUARY 2017 STORMS – PA SHEEETS?
- Severe storms/heavy rains are the primary cause of most major flooding
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: Medium
- Priority Hazard

High Winds

- Significant City history: annual occurrences
- The NCDC data recorded 186 high wind and 3 tornado incidents for Alameda County since 1955. All tornado events were EF0 intensities.
- CAN THE HMPC PROVIDE INFORMATION ON PAST HIGH WINDS AND TORNADO EVENTS AND DAMAGES? WHAT ARE THE PRIMARY CONCERNS TO THE CITY?
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: High
- Priority Hazard

Wildfire

- Wildfires occur on an annual basis in and around the City. Catastrophic wildfires have occurred in nearby areas.
- 1 state and 2 federal disaster declarations for Wildfire (1970, 1991); no NCDC wildfire events.
- Any ignition has the potential to become an out of control wildfire.
- Areas of Piedmont have similar landscape character as the area burned in the devastating 1991 Oakland Hills Fire.
- Over a third of the residential area in the City is located in a moderate to very high hazard severity zone.
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: Extremely High
- Priority Hazard

Data Needs

Review of Key Items to date:

- Hazard-specific data (from today's risk assessment review)
    - Historic Hazard Worksheets or list of past hazard occurrences and impacts to City
- Risk Assessment Worksheets

Other Data Items:

- Future Development Areas
- Stormwater Master Plan or similar
- Photos of problem areas, past events, etc.

Mitigation Action Worksheet

Jurisdiction/Department:	
Mitigation Action/Project Title:	
Hazards Addressed:	
Issue/Background:	
Other Alternatives:	
Existing Planning Mechanism(s) through which Action Will Be Implemented:	
Responsible Office/Partners:	
Cost Estimate:	
Benefits (Losses Avoided):	
Potential Funding:	
Timeline:	
Project Priority:	

Worksheet completed by:	
Name and Title:	
Phone:	

A.8.3. Mitigation Strategy Meeting Handouts

These can be found in Appendix C of this Plan.

A.8.4. Final Meeting Handouts

There were no handouts for the final meetings.

Appendix B References

2014 California Climate Adaptation Strategy

2016 Alameda County Local Hazard Mitigation Plan

2017 East Bay Regional Parks Local Hazard Mitigation Plan

2018 State of California Hazard Mitigation Plan

Alameda County Assessor's Data

Alameda County Climate and Health Profile Report

Alameda County Digital Flood Insurance Rate Map

Alameda County Flood Insurance Study

ArkStorm at Tahoe - Stakeholder Perspectives on Vulnerabilities and Preparedness for an Extreme Storm Event in the Greater Lake Tahoe, Reno and Carson City Region. 2014.

Cal Atlas

CAL FIRE

Cal OES Dam Inundation Data

Cal-Adapt

Cal-Adapt – Temperature: Decadal Averages Map

California Adaptation Planning Guide

California Department of Conservation

California Department of Finance, E-1 Report

California Department of Finance, E-4 Report

California Department of Finance, P-1 Report

California Department of Water Resources

California Department of Water Resources Disadvantaged Community Mapping Tool

California Geological Survey

California Natural Diversity Database

California Natural Resource Agency

California Office of Historic Preservation

California's Drought of 2007-2009, An Overview. State of California Natural Resources Agency, California Department of Water Resources

City of Piedmont 2025 General Plan

City of Piedmont Climate Action Plan 2.0

City of Piedmont General Plan Conservation Element

City of Piedmont General Plan Environmental Hazards Element

City of Piedmont General Plan Land Use Element

City of Piedmont General Plan Safety Element

City of Piedmont GIS

City of Piedmont Parcel Data

Climate Change and Health Profile Report - Alameda County

County and City staff

East Bay Municipal Utility District

Existing plans and studies

Federal Emergency Management Agency

FEMA Disaster Declaration Database

FEMA Hazus 4.2

FEMA: Building Performance Assessment: Oklahoma and Kansas Tornadoes

HMPC input

Intergovernmental Panel on Climate Change

Levees in History: The Levee Challenge. Dr. Gerald E. Galloway, Jr., P.E., Ph.D., Water Policy Collaborative, University of Maryland, Visiting Scholar, USACE, IWR

National Climate Assessment

National Drought Mitigation Center

National Institute of Building Science Multi-Hazard Mitigation Council 2017 Interim Report

National Integrated Drought Information System

National Oceanic and Atmospheric Administration

National Oceanic and Atmospheric Administration's National Climatic Data Center

National Weather Service

NOAA Storm Prediction Center

NOAA's Climate Prediction Center

Petersen, M. et al., 2018 One-Year Seismic Hazard Forecast for the Central and Eastern United States from Induced and Natural Earthquakes - Seis. Res. Lett., doi.org/10.1785/0220180005.

Proceedings of the National Academy of Sciences

Public Health Alliance of Southern California

San Francisco Bay Conservation and Development Commission

Science Magazine

Southern California Association of Governments

U.S. Drought Monitor

University of California

US Army Corps of Engineers

US Census Bureau 2010 Household Population Estimates

US Drought Monitor

US Fish and Wildlife Service National Wetlands Inventory

US Geological Survey

Vaisala National Lightning Detection Network

Western Regional Climate Center

Appendix C Mitigation Strategy

City of Piedmont
Local Hazard Mitigation Plan
Mitigation Strategy Meetings
January 15 & 16, 2019

Table of Contents:

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AGENDA

City of Piedmont
Local Hazard Mitigation Plan (LHMP)
Mitigation Strategy Meetings
January 15 & 16, 2019

HMPC Meeting #3:

1. Introductions
2. Status of the DMA Planning Process
3. Risk Assessment Status
4. Develop Plan Goals and Objectives
5. Identify and discuss Mitigation Alternatives/Actions/Projects

HMPC Meeting #4:

1. Introductions
2. Identify and discuss Mitigation Alternatives/Actions/Projects
3. Review Mitigation Selection Criteria
4. Prioritize Mitigation Projects
5. Review of Schedule/Data Needs

Mitigation Strategy Meetings

Day 1

Hazard Identification & Profiles

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Climate Change	Extensive	Likely	Negligible	Medium	--
Dam Failure	Significant	Unlikely	Limited	Medium	Medium
Drought and Water Shortage	Extensive	Likely	Limited	Medium	Medium
Earthquake	Extensive	Likely/Occasional	Catastrophic	High	Low
Earthquake Liquefaction	Limited	Occasional	Limited	Medium	Low
Flood: (1% and 0.2% annual chance)	Limited	Unlikely	Limited	Low	Medium
Flood: Localized/Stormwater	Significant	Highly Likely	Limited	Medium	Medium
Landslide, Mudslides, Hillside Erosion, and Debris Flows	Extensive	Likely	Limited	Medium	Medium
Levee Failure	Limited	Unlikely	Negligible	Low	Medium
Severe Weather: Extreme Heat	Extensive	Highly Likely	Limited	Medium	Medium
Severe Weather: Heavy Rains and Storms	Extensive	Highly Likely	Limited	Medium	Medium
Severe Weather: High Winds	Extensive	Highly Likely	Limited	Medium	Low
Wildfire	Extensive	Highly Likely	Catastrophic	High	Medium

