East Bay Regional Park District
Local Hazard Mitigation Plan Update
December 2022

East Bay Regional Park District

FOSTER MORRISON CONSULTING

Executive Summary

The East Bay Regional Park District (EBRPD or Park District) prepared this Local Hazard Mitigation Plan (LHMP) Update to the 2017 EBRPD LHMP to guide hazard mitigation planning to better protect the people and property of the EBRPD from the effects of natural disasters and hazard events. This LHMP Update demonstrates the Park District's commitment to reducing risks from hazards and serves as a tool to help decision makers direct mitigation activities and resources. This LHMP Update was also developed so that the EBRPD can maintain eligibility for certain federal disaster assistance, specifically, the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program (HMGP), Building Resilient Infrastructure and Communities (BRIC) 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 LHMP Update documents the 2022 hazard mitigation planning process and identifies relevant hazards, vulnerabilities and mitigation strategies the EBRPD will use to decrease vulnerability and increase resiliency and sustainability in the Park District.

This LHMP Update 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 Park District 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

DMA Process	Modified CRS Process
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

The planning process began with the organizational phase to establish the hazard mitigation planning committee (HMPC), comprised of key EBRPD 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 the EBRPD. Once approved by Cal OES and FEMA, this LHMP Update will be adopted and implemented by the Park District over the next five years.

This is a single jurisdictional plan with the EBRPD the sole jurisdiction seeking approval of the 2022 LHMP Update by FEMA.

Risk Assessment

A risk assessment was conducted that identified and profiled hazards that pose a risk to the EBRPD, assessed the vulnerability of the Park District to these hazards, and examined the existing capabilities to mitigate them.

The EBRPD is vulnerable to numerous hazards that are identified, profiled, and analyzed in this LHMP Update. Wildfires, floods, earthquakes, drought, dam failure, and other severe weather events are among the hazards that can have a significant impact on the Park District. Table ES-2 details the hazards identified for this LHMP Update.

Table ES-2 EBRPD Hazard Identification Assessment

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Climate Change	Extensive	Likely	Limited	High	–
Coastal Flooding and Sea Level Rise	Limited	Likely	Limited	Medium	High
Dam Failure	Significant	Unlikely	Critical	High	Medium
Drought & Water Shortage (with tree mortality)	Extensive	Likely	Critical	Medium	High
Earthquakes (and earthquake liquefaction)	Extensive	Occasional	Catastrophic	High	Low
Flood: 1%/0.2% annual chance	Limited	Occasional/ Unlikely	Limited	Medium	High
Flood: Localized/Stormwater Flooding	Significant	Highly Likely	Limited	Medium	Medium
Landslide, Mudslide, Debris Flow	Significant	Highly Likely	Limited	Medium	Medium
Levee Failure	Limited	Occasional	Limited	Medium	Medium
Pandemic	Extensive	Occasional	Critical	Medium	Low
Severe Weather: Extreme Heat	Extensive	Highly Likely	Limited	Medium	High
Severe Weather: Heavy Rain and Storms	Extensive	Highly Likely	Limited	Medium	High
Severe Weather: High Winds and Tornadoes	Extensive	Highly Likely	Limited	Medium	Medium
Tsunami	Limited	Occasional	Limited	Low	Medium
Wildfire (with smoke/ air quality)	Extensive	Highly Likely	Catastrophic	High	High

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

Climate Change Influence
Low: Minimal potential impact
Medium: Moderate potential impact
High: Widespread potential impact

Mitigation Strategy

Based on the results of the risk assessment, the mitigation strategy was updated to reduce the EBRPD's risk and vulnerability to hazards. The resulting Mitigation Strategy is comprised of an LHMP mission statement, goals and objectives, and a mitigation action plan which includes a series of mitigation actions, projects, and implementation measures.

Mission Statement:

> ***This Local Hazard Mitigation Plan assesses natural hazards of concern to the EBRPD, including consideration of climate change effects on hazards; evaluates risk to life safety, public health, property, and the environment; and evaluates mitigation measures to reduce risks and vulnerabilities, minimize losses, and increase EBRPD resilience and sustainability.***

Goal 1: Reduce Threats to Life Safety for Visitors, Staff and Residents Adjacent to the Park District's Parks

Goal 2: Reduce Damage to the Park District's Lands and Facilities, Critical Infrastructure, and Adjacent Areas from Future Natural Hazard Events

Goal 3: Protect Environmentally Important Lands and Facilities and Sites with Historical/Cultural Significance and to Ensure the Long-Term Viability of Important Natural Resources

Goal 4: Enhance Emergency Planning, Disaster Response and Post-Disaster Recovery Efforts to Increase Park District Capabilities and Leverage Interagency and Public-Private Coordination and Resources to be Prepared for, Respond to, and Recover from Future Natural Hazard Events

Goal 5: Increase Education, Awareness and Understanding of Natural Hazards and Mitigation

It should be noted that many of the original actions from the 2017 LHMP were determined to be more of an overarching mitigation policy or objective to the mitigation strategy development process and not an implementable action. Many of these "actions" are carried out as a common business practice of the Park District. As such, given the value of these to guide mitigation in the Park District, 21 of the 45 actions from 2017 have become objectives for this 2022 LHMP Update. Based on the risk assessment review and goal setting process, the HMPC identified an overarching mission statement and the following goals and objectives (Table ES-3), which provide the direction for reducing future hazard-related losses within the EBRPD Planning Area.

Table ES-3 East Bay Regional Park District LHMP Update: 2022 Mitigation Objectives

Mitigation Strategy Objectives	Goals Addressed
Retrofit or replace facilities, with a high vulnerability, with new current-code facilities or relocate them out of high hazard areas to protect lives, reduce damage, loss of function, economic loss, and disruptions in future natural hazard events	1, 2
Locate new facilities outside of high hazard areas whenever possible and design them to minimize risk and vulnerability from future natural hazard events	1, 2
Minimize threats to important lands, resources, facilities, and sites from future natural hazard events	3
Manage, maintain and restore park lands so that they retain their important scenic, natural and cultural values.	3
Maintain, acquire and preserve significant biologic, geologic, scenic and historic resources within Alameda and Contra Costa counties.	3
Enhance collaboration and coordination between the Park District, local governments, utilities, businesses and citizens to prepare for, respond to, and recover from future natural hazard events	1, 2, 3, 4
Enhance emergency planning to facilitate effective preparedness, response and rapid recovery from future natural hazard events	1, 2, 3, 4
Develop robust disaster response and evacuation plans for Park District staff, workers, and visitors and conduct frequent practice drills using hazard and risk information in the mitigation plan	1, 2, 3, 4
Systematically track natural hazard events that result in damage to Park District facilities to help target mitigation actions	1, 2, 3, 4, 5
Enhance and complete the Park District's inventory of facilities, resources, and sites to more accurately evaluate risks from natural hazards	2, 3
Implement education and outreach efforts to increase awareness of natural hazards throughout the Park District, including those that pose substantial life safety risk, to Park District staff, visitors and communities served by the Park District	1, 2, 5
Increase awareness and understanding of natural hazards by creating, maintaining, and publicizing a natural hazards page on the Park District's website with links to more information about natural hazards and mitigation activities to reduce risks from natural hazards	1, 2, 3, 5
Keep the Park District's LHMP on the website and encourage comments from stakeholders for the periodic review and update of the mitigation plan	1, 2, 5
Continue outreach and education programs through the Hills Emergency Forum, the Fire Wise Program, Local Fire Safe Councils and other organizations	1, 2, 3, 5
Integrate and implement the findings and mitigation actions in the mitigation plan into ongoing programs, plans and practices for the Park District	1, 2, 3, 4, 5
Continue to refine the Park District's mitigation strategies to maximize risk reduction, while minimizing possible impacts on the natural environment	1, 2, 3, 4, 5
Pursue mitigation grants from FEMA's pre- and post-disaster programs, CAL FIRE, US Forest Service, California Fire Safe Council, and from other grant sources	1, 2, 3, 4, 5
Pursue FEMA Public Assistance grants if Park District facilities suffer damage in a FEMA declared disaster and include mitigation measures in addition to repairs	2, 3

Mitigation actions and projects to support these goals and objectives are shown in Table ES-4.

Table ES-4 EBRPDs Mitigation Actions

Action Title	New Action/ 2017 Action	Address Current Development	Address Future Development	Mitigation Category
Multi-Hazard Actions				
Action 1. Ingress/egress improvements	New Action	X	X	Property Protection Emergency Services
Action 2. Upgrade and replace the Channel 3 (Fire and Park Operations) base station radio receivers and/or transmitters.	New Action	X	X	Emergency Services
Action 3. Backup power supply for critical facilities and infrastructure: Generator/solar/battery projects	New Action	X	X	Property Protection Emergency Services
Action 4. Park District wide Vegetation Map and Landscape Database project - conduct mapping of all areas and implement resulting projects	New Action	X	X	Prevention Natural Resource Protection
Action 5. Enhance public education and awareness of EBRPD priority hazards including the role of effective mitigation on Park District lands	2017 Action	X	X	Public Information
Climate Change Actions				
Action 6. Implementation of "green" projects, including greenhouse gas reduction projects and implementation of Green Fleet Management Plan	New Action	X	X	Prevention Property Protection
Climate Change, Coastal Flooding and Sea Level Rise, and Levee Failure Actions				
Action 7. Implementation of Hayward shoreline projects to address climate change, coastal flooding, sea level rise	New Action	X	X	Prevention Property Protection Structural Projects Natural Resource Protection
Drought and Water Shortage Actions				
Action 8. Water supply/source redundancy, storage, and reliability projects	New Action	X	X	Prevention Property Protection Natural Resource Protection
Earthquake Actions				
Action 9. Conduct seismic evaluation of vulnerable structures and structural retrofits of EBRPD facilities and infrastructure	2017 Action	X	X	Property Protection Structural Projects

Action Title	New Action/ 2017 Action	Address Current Development	Address Future Development	Mitigation Category
Flood, Localized Flood, Heavy Rains and Storms, Landslides, and Dam Failure Actions				
Action 10. Implementation of the Lake Temescal Dam Restoration Plan	New Action	X	X	Property Protection Structural Projects Natural Resource Protection
Action 11. Flood and Storm Mitigation Inland Areas	2017 Action	X	X	Property Protection Structural Projects Natural Resource Protection
Action 12. Drainage System Improvements and Culvert Replacement Action	2017 Action	X	X	Property Protection Structural Projects Natural Resource Protection
Wildfire, Drought and Water Shortage, Extreme Heat, Climate Change, and High Winds Actions				
Action 13. Implement the vegetation management/fuel reduction projects from the Wildfire Hazard Reduction and Resource Management Plan	2017 Action	X	X	Prevention Property Protection Natural Resource Protection
Action 14. Continued implementation of the EBRPD Tree Die-Back and Hazardous Trees Abatement Plans and Programs	2017 Action	X	X	Prevention Property Protection Natural Resource Protection
Action 15. Defensible space and ignition resistant construction projects	2017 Action	X	X	Prevention Property Protection Natural Resource Protection
Action 16. Continued update and implementation of grazing program and grazing plan	New Action	X	X	Prevention Property Protection Natural Resource Protection
Action 17. Planting of more native and fire tolerant vegetation and shaded fuel breaks	New Action	X	X	Prevention Property Protection Natural Resource Protection

East Bay Regional Park District

Table of Contents

Chapters

Appendices

Appendix A: Planning Process

Appendix B: References

Appendix C: Mitigation Strategy

Appendix D: Adoption Resolution

Appendix E: Threatened and Endangered Species

Appendix F: Detailed Hazard Tables

Appendix G: Critical Facilities Master Table

Appendix H: Critical Facilities by Hazard

Abbreviations and Acronyms

Acronym	Definition
AB	Assembly Bill
AFO	Assistant Finance Officer
ALERT	Automated Local Evaluation in Real Time
APG	California Adaptation Planning Guide
AQI	Air Quality Index
ART	Adapting to Rising Tides Program
ASTDR	Agency for Toxic Substances and Disease Registry's
BAM	Best Available Map
BCA	Benefit Cost Analysis
BCEGS	Building Code Effectiveness Grading Schedule
BLM	Bureau of Land Management
BRIC	Building Resilient Infrastructure and Communities
CA	California
Cal EPA	Environmental Protection Agency
CA-DWR	California Department of Water Resources
Cal OES	California Office of Emergency Services
CAISO	California Independent System Operator
CAP	Climate Adaptation Plan
CAS	Climate Adaptation Strategy
CBC	California Building Code
CCHPR	Climate Change and Health Profile Report
CCSM	Community Climate System Model
CDAA	California Disaster Assistance Act
CDC	Center for Disease Control
CDBG	Community Development Block Grant
CDFA	California Department of Food & Agriculture
CDFW	California Department of Fish and Wildlife
CEC	California Energy Commission
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CGS	California Geologic Survey
CHP	California Highway Patrol
CIP	Capital Improvements Plan
CNPS	California Native Plant Society
CNRA	California Natural Resource Agency
CPUC	California Public Utilities Commission
CRS	(National Flood Insurance Program's) Community Rating System

Acronym	Definition
CVP	Central Valley Project
CWPP	Community Wildfire Protection Plan
DAC	Disadvantaged Community
DFIRM	Digital Flood Insurance Rate Map
DMA	Disaster Mitigation Act of 2000
DOF	Department of Finance
DOT	Department of Transportation
DSOD	Division of Safety of Dams
EBMUD	East Bay Municipal Utility District
EBRPD	East Bay Regional Park District
EF	Enhanced Fujita
ESPM	University of California, Berkeley's Department of Environmental Science, Policy, and Management
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
GFDL	Geophysical Fluid Dynamics Laboratory
GHG	Greenhouse Gases
GIS	Geographic Information Systems
GPH	Gallons per Hour
GRASP	Geospatial Research, Analysis & Services Program
HHPD	High Hazard Potential Dam
HMGP	Hazard Mitigation Grant Program
HMPC	Hazard Mitigation Planning Committee
HI	Heat Index
IBC	International Business Code
IPCC	Intergovernmental Panel on Climate Change
LFPZ	Levee Flood Protection Zone
LHMP	Local Hazard Mitigation Plan
LOMA	Letter of Map Amendment
LOMR	Letter of Map Revision
LRA	Local Responsibility Area
MERS	Middle East Respiratory Syndrome

Acronym	Definition
MHDP	Multi Hazards Demonstration Project
MHI	Median Household Income
MMI	Modified Mercalli Intensity Scale
MSL	Mean Sea Level
MW	Megawatt
NASA	National Aerospace and Science Agency
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
NIDIS	National Integrated Drought Information System
NOAA	National Oceanic and Atmospheric Administration
NPS	National Park Service
NWS	National Weather Service
OHP	Office of Historic Preservation
PDM	Pre-Disaster Mitigation Program
PM	Particulate Matter
PNAS	Proceedings of the National Academy of Sciences
PSPS	Public Safety Power Shutoff
RAWS	Remote Automated Weather Stations
RCP	Representative Concentration Pathway
RTA	Recommended Treatment Area
SAC-SJ	Sacramento-San Joaquin Valley
SARS	Severe Acute Respiratory Syndrome
SB	Senate Bill
SBA	Small Business Administration
SFHA	Special Flood Hazard Area
SGMA	Sustainable Groundwater Management Act
SHBC	State Historical Building Code
SRA	State Responsibility Area
SWP	State Water Project
UBC	Uniform Building Code
UCERF	Uniform California Earthquake Rupture Forecast
USACE	US Army Corp of Engineers
USGS	United States Geologic Survey
USDA	United States Department of Agriculture
VHFHSZ	Very High Fire Hazard Severity Zone
WGCEP	Working Group on California Earthquake Probabilities

Acronym	Definition
WHO	World Health Organization
WHRRMP	Wildfire Hazard Reduction and Resource Management Plan
WRCC	Western Regional Climate Center
WSOC	Wildfire Safety Operations Center
WUI	Wildland Urban Interface

Chapter 1 Introduction

1.1 Purpose

The East Bay Regional Park District (EBRPD or Park District) prepared this Local Hazard Mitigation Plan (LHMP) Update to the 2017 EBRPD LHMP to guide hazard mitigation planning to better protect the people and property of the EBRPD from the effects of natural disasters and hazard events. This LHMP Update demonstrates the EBRPD's commitment to reducing risks from hazards and serves as a tool to help decision makers direct mitigation activities and resources. This LHMP Update was also developed so that the EBRPD can maintain eligibility for certain federal disaster assistance, specifically, the Federal Emergency Management Agency's (FEMA) Hazard Mitigation Grant Program (HMGP), Building Resilient Infrastructure and Communities (BRIC) 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 reduced 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 2019 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 Update documents the EBRPD's hazard mitigation planning process and identifies relevant hazards, vulnerabilities, and mitigation strategies the EBRPD will use to decrease vulnerability and increase resiliency and sustainability in the Park District.

The EBRPD LHMP Update is a single jurisdictional plan that geographically covers the entire area within the Park District's 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 effective Plan Preparation and Review Guidance. While DMA 2000 emphasized the need for mitigation

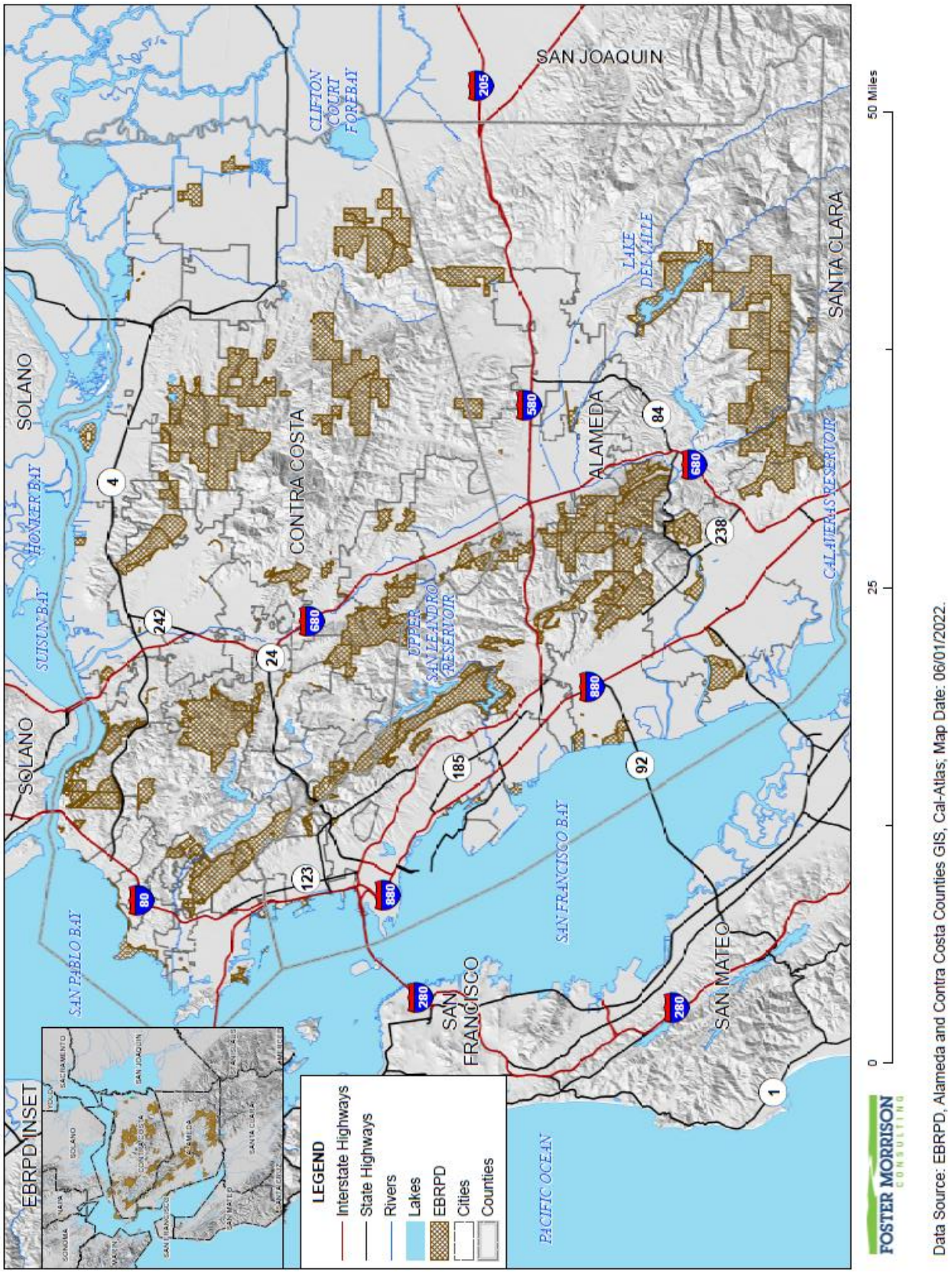
plans and more coordinated mitigation planning and implementation efforts, the regulations established the requirements that local hazard mitigation plans must meet in order for a local jurisdiction to be eligible for certain federal disaster assistance and hazard mitigation funding under the Robert T. Stafford Disaster Relief and Emergency Act (Public Law 93-288). Because the Park District is subject to many kinds of hazards, access to these programs is vital.

Information in this LHMP Update 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 public health and safety and critical community facilities; reducing liability exposure; and minimizing overall community impacts and disruptions. EBRPD has been affected by hazards in the past and is thus committed to reducing future impacts from hazard events and maintaining eligibility for mitigation-related federal funding.

1.3 EBRPD Profile

The EBRPD owns and manages regional parks and open spaces in Alameda and Contra Costa counties, a 1,400 square mile area that is home to 2.6 million people and forms the eastern shoreline of San Francisco Bay. The Park District owns and operates 73 parks spanning across 125,000 acres; 1,250 miles of trails; 55 miles of shoreline These parks and regional trails are shown in Figure 1-1.

Figure 1-1 EBRPD



The EBRPD 2022 Adopted Operating Budget noted that the Park District operates recreation areas, wildernesses, shorelines, preserves, land banks and 31 regional, inter-park trails. The EBRPD's parks receive over 25 million visits each year. Park District facilities include:

- Over 1,330 miles of trails within the parklands
- 8 freshwater lakes
- 3 swim lagoons
- Operates 3 State Parks
- 2 San Francisco Bayshore beaches
- 3 swimming pools
- 40 lake fishing docks
- 3 Bay fishing piers
- 225 family campsites
- 5 cabins
- 42 youth camping areas
- 24 backpacking camps
- 7 equestrian centers
- 2 golf courses
- 1 disc-golf course
- 137 group picnic sites subject to reservation
- 10 interpretive and education centers
- 10 children's playgrounds
- 1 adult exercise location
- 2 mobile education centers
- 1 mobile education exhibit
- 17 wedding, meeting, and banquet facilities

The 2013 EBRPD Master Plan noted that the jurisdiction of the EBRPD includes all of Alameda and Contra Costa counties. The Park District is the primary provider of regional park facilities and activities for this two county area. A publicly elected Board of Directors governs the District. These Board members are elected from seven wards within the jurisdiction of EBRPD.

The Park District was formed under the California Public Resources Code (Article 2, 5500 series), which states that the Park District has the power to:

> ***"…acquire land…to plan…develop…and operate a system of public parks, playgrounds, golf courses, beaches, trails, natural areas, ecological and open space preserves, parkways, scenic drives, boulevards and other facilities for public recreation, for the use and enjoyment of all the inhabitants of the District…to conduct programs and classes in outdoor science education and conservation education…to employ a police force…prevent and suppress fires…and to do all other things necessary or convenient to carry out the purposes of the District."***

Awareness of this broad mandate is essential to understanding the Park District's complex responsibilities to its constituents.

The 2017 EBRPD Economic Analysis Report noted that parks, trails, recreational facilities, and open space in the East Bay are well-integrated into the urban environment and community infrastructure. The Park

District provides a great range of recreational activities and educational programming. The EBRPD is the largest regional park district in the nation. The Trust for Public Land ranked Oakland as the #1 high-density U.S. city for parkland acres per resident in 2014.

1.3.1. History

The first regional parks in the East Bay were established on watershed land purchased from the East Bay Municipal Utility District (EBMUD). In 1928, EBMUD declared surplus some 10,000 acres of land in the East Bay hills. This announcement provided the impetus for a concerted effort by East Bay community leaders, who advocated opening these lands to the public as regional parklands. A vigorous lobbying effort culminated in the passage in 1933 of AB 1114, which authorized establishment of a regional park district and a board to govern it.

Then in 1934, during the depths of the Great Depression, a ballot measure to establish the EBRPD and a tax for its operation was placed on the ballot in seven cities—Alameda, Albany, Berkeley, Emeryville, Oakland, Piedmont and San Leandro. It passed by a resounding 71 percent and the first regional park agency in the nation was created. The Hayward area joined the Park District in 1956. Fremont voters approved annexation in 1958. Most of Contra Costa County joined the Park District in 1964, the Pleasanton area in 1966, East Contra Costa in 1981, and finally the Livermore area in 1992, resulting in a full two-county jurisdiction.

The Park District's subsequent history has been one of increased service, as its constituency has become more populous, complex, and culturally diverse. Gradually at first, then more rapidly, the Park District acquired more parklands and expanded its area of jurisdiction, along with new programs directed at a diverse and growing population.

1.3.2. Geography and Climate

The East Bay is the eastern region of the San Francisco Bay Area and includes cities along the eastern shores of the San Francisco Bay and San Pablo Bay. The region has grown to include inland communities in Alameda and Contra Costa counties. With a population of roughly 2.8 million in 2020, it is the most populous subregion in the Bay Area. Inside this region lies the EBRPD. The EBRPD is a system of beautiful parklands in Alameda and Contra Costa counties to the east of San Francisco. Elevations in the District range from 0 ft above mean sea level (msl) to just under 1,000 ft above msl.

The climate in Contra Costa and Alameda County is characterized by warm, dry summers and mild, wet winters. Average temperatures in the Park District range from the low 50s in the winter to the mid 60s in the summer months. Record high temperature for the Park District was 109°F on September 14, 1971. Record low for the Park District was 26°F on December 12, 1972. Days below freezing are rare in the Park District, with an average of 0.3 days below 32°F. Rainfall is the chief form of precipitation in the Park District, with most rainfall occurring from October to April. Average rainfall is approximately 23 inches. Highest annual rainfall for the Park District 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.

1.4 Plan Organization

This EBRPD LHMP Update is a single-jurisdictional plan that geographically covers the entire geographical extent of the EBRPD boundaries (or service area). The boundaries of the EBRPD include the entirety of Alameda and Contra Costa counties. Hereinafter in this document, this will be referred to as the EBRPD Planning Area.

The EBRPD LHMP Update is organized as follows:

- Chapters
  - ✓ 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

- Appendices
  - ✓ Appendix A: Planning Process
  - ✓ Appendix B: References
  - ✓ Appendix C: Mitigation Strategy
  - ✓ Appendix D: Adoption Resolution
  - ✓ Appendix E: Threatened and Endangered Species
  - ✓ Appendix F: Detailed Hazard Tables
  - ✓ Appendix G: Critical Facilities Master Table
  - ✓ Appendix H: Critical Facilities by Hazard

Chapter 2 What's New

Requirements §201.6(d)(3) and §201.7(d)(3): A local jurisdiction must review and revise its plan to reflect changes in development, progress in local mitigation efforts, and changes in priorities, and resubmit it for approval within 5 years in order to continue to be eligible for mitigation project grant funding.

The 2017 EBRPD Local Hazard Mitigation Plan (LHMP) contained descriptions of their planning processes, the risk assessments of identified hazards for the EBRPD Planning Area and mitigation strategies for reducing the risk and vulnerability from these hazards. Since approval of the 2017 LHMP by FEMA, progress has been made by the Park District on implementation of the 2017 mitigation strategies. As part of this LHMP Update, a thorough review and update of the 2017 LHMP was conducted to ensure that this Update reflects current EBRPD conditions and priorities in order to realign the updated mitigation strategy for the next five-year planning period. This section of this LHMP Update includes the following:

- **What's New in the Plan Update**. Section 2.1 provides an overview of the approach to updating the Plan and identifies new analyses, data and information included in this LHMP Update to reflect current community conditions. This includes a summary of new hazard and risk assessment data as it relates to the EBRPD Planning Area as well as information on current and future development trends affecting EBRPD vulnerability and related issues. The actual updated data, discussions, and associated analyses are contained in their respected sections within this LHMP Update.
- **Summary of Significant Changes to Current Conditions and Hazard Mitigation Program Priorities**. Section 2.2 provides a summary of significant changes in current conditions, changes in vulnerability, and any resulting modifications to the EBRPD's hazard mitigation program priorities.
- **2017 Mitigation Strategy Status and Successes**. Section 2.3.2 provides a description of the status of mitigation actions from the 2017 LHMP and also indicates whether a project is no longer relevant or is recommended for inclusion in the updated 2022 mitigation strategy. This section also highlights key mitigation success stories of the EBRPD since the 2017 LHMP.

This What's New section provides documentation of EBRPD Planning Area's progress or changes in their risk and vulnerability to hazards and their overall hazard mitigation program. Completion of this LHMP Update further provides documentation of the EBRPD's continued commitment and engagement in the mitigation planning process.

2.1 What's New in the Plan Update

This LHMP Update involved a comprehensive review and update of each section of the 2017 Plan and includes an assessment of the success of the participating communities in evaluating, monitoring, and implementing the mitigation strategy outlined in the 2017 LHMP. Only the information and data still valid from the 2017 LHMP was carried forward as applicable into this LHMP Update.

Also to be noted, Chapter 7 Implementation and Maintenance of this LHMP Update identifies key requirements for updating future plans:

- 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 inventories; and
- Incorporate new action recommendations or changes in action prioritization.

These requirements and others as detailed throughout this Plan were addressed during this LHMP Update process.

As part of its comprehensive review and update of each section of the Plan, the EBRPD recognized that updated data, if available, would enhance the analysis presented in the risk assessment and utilized in the development of the updated mitigation strategy. Highlights of new data used for this LHMP Update is identified below in this section and is also sourced in context within Chapter 4, Risk Assessment. Specific data used is sourced throughout this LHMP Update. This new data and associated analysis provided valuable input for the development of the updated mitigation strategy presented in Chapter 5 of this LHMP Update.

Highlights of new information and analyses contained in this LHMP Update includes the following:

- Most hazards from the 2017 Plan were profiled in this LHMP Update. Dropped hazards include snow and ice storm, and volcanoes. These were dropped due to the low risk of occurrence. New hazards include localized climate change and pandemic. The flood hazard was split in to four different hazards: Flood, Localized Flood, Levee Failure, Coastal Flooding and Sea Level Rise, and Heavy Rains and Storms. The earthquake hazard was split into earthquakes, tsunami, and dam failure. Tsunami and dam failure were addressed as their own hazards. Climate change was addressed as both a standalone hazard and the extent to which it exacerbates other hazards.
- The Park District developed a list of critical facilities that were spatially quantified in GIS, and then overlayed on each mapped hazard.
- Future development data was updated and collected from the EBRPD.
- Disaster declarations were updated, including federal, state, and USDA disaster declarations.
- The NCDC Storm Events and FEMA/Cal OES disaster declaration tables were updated.
- A new section on Power Shortage/Failure was added. Public Safety Power Shutoff events were also added.
- Cal-Adapt data was included in the climate change section, as well as to other hazards that are exacerbated by climate change.
- New dam data provided by Cal OES and CA DSOD was used for the dam inventory and analysis. This data included an updated hazard classification for identified dams and updated inundation mapping. Values at risk to dam inundation was analyzed. Critical facilities at risk to dams were tabulated.

- An updated GIS analysis using the recent Alameda and Contra Costa DFIRMs was performed for the flooding hazard for the 1%/0.2% annual chance floods, including values at risk, critical facilities at risk, and general community impacts.
- More detailed GIS analysis was performed for the wildfire hazard, including values at risk, critical facilities at risk, and general community impacts.
- An entire rework of the risk assessment for each identified hazard to reflect new information and to reflect the updated FEMA plan review tool. This included reworking the hazard profile and adding sections on location, extent, and new hazard event occurrences; redoing the entire vulnerability analysis to add additional items and updating the vulnerability assessment based on more recent hazard data and the most current EBRPD land and assets data for the existing built environment to develop loss estimates.
- To better meet the revised FEMA plan review tool, a more extensive analysis of the extents to identified hazards was conducted and included in this LHMP Update.
- A greater study of EBRPD mitigation capabilities was added.
- Incorporation and analysis of the 2020 census data and updated California Department of Finance population data was utilized for this LHMP Update.
- Social vulnerability data were included in portions of this Plan Update.

2.2 Summary of Significant Changes to Current Conditions, Planning Area Vulnerability, and Hazard Mitigation Priorities

This section provides a summary by hazard of significant changes in current conditions, Planning Area vulnerability, and any resulting modifications to the EBRPD's mitigation program priorities since the 2017 LHMP:

Summary of Significant Changes to Current Conditions, EBRPD Vulnerability, and Hazard Mitigation Priorities

This section provides a summary by hazard of significant changes in current conditions, EBRPD vulnerability, and any resulting modifications to the Park District's mitigation program priorities since the 2017 LHMP.

2022 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Climate Change			X

- Climate change was not addressed as a separate hazard in 2017. Regardless, the effects of climate change are becoming more apparent in the EBRPD and all of California.
- NWS data indicates temperatures are increasing resulting in more extreme heat days. 2021 and 2022 temperatures were some of the hottest.
- Weather extremes, including precipitation have become much more variable – the EBRPD is seeing increased precipitation and intensity as well as abnormally dry conditions.
- Data also suggests that changing climate conditions influence the severity of multiple hazards, such as heat, flooding, coastal flooding and sea level rise, wildfire, drought, and others identified in the EBRPD.

- Climate change has contributed to 1,500 acres of dead standing trees (located in the Wildland Urban Interface).

2022 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Coastal Flooding and Sea Level Rise			X

- With recent increases in precipitation and intensity resulting in 2 disaster declarations for heavy rains and storms affecting coastal areas since the 2017 LHMP, the EBRPD is increasingly vulnerable to these types of events
- Local and regional studies provide evidence that sea level rise is already occurring in the EBRPD.

2022 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Dam Failure		X	

- Dam failure was not specifically addressed in the 2017 LHMP. However, the number and locations of dams have not likely changed since the last Plan. Likewise, the EBRPD populations of staff and visitors to the Park District has remained fairly level since the 2017 LHMP. Thus the EBRPD vulnerability to dam failure has not increased.
- Risk of dam failure increases over the years due to aging dam infrastructure.
- EBRPD has completed EAPs on the dams they own in 2022. This planning has helped the Park District to assess current dam conditions and to prepare for future events.

2022 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Drought and Water Shortage			X

- Drought conditions since the 2017 LHMP, including water supply issues, have had an impact on the EBRPD and California. As a result, the drought hazard continues to be a significant priority for mitigation planning.
- Recent drought conditions have contributed to an increase in dry fuels (and tree mortality), and general increase in wildfire conditions.
- Recent drought conditions stress trees and vegetation making them more susceptible to insect infestation, disease, and other issues.
- Noxious weeds are more drought tolerant – better able to compete for water over local vegetation.
- Cyanobacteria increases during periods of drought. This can affect recreation areas in the EBRPD.
- Tick populations have exploded as a result of recent droughts. Increase of tick borne diseases has occurred as a result, both for humans, as well as for animals that reside in the EBRPD Planning Area.

2022 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Earthquake (w/Liquefaction)		X	

- Overall, EBRPD is in a relatively high seismically active area. Data shows that the longer the area goes without a strong earthquake, the greater the possibility of a large damaging earthquake in the future.
- A primary factor that might change the earthquake vulnerability is additional development within the EBRPD. However, adherence to current California building codes should ensure sound development of new structures better able to withstand a large earthquake. Underground utilities remain a concern.

2022 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Flood: 1%/0.2% events		X	

- The risk and vulnerability of 1% and 0.2% flood events remain somewhat constant, changing from year to year based on weather, location, new development, and improvements to the flood control systems.
- With the winter storms of 2017, heavy rains contributed to flooding in and around the EBRPD.
- Effective local land use planning and requirements for development in identified floodplains have minimized additional exposure to this hazard in the EBRPD.
- Implementation of additional improvements to the flood control systems protecting EBRPD lands and assets will help reduce this hazard in the future.

2022 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Flood: Localized Stormwater Flooding			X

- Climate change issues may result in more localized flooding as the climate warms and more frequent, wetter, and greater intensity storms create more runoff.
- 2017 winter storms, including significant, greater intensity rains, resulted in more localized flooding with damages throughout the EBRPD.
- Outdated and aging drainage infrastructure also contributes to a greater vulnerability to localized, stormwater flooding. This is especially true in areas with limited or no drainage systems.
- Recent drought conditions in some areas have hardened soils and predisposed areas to worse flooding.

2022 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Landslide, Mudslide, & Debris Flow			X

- Similar to heavy rain and storms, the overall vulnerability of the EBRPD changes from year to year depending on the season. The heavy rains and storms of 2017 had been significant, causing landslides and mudslides, and related impacts to the EBRPD.
- Climate change brings renewed concern moving forward for heavy and more intense rains, storms and associated issues to the EBRPD, which include a greater potential for landslides and mudslides.

2022 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Levee Failure		X	

- With more EBRPD development in and around levees, the vulnerability to levee failure may increase.
- Ongoing and planned levee improvements will reduce the vulnerability of the EBRPD to this hazard.

2022 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Pandemic		X	

- Pandemic is a new hazard to the 2022 LHMP Update.
- This hazard is currently considered a low priority hazard to the EBRPD for mitigation strategy planning.

2022 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Severe Weather: Extreme Heat			X

- There has been an increase in severe heat days in recent years. 2021 and 2022 were some of the hottest years on record.
- Climate change issues will continue to increase heat related impacts.
- Vulnerable populations utilizing EBRPD parks are at the greatest risk to this hazard.
- The heat, combined with drought conditions, has increased the potential for wildfires.
- Extreme heat has contributed to tree die back issues in the Park District in recent years.
- Park closures for numerous targeted parks occurred in September 2022 from extreme heat and increase in wildfire conditions due to the strain on EBRPD resources, as well as concerns about possible evacuations for fires. 40 parks in total were closed. Even with these closures, an increase in medical calls was noted. Moistures in grasses and other vegetation plummeted in this time, increasing wildfire risk.

2022 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Severe Weather: Heavy Rains and Storms (Hail, Lightning)			X

- Similar to other weather hazards, the overall vulnerability of the EBRPD changes from year to year depending on the season. The heavy rains and storms of 2017 had been significant, causing flooding and other adverse impacts to the EBRPD.
- Climate change brings renewed concern moving forward for heavy and more intense rains, storms and associated issues to the EBRPD.
- Lightning has caused fires that have led to air quality and visibility issues since the 2017 Plan.

2022 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Severe Weather: High Winds and Tornadoes			X

- Similar to other weather hazards, the overall vulnerability of the EBRPD changes from year to year depending on the season.
- High winds exacerbate the spread and intensity of wildfires.
- High winds in recent years have contributed to PSPS events occurring in the EBRPD.
- Tree fall issues increase during periods of high winds. This is especially true in eucalyptus groves. This creates a treefall hazard and increases wildfire fuels.
- Parks have closed during high wind events, especially in hilltop parks due to a potential increase in treefall and wildfire hazards. The District enacts a high wind protocol during these times.

2022 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Tsunami		X	

- This hazard has not changed since 2017 and is currently considered a low priority hazard to the EBRPD for mitigation strategy planning.

2022 LHMP Update Hazards	Decrease in Vulnerability	No Change in Vulnerability	Increase in Vulnerability
Wildfire			X

- Compounded by current drought conditions, the wildfire hazard has substantially increased and is no longer just a seasonal issue. The wildfire season, including the potential for a catastrophic wildfire, is now a year around concern.
- The vulnerability of the EBRPD to a devastating wildfire has increased as exacerbated by the recent drought, increases in tree mortality, and overall increase in wildfire conditions and fire weather.
- The increased development in WUI areas within the surrounding counties the EBRPD serves also contributes to an increase in vulnerability.
- Climate change continues to affect the nature and intensity of wildfires.
- Wind has been a major contributor to the potential for a catastrophic wildfire. When combined with extreme heat, also can trigger a PSPS which leaves the community at risk in other ways.
- With large wildfires occurring throughout California, the EBRPD has seen a significant change in air quality from smoke resulting in more recorded bad air days.
- Wildfires in the areas adjacent to Park District lands are often human caused. Wildfires often start in areas outside of EBRPD property, but burn into EBRPD lands.
- Communications are often affected during times of PSPS events. Low band radios have worked, but cell phones are often rendered useless.
- In 2018, there were 13 days of very poor air quality in the Bay Area. Parks were closed due to lack of visibility, even though there were no fires in the EBRPD.
- Wildfires occurred in areas surrounding the EBRPD, but many were not initially reported because of existing smoke in the air from other wildfires.

2.3 2017 LHMP Mitigation Strategy Successes and Status

The EBRPD has been successful in implementing mitigation actions identified in the 2017 EBRPD LHMP Mitigation Strategies, thus, working diligently towards meeting their 2017 goals and objectives of:

Goal 1: Reduce Threats to Life Safety for Visitors, Staff and Residents Adjacent to the Park District's Parks

Objectives

- Enhance life safety by retrofitting existing facilities, replacing them with new current-code facilities or relocating them out of high hazard areas.
- Locate new facilities outside of high hazard areas whenever possible and design them to minimize life safety risk from future disaster events.
- Continue and enhance the Park District's ongoing fuel management programs.
- Develop robust disaster response and evacuation plans and conduct frequent practice drills.
- Enhance life safety by improving public awareness of wildland/urban interface fires, earthquakes and other natural hazards that pose substantial life safety risk to the Park District's facilities and people.

Goal 2: Reduce Damage to the Park District's Lands and Facilities and Adjacent Areas in Future Natural Hazard Events

Objectives:

- Retrofit, replace or relocate existing facilities with a high vulnerability to one or more natural hazards to reduce damage, economic loss and disruption in future disaster events.
- Ensure that new facilities are adequately designed for hazard events and located outside of mapped high hazard zones to minimize damage and loss of function in future disaster events, to the extent practicable.
- Continue and enhance the Park District's ongoing fuel management programs.

Goal 3: Protect Environmentally Important Lands and Facilities and Sites with Historical/Cultural Significance

Objectives:

- Manage, maintain and restore park lands so that they retain their important scenic, natural and cultural values.
- Maintain, acquire and preserve significant biologic, geologic, scenic and historic resources within Alameda and Contra Costa counties.
- Minimize threats to important lands, facilities and sites from future natural hazard events, to the extent practicable.

Goal 4: Enhance Emergency Planning, Disaster Response and Post-Disaster Recovery

Objectives:

- Enhance collaboration and coordination between the Park District, local governments, utilities, businesses and citizens to prepare for and recover from future natural disaster events.
- Enhance emergency planning to facilitate effective response and rapid recovery from future natural disaster events.

Goal 5: Increase Awareness and Understanding of Natural Hazards and Mitigation

Objectives:

- Implement education and outreach efforts to increase awareness of natural hazards throughout the Park District, including staff, visitors and the entire communities served by the Park District.
- Create, maintain and publicize a natural hazards page on the Park District's website with links to more information about natural hazards and mitigation activities to reduce risks from natural hazards.

2.3.1. Success Stories

The EBRPD continues to be successful in implementing hazard mitigation measures to address priority hazards of concern. With wildfire being one of the more significant hazards to the Park District, an overview of key wildfire mitigation efforts through the Park District's implementation of their Wildfire Hazard Reduction and Resource Management Plan is detailed below.

Wildfire Hazard Reduction and Resource Management Plan

On April 20, 2010, the Park District's Board of Directors approved the Wildfire Hazard Reduction and Resource Management Plan (Plan) and the accompanying CEQA document which covers hill and shoreline parklands from Richmond to Castro Valley within the Measure CC funded area. The approved Plan is an integral component of the Park District's Safe and Healthy Forests efforts for wildfire protection, which recommends that a hazard reduction and treatment plan be prepared, updated annually, and provided to the Board for consideration in advance of the annual budget process. The Plan is available in its entirety on the Park District's website in the Stewardship/Resources section under Wildfire Hazard Reduction - https://www.ebparks.org/public-safety/fire/fuels-management. The website includes a detailed location map of all the Recommended Treatment Areas (RTAs), with numerical identifiers that can be cross referenced with specific information about each one.

The Plan includes recommendations for fuels reduction, maintenance, and vegetation management projects in identified RTAs. The Park District has been implementing these projects annually over the last 10 years. Since 2017, fuels reduction and vegetation management work has been conducted in 52 of the RTAs totaling over 600 acres. The Park District anticipates eventual entry and ongoing management of a total of 3,100 acres over the life of the Plan. Outside of the Plan area, the Park District manages another 289 acres of eucalyptus and other vegetation in other parks for wildfire hazard reduction purposes. Figure 2-1 and Figure 2-2 show fuels management projects being performed.

Figure 2-1 EBRPD – Fuels Management Project

Source: EBRPD

Figure 2-2 EBRPD – Fuels Management Project

Source: EBRPD

2.3.2. 2017 Mitigation Strategy Update

The 2017 EBRPD LHMP mitigation strategy contained 45 separate mitigation actions for the Park District. It was determined during the LHMP Update process, that many of these 45 actions were more of an overarching mitigation policy or objective to this planning process and not an implementable action. 21 of these 45 actions from 2017 have become objectives in Chapter 5 of this 2022 LHMP Update.

Of the 24 remaining actions, 0 have been completed, 17 are ongoing, and 7 have not been started. 12 2017 EBRPD actions have been identified for inclusion in this LHMP Update, and have been carried forward in Chapter 5. Table 2-1 provides a status summary of the mitigation action projects from the 2017 EBRPD LHMP. Following the table is a description of the status of each project.

Table 2-1 EBRPD's 2017 LHMP Update: Mitigation Action Status Summary

Mitigation Action	Complete	Ongoing	Not Started	Project in Plan Update
Multi-Hazard Mitigation Actions				
Long Term				

Mitigation Action	Complete	Ongoing	Not Started	Project in Plan Update
Integrate the findings and action items in the mitigation plan into ongoing programs and practices for the Park District.				Yes, but included as Objective #15
Review and enhance emergency and evacuation planning, including the adequacy of back-up generators, using hazard and risk information in the mitigation plan				Yes, but included as Objective #8
Consider natural hazards and site new facilities outside of high hazard areas whenever possible.				Yes, but included as Objective #2
Ensure that new facilities are adequately designed to minimize risk from natural hazards.				Yes, but included as Objective #2
Systematically track natural hazard events that result in damage to Park District facilities to help target mitigation actions.				Yes, but included as Objective #9
Pursue mitigation grants from FEMA's pre- and post-disaster programs and from other sources.				Yes, but included as Objective #17
Pursue FEMA Public Assistance grants if Park District facilities suffer damage in a FEMA declared disaster and include mitigation measures in addition to repairs.				Yes, but included as Objective #18
Enhance and complete the Park District's inventory of facilities to more accurately evaluate risks from natural hazards				Yes, but included as Objective #10
Increase awareness and understanding of natural hazards by creating a natural hazards page on the Park District's website with links to more information.				Yes, but included as Objective #12
Keep the Park District's mitigation plan on the website and encourage comments from stakeholders for the periodic review and update of the mitigation plan.				Yes, but included as Objective #13
Earthquake Actions				
Short Term				
Retrofit or replace the Park District's Peralta Oaks headquarters building, as funding becomes available.		X		No
Develop a Park District policy for the desired level of seismic performance for critical and important facilities.			X	No
Complete seismic evaluations of important buildings including Tilden, Sunol and Crab Cove Visitor Centers, Temescal Beach House, Tilden Carousel, and Brazil Room.		X		Yes

Mitigation Action	Complete	Ongoing	Not Started	Project in Plan Update
Complete evaluations of critical infrastructure include the Del Valle sewage ponds and the District owned dams.		X		Yes
Evaluate nonstructural seismic vulnerabilities in Park District facilities and mitigate components that pose significant life safety or loss of function risks.			X	No
Complete and update the Park District's inventory of facilities, including data necessary to evaluate seismic risk.				Yes, but included as Objective #10
Long Term				
Replace the Public Safety Office, Service Yard Office and Fire Station #1 with new current-code buildings, as funding becomes available.		X		Yes
Retrofit or replace critical and important facilities with significant seismic deficiencies, as identified by the evaluations in Short Term #2, as funding becomes available.		X		Yes
Enhance emergency planning for earthquakes including duck, cover and hold drills and evacuation drills.				Yes, but included as Objective #8
Locate new facilities outside of high earthquake hazard areas including sites subject to liquefaction, surface rupture, earthquake-induced landslides, or in close proximity to faults, whenever possible.				Yes, but included as Objective #2
Wildfire Actions				
Short Term				
Complete the remaining fuel reduction projects identified in the Fuels Plan, and expand to other areas as funding becomes available.		X		X
Continue to refine the Park District's fuels reduction strategies to maximize the reduction in fire risk, while minimizing possible impacts on the natural environment.				Yes, but included as Objective #16
Review and refine emergency response and evacuation planning for locations with high risk for wildland and/or wildland/urban interface fires.				Yes, but included as Objective #8
Continue outreach and education programs through the Hills Emergency Forum, the Fire Wise Program, Local Fire Safe Councils and other organizations.				Yes, but included as Objective #14
Long Term				
Pursue additional grants for fuels management and other fire risk reduction projects from FEMA and other agencies including Calfire, US Forest Service and California Fire Safe Council.				Yes, but included as Objective #17

Mitigation Action	Complete	Ongoing	Not Started	Project in Plan Update
Evaluate and implement mitigation measures to reduce fire risk, including enhancing defensible space around buildings, fuel reduction measures near important facilities and upgrading building elements with materials designed to be fire-resistant, as funding becomes available.		X		Yes
Continue and expand the Park District's hazardous tree abatement programs as funding becomes available.		X		Yes
Locate new facilities outside of areas with significant wildland/urban interface fire risk, whenever possible.				Yes, but included as Objective #2
Drought Actions				
Short Term				
Continue and enhance the Park District's water conservation measures, including xeriscaping.		X		No
Evaluate possible increases in water storage, including cisterns to provide emergency water for fire suppression and implement if feasible, as funding becomes available.		X		Yes
Flood Mitigation Actions				
Short Term				
Evaluate the adequacy of existing levees for floods, including storm surge, tsunamis and sea level rise and develop prioritized mitigation actions.		X		No, but addressed as part of shoreline projects
Compile and maintain an inventory of sites with a history of overbank flooding or localized stormwater drainage flooding and develop prioritized mitigation actions.		X		Yes
Enhance emergency planning, including flood response actions including flood fighting via temporary barriers, for sites with significant flood risk.				Yes, but included as Objective #7
Long Term				
Implement flood risk reduction measures for shoreline facilities or sites with high flood risk, including levees at Hayward Shoreline, shoreline protection along the Bay and recreational facilities at Lake Del Valle, as funding becomes available.		X		Yes
Implement flood risk reduction measures for facilities or sites with high flood risk from overbank or stormwater drainage flooding, as funding becomes available.		X, Through 2017 PA funding		Yes
Locate new facilities outside of areas with significant flood risk, whenever possible.				Yes, but included as Objective #2
Landslide Actions				
Short-Term				

Mitigation Action	Complete	Ongoing	Not Started	Project in Plan Update
Develop a Park District policy for closure of sites with high landslide risk during periods of heavy rainfall.			X	No
Consult with an engineering geologist or geotechnical engineer regarding landslide risk for sites with important facilities with a history of landslides and/or apparent high risk.			X	No
Compile and maintain an inventory of sites with a history of landslides and develop prioritized mitigation actions.			X	No
Long Term				
Implement landslide mitigation measures at high landslide hazard sites with important facilities including Wildcat Canyon, Lake Chabot and the other parks listed in this chapter, as funding becomes available.		X, Through 2017 PA funding		Yes
Locate new facilities outside of areas with significant landslide risk, whenever possible.				Yes, but included as Objective #2
Other Natural Hazard Actions				
Short-Term				
Review and update the Park District's emergency operations plan to include high wind events, snow or ice storms, and extreme temperatures.		X		No
Continue and enhance the Park District's hazardous tree mitigation programs, as funding becomes available.		X		Yes
Evaluate infrastructure and buildings possibly vulnerable to high winds, including communications towers.			X	No
Long term				
Implement tie downs or other measures to mitigate infrastructure and buildings vulnerable to high winds, as funding becomes available.			X	No

Multi-Hazard Mitigation Actions

Long Term

Integrate the findings and action items in the mitigation plan into ongoing programs and practices for the Park District.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): It was determined during the LHMP Update process, that this action, along with many others, is more of an overarching mitigation policy or objective to this planning process and not an implementable action. Many of these are carried out as a common business practice of the Park District. As such, given the value of this "policy" to guide mitigation in the Park District, this 2017 action has been included as an objective to the updated mitigation strategy goals for this 2022 LHMP Update.