Geographic Extent
Limited: Less than 10% of planning area
Significant: 10-50% of planning area
Extensive: 50-100% of planning area

Likelihood of Future Occurrences
Highly Likely: Near 100% chance of occurrence in next year, or happens every year.
Likely: Between 10 and 100% chance of occurrence in next year, or has a recurrence interval of 10 years or less.
Occasional: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
Unlikely: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Magnitude/Severity
Catastrophic—More than 50 percent of property severely damaged; shutdown of facilities for more than 30 days; and/or multiple deaths
Critical—25-50 percent of property severely damaged; shutdown of facilities for at least two weeks; and/or injuries and/or illnesses result in permanent disability
Limited—10-25 percent of property severely damaged; shutdown of facilities for more than a week; and/or injuries/illnesses treatable do not result in permanent disability
Negligible—Less than 10 percent of property severely damaged, shutdown of facilities and services for less than 24 hours; and/or injuries/illnesses treatable with first aid

Significance
Low: minimal potential impact
Medium: moderate potential impact
High: widespread potential impact

Risk Assessment Methodology

Calculating Likelihood of Future Occurrence

The frequency of past events is used in this section to gauge the likelihood of future occurrences. Based on historical data, the likelihood of future occurrence is categorized into one of the following classifications:

- **Highly Likely**: Near 100% chance of occurrence in next year, or happens every year.
- **Likely**: Between 10 and 90% chance of occurrence in next year, or has a recurrence interval of 10 years or less.
- **Occasional**: Between 1 and 10% chance of occurrence in the next year, or has a recurrence interval of 11 to 100 years.
- **Unlikely**: Less than 1% chance of occurrence in next 100 years, or has a recurrence interval of greater than every 100 years.

Calculating Vulnerability

Vulnerability is measured in general, qualitative terms, and is a summary of the potential impact based on past occurrences, spatial extent, and damage and casualty potential:

- **Extremely Low**: The occurrence and potential cost of damage to life and property is very minimal to non-existent.
- **Low**: Minimal potential impact. The occurrence and potential cost of damage to life and property is minimal.
- **Medium**: Moderate potential impact. This ranking carries a moderate threat level to the general population and/or built environment. Here the potential damage is more isolated and less costly than a more widespread disaster.
- **High**: Widespread potential impact. This ranking carries a high threat to the general population and/or built environment. The potential for damage is widespread. Hazards in this category may have already occurred in the past.
- **Extremely High**: Very widespread and catastrophic impact.

Defining Significance (Priority) of a Hazard

Defining the significance or priority of a hazard to a community is based on a subjective analysis of several factors. This analysis is used to focus and prioritize hazards and associated mitigation measures for the plan. These factors include the following:

- **Past Occurrences**: Frequency, extent, and magnitude of historic hazard events.
- **Likelihood of Future Occurrences**: Based on past hazard events.
- **Ability to Reduce Losses through Implementation of Mitigation Measures**: This looks at both the ability to mitigate the risk of future occurrences as well as the ability to mitigate the vulnerability of a community to a given hazard event.

Risk Assessment Summary: City of Piedmont Planning Area

Climate Change

- The 2018 State of California Multi-Hazard Mitigation Plan stated that climate change is already affecting California. Sea levels have risen by as much as seven inches along the California coast over the last century, increasing erosion and pressure on the state's infrastructure, water supplies, and natural resources. The State has also seen increased average temperatures, more extreme hot days, fewer cold nights, a lengthening of the growing season, shifts in the water cycle with less winter precipitation falling as snow, and both snowmelt and rainwater running off sooner in the year. Climate Change has the potential to alter the nature and frequency of most hazards.
- Last Meeting: In Piedmont, temperatures have been warming. City seeing more applications for installation of air conditioners. Biggest issues play into drought conditions and dry vegetation creating an increased wildfire risk. Urban trees are being affected by climate change conditions.
- Likelihood of Future Occurrence: Likely
- Vulnerability: Medium
- Priority Hazard

Dam failure

- According to data provided by Cal OES and National Performance of Dam's data, there are 30 dams in Alameda County constructed for flood control, storage, electrical generation, and recreational purposes. Of these, 23 are high hazard, 5 are significant hazard, and 2 are unknown.
- Of these 30 dams, 3 dams were identified of concern to the City (Estates Dam, Lake Temescal, Piedmont Dam); only Piedmont dam is located within City limits.
- Only Estates Dam and Piedmont Dam have inundation areas that intersect into Piedmont.
- Since the last meeting, EBMUD indicated that Piedmont Dam has been drained and in 10+ years will likely be replaced with two steel tanks. Estates Dam has already been replaced by steel tanks. Working with EBMUD to get more information on this: What is the Estates Dam now called? Additional information on the tanks – capacity, seismic standards, potential for failure, inundation area? Additionally, Tyson Lake was identified as a concern to the City. No inundation mapping is available, but Lake will be identified as a concern to the City.
- Likelihood of Future Occurrence: Unlikely
- Vulnerability: Medium
- Priority Hazard

Drought and Water Shortage

- Historical drought data for the City of Piedmont and region indicate there have been 5 significant droughts in the last 84 years.
- Since 2012, snowpack levels in California had dropped dramatically. 2015 estimates place snowpack at 5 percent of normal levels. However, snowpack levels increased in 2016 and in 2017 snowpack levels were the highest they've been in 22 years. But then back down again in 2018.
- 2 state and 1 federal disaster declaration (1977 and 2014) for Alameda County since 1950. There have been no NCDC drought events in Piedmont. This is likely due to underreporting of drought events to this database.