Review and enhance emergency and evacuation planning, including the adequacy of back-up generators, using hazard and risk information in the mitigation plan

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): It was determined during the LHMP Update process, that this action, along with many others, is more of an overarching mitigation policy or objective to this planning process and not an implementable action. Many of these are carried out as a common business practice of the Park District. As such, given the value of this "policy" to guide mitigation in the Park District, this 2017 action has been included as an objective to the updated mitigation strategy goals for this 2022 LHMP Update.

Consider natural hazards and site new facilities outside of high hazard areas whenever possible.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): It was determined during the LHMP Update process, that this action, along with many others, is more of an overarching mitigation policy or objective to this planning process and not an implementable action. Many of these are carried out as a common business practice of the Park District. As such, given the value of this "policy" to guide mitigation in the Park District, this 2017 action has been included as an objective to the updated mitigation strategy goals for this 2022 LHMP Update.

Ensure that new facilities are adequately designed to minimize risk from natural hazards.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): It was determined during the LHMP Update process, that this action, along with many others, is more of an overarching mitigation policy or objective to this planning process and not an implementable action. Many of these are carried out as a common business practice of the Park District. As such, given the value of this "policy" to guide mitigation in the Park District, this 2017 action has been included as an objective to the updated mitigation strategy goals for this 2022 LHMP Update.

Systematically track natural hazard events that result in damage to Park District facilities to help target mitigation actions.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): It was determined during the LHMP Update process, that this action, along with many others, is more of an overarching mitigation policy or objective to this planning process and not an implementable action. Many of these are carried out as a common business practice of the Park District. As such, given the value of this "policy" to guide mitigation in the Park District, this 2017 action has been included as an objective to the updated mitigation strategy goals for this 2022 LHMP Update.

Pursue mitigation grants from FEMA's pre- and post-disaster programs and from other sources.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): It was determined during the LHMP Update process, that this action, along with many others, is more of an overarching mitigation policy or objective to this planning process and not an implementable action. Many of these are carried out as a common business practice of the Park District. As such, given the value of this "policy" to guide mitigation in the Park District, this 2017 action has been included as an objective to the updated mitigation strategy goals for this 2022 LHMP Update.

Pursue FEMA Public Assistance grants if Park District facilities suffer damage in a FEMA declared disaster and include mitigation measures in addition to repairs.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): It was determined during the LHMP Update process, that this action, along with many others, is more of an overarching mitigation policy or objective to this planning process and not an implementable action. Many of these are carried out as a common business practice of the Park District. As such, given the value of this "policy" to guide mitigation in the Park District, this 2017 action has been included as an objective to the updated mitigation strategy goals for this 2022 LHMP Update.

Earthquake Mitigation Actions

Short term

Retrofit or replace the Park District's Peralta Oaks headquarters building, as funding becomes available.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): A seismic study and Benefit-Cost Analysis (BCA) of the Peralta Oaks building was conducted and did not result in a favorable benefit cost ratio. Thus, this project was determined to not be a priority for this LHMP Update.

Develop a Park District policy for the desired level of seismic performance for critical and important facilities.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): Results of seismic studies were somewhat ambiguous as to what standards should be set for what buildings. The Park District decided that a set policy would not benefit the Park District at this time.

Complete seismic evaluations of important buildings including Tilden, Sunol and Crab Cove Visitor Centers, Temescal Beach House, Tilden Carousel, and Brazil Room.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): Seismic evaluations of key buildings is in the planning stage and will continue as part of the new seismic action for this LHMP Update.

Complete evaluations of critical infrastructure include the Del Valle sewage ponds and the District owned dams.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): A seismic evaluation of the Park District owned dams were conducted as part of the Park District's dam program for Extremely High Hazard Dams. Other seismic evaluations will continue as part of the new seismic action for this LHMP Update.

Evaluate nonstructural seismic vulnerabilities in Park District facilities and mitigate components that pose significant life safety or loss of function risks.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): Non-structural seismic evaluations are not considered a priority issue for the Park District.

Complete and update the Park District's inventory of facilities, including data necessary to evaluate seismic risk.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): It was determined during the LHMP Update process, that this action, along with many others, is more of an overarching mitigation policy or objective to this planning process and not an implementable action. Many

of these are carried out as a common business practice of the Park District. As such, given the value of this "policy" to guide mitigation in the Park District, this 2017 action has been included as an objective to the updated mitigation strategy goals for this 2022 LHMP Update.

Long Term

Replace the Public Safety Office, Service Yard Office and Fire Station #1 with new current-code buildings, as funding becomes available.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): The Public Safety Office has been replaced with a building across the street at a cost of $80 million. This newer building will house the Public Safety Divisions (police and fire), the EBRPD Board, and administrative staff. This should reduce the risk and vulnerability of Park District staff to future seismic events. The Service Yard Office and Fire Station #1 will be future considered as part of the seismic action included in this LHMP Update.

Retrofit or replace critical and important facilities with significant seismic deficiencies, as identified by the evaluations in Short Term #2, as funding becomes available.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): With seismic evaluations still ongoing, the identification of seismically deficient buildings is not complete. Once the evaluations are complete, possible retrofits and replacement projects can be identified. This will be further conducted as part of the seismic action included in this LHMP Update.

Enhance emergency planning for earthquakes including duck, cover and hold drills and evacuation drills.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): It was determined during the LHMP Update process, that this action, along with many others, is more of an overarching mitigation policy or objective to this planning process and not an implementable action. Many of these are carried out as a common business practice of the Park District. As such, given the value of this "policy" to guide mitigation in the Park District, this 2017 action has been included as an objective to the updated mitigation strategy goals for this 2022 LHMP Update.

Locate new facilities outside of high earthquake hazard areas including sites subject to liquefaction, surface rupture, earthquake-induced landslides, or in close proximity to faults, whenever possible.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): It was determined during the LHMP Update process, that this action, along with many others, is more of an overarching mitigation policy or objective to this planning process and not an implementable action. Many of these are carried out as a common business practice of the Park District. As such, given the value of this "policy" to guide mitigation in the Park District, this 2017 action has been included as an objective to the updated mitigation strategy goals for this 2022 LHMP Update.

Wildfire Mitigation Actions

Short term

Complete the remaining fuel reduction projects identified in the Fuels Plan, and expand to other areas as funding becomes available.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): Fuel reduction continues to be a high priority in the Park District and projects are conducted on an annual basis. Since 2017, fuel reduction work has been conducted in 52 of the Recommended Treatment Areas (RTAs) identified in the Park District's Wildfire Hazard Reduction and Resource Management Plan totaling over 600 acres. These fuels reduction efforts have proven to be effective in reducing risk from wildfire.

Continue to refine the Park District's fuels reduction strategies to maximize the reduction in fire risk, while minimizing possible impacts on the natural environment.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): It was determined during the LHMP Update process, that this action, along with many others, is more of an overarching mitigation policy or objective to this planning process and not an implementable action. Many of these are carried out as a common business practice of the Park District. As such, given the value of this "policy" to guide mitigation in the Park District, this 2017 action has been included as an objective to the updated mitigation strategy goals for this 2022 LHMP Update.

Review and refine emergency response and evacuation planning for locations with high risk for wildland and/or wildland/urban interface fires.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): It was determined during the LHMP Update process, that this action, along with many others, is more of an overarching mitigation policy or objective to this planning process and not an implementable action. Many of these are carried out as a common business practice of the Park District. As such, given the value of this "policy" to guide mitigation in the Park District, this 2017 action has been included as an objective to the updated mitigation strategy goals for this 2022 LHMP Update.

Continue outreach and education programs through the Hills Emergency Forum, the Fire Wise Program, Local Fire Safe Councils and other organizations.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): It was determined during the LHMP Update process, that this action, along with many others, is more of an overarching mitigation policy or objective to this planning process and not an implementable action. Many of these are carried out as a common business practice of the Park District. As such, given the value of this "policy" to guide mitigation in the Park District, this 2017 action has been included as an objective to the updated mitigation strategy goals for this 2022 LHMP Update. However, this 2017 action has also been included in the Public Education and Awareness action in this LHMP Update.

Long Term

Pursue additional grants for fuels management and other fire risk reduction projects from FEMA and other agencies including Calfire, US Forest Service and California Fire Safe Council.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): It was determined during the LHMP Update process, that this action, along with many others, is more of an overarching mitigation policy or objective to this planning process and not an implementable action. Many of these are carried out as a common business practice of the Park District. As such, given the value of this "policy" to guide mitigation in the Park District, this 2017 action has been included as an objective to the updated mitigation strategy goals for this 2022 LHMP Update.

Evaluate and implement mitigation measures to reduce fire risk, including enhancing defensible space around buildings, fuel reduction measures near important facilities and upgrading building elements with materials designed to be fire-resistant, as funding becomes available.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): Defensible space projects are ongoing in the Park District and since 2017 include defensible space efforts on an estimated 25 structures. Ignition resistant construction has not yet been specifically addressed. However, for all new construction, the Park District is required to comply with the codes and ordinances of the Counties and Cities where the projects are located which may include compliance with ignition resistance construction standards that may be included in local requirements for Very High Fire Hazard Severity Zones.

Continue and expand the Park District's hazardous tree abatement programs as funding becomes available.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): The Park District's hazardous tree abatement program continues to be implemented on an annual basis. Annually an estimated 30 trees are removed. Since 2017, approximately 150 hazardous trees have been removed under this program. This action will be combined with the Park District's Tree Die Back Plan action for this LHMP Update.

Locate new facilities outside of areas with significant wildland/urban interface fire risk, whenever possible.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): It was determined during the LHMP Update process, that this action, along with many others, is more of an overarching mitigation policy or objective to this planning process and not an implementable action. Many of these are carried out as a common business practice of the Park District. As such, given the value of this "policy" to guide mitigation in the Park District, this 2017 action has been included as an objective to the updated mitigation strategy goals for this 2022 LHMP Update.

Drought Mitigation Actions

Short term

Continue and enhance the Park District's water conservation measures, including xeriscaping.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): The Park District continues to implement water conservation measures as funding is available. Completed projects since 2017 include xeriscape projects at crown Beach and Contra Loma. Irrigation system replacement projects have also been completed since 2017 at Lake Ansa, Martinez Shoreline, and the Redwood Canyon Golf course to increase efficiency.

Evaluate possible increases in water storage, including cisterns to provide emergency water for fire suppression and implement if feasible, as funding becomes available.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): Water storage projects continue to be identified and implemented throughout the Park District as funding is available. Since 2017, projects include the installation of a recycled waterline to Shadow Cliffs, a new well drilled at Coyote Hills, and the restoration/rebuilding of cattle ponds in multiple areas as part of the grazing program.

Flood Mitigation Actions

Short term

Evaluate the adequacy of existing levees for floods, including storm surge, tsunamis and sea level rise and develop prioritized mitigation actions.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): Levee evaluations as a stand alone project is not currently a viable project. Levee evaluations and improvements are identified and implemented as part of the larger Shoreline projects. Efforts conducted since 2017 include replacement of 700 feet of rip rap at Point Isabell. Shoreline protection and beach restoration efforts have also been conducted for 1000 feet at Albany Beach, 300 feet at Hayward Beach; and 1000 feet at Encinal Beach. Levee improvements will continue to be addressed as part of shoreline improvement efforts planned by the Park District.

Compile and maintain an inventory of sites with a history of overbank flooding or localized stormwater drainage flooding and develop prioritized mitigation actions.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): Recent 2017 severe storm and flood events affecting the Park District resulted in Public Assistance claims from two Federal Disaster Declarations. Through the PA process, problem areas have been inventoried and efforts are ongoing to repair these sites. The identification of additional problem areas and recommended mitigation solutions continue and have been combined into a mitigation action for this LHMP Update in order to proactively address these issues to reduce damages from the next severe storm event.

Enhance emergency planning, including flood response actions including flood fighting via temporary barriers, for sites with significant flood risk.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): It was determined during the LHMP Update process, that this action, along with many others, is more of an overarching mitigation policy or objective to this planning process and not an implementable action. Many of these are carried out as a common business practice of the Park District. As such, given the value of this "policy" to guide mitigation in the Park District, this 2017 action has been included as an objective to the updated mitigation strategy goals for this 2022 LHMP Update.

Long Term

Implement flood risk reduction measures for shoreline facilities or sites with high flood risk, including levees at Hayward Shoreline, shoreline protection along the Bay and recreational facilities at Lake Del Valle, as funding becomes available.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): Flood risk reduction measures are ongoing for shoreline facilities and sites with high flood risk as funding is available through the Park District's numerous Shoreline plans and programs. Examples include the Hayward Marsh Restoration project, which is in final design. Other efforts since the 2017 LHMP include

removal of the kayak rental concessions at Del Valle and replacement with a movable trailer that can be relocated to high ground and the replacement and flood proofing of the Visitor Center, also at Del Valle. New restrooms are also being constructed with floodproofing measures included in the design.

Implement flood risk reduction measures for facilities or sites with high flood risk from overbank or stormwater drainage flooding, as funding becomes available.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): Recent 2017 severe storm and flood events affecting the Park District resulted in Public Assistance claims from two Federal Disaster Declarations. Through the PA process problem areas have been inventoried and efforts are ongoing to repair these sites. The identification of additional problem areas and recommended mitigation solutions continue and have been combined into two mitigation action for this LHMP Update in order to proactively address these issues to reduce damages from the next severe storm event.

Locate new facilities outside of areas with significant flood risk, whenever possible.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): It was determined during the LHMP Update process, that this action, along with many others, is more of an overarching mitigation policy or objective to this planning process and not an implementable action. Many of these are carried out as a common business practice of the Park District. As such, given the value of this "policy" to guide mitigation in the Park District, this 2017 action has been included as an objective to the updated mitigation strategy goals for this 2022 LHMP Update.

Landslide Mitigation Actions

Short-Term

Develop a Park District policy for closure of sites with high landslide risk during periods of heavy rainfall.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): Most landslides in the Park District occur in the back county areas and are generally not a threat to people or structures. The Park District decided that a policy to address closure of landslide prone areas would not benefit the Park District at this time.

Consult with an engineering geologist or geotechnical engineer regarding landslide risk for sites with important facilities with a history of landslides and/or apparent high risk.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): This is not currently considered a viable project to the Park District as most historic landslides have been smaller in size, occurred in back country areas, and have not threatened structures.

Compile and maintain an inventory of sites with a history of landslides and develop prioritized mitigation actions.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): Recent 2017 severe storm events affecting the Park District resulted in Public Assistance claims from two Federal Disaster Declarations. Storm damages included areas of landsliding. Through the PA process, problem landslide areas have been inventoried and efforts are ongoing to repair these sites. The identification of additional problem areas and recommended mitigation solutions continue and have been combined into a mitigation action for this LHMP Update in order to proactively address these issues to reduce damages from the next severe storm event.

Long Term

Implement landslide mitigation measures at high landslide hazard sites with important facilities including Wildcat Canyon, Lake Chabot and the other parks listed in this chapter, as funding becomes available.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): Recent 2017 severe storm and flood events affecting the Park District resulted in Public Assistance claims from two Federal Disaster Declarations. Storm damages included areas of landsliding. Through the PA process, problem areas have been inventoried and efforts are ongoing to repair these sites. The identification of additional problem areas and recommended mitigation solutions continue and have been combined into two mitigation action for this LHMP Update in order to proactively address these issues to reduce damages from the next severe storm event.

Locate new facilities outside of areas with significant landslide risk, whenever possible.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): It was determined during the LHMP Update process, that this action, along with many others, is more of an overarching mitigation policy or objective to this planning process and not an implementable action. Many of these are carried out as a common business practice of the Park District. As such, given the value of this "policy" to guide mitigation in the Park District, this 2017 action has been included as an objective to the updated mitigation strategy goals for this 2022 LHMP Update.

Other Natural Hazards Mitigation Actions

Short-Term

Review and update the Park District's emergency operations plan to include high wind events, snow or ice storms, and extreme temperatures.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): The EBRPD Fire Department recently updated their Wildfire EOP to include procedures for Park Closures during extreme heat and high wind events. This new closure policy was recently implemented during the September 2022 extreme heat event.

Continue and enhance the Park District's hazardous tree mitigation programs, as funding becomes available.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): The Park District's hazardous tree abatement program continues to be implemented on an annual basis. Annually an estimated 30 trees are removed. Since 2017, approximately 150 hazardous trees have been removed under this program. This action will be combined with the Park District's Tree Die Back Plan action for this LHMP Update.

Evaluate infrastructure and buildings possibly vulnerable to high winds, including communications towers.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): This is not a priority issue for the Park District. Historically high winds have not caused damage to infrastructure and buildings in the Park District. The Park District does not own communication towers. High winds are primarily a concern to the Park District as they contribute to the wildfire hazard.

Long term

Implement tie downs or other measures to mitigate infrastructure and buildings vulnerable to high winds, as funding becomes available.

Progress to Date (Consider: Was the project implemented – why or why not? Other details?): This is not a priority issue for the Park District. Historically high winds have not caused damage to infrastructure and buildings in the Park District. High winds are primarily a concern to the Park District as they contribute to the treefall and wildfire hazard.

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 East Bay Regional Park District (EBRPD or Park District) recognized the importance and need of an update to their 2017 Local Hazard Mitigation Plan (LHMP) and initiated its development. The Park District contracted with Foster Morrison Consulting, Ltd. (Foster Morrison) to facilitate and develop the 2022 LHMP Update. 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) of 2000;
- 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

The EBRPD made a commitment to the development of this 2022 LHMP Update, as the single participating jurisdiction seeking FEMA approval of this LHMP. 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 Park District the risk differs from that facing the entire area;

- Identify potential mitigation actions; and
- Formally adopt the plan.

For this EBRPD LHMP Update, "participation" meant the following:

- 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 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 LHMP Update by the EBRPD governing board.

The EBRPD, seeking FEMA approval of this LHMP Update, met all of these participation requirements. Multiple representatives from the Park District 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, including members of the HMPC. Other jurisdictions and public and private stakeholders supported the planning process through representation on the HMPC, providing data and input for the risk assessment and mitigation strategy; and reviewing and providing input on LHMP drafts prior to finalization and submittal to Cal OES and FEMA.

3.2 The 10-Step Planning Process

Foster Morrison established the planning process for the EBRPD 2022 LHMP Update 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 LHMP Update meets the requirements of FEMA's mitigation grant programs: Hazard Mitigation Grant Program (HMGP); Building Resilient Infrastructure and Communities (BRIC) program; High Hazard Potential Dam (HHPD) program and Flood Mitigation Assistance (FMA) program.

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 EBRPD 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 the EBRPD's commitment to participate in the DMA planning process, Foster Morrison worked with EBRPD's Management Services Division, Assistant Finance Officer (AFO), as overall project lead, to establish the framework and organization for development of this LHMP Update. An initial call was held with the EBRPD project lead in April of 2022 to discuss the organizational and process aspects of this LHMP Update development process.

An initial EBRPD internal kick-off meeting was held on May 11, 2022, with a kickoff meeting of the HMPC held on June 1, 2022. Invitations to the kickoff meeting was extended to key Park District staff and representatives from Alameda and Contra Costa Counties, incorporated communities, and special districts, as well as to other federal, state, and local stakeholders that might have an interest in participating in the planning process. Representatives from the Park District 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 EBRPD staff and other government, community, and stakeholder representatives developed the LHMP Update with leadership from the EBRPD and facilitation by Foster Morrison. Table 3-2 shows who participated on the HMPC.

Table 3-2 HMPC Participant List

Agency	Name	Title
East Bay Regional Parks	Jeff Rasmussen	Assistant Finance Officer
East Bay Regional Parks	Dave Mason	Public Information Officer
East Bay Regional Parks	Aileen Theile	Fire Chief
East Bay Regional Parks	Kristen Van Dam	Fuels Ecologist
East Bay Regional Parks	Matt Graul	Division Chief
East Bay Regional Parks	Alma Balmes	Manager
East Bay Regional Parks	Katy Hornbeck	Manager
East Bay Regional Parks	Eric Holmes	Administrative Analyst II
East Bay Regional Parks	Lisa Goorjian	Chief of Design & Construction
East Bay Regional Parks	David Rusting	Chief Information Officer
East Bay Regional Parks	Brian Holt	Chief
East Bay Regional Parks	Khari Helae	Assistant Fire Chief
East Bay Regional Parks	Devan Reiff	Principal Planner
East Bay Regional Parks	Lt. Terrence (Joe) Cotcher	Police Lieutenant
East Bay Regional Parks	David Phulps	Police Lieutenant
East Bay Regional Parks	Glen Gilchrist	Design Manager
East Bay Regional Parks	Debra Auker	Assist. GM of Finance and Management Services/CFO
City of Alameda	Sharon Oliver	Fire Department, Disaster Preparedness Coordinator
City of Berkeley Fire	Dan Green	Assistant Fire Chief
City of Union City	Joan Malloy	City Manager
Contra Costa County	Rick Kovar	OES
Contra Costa County	Chris Lau	Public Works Department
Contra Costa County	Kelly Kalfsbeek	Public Works Department
Contra Costa County	Will Nelson	Director of Community Development
Contra Costa Fire	Aaron McAlister	Deputy Fire Chief
Contra Costa Fire	Chris Bachman	
City of Concord	Trish Beirne	Emergency and Volunteer Services Mgr.
City of Lafayette	Cathy Surges-Moscato	
Town of Moraga	Afshan Hamid	
City of San Pablo	Ronalyn Nonato	Associate Engineer
City of Walnut Creek	Betsy Burkhart	
Kensington Fire	Bill Hansell	
San Ramon Valley Fire Protection District	Ron Marley	
State Lands Commission	Ken Foster	

Agency	Name	Title
Hills Emergency Forum	Edgar Orre	Cal Fire
Hills Emergency Forum/Berkeley Fire	Dori Tieu	Berkely Edu
Hills Emergency Forum	David Winnacker	Chief Moraga-Orinda Fire
UCSF	Michelle Heckle	USSF Police/EOC
City of Union City	Ricardo Martinez	
El Cerrito Fire	Jose Castrejon	Interim Fire Chief
Livermore-Pleasanton Fire Department	Kim Colantuona	
Danville Police Department	Allan Shields	
City of Walnut Creek	Mike Vickers	
Diablo Water	Christine Belleci	
City of Fremont Fire	Alec Tune	Emergency Services Manager
El Cerrito	Chase Beckman	Fire Marshall
City of Orinda	David Biggs	City Manager
City of Concord	Bruce Davis	
	Michelle Battaglia	
City of Richmond	Jonelyn Whales	Senior Planner

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 LHMP Update development process. In addition to providing representation on the HMPC, the Park District formulated an internal planning team to collect and provide requested data and to conduct timely reviews of the draft documents.

Meetings

The planning process officially began with an initial project planning meeting held in April 2022, followed by an internal Park District and HMPC kick-off meetings held on May 11, 2022, and June 1, 2022, respectively. 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 Park District, 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.

During the planning process, the HMPC communicated through virtual meetings, email, telephone conversations, a Dropbox website, and through a Park District developed webpage dedicated to the LHMP development process. This later webpage was developed to provide information to the HMPC, the public and all stakeholders involved in the LHMP Update process. Draft documents were also posted on this webpage so that the HMPC members and the public could easily access and review them. The LHMP webpage (shown on Figure 3-1) can be accessed at: https://www.ebparks.org/projects/fema-local-hazard-mitigation-plan.

The HMPC met formally five times during the planning period (April 2022 – December 2022) 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 EBRPD Internal and HMPC Meetings

Meeting Type	Meeting Topic	Meeting Date(s)	Meeting Location
EBRPD Internal Kick-off Meeting	1) Introduction to DMA and the planning process 2) Organize Resources: the role of the HMPC, planning for public involvement, coordinating with other agencies/stakeholders 3) Identification of stakeholders for HMPC	May 11, 2022	Virtual Zoom Meeting
HMPC #1 Kick-off Meeting	1) Introduction to DMA and the planning process 2) Organize Resources: the role of the HMPC, planning for public involvement, coordinating with other agencies/stakeholders 3) Introduction to Hazard Identification	June 1, 2022	Virtual Zoom Meeting
HMPC #2	1) Risk assessment overview and work session - Assess the Hazard - Assess the Problem - Capability Assessment	July 13, 2022	Virtual Zoom Meeting
HMPC #3	1) Review of risk assessment summary 2) Intro to Mitigation Action Strategy development - Set Goals - Review possible activities	August 3, 2022	Virtual Zoom Meeting
HMPC #4	1) Review of mitigation alternatives 2) Identify updated list of mitigation actions by hazard 3) Review of mitigation selection criteria 4) Update and prioritize mitigation actions 5) Mitigation Action Strategy Implementation and Draft Action Development - Review possible activities - Draft an Action Plan	August 4, 2022	Virtual Zoom Meeting
HMPC #5	1) Review of final HMPC, stakeholder, and public comments and input to Plan 3) Draft an Action Plan 4) Plan maintenance and Implementation Procedures	November 17, 2022	Virtual Zoom Meeting

Zoom Meetings

As a result of the ongoing Covid-19 Pandemic, all of the HMPC and public meetings were conducted virtually via the online Zoom format. While these Zoom meetings presented a few challenges from a collaboration standpoint, holding these meetings online also had its advantages. First, it was observed that more people were available to attend an online meeting, including those out of area agencies where travel to the EBRPD for a meeting was difficult due to the time involved. Another benefit was the use of the Chat function in the Zoom format. This allowed those individuals not likely to speak up in a face-to-face meeting to provide input via Chat. Further, these Chat transcripts were recorded in a written retrievable format that

allowed Foster Morrison to develop comprehensive notes detailing HMPC and public input. The primary negative impact of the Zoom meeting is that it did not allow us to collect a full and accurate sign-in record from the meeting participants. While it was encouraged for everyone to use the chat function to sign in. Not everyone was online to be able to use the chat function (e.g., those people calling in via their phones) and even those that had access did not always use it. Thus, the sign-in sheets cannot be considered definitive on those who attended and those who did not.

Planning Step 2: Involve the Public

Up-front coordination discussions with the EBRPD established the initial plan for public involvement. Public involvement activities for this LHMP Update 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 mitigation status and successes resulting from implementation of the 2017 LHMP as well as information on the processes, new risk assessment data, and proposed mitigation strategies for this 2022 LHMP Update. At the EBRPD 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 Park District.

Public Outreach Activities

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

- Outreach on EBRPD website
- Outreach on Park District social media sites: Twitter, Facebook, Instagram, LinkedIn
- Press releases on the LHMP development process and Draft document review
- Outreach through EBRPD community emails

The purpose of this outreach was to inform the public and other stakeholders of the EBRPD's LHMP Update project and how they could get involved and how to provide comments on the draft LHMP Update prior to submittal to Cal OES/FEMA. The initial outreach also invited the public and stakeholders to the public kickoff meeting for the project. Information on these outreach efforts and public comments/responses can be seen in Appendix A to this LHMP.

Public Meetings

Two public meetings for the EBRPD 2022 LHMP Update were planned during key times of the LHMP development process:

Public Meeting #1: LHMP Update Kickoff

An early public meeting was held at the beginning of the LHMP planning process to inform the public of the purpose of the Disaster Mitigation Act, hazard mitigation and the hazard mitigation planning process

for the EBRPD, and how the public can get involved. This meeting was advertised on the EBRPD LHMP webpage, through a press release, and other local outreach mechanisms.

Public Meeting #2: Meeting on the Draft LHMP Update

The first draft of the LHMP Update was provided to the HMPC in September 2022, with a public review draft provided in October 2022. A public meeting was scheduled for November 16, 2022 to present the draft LHMP Update and to collect public comments on the LHMP Update 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 a press release and social media communications. The outreach efforts 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 EBRPD website in advance of the public meeting, a hard copy of the draft Plan was made available to interested parties at the EBRPD administrative office – Peralta Building.

Documentation to support the public meetings can be found in Appendix A. In addition to outreach for public participation, notices of meetings were sent directly to all persons on the HMPC contact list which included other agency and key stakeholders with an interest in the EBRPD LHMP Update project.

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 Location
Public Meeting #1	1) Intro to DMA and mitigation planning 2) The EBRPD LHMP Update Development Process	June 1, 2022	Virtual Zoom Meeting
Public Meeting #2	1)Presentation of Draft LHMP Update and solicitation of public and stakeholder comments	November 16, 2022	Virtual Zoom Meeting

As appropriate, stakeholder and public comments and recommendations are incorporated into the LHMP Update throughout the LHMP development process, including the sections that address mitigation goals and strategies. However, no public comments were received on the draft Plan.

The draft LHMP is currently available online on the EBRPD webpage at: https://www.ebparks.org/projects/fema-local-hazard-mitigation-plan.

Figure 3-1 EBRPD Local Hazard Mitigation Plan Webpage

Source: EBRPD

Planning Step 3: Coordinate with Other Departments and Agencies

Early in the planning process, the HMPC determined that data collection, mitigation strategy development, and LHMP Update 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 EBRPD Planning Area, and/or their interest as a neighboring jurisdiction, representatives from the following agencies were invited to participate on the HMPC:

- Alameda County
- Alameda County Flood Control and Water Conservation District
- American Red Cross
- Bay Area Ridge Trail
- BIMID
- Cal DWR
- Cal Fire
- Cal OES
- Cal Trans
- California Department of Fish and Wildlife
- Central San
- City of Alameda
- City of Albany
- City of Antioch
- City of Brentwood
- City of Clayton
- City of Concord

- City of Concord
- City of El Cerrito
- City of Emeryville
- City of Fremont
- City of Fremont Fire
- City of Hayward
- City of Hercules
- City of Lafayette
- City of Livermore
- City of Martinez
- City of Oakley
- City of Orinda
- City of Orinda
- City of Pinole
- City of Pittsburg
- City of Pleasant Hill
- City of Pleasanton
- City of Richmond
- City of San Pablo
- City of San Ramon
- City of Union City
- City of Walnut Creek
- Conservation District
- Contra Costa County
- Contra Costa County Fire Protection District
- Contra Costa County Flood Control and Water
- Contra Costa Water District
- Danville Police Department
- Delta Diablo
- Diablo Fire Safe Council
- Diablo Water
- East Bay California Native Plant Society
- East Bay MUD
- East Contra Costa Fire Protection District
- EBRPD Park Advisory Committee
- El Cerrito
- El Cerrito Fire
- FEMA Region IX - Hazard Mitigation
- Hayward Area Recreation and Park District
- Hills Emergency Forum
- Livermore-Pleasanton Fire Department
- Moraga Orinda Fire
- Moraga-Orinda Fire District
- National Weather Service
- PG&E
- Pleasant Hill Recreation and Park District
- Regional Parks Foundations
- Regional Water Resources Control Board
- Rideout Adventist Health
- Rodeo-Hercules Fire Protection District
- San Ramon Valley Fire Protection District

- State Lands Commission
- Town of Moraga
- U.S. Army Corps of Engineers
- UC Berkely
- UCSF
- United States Forest Service

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, inviting them to HMPC meetings, and asking if they had any expertise or assistance they could lend to the planning process, risk assessment, or specific mitigation strategy.

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:

- Cal-Adapt
- Cal Atlas
- Cal OES
- CAL FIRE
- Cal Trans
- California Department of Conservation
- California Department of Finance
- California Department of Fish and Wildlife
- California Department of Food and Agriculture
- California Department of Parks and Recreation
- California Department of Water Resources
- California Division of Mines and Geology
- California Employment Development Department
- California Geological Survey
- California Invasive Plant Council
- California Natural Resources Agency
- FEMA Region IX
- Library of Congress
- National Drought Mitigation Center
- National Levee Database
- 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
- Pacific Gas and Electric
- Public Policy Institute of California
- United States Army Corps of Engineers
- United States Bureau of Land Management
- United States Bureau of Reclamation
- United States Department of Agriculture
- US Department of Transportation

- United States Farm Service Agency
- United States Forest Service
- United States Geological Survey
- United States Occupational Health and Safety Agency
- 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 many of these groups to actively participate on the HMPC. Others assisted in the process by providing data directly as requested in the Data Collection 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 HMPC and public meetings and to review and comment on the LHMP Update prior to submittal to CAL OES and FEMA

Other Community Planning Efforts and Hazard Mitigation Activities

Coordination with other Park District and community planning efforts is also paramount to the success of this LHMP Update. Hazard mitigation planning involves identifying existing policies, tools, and actions that will reduce a community's risk and vulnerability to hazards. The EBRPD uses a variety of comprehensive planning mechanisms, such as strategic and master plans, hazard and climate plans, emergency planning documents, and internal planning efforts and processes to guide Park District operations and growth and development of the EBRPD. Integrating existing planning efforts and mitigation policies and action strategies into this LHMP Update establishes a credible and comprehensive plan that ties into and supports other Park District programs. The development of this LHMP Update incorporated information from the following existing plans, studies, reports, and initiatives as well as other relevant data from neighboring communities and other jurisdictions. More details can be found in Appendix B.

- 2013 East Bay Regional Park District Master Plan
- 2017 EBRPD Local Hazard Mitigation Plan
- 2017 Economic Analysis Impact Report
- 2018 Contra Costa County Local Hazard Mitigation Plan
- 2018 State of California Hazard Mitigation Plan
- 2021 Alameda County Local Hazard Mitigation Plan Public Draft
- CAL FIRE Plans and data
- CAL OES plans and data
- California Department of Finance demographic documents
- California Department of Water Resources plans and information
- California DWR Division of Safety of Dams plans and information
- California Geological Survey Plans
- Climate Adaptation Plans
- Climate Change and Health Profile Report – Alameda and Contra Costa County
- CWPPs
- Dam Emergency Action Plans
- Emergency Operations Plans
- Evacuation Plans
- FEMA mitigation planning documents
- Flood Insurance Studies
- General Plans – County and Cities
- National Weather Service documents

- Stormwater Master Plans
- US Department of Agriculture Reports
- US Department of Interior Plans
- 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 ordinances was incorporated into the risk assessment and hazard vulnerability sections of the LHMP Update. In accordance with DMA requirements and guidance, Best Available Data was used throughout the development of this LHMP. Where the data from the existing studies and reports is used in this LHMP Update, the source document is referenced throughout this LHMP. The data was also used in determining the capability of the Park District in being able to implement mitigation strategies. Appendix B, References, provides a detailed list of references used in the preparation of this LHMP Update.

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 the natural hazards that have, or could have, an impact on the EBRPD Planning Area. Starting with the 2017 LHMP, natural hazards of concern were added, deleted, and modified for this LHMP Update. Regional and EBRPD data sources and HMPC input were used in this effort to aid in determining hazards and vulnerabilities and where the risk varies across the EBRPD Planning Area. Geographic information systems (GIS) were used to display, analyze, and quantify hazards and vulnerabilities, where available.

The HMPC also conducted a capability assessment to review and document the Park District's current capabilities to mitigate risk from and vulnerability to hazards. By collecting information about existing Park District 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.

NFIP Participation

Also to be noted, DMA requires an assessment of a jurisdiction's continued compliance with the NFIP as part of an LHMP. However, this applies only to eligible NFIP communities. The EBRPD as a Special District is not eligible to participate in this program. While the Park District does not participate in the NFIP and thus does not administer its own floodplains, it complies with the flood requirements established by the State of California and the counties and cities in which its facilities are located.

High Hazard Potential Dam Hazard (HHPD) Identification and Coordination

East Bay Regional Park District owns two dams, C.L. Tilden and Lake Temescal, that are classified by the State of California as Extremely High Hazard dams. Foster Morrison worked with both the EBRPD (as the local dam owner) and the State of California Department of Water Resources (DWR) Division of Safety of Dams (DSOD) to identify these dams their locations, current conditions, inundation mapping and other dam specific data. The EBRPD dam coordinator provided Foster Morrison with the newly developed 2022 dam Emergency Action Plans (EAPs) for both C.L. Tilden and Lake Temescal dams and other data related to the current status, issues, and concerns relative to these dams. The inundation data was obtained from the California DWR DSOD. The DSOD also provided reports on dam status for this LHMP Update. The EAPs and dam inundation data was utilized in Section 4.3.7 Dam Failure of this Plan Update. Risks and vulnerabilities, as well as any dam deficiencies, from HHPD dams are discussed in Section 4.3.7 as well. Goals and mitigation actions to address any deficiencies are noted in Chapter 5 of this Plan Update. In addition to addressing the specifics of the two EBRPD owned dams to meet the requirements of the HHPD program for the EBRPD, Section 4.3.7 also includes a complete inventory and risk and vulnerability assessment of other dams located within the EBRPD Planning Area.

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 Update was developed. This complete draft was provided for HMPC review and comment via a Dropbox web link. HMPC comments were integrated into a second public review draft, which was placed on the EBRPD website and advertised to collect public input and comments. The HMPC integrated comments and issues from the public, as appropriate and as detailed above, 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 EBRPD Board.

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 Update, the Plan was adopted by the EBRPD governing board 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 EBRPD 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 Update and hazard mitigation in the Park District and is addressed further in Chapter 7.

Implementation and Maintenance Process: 2017

The 2017 EBRPD LHMP included a process for Plan maintenance and implementation of the mitigation strategy as well as formal updates to the Plan document. The 2017 process called for annual reviews of the LHMP and following any significant disaster event. In addition, the 2017 process called for a formal plan update as required by DMA regulations every 5 years. While formal reviews of the 2017 LHMP by the HMPC did not occur on an annual basis, the EBRPD staff conducted informal reviews as part of their process for identifying and implementing mitigation projects in the Park District. This 2022 LHMP Update, once approved and adopted, will meet the DMA formal 5-year update requirement.

In addition, the 2017 LHMP was relied on and integrated into other planning mechanisms in the Park District. Table 3-5 lists the planning mechanism the 2017 LHMP was integrated into by the EBRPD.

Table 3-5 Incorporation of 2017 EBRPD LHMP into Other Planning Mechanisms

Planning Mechanism 2017 LHMP Was Incorporated or Implemented Through	Details
FEMA HMGP Grant Applications	Utilized hazard data and mitigation actions from the LHMP to support development of FEMA mitigation grant applications

The plan implementation and maintenance process as set forth in the 2017 Plan has been updated for this LHMP Update. The revised update implementation and maintenance process for the EBRPD 2022 LHMP Update is set forth in Section 7 of this Plan document. A strategy for continued public involvement for this update process is also included 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 East Bay Regional Park District (EBRPD or Park District) 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 Park District and describes why some hazards have been omitted from further consideration.
- **Section 4.2**. **EBRPD Assets at Risk** identifies the property values; populations; critical facilities; and cultural, historical, and natural resources at risk. This information is not hazard specific and covers the entire EBRPD Planning Area.
- **Section 4.3: Hazard Profiles and Vulnerability Assessment** provides an overview of each hazard, its location and extent, and discusses the risk, vulnerability, and impacts of each natural hazard to the Planning Area. The hazard profile also describes previous occurrences of hazard events and the likelihood of future occurrences. The vulnerability assessment evaluates the Park District's exposure to natural hazards; considering assets at risk, populations at risk, critical facilities, future development trends, and, where possible, estimates potential hazard losses.
- **Section 4.4 Capability Assessment** inventories existing mitigation activities and policies, regulations, and plans that pertain to mitigation in the Park District and can affect net vulnerability.

This risk assessment covers the entire geographical extent of the EBRPD boundaries (or service area). The boundaries of the EBRPD include the entirety of Alameda and Contra Costa counties. Hereinafter in this document, this will be referred to as the EBRPD Planning Area.

This LHMP Update involved a comprehensive review and update of each section of the 2017 risk assessment. Information from the 2017 LHMP was used in this Update where valid and applicable. As part of the risk assessment update, new data was used, where available, and new analyses were conducted. Where data from existing studies and reports was used, the source is referenced throughout this risk assessment. Refinements, changes, and new methodologies used in the development of this risk assessment update are summarized in Chapter 2 What's New and are also detailed in this risk assessment portion of this Plan.

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 natural hazards that threaten the EBRPD. This section details the methodology and results of this effort.

Data Sources

The following data sources were used for this Hazard Identification portion of the Plan:

- HMPC input
- National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center (NCDC) Storm Events Database
- 2017 EBRPD Local Hazard Mitigation Plan
- 2018 State of California Hazard Mitigation Plan
- 2018 Contra Costa County Local Hazard Mitigation Plan
- 2021 Alameda County Local Hazard Mitigation Plan Public Draft
- 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 the EBRPD. 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 Park District. Those hazards identified as a high or medium significance are considered priority hazards for mitigation planning. Those hazards that occur infrequently or have little or no impact on the Planning Area were determined to be of low significance and not considered a priority hazard. 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 ability of a community to reduce losses through implementation of existing and new mitigation measures was also

considered as to the significance of a hazard. The natural hazards evaluated as part of this Plan include those that have occurred historically and/or have the potential to cause significant human and/or monetary losses in the future.

The following hazards in Table 4-1, listed alphabetically, were identified and investigated for this LHMP Update. As a starting point, the 2018 California State Hazard Mitigation Plan and LHMPs for Alameda and Contra Costa Counties were consulted to evaluate the applicability of hazards of concern to the Park District. Building upon this effort, hazards from the 2017 EBRPD Local Hazard Mitigation Plan (LHMP) were also identified, and comments explain how hazards were updated from the 2017 Plan. Most hazards from the 2017 Plan were profiled in this LHMP Update. Hazards dropped for this 2022 Plan Update include snow and ice storms and volcano. Dam failure, localized flood, landslide, levee failure, sea level rise, and tsunami were broken out as standalone hazards. New hazards include climate change and pandemic.

Table 4-1 EBRPD Hazard Identification and Comparison from 2017 LHMP

2022 Hazards	2017 Hazards	Comment
Climate Change	–	New hazard (although it was briefly discussed in the 2017 Plan, no analysis or significant discussions were done).
Dam Failure	Part of earthquake hazard	This hazard was made to be a standalone hazard which included a complete risk assessment with a dam inventory and inundation mapping analysis.This included meeting HHPD program requirements for EBRPD owned dams.
Drought & Water Shortage (with tree mortality)	Drought	Similar analysis was performed.
Earthquakes (and earthquake liquefaction)	Earthquake	Similar earthquake analysis was performed. Additional analysis on liquefaction was performed. An analysis of Park District lands and values at risk to liquefaction was analyzed.
Flood: 1%/0.2% annual chance	Part of Flood hazard	Additional analysis was performed on Park District lands and values that fall into DFIRM flood zones.
Flood: Localized/Stormwater Flooding	Part of Flood hazard	Additional review was done on locations at risk from localized flooding.
Landslide, Mudslide, Debris Flow	Part of Earthquake hazard	This hazard was made to be a stand-alone hazard. Additional analysis on Park District facilities in the landslide susceptibility zones was performed.
Levee Failure	Part of Flood hazard	Additional analysis of levees was performed. Levee X Protected by flood zones were mapped, and an analysis of Park District lands and values was performed.
Pandemic	–	New hazard
Sea Level Rise	Part of Flood hazard	This hazard was made to be a stand-alone hazard. Additional analysis on Park District facilities in the anticipated sea level rise areas was performed.
Severe Weather: Extreme Heat	Extreme Temperatures	Similar analysis was performed.

2022 Hazards	2017 Hazards	Comment
Severe Weather: Heavy Rain and Storms	Part of Flood hazard	Similar analysis was performed.
Severe Weather: High Winds and Tornadoes	High Winds	Similar analysis was performed.
–	Snow and Ice Storms	This hazard was dropped due to its historically low chance of occurrence.
Tsunami	Part of Earthquake hazard	This hazard was made to be a stand-alone hazard. Additional analysis on District facilities in the tsunami zone was performed.
Wildfire (with smoke/ air quality)	Wildland Urban Interface Fires	Similar analysis was performed, but newer asset and facility data from the Park District was analyzed.
–	Volcano	This hazard was dropped due to its low chance of occurrence and impact to the Park District.

Certain hazards were excluded from consideration for this Plan. They are shown in Table 4-2.

Table 4-2 EBRPD – Excluded Hazards

Hazard Excluded	Why Excluded
Avalanches	The Park District does not have measurable snowfall to have avalanche as a hazard.
Air Pollution	The Park District did consider this a hazard for the LHMP; it is dealt with in other EBRPD planning mechanisms. Air quality issues associated with wildfire smoke is included in the wildfire hazard discussion of this 2022 LHMP Update.
Insects Pests and Diseases	The Park District did consider this a hazard for this LHMP; however, it is dealt with in other EBRPD planning mechanisms.
Natural Gas Pipeline Hazards	The Park District did not consider this a hazard due to the low number of gas pipelines traversing the EBRPD. The Park District has no control over any pipelines.
Oil Spills	The Park District did not consider this a hazard, as there are few pipelines or oil wells in the EBRPD. The Park District has no control over any pipelines.
Radiological Accidents	There are no areas in the Park District at risk to this hazard.
Terrorism	The Park District did consider this a hazard for this LHMP; however, it is dealt with in other County and EBRPD planning mechanisms.
Cyber Threats	The Park District did consider this a hazard for this LHMP; however, it is dealt with in other County and EBRPD planning mechanisms.
Airline Crashes	There have been no past occurrences in the Park District of airplane crashes. This is not under the control of the EBRPD to address.
Civil Disturbance	The Park District did not consider this a hazard for this LHMP; however, it is dealt with in other County and EBRPD planning mechanisms.
Well Stimulation and Hydraulic Fracking	This is not occurring in the Park District.

The worksheet below was completed by the EBRPD to identify, profile, and rate the significance of identified hazards.

Table 4-3 EBRPD Hazard Identification

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Climate Change	Extensive	Likely	Limited	High	–
Coastal Flooding and Sea Level Rise	Limited	Likely	Limited	Medium	High
Dam Failure	Significant	Unlikely	Critical	High	Medium
Drought & Water Shortage (with tree mortality)	Extensive	Likely	Critical	Medium	High
Earthquakes (and earthquake liquefaction)	Extensive	Occasional	Catastrophic	High	Low
Flood: 1%/0.2% annual chance	Limited	Occasional/ Unlikely	Limited	Medium	High
Flood: Localized/Stormwater Flooding	Significant	Highly Likely	Limited	Medium	Medium
Landslide, Mudslide, Debris Flow	Significant	Highly Likely	Limited	Medium	Medium
Levee Failure	Limited	Occasional	Limited	Medium	Medium
Pandemic	Extensive	Occasional	Critical	Low	Low
Severe Weather: Extreme Heat	Extensive	Highly Likely	Limited	Medium	High
Severe Weather: Heavy Rain and Storms	Extensive	Highly Likely	Limited	Medium	High
Severe Weather: High Winds and Tornadoes	Extensive	Highly Likely	Limited	Medium	Medium
Tsunami	Limited	Occasional	Limited	Low	Medium
Wildfire (with smoke/ air quality)	Extensive	Highly Likely	Catastrophic	High	High

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

Climate Change Influence
Low: Minimal potential impact
Medium: Moderate potential impact
High: Widespread potential impact

Source: EBRPD

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 Park District (although disaster declarations are generally 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 disaster and emergency declarations. Since the Park District sits in two separate counties, the following Disaster Declaration sections are broken out by Alameda and Contra Costa counties.

Alameda County Disaster Declaration History

Alameda County has experienced 26 federal and 32 state declarations since 1950. 17 of the federal declarations were associated with flood events (including heavy rain and storms), 2 from freeze, 2 from pandemic, 2 from wildfire, 1 from drought, 1 from earthquake, and 1 for hurricane (for evacuations stemming from Hurricane Katrina in 2005). Regarding state disaster declarations, 19 of the state declarations were associated with flood (including heavy rain and storms), 3 were economic, 2 were associated with drought, 2 were associated with pandemic, 2 with freeze, 1 was agricultural, 1 for fire, 1 from road damage, and 1 from other (Bay Area oil spill). Details of each federal and state disaster declaration are detailed in Table 4-4. A summary of federal and state disaster declarations is shown in Table 4-5.