- From last meeting: Drought contributes to wildfire conditions. Urban trees also affected during drought conditions. Water supply has not been affected during past droughts.
- OTHER ISSUES/IMPACTS?
- Likelihood of Future Occurrence: Drought - Likely/Water shortage - Occasional
- Vulnerability: Medium
- Priority Hazard

Earthquake

- The General Plan Background Report noted that there are no known active faults within the City; however, the area could experience considerable ground shaking generated by regional nearby faults: According to the General Plan, the three primary faults of concern include: Hayward, San Andreas, Calaveras
- The USGS National Seismic Hazard Maps provides acceleration and probabilities for various time periods. This data indicates that the expected severity of earthquakes in the region is high to very high.
- There has been 1 disaster declarations in Alameda County associated with the 1989 Loma Prieta earthquake. No major earthquakes have been recorded within the City; although the City has felt ground shaking from earthquakes with epicenters located elsewhere.
- From last meeting: Loma Prieta – too far from City to be a real issue. City experienced mild damage to chimneys and personal property shifting. No Catastrophic failures. Other area earthquakes, while shaking sometimes felt, City experienced no real damages.
- Water and sewer infrastructure (East Bay Mud) and supply is a primary issue during a large earthquake affecting the City. PG&E services an issue should power be cut off to City. Communications also a significant concern during a large earthquake event.
- Likelihood of Future Occurrence: occasional – large, damaging earthquake; Likely – minor earthquake
- Vulnerability: Extremely High
- Priority Hazard

Earthquake - Liquefaction

- Liquefaction hazard maps indicate only one high-risk area in Piedmont, located along an old streambed that runs beneath Grand Avenue.
- There have been no disaster declarations in Alameda County or any identified past issues of liquefaction within Piedmont.
- ANY PAST LIQUEFACTION ISSUES or CONCERNS TO NOTE IN THE CITY?
- Likelihood of Future Occurrence: Unlikely
- Vulnerability: Medium
- Priority Hazard

Flood Hazards

100/500 year

- The City of Piedmont does not have any mapped 1% or 0.2% annual chance floodplains. While they are part of the Alameda County DFIRM map, all areas within the City are in the X Zone, indicating areas of minimal flood hazard, which are the areas outside the SFHA and higher than the elevation of the 0.2-percent-annual-chance flood.

- Of the 22 state and 23 federal declarations from 1950-present– 18 state and 13 federal declarations were for heavy rains and flooding. Flooding is an ongoing issue for the planning area.
- HMPC - ANY INFORMATION ON PAST FLOOD EVENTS?
- Likelihood of Future Occurrence: 100-Occasional; 500-Unlikely; but with no floodplain=Unlikely
- Vulnerability: Low
- Non-Priority Hazard

Localized/Stormwater flooding

- Localized flood history in the City – occurs annually
- Last Meeting: past issues include partial street closures, catch basins get clogged and create ponding. City has a storm watch protocol?
- CAN THE HMPC PROVIDE ADDITIONAL DETAILS ON THESE AREAS? PICTURES/DESCRIPTIONS? PAST PA WORKSHEETS?
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: Medium
- Priority Hazard

Landslides, Mudslides, Hillside Erosion and Debris Flows

- Three general causes of landslides: heavy rains, earthquakes, post fire areas
- There have been one disaster declarations associated with landslides in Alameda County where 22 homes were affected in the Oakland Hills. The NCDC contains 12 records of debris flows in the County; one of these detailed specific issues in Piedmont in February 2017.
- Landslide mapping indicate that portions of the City are at moderate to high risk for landslides.
- Last Meeting: most landslides occur on private property on sloped areas. Nothing large, all localized. Creates partial road closures. Problem areas include Moraga Road, La Salle, Zion – private church and school, potential loss of estates drive and utilities. Parks such as Blair Park and Drisiana Park? (old quarry) have sloughing, landslide prone. Moraga Road had slides that took out PG&E utilities and trees.
- CAN THE CITY PROVIDE INFORMATION ON PAST LANDSLIDE EVENTS?
- Likelihood of Future Occurrence: Likely
- Vulnerability: Medium
- Priority Hazard

Levee Failure

- While a few levees exist in Alameda County, there are no levees in or near the City that would be of concern to Piedmont.
- Likelihood of Future Occurrence: Unlikely
- Vulnerability: Extremely Low
- Non-Priority Hazard

Severe weather

Extreme Heat

- Annual occurrences of hot temperatures. The highest recorded daily extreme was 109°F on September 14, 1971. In a typical year, maximum temperatures exceed 90°F on 5.9 days.
- 10 extreme heat events (NCDC) from 1993-2018; No state or federal disaster declarations
- Last Meeting: biggest issue is PG&E cutting off power
- PLEASE PROVIDE DETAILS ON EXTREME HEAT EVENTS IN THE CITY.
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: Medium
- Non-Priority Hazard

Heavy rains and storms (Hail, Lightning, Wind)

- Significant City history: annual occurrences.
- The NCDC data recorded 13 hail, 1 lightning, and 1 winter weather incidents for Alameda County since 1950.
- There have been 15 federal and 14 state declarations since 1950 for flooding and severe storms.
- Last Meeting: hail if they have it is very small, heavy rains really an issue for localized flooding and earth movements such as landsliding. All past landslides events in the City occur during rain events.
- CAN THE HMPC PROVIDE DETAILS ON HEAVY RAIN AND STORM EVENTS IN THE CITY. JANUARY 2017 STORMS – PA SHEEETS?
- Severe storms/heavy rains are the primary cause of most major flooding
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: Medium
- Priority Hazard

High Winds

- Significant City history: annual occurrences
- The NCDC data recorded 186 high wind and 3 tornado incidents for Alameda County since 1955. All tornado events were EF0 intensities.
- Last Meeting: Biggest issues are power going out, trees coming down and exacerbation of wildfire. There are high voltage power ines running through the Very Hire Fire Hazard Severity Zones.
- CAN THE HMPC PROVIDE INFORMATION ON PAST HIGH WIND EVENTS AND DAMAGES? WHAT ARE THE PRIMARY CONCERNS TO THE CITY?
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: High
- Priority Hazard

Wildfire

- Wildfires occur on an annual basis in and around the City. Catastrophic wildfires have occurred in nearby areas.
- 1 state and 2 federal disaster declarations for Wildfire (1970, 1991); no NCDC wildfire events.
- Any ignition has the potential to become an out of control wildfire.

- Areas of Piedmont have similar landscape character as the area burned in the devastating 1991 Oakland Hills Fire.
- Over a third of the residential area in the City is located in a moderate to very high hazard severity zone.
- Grizzely Road, Fish Ranch Road – a couple key areas of concern. Evacuation out of Piedmont neighborhoods is one of the biggest concerns. Not much room for two way traffic, emergency vehicles and fire engines.
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: Extremely High
- Priority Hazard

City of Piedmont Priority Hazards

- Climate Change
- Dam Failure
- Drought & Water Shortage
- Earthquake
- Earthquake Liquefaction
- Flood: Localized/Stormwater
- Landslide, Mudslides, Hillside Erosion, and Debris Flows
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rains and Storms (wind, hail, lightning)
- Severe Weather: High Winds
- Wildfire

Non-Priority Hazards:

- Flood: 1%/0.2% annual chance
- Levee Failure

Data Needs

Review of Key Items to date:

- Hazard-specific data (from Chapter 4 – Risk Assessment)
  - Historic Hazard Worksheets or list of past hazard occurrences and impact to jurisdiction
- Risk Assessment Worksheets
- Future Development Areas

Other Key Data Items:

- Photos of problem areas, past events, etc.
- EOC Activations
- 2017 Winter Storm damages
- Mitigation Actions/Projects

Mitigation Strategy: Goals

The most important element of the LHMP is the resulting mitigation strategy which serves as the long-term blueprint for reducing the potential losses identified in the risk assessment. The mitigation strategy is comprised of three components:

6. Mitigation Goals
7. Mitigation Actions
8. Action (Implementation) Plan

Mitigation Goals

Up to now, the HMPC has been involved in collecting and providing data for the City of Piedmont Local Hazard Mitigation Plan. From this information, a Risk Assessment has been developed that describes the risk and vulnerability of the Piedmont planning area to identified hazards and includes an assessment of the area's current capabilities for countering these threats through existing policies, regulations, programs, and projects.

This analysis identifies areas where improvements could or should be made. Formulating Goals will lead us to incorporating these improvements into the Mitigation Strategy portion of the plan. Our planning goals should provide direction for what loss reduction activities can be undertaken to make the planning area more disaster resistant.

Mitigation Goals are general guidelines that represent the community's vision for reducing or avoiding losses from identified hazards. Goals are stated without regard for achievement, that is, implementation cost, schedule, and means are not considered. Goals are public policy statements that:

- Represent basic desires of the jurisdiction;
- Encompass all aspects of planning area, public and private;
- Are nonspecific, in that they refer to the quality (not the quantity) of the outcome;
- Are future-oriented, in that they are achievable in the future; and
- Are time-independent, in that they are not scheduled events.

While goals are not specific (quantitative), they should not be so general as to be meaningless or unachievable.

Goals statements will form the basis for objectives. They should be stated in such a way as to develop one or more objectives related to each goal.

The key point in writing goals is to remember that they must deal with results, not the activities that produce those results.

Finally, before we formulate our goals, we should discuss other planning area goals from other regional/county/city programs and priorities. This keeps us from "reinventing the wheel," as well as being consistent with Multi-Objective Management --- or "MOM" --- where communities strive for efficiency by combining projects/needs that are similar in nature or location. Utilizing "MOM" effectively can result in identifying multiple sources of funding that can be "packaged" and broadening the supporting constituency base by including "outcomes" desired by various stakeholder groups.

Types/Sources of other area mitigation plans and programs include:

- General Plans
- Stormwater Program and Plans
- Flood/Watershed Management Plans and Studies
- Drought Plans
- Community Wildfire Protection Plans
- Strategic Fire Plans
- Dam Emergency Action Plans
- Emergency Operations Plans
- Climate Adaptation Plans
- Other?

Sample Goals from other Plans

Goals from the 2018 California State Hazard Mitigation Plan

1. Significantly reduce life loss and injuries.

2. Minimize damage to structures and property, as well as minimizing interruption of essential services and activities.

3. Protect the environment.

4. Promote community resilience through integration of hazard mitigation with public policy and standard business practices.

Goals from the City of Piedmont General Plan, 2012

Goal 13: Natural Features: Protect and enhance Piedmont's natural features, including its hillsides, creeks, and woodlands.

Goal 18: Geologic Hazards: Minimize the loss of life, personal injury, and property damage resulting from earthquakes, landslides, unstable soils, and other geologic hazards.

Goal 19: Wildfire and Flooding Hazards: Reduce exposure to wildfire, flooding, and other climate-related hazards.

Goal 21: Emergency Preparedness: Ensure that the City, the School District, and Piedmont residents and businesses are prepared for natural and man-made disasters.

Goal 37: Infrastructure: Provide water, sewer, storm drainage, energy, and telecommunication services in the most efficient, cost-effective, and environmentally sound manner possible.

Goals from the City of Piedmont Emergency Operations Plan (EOP), 2015

Operational Goals: During the response phase, the agencies that are charged with responsibilities in this plan should focus on the following five goals:

- Mitigate hazards.
- Meet basic human needs.
- Address needs of People with Access and Functional Needs (PAFN).
- Restore essential services.
- Support community and economic recovery.

Operational Priorities: To meet the Operational Goals, emergency responders should consider the following strategies:

- **Save Lives** – The preservation of life is the top priority of emergency managers and fire responders and takes precedence over all other considerations
- **Protect Health and Safety** – Measures should be taken to mitigate the impact of the emergency on public health and safety.
- **Protect Property** – All feasible efforts must be made to protect public and private property and resources, including critical infrastructure, from damage during and after an emergency.
- **Preserve the Environment** – All possible efforts must be made to preserve the environment and protect it from damage during an emergency.

Goals Development

You will each be given 3 sticky notes. On each note you will write what you think the goals for this mitigation planning effort should be. To get you started, provided below are possible goals for this mitigation plan. You may reword these or develop your own. These goal statements should serve as examples. It is vital that our Hazard Mitigation Planning Committee establish its own goals. Use one note card for each goal. The purpose of the goal development is to reach a consensus on plan goals.

- Minimize risk and vulnerability from natural hazards
- Increase communities' awareness of vulnerability to hazards
- Increase the use of shared resources
- Improve communities' capabilities to mitigate losses
- Maintain coordination of disaster plans with changing DHS/FEMA needs
- Maintain FEMA eligibility/position jurisdictions for grant funding
- Maintain/enhance the flood mitigation program to provide 200/500-year flood protection
- Maintain current service levels
- Provide protection for existing buildings from hazards
- Provide protection for future development from hazards
- Provide protection for natural and cultural resources from hazard impacts
- Provide protection for people's lives from hazards
- Provide protection for public health
- Provide protection for critical services (fire, police, etc.) from hazard impacts
- Provide protection for critical lifeline utilities from hazard impacts
- Reduce exposure to hazard related losses
- Reduce the number of emergency incidents
- Make better use of technology

When done, we will:

- Pin/tape them to the wall/easel-chart and arrange them by category
- Combine and reword them into 3-4 goals for the plan.

Mitigation Strategy Meetings
Day 2

Mitigation Strategy: Actions

Mitigation Actions are specific projects and activities that help achieve the goals and accomplish risk reduction in the community.

Categories of Mitigation Measures

PREVENTION: Preventive measures are designed to keep the problem from occurring or getting worse. Their objective is to ensure that future development is not exposed to damage and does not increase damage to other properties.