Table 4-4 Alameda County Disaster Declarations 1950-2022

Year	Disaster Name	Disaster Type	Disaster Cause	Disaster #	State Declaration #	Federal Declaration #
2020	Covid-19	Pandemic	Pandemic	DR-4482	3/4/2020	1/20/2020
2020	Covid-19	Pandemic	Pandemic	EM-3428	3/4/2020	3/13/2020
2017	California Severe Winter Storms, Flooding, Mudslides	Flood	Storms	DR-4308	3/7/2017	4/1/2017
2017	California Severe Winter Storms, Flooding, Mudslides	Flood	Storms	DR-4305	2/10/2017	3/16/2017

Year	Disaster Name	Disaster Type	Disaster Cause	Disaster #	State Declaration #	Federal Declaration #
2017	California Severe Winter Storms, Flooding, Mudslides	Flood	Storms	DR-4301	–	2/14/2017
2014	California Drought	Drought	Drought	GP 2014-13	1/17/2014	–
2008	2008 January Storms	Flood	Flood	GP-2008-01	12/21/2007	–
2007	Bay Area Oils Spill	Other	Accident	GP-2007-15	11/9/2007	–
2006	California Severe Winter Storms, Flooding, Landslides, Mud Flows	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	Road Damage	Flood	Storms	GP 2003	1/1/2003	–
2001	Energy Emergency	Economic	Greed	GP 2001	1/1/2001	–
1998	1998 El Nino Floods	Flood	Flood	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	Proclaimed	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	Wildfire	Wildfire	DR-919	–	10/22/1991
1990	Freeze	Freeze	Freeze	DR-894	12/19/1990-1/18/1991	2/11/1991
1989	Loma Prieta Earthquake	Earthquake	Earthquake	DR-845	–	9/18/1989
1986	1986 Storms	Flood	Storms	DR-758	2/18-86-3/12/86	2/18/1986
1983	Bradford Levee Failure	Flood	Storms	GP 83-05	12/9/1983 1/18/1984	–
1983	1982-1983 Winter Storms	Flood	Storms	DR-677	12/8/1982-3/21/1983	2/9/1983

Year	Disaster Name	Disaster Type	Disaster Cause	Disaster #	State Declaration #	Federal Declaration #
1982	California Severe Storms, Flood, Mudslides, High Tide	Flood	Storms	DR-651	1/5/1982	1/7/1982
1981	Mediterranean Fruit Fly Infestation	Agricultural	Insect Pests	GP-1980 Medfly	12/1/1980	–
1979	Gasoline Shortage	Economic	OPEC	–	5/8/1979	–
1977	1976 Drought	Drought	Drought	EM-3023	2/9/1976, 2/13/1976, 2/24/1976, 3/26/1976, 7/6/1976	1/20/1977
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	9/24/1970 9/28/1970 10/1/1970 10/2/1970 10/20/1970 11/14/1970	8/29/1970
1970	1970 Northern California Flooding	Flood	Flood	DR 283	1/27/1970 - 3/2/1970	2/16/1970
1963	1963 Floods	Flood	Storms	–	2/14/1964	–
1962	Flood and Rainstorm	Flood	Storms	–	10/17/1962, 10/25/1962, 10/30/1962, 11/4/1962	10/24/1962
1962	Floods and Rains	Floods	Storms	–	10/17/1962 10/25/1962 10/30/1962 11/4/1962	10/24/1962
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	–
1957	Unseasonal and Heavy Rainfall	Flood	Severe Storm, Economic	–	5/20/1957 (Cherry-producing)	–
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 4-5 Alameda County Disaster Declarations 1950-2022 Summarized by Disaster Type

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Agricultural	1	1981	0	–
Drought	2	1976, 2014	1	1976
Earthquake	0	–	1	1989
Economic	3	1974, 1979, 2001	0	–
Freeze	2	1973, 1990	2	1973, 1990
Flood (including heavy rains and storms)	19	1950, 1955, 1957, 1958 (twice), 1962, 1963, 1970, 1982, 1983 (twice), 1986, 1995 (twice), 1997, 1998, 2008, 2017 (twice)	17	1955, 1958, 1962 (twice), 1970, 1982, 1983, 1986, 1995 (twice), 1997, 1998, 2005, 2006, 2017 (three)
Hurricane	0	–	1	2005
Other	1	2007	0	–
Pandemic	2	2020	2	2020
Road Damage	1	2003	0	–
Wildfire	1	1970	2	1970, 1991
Totals	**32**	–	**26**	**–**

Source: Cal OES, FEMA

Alameda County Disasters since 2017 Plan

- 2017 Flood (three federal and two state)
- 2020 Pandemic (state and federal)

Contra Costa County Disaster Declaration

Contra Costa County has experienced 28 federal and 37 state declarations since 1950. 20 of the federal declarations were associated with flood events (including heavy rain and storms), 2 from pandemic, 1 from freeze, 1 from drought, 1 from earthquake, 1 from wildfire, and 1 for hurricane (for evacuations stemming from Hurricane Katrina in 2005). Regarding state disaster declarations, 24 of the state declarations were associated with flood (including heavy rain and storms), 3 were economic, 2 were associated with drought, 2 were associated with pandemic, 1 for freeze, 1 from wildfire, 1 was agricultural, 1 was from road damage, and 2 from other (Bay Area oil spill and Richmond sinkhole). Details of each federal and state disaster declaration are detailed in Table 4-6. A summary of federal and state disaster declarations is shown in Table 4-7.

Table 4-6 Contra Costa County Disaster Declarations 1950-2022

Year	Disaster Name	Disaster Type	Disaster Cause	Disaster #	State Declaration #	Federal Declaration #
2020	Covid-19	Pandemic	Pandemic	DR-4482	3/4/2020	1/20/2020
2020	Covid-19	Pandemic	Pandemic	EM-3428	3/4/2020	3/13/2020

Year	Disaster Name	Disaster Type	Disaster Cause	Disaster #	State Declaration #	Federal Declaration #
2017	California Severe Winter Storms, Flooding, Mudslides	Flood	Storms	DR-4308	3/7/2017	4/1/2017
2017	California Severe Winter Storms, Flooding, Mudslides	Flood	Storms	DR-4305	2/10/2017	3/16/2017
2017	California Severe Winter Storms, Flooding, Mudslides	Flood	Storms	DR-4301	–	2/14/2017
2014	California Drought	Drought	Drought	GP 2014-13	1/17/2014	–
2008	2008 January Storms	Flood	Flood	GP-2008-01	12/21/2007	–
2007	Bay Area Oils Spill	Other	Accident	GP-2007-15	11/9/2007	–
2006	California Severe Winter Storms, Flooding, Landslides, Mud Flows	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	Road Damage	Flood	Storms	GP 2003	1/1/2003	–
2001	Energy Emergency	Economic	Greed	GP 2001	1/1/2001	–
1998	1998 El Nino Floods	Flood	Flood	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	Proclaimed	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	Wildfire	Wildfire	DR-919	–	10/22/1991
1990	Freeze	Freeze	Freeze	DR-894	12/19/1990-1/18/1991	2/11/1991
1989	Loma Prieta Earthquake	Earthquake	Earthquake	DR-845	–	9/18/1989
1986	1986 Storms	Flood	Storms	DR-758	2/18-86-3/12/86	2/18/1986

Year	Disaster Name	Disaster Type	Disaster Cause	Disaster #	State Declaration #	Federal Declaration #
1983	Bradford Levee Failure	Flood	Storms	GP 83-05	12/9/1983 1/18/1984	–
1983	1982-1983 Winter Storms	Flood	Storms	DR-677	12/8/1982- 3/21/1983	2/9/1983
1982	California Severe Storms, Flood, Mudslides, High Tide	Flood	Storms	DR-651	1/5/1982	1/7/1982
1981	Mediterranean Fruit Fly Infestation	Agricultural	Insect Pests	GP-1980 Medfly	12/1/1980	–
1979	Gasoline Shortage	Economic	OPEC	–	5/8/1979	–
1977	1976 Drought	Drought	Drought	EM-3023	2/9/1976, 2/13/1976, 2/24/1976, 3/26/1976, 7/6/1976	1/20/1977
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	9/24/1970 9/28/1970 10/1/1970 10/2/1970 10/20/1970 11/14/1970	8/29/1970
1970	1970 Northern California Flooding	Flood	Flood	DR 283	1/27/1970 - 3/2/1970	2/16/1970
1963	1963 Floods	Flood	Storms	–	2/14/1964	–
1962	Flood and Rainstorm	Flood	Storms	–	10/17/1962, 10/25/1962, 10/30/1962, 11/4/1962	10/24/1962
1962	Floods and Rains	Floods	Storms	–	10/17/1962 10/25/1962 10/30/1962 11/4/1962	10/24/1962
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	–
1957	Unseasonal and Heavy Rainfall	Flood	Severe Storm, Economic	–	5/20/1957 (Cherry-producing)	–

Year	Disaster Name	Disaster Type	Disaster Cause	Disaster #	State Declaration #	Federal Declaration #
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 4-7 Contra Costa County Disaster Declarations 1950-2022 Summarized by Disaster Type

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Agricultural	1	1981	0	–
Drought	2	1976, 2014	1	1976
Earthquake	0	–	1	1989
Economic	3	1974, 1979, 2001	0	–
Freeze	1	1973	1	1973
Flood (including heavy rains and storms)	24	1950, 1955, 1957, 1958 (twice), 1962, 1963, 1969, 1970, 1980, 1982 (twice), 1983 (twice), 1984, 1986, 1992, 1995 (twice), 1997, 1998, 2008, 2017 (twice)	20	1955, 1958, 1962 (twice), 1969, 1970, 1980, 1982, 1983, 1986, 1992, 1995 (twice), 1997, 1998, 2005, 2006, 2017 (three)
Hurricane	0	–	1	2005
Other	2	2007, 2010	0	–
Pandemic	2	2020	2	2020
Road Damage	1	2003	0	–
Wildfire	1	1970	2	1991, 1970
Totals	**37**	–	**28**	**–**

Source: Cal OES, FEMA

Contra Costa County Disasters since 2017 Plan

- 2017 Flood (three federal and two state)
- 2020 Pandemic (state and federal)

4.2 EBRPD Park Lands and Assets Inventory

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

- Park Lands and Assets;
- Economic value of Park District services
- Populations

- Critical facilities;
- Natural, cultural, and historical resources; and
- Growth and development trends.

Data Sources

- 2013 East Bay Regional Park District Master Plan
- 2017 Economic Analysis Impact Report
- CalAtlas
- California Department of Finance
- California Department of Fish and Wildlife
- California Department of Parks and Recreation Office of Historic Preservation
- California Natural Diversity Database
- East Bay Regional Park District GIS
- Hazus MH 4.2
- State of California Department of Conservation
- US Census Bureau

4.2.1. Park Lands and Assets

An inventory of Park District lands and assets was conducted to determine what is potentially at risk and vulnerable to the damaging effects of natural hazards within the EBRPD. This data provided by EBRPD in GIS, as described further below, represents best available data.

EBRPD Analysis: Park Lands and Assets

Methodology

The GIS methodology describes the data collection, data interpretation, and data analysis performed for the LHMP Update. The EBRPD Planning Area is the entire Alameda and Contra Costa County areas, of which base GIS data were obtained from the County GIS portals. The EBRPD Park Lands polygons and EBRPD Assets obtained from the EBRPD were used for this analysis. EBRPD provided data included:

- **EBRPD Park Lands** – The EBRPD Parks Lands (Ebparkp_m_03222022.shp) GIS polygon data was obtained from EBRPD and were added to base maps. There are a total of 132 Park Lands in EBRPD, with 62 located in Alameda County and 70 located in Contra Costa County. The values of Lands was not included in this data for several reasons as noted by the EBRPD:
  - ✓ The EBRPD parklands and trail corridors have been assembled through 1354 different projects dating back to 1934. The Park District has acquired land through purchase of fee title, easements, leases, licenses, and operating agreements.
  - ✓ While the total purchase price of the 816 properties the Park District owns outright is $452,212,723, that number is not adjusted for inflation, so it may not accurately reflect current values.
  - ✓ Many of the properties owned by EBRPD were acquired for free as donations or dedications from developers.

- ✓ EBRPD has a total of 538 properties that it does not own, but operates as easements, or under leases, licenses, or operating agreements. The Park District does not have a way to collectively appraise the value of these property rights.
- ✓ The EBRPD usually values their Park Lands individually as needed; thus the overall value of Park Lands was not available for analysis.

- **EBRPD Assets** – The EBRPD Asset data package (EBRPD_FullAssetList_20220503) obtained from EBRPD included the Replacement Values for each asset. 491 of the 1,401 assets contained NULL ($0) or $1 replacement values, and EBRPD indicated those "assets without cost data were generally considered to be of low value to the Park District (abandoned, low-value storage, outbuildings, low replacement cost) and therefore were financially not a priority to be assessed" and the remainder have values ranging from $1 and up. All 1,401 assets remained in the analysis. The $1 replacement values were adjusted to $0 to simplify the data analysis tables. This asset layer was then intersected with the Park Lands polygons to associate the assets with the corresponding Park Lands.
- **EBRPD Park Lands and Assets**– The resulting inventory of Park Lands and Assets reflects what is potentially at risk to the effects of natural hazards. Both Park Lands and EBRPD assets were then intersected by the identified hazards to determine Park District Lands and assets impacted by each hazard, and the analysis tables provide detailed information for both datasets. The hazard specific analysis is contained in each of the hazard sections in this Risk Assessment.

EBRPD Analysis – Park Lands Results

A summary of Park Lands by acres and County where they are located can be found in Table 4-8. More detail on land acreages by Park Lands are shown on Table 4-9.

Table 4-8 EBRPD – Park Lands Summary

Park District Lands	Total Park Lands	Total Acres
EBRPD – Alameda County	43	58,257.25
EBRPD – Contra Costa County	57	63,787.20
Grand Total	**100**	**122,044.45**

Source: EBRPD GIS

Table 4-9 EBRPD – Total Acres by Park Lands

Park District Lands	Total Acres
EBRPD – Alameda County	
Alameda Creek Trail	7.87
Alameda Point Shoreline Trail	3.27
Anthony Chabot	3,351.56
Ardenwood Historic Farm	204.92
Bay Area Ridge Trail (GD to LC)	57.22
Brushy Peak	1,931.58
Camp Arroyo	143.82

Park District Lands	Total Acres
Claremont Canyon	218.45
Coyote Hills	1,238.74
Creative Design Group Building	0.20
Crown Beach	184.19
Cull Canyon	361.52
Del Valle	5,032.19
Del Valle to Shadow Cliffs Trail	1.08
Don Castro	94.60
Doolan Canyon	774.18
Dry Creek Pioneer	1,675.11
Dublin Hills	642.31
Five Canyons	226.23
Garin	4,449.38
Hayward Shoreline	1,064.31
Helicopter Unit	1.20
Judge John Sutter Shoreline	32.62
Lake Chabot	1,651.97
Leona Canyon	297.32
Martin Luther King Jr. Shoreline	773.96
McLaughlin Eastshore	1,830.46
Mission Peak	3,014.71
Niles Canyon Trail	17.16
Ohlone	9,047.62
Oyster Bay Shoreline	194.76
Peralta Oaks Headquarters	7.39
Pleasanton Ridge	8,923.59
Quarry Lakes	479.56
Reinhardt Redwood	1,783.01
Roberts	120.64
SF Bay Trail (MLK to MESP)	43.70
Shadow Cliffs	259.16
Skyline National Trail	0.16
Sunol	6,824.95
Tassajara Creek Trail	4.50
Temescal	41.64
Vargas Plateau	1,244.44
EBRPD – Alameda County Total	**58,257.25**

Park District Lands	Total Acres
EBRPD – Contra Costa County	
Antioch/Oakley Shoreline	8.56
Bay Area Ridge Trail (KG to SO)	166.04
Bay Point Shoreline	137.91
Big Break Delta Shoreline Trail	8.88
Big Break Shoreline	1,657.33
Bishop Ranch	983.02
Black Diamond Mines	6,130.11
Briones	6,223.52
Briones to Las Trampas Trail	37.46
Briones to Martinez Trail	0.47
Briones to Mt Diablo Trail	6.06
Brooks Island	378.28
Browns Island	600.48
Byron Vernal Pools	1,959.03
CA State Riding & Hiking Trail	50.46
Calaveras Ridge Trail (LT to PR)	43.34
Carquinez Strait Shoreline	1,513.65
Castle Rock	39.34
Clayton Ranch	4,077.50
Contra Costa Canal Trail	0.37
Contra Costa Trails	2.04
Contra Loma	681.03
Crockett Hills	2,114.61
Deer Valley	3,611.47
Delta Access	992.97
Delta de Anza Trail	5.45
Diablo Foothills	956.90
Huckleberry	238.29
Iron Horse Trail	0.03
Kennedy Grove	218.09
Lafayette to Moraga Trail	19.24
Las Trampas	5,850.56
Las Trampas to Mt Diablo Trail	190.88
Little Hills	36.49
Miller/Knox Shoreline	318.08
Morgan Territory	5,482.45

Park District Lands	Total Acres
North Richmond Shoreline	32.80
Point Isabel Shoreline	38.01
Point Pinole Shoreline	2,202.78
Radke Martinez Shoreline	334.84
Rancho Pinole	556.25
Round Valley	1,905.76
San Pablo Bay Shoreline	278.70
SF Bay Trail	1.02
SF Bay Trail (PP to CS)	0.43
Sibley	927.77
Sobrante Ridge	272.39
Sycamore Valley	692.10
Thurgood Marshall	2,543.85
Tilden	1,467.65
Tilden (Botanic Garden)	8.75
Tilden (Nature Area)	709.57
Vasco Caves	719.84
Vasco Hills	3,411.12
Waterbird	198.17
Wildcat Canyon	2,738.80
Wildcat Creek Trail	6.21
EBRPD – Contra Costa County	**63,787.20**
EBRPD Grand Total	**122,044.45**

Source: EBRPD GIS

EBRPD Analysis – Park Assets Results

Using the GIS data package of assets provided by EBRPD, Table 4-10 shows the total number of assets by the County in which they are located and includes the replacement values of these assets. Table 4-11 shows the replacement values by park lands. It should be again noted that 491 of the 1,401 assets had no values. As such, both Table 4-10 and Table 4-11 will show values lower than the actual replacement values for the Park District. More information on EBRPD assets can be found in Appendix F.

Table 4-10 EBRPD – Park Assets Summary

Park District Lands	Total Parks	Asset Count	Replacement Value
EBRPD – Alameda County Total	43	746	$192,893,264
EBRPD Contra Costa County Total	57	655	$137,649,852

Park District Lands	Total Parks	Asset Count	Replacement Value
EBRPD Grand Total	**100**	**1,401**	**$330,543,116**

Source: EBRPD GIS

Table 4-11 EBRPD – Park Assets and Replacement Values by Park Lands

Park District Lands	Asset Count	Replacement Value
EBRPD – Alameda County		
Alameda County Trails	8	$2,248,543
Anthony Chabot	65	$14,846,086
Ardenwood	45	$6,229,584
Brushy Peak	12	$202,430
Camp Arroyo	34	$11,804,633
Claremont Canyon	2	$0
Coyote Hills	33	$3,656,453
Crown Beach	29	$12,933,344
Cull Canyon	15	$3,109,592
Del Valle	73	$23,618,139
Don Castro	15	$3,136,284
Dublin Hills	1	$204,384
Garin/Dry Creek Pioneer	43	$6,179,289
Hayward Shoreline	17	$3,128,230
Judge John Sutter	9	$17,906,989
Lake Chabot	89	$20,024,086
Martin Luther King, Jr.	29	$12,328,097
McLaughlin Eastshore	4	$4,909,320
Mission Peak	9	$1,752,489
Peralta Oaks	2	$11,713,395
Peralta Oaks North	1	$0
Pleasanton Ridge	16	$3,454,447
Quarry Lakes	22	$4,116,423
Reinhardt Redwood	34	$7,877,022
Roberts	22	$3,210,116
Shadow Cliffs	41	$5,441,732
Sunol / Ohlone Wilderness	42	$3,629,405
Temescal	30	$4,542,916
Vargas Plateau	4	$689,836
EBRPD – Alameda County Total	**746**	**$192,893,264**

Park District Lands	Asset Count	Replacement Value
EBRPD – Contra Costa County		
Antioch/Oakley	7	$1,228,996
Bay Point	6	$703,827
Big Break	12	$3,550,137
Black Diamond Mines	78	$5,069,491
Briones	21	$1,720,644
Brooks Island	5	$771,617
Byron Vernal Pools	4	$0
Carquinez Strait	11	$3,528,416
Clayton Ranch	3	$29,075
Contra Costa Trails	44	$16,897,772
Contra Loma	28	$8,662,484
Crockett Hills	7	$361,370
Deer Valley	18	$621,065
Delta Access	6	$337,230
Diablo Foothills / Castle Rock	14	$2,278,152
East County Trails	16	$7,216,387
Huckleberry	1	$0
Kennedy Grove	9	$836,117
Las Trampas	40	$9,186,790
McLaughlin Eastshore	3	$0
Miller/Knox	22	$5,981,385
Morgan Territory	16	$401,128
Point Isabel	6	$718,293
Point Pinole	29	$21,734,152
Radke Martinez	16	$4,193,845
Reinhardt Redwood	8	$554,428
Roberts	6	$1,180,080
Round Valley	18	$2,421,177
Sibley	8	$2,414,572
Sycamore Valley	2	$191,007
Thurgood Marshall, Home of the Port Chicago 50	2	$0
Tilden	142	$25,023,016
Vasco Caves	6	$92,991
Vasco Hills	27	$5,411,015
Waterbird	2	$89,303

Park District Lands	Asset Count	Replacement Value
Wildcat Canyon	12	$4,243,890
EBRPD Contra Costa County Total	**655**	**$137,649,852**
EBRPD Grand Total	**1,401**	**$330,543,116**

Source: EBRPD GIS

4.2.2. Economic Value of Park District Services

In addition to the Park District land and assets listed above, the services that the Park District provides should also be considered potentially at risk should a disaster occur. These Park District services add benefits and value to both the Park District and surrounding communities.

The 2017 EBRPD Economic Analysis Impact Report noted that the Park District plays a critical role in the well-being of the East Bay sub-region of the San Francisco Bay Area (Alameda and Contra Costa counties). The East Bay's 2.7 million residents and 1.4 million workers in 33 cities and unincorporated communities benefit from the Park District's diverse network of green infrastructure. The benefits of the Park District and the return provided for the taxpayer investment can be assessed from numerous perspectives — environmental, social, and economic, among others. A summary of the economic values of these services is provided below.

Economic Values

The economic values contributed by the EBRPD in the 2017 Economic Analysis Impact Report include:

- Park District lands provide services with an economic value of about $500 million annually.
- Park District lands are estimated to provide ecosystem services with an average annual value of about $517 million.
- Recreation users place an annual value of about $200 million on their EBRPD park visits.
- Properties proximate to Park District lands exhibit a sales value premium of about $65 million annually.
- Recreational activities on Park District lands provide healthcare cost savings of $20 million annually.
- The economic value of other services associated with Park District lands contributes over $200 million each year.

4.2.3. Populations

Life safety is a priority issue for hazard mitigation planning. The people that work and recreate in the EBRPD, and those that live and work in surrounding communities are also potentially at risk during a natural hazard event. Populations potentially at risk are described in the following sections:

- EBRPD staff and contractors
- Visitors to EBRPD
- Populations of surrounding communities

While these various groups are at risk to a hazard event occurring on Park District lands, it is difficult to quantify on a hazard specific basis. The risk to specific populations will vary depending on the type and location of the hazard and the proximity of the various populations to any given event. As a result, further analyses of populations at risk by hazard could not be quantified in the hazard risk assessment that follows.

EBRPD Staff and Seasonal Workers

The Park District noted the following staff for 2022:

- 827 permanent staff
- 98 Seasonal/Part time staff
- 925 Total Staff

Visitors to EBRPD

Estimates of total visitation are derived from a recent survey that indicates an estimated 25 million visits annually to EBRPD lands and facilities.

Population of Surrounding Communities

The Planning Area of the Park District includes all of the areas inside Alameda and Contra Costa County. Populations for these areas is shown on Table 4-12.

Table 4-12 EBRPD – Populations of Alameda and Contra Costa Counties and Communities

State/County/City	1/1/2021	1/1/2022	Change
California	**39,303,157**	**39,185,605**	**-0.3**
Alameda County	1,662,370	1,651,979	-0.6
Alameda (city)	78,262	77,784	-0.6
Albany	20,542	21,648	5.4
Berkeley	121,269	124,563	2.7
Dublin	73,209	72,932	-0.4
Emeryville	12,617	12,497	-1.0
Fremont	228,872	229,476	0.3
Hayward	161,744	160,591	-0.7
Livermore	87,388	86,149	-1.4
Newark	47,157	47,229	0.2
Oakland	430,100	424,464	-1.3
Piedmont	11,138	10,977	-1.4
Pleasanton	78,924	77,609	-1.7
San Leandro	89,926	88,404	-1.7
Union City	69,301	68,150	-1.7
Balance of County	151,921	149,506	-1.6

State/County/City	1/1/2021	1/1/2022	Change
Contra Costa	**1,161,324**	**1,156,555**	**-0.4**
Antioch	115,142	115,074	-0.1
Brentwood	64,224	64,342	0.2
Clayton	10,964	10,863	-0.9
Concord	124,755	123,634	-0.9
Danville	43,373	43,352	0.0
El Cerrito	25,671	25,650	-0.1
Hercules	26,357	26,091	-1.0
Lafayette	25,217	25,064	-0.6
Martinez	37,195	36,908	-0.8
Moraga	17,206	17,105	-0.6
Oakley	43,627	44,533	2.1
Orinda	19,496	19,478	-0.1
Pinole	18,819	18,628	-1.0
Pittsburg	75,788	75,156	-0.8
Pleasant Hill	34,335	34,026	-0.9
Richmond	114,643	114,489	-0.1
San Pablo	31,793	31,510	-0.9
San Ramon	84,226	83,820	-0.5
Walnut Creek	70,566	69,891	-1.0
Balance of County	177,927	176,941	-0.6

Source: California Department of Finance E-1 Population Estimates for Cities, Counties, and the State – January 1, 2021, and 2022

Vulnerable and Underserved Populations

Vulnerable populations are those who may need additional help or accommodation during a hazard event. It should be noted that this is based on the vulnerable or underserved populations of Alameda and Contra Costa Counties and cities that are served by the EBRPD, and are not specific to EBRPD staff and workers. The vulnerable and underserved populations discussion is based on the following five sources:

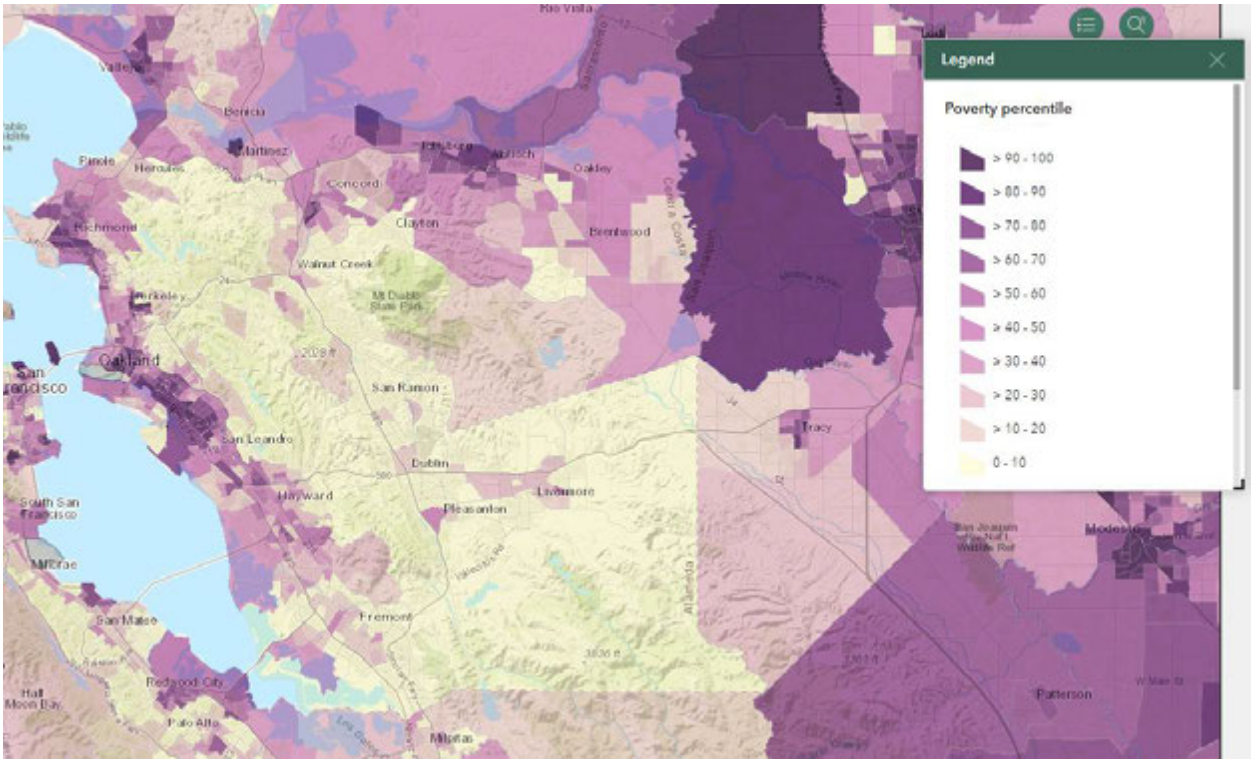
- California Environmental Protection Agency (Cal EPA) Disadvantaged Communities
- Plan Bay Area 2050 Equity Priority Community
- Center for Disease Control (CDC) Social Vulnerability Index
- California Department of Water Resources (CA DWR) Special Populations and Disadvantaged Community Mapping

Cal EPA Disadvantaged Communities

Disadvantaged communities are defined by CalEPA as the top 25 percent of communities experiencing disproportionate amounts of pollution, environmental degradation, and socioeconomic and public health conditions according to the Office of Environmental Health Hazard Assessment's CalEnviroScreen tool.

CalEPA is responsible for identifying disadvantaged communities for the purposes of the Cap-and-Trade funding program. This uses the CalEnviroScreen 4.0 Tool. Maps showing these areas in the Park District Planning Area are shown on Figure 4-1.

Figure 4-1 EBRPD – Cal EPA Disadvantaged Communities

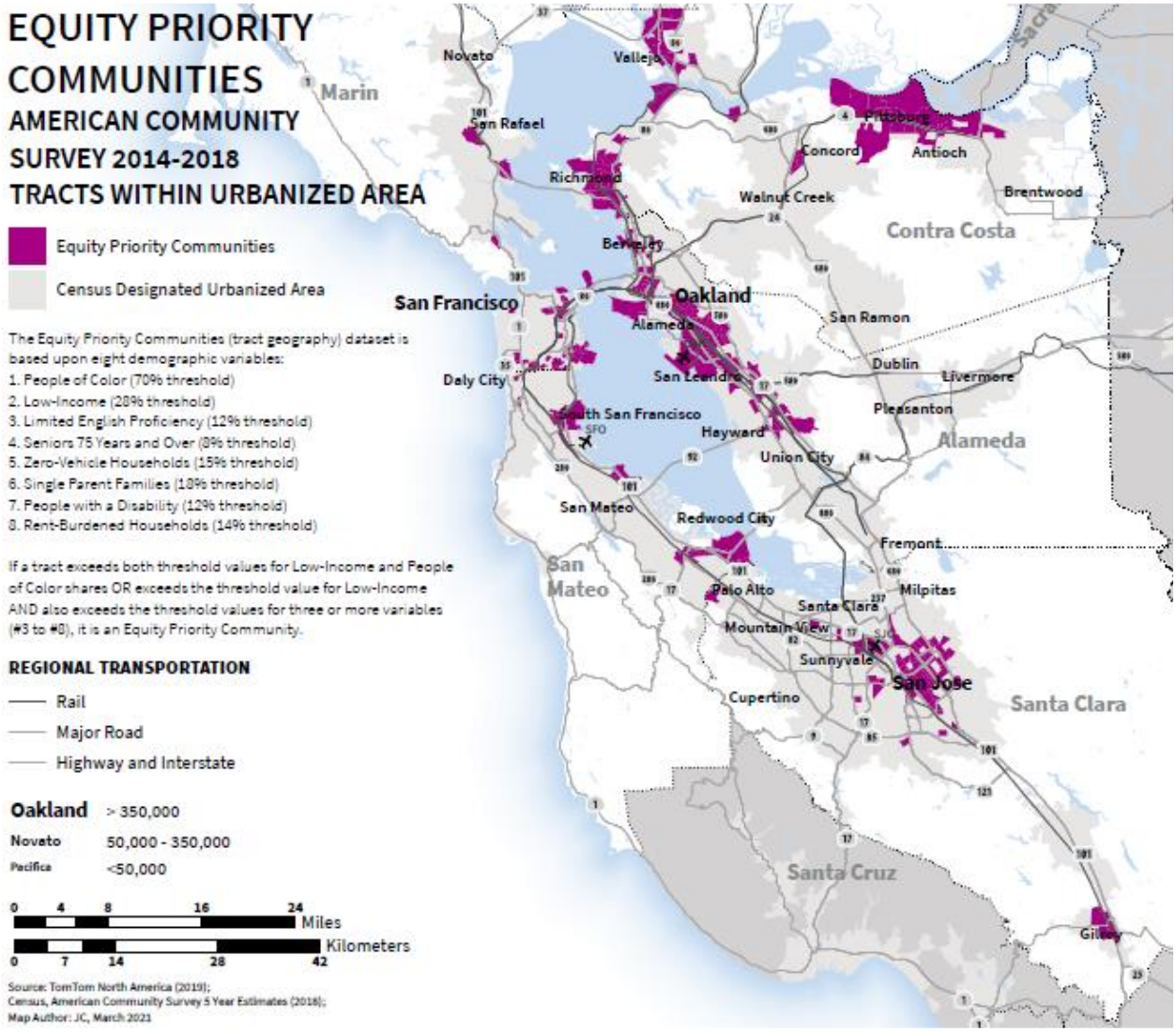


Source: Cal EPA, map retrieved 6/24/2022

Plan Bay Area 2050 Equity Priority Community

Plan Bay Area noted that formerly called "Communities of Concern," Equity Priority Communities are census tracts that have a significant concentration of underserved populations, such as households with low incomes and people of color. A combination of additional factors helps define these areas. Equity Priority Communities within the Park District Planning Area are shown on Figure 4-2.

Figure 4-2 EBRPD – Equity Priority Communities



Source: Plan Bay Area 2050, map retrieved 6/24/2022

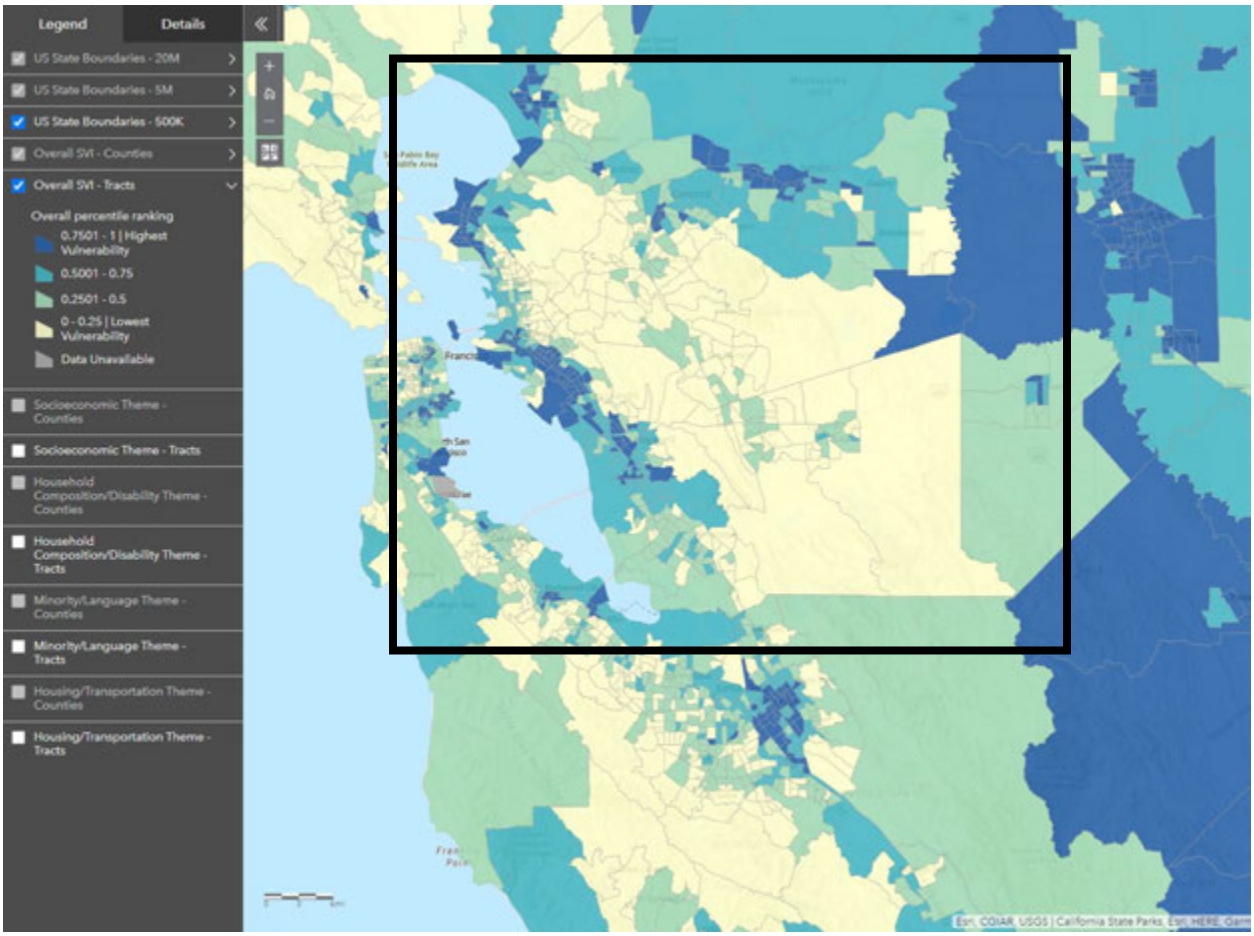
CDC Social Vulnerability Index

Every community must prepare for and respond to hazardous events, whether a natural disaster like a tornado or disease outbreak, or a human-made event such as a harmful chemical spill. A number of factors, including poverty, lack of access to transportation, and crowded housing may weaken a community's ability to prevent human suffering and financial loss in a disaster. These factors are known as social vulnerability.

Social vulnerability refers to the potential negative effects on communities caused by external stresses on human health. Such stresses include natural or human-caused disasters, or disease outbreaks. Reducing social vulnerability can decrease both human suffering and economic loss. CDC Social Vulnerability Index (CDC SVI) uses 15 U.S. census variables to help local officials identify communities that may need support before, during, or after disasters.

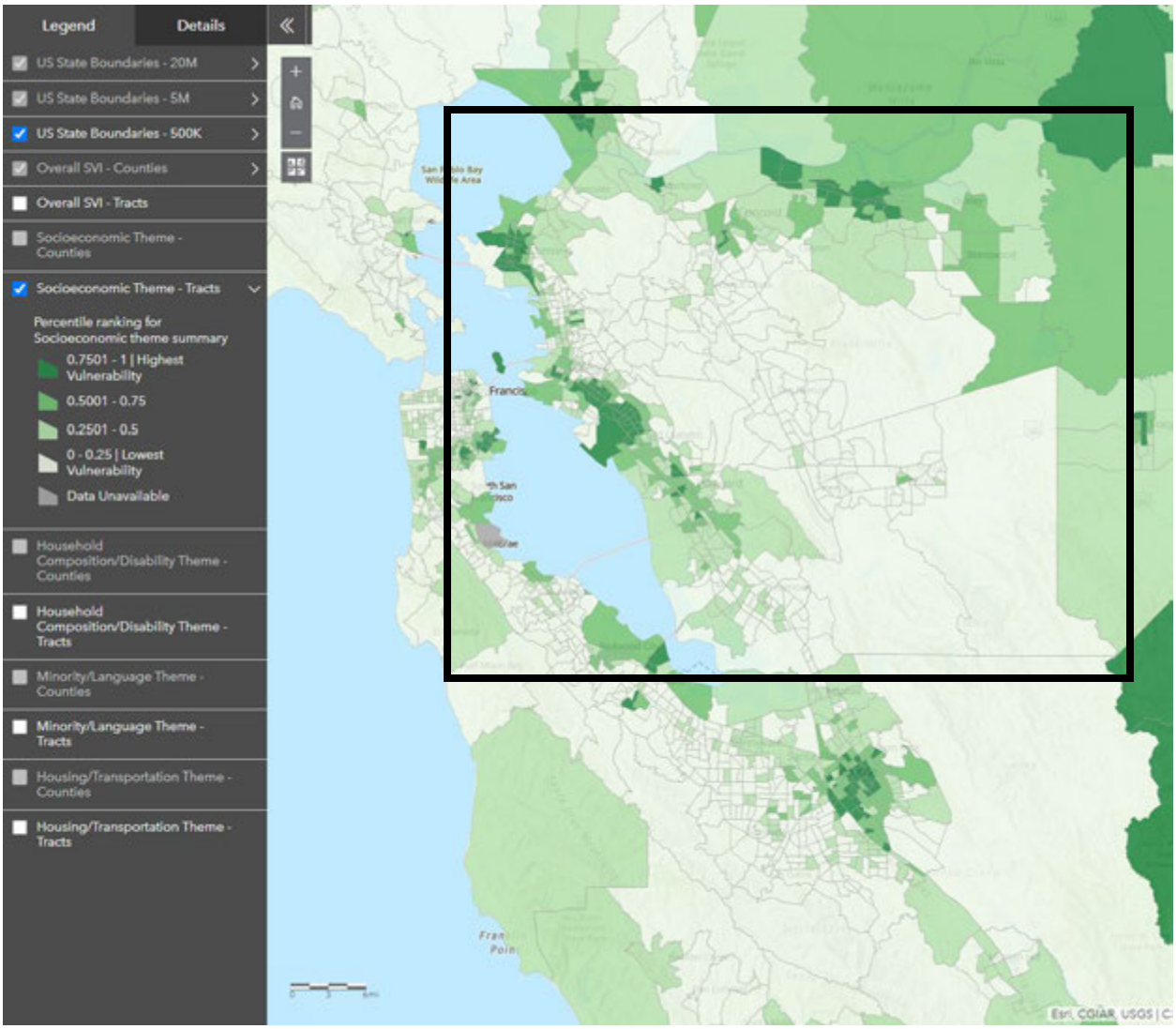
The Agency for Toxic Substances and Disease Registry's (ATSDR) Geospatial Research, Analysis & Services Program (GRASP) created databases to help emergency response planners and public health officials identify and map communities that will most likely need support before, during, and after a hazardous event. CDC SVI uses U.S. Census data to determine the social vulnerability of every census tract. Census tracts are subdivisions of counties for which the Census collects statistical data. The CDC SVI ranks each tract on 15 social factors, including poverty, lack of vehicle access, and crowded housing, and groups them into four related themes. Each tract receives a separate ranking for each of the four themes, as well as an overall ranking. Maps of the four themes are shown in the figure below. The overall SVI map is shown in Figure 4-3; the socioeconomic SVI for the Park District Planning Area is shown in Figure 4-4; the household composition SVI for the Park District is shown in Figure 4-5; the minority and language SVI for the Park District Planning Area is shown in Figure 4-6; and the housing and transportation SVI for the Park District is shown in Figure 4-7.

Figure 4-3 EBRPD – Overall Social Vulnerability



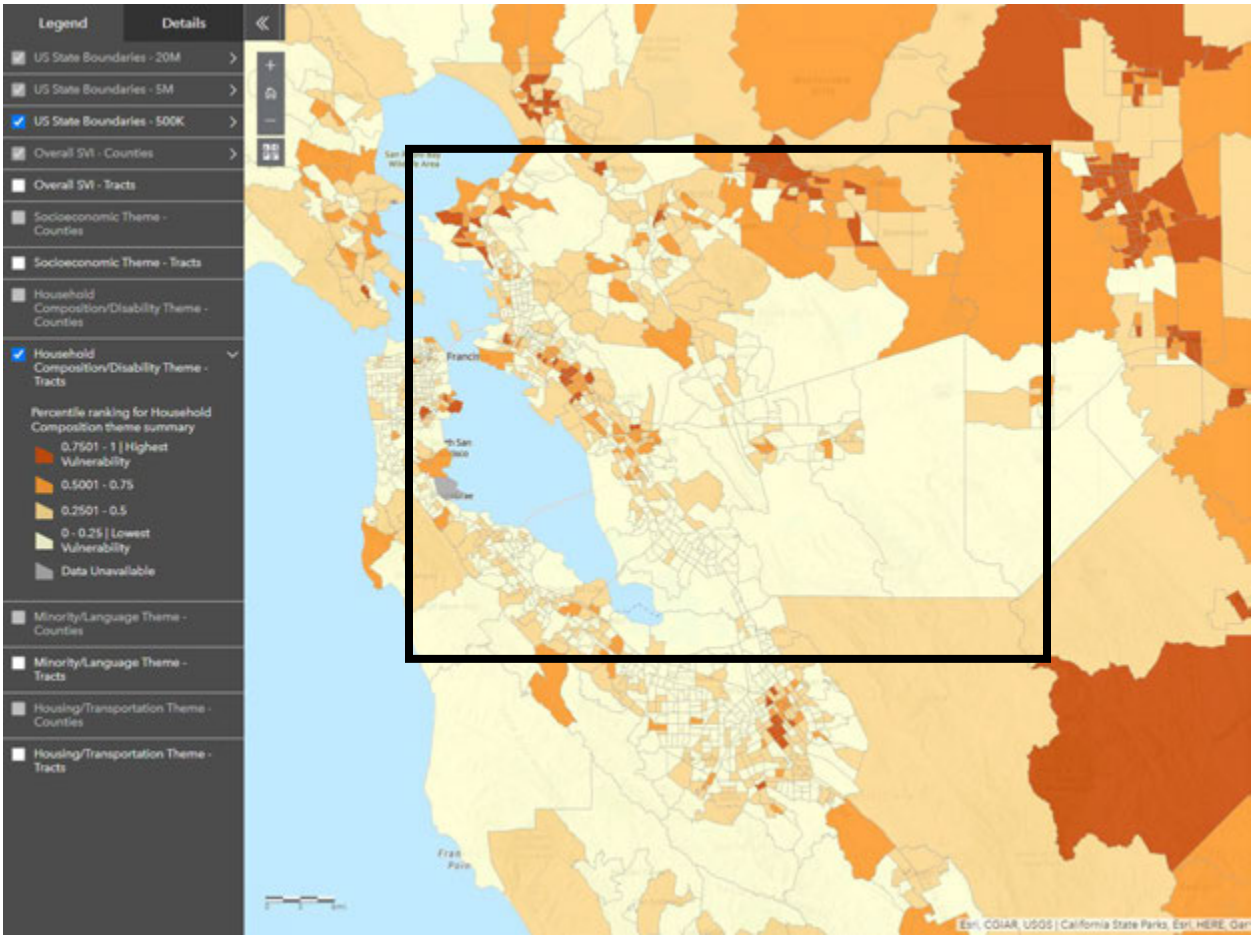
Source: CDC Social Vulnerability Index – map retrieved 5/11/2022

Figure 4-4 EBRPD – Socioeconomic Status Vulnerability



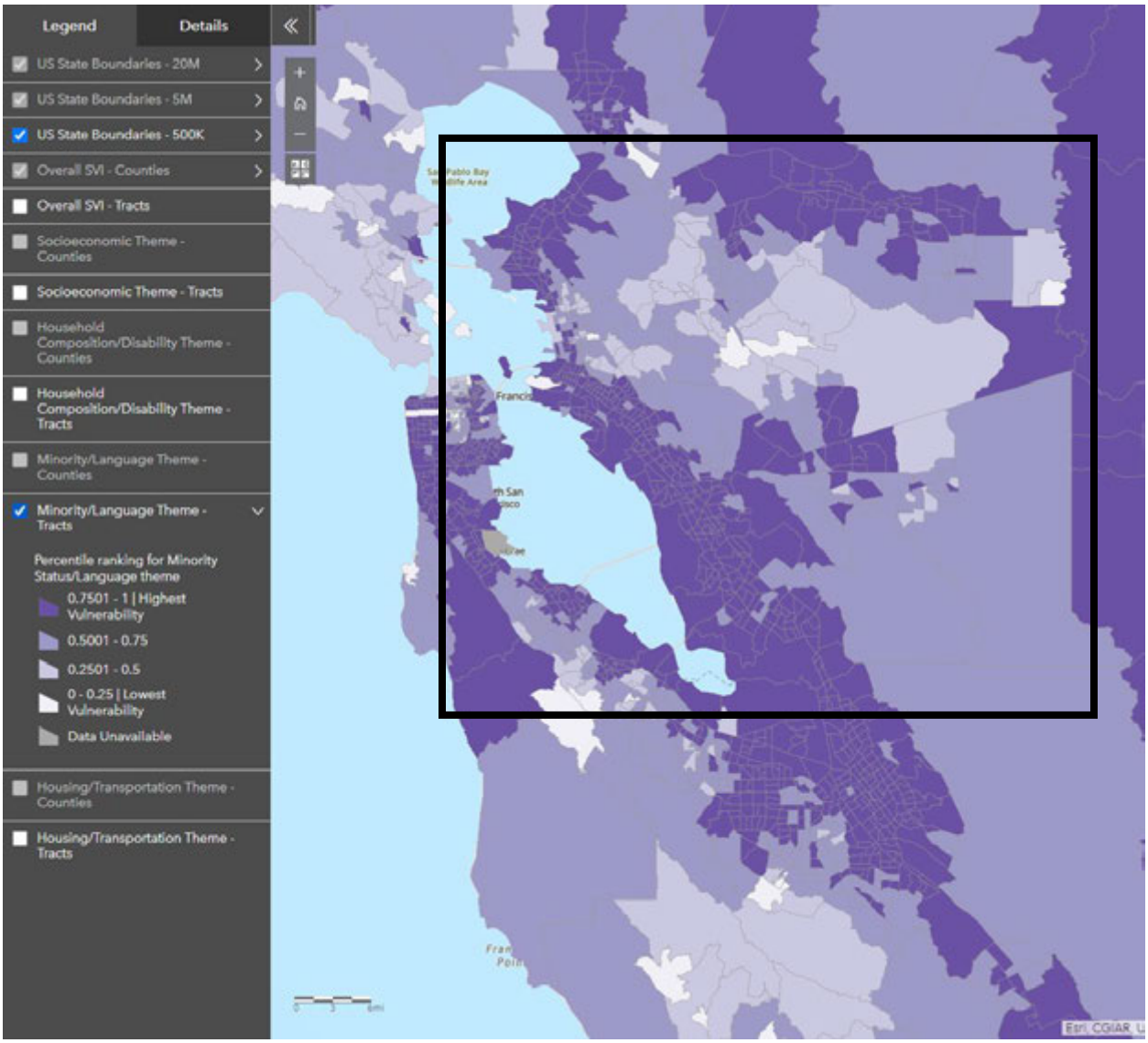
Source: CDC Social Vulnerability Index – map retrieved 5/11/2022

Figure 4-5 EBRPD – Household Composition and Disabilities Social Vulnerability



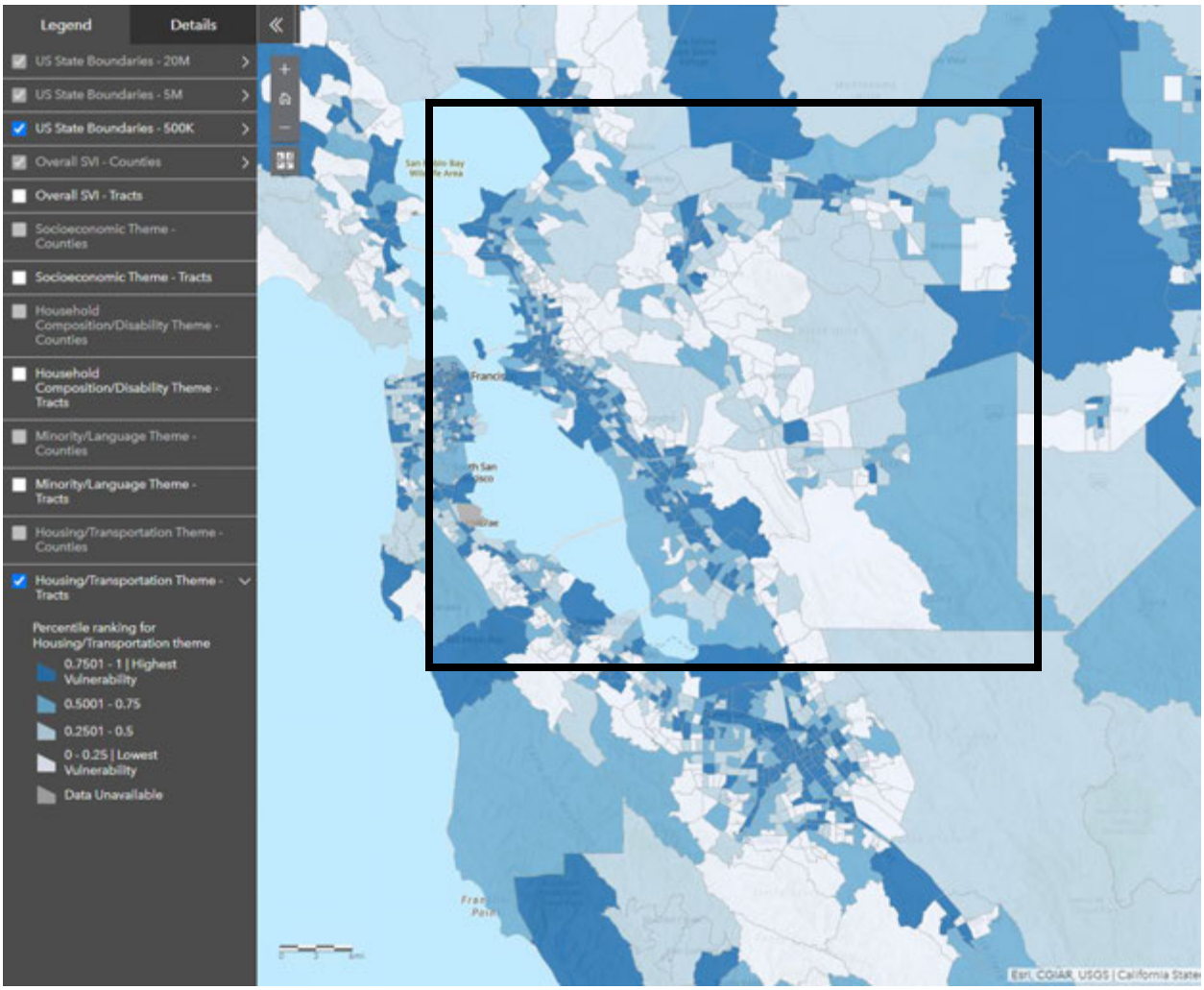
Source: CDC Social Vulnerability Index – map retrieved 5/11/2022

Figure 4-6 EBRPD – Minority/Language Social Vulnerability



Source: CDC Social Vulnerability Index – map retrieved 5/11/2022

Figure 4-7 EBRPD – Housing/Transportation Social Vulnerability

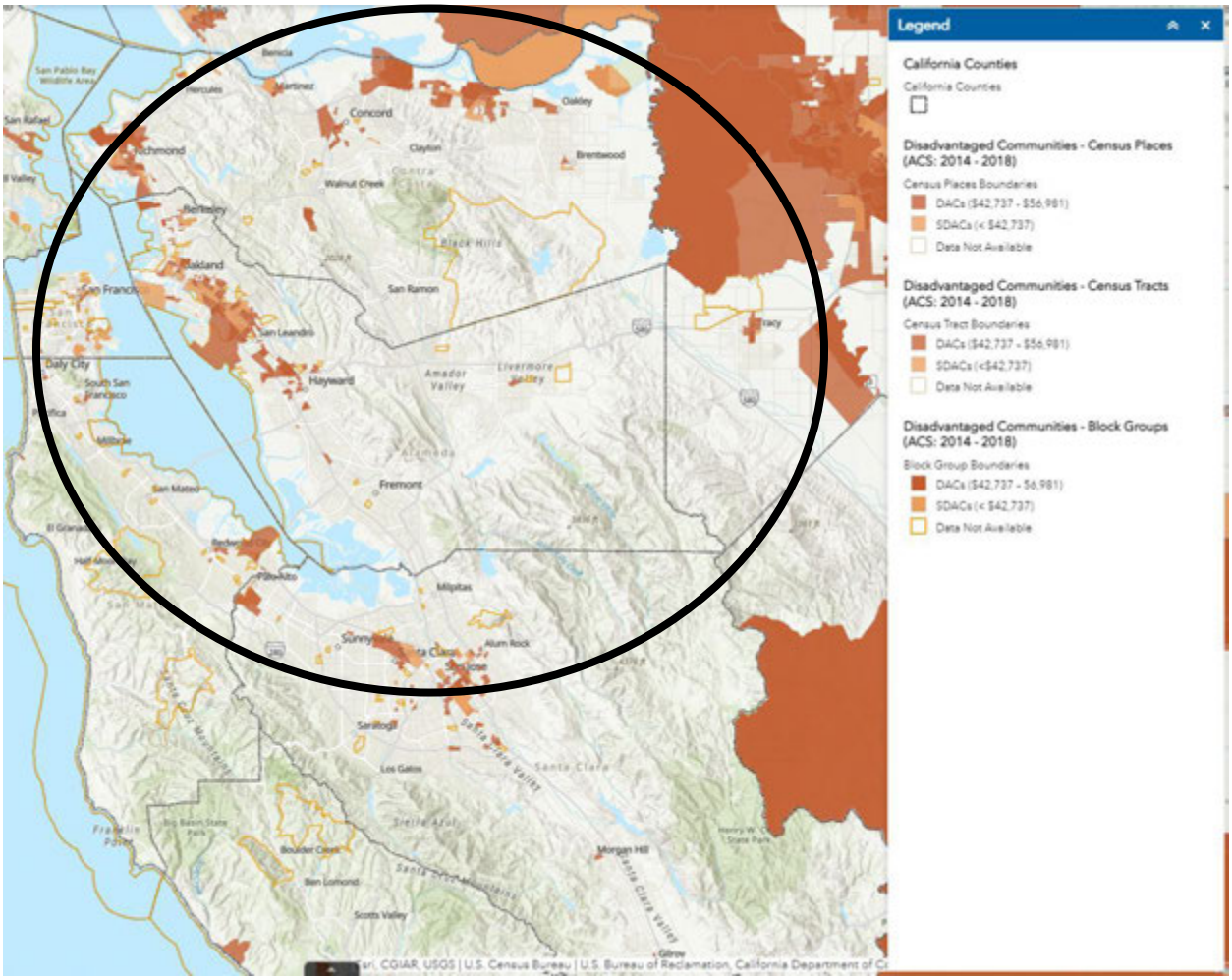


Source: CDC Social Vulnerability Index – map retrieved 5/11/2022

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 the Park District considered disadvantaged are shown in Figure 4-8.