- Planning
- Zoning
- Open Space Preservation
- Land Development Regulations
  - ✓ Subdivision regulations
  - ✓ Building Codes
    - Fire-Wise Construction
  - ✓ Floodplain development regulations
  - ✓ Geologic Hazard Areas development regulations (for roads too!)
- Storm Water Management
- Fuels Management, Fire-Breaks

EMERGENCY SERVICES: protect people during and after a disaster. A good emergency services program addresses all hazards. Measures include:

- Warning (flooding, tornadoes, winter storms, geologic hazards, fire)
  - ✓ NOAA Weather Radio
  - ✓ Sirens
  - ✓ "Reverse 911" (Emergency Notification System)
- Emergency Response
  - ✓ Evacuation & Sheltering
  - ✓ Communications
  - ✓ Emergency Planning
    - Activating the EOC (emergency management)
    - Closing streets or bridges (police or public works)
    - Shutting off power to threatened areas (utility company)
    - Holding/releasing children at school (school district)
    - Ordering an evacuation (mayor)
    - Opening emergency shelters (Red Cross)
    - Monitoring water levels (engineering)
    - Security and other protection measures (police)
- Critical Facilities Protection (Buildings or locations vital to the response and recovery effort, such as police/fire stations, hospitals, sewage treatment plants/lift stations, power substations)

    - ✓ Buildings or locations that, if damaged, would create secondary disasters, such as hazardous materials facilities and nursing homes
    - ✓ Lifeline Utilities Protection
- ➢ Post-Disaster Mitigation
- ➢ Building Inspections
    - ✓ ID mitigation opportunities & funding before reconstruction

PROPERTY PROTECTION: Property protection measures are used to modify buildings subject to damage rather than to keep the hazard away. A community may find these to be inexpensive measures because often they are implemented by or cost-shared with property owners. Many of the measures do not affect the appearance or use of a building, which makes them particularly appropriate for historical sites and landmarks.

- ➢ Retrofitting/disaster proofing
    - ✓ Floods
        - Wet/Dry floodproofing (barriers, shields, backflow valves)
        - Relocation/Elevation
        - Acquisition
        - Retrofitting
    - ✓ High Winds/Tornadoes
        - Safe Rooms
        - Securing roofs and foundations with fasteners and tie-downs
        - Strengthening garage doors and other large openings
    - ✓ Winter Storms
        - Immediate snow/ice removal from roofs, tree limbs
        - "Living" snow fences
    - ✓ Geologic Hazards (Landslides, earthquakes, sinkholes)
        - Anchoring, bracing, shear walls
        - Dewatering sites, agricultural practices
        - Catch basins
    - ✓ Drought
        - Improve water supply (transport/storage/conservation)
        - Remove moisture competitive plants (Tamarisk/Salt Cedar)
        - Water Restrictions/Water Saver Sprinklers/Appliances
        - Grazing on CRP lands (no overgrazing-see Noxious Weeds)
        - Create incentives to consolidate/connect water services
        - Recycled wastewater on golf courses
    - ✓ Wildfire, Grassfires
        - Replacing building components with fireproof materials
        - Roofing, screening
        - Create "Defensible Space"
        - Installing spark arrestors
        - Fuels Modification

- ✓ Noxious Weeds/Insects
    - Mowing
    - Spraying
    - Replacement planting
    - Stop overgrazing
    - Introduce natural predators
- Insurance

NATURAL RESOURCE PROTECTION: Natural resource protection activities are generally aimed at preserving (or in some cases restoring) natural areas. In so doing, these activities enable the naturally beneficial functions of floodplains and watersheds to be better realized. These natural and beneficial floodplain functions include the following:

- storage of floodwaters
- absorption of flood energy
- reduction in flood scour
- infiltration that absorbs overland flood flow
- groundwater recharge
- removal/filtering of excess nutrients, pollutants, and sediments from floodwaters
- habitat for flora and fauna
- recreational and aesthetic opportunities

Methods of protecting natural resources include:

- Wetlands Protection
- Riparian Area/Habitat Protection/Threatened-Endangered Species
- Erosion & Sediment Control
- Best Management Practices

Best management practices ("BMPs") are measures that reduce nonpoint source pollutants that enter the waterways. Nonpoint source pollutants come from non-specific locations. Examples of nonpoint source pollutants are lawn fertilizers, pesticides, and other farm chemicals, animal wastes, oils from street surfaces and industrial areas and sediment from agriculture, construction, mining and forestry. These pollutants are washed off the ground's surface by stormwater and flushed into receiving storm sewers, ditches and streams. BMPs can be implemented during construction and as part of a project's design to permanently address nonpoint source pollutants. There are three general categories of BMPs:

9. Avoidance: setting construction projects back from the stream.
10. Reduction: Preventing runoff that conveys sediment and other water-borne pollutants, such as planting proper vegetation and conservation tillage.
11. Cleanse: Stopping pollutants after they are en route to a stream, such as using grass drainageways that filter the water and retention and detention basins that let pollutants settle to the bottom before they are drained

- Dumping Regulations
- Set-back regulations/buffers

- Fuels Management
- Water Use Restrictions
- Landscape Management
- Weather Modification

STRUCTURAL: Projects that have traditionally been used by communities to control flows and water surface elevations. Structural projects keep flood waters away from an area. They are usually designed by engineers and managed or maintained by public works staff. These measures are popular with many because they "stop" flooding problems. However, structural projects have several important shortcomings that need to be kept in mind when considering them for flood hazard mitigation:

- They are expensive, sometimes requiring capital bond issues and/or cost sharing with Federal agencies, such as the U.S. Army Corps of Engineers or the Natural Resources Conservation Service.
- They disturb the land and disrupt natural water flows, often destroying habitats or requiring Environmental Assessments.
- They are built to a certain flood protection level that can be exceeded by a larger flood, causing extensive damage.
- They can create a false sense of security when people protected by a structure believe that no flood can ever reach them.
- They require regular maintenance to ensure that they continue to provide their design protection level.

Structural measures include:

- Detention/Retention structures
- Erosion and Sediment Control
- Basins/Low-head Weirs
- Channel Modifications
- Culvert resizing/replacement/Maintenance
- Levees and Floodwalls
- Anchoring, grading, debris basins (for landslides)
- Fencing (for snow, sand, wind)
- Drainage System Maintenance
- Reservoirs (for flood control, water storage, recreation, agriculture)
- Diversions
- Storm Sewers

PUBLIC INFORMATION: A successful hazard mitigation program involves both the public and private sectors. Public information activities advise property owners, renters, businesses, and local officials about hazards and ways to protect people and property from these hazards. These activities can motivate people to take protection

- Hazard Maps and Data
- Outreach Projects (mailings, media, web, speakers, displays)
- Library Resources
- Real Estate Disclosure
- Environmental Education

Mitigation Strategy: Action Plan

The mitigation action plan describes how the mitigation actions will be implemented, including how those actions will be prioritized, administered, and incorporated into the community's existing planning mechanism. Each participating jurisdiction must have a mitigation action(s) and an action plan specific to that jurisdiction and its priority hazards and vulnerabilities.

Mitigation Criteria

For use in selecting and prioritizing Proposed Mitigation Measures

1. STAPLEE

Social: Does the measure treat people fairly? (different groups, different generations)

- Community Acceptance
- Effect on Segment of Population
- Social Benefits

Technical: Will it work? (Does it solve the problem? Is it feasible?)

- Technical Feasibility
- Reduce Community Risk
- Long Term Solution/Sustainable
- Secondary Impacts

Administrative: Do you have the capacity to implement & manage project?