Figure 4-8 EBRPD – Disadvantaged Areas



Source: Cal DWR DAC Mapping Tool – Map Date 5/11/2022

4.2.4. Critical Facilities

Critical facilities commonly include all public and private facilities that a community considers essential for the delivery of vital services and for the protection of the community. They usually include emergency response facilities (fire stations, police stations, rescue squads, and emergency operation centers [EOCs]), custodial facilities (jails and other detention centers, long-term care facilities, hospitals, and other health care facilities), schools, emergency shelters, utilities (water supply, wastewater treatment facilities, and power), communications facilities, and any other assets determined by the community to be of critical importance for the protection of the health and safety of the population.

The EBRPD generally defines critical facilities as those facilities that are critical to the ongoing operations of the Park District. While every park land and asset provides value to the EBRPD and those who use them, certain facilities ensure that the Park District can maintain operations before, during, and following a hazard event.

For purposes of this Plan a critical facility is defined by the EBRPD as:

> ***A structure or other improvement that, because of its function, size, service area, or uniqueness, has the potential to cause serious bodily harm, extensive property damage, or disruption of vital socioeconomic activities if it is destroyed or damaged or if its functionality is impaired.***

EBRPD critical facilities are a subset of the total assets of the Park District. Utilizing the above definition, the Park District reviewed the total EBRPD assets inventory, and determined that the following types of Park District assets should be considered critical facilities:

- Buildings (fire/police stations, administrative buildings, others depending on use and occupancy)
- Dams (Park District Owned)
- Site Electrical Utilities
- Roadways (vehicular bridges)
- Service and Pedestrian Tunnels
- Sanitary Sewer Systems (lift stations, septic disposal systems)
- Tanks
- Water Supply Systems (pumping stations, water tanks, well systems, potable and non-potable water distribution and storage)

Using this definition and mapping from of Park District assets, those critical facilities that fall within the EBRPD Planning Area can be seen in Figure 4-9 and detailed in Table 4-13. More detailed information on critical facilities and the mapped hazards they are at risk to can be found in Appendix G and Appendix H.

Figure 4-9 EBRPD– Critical Facilities Inventory

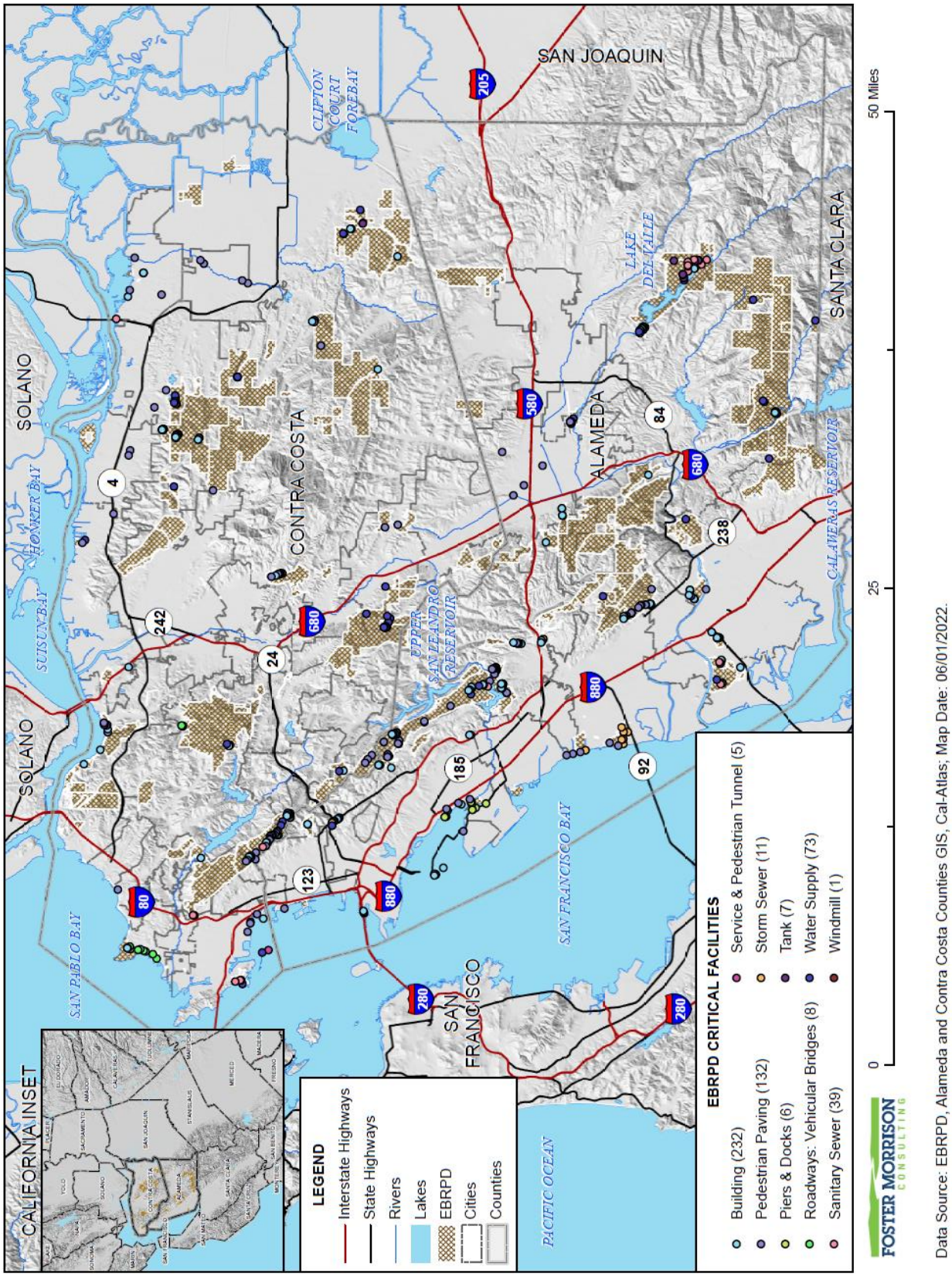


Table 4-13 EBRPD – Critical Facilities Inventory by Park Lands

Park Lands	Asset Type	Asset Use	Asset Count
Alameda County			
Alameda County Trails	Building	Office	1
		Utility Plant	2
	Pedestrian Paving: Pedestrian Bridges	(blank)	5
	Alameda County Trails Total		**8**
Anthony Chabot	Building	Guard house / Guard Station	1
		Maintenance Shops	1
		Office	3
		Site Utility	1
	Pedestrian Paving: Pedestrian Bridges	(blank)	4
	Sanitary Sewer	(blank)	1
	Sanitary Sewer: Lift Stations	(blank)	2
	Sanitary Sewer: Septic Disposal Systems	(blank)	1
	Water Supply: Pumping Station	(blank)	1
	Water Supply: Storage Tanks	(blank)	4
	Anthony Chabot Total		**19**
Ardenwood	Building	Maintenance Shops	3
		Office	1
		Specialty Cultural (Museum, Library)	2
	Ardenwood Total		**6**
Camp Arroyo	Building	Dining / Cafeteria (with Kitchen)	1
		Housing - Cabins	9
		Maintenance Shops	1
		Medical - Clinic	1
		Office	3
		Recreation	3
		Restrooms	2
	Sanitary Sewer: Lift Stations	(blank)	1
	Water Supply: Potable Water Distribution & Storage	(blank)	1
	Water Supply: Storage Tanks	(blank)	1
	Camp Arroyo Total		**23**
Claremont Canyon	Building	Maintenance Shops	1
		Office	1
	Claremont Canyon Total		**2**

Park Lands	Asset Type	Asset Use	Asset Count
Coyote Hills	Building	Bathhouse	1
		Office	4
		Utility Plant	1
	Sanitary Sewer: Lift Stations	(blank)	2
	Water Supply: Non-Potable Water Distribution & Storage	(blank)	2
	Water Supply: Pumping Station	(blank)	1
	Water Supply: Well Systems	(blank)	1
	Coyote Hills Total		**12**
Crown Beach	Building	Office	1
		Retail	4
		Specialty Cultural (Museum, Library)	1
	Pedestrian Paving: Pedestrian Bridges	(blank)	1
	Sanitary Sewer: Lift Stations	(blank)	1
	Crown Beach Total		**8**
Cull Canyon	Building	Aquatic Facility	2
		Office	1
		Site Utility	2
	Pedestrian Paving: Pedestrian Bridges	(blank)	1
	Sanitary Sewer: Lift Stations	(blank)	1
	Cull Canyon Total		**7**
Del Valle	Building	Maintenance Shops	2
		Office	1
		Specialty Cultural (Museum, Library)	1
		Storage - Fuel and Haz. Materials	1
		Utility Plant	2
	Pedestrian Paving: Pedestrian Bridges	(blank)	1
	Sanitary Sewer: Drain Fields	(blank)	1
	Sanitary Sewer: Lift Stations	(blank)	6
	Sanitary Sewer: Septic Disposal Systems	(blank)	1
	Tank	(blank)	5
	Water Supply: Non-Potable Water Distribution & Storage	(blank)	1
	Water Supply: Pumping Station	(blank)	1
	Del Valle Total		**23**
Don Castro	Building	Guard house / Guard Station	1

Park Lands	Asset Type	Asset Use	Asset Count
		Maintenance Shops	1
	Sanitary Sewer: Lift Stations	(blank)	2
	Don Castro Total		**4**
Garin/Dry Creek Pioneer	Building	Maintenance Shops	1
		Office	1
		Utility Plant	2
	Pedestrian Paving: Pedestrian Bridges	(blank)	15
	Pedestrian Paving: Pedestrian Bridges Total		15
	Sanitary Sewer: Lift Stations	(blank)	1
	Water Supply	(blank)	1
	Water Supply: Pumping Station	(blank)	1
	Water Supply: Storage Tanks	(blank)	2
	Garin/Dry Creek Pioneer Total		**24**
Hayward Shoreline	Pedestrian Paving: Pedestrian Bridges	(blank)	6
	Hayward Shoreline Total		**14**
Judge John Sutter	Building	Maintenance Shops	1
		Multipurpose Use	1
		Site Utility	1
	Judge John Sutter Total		**3**
Lake Chabot	Building	Maintenance Shops	12
		Multipurpose Use	2
		Office	8
	Pedestrian Paving: Pedestrian Bridges	(blank)	24
	Sanitary Sewer: Lift Stations	(blank)	2
	Water Supply: Pumping Station	(blank)	2
	Water Supply: Storage Tanks	(blank)	1
	Lake Chabot Total		**51**
Martin Luther King, Jr.	Building	Office	2
		Recreation	2
	Pedestrian Paving: Pedestrian Bridges	(blank)	6
	Piers & Docks	(blank)	6
	Martin Luther King, Jr. Total		**16**
McLaughlin Eastshore	Pedestrian Paving: Pedestrian Bridges	(blank)	1
	McLaughlin Eastshore Total		**1**
Mission Peak	Water Supply: Potable Water Distribution & Storage	(blank)	1
	Mission Peak Total		**1**

Park Lands	Asset Type	Asset Use	Asset Count
Peralta Oaks	Building	Office	1
	Peralta Oaks Total		**1**
Peralta Oaks North	Building	Office	1
	Peralta Oaks North Total		**1**
Pleasanton Ridge	Building	Housing - Single Family	6
		Office	1
	Pleasanton Ridge Total		**7**
Quarry Lakes	Building	Guard house / Guard Station	1
		Maintenance Shops	1
		Office	1
	Water Supply: Non-Potable Water Distribution & Storage	(blank)	1
	Quarry Lakes Total		**4**
Reinhardt Redwood	Building	Assembly (Auditorium, Theater)	1
		Fire/Police Station	1
		Guard house / Guard Station	1
		Maintenance Shops	1
		Office	3
		Site Utility	1
		Utility Plant	1
	Pedestrian Paving: Pedestrian Bridges	(blank)	8
	Water Supply	(blank)	1
	Water Supply: Potable Water Distribution & Storage	(blank)	1
	Reinhardt Redwood Total		**19**
Roberts	Building	Guard house / Guard Station	2
		Maintenance Shops	1
		Office	1
	Water Supply: Potable Water Distribution & Storage	(blank)	1
	Roberts Total		**5**
Shadow Cliffs	Building	Guard house / Guard Station	1
		Maintenance Shops	1
		Office	2
	Pedestrian Paving: Pedestrian Bridges	(blank)	1
	Water Supply: Potable Water Distribution & Storage	(blank)	1
	Water Supply: Pumping Station	(blank)	1

Park Lands	Asset Type	Asset Use	Asset Count
	Water Supply: Well Systems	(blank)	1
	Shadow Cliffs Total		**8**
Sunol / Ohlone Wilderness	Building	Office	3
		Specialty Cultural (Museum, Library)	1
	Pedestrian Paving: Pedestrian Bridges	(blank)	1
	Water Supply	(blank)	2
	Water Supply: Potable Water Distribution & Storage	(blank)	1
	Water Supply: Storage Tanks	(blank)	1
	Windmill	(blank)	1
	Sunol / Ohlone Wilderness Total		**10**
Temescal	Building	Guard house / Guard Station	3
		Office	2
		Pump Station	1
	Pedestrian Paving: Pedestrian Bridges	(blank)	2
	Sanitary Sewer: Lift Stations	(blank)	3
	Service & Pedestrian Tunnel	(blank)	1
	Storm Sewer	(blank)	1
	Water Supply: Pumping Station	(blank)	1
	Temescal Total		**14**
Vargas Plateau	Water Supply: Potable Water Distribution & Storage	(blank)	1
	Vargas Plateau Total		**1**
Alameda County Total			**292**
Contra Costa County			
Antioch/Oakley	Sanitary Sewer: Lift Stations	(blank)	1
	Antioch/Oakley Total		**1**
Bay Point	Pedestrian Paving: Pedestrian Bridges	(blank)	1
	Water Supply: Well Systems	(blank)	1
	Bay Point Total		**2**
Big Break	Building	Recreation	1
	Big Break Total		**1**
Black Diamond Mines	Building	Maintenance Shops	7
		Office	4
		Pump Station	1
		Recreation	18
		Site Utility	1

Park Lands	Asset Type	Asset Use	Asset Count
		Storage - Fuel and Haz. Materials	1
	Water Supply: Potable Water Distribution & Storage	(blank)	2
	Water Supply: Storage Tanks	(blank)	2
	Water Supply: Well Systems	(blank)	1
	Black Diamond Mines Total		**37**
Briones	Building	Maintenance Shops	1
		Office	1
		Site Utility	1
	Roadways: Vehicular Bridges	(blank)	1
	Water Supply: Potable Water Distribution & Storage	(blank)	2
	Water Supply: Well Systems	(blank)	2
	Briones Total		**8**
Brooks Island	Service & Pedestrian Tunnel	(blank)	1
	Water Supply: Potable Water Distribution & Storage	(blank)	1
	Brooks Island Total		**2**
Byron Vernal Pools	Water Supply: Well Systems	(blank)	1
	Byron Vernal Pools Total		**1**
Carquinez Strait	Building	Office	2
	Pedestrian Paving: Pedestrian Bridges	(blank)	1
	Carquinez Strait Total		**3**
Clayton Ranch	Pedestrian Paving: Pedestrian Bridges	(blank)	1
	Clayton Ranch Total		**1**
Contra Costa Trails	Building	Maintenance Shops	1
	Contra Costa Trails Total		**1**
Contra Loma	Building	Office	2
	Sanitary Sewer: Lift Stations	(blank)	1
	Water Supply: Non-Potable Water Distribution & Storage	(blank)	4
	Contra Loma Total		**7**
Deer Valley	Water Supply: Potable Water Distribution & Storage	(blank)	2
	Water Supply: Well Systems	(blank)	1
	Deer Valley Total		**3**
Diablo Foothills / Castle Rock	Building	Bathhouse	1
		Maintenance Shops	2

Park Lands	Asset Type	Asset Use	Asset Count
		Office	1
		Recreation	1
		Site Utility	1
	Pedestrian Paving: Pedestrian Bridges	(blank)	3
	Water Supply: Non-Potable Water Distribution & Storage	(blank)	1
	Diablo Foothills / Castle Rock Total		**10**
East County Trails	Building	Maintenance Shops	1
		Office	1
	Pedestrian Paving: Pedestrian Bridges	(blank)	12
	Sanitary Sewer: Lift Stations	(blank)	1
	East County Trails Total		**15**
Kennedy Grove	Building	Office	1
	Kennedy Grove Total		**1**
Las Trampas	Building	Maintenance Shops	1
		Office	3
		Site Utility	1
	Pedestrian Paving: Pedestrian Bridges	(blank)	1
	Sanitary Sewer: Lift Stations	(blank)	1
	Water Supply: Potable Water Distribution & Storage	(blank)	1
	Water Supply: Pumping Station	(blank)	2
	Water Supply: Storage Tanks	(blank)	5
	Las Trampas Total		**15**
McLaughlin Eastshore	Pedestrian Paving: Pedestrian Bridges	(blank)	3
	McLaughlin Eastshore Total		**3**
Miller/Knox	Building	Office	1
	Sanitary Sewer: Lift Stations	(blank)	3
	Water Supply: Pumping Station	(blank)	1
	Miller/Knox Total		**5**
Morgan Territory	Building	Maintenance Shops	1
	Morgan Territory Total		**1**
Point Isabel	Building	Office	1
	Pedestrian Paving: Pedestrian Bridges	(blank)	1
	Point Isabel Total		**2**
Point Pinole	Building	Guard house / Guard Station	2
		Maintenance Shops	2

Park Lands	Asset Type	Asset Use	Asset Count
		Office	1
	Pedestrian Paving: Pedestrian Bridges	(blank)	1
	Roadways: Vehicular Bridges	(blank)	6
	Sanitary Sewer: Lift Stations	(blank)	1
	Point Pinole Total		**13**
Radke Martinez	Building	Office	1
	Pedestrian Paving: Pedestrian Bridges	(blank)	6
	Radke Martinez Total		**7**
Reinhardt Redwood	Pedestrian Paving: Pedestrian Bridges	(blank)	3
	Reinhardt Redwood Total		**3**
Round Valley	Building	Utility Plant	1
	Pedestrian Paving: Pedestrian Bridges	(blank)	2
	Water Supply: Well Systems	(blank)	2
	Round Valley Total		**5**
Sibley	Building	Pump Station	1
	Water Supply: Storage Tanks	(blank)	1
	Sibley Total		**2**
Sycamore Valley	Pedestrian Paving: Pedestrian Bridges	(blank)	2
	Sycamore Valley Total		**2**
Tilden	Building	Animal Facility	3
		Fire/Police Station	1
		Maintenance Shops	10
		Multipurpose Use	5
		Pump Station	1
		Recreation	5
		Utility Plant	1
	Pedestrian Paving: Pedestrian Bridges	(blank)	19
	Sanitary Sewer	(blank)	1
	Sanitary Sewer: Lift Stations	(blank)	4
	Service & Pedestrian Tunnel	(blank)	3
	Storm Sewer	(blank)	2
	Water Supply: Pumping Station	(blank)	2
	Water Supply: Storage Tanks	(blank)	3
	Tilden Total		**60**
Vasco Caves	Building	Pump Station	1
	Vasco Caves Total		**1**
Vasco Hills	Building	Maintenance Shops	1

Park Lands	Asset Type	Asset Use	Asset Count
		Office	1
		Pump Station	1
	Tank	(blank)	2
	Water Supply: Well Systems	(blank)	2
	Vasco Hills Total		7
Wildcat Canyon	Building	Multipurpose Use	1
	Roadways: Vehicular Bridges	(blank)	1
	Sanitary Sewer: Lift Stations	(blank)	1
	Wildcat Canyon Total		**3**
Contra Costa County Total			**222**
Grand Total			**514**

Source: EBRPD GIS

4.2.5. Natural, Historical, and Cultural Resources

Assessing the vulnerability of the EBRPD 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

The EBRPD is a steward of the natural resources they have been entrusted with. According to the 2013 EBRPD Master Plan, the Park District's goal is to preserve and provide access to the best remaining natural open lands in the East Bay through a connected system of regional park lands that preserve water resources, native plants, wildlife habitat, traces of the history of the human occupation and use of the area. The Park District area contains a variety of natural resources. The sections below discuss key natural resources that fall within the EBRPD boundary that are potentially at risk to a hazard event.

Wetlands and their 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.

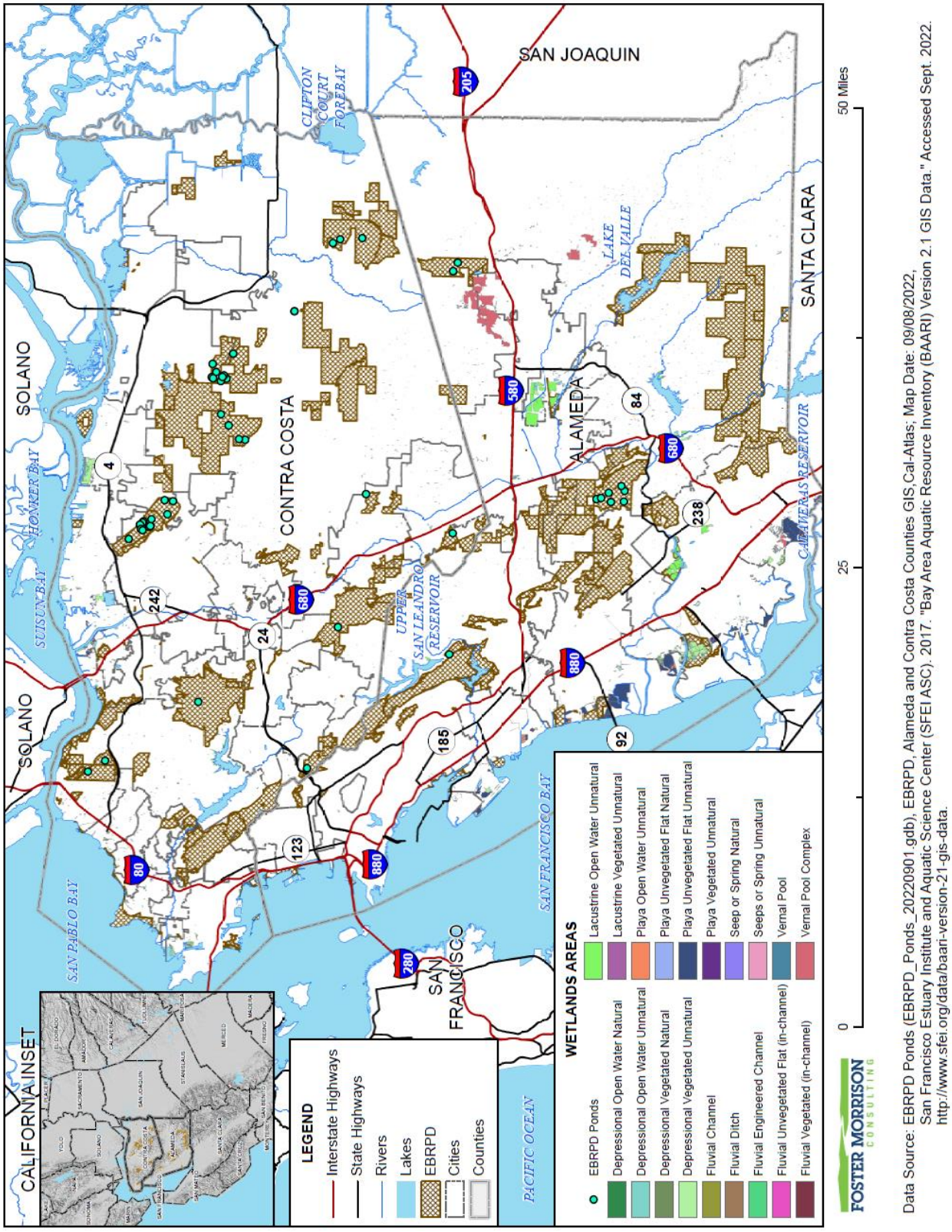
Wetlands, and other riparian and sensitive areas, provide habitat for insects and other invertebrates that are critical food sources to a variety of wildlife species, particularly birds. There are species that depend on these areas during all parts of their lifecycle for food, overwintering, and reproductive 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 Park District.

The EBRPD provided mapped data of their wetland areas located within the Park District. Wetlands in the Park District are shown in Figure 4-10.

Figure 4-10 EBRPD – Wetland Areas



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 Park District. 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 the Park District. The California Natural Diversity Database was searched for listed species. The Park District contained 237 species in Alameda County and 217 species in Contra Costa County. These species are listed in Table 4-14 and Table 4-15, respectively. Additional specific information for the Park District, organized by County, is included in Appendix E.

Table 4-14 EBRPD – Threatened and Endangered Species in Alameda County

Type	Number
Animals - Amphibians	3
Animals - Birds	54
Animals – Crustaceans	6
Animals - Fish	18
Animals - Insects	21
Animals - Mammals	17
Animals – Mollusks	3
Animals – Reptiles	7
Community – Terrestrial	12
Plants – Bryophytes	3
Plants – Vascular	93

Source: California Natural Diversity Database

Table 4-15 EBRPD – Threatened and Endangered Species in Contra Costa County

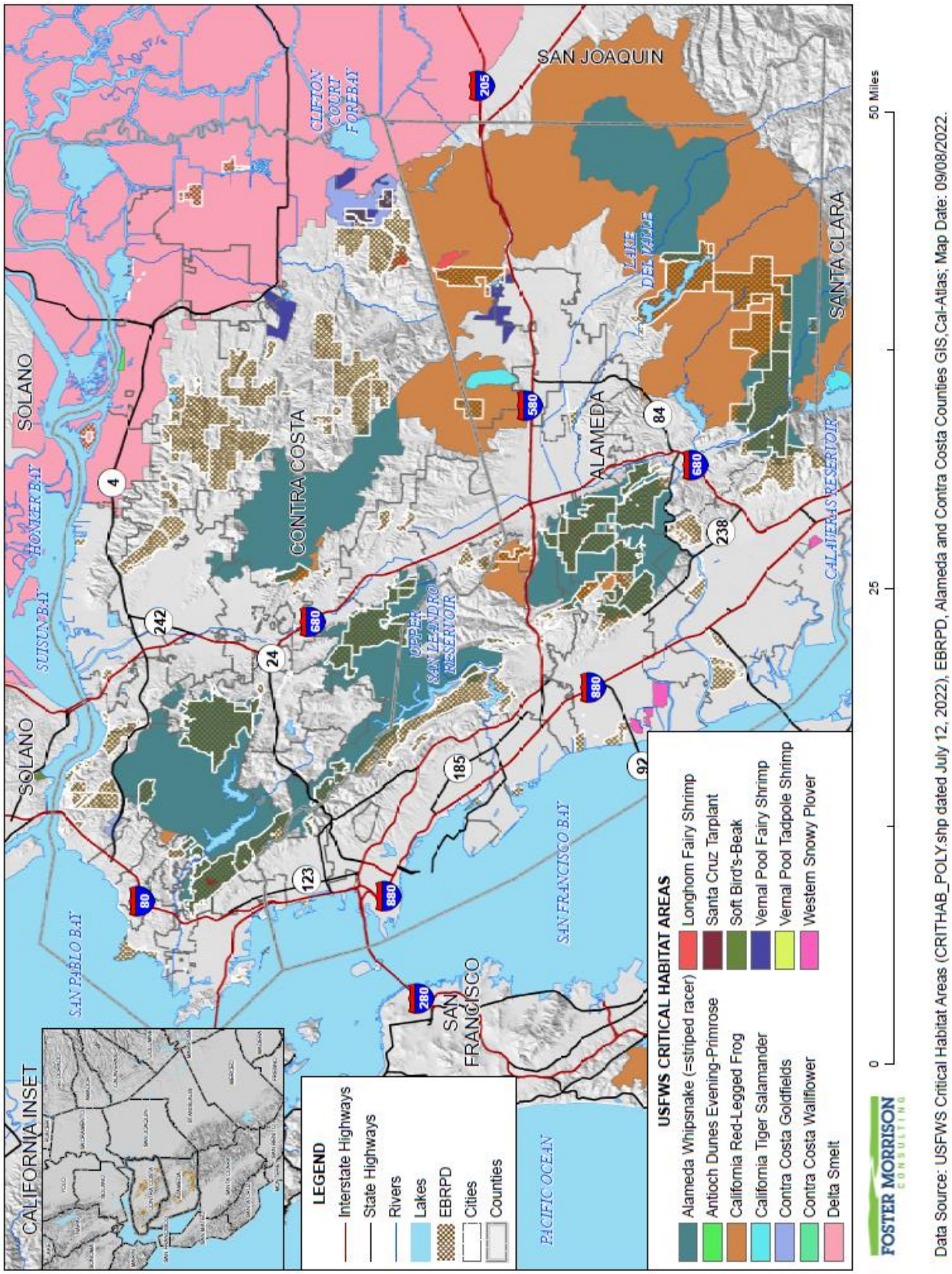
Type	Number
Animals - Amphibians	3
Animals - Arachnids	2
Animals - Birds	53
Animals – Crustaceans	6
Animals - Fish	18
Animals - Insects	9
Animals - Mammals	18
Animals – Mollusks	5

Type	Number
Animals – Reptiles	6
Community – Terrestrial	7
Plants – Bryophytes	1
Plants – Vascular	88

Source: California Natural Diversity Database

Additionally, EBRPD contains critical habitat areas for certain species. These can be seen on Figure 4-11.

Figure 4-11 EBRPD – Critical Habitat Areas



Historical and Cultural Resources

According to the 2013 EBRPD Master Plan, humans have occupied the lands of the East Bay area for more than 13,000 years, making the land managed by the Park District rich and diverse in both cultural and historical content. To inventory these resources, information was collected from two primary sources: The California Department of Parks and Recreation Office of Historic Preservation (OHP) and the EBRPD 2017 LHMP.

OHP Historical Resources

The California 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.

Based on these sources, there is one historic property in the Park District. This is shown in Table 4-16.

Table 4-16 EBRPD – Historical Resources

Resource Name (Plaque Number)	National Register	State Landmark	Point of Interest	Date Listed	City/ County
Black Diamond Mines		X		10/2/1991	Antioch (Contra Costa)

Source: California Department of Parks and Recreation Office of Historic Preservation, http://ohp.parks.ca.gov/

It should be noted that these lists may not be complete, as they may not include those currently in the nomination process and not yet listed. Additionally, as defined by the California Environmental Quality Act (CEQA) and 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 CEQA and NEPA. Structural mitigation projects are considered alterations for the purpose of this regulation.

2017 LHMP Historical Resources

The Park District noted the following cultural and historical resources (sourced from the previous EBRPD LHMP). The Park District owns and operates a number of special facilities that offer unique recreational opportunities, appeal to diverse interests, and are a treasured part of the region. These special facilities include, for example, equestrian centers, a boating center, meeting and conference areas, a botanical garden, golf courses, archery and marksmanship ranges, a hang gliding area, model boat and train areas, a historic merry-go-round, and two historic farms. The lands managed by the EBRPD have a rich history and diverse cultural background. Cultural resources include archaeological, historical, and scientifically valuable sites, areas, and objects. The following parks contain significant cultural resources:

- **Coyote Hills Regional Park** – An original Ohlone shellmound and reconstructed village site. Interpretive exhibits of original native inhabitants and their way of life, including tule reed boats, clothing, baskets, and tools. Site of the annual gathering of the Ohlone people.
- **Point Pinole Regional Shoreline** – Site of Ohlone coastal villages; later part of the Rancho San Pablo (Francisco Maria Castro). Between 1892 and 1960, Point Pinole was the town site of the Giant Powder Company, which manufactured dynamite there.
- **Black Diamond Mines Regional Preserve** – Located in the territories of the Chupcan, Volvon, and Ompin (Bay Miwok) tribes. From 1850 to1900, this was the site of the largest coal mining operation in California, and the five towns where miners lived. The Rose Hill cemetery is the final resting place of inhabitants of these towns, many of whom died in epidemics and mining accidents. Underground visitor center in the Hazel Atlas Mine, where sand was mined for the manufacture of glass from the 1920s to1940s.
- **Ardenwood Historic Farm** – Site of the original Patterson Ranch—one of the largest working farms in Alameda County in the late 19th century. The original Patterson house and outbuildings with typical 19th century farm equipment are on display, along with farm animals and a horse-drawn railway.
- **Vasco Caves Regional Preserve** – The area around Vasco Caves was an important cultural crossroads for trade and ceremony for the Ohlone, Bay Miwok, and Yokut peoples. The cultural sites of Vasco Caves Regional Preserve contain Indian rock art, part of a complex that reaches back more than 10,000 years.

4.2.6. Growth and Development Trends

As part of the LHMP development process, changes in growth and development, both past and future, are evaluated and examined in the context of the overall Park District and with respect to hazard-prone areas, and how the changes in growth and development affects vulnerability of the Park District to future disasters. Information from the EBRPD and other sources as detailed below form the basis of this discussion.

EBRPD Staff and Seasonal Workers

EBRPD has seen an increase in staff since the 2017 LHMP:

- 2016 staffing levels
  - ✓ 689 permanent staff
  - ✓ 93 Seasonal/Part time staff
  - ✓ 782 Total

- 2022 staffing levels
  - ✓ 827 permanent staff
  - ✓ 98 Seasonal/Part time staff
  - ✓ 925 Total

This is an increase of 138 in permanent staff and 5 in seasonal/part time staff for a total increase of 143 for all Park District staff since the 2017 LHMP.

Visitors to EBRPD

Estimates of total visitation are derived from a recent survey that indicates an estimated 25 million visits annually to EBRPD lands and facilities. This information is difficult to measure with so many visitors recreating throughout Park District lands, and this general estimate of park usage has been the same since the 2017 LHMP. While the EBRPD indicated that they saw a 2-3 fold increase in visitors to the Park District during the initial year of the Pandemic with the increase in business closures and people working from home, there is no metric in place to truly calculate this number or whether it was sustained over time.

Surrounding Communities

As the East Bay's population continues to grow, the EBRPD has noticed a corresponding increase in park visitors. According to the US Census, Alameda County's population increased 10.2% between 2010 and 2020 (based on the latest Census Data) and Contra Costa County's population increased 10.0% during the same time period.

The ethnic composition of the Bay Area also continues to change. International migration has played a significant role in the growing diversity of the area. According to the Association of Bay Area Government's (ABAG) report, over 32% of Alameda County residents were foreign born, as were over 23% of Contra Costa residents.

With the growing and changing populations of the EBRPD's service area, annual park usage is expected to increase accordingly. The EBRPD has been monitoring these changes over time and considers them in future planning projects, including the 2013 update of their Master Plan. This includes Park District efforts to meet the needs of growing and evolving populations, and in particular to be inclusive of underserved residents, including marginalized communities, people of color, persons with disabilities, and elderly park visitors.

Development since 2017

DMA guidance requires communities to provide information on actual growth and development since the last LHMP, which for the EBRPD was 2017. Throughout their Planning Area, the EBRPD continues to acquire and develop new lands and to develop and build out their existing lands as part of their mission. The Park District has added additional lands, trails, and infrastructure since 2017. The new acquisitions identified in their 2021 Park and Trails Statistics are included in Table 4-17 (for parks) and Table 4-18 (for trails). As shown, the Park District added 6,442.09 acres of park lands between 2017 and 2021 with a fiscal outlay of $23,990,299. The Park District also added 337.28 acres of trails between 2017 and 2021, with a fiscal outlay of $25,000.

The specific lands acquired and locations of development projects were not available in a format that allowed for a hazard specific analysis of these areas. However, it can be assumed that the new development areas are similarly affected by the hazards associated with the Park District lands where these acquisitions and development projects occurred. As such, the development occurring since 2017 has likely resulted in a slight increase in vulnerability of the Park District to future hazard events. It is also important to note that all new development is conducted in accordance with existing development codes which likely mitigates, to some extent, any increase in overall vulnerability to the Park District.

Table 4-17 EBRPD – Park Acquisitions by Year

Park Land	Acreage
2017	
Bay Point	0.01
Black Diamond Mines	191.45
Black Diamond Mines	0.58
Byron Vernal Pools	80
Byron Vernal Pools	320
Crown Beach	1.19
Deer Valley	0.01
Deer Valley	40.00
Garin	5.24
Leona Canyon	0.71
Pleasanton Ridge	4.00
Redwood	.03
Sutter, Judge John	7.30

Park Land	Acreage
2017 Total	**2,667.52**
2018	
Anthony Chabot	0.44
Deer Valley	71.99
Deer Valley	230.00
Doolan Canyon	160.00
Las Trampas	96.09
Pleasanton Ridge	0.05
Round Valley	9.24
Round Valley	271.91
2018 Total	**839.72**
2019	
Bay Point	1.06
Deer Valley	120.09
Las Trampas	7.80
Leona Canyon	0.50
Mclaughlin Eastshore	2.88
Redwood	1.83
Thurgood Marshall	2,216.00
Vasco Hills	0.0
2019 Total	**2,350.16**
2020	
Bishop Ranch	176.03
Black Diamond Mines	5.38
Garin – Chouinard Winery	10.01
Las Trampas	186.47
Mission Peak	0.00
Morgan Territory	3.25
Sutter, Judge Jon	5.10
2020 Total	**386.24**
2021	
Byron Vernal Pools	80.00
Carquinez Strait	0.00
Coyote Hills	38.00
Deer Valley	80.45
2021 Totals	**198.45**

Park Land	Acreage
Grand Total 2017-2021	**6,442.09**

Source: 2021 EBRPD Park and Trail Statistics

Table 4-18 EBRPD – Trail Acquisitions by Year

Grantor	Acreage
2017	
–	–
2017 Total	**0.00**
2018	
SF Bay Trail	1.7
SF Bay Trail	36.73
2018 Total	**38.43**
2019	
Bay Area Ridge Trail	281.30
SF Bay Trail (Point Molate)	0.4
SF Bay Trail (Point Pinole-Carquinez)	4.26
2019 Total	**285.60**
2020	
Tassajara Creek Trail	13.28
2020 Total	**13.25**
2021	
–	–
2021 Totals	**0.00**
Grand Total 2017-2021	**337.28**

Source: 2021 EBRPD Park and Trail Statistics

Future Development

EBRPD is working on many future development projects, including new acquisitions and build outs of existing park lands. Most new acquisitions are confidential until after an acquisition occurs. Due to the confidential nature of this process, Measure WW reflects the best available (public) data for the Park District describing new acquisitions, build outs and other EBRPD development and redevelopment projects.

Measure WW was approved by voters in Alameda and Contra Costa counties in November 2008. The measure extended Measure AA, approved in 1988, to enable the Park District to meet the increasing demand of protecting open space for recreation and wildlife habitat. It also made funding available directly to cities and special park districts for high priority community park projects.

Measure WW provides $500 million in bonds to expand regional parks and trails, and to preserve and protect open space for recreation and wildlife habitat. Of the $500 million from Measure WW, $125 million (25%) is allocated on a per-capita basis for grants to 46 cities, communities, local park and recreation districts, county service areas, and the Oakland Zoo to address local park and recreation needs. Projects in Measure WW are shown on Figure 4-12 and detailed in Table 4-19. These projects are in various stages of implementation. Some of these are complete or mostly complete, while others are still in early stages of development.

Figure 4-12 EBRPD – Measure WW Future Development and Project Areas

Source: EBRPD

Table 4-19 EBRPD – Future Development and Project Areas

Map #	EBRPD Park Lands	Description of Development Activities
1*	Alameda Point	$6.5 million to protect wildlife habitat, create regional recreation opportunities on San Francisco Bay, and extend the Bay Trail around Alameda Point in cooperation with the City of Alameda. Restore shoreline areas, including beach and dune grass habitat
2**	Alamo Canal Trail	$630,000 to complete the key bicycle, pedestrian, and equestrian trail connection under the 580-680 interchange, creating the first trail connection linking the communities of Dublin and Pleasanton.
3	Anthony Chabot	$2 million to acquire the last remaining open space to establish final park boundaries to buffer sensitive wildlife habitats and create new access for all users.
4	Ardenwood	$2.2 million to improve facilities and increase opportunities for school classes and families to experience early California life at the historic Ardenwood Farm.
5*	Bay Point	$1.6 million to expand and restore wetlands to enhance habitat for Delta Smelt and other species. Provide water access to the Pittsburg/Bay Point shoreline. Establish the first section of the Great Delta Trail project linking the East Bay to the Delta and Central Valley.
6**	Bay Trail	$12.3 million to connect urban communities to shoreline access and wildlife viewing opportunities by completing the 86-mile Bay Trail along the East Bay shoreline. Acquire and develop trail links to close the remaining gaps between Martinez and Fremont.
7**	Bay Water Trail	$5.9 million to establish safe and environmentally sound launch sites, wildlife viewing, camping, and other facilities to support the new Bay Water Trail, providing places for kayakers, canoers, and other small boats to travel the length of the East Bay shoreline and ultimately circumnavigate the Bay.
8*	Big Break Shoreline	$2.6 million to enhance delta shoreline access and expand interpretative/educational opportunities for East Contra Costa County schools and families to experience the Delta in a natural setting. Protect and enhance habitat for the threatened California black rail and giant garter snake; restore coastal prairie grassland.
9*	Black Diamond	$4.5 million to complete the underground trail and Mining Museum and to preserve important open space; enhance wetland and riparian habitat in partnership with the East Contra Costa County Habitat Conservation Plan.
10	Briones	$7.8 million to preserve additional ridgetop and hillside open space surrounding and near the park in partnership with other agencies. Improve Alhambra Valley and Buckeye Ranch access, develop staging area and trail connections for all users, renovate picnic areas and group camps.
11*	Byron Vernal Pools	$3 million to acquire rare vernal pool habitat and wetlands near Byron to expand, preserve, protect, and interpret rare species including tiger salamander, fairy shrimp and vernal pool wildflowers in partnership with the East Contra Costa County Habitat Conservation Plan.
12**	Calaveras Ridge Trail	$11.3 million to acquire open space and park corridor and construct this trail for all users connecting six regional parks along the I-680 corridor serving all communities from Sunol to the Carquinez Strait.
13	Carquinez Strait	$4.1 million to complete the shoreline scenic corridor between Martinez and Crockett. Expand outdoor recreation opportunities, preserve shoreline areas, and connect park trails for all users from historic Port Costa to the San Francisco Bay and Ridge Trails.

Map #	EBRPD Park Lands	Description of Development Activities
14	Clayton Ranch	$2 million to preserve open space and complete this critical wildlife corridor for Alameda whipsnake, red-legged frog and rare plants between Mt. Diablo and Black Diamond Mines Regional Preserve in partnership with the East Contra Costa County Habitat Conservation Plan. Provide initial staging and new trail opportunities for all users.
15*	Concord Naval Weapons Station	$16 million to work in partnership with Concord and the National Park Service to acquire, restore, and develop a major new regional park on the inland portion of the former Concord Naval Weapons Station. Protect open space and wildlife habitat for tiger salamanders and red-legged frogs and restore Mt. Diablo Creek. Develop regional recreation facilities, including picnic areas, trails for all users, parking, and camp sites. Provide interpretive and education facilities and partner with the National Park Service to provide services in the area.
16*	Coyote Hills	$8.1 million to acquire remaining lands adjacent to Coyote Hills to complete park boundaries and preserve sensitive riparian wildlife habitat. Restore and expand the existing marsh complex to include seasonal wetlands, coastal prairie grassland, and reduce cattails. Enhance habitat for salt marsh harvest mouse and California black rail. Replace the aging visitor center with a state-of-the-art facility to interpret the significant cultural and natural resources of the area. Add family camping opportunities at the reclaimed Dumbarton Quarry site and provide trail links to the Don Edwards National Wildlife Refuge and Bay Trail.
17	Crockett Hills	$4 million to acquire scenic open space to expand this park near the West County communities of Crockett, Hercules, and Rodeo. Build new public access, trails for all users, and camp sites easily accessible from Highway 4 and the Cummings Skyway.
18	Crown Beach	$6.5 million to replace and expand the Crab Cove interpretive center, currently located in an outdated military building. Expand and restore Alameda Beach to increase space for beach recreation and protect the shoreline. Acquire appropriate surplus federal property if it becomes available.
19*	Deer Valley	$3.6 million to establish a new park near the communities of Brentwood and Oakley. When matched with funding from the East Contra Costa County Habitat Conservation Plan, the park will preserve a regional wildlife corridor for San Joaquin kit fox, tiger salamander, and other threatened species between Los Vaqueros and Black Diamond, and will preserve the rural ranching history of the area.
20*	Delta Access	$5 million to open a new regional park on the Delta, providing swimming, boating, fishing, picnicking, and camping close to East Contra Costa communities. Work with federal and state agencies to provide both Delta recreation and wildlife habitat for threatened California black rails, giant garter snakes and migratory waterfowl.
21	Delta Recreation	$1 million for new public access, trails, family camping, and picnicking in the Delta on Jersey Island and the San Joaquin River.
22**	Delta Trail	$4.1 million to provide a new trail for all users, connecting the communities of Bay Point, Brentwood, Pittsburg, Antioch, and Oakley to the shoreline. Work with State and local agencies to develop the Great Delta Trail, improving urban access to fishing and boating in the Delta.
23	Diablo Foothills / Castle Rock	$7.2 million to preserve open space and habitat in central Contra Costa County adjacent to Mt. Diablo State Park; complete renovation of picnic areas, play areas, and trail access improvements for all users.

Map #	EBRPD Park Lands	Description of Development Activities
24	Doolan Canyon/Tassajara Hills	$5.7 million to acquire land for a new park preserving the last major undeveloped expanse of the Tassajara Hills north of the communities of Dublin and Pleasanton. Restore grassland and seasonal wetland habitat for tiger salamanders, golden eagles, prairie falcons and other species. Provide public access, scenic resources, and trails for all users.
25	Dry Creek	$6.7 million to acquire and preserve scenic ridgelands in the Union City Hills along Walpert Ridge; complete the renovation of the historic Meyers Estate and garden for intimate community gatherings. Complete multi-use Ridge Trail connections.
26*	Dublin Hills	$4.7 million to complete this new park along the ridgelines in the scenic West Dublin hills. Preserve wildlife corridor and connect community residents to nearby natural areas and regional trails for all users. Restore ponds and enhance riparian habitats and grasslands.
27**	Dunsmuir Heights Trail	$2.3 million to acquire and construct an urban open space and multi-use trail corridor connecting Oakland and San Leandro neighborhoods to Anthony Chabot through the Dunsmuir Heights area.
28	East Bay Greenwood Trail	$400,000 to partner with local cities to secure public use of this abandoned rail right of-way to serve urban residents from Oakland to Fremont.
29*	Eastshore State Park	$27 million to expand and restore this eight-mile-long urban shoreline park adjacent to the East Bay communities of Oakland, Berkeley, Emeryville, Albany, and Richmond. Consistent with the Eastshore State Park General Plan, develop access improvements, restore upland and wetland areas to enhance wildlife habitat, and complete east shore segments of the Bay Trail.
30	Garin	$2.9 million to acquire and protect scenic ridges and wildlife habitat adjacent to Union City, Fremont, and Hayward communities. Expand park trail system to improve recreational opportunities for all users and connect to the Ridge Trail.
31**	Garin to Pleasanton Ridge Trail	$2 million to acquire and construct trail connecting Garin to Pleasanton Ridge for hiking, biking, and equestrian use.
32	Gateway Shoreline	$5.4 million to establish a new regional shoreline park as a bicycle trail hub connecting the new Bay Bridge bicycle access to the East Bay and the Bay Trail in cooperation with other agencies. This intermodal node will include parking, promenade, fishing access, landscape improvements, and facilities to interpret the natural and historic resources of this site.
33*	Hayward Shoreline	$4.5 million to restore and protect shoreline bird habitat, strengthen and repair levees along this shoreline to address climate change impacts, improve public trail access, and cooperate on shoreline interpretive improvements with other state and local agencies. Dredge channels to improve water circulation and enhance habitat on islands for endangered least terns.
34**	Iron Horse to Mount Diablo Trail	$1.4 million to complete trail corridors between Las Trampas, Sycamore Valley, and Mount Diablo.
35**	Iron Horse Trail	$2.2 million to complete extensions north of Concord and south to Pleasanton of this 28-mile-long urban bicycle trail.
36	Lake Chabot	$1.8 million to preserve hillside areas, connect trails, and add public access along the western park boundary.

Map #	EBRPD Park Lands	Description of Development Activities
37	Las Tampas	$8.3 million to establish an interpretive visitor facility and indoor meeting space to serve the increasing population in the San Ramon Valley. Develop access for all users to recently acquired properties in the Lafayette, Moraga, and San Ramon Valley areas including staging, trails, and camping areas.
38	Leona Open Space	$2.5 million to acquire remaining land to complete the park and improve public access.
39**	Marsh Creek Trail	$900,000 to complete the Marsh Creek Trail connecting the Brentwood area through the State Historic Park at Cowell Ranch to Round Valley Regional Preserve.
40	Martin Luther King Jr. Shoreline	$12.3 million to expand existing public use, shoreline access, and Bay Trail improvements at the Tidewater and Shoreline Center areas of the Martin Luther King Jr. Shoreline.
41	Mission Peak	$5.4 million to expand the ridgeline corridor on Mission Ridge and improve trails and staging areas including Stanford Avenue.
42	Morgan Territory	$8.1 million to expand wildlife corridors in partnership with the East Contra Costa Habitat Conservation Plan. Provide trails for all users and additional access to the ridgelands south of Mt. Diablo.
43*	North Richmond Wetlands	$3.6 million to preserve San Pablo and Wildcat Creek Marsh and creek deltas to protect and restore the two largest remaining marsh areas along the North Contra Costa shoreline. Connect the trail corridor from the north Richmond Wetlands to Point Pinole. Develop appropriate public access for wildlife viewing and education programs.
44**	Oak Knoll to Ridge Trail	$720,000 to join with the City of Oakland and community groups to create trail connections between the Oak Knoll redevelopment project and Leona Heights Open Space.
45*	Oakland Shoreline	$10.8 million to join with Oakland to develop new access for urban residents to the Oakland Shoreline. Clean up and restore marshes to benefit nesting birds, improve water circulation through dredging, and construct improvements on shoreline sites along the Bay Trail from San Leandro Bay, through the Oakland Estuary, and north to connect to Gateway Shoreline Park. Assist with the City's Estuary Plan trail and access projects, including public use facilities.
46*	Ohlone	$7.4 million to expand Alameda County's largest wilderness park, preserve park wilderness values, protect wildlife habitat and high mountain ridge resources. Develop trail loops and expand public access and camping opportunities. Restore failing ponds to support tiger salamander and red-legged frog populations.
47	Oyster Bay	$2.1 million to complete the development of this 200-acre urban shoreline park and Bay Trail connection by working with the City of San Leandro to provide recycled water for the irrigation of new turf meadows, construct picnic and play areas, parking, restrooms, and landscaping.
48	Pleasanton Ridge	$13.7 million to acquire parkland on scenic Pleasanton and Sunol ridges and Devaney Canyon; complete bicycle loop trail system, construct parking, staging areas, access, picnic, camping, and visitor facilities.
49*	Point Pinole	$7.5 million to develop new Atlas Road access to the park with parking, picnic areas, meadows, play areas, environmental maintenance facility, and new visitor/interpretive center. The center will provide an introduction to the rich natural and cultural resources found at this site. Complete park boundary and wetland restoration. Enhance and restore wetland and coastal prairie habitats.

Map #	EBRPD Park Lands	Description of Development Activities
50	Point San Pablo Peninsula	$4.5 million to acquire and restore shoreline and complete Bay Trail spur north of the Richmond/San Rafael Bridge to provide new public access to this scenic north bay shoreline.
51	Quarry Lakes	$4.5 million to complete the development of this regional recreation area by providing new turf meadows, picnic and play areas, restrooms, and landscaping. Complete park boundaries in this urban recreation area.
52	Rancho Pinole	$3.2 million to preserve open space in West Contra Costa County and establish a new park. Acquire land and provide access for all users in cooperation with Muir Heritage land trust to connect the Ridge Trail to Crockett Hills, Franklin Ridge, and West County communities
53*	Redwood	$5.2 million to acquire and restore Redwood Creek to protect rare native trout habitat; cooperate with the City of Oakland and Chabot Space and Science Center to support youth camping and facilities to interpret the historic and natural features of the East Bay's only native redwoods. Enhance serpentine prairie for rare plants, improve whipsnake habitat and rare manzanita groves.
54**	Ridge Trail	$12.7 million to acquire and construct trail corridor segments to close gaps in the existing 25-mile-long East Bay Ridge Trail alignment. Provide a continuous trail connection through 16 regional parks from Martinez to Fremont.
55	Roberts	$1.4 million to update existing pool and facilities to accommodate regional swimming meets and events.
56*	Round Valley	$7.2 million to expand the park to protect this unique pristine valley. Acquire lands in cooperation with the East Contra Costa County Habitat Conservation Plan. Expand trail access for all users, and staging, picnic, and camping opportunities. Connect trail corridors to adjacent State parks and to Morgan Territory Regional Preserve. Improve grasslands for kit fox and golden eagle habitat.
57	San Pablo Bay Shoreline	$855,000 to acquire and restore the scenic San Pablo Bay shoreline to provide access and wildlife viewing to bayside natural resources. Provide Bay Trail amenities to enhance public use of the bay shoreline.
58*	Sibley-Huckleberry	$5.9 million to acquire additional open space south of Sibley Regional Preserve between Oakland, Orinda, and Moraga. Expand trails, including connection to Lake Temescal; construct new trailhead, and develop new camping opportunities. Restore ponds and riparian habitat.
59*	Sunol	$5 million to expand wilderness area to protect Alameda Creek watershed, preserve wildlife habitat, remove barriers to steelhead migration, and renovate and/or replace the aging visitor center, picnic, and campground facilities.
60*	Sycamore Valley Open Space	$925,000 to acquire lands to complete open space boundaries and trail connections, both inside the park and to Mt. Diablo. Enhance red-legged frog habitat.
61**	Tassahara Creek Trail	$875,000 to acquire and develop the regional trail connecting Tassajara Creek in Dublin to Mt. Diablo. Cooperate with Dublin, San Ramon, and Contra Costa County to complete this trail.
62	Tilden Park	$2 million to renovate and/or expand Tilden Park's visitor facilities at the Botanic Garden and Environmental Education Center for public interpretive programs, lectures, and research.
63*	Urban Creeks	$8 million to work with cities and community organizations to restore urban creeks and acquire creek easements, such as BART-to-Bay and other urban creek projects.

Map #	EBRPD Park Lands	Description of Development Activities
64*	Vargas Plateau	$7.6 million to expand the park; develop access and construct parking, picnic areas, trails for all users, and campsites at this new park. Preserve Alameda Creek watershed, extend the Ridge Trail, connect the park to Fremont and Sunol, protect hillside vistas and open space east of Fremont and south of Niles Canyon. Restore wetlands and enhance grasslands
65	Vasco Caves	$4.7 million to expand the preserve to protect unique natural and cultural resources in partnership with the East Contra Costa County Habitat Conservation Plan. Improve habitat for kit fox, golden eagles, and enhance wetlands. Provide suitable guided public access, parking, and visitor facilities.
66	Wildcat Canyon	$900,000 to expand park boundaries along the San Pablo Ridge, improve access to park for all users.
67**	Wildcat Creek Trail	$900,000 to work with the City of Richmond and Contra Costa County to safely re-open the Wildcat Creek Trail crossing under the Richmond Parkway to connect north Richmond communities to the bay shoreline.

Source: EBRPD Measure WW, 9/9/2008

For EBRPD's acquisition and development projects, the Park District has an Acquisition Evaluation Process. Through this process, the Park District reviews:

- Site descriptions and existing structures
- Natural and cultural resources
- Historic resources
- CEQA compliance
- Planning issues
- Public Safety (what additional police, fire (due to increased wildfire risk), or other measures are needed to add the property into the EBRPD Park system)
- Review of any land use plans that exist in the area to be acquired.

4.3 Hazard Profiles and Vulnerability Assessment

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.

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.

The hazards identified in Section 4.1 Hazard Identification, are profiled individually in this section. The Hazard Profiles set the stage for the Vulnerability Assessment, where the vulnerability is quantified, as data allows, for each of the identified hazards.

Hazard Profiles Methodology

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 Park District. Where known, this includes information on the hazard extent, location, 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. Hazard research, historical incident worksheets and other input from the HMPC were used to capture information 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 (as applicable). The possible influence of climate change on the hazard is discussed.

Vulnerability Assessment Methodology

With EBRPD's hazards identified and profiled, a vulnerability assessment was conducted to describe the vulnerability and impact that each hazard would have on the Park District. The vulnerability assessment quantifies, to the extent feasible using best available data, assets at risk to identified hazards and estimates potential losses. This section focuses on the vulnerabilities of the EBRPD Planning Area as a whole.

An estimate of the vulnerability of the EBRPD Planning Area to each identified hazard, in addition to the estimate of risk 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 assets 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 critical facilities, historic structures, and valued natural resources. Together, this information conveys the impact, or vulnerability, of the EBRPD Planning Area to that hazard.

The vulnerability assessment identified eight hazards in the EBRPD Planning Area for which specific geographical hazard areas have been defined and for which sufficient data exists to support a quantifiable vulnerability analysis. These eight hazards are dam failure, earthquake (liquefaction), flood, landslide, levee failure, coastal flooding and sea level rise, tsunami, and wildfire. These hazards were analyzed using GIS and Park District data.

For these eight hazards, the following elements were inventoried for each community, to the extent possible, to quantify vulnerability in identified hazard areas:

- General vulnerability and hazard-related impacts, including impacts to life, safety, and health
- Park District lands and assets
- Critical facilities at risk
- Overall community impact
- Future development/development trends within the identified hazard area

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

- Climate Change
- Drought and Water Shortage
- Flood: Localized/Stormwater
- Pandemic
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rain and Storms

- Severe Weather: High Winds and Tornadoes

Power Outages/Failure: A Common Vulnerability of all Hazards

An additional impact or vulnerability common to most all hazards is power outage or power failure. The US power grid crisscrosses the country, bringing electricity to homes, offices, factories, warehouses, farms, traffic lights and even campgrounds. According to statistics gathered by the Department of Energy, major blackouts are on the upswing. Over the past two decades, blackouts impacting at least 50,000 customers have increased 124 percent. The electric power industry does not have a universal agreement for classifying disruptions. Nevertheless, it is important to recognize that different types of outages are possible so that plans may be made to handle them effectively. Electric power disruptions can be generally grouped into two categories: intentional and unintentional.

Intentional Disruptions

There are four types of intentional disruptions:

- **Planned**: Some disruptions are intentional and can be scheduled based maintenance or upgrading needs
- **Unscheduled**: Some intentional disruptions must be done "on the spot." in response to an emergency
- **Demand-Side Management**: Some customers (i.e., on the demand side) have entered into an agreement with their utility provider to curtail their demand for electricity during periods of peak system loads
- **Load Shedding**: When the power system is under extreme stress due to heavy demand and/or failure of critical components, it is sometimes necessary to intentionally interrupt the service to selected customers to prevent the entire system from collapsing, resulting in rolling blackouts

The California Independent System Operator (CAISO) is tasked with managing the power distribution grid that supplies most of California, except in areas served by municipal utilities. CAISO is thus the entity that coordinates statewide flow of electrical supply. CAISO uses a series of stage alerts to the media based on system conditions. The alerts are:

- Stage 1 – reserve margin falls below 7 percent
- Stage 2 – reserve margin falls below 5 percent
- Stage 3 – reserve margin falls below 1.5 percent

Rotating blackouts become a possibility when Stage 3 is reached. Rotating outages and/or blackouts such as those experienced in 2000/2001 and 2006 can occur due to losses in transmission or generation and/or extremely severe temperatures that lead to heavy electric power consumption.

On January 17, 2001, CAISO declared a Stage 3 Emergency and notified the then Governor's Office of Emergency Services (Cal OES) that PG&E was dropping firm load of 500 megawatts (MW) in Northern California leading to rolling black-outs. Cal OES, in turn, issued an Electrical Emergency Message to all Emergency Services Agencies to prepare for rolling blackouts. This scenario was repeated the following day, January 18, 2001, and again on March 19, 2001.

A July 2006 heat storm event affected the entire state as well as most of the West, producing record energy demand levels in California. The state was able to avoid rotating outages due to a combination of favorable

factors that included no major transmission outages, lower than typical generator outages, significant customer response to pleas for energy conservation, high imports from the Pacific Northwest despite unusually high loads, outstanding cooperation among western control area operators, and prompt response to fires that potentially threatened major interties. However, the event brought to light the vulnerability of the electric distribution system, as over 3,500 distribution transformers failed, leaving over two million customers without power at various times over the ten-day event, many for several hours and a small minority for up to three days.

In 2020, the state battled both extreme heat and wildfires. As a result of extreme heat, the CAISO declared a Stage 3 emergency. PG&E initiated rotating outages in August at the request of California's grid operator. The outages, which impacted 220,000 customers, occurred during periods of high heat. These rolling blackouts lasted less than a week.

Unintentional Disruptions

Unintentional or unplanned disruptions are outages that come with essentially no advance notice. This type of disruption can be the most problematic. The following are categories of unplanned disruptions:

- Accident by the utility, utility contractor, or others
- Malfunction or equipment failure
- Equipment overload (utility company or customer)
- Reduced capability (equipment that cannot operate within its design criteria)
- Tree contact other than from storms
- Vandalism or intentional damage
- Weather, including lightning, wind, earthquake, flood, and broken tree limbs taking down power lines
- Wildfire that damages transmission lines

Climate Change and Energy Shortage

Changing climate is expected to bring more frequent and intense natural disasters. Key climate parameters are starting to move outside of historically observed variability at a rate that makes historical data a poor predictor of future climate. For example, the warmest years on record in California occurred in 2014, 2015, 2016, and 2019. 2020 is on pace to be a remarkably hot year as well. In addition, the 2016-2017 year broke the record as the wettest ever recorded in the northern Sierra Nevada Mountains.

Changes in temperatures, precipitation patterns, extreme events, and sea level rise have the potential to decrease the efficiency of thermal power plants and substations, decrease the capacity of transmission lines, render hydropower less reliable, spur an increase in electricity demand, and put energy infrastructure at risk of flooding.

With climate warming, higher costs from increased demand for cooling in the summer are expected to outweigh the decreases in heating costs in the cooler seasons. Hotter temperatures in California will mean more energy (typically measured in "cooling-degree days") needed to cool homes and businesses both during heat waves and on a daily basis, during the daytime peak of the diurnal temperature cycle. During future heat waves, historically cooler coastal cities (e.g., San Francisco and Los Angeles) are projected to experience greater relative increases in temperature, such that areas that never before relied on air conditioning will experience new cooling demands.

Secondary impacts of energy shortages are most often felt by vulnerable populations. For example, those who rely on electric power for life-saving medical equipment, such as respirators, are extremely vulnerable to power outages. Also, during periods of extreme heat emergencies, the elderly and the very young are more vulnerable to the loss of cooling systems requiring power sources.

Additional impacts from a power disruption affect remote areas. This can affect evacuation messaging and coordination difficulties, and a reduction in firefighting capabilities due to lack of water access in more remote areas (especially for those on wells).

Public Safety Power Shutoff (PSPS)

A new intentional disruption type of power shortage/failure event has recently occurred in California. In recent years, several wildfires have started as a result of downed power lines or electrical equipment. This was the case for the Camp Fire in 2018. As a result, California's three largest energy companies (including PG&E), at the direction of the California Public Utilities Commission (CPUC), are coordinating to prepare all Californians for the threat of wildfires and power outages during times of extreme weather. To help protect customers and communities during extreme weather events, electric power may be shut off for public safety in an effort to prevent a wildfire. This is called a Public Safety Power Shutoff (PSPS).

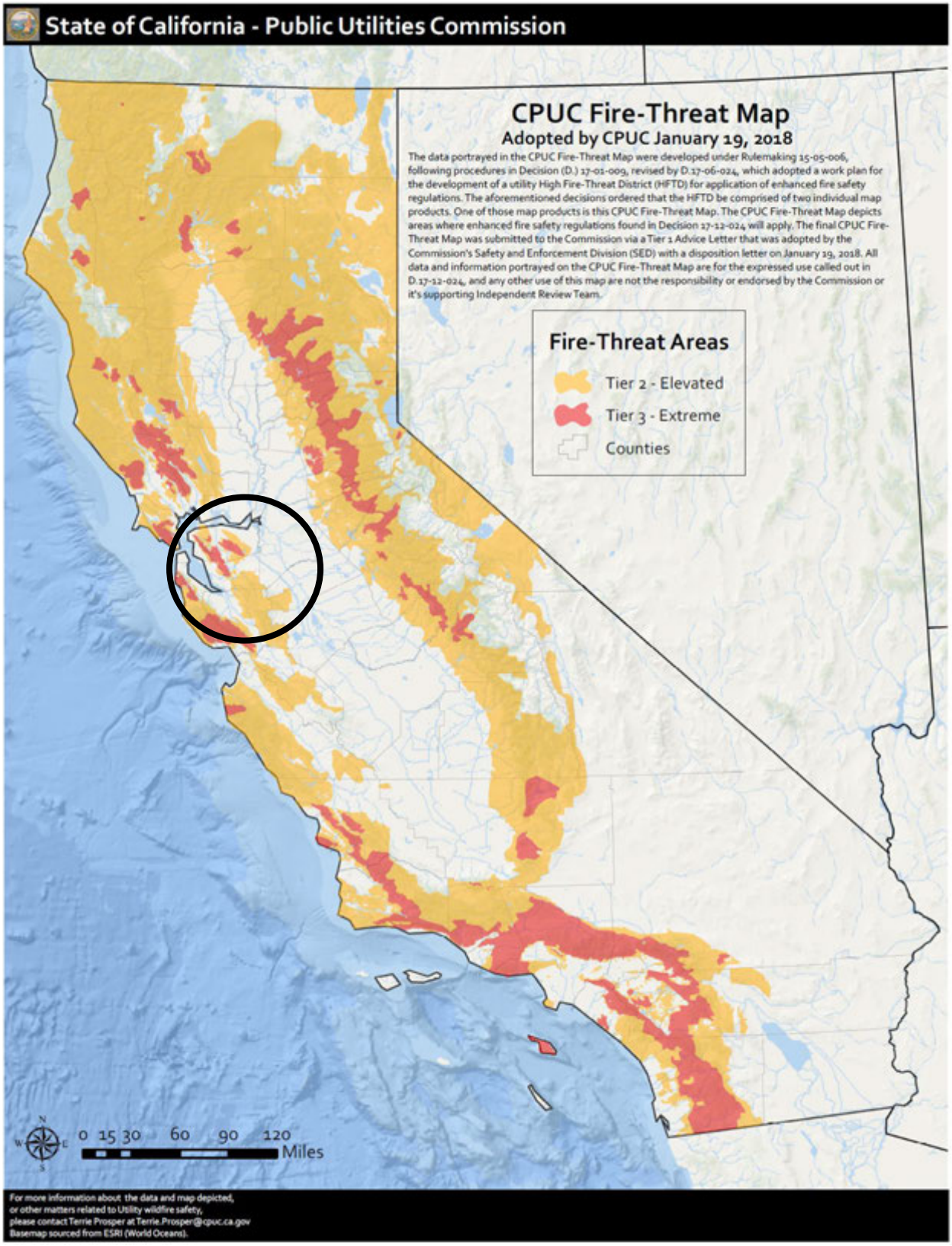
Public Safety Power Shutoff Criteria

The Wildfire Safety Operations Center (WSOC) monitors fire danger conditions across PG&E service area and PSPS, some factors include:

- A Red Flag Warning declared by the National Weather Service
- Low humidity levels generally 20% and below
- Forecasted sustained winds generally above 25 mph and wind gusts in excess of approximately 45 mph, depending on location and site-specific conditions such as temperature, terrain and local climate
- Condition of dry fuel on the ground and live vegetation (moisture content)
- On-the-ground, real time observations from PG&E's WSOC and field observations from PG&E crews

The most likely electric lines to be considered for shutting off for safety will be those that pass through areas that have been designated by the CPUC as at elevated (Tier 2) or extreme (Tier 3) risk for wildfire (seen on Figure 4-14). This includes both distribution and transmission lines. The specific area and number of affected customers will depend on forecasted weather conditions and which circuits PG&E needs to turn off for public safety. Although a customer may not live or work in a high fire-threat area, their power may also be shut off if their community relies upon a line that passes through an area experiencing extreme fire danger conditions. This means that any customer who receives electric service from PG&E should be prepared for a possible PSPS. PSPS events, while preventative in nature, can cause a variety of issues related to the lack of power to those impacted by the PSPS. For the EBRPD, a significant concern is the impact to their communication systems as well as on other critical infrastructure and services. As seen on Figure 4-14, the Park District has areas inside the Tier 2 and Tier 3 areas, as well as areas outside of them.

Figure 4-13 State of California Tier 2 and 3 Areas



PG&E noted that extreme weather threats can change quickly. When possible, PG&E will provide customers with advance notice prior to turning off the power, as well as updates until power is restored. Timing of notifications (when possible) are:

- Approximately 48 hours before power is turned off
- Approximately 24 hours before power is turned off
- Just before power is turned off
- During the public safety outage
- Once power has been restored

According to records provided by EBRPD, there have been 132 PSPS events since the 2017 Plan. All of these events happened in 2019 and 2020. All of these were a result of extreme wildfire weather, usually a combination of extreme heat, low humidity, and high winds contributing to the potential for red flag days. And, again, all of these occurred in the month of October, when the hills are dry and Diablo winds come in. These can be seen in Table 4-20.

Table 4-20 EBRPD – PSPS Events

Feeder Name	Event Off Time	Elapsed Minutes
San Ramon-2107	26OCT2019:20:17:00	2,411
San Ramon-2107	25OCT2020:20:00:00	2,349
San Leandro-1109	09OCT2019:23:44:00	1,093
Brentwood-2105	26OCT2019:20:11:00	4,027
Rossmoor-1108	09OCT2019:22:44:00	1,124
Rossmoor-1108	26OCT2019:20:08:00	2,718
Rossmoor-1108	25OCT2020:20:11:00	2,395
Lone Tree-2105	26OCT2019:23:33:00	3,870
San Leandro-1109	09OCT2019:23:44:00	1,221
San Leandro-1109	26OCT2019:23:02:00	2,331
San Leandro-1109	25OCT2020:20:26:00	2,494
San Leandro-1109	25OCT2020:20:26:00	2,494
San Leandro-1109	09OCT2019:23:44:00	2,287
Cayetano-2109	26OCT2019:21:09:00	2,613
Cayetano-2109	25OCT2020:20:11:00	2,531
Oakland X-1106	09OCT2019:22:49:00	1,272
Oakland X-1106	27OCT2019:00:31:00	2,187
Oakland X-1106	14OCT2020:23:05:00	1,015
Oakland X-1106	25OCT2020:20:07:00	2,668
Spruce-0401	09OCT2019:22:49:00	1,009
Spruce-0401	26OCT2019:21:59:00	2,522
El Cerrito G-1105	09OCT2019:22:49:00	1,073

Feeder Name	Event Off Time	Elapsed Minutes
Fairview-2207	26OCT2019:23:04:00	2,457
Kirker-2104	26OCT2019:21:23:00	4,103
Clayton-2215	26OCT2019:20:49:00	2,621
Clayton-2215	14OCT2020:20:10:00	1,235
Clayton-2215	15OCT2020:22:32:00	806
Clayton-2215	25OCT2020:20:58:00	2,277
Lone Tree-2105	26OCT2019:23:33:00	3,870
Fairview-2207	26OCT2019:23:04:00	2,457
El Cerrito G-1105	09OCT2019:22:49:00	1,073
Vineyard-2108	26OCT2019:20:46:00	2,337
Fairview-2207	26OCT2019:23:04:00	2,457
Fairview-2207	26OCT2019:23:04:00	2,457
Castro Valley-1106	09OCT2019:23:01:00	1,380
Castro Valley-1106	26OCT2019:21:01:00	2,315
Castro Valley-1108	25OCT2020:20:19:00	1,376
Castro Valley-1104	26OCT2019:20:29:00	2,441
San Ramon-2108	09OCT2019:23:13:00	1,088
San Ramon-2108	26OCT2019:21:05:00	2,705
San Ramon-2108	25OCT2020:20:00:00	1,360
Alhambra-1105	26OCT2019:21:26:00	2,600
Alhambra-1105	26OCT2019:21:26:00	2,600
Alhambra-1105	26OCT2019:21:26:00	2,600
Vineyard-2108	26OCT2019:20:46:00	2,337
Milpitas-1109	10OCT2019:00:24:00	2,291
Milpitas-1109	26OCT2019:20:14:00	2,663
Milpitas-1109	14OCT2020:21:00:00	1,051
Milpitas-1109	25OCT2020:21:13:00	2,264
Spruce-0401	09OCT2019:22:49:00	1,009
El Cerrito G-1105	26OCT2019:21:59:00	2,525
El Cerrito G-1105	25OCT2020:20:04:00	1,306
El Cerrito G-1105	09OCT2019:22:49:00	1,073
El Cerrito G-1105	26OCT2019:21:59:00	2,524
El Cerrito G-1105	09OCT2019:22:49:00	1,073
El Cerrito G-1105	26OCT2019:21:59:00	2,525
El Cerrito G-1105	25OCT2020:20:04:00	1,306
El Cerrito G-1105	09OCT2019:22:49:00	1,073
El Cerrito G-1105	26OCT2019:21:59:00	2,525

Feeder Name	Event Off Time	Elapsed Minutes
El Cerrito G-1105	25OCT2020:20:04:00	1,306
El Cerrito G-1105	09OCT2019:22:49:00	1,095
El Cerrito G-1105	26OCT2019:21:59:00	2,523
El Cerrito G-1105	25OCT2020:20:04:00	1,306
El Cerrito G-1105	09OCT2019:22:49:00	1,073
El Cerrito G-1105	26OCT2019:21:59:00	2,524
El Cerrito G-1112	26OCT2019:20:25:00	2,348
San Leandro-1109	26OCT2019:23:02:00	2,430
Spruce-0401	26OCT2019:21:59:00	2,522
Valley View-1106	09OCT2019:22:46:00	998
Valley View-1106	26OCT2019:20:12:00	2,468
Cayetano-2109	26OCT2019:21:09:00	2,613
Cayetano-2109	14OCT2020:21:00:00	1,169
Cayetano-2109	15OCT2020:22:55:00	761
Cayetano-2109	25OCT2020:20:11:00	2,531
Kirker-2104	26OCT2019:21:23:00	4,103
Kirker-2104	26OCT2019:21:23:00	4,103
Kirker-2104	26OCT2019:21:23:00	4,103
Fairview-2207	26OCT2019:23:04:00	2,457
Fairview-2207	26OCT2019:23:04:00	2,457
Oakland X-1106	09OCT2019:22:49:00	1,272
Oakland X-1106	27OCT2019:00:31:00	2,179
Oakland X-1106	14OCT2020:23:05:00	1,015
Oakland X-1106	25OCT2020:20:07:00	2,664
Oakland X-1106	09OCT2019:22:49:00	1,272
Oakland X-1106	27OCT2019:00:31:00	2,179
Oakland X-1106	14OCT2020:23:05:00	1,015
Oakland X-1106	25OCT2020:20:07:00	2,664
San Leandro-1109	09OCT2019:23:44:00	2,287
San Leandro-1109	26OCT2019:23:02:00	2,389
San Leandro-1109	25OCT2020:20:26:00	2,558
San Leandro-1109	09OCT2019:23:44:00	2,287
San Leandro-1109	26OCT2019:23:02:00	2,389
San Leandro-1109	25OCT2020:20:26:00	2,558
Oakland X-1106	09OCT2019:22:49:00	1,272
Oakland X-1106	27OCT2019:00:31:00	2,168
Oakland X-1106	25OCT2020:20:07:00	2,662

Feeder Name	Event Off Time	Elapsed Minutes
Oakland X-1106	09OCT2019:22:49:00	1,272
Oakland X-1106	27OCT2019:00:31:00	2,187
Oakland X-1106	14OCT2020:23:05:00	1,015
Oakland X-1106	25OCT2020:20:07:00	2,668
Oakland X-1106	09OCT2019:22:49:00	1,272
Oakland X-1106	27OCT2019:00:31:00	2,187
Oakland X-1106	14OCT2020:23:05:00	1,015
Oakland X-1106	25OCT2020:20:07:00	2,668
Oakland K-1103	26OCT2019:23:33:00	2,569
Oakland K-1103	26OCT2019:23:33:00	2,569
Oakland K-1103	26OCT2019:23:33:00	2,569
Jarvis-1111	10OCT2019:00:05:00	998
Jarvis-1111	26OCT2019:20:05:00	2,363
Jarvis-1111	25OCT2020:20:53:00	2,194
Vasco-1102	26OCT2019:20:36:00	3,570
Vasco-1102	26OCT2019:20:36:00	3,570
Vasco-1102	25OCT2020:20:56:00	1,272
Vasco-1102	26OCT2019:20:36:00	3,570
Vasco-1102	25OCT2020:20:56:00	1,272
Vasco-1102	26OCT2019:20:36:00	3,570
Vasco-1102	25OCT2020:20:56:00	1,272
Vasco-1102	26OCT2019:20:36:00	3,570
Vasco-1102	25OCT2020:20:56:00	1,272
Vasco-1102	26OCT2019:20:36:00	3,570
Vasco-1102	25OCT2020:20:56:00	1,272
Vasco-1102	25OCT2020:20:56:00	1,272
Vasco-1102	26OCT2019:20:36:00	3,570
Vasco-1102	25OCT2020:20:56:00	1,272
Vasco-1102	25OCT2020:20:56:00	1,272
Vasco-1102	26OCT2019:20:36:00	3,570
Vasco-1102	25OCT2020:20:56:00	1,272
Vasco-1102	26OCT2019:20:36:00	3,570
Vasco-1102	25OCT2020:20:56:00	1,272
Vasco-1102	26OCT2019:20:36:00	3,570
Vasco-1102	25OCT2020:20:56:00	1,272
Lone Tree-2105	26OCT2019:23:33:00	3,870

Source: EBRPD

The following sections provide the hazard profile and vulnerability assessments for each of the hazards identified in Section 4.1 Hazard Identification. ***The severe weather hazards are discussed first to paint the picture of the Park District's climate and hazard environment which often lead to other hazards such as flood and wildfire. The remainder of the hazards follow alphabetically.***

Data Sources

The following data sources formed the basis for this Hazard Profile and Vulnerability Assessment portion of the Plan Update:

- 2013 East Bay Regional Park District Master Plan
- 2018 California State 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.
- Bureau of Land Management
- CA DWR Best Available Maps
- CAL FIRE GIS datasets
- Cal OES
- Cal-Adapt
- Cal-Adapt – Annual Average of Acres Burned
- Cal Adapt – Extended Drought Scenarios
- Cal-Adapt – Number of Extreme Heat Days by Year
- Cal-Adapt – Precipitation: Decadal Averages Map
- California Adaptation Planning Guide
- California Climate Adaptation Strategy (CAS) – 2021
- California Department of Water Resources
- California Department of Water Resources (CA DWR) Division of Safety of Dams
- California Department of Water Resources Best Available Maps
- California Department of Water Resources Division of Safety of Dams
- California Division of Mines and Geology
- California Geological Survey
- California Office of Emergency Services – Dam Inundation Data
- California's Drought of 2007-2009, An Overview. State of California Natural Resources Agency, California Department of Water Resources.
- Climate Change and Health Profile Report – Alameda and Contra Costa County
- East Bay Regional Park District GIS
- East Bay Regional Park District staff
- Existing plans and studies
- FEMA
- FEMA: Building Performance Assessment: Oklahoma and Kansas Tornadoes
- FEMA's HAZUS-MH 4.2 GIS-based inventory data
- Integrated Regional Water Management Plan
- IPCC Fifth Assessment Synthesis Report (2014)
- Kenward, Alyson PhD, Adams-Smith, Dennis, and Raja, Urooj. Wildfires and Air Pollution – The Hidden Health Hazards of Climate Change. Climate Central. 2013.

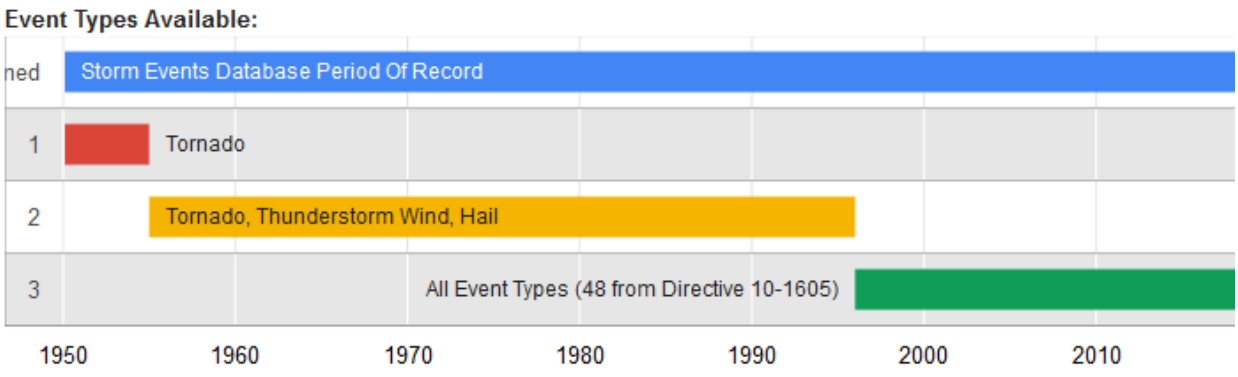
- Levees in History: The Levee Challenge. Dr. Gerald E. Galloway, Jr., P.E., Ph.D., Water Policy Collaborative, University of Maryland, Visiting Scholar, USACE, IWR.
- Liu, J.C., Mickley, L.J., Sulprizio, M.P. et al. Climatic Change. 138: 655. doi:10.1007/s10584-016-1762-6. 2016.
- Multi-Hazard Identification and Risk Assessment, FEMA 1997
- National Drought Mitigation Center
- National Drought Mitigation Center – Drought Impact Reporter
- National Integrated Drought Information System
- National Levee Database
- National Oceanic and Atmospheric Administration's National Climatic Data Center
- National Weather Service
- Natural Resource and Conservation Service
- NOAA Storm Prediction Center
- Pacific Gas and Electric Company
- Personal interviews with planning team members and staff from the County
- Proceedings of the National Academy of Sciences
- Public Health Alliance of Southern California
- Public Policy Institute of California
- Science Magazine
- Statewide GIS datasets from other agencies such as Cal OES, FEMA, USGS, CGS, Cal Atlas, and others
- U.S. Census Bureau 2010 Household Population Estimates
- U.S. Fish and Wildlife Service
- U.S. Fish and Wildlife Service's National Wetlands Inventory maps
- U.S. Forest Service GIS datasets
- U.S. Geological Survey
- U.S. Occupational Safety and Health Administration
- United States Geological Survey Open File Report 2015-3009
- University of California
- US Army Corps of Engineers
- US Department of Agriculture
- US Farm Service Agency
- US Fish and Wildlife Service
- USDA Forest Service Region 5
- USGS Bulletin 1847
- USGS National Earthquake Information Center
- USGS Publication 2014-3120
- Vaisala National Lightning Detection Network
- Western Regional Climate Center
- World Health Organization
- Written descriptions of inventory and risks provided by East Bay Regional Park District staff

4.3.1. Severe Weather: General

Severe weather is generally any destructive weather event, but usually occurs throughout the Park District as localized storms that bring heavy rain, lightning, and strong winds. The 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 4-14.

Figure 4-14 NCDC Storm Events Database Period of Record



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 severe weather events that occurred in Alameda and Contra Costa County between January 1, 1950, and January 31, 2022. These events affected each County as a whole, and most likely had some effect on the EBRPD as well. Table 4-21 summarizes these events for Alameda County, while Table 4-22 summarizes these events for Contra Costa County.

*Table 4-21 Alameda County NCDC Storm Events 1/1/1950-1/31/2022**

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Coastal Flood	3	0	0	0	0	$0	$0
Debris Flow	16	0	0	0	0	$12,874,000	$0
Dense Fog	19	0	0	0	0	$0	$0
Dense Smoke	8	0	0	0	0	$0	$0
Excessive Heat	6	0	0	0	0	$0	$0
Flash Flood	12	0	0	0	0	$100,000	$0
Flood	43	0	0	0	0	$44,325,500	$0
Frost/Freeze	4	0	0	0	0	$20,000	$400,000

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Hail	14	0	0	0	0	$0	$0
Heat	14	1	1	13	0	$30,000	$0
Heavy Rain	5	0	2	0	1	$60,000	$30,000
High Surf	1	0	0	0	0	$0	$0
Heavy Snow	1	0	0	0	0	$0	$0
High Wind	88	1	0	1	0	$3,210,000	$0
Strong Wind	258	4	0	8	0	$3,753,800	$0
Thunderstorm Wind	2	0	0	0	0	$50,000	$0
Tornado	5	0	0	0	0	$275,000	$0
Tsunami	1	0	0	0	0	$50,000	$0
Wildfire	17	0	0	6	1	$10,000	$0
Winter Storm	6	0	0	0	0	$0	$0
Total	**523**	**6**	**3**	**28**	**2**	**$64,758,300**	**$430,000**

Source: NCDC

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

*Table 4-22 Contra Costa County NCDC Storm Events 1/1/1950-1/31/2022**

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Coastal Flood	2	0	0	0	0	$0	$0
Debris Flow	21	0	0	0	0	$12,875,000	$0
Dense Fog	19	0	0	0	0	$0	$0
Dense Smoke	8	0	0	0	0	$0	$0
Excessive Heat	6	0	0	0	0	$0	$0
Flash Flood	26	0	0	0	0	$701,000	$0
Flood	99	0	0	0	0	$17,647,500	$0
Frost/Freeze	4	0	0	0	0	$20,000	$400,000
Hail	19	0	0	0	0	$5,000,010	$10,000
Heat	14	1	1	13	0	$0	$0
Heavy Rain	9	1	1	0	5	$2,075,000	$0
Heavy Snow	1	0	0	0	0	$0	$0
High Surf	1	0	0	0	0	$0	$0
High Wind	88	1	0	1	0	$3,210,000	$0
Lightning	2	0	0	0	0	$3,000	$0
Strong Wind	258	4	1	8	4	$3,753,800	$0
Thunderstorm Wind	6	0	0	0	0	$10,000	$0
Tornado	6	0	0	0	0	$72,500	$0

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Tsunami	1	0	0	0	0	$50,000	$0
Wildfire	17	0	0	6	1	$10,000	$0
Winter Storm	6	0	0	0	0	$0	$0
Total	**613**	**7**	**3**	**28**	**10**	**$45,427,810**	**$410,000**

Source: NCDC

*Note: Losses reflect totals for all impacted areas, some of which fell outside of the Park District and outside of Contra Costa County.

The NCDC table above summarizes severe weather events that occurred in greater Alameda and Contra Costa County. Only a few of the events actually resulted in state and federal disaster declarations. It is 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 EBRPD's "big picture" hazard environment.

As previously mentioned, many of Alameda and Contra Costa County's state and federal disaster declarations have been a result of severe weather. For this Plan Update, severe weather is discussed in the following subsections:

- Extreme Heat
- Heavy Rains and Storms
- High Winds and Tornadoes

The remainder of the hazards follow alphabetically.

4.3.2. Severe Weather: Extreme Heat

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect the EBRPD. These sections include a hazard/problem description; description of location and extent; past occurrences of this hazard; and how climate change can affect this hazard.

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. According to the US Center for Disease Control (CDC), in a normal year, about 658 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. According to NASA, 2021 was one of the hottest years on record. Recently in California, records were set across the state during a September 2022 heat event. Extreme heat can also affect the agricultural industry, significantly impact natural resources, and can increase the risk of wildfires.

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, low income households, individuals with chronic medical issues, outdoor workers, and even athletes are particularly susceptible to heat issues.

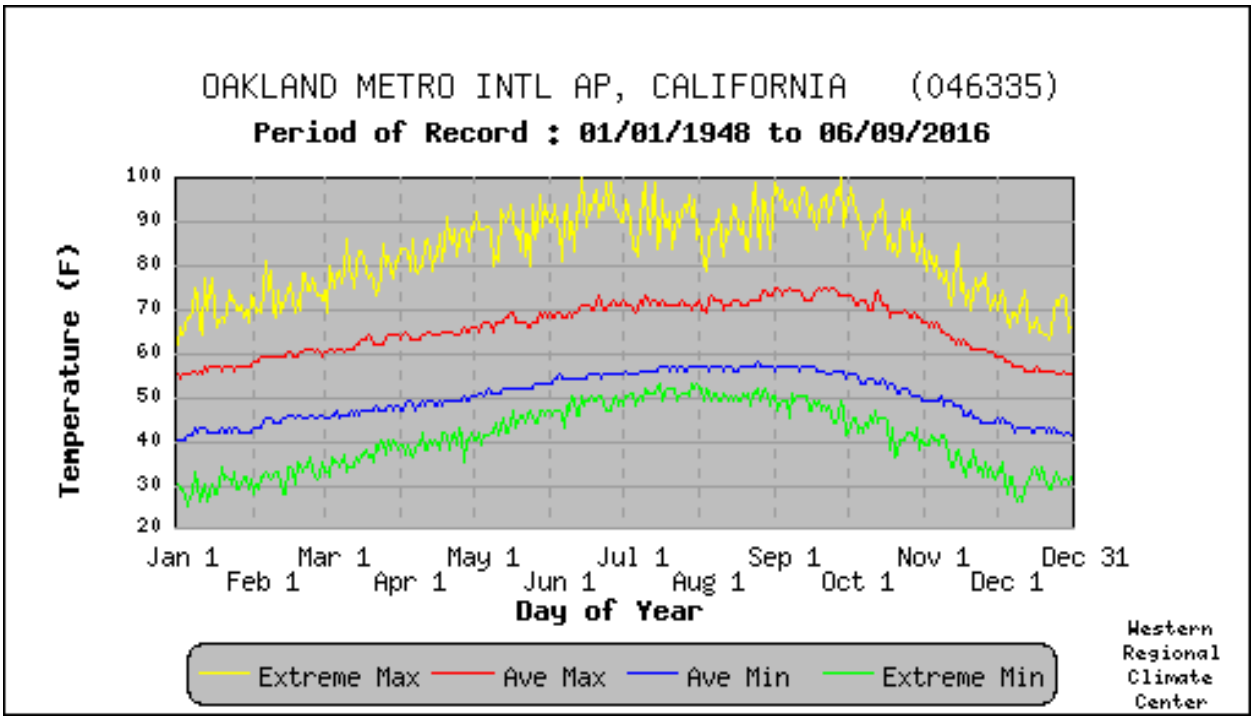
Location and Extent

Extreme heat events occur on a regional basis. Portions of the EBRPD area have many extreme heat days due to its location. All portions of the Park District are at risk to extreme heat. Extreme heat can occur in any location of the Park District, with the Contra Costa side of the Park District being more prone to high temperature events due to its more inland location. The Western Regional Climate Center (WRCC) and National Weather Service (NWS) maintain data on weather normal and extremes in the western United States. WRCC and NWS data for the Park District is summarized below for Alameda and Contra Costa counties.

EBRPD (Alameda County) – Oakland Metro International Airport WRCC Weather Station, Period of Record 1948 to 2016

According to the WRCC, monthly average maximum temperatures in the warmest months (June through September) range from the upper-60s to the low 70s. The highest recorded daily extreme was 107°F on June 2, 1960. In a typical year, maximum temperatures exceed 90°F on 3.5 days. Figure 4-15 shows the average daily high temperatures and extremes for the Alameda County portions of the Park District. Table 4-23 shows the record high temperatures by month for the Alameda County portions of the Park District.

Figure 4-15 EBRPD (Alameda County)— Daily Temperature Averages and Extremes



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

Table 4-23 EBRPD (Alameda County) – Record High Temperatures 1948 to 2016

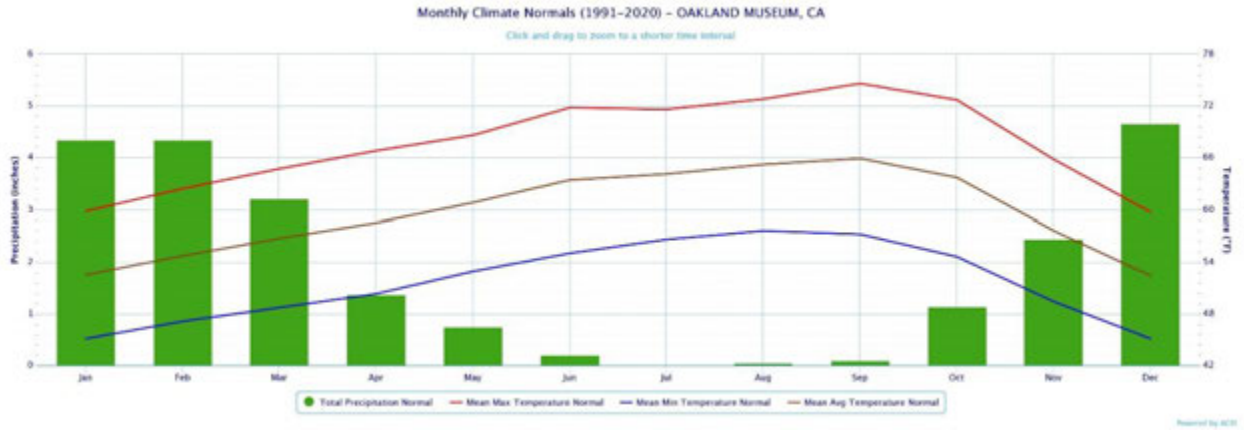
Month	Record High	Date	Month	Record High	Date
January	75°	1/8/1962	July	99°	7/10/1959
February	81°	2/6/2011	August	95°	8/27/1962
March	87°	3/8/1986	September	99°	9/1/1952
April	88°	4/23/1966	October	98°	10/2/1980
May	98°	5/29/1975	November	83°	11/3/1950
June	107°	6/2/1960	December	74°	12/3/1958

Source: Western Regional Climate Center

EBRPD – (Alameda County) – Oakland Museum NWS Station

According to the NWS, monthly average maximum temperatures in the warmest months (June through September) range from the upper-60s to the low 70s. The highest recorded daily extreme was 109°F on September 4, 1971. Figure 4-16 shows the average daily high temperatures and extremes for the Alameda County portions of the Park District. Table 4-24 shows the record high temperatures for the Alameda County portions of the Park District.

Figure 4-16 EBRPD (Alameda County)— Daily Temperature Averages and Extremes, 1991-2022



Source: National Weather Service XMAX site. Retrieved 7/5/2022.

Table 4-24 EBRPD (Alameda County) – Record High Temperatures (Descending) 1955 to 2016

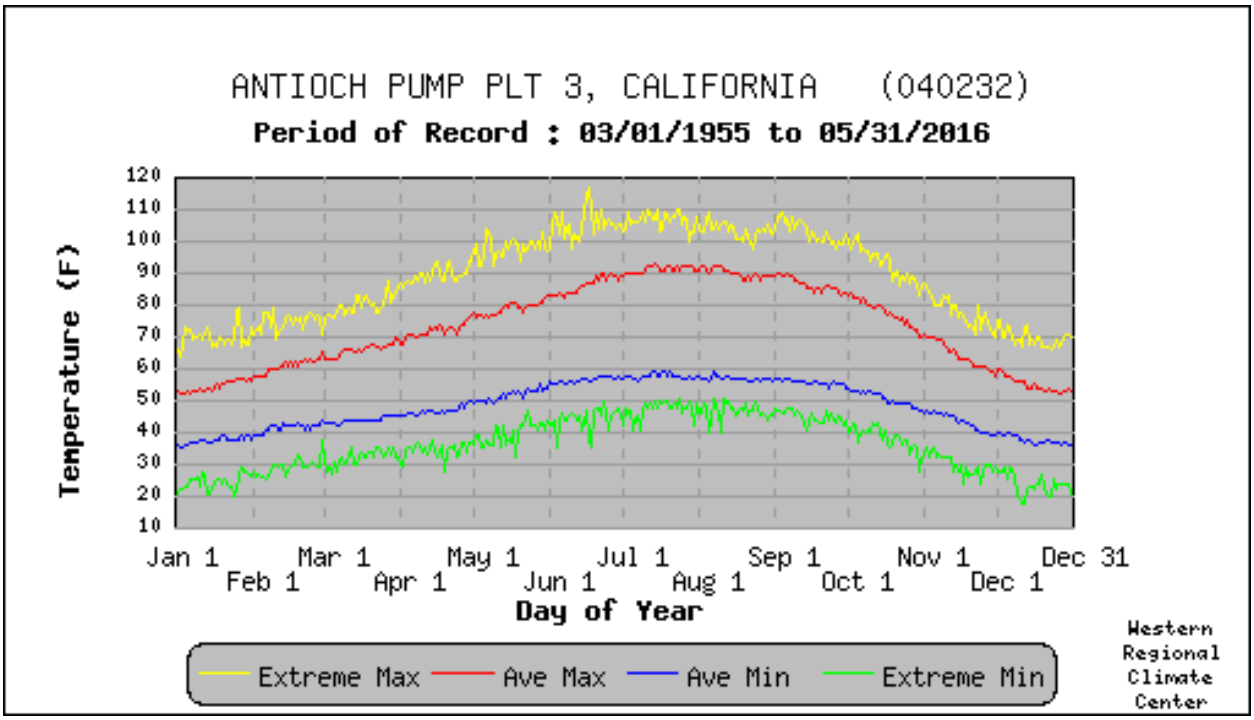
Temperature	Date
109.0°	1971-09-14
106.0°	2000-06-15
106.0°	1979-09-11
105.0°	1979-09-12
105.0°	1976-05-12
104.0°	1973-06-26
104.0°	1971-09-13
103.0°	1984-09-08
103.0°	1980-10-02
103.0°	1980-10-01

Period of record: 1955-03-01 to 2021-08-31

EBRPD (Contra Costa County) – Antioch Pump Station 3 WRCC Weather Station, Period of Record 1955 to 2016

According to the WRCC, monthly average maximum temperatures in the warmest months (June through September) range from the upper-80s to the low 90s. The highest recorded daily extreme was 117°F on June 17, 1961. In a typical year, maximum temperatures exceed 90°F on 61.3 days. Figure 4-17 shows the average daily high temperatures and extremes for the Contra Costa County portions of the Park District. Table 4-25 shows the record high temperatures for the Contra Costa County portions of the Park District.