- Staffing
- Funding Allocated
- Maintenance/Operations

Political: Who are the stakeholders? Did they get to participate? Is there public support? Is political leadership willing to support?

- Political Support
- Local Champion
- Public Support
- Achieves Multiple Objectives
- Supported by a broad array of Stakeholders

Legal: Does your organization have the authority to implement? Is it legal? Are there liability implications?

- Existing Local Authority
- State Authority
- Potential Legal Challenges

Economic: Is it cost-beneficial? Is there funding? Does it contribute to the local economy or economic development?

- Benefit of Action
- Cost of Action
- Cost Effective/Economic Benefits
- Economically Viable
- Outside Funding Required

Environmental: Does it comply with Environmental regulations?

- Effect on Land/Water
- Effect on Endangered Species
- Effect on Cultural Resources
- Effect on Hazmat sites
- Consistent with Community Environmental Goals
- Consistent with Environmental Laws
- Environmental Benefits

2. SUSTAINABLE DISASTER RECOVERY

- Quality of Life
- Social Equity
- Hazard Mitigation
- Economic Development
- Environmental Protection/Enhancement
- Community Participation

3. SMART GROWTH PRINCIPLES

- Infill versus Sprawl
- Efficient Use of Land Resources
- Full Use of Urban Resources
- Mixed Uses of Land
- Transportation Options
- Detailed, Human-Scale Design

4. OTHER

- Does measure address area with highest risk?
- Does measure protect …
  - ✓ The largest # of people exposed to risk?
  - ✓ The largest # of buildings?
  - ✓ The largest # of jobs?
  - ✓ The largest tax income?
  - ✓ The largest average annual loss potential?
  - ✓ The area impacted most frequently?

    - ✓ Critical Infrastructure (access, power, water, gas, telecommunications)
- ➢ Timing of Available funding
- ➢ Visibility of Project
- ➢ Community Credibility

Mitigation Action Prioritization Instructions

Our Team recommendations are listed on flip-chart paper around the room.

You each have 3 sets of colored dots:

- 3 red dots
- 3 blue dots
- 3 green dots

The red dots are for high priority (5 points each)

The blue dots are for medium priority (3 points each)

The green dots are for low priority (1 point each)

Place your dots on the recommendations, using the different colors to indicate your priority. You may use as many of your dots, of any color, on any recommendation --- or you may spread them out using as few of your dots as you wish. The dots will indicate the consensus of the team.

Use your list of criteria to help you make your determinations.

After the totals are counted, we will discuss them further to confirm or change any of the results as we see fit.

Mitigation Action Worksheet

Jurisdiction:	
Mitigation Action/Project Title:	
Hazards Addressed:	
Issue/Background:	
Project Description:	
Other Alternatives:	
Existing Planning Mechanism(s) through which Action Will Be Implemented:	
Responsible Office/Partners:	
Cost Estimate:	
Benefits (Losses Avoided):	
Potential Funding:	
Timeline:	
Project Priority:	

Worksheet completed by:	
Name and Title:	
Phone:	

City of Piedmont
Local Hazard Mitigation Plan
Mitigation Strategy Meetings: Mitigation Actions v/1
January 15 & 16, 2019

Responsible Department/ Staff	Mitigation Action Title	Hazards Addressed	Points/ Worksheet Status
Planning (FM to complete worksheet)	Public awareness, education, and outreach program enhancements: Improve/Enhance public education, engagement, and preparedness, response, and recovery program for all hazards (simplify, multi-media, educate and clarify various emergency systems, messaging and training)	Multi-hazard	35
Planning (FM to complete worksheet)	Incorporate LHMP Update by reference through council adoption into the safety element of the General Plan Update	Multi-hazard	N/A*
Public Works	Obtain backup generators where lines go down during wildfire, i.e., power pumping plants	Emergency Services/Multi-hazard	0
GIS	Update and maintain countywide Critical Facilities GIS layer	Emergency Services/Multi-hazard	N/A
Emergency Services	Establish Communications Redundancies	Emergency Services/Multi-hazard	8
Emergency Services/ Plannig	Identify vulnerable populations for inclusion in EOP Annexes	Emergency Services/Multi-hazard	11
Emergency Services	Update Emergency Operations Plan and Annexes	Emergency Services/Multi-hazard	6
Emergency Services	Develop Evacuation Plan (neighborhood level) for all communities and populations (to include all critical hazards, at risk populations, medical, ADA, animals, and an outreach component)	Emergency Services/Multi-hazard	31
Emergency Services	Develop Shelter Plan (neighborhood, animals, access and functional needs); focus on newer buildings, with seismic retrofits (schools?))	Emergency Services/Multi-hazard	0
Emergency Services	Develop backup generator projects with focus on critical facilities	Emergency Services/Multi-hazard	20
Emergency Services	Establish alternative EOC	Emergency Services/Multi-hazard	19
Emergency Services	Reverse 911 Upgrades/training	Emergency Services/Multi-hazard	4

Responsible Department/ Staff	Mitigation Action Title	Hazards Addressed	Points/ Worksheet Status
Emergency Services	Conduct preparedness, response, and recovery training and exercises	Emergency Services/Multi-hazard	12
Emergency Services/ Fire/ Public Works	Develop a plan to ensure a water source post disaster (drinking, fire suppression)	Emergency Services/Multi-hazard/ Earthquake/ Wildfire	8
City/EBMUD	Develop MOU with EBMUD to establish plans for reliability of services during and post disaster: Drinking Water and Wastewater systems	Emergency Services/Multi-hazard	N/A
Emergency Services/ Fire/ Public Works	Acquire manifolds for hydrants	Emergency Services/Multi-hazard/ Wildfire	6
Emergency Services	Establish City CERT program	Emergency Services/Multi-hazard	11
HOA/Public Works	Tyson Lake –research owner responsibilities and study inundation/assessment of downstream conditions	Dam Failure	18
EBMUD	Dam surveillance and inspection programs	Dam Failure	10
EBMUD	New inundation mapping associated with new containment structures	Dam Failure	5
City/ EBMUD	Develop public safety MOU with EBMUD for Estates containment structures	Dam Failure	N/A
Public Works/ Planning	Implement Cal Water Efficiency Landscape projects, with code enforcement component	Drought & Water Shortage	0
Planning/ Public Works	Develop landscaping ordinance	Drought & Water Shortage	12
Public Works	Seismic evaluation and prioritization of public buildings	Earthquake	36
Public Works/ Planning	Enhance building code enforcements	Earthquake	3
	Continue Bracebolt program for private home retrofits	Earthquake	23
Planning	Conduct study to preserve architectural integrity of structural retrofits	Earthquake	4
Public Works	Identify and implement critical facility retrofits	Earthquake	33
Public Works	Identify critical facilities for backup generators/fuel	Earthquake	22
Public Works	Identify and retrofit vulnerable bridges	Earthquake	3
Planning	Implement recommendations from Piedmont CAP (goal of reducing greenhouse emissions)	Climate Change	18
Public Works	Develop Stormwater Master Plan	Flood	12
Public Works	Hot Spot Mitigation (e.g., creek ends at Whittier Field – school property, Oak Road, etc)	Flood	5