Figure 4-17 EBRPD (Contra Costa County) – Daily Temperature Averages and Extremes



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

Table 4-25 EBRPD (Contra Costa County) – Record High Temperatures 1955 to 2016

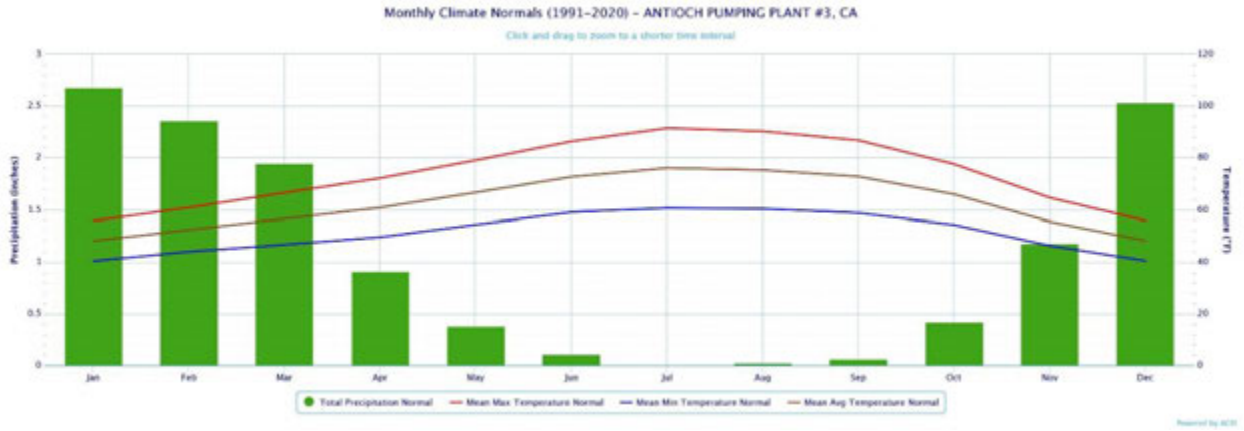
Month	Record High	Date	Month	Record High	Date
January	79°	1/26/2012	July	110°	7/11/1959
February	79°	2/9/2011	August	109°	8/5/1998
March	88°	3/27/1988	September	109°	9/4/1955
April	94°	4/29/1981	October	102°	10/5/1964
May	104°	5/6/2011	November	87°	11/1/2011
June	117°	6/17/1961	December	75°	12/1/1977

Source: Western Regional Climate Center

EBRPD (Contra Costa County) – Antioch Pump Station NWS Weather Station

According to the WRCC, monthly average maximum temperatures in the warmest months (June through September) range from the upper-80s to the low 90s. The highest recorded daily extreme was 117°F on June 17, 1961. Figure 4-18 shows the average daily high temperatures and extremes for the Contra Costa County portions of the Park District. Table 4-26 shows the record high temperatures in descending order for the Contra Costa County portions of the Park District.

Figure 4-18 EBRPD (Contra Costa County)— Daily Temperature Averages and Extremes, 1991-2022



Source: National Weather Service XMAX site. Retrieved 7/5/2022.

Table 4-26 EBRPD (Contra Costa County) – Record High Temperatures (Descending) 1970 to 2016

Temperature	Date
113.7°	1961-06-17
109.7°	1961-06-18
109.3°	2006-07-24
108.3°	2006-07-25
108.3°	1955-09-04
108.0°	2006-07-23
108.0°	1961-06-16
107.7°	1961-07-12
107.3°	1959-07-12
107.3°	1955-09-05

Period of record: 1970-10-01 to 2021-08-31

Heat emergencies are often slower to develop, taking several days of continuous, oppressive heat before a significant or quantifiable impact is seen. 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 4-27.

Table 4-27 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 San Francisco 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 duration of time.

Past Occurrences

Disaster Declaration History

There have been no FEMA or Cal OES disaster declarations in Alameda or Contra Costa County related to extreme heat, as shown in Table 4-4 and Table 4-6.

NCDC Events

The NCDC has tracked heat and extreme heat events since 1996 for both Alameda and Contra Costa County. 20 events were recorded for both counties, likely due to the regional nature of heat, as shown in Table 4-28. More events have likely occurred, without being reported to the NCDC database. Specifics on damages in the Park District were not included in the database.

*Table 4-28 EBRPD – Alameda and Contra Costa County Heat Events 1/1/1996-1/31/2022**

Event Type	Date	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Alameda County							
Excessive Heat	6	0	0	0	0	$0	$0
Heat	14	1	1	13	0	$30,000	$0
Total	**20**	**1**	**1**	**13**	**0**	**$30,000**	**$0**

Event Type	Date	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Contra Costa County							
Excessive Heat	6	0	0	0	0	$0	$0
Heat	14	1	1	13	0	$0	$0
Total	**20**	**1**	**1**	**13**	**0**	**$30,000**	**$0**

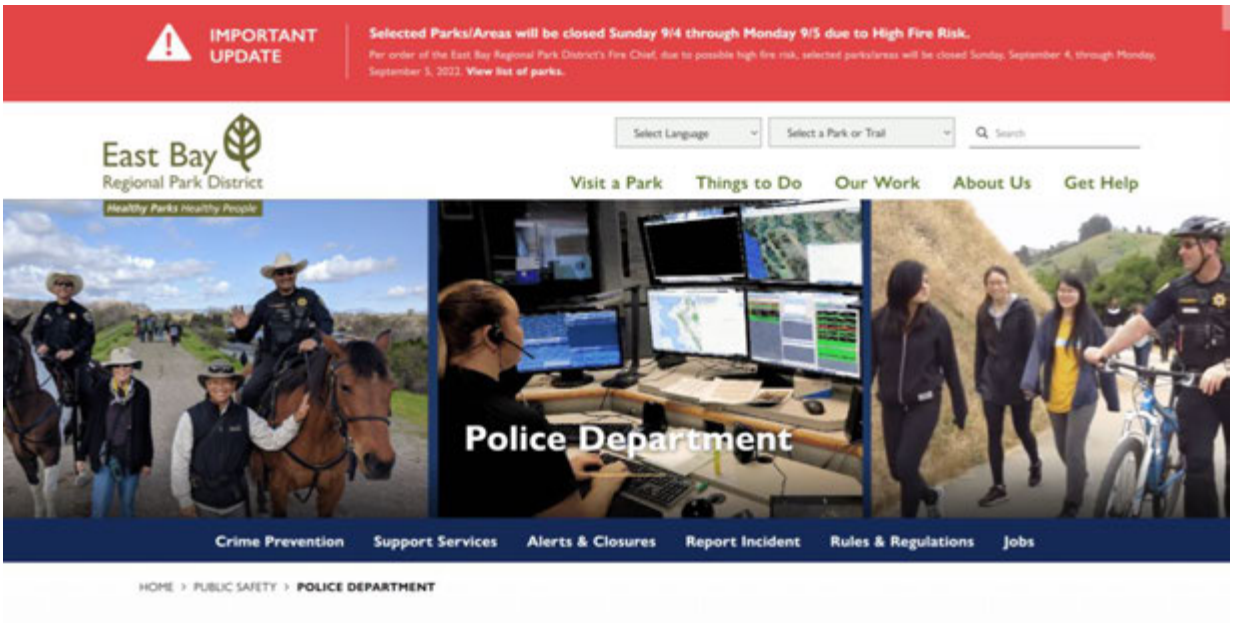
Source: NCDC

*Deaths, injuries, and damages are for the entire event, and may not be exclusive to the County.

Hazard Mitigation Planning Team Events

The HMPC noted that extreme heat is an annual occurrence in sections of the Park District. It is rare for Park District assets to be affected directly by extreme heat. Park District turf and grazing lands can be affected. A past extreme heat event since the 2017 LHMP caused IT issues when a server room struggled to stay cool. Park closures have also been occurring more frequently since 2018 due to fire weather conditions (i.e., extreme heat, low humidity, and high winds) creating the potential for a catastrophic wildfire. During extreme heat days, live fuel moisture in vegetation plummets, often to less than 5%. Most recently over the 2022 Labor Day weekend, the Park District closed the Parks at risk to wildfire for two days due to extreme heat contributing to the wildfire potential (see Figure 4-19). This was done to reduce the possibility of fire, but also to reduce the strain on EBRPD resources, especially public safety personnel. During periods of extreme heat, an increase in medical response calls within the Park District generally occurs. Also, since a large portion of fires are human caused, this also reduces the opportunity for a fire starting on Park District lands and limits the need for a coordinated evacuation should a fire occur in these conditions. The EBRPD noted that other effects can be felt during times of drought (discussed in Section 4.3.8) that can contribute to the wildfire hazard (discussed in Section 4.3.16) and PSPS events.

Figure 4-19 EBRPD – Labor Day 2022 Park Closure Announcement



Source: EBRPD

Likelihood of Future Occurrences

Highly Likely—Temperature extremes are likely to continue to occur annually in the Park District. According to the WRCC, temperatures at or above 90°F occur on 61.3 summer days in the Park District each year.

Climate Change and Extreme Heat

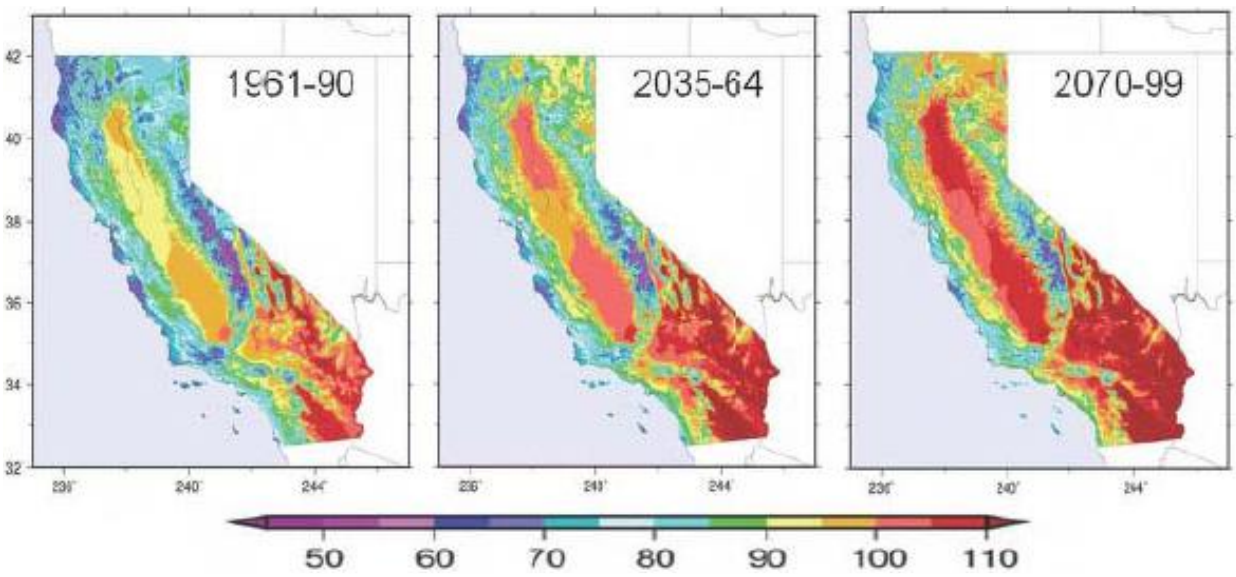
Climate change and its effect on extreme heat in and around the Park District is discussed by three sources:

- California Climate Adaptation Strategy (CAS) – 2021
- Climate Change and Health Profile Report (CCHPR) – Alameda and Contra Costa County (2017)
- Cal-Adapt

Climate Adaptation Strategy

The 2021 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 4-20.

Figure 4-20 California Historical and Projected Temperature Increases – 1961 to 2099



Source: Dan Cayan; California Climate Adaptation Strategy

As temperatures increase, populations in California and the Park District will likely face increased risk of death from dehydration, heat stroke, heat exhaustion, heart attack, stroke and respiratory distress caused by extreme heat. According to the 2021 CAS report and the 2018 State 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 health issues and deaths related to extreme heat in the Park District.

Climate Change and Health Profile Report – Alameda and Contra Costa County

The CCHPR noted for both Alameda and Contra Costa County and the Park District that increased temperatures manifested as heat waves and sustained high heat days directly harm human health through heat-related illnesses (mild heat stress to fatal heat stroke) and the exacerbation of pre-existing conditions in the medically fragile, chronically ill, and vulnerable. Increased heat also intensifies the photochemical reactions that produce smog and ground level ozone and fine particulates (PM2.5), which contribute to and exacerbate respiratory disease in children and adults. Increased heat and carbon dioxide enhance the growth of plants that produce pollen, which are associated with allergies. Increased temperatures add to the heat load of buildings in urban areas and exacerbate existing urban heat islands adding to the risk of high ambient temperatures.

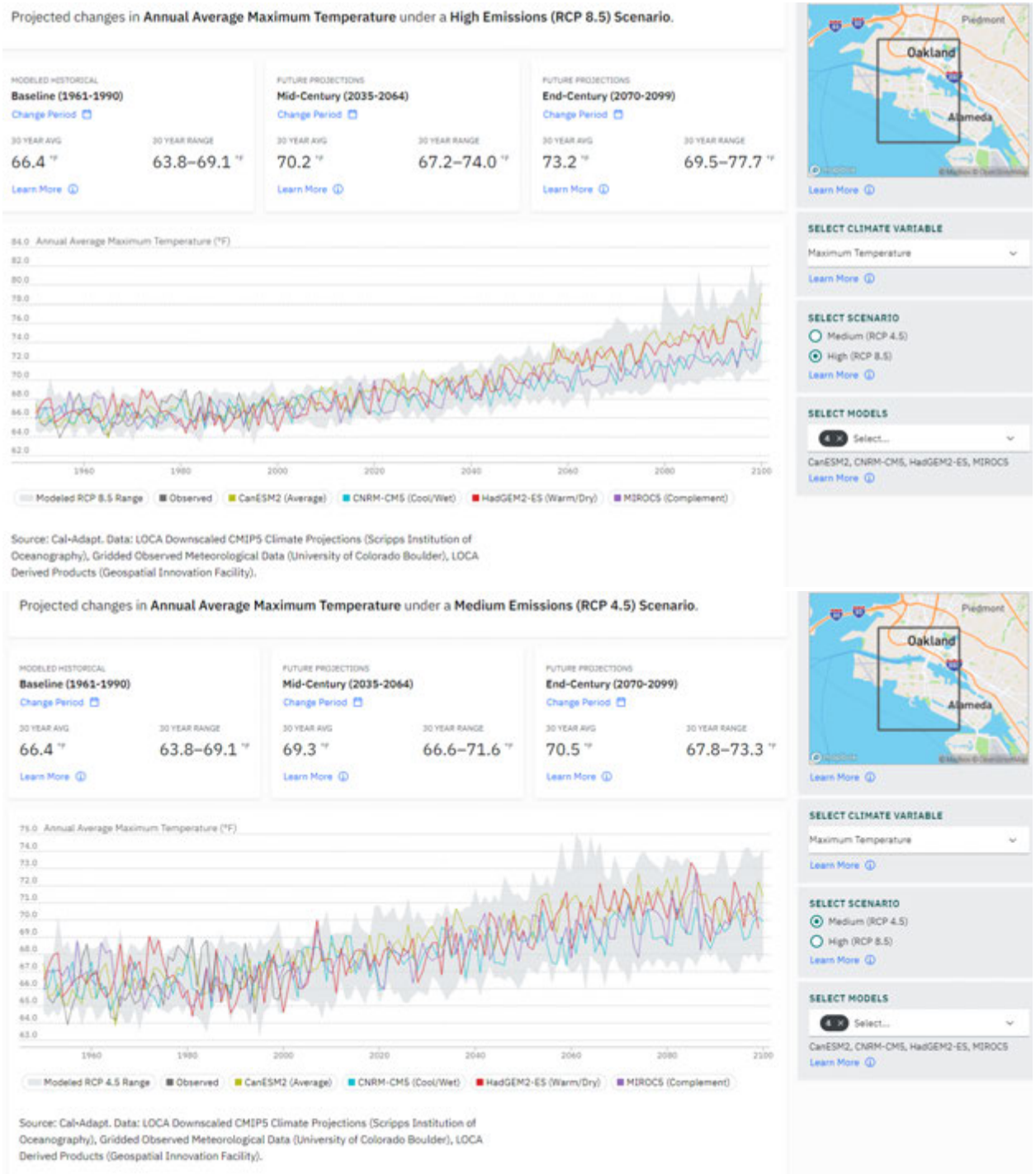
Cal-Adapt

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 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 Park District are shown in Figure 4-21 for Alameda County and Figure 4-22. Each show the following:

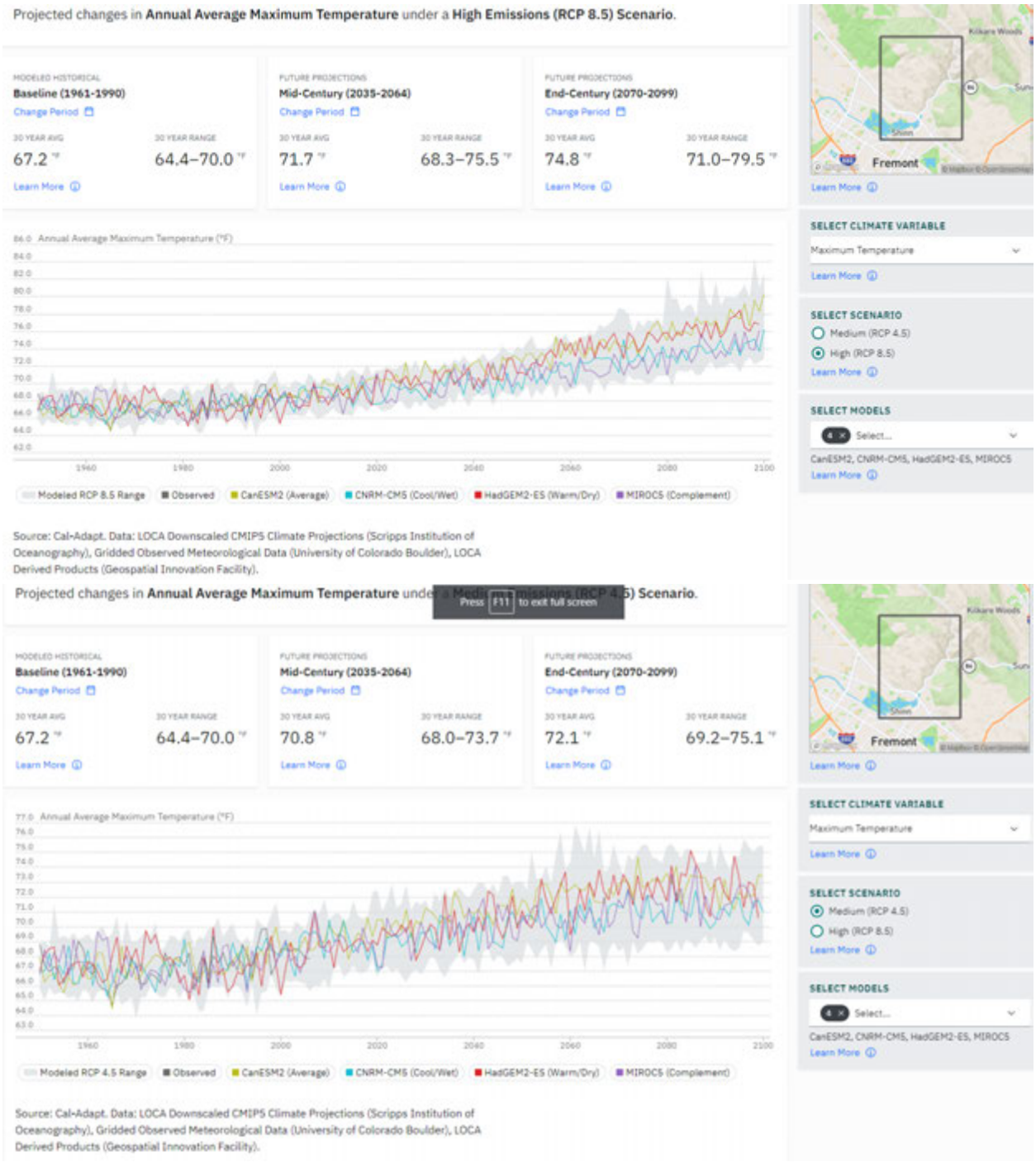
- The upper chart shows the number of days in a year when daily maximum temperature is above the extreme heat threshold of 90.0°F. Data is shown for the Park District under the RCP 8.5 scenario in which emissions continue to rise strongly through 2050 and plateau around 2100.
- The lower chart shows the number of days in a year when daily maximum temperature is above the extreme heat threshold of 90.0 °F. Data is shown for the Park District under the RCP 4.5 scenario in which emissions peak around 2040, then decline.

Figure 4-21 EBRPD (Alameda County)– Future Temperature Estimates in High and Low Emission Scenarios



Source: Cal-Adapt – Temperature: Decadal Averages Map. Retrieved on 6/1/2022.

Figure 4-22 EBRPD (Contra Costa County)– Future Temperature Estimates in High and Low Emission Scenarios



Source: Cal-Adapt – Temperature: Decadal Averages Map. Retrieved on 6/1/2022.

Vulnerability Assessment

Vulnerability—Medium

Extreme heat is becoming more frequent, intense, longer lasting and geographically widespread. Extreme heat occurs on an annual basis in the Park District. In recent years, compounded by climate change conditions, summer months continue to get a bit hotter. Given the various park lands and assets owned and operated by the Park District and the recreational services they provide to surrounding communities, the Park District is uniquely vulnerable to the effects of extreme heat events.

Vulnerability to and Impacts from Extreme Heat

Vulnerable populations are at the greatest risk to the effects of extreme heat. Vulnerable populations to extreme heat include elderly persons, small children, individuals with chronic medical issues, outdoor workers, and can include those recreating during hot days on Park District lands. For the EBRPD, Park District staff including outdoor workers and visitors to the trails and parks can be extremely vulnerable.

Extreme heat normally does not generally impact structures, but Park District staff working in structures may be affected during periods of extended heat, especially in structures that might not be equipped with air conditioning. During extended periods of high temperatures, extreme heat may overload the demands for electricity to run air conditioners and can present health concerns to individuals. The EBRPD noted that extreme heat has caused brownout conditions in the past. A brownout is a reduction in or restriction on the availability of electrical power in a particular area. When brownouts happen during extreme heat, the risk of heat related illnesses and deaths increases. Also depending on the structure, sensitive contents such as IT equipment can be impacted, especially if a power outage occurs.

While structures are generally not affected during extreme heat events, other Park District assets may be vulnerable. The Park District's trails and parks, with their vast amounts of vegetation and other natural resources can be impacted during prolonged extreme heat events. These include turfed areas; landscape, trees that are already compromised from an extended drought, grazing and habitat areas. Other assets that can also be affected by extreme heat include Park District water and sewer utilities. Backup power sources to these critical facilities should be in place to reduce possible impacts from these systems going off line.

Extreme heat may also cause drought-like conditions. 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. Drought is discussed further in Section 4.3.8 and wildfire in Section 4.3.16. Extreme heat can also contribute to initiation of PSPS events.

Future Development

Future development in the Park District will take extreme heat into account. Backup generators are currently in use, and additional generators are being sought. Cool surface playgrounds are being considered as well. The Park District will continue to consider extreme heat when designing new facilities, including incorporating techniques for climate or heat proofing structures.

4.3.3. Severe Weather: Heavy Rains and Storms

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect the EBRPD. These sections include a hazard/problem description; description of location and extent; past occurrences of this hazard; and how climate change can affect this hazard.

Hazard/Problem Description

Storms in the Park District are generally characterized by heavy rain often accompanied by strong winds and infrequent 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 Park District falls mainly in the fall, winter, and spring months. Winter storms in the form of snow are very rare in in the Park District.

Heavy Rain and Storms

The NWS reports that 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.

Location and Extent

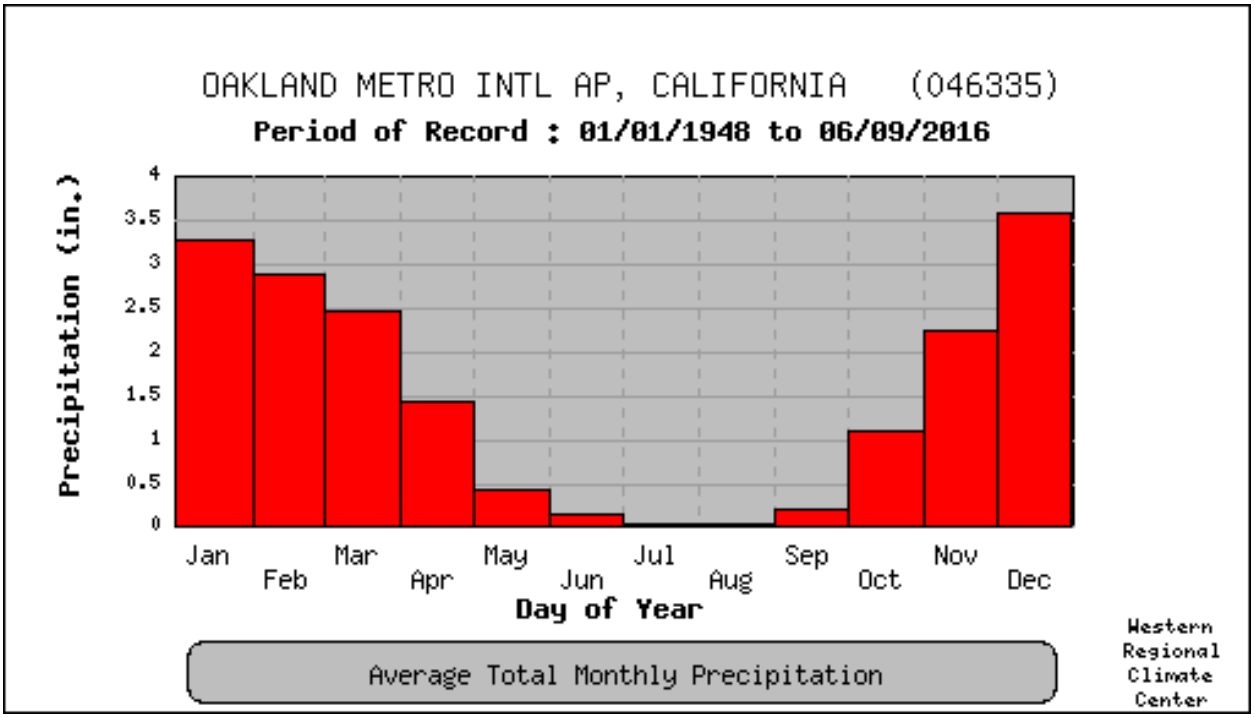
Heavy rain events occur on a regional basis. Rains and storms can occur in any location of the Park District. All portions of the Park District are at risk to heavy rains. Most of these rains occur during the winter months, as discussed below. There is no scale by which heavy rain and storms are measured. Thunderstorms and hail are rare in the Park District. Lightning, while also somewhat rare during storm events, does occur on an infrequent basis. 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 heavy rain and storms in California is often short, ranging from minutes to hours. The WRCC maintains data on weather normal and extremes in the western United States. WRCC data for the Park District is summarized below for the areas in Alameda and Contra Costa counties.

EBRPD (Alameda County) – Oakland Metro International Airport Weather Station, Period of Record 1948 to 2016

According to the WRCC, average annual precipitation in Alameda County side of the Park District is 18.03 inches per year. The highest recorded annual precipitation is 29.37 inches in 1973; the highest recorded precipitation for a 24-hour period is 4.53 inches on October 13, 1962. The lowest recorded annual

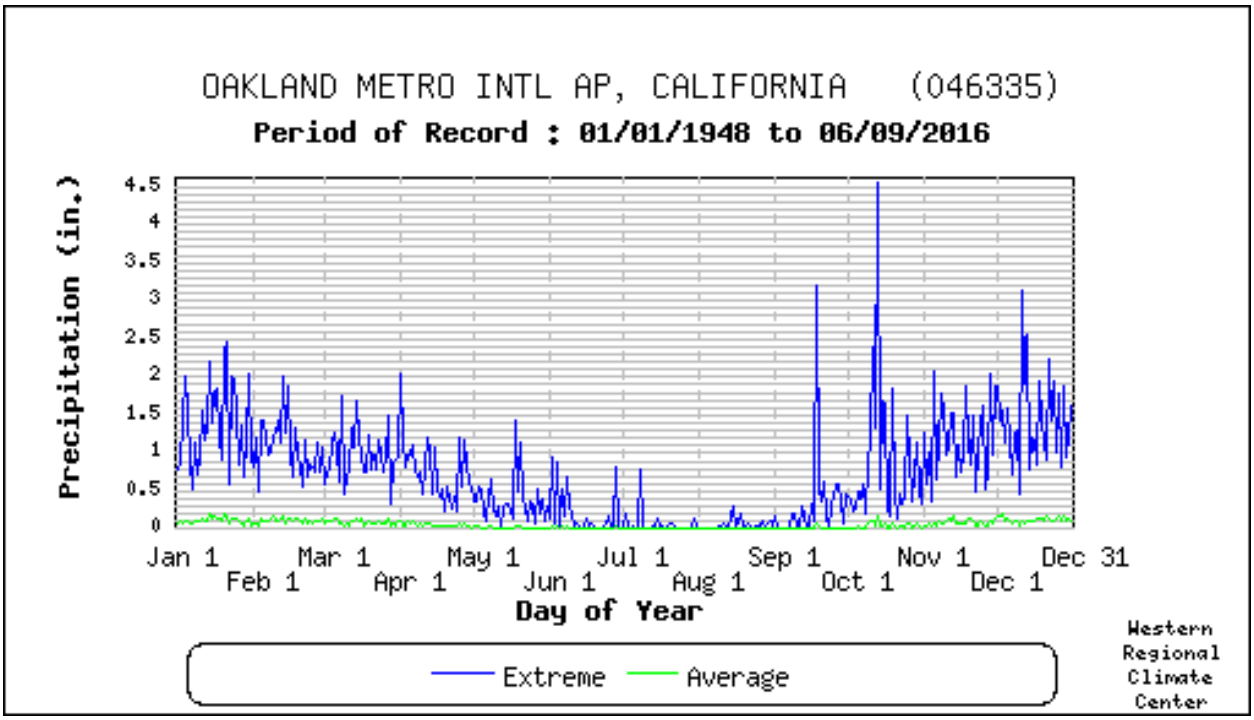
precipitation was 8.64 inches in 1976. Average monthly precipitation for the Park District is shown in Figure 4-23. Daily average and extreme precipitations are shown in Figure 4-24. NWS precipitation was shown on Figure 4-16.

Figure 4-23 EBRPD (Alameda County) – Monthly Average Total Precipitation



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

Figure 4-24 EBRPD (Alameda County) – Daily Average and Extreme Precipitation

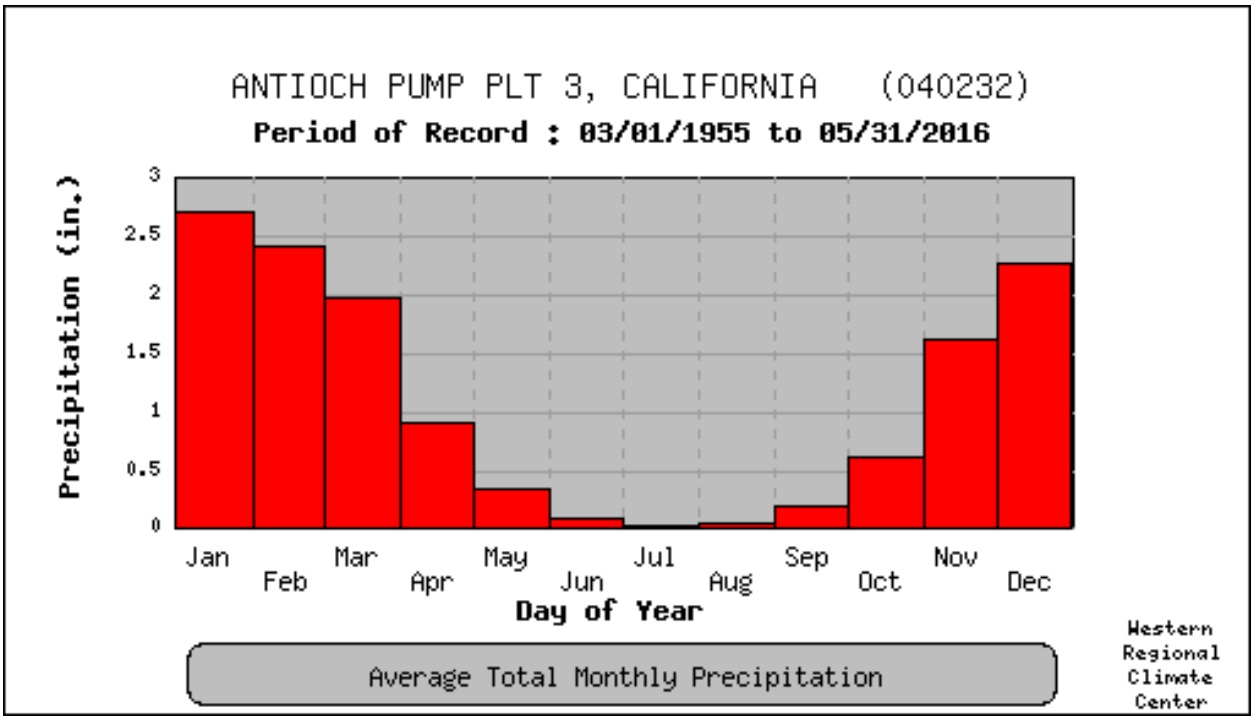


Source: Western Regional Climate Center, www.wrcc.dri.edu/

EBRPD (Contra Costa County) – Antioch Pump Station 3 Weather Station, Period of Record 1955 to 2016

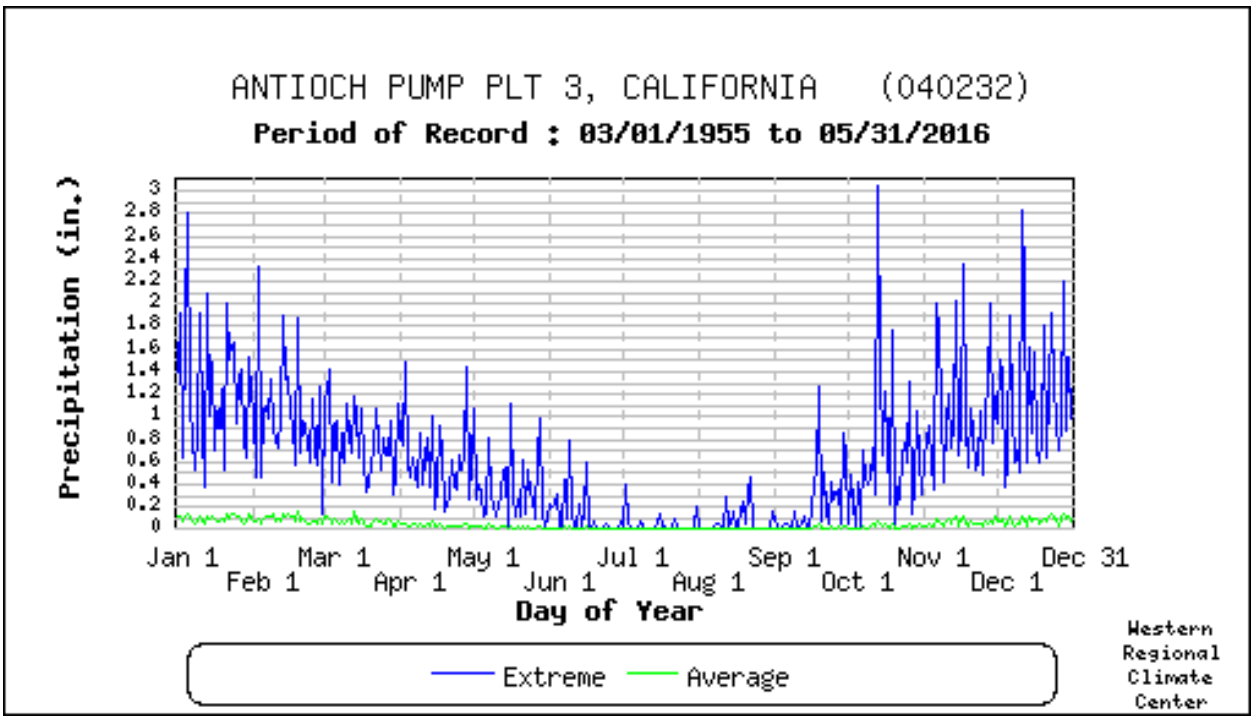
According to the WRCC, average annual precipitation in Contra Costa County side of the Park District is 13.22 inches per year. The highest recorded annual precipitation is 27.75 inches in 1983; the highest recorded precipitation for a 24-hour period is 3.03 inches on October 13, 1962. The lowest recorded annual precipitation was 5.87 inches in 1976. Average monthly precipitation for the Park District is shown in Figure 4-25. Daily average and extreme precipitations are shown in Figure 4-26. NWS precipitation was shown on Figure 4-18.

Figure 4-25 EBRPD (Contra Costa County) – Monthly Average Total Precipitation



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

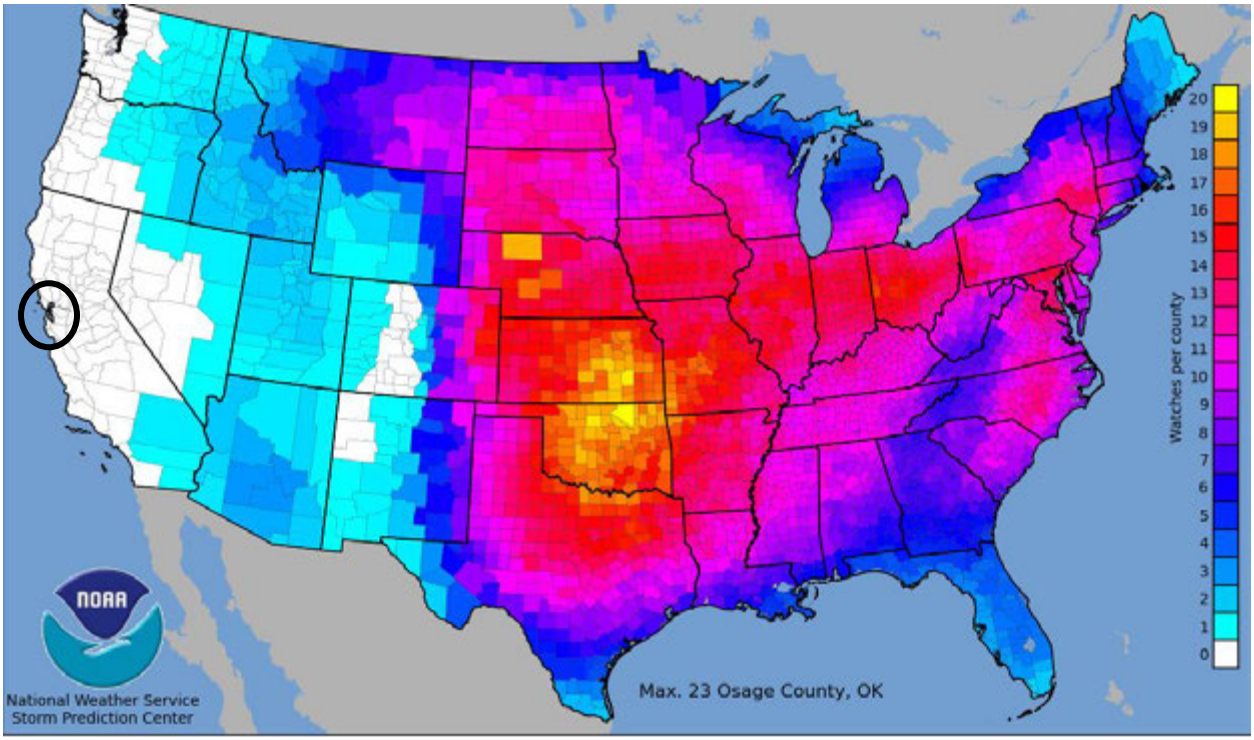
Figure 4-26 EBRPD (Contra Costa County) – Daily Average and Extreme Precipitation



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

The NOAA Storm Prediction Center tracks thunderstorm watches in the United States on a county basis. Figure 4-27 shows thunderstorm watches in the Park District and the United States for a 20-year period between 1993 and 2012.

Figure 4-27 EBRPD – Average Thunderstorm Watches per Year (1993 to 2012)



Source: NOAA Storm Prediction Center. Retrieved on 6/2/2022

Hail

Hail events in the Park District are rare; however, hail can occur throughout the Park District 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. Hailstones 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.

Location and Extent of Hail

While rare, hail events can occur in any location of the Park District. All portions of the Park District are at risk to hail. There is no scale in which to measure hail, other than hail stone size. The National Weather Service classifies hail by diameter size, and corresponding everyday objects to help relay scope and severity to the population. Table 4-29 indicates the hailstone measurements utilized by the National Weather Service.

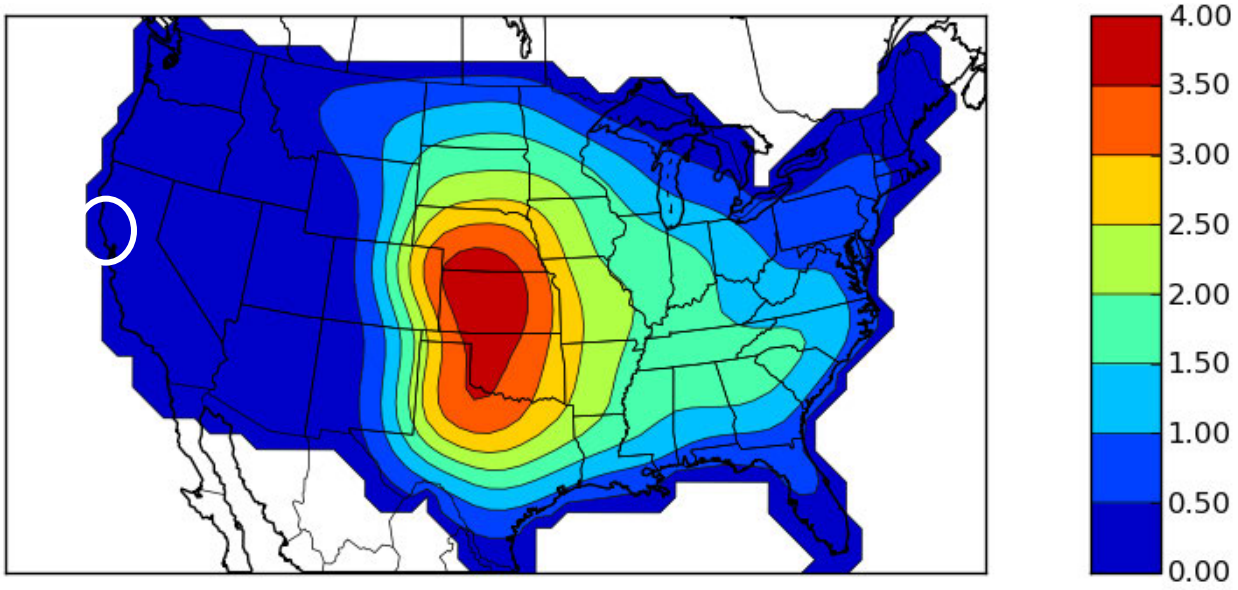
Table 4-29 Hailstone Measurements

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

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 4-28 shows the average days each year where hail of greater than 1" in diameter occurred during a 20-year period from 1990 to 2009. As shown in the figure, hail is rare in the Park District.

Figure 4-28 EBRPD – Average Hail Days per Year (1990 to 2009)



Source: National Weather Service. Retrieved 6/2/2022.

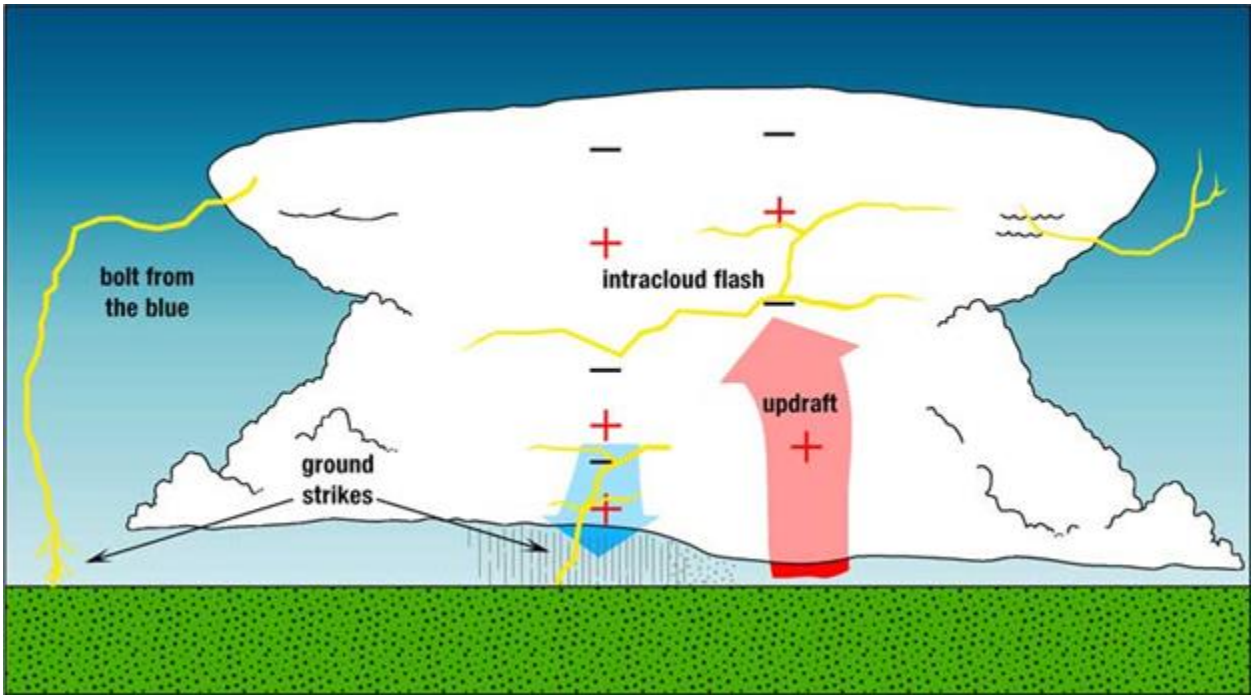
Lightning

Lightning, while somewhat rare in the Park District, can occur throughout the Park District both during and outside of storm events. Lightning is defined by the NWS as any and all of the various forms of visible electrical discharge caused by thunderstorms. 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 4-29). 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 4-29 Cloud to Ground Lightning

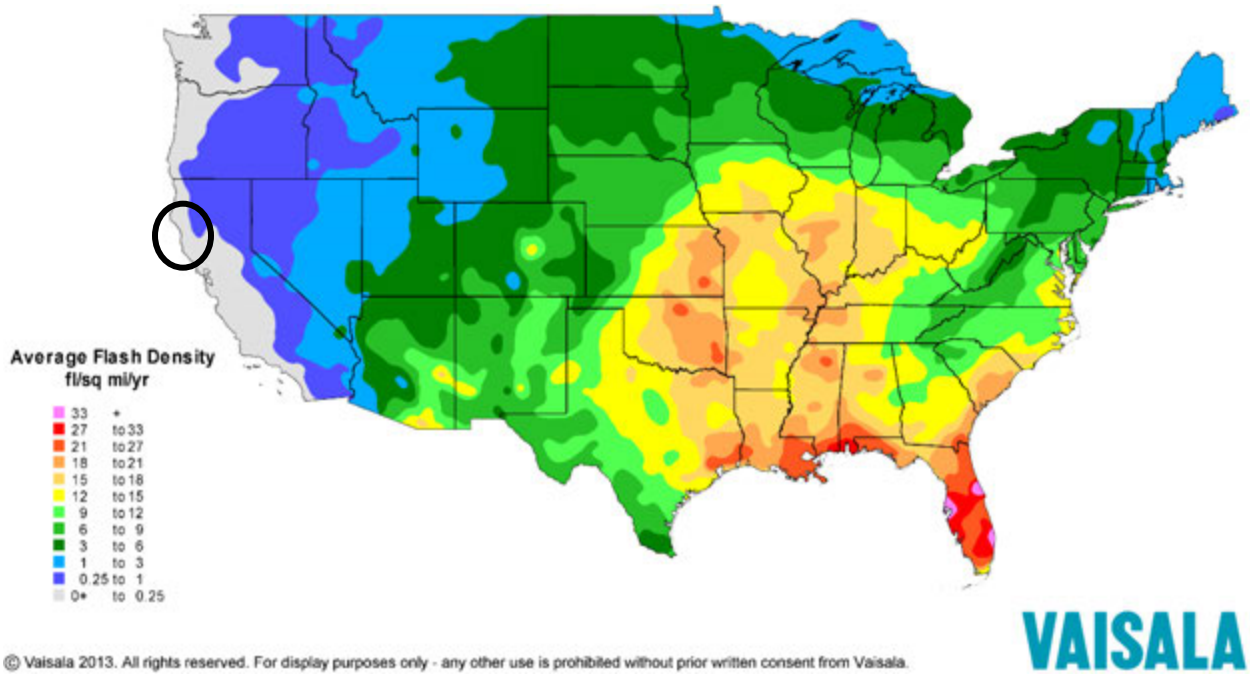


Source: National Weather Service

Location and Extent of Lightning

Lightning events can occur in any location of the Park District and are often associated with thunderstorms, but also may occur outside of rain, often referred to as dry lightning events. All portions of the Park District are at risk to lightning. The speed of onset of thunderstorms (that cause lightning) can be short, and the duration is often short as well, generally ranging from minutes to hours. Vaisala maintains the National Lightning Detection Network. It tracks cloud to ground lightning incidences in the United States. Figure 4-30 shows lightning incidences in the Park District and the rest of the United States from 1997 to 2012.

Figure 4-30 EBRPD – Lightning Incidence Map 1997 to 2012



Source: Vaisala National Lightning Detection Network. Retrieved 6/2/2022.

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 both Alameda and Contra County. Events where heavy rain and storms (including the resultant flooding) resulted in a state or federal disaster declaration are shown in Table 4-30 and Table 4-31. Of the three disaster declarations occurring since the 2017 LHMP, the EBRPD declared for two of the three 2017 events (DR-4305 and DR-4308).

Table 4-30 Alameda County – Disaster Declarations from Heavy Rain and Storms 1950-2022

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Flood (including heavy rains and storms)	19	1950, 1955, 1957, 1958 (twice), 1962, 1963, 1970, 1982, 1983 (twice), 1986, 1995 (twice), 1997, 1998, 2008, 2017 (twice)	17	1955, 1958, 1962 (twice), 1970, 1982, 1983, 1986, 1995 (twice), 1997, 1998, 2005, 2006, 2017 (three)

Source: FEMA, Cal OES

Table 4-31 Contra Costa County – Disaster Declarations from Heavy Rain and Storms 1950-2022

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Flood (including heavy rains and storms)	24	1950, 1955, 1957, 1958 (twice), 1962, 1963, 1969, 1970, 1980, 1982 (twice), 1983 (twice), 1984, 1986, 1992, 1995 (twice), 1997, 1998, 2008, 2017 (twice)	20	1955, 1958, 1962 (twice), 1969, 1970, 1980, 1982, 1983, 1986, 1992, 1995 (twice), 1997, 1998, 2005, 2006, 2017 (three)

Source: FEMA, Cal OES

NCDC Events

The NCDC data recorded 78 and 158 coastal flood, flash flood, flood, hail, heavy rain, high surf, and lightning incidents for Alameda and Contra Costa County since 1955, respectively. Many of these events also affected the Park District. A summary of these events is shown in Table 4-32 and Table 4-33.

*Table 4-32 Alameda County NCDC Storm Events 1/1/1955-1/31/2022**

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Coastal Flood	3	0	0	0	0	$0	$0
Flash Flood	12	0	0	0	0	$100,000	$0
Flood	43	0	0	0	0	$44,325,500	$0
Hail	14	0	0	0	0	$0	$0
Heavy Rain	5	0	2	0	1	$60,000	$30,000
High Surf	1	0	0	0	0	$0	$0
Total	**78**	**0**	**2**	**0**	**1**	**$44,485,500**	**$30,000**

Source: NCDC

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

*Table 4-33 Contra Costa County NCDC Storm Events 1/1/1955-1/31/2022**

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Coastal Flood	2	0	0	0	0	$0	$0
Flash Flood	26	0	0	0	0	$701,000	$0

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Flood	99	0	0	0	0	$17,647,500	$0
Hail	19	0	0	0	0	$5,000,010	$10,000
Heavy Rain	9	1	1	0	5	$2,075,000	$0
High Surf	1	0	0	0	0	$0	$0
Lightning	2	0	0	0	0	$3,000	$0
Total	**158**	**1**	**1**	**0**	**5**	**$25,426,510**	**$10,000**

Source: NCDC

*Note: Losses reflect totals for all impacted areas, some of which fell outside of the Park District and outside of Contra Costa County.

Hazard Mitigation Planning Team Events

The HMPC noted that there are annual events of heavy rains and storms causing issues in the Park District. These are discussed in the Flood (Section 4.3.10) Localized Flood (Section 4.3.11), and Landslide (Section 4.3.12) past occurrences. In 2020, a lightning siege caused multiple fires in the Park District. Affecting over 6,900 acres, lightning caused more than 5 fires on Park District lands. During this event, the resulting smoke caused significant visibility issues, creating a strain on Park District resources. This is discussed in greater detail in the Past Occurrences section (under HMPC events in Section 4.3.16) below.

Likelihood of Future Occurrences

Highly Likely – Based on NCDC data and HMPC input, 78 and 158 coastal flood, flash flood, flood, hail, heavy rain, high surf, and lightning incidents over a 72-year period (1955-2022) equates to a severe storm event every year. As noted, this database likely doesn't capture all heavy rain, hail, lightning, and winter weather events. Severe weather, including heavy rains and storms, is a well-documented seasonal occurrence that will continue to occur often in the Park District.

Climate Change and Heavy Rains and Storms

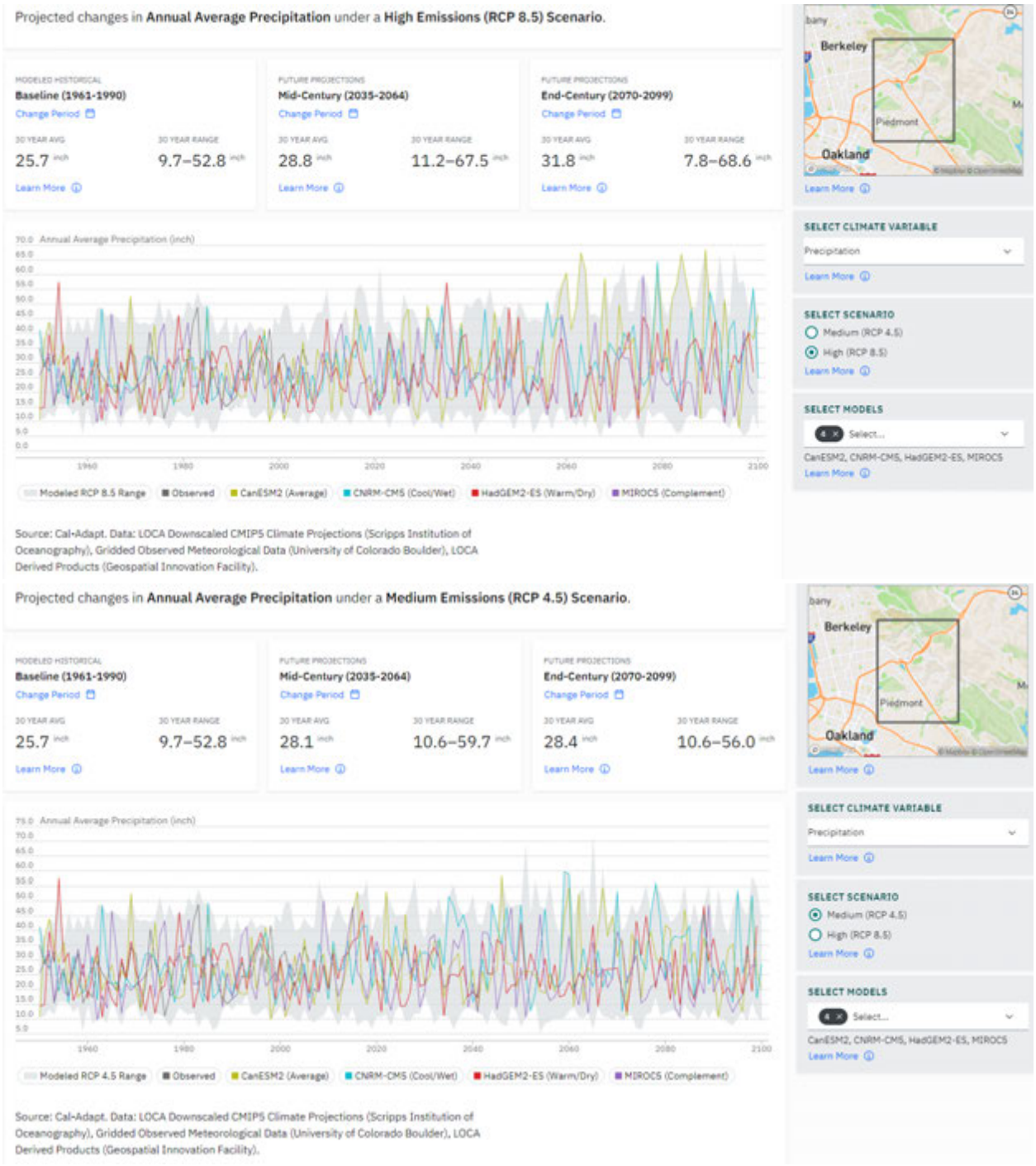
According to the 2021 CAS, while average annual rainfall may increase or decrease slightly, the intensity of individual rainfall events is likely to increase during the 21st century. However, it is unlikely that hail will become more common in the Park District. The amount of lightning is not projected 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 Park District are shown in Figure 4-31 for Alameda County and Figure 4-32 for Contra Costa County. Each consists of two charts:

- The upper chart shows annual averages of observed and projected precipitation values for the selected area on the 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.

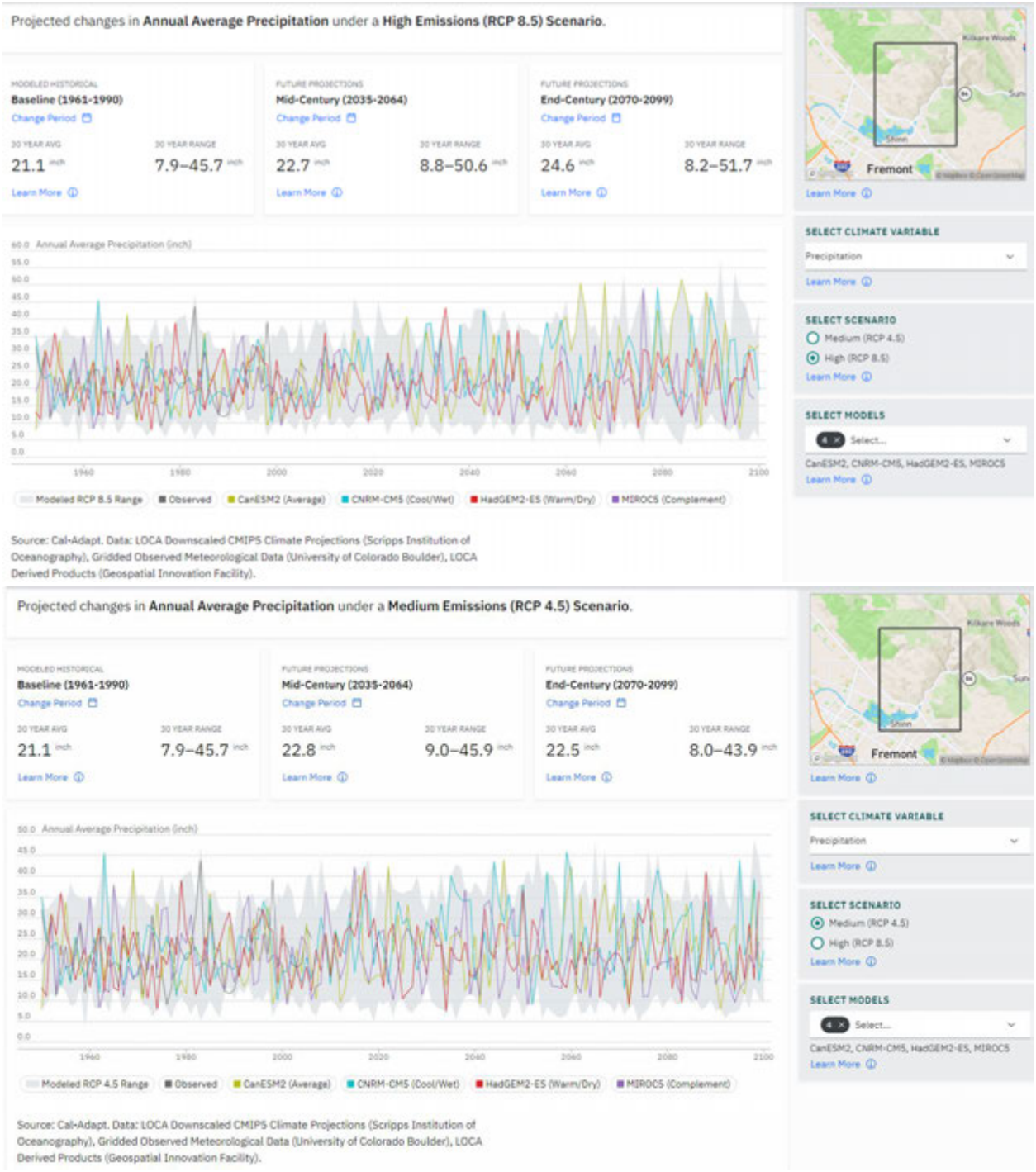
These models have been selected by California state agencies as priority models for research contributing to California's Fourth Climate Change Assessment.

Figure 4-31 EBRPD (Alameda County) – Future Precipitation Estimates in High and Low Emission Scenarios



Source: Cal-Adapt. Retrieved 6/2/2022.

Figure 4-32 EBRPD (Contra Costa County)– Future Precipitation Estimates in High and Low Emission Scenarios



Source: Cal-Adapt – Temperature: Decadal Averages Map. Retrieved on 6/1/2022.

Vulnerability Assessment

Vulnerability—Medium

According to historical hazard data, heavy rains and storms, including lightning, are an annual occurrence in the Park District. Both the population who use the Park District as well as Park District staff and workers and many of the structures and other assets within the Park District can be vulnerable to these events.

Vulnerability to and Impacts from Heavy Rains and Storms

Short-term, heavy storms can cause both widespread flooding as well as extensive localized drainage issues throughout the EBRPD Planning Area. As storms continue to increase in intensity, the limited drainage infrastructure has become an increasingly important issue. Inadequate drainage can contribute to flooding, erosion, and landslides on Park lands. Park trails and other pedestrian infrastructure can be washed out during extreme events. In addition to the flooding that often occurs during these storms, when combined with saturated ground conditions, strong winds can down very mature trees and cause power outages. The safety to workers and visitors to the Park District is a significant concern from hazardous trees in the recreational areas of the EBRPD, as noted in the Park District Hazardous Tree Program. Trees can fall with little or no warning and cause injury or loss of life. Sometimes, areas may have to be closed due to possible danger from hazardous trees.

Impacts from heavy rains and storms include damage to property, and critical facilities and infrastructure, and the natural landscape. This includes: downed trees, damaged utility structures and infrastructure; power outages; road damage and blockages; and lightning strikes to critical infrastructure, and people. Lightning can also cause wildfires to occur, often in remote areas of the Park District. Actual damage associated with the primary effects of severe weather has been somewhat limited. It is the secondary hazards caused by severe weather, such as floods, erosion, landslides, and wildfire that have had the greatest impact on the Park District. The risk and vulnerability associated with these secondary hazards are discussed in other sections of this Plan(Section 4.3.10 Flood: 1%/0.2% Annual Chance, Section 4.3.10 Flood: Localized Stormwater, Section 4.3.6 Dam Failure, Section 4.3.12 Landslide, Section 4.3.13 Levee Failure, and Section 4.3.16 Wildfire).

Future Development

Future development in the Park District will take heavy rains and storms (and the localized flooding they can cause) into account. The Park District will build any new facilities to current building codes of the applicable jurisdiction. Building codes (like the California Building Code) take winds into account during the construction process.

4.3.4. Severe Weather: High Winds and Tornadoes

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect the EBRPD. These sections include a hazard/problem description; description of location and extent; past occurrences of this hazard; and how climate change can affect this hazard.

Hazard/Problem Description

High Winds

High winds can cause significant property and resource damage, threaten public safety, and have adverse economic impacts from facility 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 thunderstorms.

Straight-line (i.e., non-tornadic) 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 snowstorms. 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, as well as contributing to fire weather conditions resulting in red flag days. Winds can push automobiles off roads, damage roofs and structures, cause power outages, and cause secondary damage due to flying debris and hazardous trees.

Location and Extent

The entire Park District is subject to significant, non-tornadic (straight-line) winds. Each area of the Park District is at risk to high winds. Magnitude of winds is measured often in speed and damages. The speed of onset of both thunderstorm winds and high winds outside of thunderstorm events can be short or prolonged, 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, but can occur for longer periods. 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 4-33 shows the Beaufort wind scale.

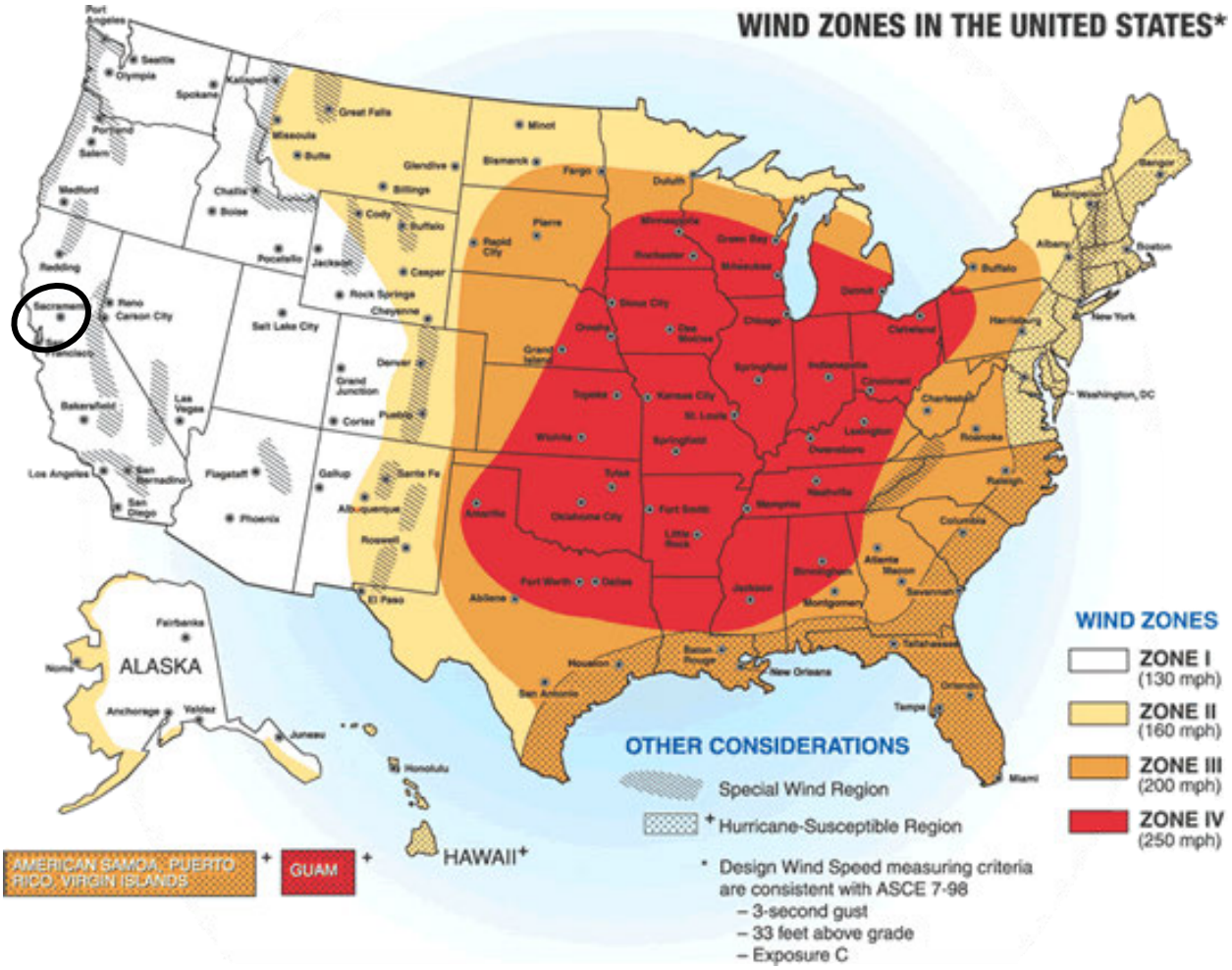
Figure 4-33 Beaufort Wind Scale

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 4-34 depicts wind zones for the United States. The map denotes that the Park District falls into Zone I, which is characterized by high winds of up to 130 mph (above Beaufort Number 12).

Figure 4-34 Wind Zones in the United States



Source: FEMA

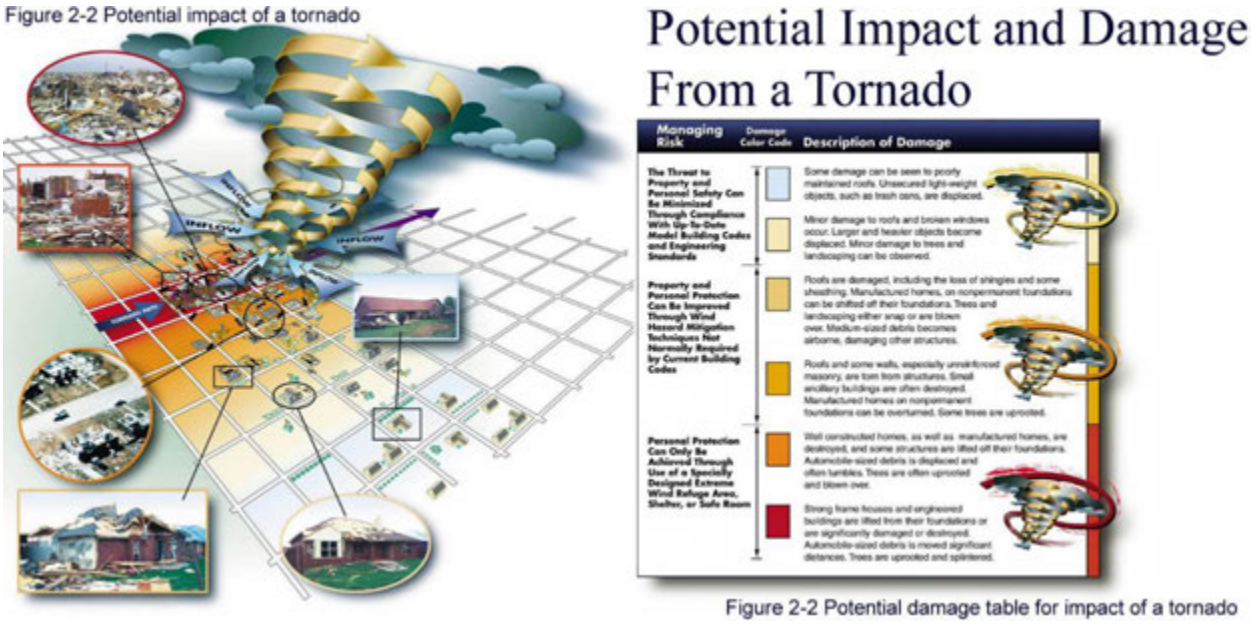
Though not included on the map above as a special wind region, the Park District did note that they are subject to diablo winds on a seasonal basis. Diablo wind is a name that is often used for the hot, dry wind from the northeast that typically occurs in the San Francisco Bay Area of Northern California, during the spring and fall. The Diablo wind is created by the combination of strong inland high pressure at the surface, strongly sinking air aloft, and lower pressure off the California coast. The air descending from aloft as well as from the Coast Ranges compresses as it sinks to sea level where it warms as much as 20°F, and loses relative humidity. While the Diablo wind pattern occurs in both the spring and fall, it is most dangerous in the fall, when vegetation is at its driest such as what occurred during the devastating Tunnel Fire.

Tornadoes

Tornadoes and funnel clouds can also occur during severe storms events. Tornadoes are another severe weather hazard that, though rare in the East Bay, can affect anywhere within the Park District, primarily during the rainy season in the late fall, winter, and early spring. Tornadoes form when cool, dry air sits on top of warm, moist air. Tornadoes are rotating columns of air marked by a funnel-shaped downward extension of a cumulonimbus cloud whirling at destructive speeds of up to 300 mph, usually accompanying

a thunderstorm. Tornadoes are the most powerful storms that exist. They can have the same pressure differential across a path only 300 yards wide or less as 300-mile-wide hurricanes. Figure 4-35 illustrates the potential impact and damage from a tornado.

Figure 4-35 Potential Impact and Damage from a Tornado



Source: FEMA: Building Performance Assessment: Oklahoma and Kansas Tornadoes

Location and Extent

Tornadoes, while rare, can occur in any part of the Park District. Prior to February 1, 2007, tornado intensity was measured by the Fujita (F) scale. This scale was revised and is now the Enhanced Fujita scale. Both scales are sets of wind estimates (not measurements) based on damage. The new scale provides more damage indicators (28) and associated degrees of damage, allowing for more detailed analysis and better correlation between damage and wind speed. It is also more precise because it considers the materials affected and the construction of structures damaged by a tornado. Table 4-34 shows the wind speeds associated with the original Fujita scale ratings and the damage that could result at different levels of intensity. Table 4-35 shows the wind speeds associated with the Enhanced Fujita Scale ratings.

Table 4-34 Original Fujita Scale

Fujita (F) Scale	Fujita Scale Wind Estimate (mph)	Typical Damage
F0	< 73	Light damage. Some damage to chimneys; branches broken off trees; shallow-rooted trees pushed over; sign boards damaged.
F1	73-112	Moderate damage. Peels surface off roofs; mobile homes pushed off foundations or overturned; moving autos blown off roads.
F2	113-157	Considerable damage. Roofs torn off frame houses; mobile homes demolished; boxcars overturned; large trees snapped or uprooted; light-object missiles generated; cars lifted off ground.

Fujita (F) Scale	Fujita Scale Wind Estimate (mph)	Typical Damage
F3	158-206	Severe damage. Roofs and some walls torn off well-constructed houses; trains overturned; most trees in forest uprooted; heavy cars lifted off the ground and thrown.
F4	207-260	Devastating damage. Well-constructed houses leveled; structures with weak foundations blown away some distance; cars thrown, and large missiles generated.
F5	261-318	Incredible damage. Strong frame houses leveled off foundations and swept away; automobile-sized missiles fly through the air in excess of 100 meters (109 yards); trees debarked; incredible phenomena will occur.

Source: National Oceanic and Atmospheric Administration Storm Prediction Center, www.spc.noaa.gov/faq/tornado/f-scale.html

Table 4-35 Enhanced Fujita Scale

Enhanced Fujita (EF) Scale	Enhanced Fujita Scale Wind Estimate (mph)
EF0	65-85
EF1	86-110
EF2	111-135
EF3	136-165
EF4	166-200
EF5	Over 200

Source: National Oceanic and Atmospheric Administration Storm Prediction Center, www.spc.noaa.gov/faq/tornado/ef-scale.html

It is difficult to predict a tornado or the conditions that preclude a tornado far in advance. Tornadoes can strike quickly with very little warning. In California it is rare for tornadoes to exceed an EF3 magnitude. Most tornadoes that touch down are not long lived.

Past Occurrences

Disaster Declaration History

There have been no past federal or state disaster declarations due to high winds or tornadoes, as detailed in Table 4-4 and Table 4-6.

NCDC Events

The NCDC data recorded 353 and 360 high wind incidents for Alameda and Contra Costa County, respectively, since 1955. This includes 5 (all F0) tornado events in Alameda and 6 (5 F0 and 1 EF1) in Contra Costa Counties. A summary of these events is shown in Table 4-36 and Table 4-37.

*Table 4-36 Alameda County NCDC Storm Events 1/1/1950-1/31/2022**

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
High Wind	88	1	0	1	0	$3,210,000	$0
Strong Wind	258	4	0	8	0	$3,753,800	$0

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Thunderstorm Wind	2	0	0	0	0	$50,000	$0
Tornado	5	0	0	0	0	$275,000	$0
Total	**353**	**5**	**0**	**9**	**0**	**$7,288,800**	**$ 0**

Source: NCDC

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

*Table 4-37 Contra Costa County NCDC Storm Events 1/1/1950-1/31/2022**

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
High Wind	88	1	0	1	0	$3,210,000	$0
Lightning	2	0	0	0	0	$3,000	$0
Strong Wind	258	4	1	8	4	$3,753,800	$0
Thunderstorm Wind	6	0	0	0	0	$10,000	$0
Tornado	6	0	0	0	0	$72,500	$0
Total	**360**	**5**	**1**	**9**	**4**	**$7,049,300**	**$ 0**

Source: NCDC

*Note: Losses reflect totals for all impacted areas, some of which fell outside of the Park District and outside of Contra Costa County.

Hazard Mitigation Planning Team Events

The HMPC noted that high wind events are a common occurrence throughout the Park District. They further indicated that some of the most severe high wind events occur outside of storms. These high winds contribute to the potential for catastrophic wildfires as seen in the 1991 Tunnel Fire. It is often high winds, in conjunction with heat and low humidity and compounded by drought conditions, that cause wildfire risk in the Park District to increase. These conditions can also cause red flag days and PSPS events in the Park District as previously described. In 2019 and 2020, the EBRPD recorded 132 PSPS events, associated with high wind events, occurring in District Park lands. The HMPC could not identify any historical damages associated with tornado events to Park District lands or assets.

Likelihood of Future Occurrences

Highly Likely – Based on NCDC data and HMPC input, 353 and 360 wind incidents over a 67-year period (1955-2022) equates to a severe wind event every year. High winds are a well-documented seasonal occurrence that will continue to occur annually in the Park District.

Climate Change and High Winds

According to the 2021 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 or tornadoes.

Vulnerability Assessment

Vulnerability—Medium

EBRPD is subject to potentially destructive high winds and tornadoes. Regional Diablo winds are a significant concern in the Park District. High winds are common throughout the area and can happen during most times of the entire year and outside of a severe storm event. High winds are a significant factor contributing to the EBRPD Hazardous Tree Program. Tornadoes are rare. High winds and tornadoes can be a significant public safety and economic concern.

Vulnerability to and Impacts from High Winds and Tornadoes

High winds and tornadoes can cause damage to structures, critical facilities and infrastructure, and other Park District assets. High winds 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. Of most significant concern to the Park District, high winds, combined with extreme heat and low humidity can lead to red flag days and the increased potential for catastrophic wildfires. In addition, high winds can result in tree fall issues, which can be significant given the 1500 acres of dead standing trees located in the Park District. As well, both the increased risk of wildfire and trees falling, have led to the closing of parks during these high wind events.

Impacts from straight line winds and tornadoes include:

- Injury to people from flying debris and downed trees
- Building and structure damages
- Hazardous and downed trees as noted in the Park District Hazardous Tree Program
- Erosion (soil loss)
- Increased levee, streambank, and coastal erosion during periods of high water and high winds
- Windblown weeds
- Increased chance of a power outage, including PSPS events
- Power line and other utility impacts and economic losses from power outages
- Increased wildfire risk

Future Development

Future development in the Park District will take windstorms into account. The Park District will build any new facilities to current building codes of the applicable jurisdiction. California Building codes take winds into account during the design and construction process.

4.3.5. Climate Change

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect the EBRPD. These sections include a hazard/problem description; description of location and extent; past occurrences of this hazard; and how climate change can affect this hazard.

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 Update 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.

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 noted 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 the Park District and regionally, each year it seems to get a bit warmer. It was also noted that 2017 was one of the wettest years ever. Post 2017 saw many years of very dry weather. 2021 was noted by NASA to be one of the hottest on record. 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. The Park District falls in the Bay Area Region. The Bay Area is a heavily urbanized region (over 7 million people). The predominant feature of this region is San Francisco Bay and the miles of shoreline, both on the Pacific coast and along the bay, extending north to Sonoma County, inland to the Delta, and south to San Jose. The urbanized areas are concentrated primarily around the bay. To the north and south, the region is characterized by low coastal mountains (CDFG, 2007). Sonoma and Napa counties produce wine grapes valued over $850 million in 2010 (California Farm Bureau Federation, 2012). To the east, Solano and

Contra Costa counties are on the western edge of the low-lying California Delta. Table 4-38 provides a summary of Cal-Adapt Climate Projections for the Bay Area Region.

Table 4-38 Bay Area Region – Cal Adapt Climate Projections

Effect	Ranges
Temperature Change, 1990-2100	January: 4°F to 5°F increase in average temperatures July: 5°F to 6°F increase in average temperatures (Modeled high temperatures – average of all models; high carbon emissions scenario)
Precipitation	Precipitation varies widely in this region, with annual totals over 40 inches in northern Sonoma County to roughly 15 inches in the 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 3 (CCSM3) climate model; high carbon emissions scenario)
Sea Level Rise	By 2100, sea levels may rise up to 55 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 of over 40 percent. Coastal areas are estimated to experience an increase of approximately 15 percent in the acreage vulnerable to flooding.
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. (Geophysical Fluid Dynamics Laboratory (GFDL) climate model; high carbon emissions scenario)

Source: Cal-Adapt

Location and Extent

Climate change is a global phenomenon. It is expected to affect the whole of the Park District, surrounding counties, and State of California. There is no scale to measure the extent of climate change. Climate change exacerbates other hazards, 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 4-4 or Table 4-6.

NCDC Events

The NCDC does not track climate change events.

Hazard Mitigation Planning Committee Events

The HMPC noted the following:

- Tree Die back is increasing. The EBRPD noted mass vegetation dieback including large swaths of eucalyptus. By 2020, the Park District had 1,500 acres of dead standing trees, predominantly located in the WUI areas. One of the affected groves was struck by fire in summer of 2022.
- There has been an increase in red flag days. This is problematic as red flag days limit fuels management work. As a result of drought (as exacerbated by climate change) there is more dead biomass to process and less burn days to do so. In addition to an increase in red flag days which limits processing, recent weather patterns are providing less days with adequate air quality to allow burning.
- Lakes and reservoirs are seeing an increase in nutrient loading and blue green algae.
- Ponds on Park District lands are drying up.
- There have been impacts to the grazing program with grazing areas affected and ponds drying up.
- The strength of storms seems to be increasing and the temperatures seem to be getting hotter.

Likelihood of Future Occurrence

Likely – Climate change is virtually certain to continue without immediate and effective global action. According to NASA, 2021 was one of the hottest years on record. Without significant global action to reduce greenhouse gas emissions, the IPCC concludes in its Sixth Assessment Synthesis Report (2022) 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.

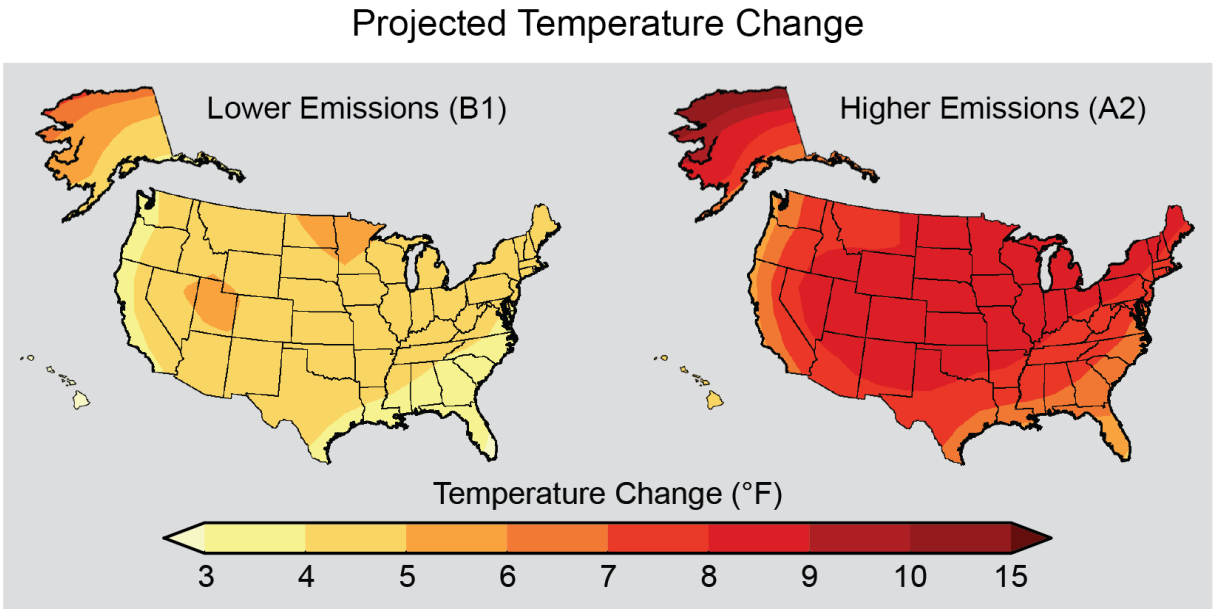
Key Uncertainties Associated with Climate Projections

- 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 4-36.

Figure 4-36 Projected Temperature Change – Lower and Higher Emissions Scenario



Source: National Climate Assessment

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 2021 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 Park District 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 saltwater 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.

Vulnerability Assessment

Vulnerability—High

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 climate change on its own is a hazard, its effect on exacerbating other hazards is also a concern.

EBRPD Climate Change Impacts

The discussion on impacts to the Park District and Alameda and Contra Costa County come from three sources:

- Alameda and Contra Costa County Climate Change and Health Profile Reports (CCHPRs)
- California Adaptation Planning Guide
- Proceedings of the National Academy of Sciences

Impacts from the HMPC were discussed in the Past Occurrences section above.

Alameda and Contra Costa County Climate Change and Health Profile Report Impacts

According to the Alameda and Contra Costa County CCHPRs, 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.

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, saltwater may intrude into coastal aquifers thus reducing quality and quantity of water supply. 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, extreme heat, and wildfire are also exacerbated by climate change. This will be discussed further in Section 4.3.8 (Drought), Section 4.3.2 (Extreme Heat), and Section 4.3.16 (Wildfire). Sea level rise is a byproduct of climate change. It is discussed in Section 4.3.6. 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.

California Adaptation Planning Guide Impacts

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 in the Park District. 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. The APG: Understanding Regional Characteristics identified the following impacts specific to the North Coast region in which the Park District is part of:

- Temperature increases
- Decreased precipitation
- Reduced snowpack
- Reduced tourism
- Ecosystem change
- Sensitive species stress
- Increase wildfire

California's Adaptation Guide: Understanding Regional Characteristics provides input on adaptation considerations for the North Coast 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. Each of the products will be affected by climate change differently. The Park District should collaborate closely with local agricultural organizations to best support and prepare for changes in this economic sector.

Ecosystems and Biodiversity. Exacerbated by new development in the region, climate change can cause habitats to shift, creating conditions that stress ecosystems and endemic species. Continued changes in hydrologic flow regimes and increased temperatures will further stress these systems regional habitats supporting many special-status species.

Snowpack and Flooding. Climate-related decrease in snowpack can have significant consequences on the areas that depend on this water. In addition, a decrease in snowpack can increase impacts from flooding, landslide, and loss of economic base related to a drop in tourism. Increases in flood events can further stress the region and increase flood related impacts and damages.

Water Management. Depending on location, parts of this region are projected to experience between 6 inches and 15 inches less rainfall by 2100. Specifics for the Park District were not given in this report. Reduced rainfall, combined with reductions in snowpack and existing diversions, could result in an altered flow regime in the region. This change would be particularly challenging due to its impact on fish. Reduced flow, altered timing of flows, and periodic extreme events can result in reduced water quality, habitat destruction, and/or isolation of habitats. The Park District will need to carefully assess local aquatic ecosystems for vulnerability to these changes.

Wildfire. The North Sierra Region is already challenged through past fire suppression combined with the large number of structures that have been built throughout the WUI areas. Climate change is projected to result in large increases in wildfire frequency and size which will further compound the wildfire problem.

In addition, potential impacts following fires, such as heavy rains causing landslide and erosion in post-burn areas can have significant consequences on waterways and entire watersheds.

Proceedings of National Academy of Sciences Impacts

In addition to the APG, a report from the Proceedings of the National Academy of Sciences (PNAS) stated 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 spend a lot of time working or recreating outdoors.

Future Development

The EBRPD Planning Area could see population fluctuations as a result of climate impacts relative to those experienced in other regions, and these fluctuations are expected to affect Park District use. While there are currently no formal studies of specific migration patterns expected to impact the Park District, 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. Future development issues in the Park District are expected to be as follows:

- **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. 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 by the Park District and the surrounding counties 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 Park District. 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 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. 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.

4.3.6. Coastal Flooding and Sea Level Rise

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect the EBRPD. These sections include a hazard/problem description; description of location and extent; past occurrences of this hazard; and how climate change can affect this hazard.

Hazard/Problem Description

Coastal Flooding

Historically, cities, towns and villages were often settled around ports and waterways along the nation's coastlines, providing individuals and families opportunities for trade, jobs and transportation, recreation and relaxation. These areas are extremely important to our nation, with great economic, historic and cultural significance. Although the coastal areas of the United States comprise only one-fifth of the land area of the contiguous 48 states, they account for more than half of the nation's population and housing supply. In 1990, over 133 million Americans lived in the 673 counties along the Atlantic and Pacific Oceans, the Gulf of Mexico and the Great Lakes. Since 1960, population in these areas increased by 41 percent. The continued increase in coastal population leads to increased coastal development, which places greater numbers of people and structures at risk from coastal hazards.

Coastal flooding can result from a variety of different causes including storm surges created by tidal influences; storms like hurricanes and tropical cyclones, and even strong rain and wind storm events; rising sea levels due to climate change (discussed below) and to a much lesser extent by possible tsunamis events (discussed in Section 4.3.6).

Sea Level Rise

In the past decade, there have been groundbreaking studies and an increased public awareness on the worldwide effects of climate change associated with global warming. Studies continue to document that global warming is continuing at progressive rates, which has been demonstrated by warmer and colder seasonal temperatures and patterns of more severe seasonal storm events. Sea-level rise has accelerated in recent decades due, in part, to increasing ice loss in the world's polar regions. Latest data from the World Meteorological Organization shows that global mean sea-level reached a new record high in 2021, rising an average of 4.5 millimeter per year over the period 2013 to 2021. It is projected that sea levels will continue to rise as precipitation continues to increase and ice caps continue to melt. There are number of large geographic areas of EBRPD that are at risk of coastal flooding and will be dramatically impacted by sea level rise.

Location and Extent

The coastal areas of EBRPD at risk for coastal flooding will also be affected by sea level rise. These geographic areas include park lands with low-lying elevations (some at sea level), and areas that are now filled and were once marshland. Geographic extents of coastal flooding in FEMA DFIRM VE zones is shown on Figure 4-38. Duration of coastal flooding generally lasts as long as the storm that causes it and

is relatively short, with a quick speed of onset. There is no scientific scale to measure coastal flooding, as floods are measured in depths of flooding.

Geographic extents of baseline coastal flooding and potential sea level rise scenarios are shown on Table 4-43 in the Vulnerability Assessment below. Duration of sea level rise is thought to be long. The speed of onset is slow. There is no scientific scale for sea level rise, other than the actual physical measurement of sea level.

Past Occurrences

Disaster Declaration History

There have been 19 state and 17 federal disaster declarations due to flooding and heavy rains and storms in Alameda County as shown in Table 4-39. There have been 24 state and 20 federal disaster declarations due to flooding and heavy rains and storms in Contra Costa County as shown in Table 4-40. Of the three disaster declarations occurring since the 2017 LHMP, the EBRPD declared for two of the three 2017 events (DR-4305 and DR-4308). These events are known to have caused some measures of coastal flooding, as compounded by sea level rise, affecting EBRPD lands. No disaster declarations have occurred specific to sea level rise.

Table 4-39 Alameda County Disaster Declarations 1950-2022 from Flood

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Flood (including heavy rains and storms)	19	1950, 1955, 1957, 1958 (twice), 1962, 1963, 1970, 1982, 1983 (twice), 1986, 1995 (twice), 1997, 1998, 2008, 2017 (twice)	17	1955, 1958, 1962 (twice), 1970, 1982, 1983, 1986, 1995 (twice), 1997, 1998, 2005, 2006, 2017 (three)

Source: Cal OES, FEMA

Table 4-40 Contra Costa County Disaster Declarations 1950-2022 from Flood

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Flood (including heavy rains and storms)	24	1950, 1955, 1957, 1958 (twice), 1962, 1963, 1969, 1970, 1980, 1982 (twice), 1983 (twice), 1984, 1986, 1992, 1995 (twice), 1997, 1998, 2008, 2017 (twice)	20	1955, 1958, 1962 (twice), 1969, 1970, 1980, 1982, 1983, 1986, 1992, 1995 (twice), 1997, 1998, 2005, 2006, 2017 (three)

Source: Cal OES, FEMA

NCDC Events

The NCDC does not track sea level rise. There are NCDC events for coastal flooding, which are shown in Table 4-41 for Alameda County and in Table 4-42 for Contra Costa County.

*Table 4-41 Alameda County NCDC Coastal Flood Events 1/1/1950-1/31/2022**

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Coastal Flood	3	0	0	0	0	$0	$0
High Surf	1	0	0	0	0	$0	$0
Total	**4**	**0**	**0**	**0**	**0**	**$ 0**	**$ 0**

Source: NCDC

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

*Table 4-42 Contra Costa County NCDC Coastal Flood Events 1/1/1950-1/31/2022**

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Coastal Flood	2	0	0	0	0	$0	$0
High Surf	1	0	0	0	0	$0	$0
Total	**3**	**0**	**0**	**0**	**0**	**$ 0**	**$ 0**

Source: NCDC

*Note: Losses reflect totals for all impacted areas, some of which fell outside of the Park District and outside of Contra Costa County.

Hazard Mitigation Planning Team Events

The HMPC noted that coastal flooding is an annual event, with some past damages and that sea level rise is adding to the concern of coastal flooding. The EBRPD is concerned that sea level rise will exacerbate these damages in the future. Past events with damage since the 2017 Plan include:

- **2017** – Hayward Shoreline, Site 3 Marsh Levee, 2 sections of the levee were damaged. 1) Approx 30' long by 3' wide section of trail was lost. 2) Approx 25' long by 3' wide section of trail was lost. Repair with rip rap and rock fill. Restore trail.

Likelihood of Future Occurrence (for both Coastal Flooding and Sea Level Rise)

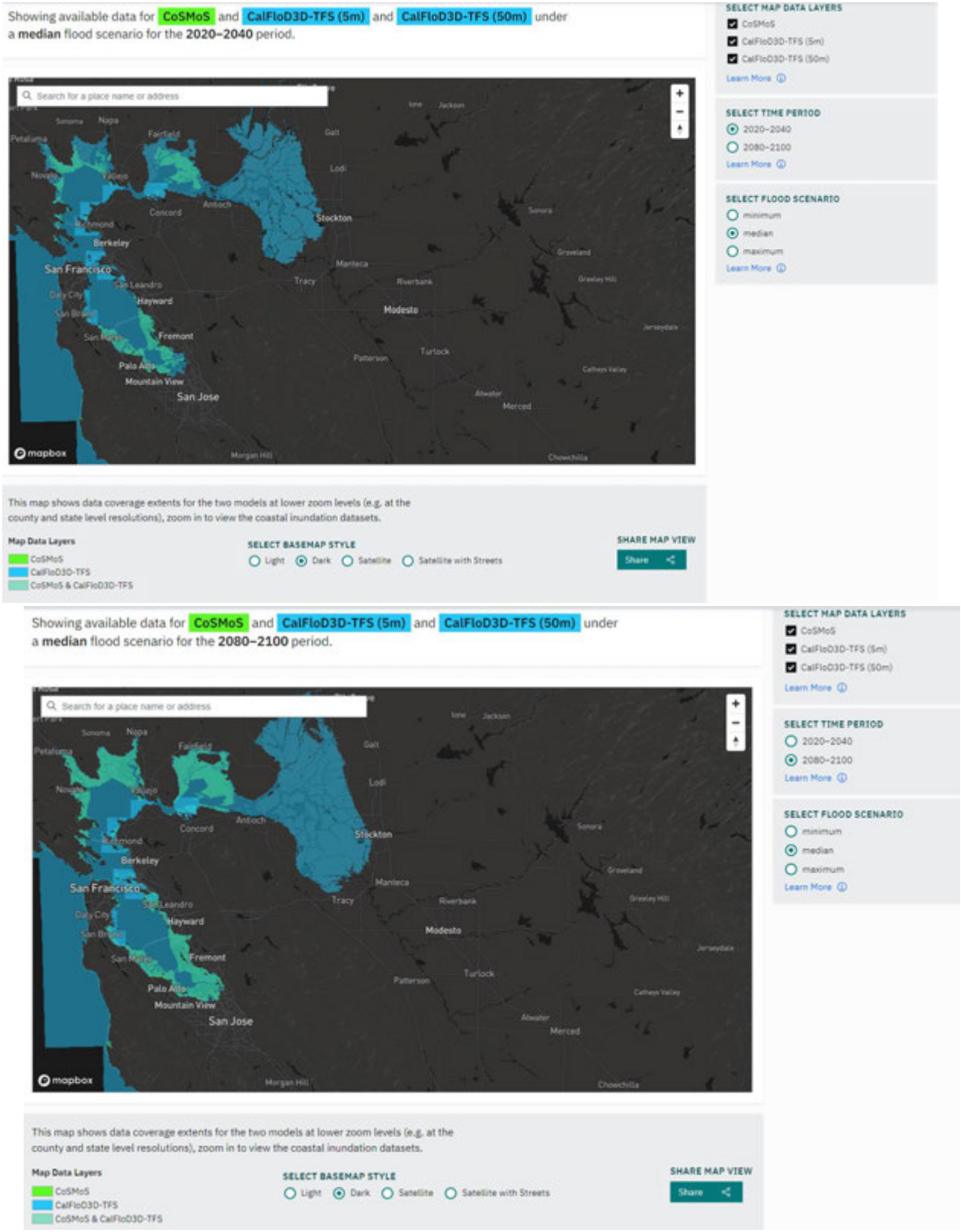
Likely – Coastal flooding occurs in the Park District during large storm events. Studies continue to document that global warming is continuing at progressive rates, which has been demonstrated by warmer and colder seasonal temperatures and patterns of more severe seasonal storm events. It is projected that sea levels will continue to rise as precipitation continues to increase and ice caps continue to melt. This will compound the coastal flooding issues. Therefore, the HMPC regards the likelihood of future occurrence of coastal flooding and sea level rise as likely.

Climate Change and Coastal Flooding and Sea Level Rise

Global models indicate that California will see substantial sea level rise during this century, with the exact magnitude depending on such factors as, global emissions, rate at which oceans absorb heat, melting rates and movement of land-based ice sheets, and local coastal land subsidence or uplift. Cal-Adapt's "Sea Level Rise" map tool displays areas that may be vulnerable to inundation during an extreme storm event (coastal flooding) coupled with sea level rise. Information from that tool for the EBRPD is shown in Figure 4-37.

The upper map shows expected sea level rise between 2020 and 2040, while the lower map shows expected sea level rise between 2080 and 2100.

Figure 4-37 EBRPD –Coastal Flooding and Sea Level Rise Threatened Areas



Source: Cal Adapt Sea Leve Rise – Coast Inundation Scenarios. Retrieved 6/29/2022.

According to the California Adaptation Planning Guide, Understanding Regional Characteristics, with all of the coastal development in the Bay Area Region, sea level rise is likely to be the greatest threat to the Bay Area from Climate Change significantly affecting development, infrastructure, transportation infrastructure, populations, and the environment.