Responsible Department/ Staff	Mitigation Action Title	Hazards Addressed	Points/ Worksheet Status
Planning	Flood Insurance Promotion for RL properties and areas	Flood	5
Planning	Code Enforcement	Flood	0
Public Works	Storm Sewer Upgrades, including structural	Flood	15
Emergency Services	Develop Heat Contingency Plan to include designated cooling centers	Heat	6
Planning/ Public Works	Plan to reduce heat island affect	Climate Change/Heat	0
Public Works	Undergrounding of utilities in VHFHSZs	Heavy Rain and Storms/High Winds/ Wildfire	30
Public Works	Enhance Urban Tree Program – storm watch protocols, tree trimming and removal	Heavy Rains and Storms/High Winds	0
Public Works/	City study and mapping to identify potential localized landslide areas based on soil type, past issues, and other factors	Landslide	6
Planning	Implementing hillside hazard overlay district to address slope stability hazards/ Code enforcement	Landslide	N/A
Public Works/	Pipe replacement to flexible pipes for smaller pipe systems	Earthquake/ Landslide	1
City Fire	Develop City specific CWPP	Wildfire	45
City Fire	Promote/obtain Firewise Communities Certification Programs	Wildfire	21
City Fire/Cal Fire	Implement Piedmont projects from Diablo CWPP for Alameda County	Wildfire	0
City Fire	Implement Fuels Mitigation Projects	Wildfire	9
City Fire/Planning	Develop and implement Vegetation Management Ordinance	Wildfire	6
City Fire/Planning	Require and/or encourage retrofits for fire safe construction	Wildfire	0
City Fire/Public Works	Identify backup water sources when water quality becomes an issue	Wildfire	3
City Fire/Public Works	Implement Hydrant connection upgrades	Wildfire	4
City Fire	Identify and implement Defensible Space projects	Wildfire	10
City Fire	Continue Eucalyptus and other vegetation clearing programs	Wildfire	N/A

Appendix D Adoption Resolution

Note to Reviewers: When this plan has been reviewed and approved pending adoption by FEMA Region IX, the adoption resolution will be signed by the City and added to this appendix. The intended resolution is provided below:

Resolution # ______

Adopting the Piedmont Local Hazard Mitigation Plan

Whereas, the City of Piedmont recognizes the threat that natural hazards pose to people and property within our community; and

Whereas, undertaking hazard mitigation actions will reduce the potential for harm to people and property from future hazard occurrences; and

Whereas, the U.S. Congress passed the Disaster Mitigation Act of 2000 ("Disaster Mitigation Act") emphasizing the need for pre-disaster mitigation of potential hazards;

Whereas, the Disaster Mitigation Act makes hazard mitigation grants available to state and local governments;

Whereas, an adopted Local Hazard Mitigation Plan is a requirement for certain funding for mitigation projects under multiple Federal Emergency Management Agency (FEMA) pre- and post-disaster mitigation grant programs; and

Whereas, the City of Piedmont used the FEMA-prescribed process to prepare this local hazard mitigation plan; and

Whereas, under the California Disaster Assistance Act, as amended by AB 2140, certain disaster funding is available to a local jurisdiction if such jurisdiction has adopted a local hazard mitigation plan into the safety element of its general plan; and

Whereas, the City Council desires that a local hazard mitigation plan be adopted by reference into the Safety Element of the City of Piedmont General Plan in accordance with AB 2140, as codified in Government Code sections 8685.9 and 65302.6; and

Whereas, the California Office of Emergency Services and FEMA Region IX have reviewed the draft City of Piedmont Local Hazard Mitigation Plan and approved it contingent upon the City Council adopting the Local Hazard Mitigation Plan; and

Whereas, the City of Piedmont desires to augment its emergency planning efforts by formally adopting the Local Hazard Mitigation Plan and to comply with the funding eligibility requirements of the Disaster Mitigation Act; and

Whereas, adoption of the Local Hazard Mitigation Plan by the City Council demonstrates the City of Piedmont's commitment to fulfilling the mitigation goals and objectives outlined in this Local Hazard Mitigation Plan; and

NOW, THEREFORE, BE IT RESOLVED that the City Council of the City of Piedmont does hereby resolve, declare, determine, and order as follows:

SECTION 1. The above recitals are correct and are incorporated into this Resolution as findings of the City Council.

SECTION 2. The Local Hazard Mitigation Plan dated _________________ is hereby adopted.

SECTION 3. The City Clerk is directed to the forward a copy of this resolution, along with the adopted Local Hazard Mitigation Plan, to the California Office of Emergency Services and FEMA Region IX to enable the plan's final approval in accordance with the requirements of the Disaster Mitigation Act and to establish conformance with the requirements of AB 2140.

SECTION 4. The City Council of the City of Piedmont hereby finds this action is not a project subject to the California Environmental Quality Act (CEQA) pursuant to State CEQA Guidelines section 15378(a), in that the adoption of the Local Hazard Mitigation Plan does not have a potential for a direct physical change or reasonably indirect physical change in the environment, and State Guidelines section 15061(b)(3), providing that actions are not subject to CEQA where it can be seen with certainty that there is no possibility that the activity in question may have a significant effect on the environment.

Appendix E Critical Facilities

Table E-1 City of Piedmont Critical Facility Inventory

Type	Name	Address	CAT	FHSZ	Dam Inundation Area	Rainfall Induced Landslide	Earthquake Induced Landslide Zone	CGS Liquefaction	USGS Liquefaction
Transmission Towers	Transmission Towers	298 St. James Rd - South	Essential Services Facilities	Very High	–	–	–	Outside of Liquefaction Zone	Very Low Susceptibility
Transmission Towers	Transmission Towers	298 St. James Rd - North	Essential Services Facilities	Very High	–	–	–	Outside of Liquefaction Zone	Very Low Susceptibility
Day Care / School	Corpus Christi Church and School	1 Estates Drive	At Risk Population Facilities	Very High	–	–	–	Outside of Liquefaction Zone	Very Low Susceptibility
Transmission Towers	Transmission Towers	275 Sandringham Road - South	Essential Services Facilities	Very High	–	–	–	Outside of Liquefaction Zone	Very Low Susceptibility
Communication	T-Mobile Wireless Site	275 Sandringham Road	Essential Services Facilities	Very High	–	–	–	Outside of Liquefaction Zone	Very Low Susceptibility
Transmission Towers	Transmission Towers	275 Sandringham Road - North	Essential Services Facilities	Very High	–	–	–	Outside of Liquefaction Zone	Very Low Susceptibility
Communication	AT&T Wireless Site	275 Sandringham Road	Essential Services Facilities	Very High	–	–	–	Outside of Liquefaction Zone	Very Low Susceptibility
Day Care / School	Zion Luthern Church and School	5201 Park Boulevard	At Risk Population Facilities	Very High	–	–	Earthquake Induced Landslide Zone	Outside of Liquefaction Zone	Very Low Susceptibility

Type	Name	Address	CAT	FHSZ	Dam Inundation Area	Rainfall Induced Landslide	Earthquake Induced Landslide Zone	CGS Liquefaction	USGS Liquefaction
Gas Station	Shell Gas Station	29 Wildwood Avenue	Hazardous Materials Facilities	Non-Very High	–	–	–	Inside Liquefaction Zone	Moderate Susceptibility
School	Wildwood Elementary	301 Wildwood Avenue	At Risk Population Facilities	Non-Very High	–	–	Earthquake Induced Landslide Zone	Outside of Liquefaction Zone	Very Low Susceptibility
Child Facility	Piedmont Play School	401 Hampton Road	At Risk Population Facilities	Non-Very High	–	–	–	Outside of Liquefaction Zone	Very Low Susceptibility
School	Kehilla Community Synagogue and School	1300 Grand Avenue	At Risk Population Facilities	Non-Very High	–	–	–	Inside Liquefaction Zone	Moderate Susceptibility
Response Center	Piedmont Unified School District Corporation Yard	(Behind Middle School, accessed via El Cerrito Ave)	Essential Services Facilities	Non-Very High	–	–	Earthquake Induced Landslide Zone	Outside of Liquefaction Zone	Very Low Susceptibility
School	Piedmont Middle School	742 Magnolia Avenue	At Risk Population Facilities	Non-Very High	–	–	–	Outside of Liquefaction Zone	Very Low Susceptibility
School	Millennium High School	760 Magnolia Avenue	At Risk Population Facilities	Non-Very High	–	–	Earthquake Induced Landslide Zone	Outside of Liquefaction Zone	Very Low Susceptibility
School	Piedmont High School	800 Magnolia Avenue	At Risk Population Facilities	Non-Very High	–	–	Earthquake Induced Landslide Zone	Outside of Liquefaction Zone	Very Low Susceptibility
Day Care Facility	Recreation Center	358 Hillside Avenue	At Risk Population Facilities	Non-Very High	–	–	–	Outside of Liquefaction Zone	Very Low Susceptibility

Type	Name	Address	CAT	FHSZ	Dam Inundation Area	Rainfall Induced Landslide	Earthquake Induced Landslide Zone	CGS Liquefaction	USGS Liquefaction
Utility	East Bay MUD Pleasant Valley Pumping Station	1507 Grand Avenue	Essential Services Facilities	Non-Very High	–	–	–	Inside Liquefaction Zone	Moderate Susceptibility
Pool	Piedmont Community Pool	777 Magnolia Avenue	Hazardous Materials Facilities	Non-Very High	–	–	–	Outside of Liquefaction Zone	Very Low Susceptibility
Day Care Facility	Community Hall	711 Highland Avenue	At Risk Population Facilities	Non-Very High	–	Potential Debris Flow Source	Earthquake Induced Landslide Zone	Outside of Liquefaction Zone	Very Low Susceptibility
Staging Facility	Piedmont Park	711 Highland Avenue	Essential Services Facilities	Non-Very High	–	Potential Debris Flow Source	Earthquake Induced Landslide Zone	Outside of Liquefaction Zone	Very Low Susceptibility
School	Linda Beach Elementary	100 Lake Avenue	At Risk Population Facilities	Non-Very High	–	–	–	Outside of Liquefaction Zone	Very Low Susceptibility
Communication	Sprint Wireless Site	120 Vista Avenue	Essential Services Facilities	Non-Very High	–	–	–	Outside of Liquefaction Zone	Very Low Susceptibility
Communication	AT&T Wireless Site	120 Vista Avenue	Essential Services Facilities	Non-Very High	–	–	–	Outside of Liquefaction Zone	Very Low Susceptibility
Essential Gov Operations	City Hall	120 Vista Avenue	Essential Services Facilities	Non-Very High	–	–	–	Outside of Liquefaction Zone	Very Low Susceptibility
Fire Department	Piedmont Fire Department	120 Vista Avenue	Essential Services Facilities	Non-Very High	–	–	–	Outside of Liquefaction Zone	Very Low Susceptibility
EOC	Piedmont EOC	403 Highland Avenue	Essential Services Facilities	Non-Very High	–	–	–	Outside of Liquefaction Zone	Very Low Susceptibility

Type	Name	Address	CAT	FHSZ	Dam Inundation Area	Rainfall Induced Landslide	Earthquake Induced Landslide Zone	CGS Liquefaction	USGS Liquefaction
Police Station	Piedmont Police Station	403 Highland Avenue	Essential Services Facilities	Non-Very High	–	–	–	Outside of Liquefaction Zone	Very Low Susceptibility
Gas Station	Piedmont Valero	340 Highland Avenue	Hazardous Materials Facilities	Non-Very High	–	–	–	Outside of Liquefaction Zone	Very Low Susceptibility
Day Care	Piedmont Community Church	400 Highland Avenue	At Risk Population Facilities	Non-Very High	–	–	–	Outside of Liquefaction Zone	Very Low Susceptibility
Communication	T-Mobile Wireless Site	400 Highland Avenue	Essential Services Facilities	Non-Very High	–	–	–	Outside of Liquefaction Zone	Very Low Susceptibility
School	Frank C. Havens Elementary	323 Highland Avenue	At Risk Population Facilities	Non-Very High	–	–	–	Outside of Liquefaction Zone	Very Low Susceptibility
Response Center	Corporation Yard	898 Red Rock Road	Essential Services Facilities	Non-Very High	Piedmont Dam	–	Earthquake Induced Landslide Zone	Outside of Liquefaction Zone	Very Low Susceptibility
Response Center	Corporation Yard	898 Red Rock Road	Hazardous Materials Facilities	Non-Very High	Piedmont Dam	–	Earthquake Induced Landslide Zone	Outside of Liquefaction Zone	Very Low Susceptibility
Communication	T-Mobile Wireless Site	898 Red Rock Road	Essential Services Facilities	Non-Very High	Piedmont Dam	–	Earthquake Induced Landslide Zone	Outside of Liquefaction Zone	Very Low Susceptibility
Transportation Life System	Oakland Avenue Bridge	900-944 Oakland Avenue	Essential Services Facilities	Non-Very High	–	–	–	Inside Liquefaction Zone	Moderate Susceptibility
Communication	AT&T Wireless Site	1658 Lower Grand Avenue	Essential Services Facilities	Non-Very High	–	–	–	Outside of Liquefaction Zone	Very Low Susceptibility

Source: City of Piedmont GIS, CAL FIRE, Cal OES, CGS, USGS

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