Vulnerability Assessment

Vulnerability—High

Coastal Flooding and global climate change, sea level rise, and the need to nurture sustainable community development have become widely recognized issues that need to be addressed by Bay Area communities. The Park District is impacted by these issues in its long-term operations and has an important role to play in contributing to the sustainability of the region. Complicating this situation is the realization that coastal flooding and sea level rise is affecting California's and The Bay Area's ecosystems in ways that are still too complex to fully understand.

Many coastal areas experience periodic minor-to-moderate shallow coastal flooding events typically as a result of meteorological factors that include high tides, winds, and rain. These events often affect roadways, buildings, natural resources and critical infrastructure. Properties located in low lying areas, including those in DFIRM VE flood zones, are most at risk, not just to long term inundation by the sea but more frequent coastal flooding during storm events. EBRPD has a significant history of coastal flooding during "normal" rain events. The saying "Today's flood is tomorrow's high tide" is particularly applicable to areas that are frequently inundated due to seasonal rain events. More frequent tidal, rain events, and storm surge flooding of low-lying areas would cause more frequent flooding of the coastal shorelines where EBRPD has numerous Park District lands and assets. This can disrupt travel and damage roads, highways, levees, trails, natural resource areas, bridges, and other structures in coastal areas.

Vulnerability to and Impacts from Coastal Flooding and Sea Level Rise

All of the Park District lands located in coastal areas are exposed to at least some level of inundation from coastal flooding and sea level rise. Low-lying park lands consisting mostly of wetlands, such as the North Richmond Shoreline, Bay Point Shoreline, Martinez Shoreline, Point Isabel and Waterbird will be significantly impacted much sooner with only one foot of sea level rise and will be nearly inundated with 6 feet of sea level rise. Higher elevation park lands, such as Miller Knox Regional Shoreline and Oyster Bay Regional Shoreline, may only experience limited inundation even with eight feet of sea level rise.

Coastal flooding is expected to worsen from sea level rise. The Park District noted that coastal flooding and sea level rise impacts include:

- A projected rise in sea level of between 15 and 55 inches will impact the Park District's 55 miles of Bay-Delta shoreline through increased sand and bank erosion as well as the loss of land, directly affecting the Bay Trail, piers, levees, boat launches, developed wetland areas, and other shoreline facilities. Although much of the Park District's shoreline ownership is offshore wetlands, this protected open space serves an essential function as a buffering mechanism for adjacent communities and vital infrastructure against storm damage and tidal flooding. The Park District is already facing major

expenses for beach replacement at Crown Beach and levee repair to protect marsh habitat along the Hayward Shoreline due to coastal flooding.

- More frequent coastal floods: Rising sea levels will lead to more frequent flooding of existing flood-prone areas, including more frequent overtopping and overbank flooding of riverine systems that already flood when rainfall coincides with high tides due to the increased backwater effect. In addition, gravity drained and pumped systems that discharge stormwater into flood control channels can have reduced performance, causing backups and flooding of streets.
- More extensive, longer-duration coastal flooding: As sea levels rise, storm events will flood larger areas for longer periods of time and that there will be new overtopping and overbank flooding of riverine systems that that do not currently cause flooding.
- Shoreline erosion and overtopping from coastal flooding: Sea level rise may cause shoreline protection, such as levees, berms and revetments, to be damaged or fail to due to increased tidal and wave energy. There is also the potential that shoreline protection will be overtopped during storm events when there are extreme tide levels and wind-driven waves, flooding inland areas, including homes and community services that are currently protected.
- Elevated groundwater and increased salinity intrusion: As sea levels rise, groundwater and salinity levels are also predicted to rise. This may cause damage to below grade living spaces, finished basements, and electrical/mechanical equipment that is below or at-grade. In addition, increasing groundwater levels may increase liquefaction susceptibility, and require the use of pumping of stormwater for flood management, which will increase both operations and maintenance costs.
- Permanent inundation: Sea level rise can cause areas that are not currently exposed to regular high tide inundation to be flooded, resulting in the need to either protect or move people and infrastructure, and the loss of trails, beaches, vistas, and other shoreline recreation areas. In addition, increased tidal scour due to increased tidal prism in riverine systems can trigger changes in channel geometry and sediment transport processes.
- As sea level rises, so will the groundwater table and salinity levels, which can impact the vegetation and habitat in shoreline parks, increase the areas subject to liquefaction in earthquakes and require the use of pumping of stormwater for flood management, increasing both operations and maintenance costs.

The Adapting to Rising Tides Program (ART) of the Bay Conservation Development Commission undertook an analysis to understand the sea level rise vulnerability and risk to shoreline parks within the Park District. In many locations, the Park District flood protection systems protect not only its own park and recreation areas, but also inland development, such as that managed by Union Pacific Railroad, cities, and private landowners.

Projected rise in sea level rise will impact the Park District's 40 miles of Bay Shoreline through increased sand and bank erosion, as well as the loss of land, directly affecting the Bay Trail, piers, levees, boat launches, developed wetland areas and other shoreline facilities. Although much of the Park District's shoreline ownership is offshore wetlands, the protected open space serves an essential function as a buffering mechanism for adjacent communities against storm damage and tidal flooding. The Park District has already faced major expenses for beach and replacement at Crown Beach and levee repair to protect marsh habitat along the Hayward Shoreline.

The EBRPD noted that coastal flooding and sea level rise are exacerbated during king tides. King tides are simply the very highest tides. They are naturally occurring, predictable events. King tides of today may

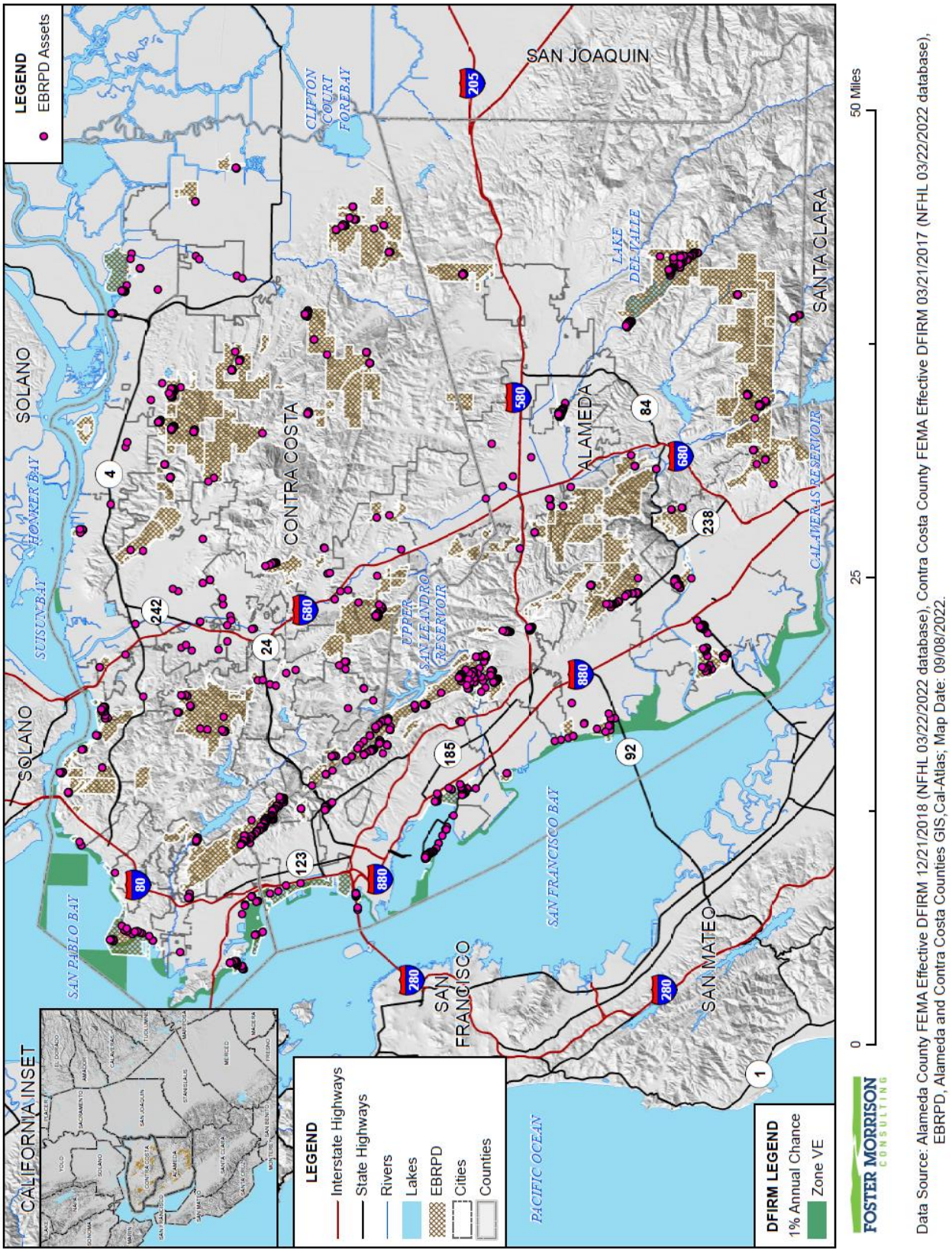
give an idea of future normal conditions that may occur due to sea level rise. High tides may coincide with heavy rain causing coastal flooding, coastal bluff erosion, and landslides, such as were experienced during the 1998 and 2016 El Nino storms. The 2018 California State Hazard Mitigation Plan noted that coupled with increased frequency, severity, and duration of high tide and storm events related to climate change, sea-level rise will exacerbate these extreme events along the coast. These events may expose the coast to severe flooding and erosion; damage to coastal structures, real estate, public access, and coastal habitats; and seawater intrusion into delta areas and coastal aquifers. El Niño events exacerbate storms and coastal inundation above that already occurring due to sea-level rise and normal coastal weather and tidal patterns.

Park Lands and Assets at Risk to Coastal Flooding and Sea Level Rise

Coastal Flooding Analysis

Coastal flooding areas are part of the DFIRM analysis in Section 4.3.10 below. Reference that section for additional coastal flooding analysis. The VE DFIRM zones are coastal flooding zones that are part of the 1% annual chance flood. Figure 4-38 shows FEMA DFIRM VE zones. The HMPC noted that this is only a subset of where coastal flooding occurs, as DFIRM mapping is done for flood insurance purposes.

Figure 4-38 EBRPD – FEMA DFIRM Coastal VE Zones



Parks in the DFIRM VE flood zones include:

- Alameda Point Shoreline Trail
- Brooks Island
- Carquinez Strait Shoreline
- Crown Beach
- Hayward Shoreline
- Judge John Sutter Shoreline
- McLaughlin Eastshore
- Miller/Knox Shoreline
- Oyster Bay Shoreline
- Point Isabel Shoreline
- Point Pinole Shoreline
- San Pablo Bay Shoreline

Sea Level Rise Analysis

GIS was used to analyze EBRPD park lands and assets potentially at risk to sea level rise. EBRPD park lands and asset data obtained from the Park District were intersected with CoSMoS v2.1 2021 sea level rise scenario data to determine Park District lands and assets that fall into defined sea level rise scenario areas. Separate analysis was performed for park lands (in acres) and park assets (as types of assets and replacement values). Affected Park District lands and assets are described below.

Note, the sea level rise scenario data used to evaluate park exposure does not account for the nearshore dynamic processes; the percentage of shoreline parks expected to be flooded are conservative estimates of the potential impact to these areas.

Figure 4-39 shows the six Sea Level Rise Scenarios for the Park District. These 6 scenarios are:

- Existing Condition: 0-year (tidal) scenario
- Existing Condition: 100-year (storm) scenario
- 1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario
- 1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario
- 2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario
- 2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario

These are the same 6 scenarios used in their EBRPD Sea Level Rise risk assessment study for the Bay Trail (Se-Level Rise Hazard Mapping and Coastal Data Memo). Figure 4-39 shows the six Sea Level Rise scenarios for the entirety of the Park District. Figure 4-40 shows the six Sea Level Rise Scenarios zoomed into the northern portion of the Park District Figure 4-41 shows the six Sea Level Rise Scenarios zoomed into the western portion of the Park District. Table 4-43 summarizes the Park District lands and acres that lie in each Sea Level Rise Scenario, while Table 4-44 summarizes the Park District assets and replacement values that lie in each Sea Level Rise Scenario. More detail on specific park lands and assets in these Scenarios can be found in Appendix F.

Figure 4-39 EBRPD – Sea Level Rise Scenarios

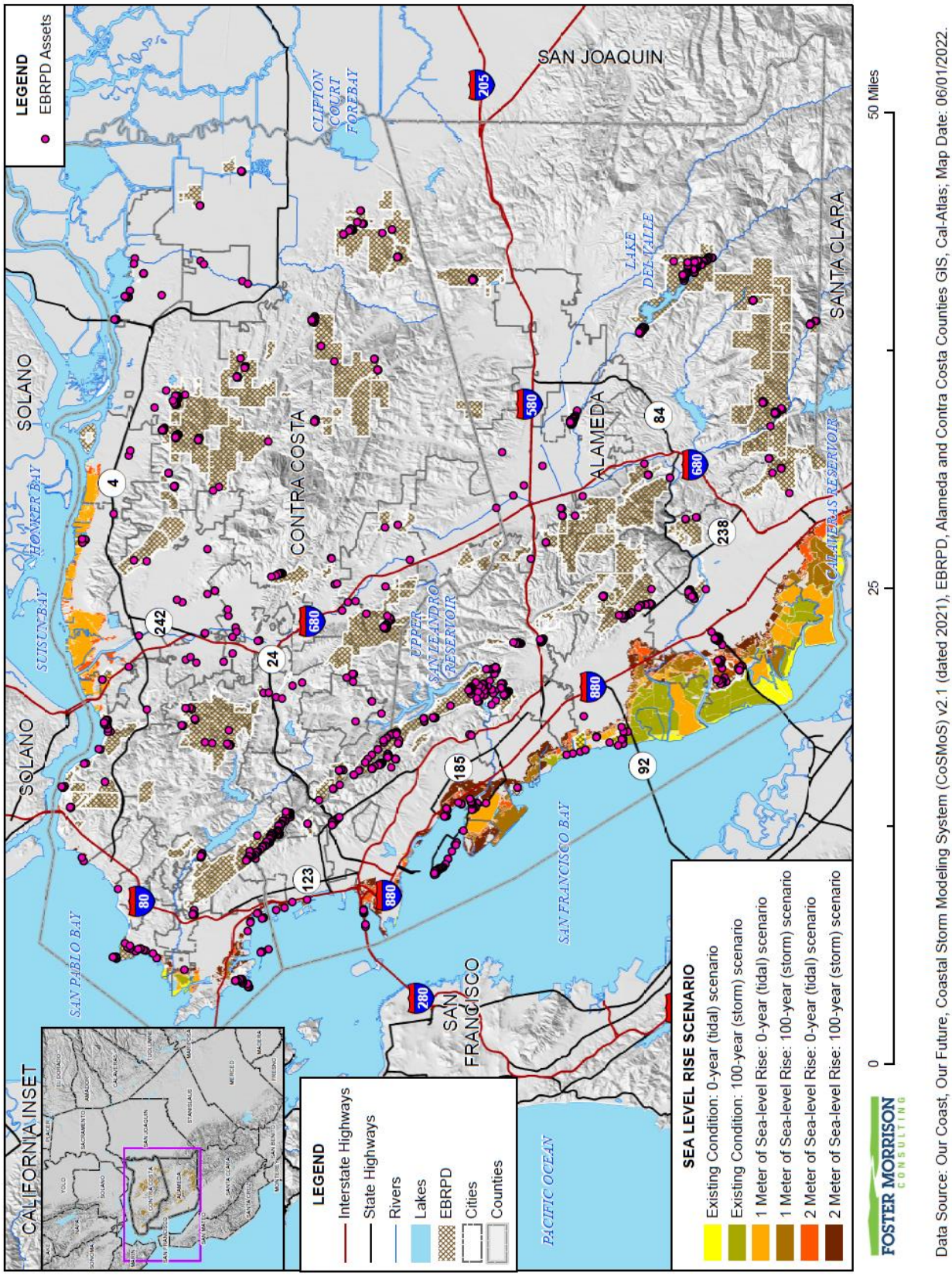


Figure 4-40 EBRPD – Sea Level Rise Scenarios (North)

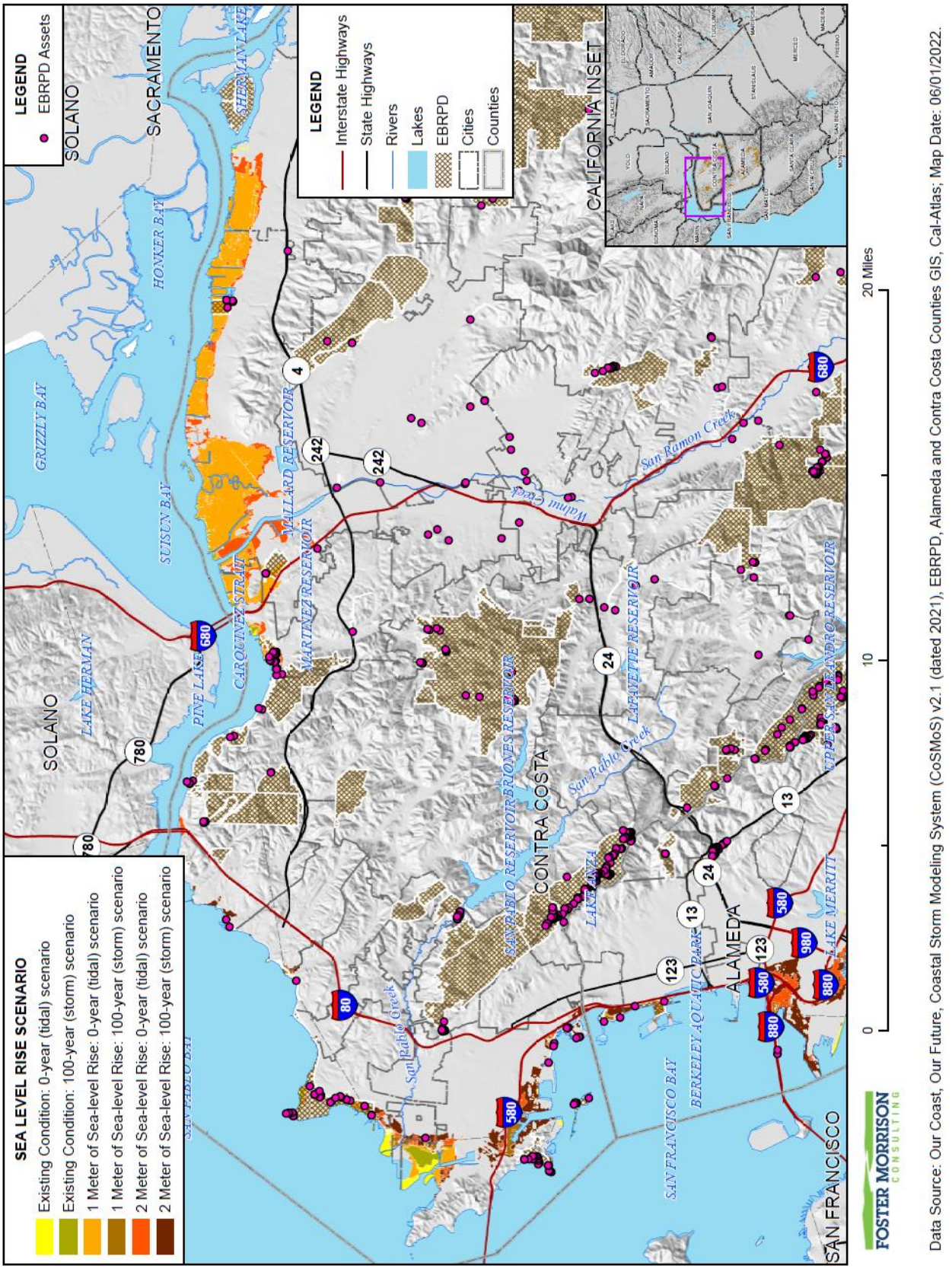


Figure 4-41 EBRPD – Sea Level Rise Scenarios (West)

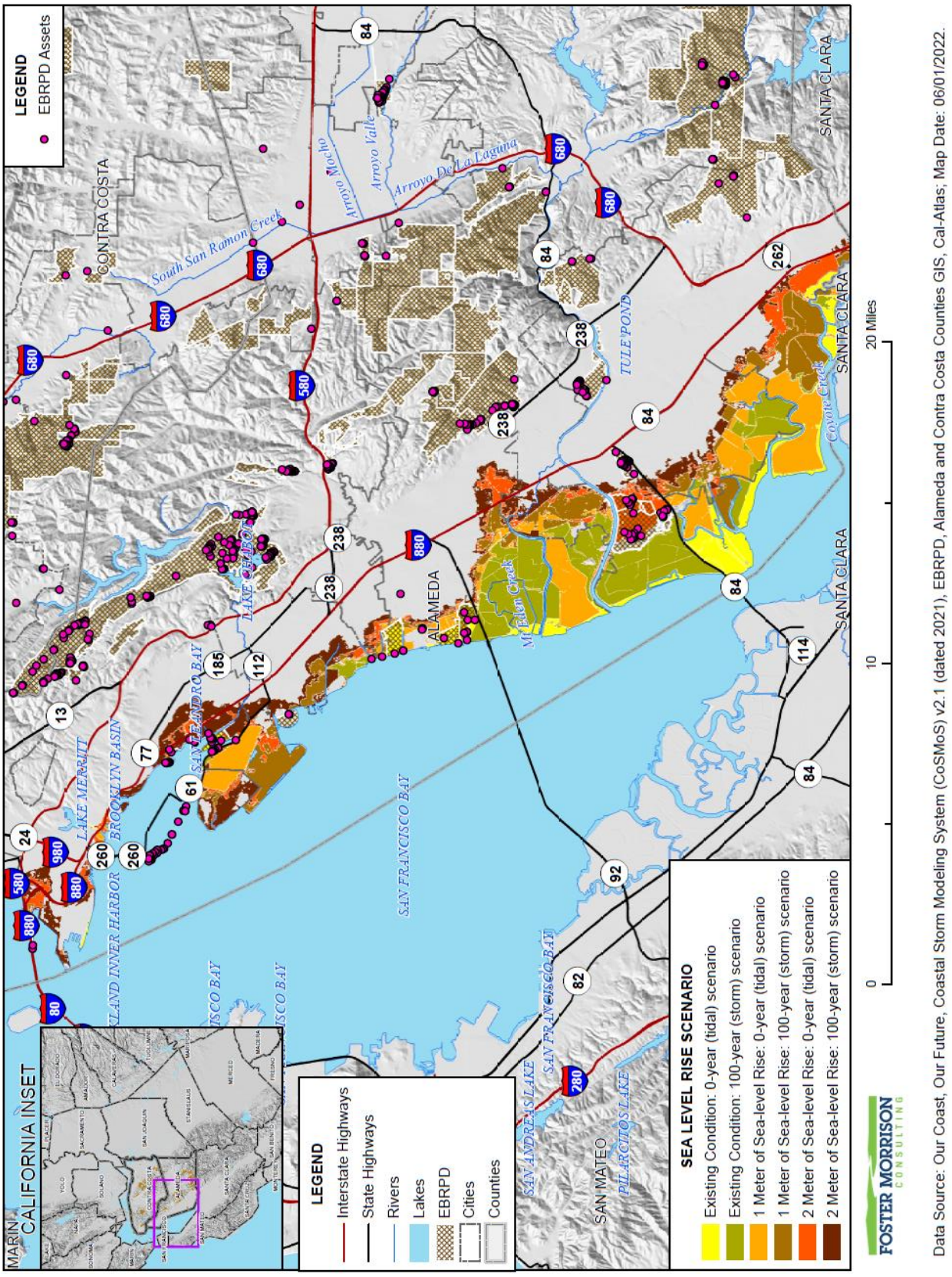


Table 4-43 EBRPD - Sea Level Rise Scenarios and Affected Park District Lands and Acres

Sea Level Rise Scenario/ EBRD Park Lands	Total Number of Park Lands	Affected Park Lands	Percent of Affected Park Lands	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
Existing Condition: 0-year (tidal) scenario						
EBRPD – Alameda County	43	8	18.6%	508,404	2,932	0.58%
EBRPD – Contra Costa County	57	9	15.8%	530,785	2,251	0.42%
EBRPD Total	**100**	**17**		**1,039,189**	**5,183**	**0.50%**
Existing Condition: 100-year (storm) scenario						
EBRPD – Alameda County	43	9	20.9%	508,404	3,194	0.63%
EBRPD – Contra Costa County	57	11	19.3%	530,785	2,438	0.46%
EBRPD Total	**100**	**20**	**20.0%**	**1,039,189**	**5,632**	**0.50%**
1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario						
EBRPD – Alameda County	43	9	20.9%	508,404	3,398	0.67%
EBRPD – Contra Costa County	57	12	21.1%	530,785	2,740	0.52%
EBRPD Total	**100**	**21**	**21.0%**	**1,039,189**	**6,138**	**0.60%**
1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario						
EBRPD – Alameda County	43	9	20.9%	508,404	3,579	0.70%
EBRPD – Contra Costa County	57	13	22.8%	530,785	2,772	0.52%
EBRPD Total	**100**	**22**	**22.0%**	**1,039,189**	**6,351**	**0.61%**
2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario						
EBRPD – Alameda County	43	10	23.2%	508,404	4,509	0.90%
EBRPD – Contra Costa County	57	13	22.8%	530,785	2,874	0.54%
EBRPD Total	**100**	**23**	**23.0%**	**1,039,189**	**7,383**	**0.72**
2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario						
EBRPD – Alameda County	43	10	23.2%	508,404	4,704	0.93%
EBRPD – Contra Costa County	57	13	22.8%	530,785	2,958	0.56%
EBRPD Total	**100**	**23**	**23.0%**	**1,039,189**	**7,662**	**0.74%**

Source: Cosmos, EBRPD GIS

Table 4-44 EBRPD – Sea Level Rise Scenarios and Affected Park District Assets and Replacement Values

Sea Level Rise Scenario/EBRPD Park Lands	Affected Park Lands	Asset Count	Replacement Value
Existing Condition: 0-year			
EBRPD – Alameda County	4	12	$13,274,048
EBRPD – Contra Costa County	4	7	$7,769,680
Total	**8**	**19**	**$21,043,728**

Sea Level Rise Scenario/EBRPD Park Lands	Affected Park Lands	Asset Count	Replacement Value
Existing Condition: 100-year			
EBRPD – Alameda County	4	13	$13,369,755
EBRPD – Contra Costa County	4	8	$7,934,522
Total	**8**	**21**	**$21,304,277**
1 Meter of Sea-level Rise: 0-year (tidal) scenario			
EBRPD – Alameda County	4	21	$14,414,345
EBRPD – Contra Costa County	6	19	$12,386,310
Total	**10**	**40**	**$26,800,655**
1 Meter of Sea-level Rise: 100-year (storm) scenario			
EBRPD – Alameda County	4	50	$27,245,909
EBRPD – Contra Costa County	7	19	$11,911,266.00
Total	**11**	**69**	**$39,157,175**
2 Meter of Sea-level Rise: 0-year (tidal) scenario			
EBRPD – Alameda County	5	65	$32,148,118
EBRPD – Contra Costa County	7	30	$15,969,245
Total	**12**	**95**	**$48,117,363**
2 Meter of Sea-level Rise: 100-year (storm) scenario			
EBRPD – Alameda County	6	99	$47,783,335
EBRPD – Contra Costa County	7	36	$17,600,691
Total	**13**	**135**	**$65,384,026.00**

Source: Cosmos, EBRPD GIS

In addition to the tables above, the following is a list of park lands that fall within each of the six sea level rise scenarios. More detail on specific park lands and assets in these sea level rise scenarios can be found in Appendix F.

- **Existing Condition: 0-year (tidal) scenario**
  - ✓ Hayward Shoreline
  - ✓ Martin Luther King Jr. Shoreline
  - ✓ McLaughlin Eastshore
  - ✓ Oyster Bay Shoreline
  - ✓ SF Bay Trail (MLK to MESP)
  - ✓ Alameda Point Shoreline Trail
  - ✓ Crown Beach
  - ✓ Judge John Sutter Shoreline
  - ✓ North Richmond Shoreline
  - ✓ Point Pinole Shoreline
  - ✓ San Pablo Bay Shoreline
  - ✓ Wildcat Creek Trail
  - ✓ Bay Point Shoreline
  - ✓ Brooks Island
  - ✓ Browns Island
  - ✓ Carquinez Strait Shoreline
  - ✓ Point Isabel Shoreline
  - ✓ Radke Martinez Shoreline
- **Existing Condition: 100-year (storm) scenario**
  - ✓ Coyote Hills
  - ✓ Hayward Shoreline
  - ✓ Martin Luther King Jr. Shoreline
  - ✓ McLaughlin Eastshore
  - ✓ Oyster Bay Shoreline

- ✓ SF Bay Trail (MLK to MESP)
- ✓ Alameda Point Shoreline Trail
- ✓ Crown Beach
- ✓ Judge John Sutter Shoreline
- ✓ North Richmond Shoreline
- ✓ Point Pinole Shoreline
- ✓ San Pablo Bay Shoreline
- ✓ Wildcat Creek Trail
- ✓ Bay Point Shoreline
- ✓ Brooks Island
- ✓ Browns Island
- ✓ Carquinez Strait Shoreline
- ✓ Miller/Knox Shoreline
- ✓ Point Isabel Shoreline
- ✓ Radke Martinez Shoreline

- **1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario**
  - ✓ Coyote Hills
  - ✓ Hayward Shoreline
  - ✓ Martin Luther King Jr. Shoreline
  - ✓ McLaughlin Eastshore
  - ✓ Oyster Bay Shoreline
  - ✓ SF Bay Trail (MLK to MESP)
  - ✓ Alameda Point Shoreline Trail
  - ✓ Crown Beach
  - ✓ Judge John Sutter Shoreline
  - ✓ North Richmond Shoreline
  - ✓ Point Pinole Shoreline
  - ✓ San Pablo Bay Shoreline
  - ✓ Waterbird
  - ✓ Wildcat Creek Trail
  - ✓ Bay Point Shoreline
  - ✓ Brooks Island
  - ✓ Browns Island
  - ✓ Carquinez Strait Shoreline
  - ✓ Miller/Knox Shoreline
  - ✓ Point Isabel Shoreline
  - ✓ Radke Martinez Shoreline
- **1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario**
  - ✓ Coyote Hills
  - ✓ Hayward Shoreline
  - ✓ Martin Luther King Jr. Shoreline
  - ✓ McLaughlin Eastshore
  - ✓ Oyster Bay Shoreline
  - ✓ SF Bay Trail (MLK to MESP)
  - ✓ Alameda Point Shoreline Trail
  - ✓ Crown Beach
  - ✓ Judge John Sutter Shoreline
  - ✓ North Richmond Shoreline
  - ✓ Point Pinole Shoreline
  - ✓ San Pablo Bay Shoreline
  - ✓ Waterbird
  - ✓ Wildcat Creek Trail
  - ✓ Bay Point Shoreline
  - ✓ Brooks Island
  - ✓ Browns Island
  - ✓ Carquinez Strait Shoreline
  - ✓ Miller/Knox Shoreline
  - ✓ Point Isabel Shoreline
  - ✓ Radke Martinez Shoreline
  - ✓ SF Bay Trail
- **2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario**
  - ✓ Alameda Creek Trail
  - ✓ Coyote Hills
  - ✓ Hayward Shoreline
  - ✓ Martin Luther King Jr. Shoreline
  - ✓ McLaughlin Eastshore
  - ✓ Oyster Bay Shoreline
  - ✓ SF Bay Trail (MLK to MESP)
  - ✓ Alameda Point Shoreline Trail
  - ✓ Crown Beach
  - ✓ Judge John Sutter Shoreline
  - ✓ North Richmond Shoreline
  - ✓ Point Pinole Shoreline
  - ✓ San Pablo Bay Shoreline
  - ✓ Waterbird
  - ✓ Wildcat Creek Trail
  - ✓ Bay Point Shoreline
  - ✓ Brooks Island
  - ✓ Browns Island
  - ✓ Carquinez Strait Shoreline
  - ✓ Miller/Knox Shoreline
  - ✓ Point Isabel Shoreline
  - ✓ Radke Martinez Shoreline
  - ✓ SF Bay Trail

- **2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario**
  - ✓ Alameda Creek Trail
  - ✓ Coyote Hills
  - ✓ Hayward Shoreline
  - ✓ Martin Luther King Jr. Shoreline
  - ✓ McLaughlin Eastshore
  - ✓ Oyster Bay Shoreline
  - ✓ SF Bay Trail (MLK to MESP)
  - ✓ Alameda Point Shoreline Trail
  - ✓ Crown Beach
  - ✓ Judge John Sutter Shoreline
  - ✓ North Richmond Shoreline
  - ✓ Point Pinole Shoreline
  - ✓ San Pablo Bay Shoreline
  - ✓ Waterbird
  - ✓ Wildcat Creek Trail
  - ✓ Bay Point Shoreline
  - ✓ Brooks Island
  - ✓ Browns Island
  - ✓ Carquinez Strait Shoreline
  - ✓ Miller/Knox Shoreline
  - ✓ Point Isabel Shoreline
  - ✓ Radke Martinez Shoreline
  - ✓ SF Bay Trail

Critical Facilities at Risk from Coastal Flooding and Sea Level Rise

EBRPD critical facilities are a subset of the total facilities of the Park District. The Park District reviewed the total EBRPD assets and determined that the certain types and uses of Park District assets would be considered critical facilities, as discussed in Section 4.2.4 above. Critical facilities in VE zones are shown in Section 4.3.10 below. Using the definition and mapping of Park District assets, Sea Level Rise Scenarios were overlayed on the critical facility layer. Those critical facilities that fall within the Sea Level Rise Scenarios can be seen in Figure 4-39 through Figure 4-41 (which shows all mapped assets including critical facilities) and detailed on Table 4-45 below. More information on critical facilities can be found in Appendix G and H.

Table 4-45 EBRPD –Critical Facilities in Sea Level Rise Scenarios

County /Scenario/ Park Lands	Asset Type	Asset Count
Existing Conditions of Sea-level Rise: 0-year (tidal) scenario		
Alameda County		
Crown Beach	Pedestrian Paving	1
	Crown Beach Total	**1**
Hayward Shoreline	Pedestrian Paving	3
	Storm Sewer	2
	Hayward Shoreline Total	**5**
Martin Luther King, Jr.	Piers & Docks	3
	Martin Luther King, Jr. Total	**3**
Alameda County Total		**9**
Contra Costa County		
Brooks Island	Service & Pedestrian Tunnel	1
	Brooks Island Total	1
Contra Costa County Total		**1**

County /Scenario/ Park Lands	Asset Type	Asset Count
Grand Total		**10**
Existing Conditions of Sea-level Rise: 100-year (storm) scenario		
Alameda County		
Crown Beach	Pedestrian Paving	1
	Crown Beach Total	**1**
Hayward Shoreline	Pedestrian Paving	3
	Storm Sewer	2
	Hayward Shoreline Total	**5**
Martin Luther King, Jr.	Piers & Docks	4
	Martin Luther King, Jr. Total	**4**
Alameda County Total		**10**
Contra Costa County		
Brooks Island	Service & Pedestrian Tunnel	1
	Brooks Island Total	**1**
McLaughlin Eastshore	Pedestrian Paving	1
	McLaughlin Eastshore Total	**1**
Contra Costa County Total		**2**
Grand Total		**12**
1 Meter of Sea-level Rise: 0-year (tidal) scenario		
Alameda County		
Crown Beach	Pedestrian Paving	1
	Crown Beach Total	**1**
Hayward Shoreline	Pedestrian Paving	3
	Storm Sewer	8
	Hayward Shoreline Total	**11**
Martin Luther King, Jr.	Piers & Docks	4
	Martin Luther King, Jr. Total	**4**
Alameda County Total		**16**
Contra Costa County		
Bay Point	Pedestrian Paving	1
	Bay Point Total	**1**
Brooks Island	Service & Pedestrian Tunnel	1
	Brooks Island Total	**1**
McLaughlin Eastshore	Pedestrian Paving	1
	McLaughlin Eastshore Total	**1**
Radke Martinez	Building	1
	Pedestrian Paving	6

County /Scenario/ Park Lands	Asset Type	Asset Count
	Radke Martinez Total	**7**
Contra Costa County Total		**10**
Grand Total		**26**
1 Meter of Sea-level Rise: 100-year (storm) scenario		
Alameda County		
Crown Beach	Building	3
	Pedestrian Paving	1
	Crown Beach Total	**4**
Hayward Shoreline	Pedestrian Paving	5
	Storm Sewer	8
	Hayward Shoreline Total	**13**
Judge John Sutter	Building	2
	Judge John Sutter Total	**2**
Martin Luther King, Jr.	Building	1
	Pedestrian Paving	2
	Piers & Docks	5
	Martin Luther King, Jr. Total	**8**
Alameda County Total		**27**
Contra Costa County		
Brooks Island	Service & Pedestrian Tunnel	1
	Brooks Island Total	**1**
McLaughlin Eastshore	Pedestrian Paving	2
	McLaughlin Eastshore Total	**2**
Radke Martinez	Building	1
	Pedestrian Paving	6
	Radke Martinez Total	**7**
Contra Costa County Total		**10**
Grand Total		**37**
2 Meter of Sea-level Rise: 0-year (tidal) scenario		
Alameda County		
Coyote Hills	Building	1
	Sanitary Sewer	1
	Water Supply	4
	Coyote Hills Total	**6**
Crown Beach	Pedestrian Paving	1
	Crown Beach Total	**1**
Hayward Shoreline	Pedestrian Paving	5

County /Scenario/ Park Lands	Asset Type	Asset Count
	Storm Sewer	8
	Hayward Shoreline Total	**13**
Judge John Sutter	Building	3
	Judge John Sutter Total	**3**
Martin Luther King, Jr.	Building	2
	Pedestrian Paving	2
	Piers & Docks	6
	Martin Luther King, Jr. Total	**10**
Alameda County Total		**33**
Contra Costa County		
Bay Point	Pedestrian Paving	1
	Bay Point Total	**1**
Brooks Island	Service & Pedestrian Tunnel	1
	Brooks Island Total	**1**
McLaughlin Eastshore	Pedestrian Paving	2
	McLaughlin Eastshore Total	**2**
Point Pinole	Roadways: Vehicular Bridges	2
	Point Pinole Total	**2**
Radke Martinez	Building	1
	Pedestrian Paving	6
	Radke Martinez Total	**7**
Contra Costa County Total		**13**
Grand Total		**46**
2 Meter of Sea-level Rise: 100-year (storm) scenario		
Alameda County		
Coyote Hills	Building	2
	Sanitary Sewer	2
	Water Supply	4
	Coyote Hills Total	**8**
Crown Beach	Building	6
	Pedestrian Paving	1
	Sanitary Sewer	1
	Crown Beach Total	**8**
Hayward Shoreline	Pedestrian Paving	6
	Storm Sewer	8
	Hayward Shoreline Total	**14**
Judge John Sutter	Building	3

County /Scenario/ Park Lands	Asset Type	Asset Count
	Judge John Sutter Total	**3**
Martin Luther King, Jr.	Building	4
	Pedestrian Paving	6
	Piers & Docks	6
	Martin Luther King, Jr. Total	**16**
Alameda County Total		**49**
Contra Costa County		
Bay Point	Pedestrian Paving	1
	Bay Point Total	**1**
Brooks Island	Service & Pedestrian Tunnel	1
	Brooks Island Total	**1**
McLaughlin Eastshore	Pedestrian Paving	3
	McLaughlin Eastshore Total	**3**
Miller/Knox	Water Supply	1
	Miller/Knox Total	**1**
Point Isabel	Pedestrian Paving	1
	Point Isabel Total	**1**
Point Pinole	Roadways: Vehicular Bridges	3
	Point Pinole Total	3
Radke Martinez	Building	1
	Pedestrian Paving	6
	Radke Martinez Total	**7**
Contra Costa County Total		**17**
Grand Total		**66**

Source: Cosmos, EBRPD GIS

Future Development

Future development in the Park District will take coastal flooding and sea level rise into account. The Park District will build any new facilities to current building standards of the jurisdiction the building will lie in.

4.3.7. Dam Failure

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect the EBRPD. These sections include a hazard/problem description; description of location and extent; past occurrences of this hazard; and how climate change can affect this hazard.

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
- Failure of upstream dams on the same waterway

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. 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 (DSOD) 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, DSOD assigns hazard ratings to large "jurisdictional sized" 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 four categories that identify the potential hazard to life and property:

- **Extremely High Hazard** – Expected to cause considerable loss of human life or would result in an inundation area with a population of 1,000 or more.
- **High Hazard** – Expected to cause loss of at least one human life.
- **Significant Hazard** – No probable loss of human life but can cause economic loss, environmental damage, impacts to critical facilities, or other significant impacts.
- **Low Hazard** – No probable loss of human life and low economic and environmental losses. Losses are expected to be principally limited to the owner's property.

Location and Extent

According to data provided by Cal DWR and Cal OES, there are 23 dams in Alameda County and 25 dams in Contra Costa County that were constructed for flood control, storage, treatment impoundments, electrical generation, and recreational purposes. Of the 23 dams in Alameda County, 11 were rated as Extremely High Hazard, 7 are rated as High Hazard, 3 as Significant Hazard, 2 as Low Hazard. Of the 25 dams in Contra Costa County, 12 were rated as Extremely High Hazard, 11 are rated as High Hazard, 0 as Significant Hazard, 2 as Low Hazard. Figure 4-42 identifies the dams in each County, which are also detailed in Table 4-46 and Table 4-47.

Figure 4-42 Alameda and Contra Costa Dam Inventory

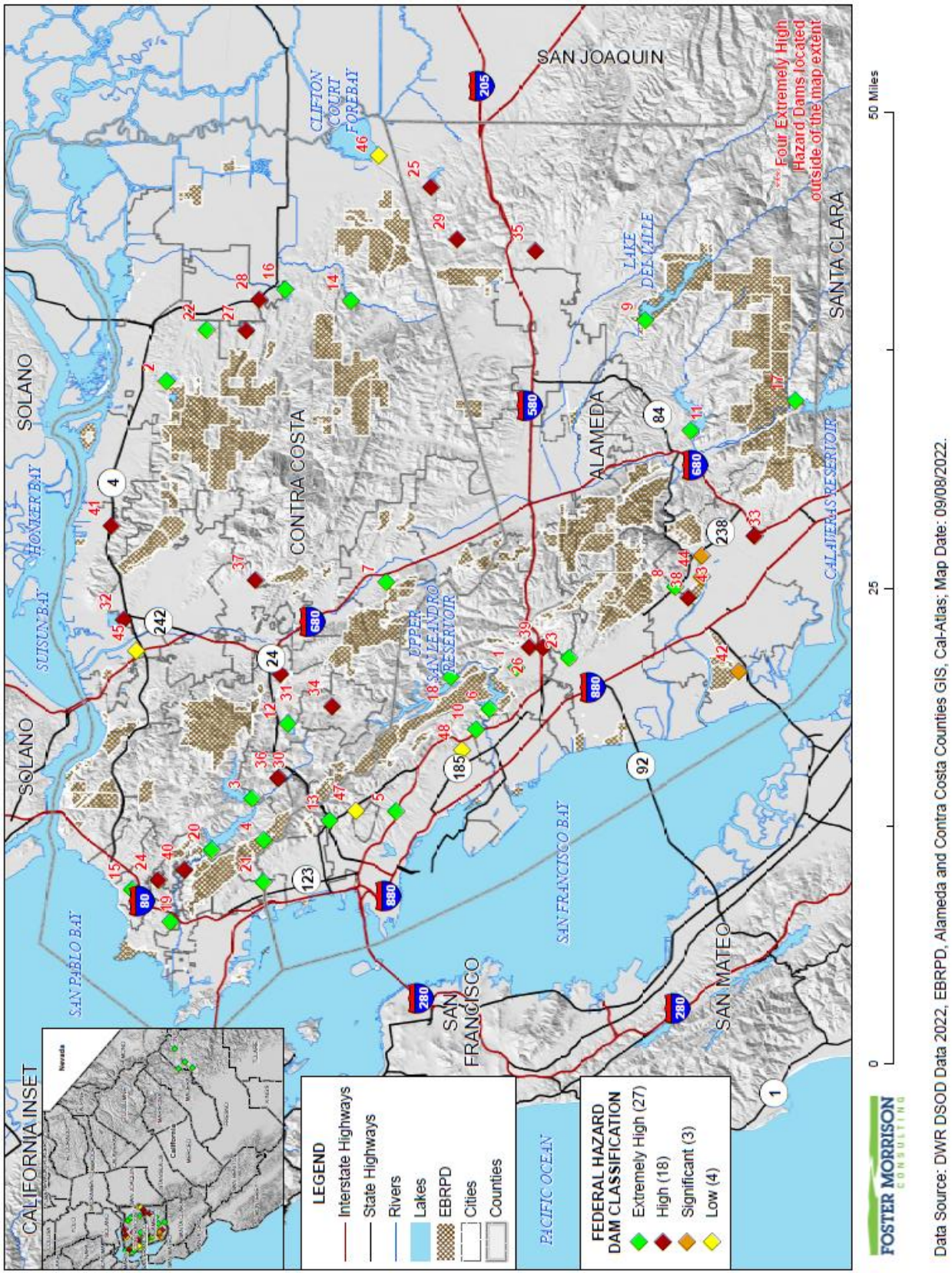


Figure 4-43 EBRPD Dam Map Legend

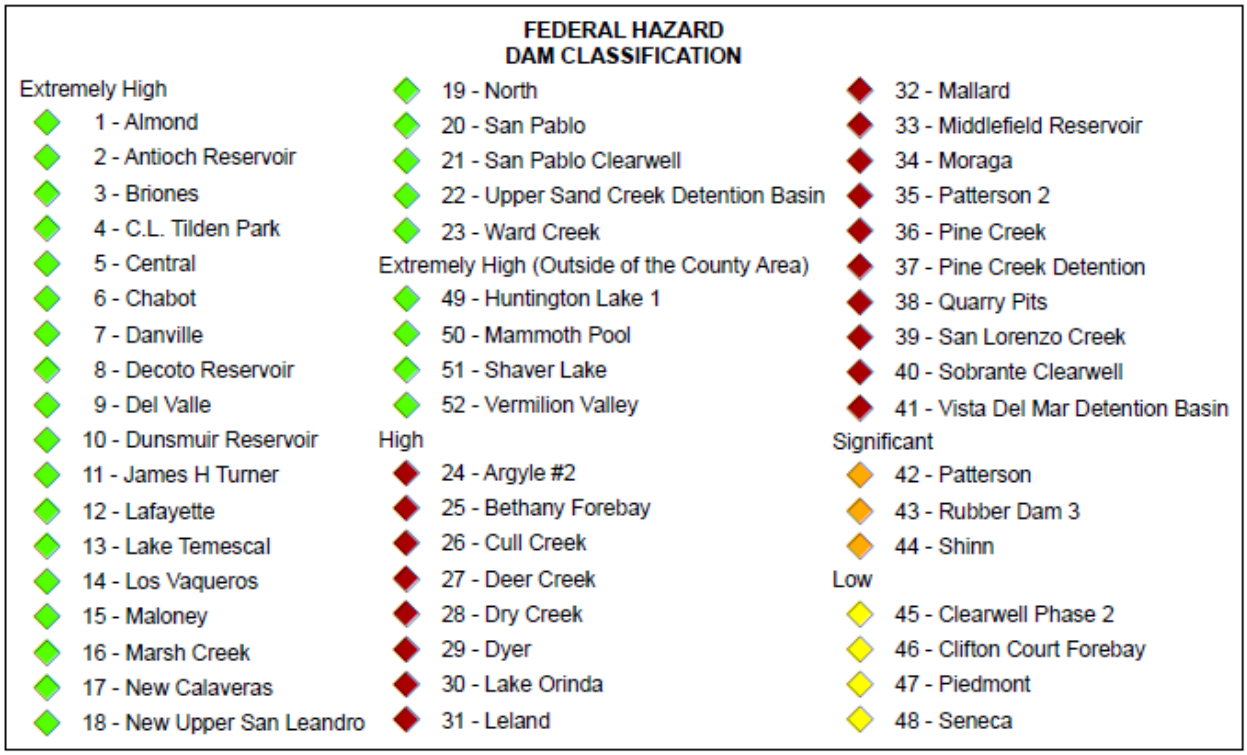


Table 4-46 Alameda County Dams Inventory

Name	Significance	Owner	Dam Type	Structural Height (ft)	Maximum Storage (acre-ft)
Almond	Extremely High	East Bay Municipal Utility District	Earthen Embankment	30	20
Bethany Forebay	High	CA DWR	Earthen Embankment	95	5000
Central	Extremely High	East Bay Municipal Utility District	Earthen Embankment	55	485
Chabot	Extremely High	East Bay Municipal Utility District	Hydraulic Fill	142	10,281
Cull Creek	High	Alameda County Public Works	Earthen Embankment	55	140
Decoto Reservoir	Extremely High	Alameda County Water District	Earthen Embankment	33	46
Del Valle	Extremely High	CA DWR	Earthen Embankment	222	77,100
Dunsmuir Reservoir	Extremely High	East Bay Municipal Utility District	Reinforced Concrete Tank	43	197
Dyer	High	CA DWR	Earthen Embankment	30	525

Name	Significance	Owner	Dam Type	Structural Height (ft)	Maximum Storage (acre-ft)
James H Turner	Extremely High	City and County of San Francisco	Earthen Embankment	193	50,500
Lake Temescal	Extremely High	East Bay Regional Park District	Earthen Embankment	116	200
Middlefield Reservoir	High	Alameda County Water District	Earthen Embankment	147	22
New Calaveras	Extremely High	City and County of San Francisco	Earthen Embankment	210	96,850
New Upper San Leandro	Extremely High	East Bay Municipal Utility District	Earthen Embankment	182	42,000
Patterson	Significant	Alameda County Water District	Earthen Embankment	100	56
Patterson 2	High	CA DWR	Earthen Embankment	39	104
Piedmont	Low	East Bay Municipal Utility District	Earthen Embankment	64	60
Quarry Pits	High	Alameda County Water District	Earthen Embankment	26	3360
Rubber Dam 3	Significant	Alameda County Water District	Earthen Embankment	17	154
San Lorenzon Creek	High	Alameda County Public Works	Inflatable	65	380
Seneca	Low	East Bay Municipal Utility District	Earthen Embankment	40	92
Shinn	Significant	Alameda County Water District	Earthen Embankment	45	390
Ward Creek	Extremely High	Alameda County Public Works	Earthen Embankment	71	13

Source: Cal OES, National Performance of Dams Program

*One acre foot equals 325,000 gallons

Table 4-47 Contra Costa County Dams Inventory

Name	Significance	Owner	Dam Type	Structural Height (ft)	Maximum Storage (acre-ft)
Antioch Reservoir	Extremely High	City of Antioch	Earthen Embankment	30	722
Argyle #2	High	East Bay Municipal Utility District	Reinforced Concrete Tank	27	22
Briones	Extremely High	East Bay Municipal Utility District	Earthen Embankment	273	67520
C.L. Tilden Park	Extremely High	East Bay Regional Park District	Earthen Embankment	88	268

Name	Significance	Owner	Dam Type	Structural Height (ft)	Maximum Storage (acre-ft)
Clearwell Phase 2	Low	Central Contra Costa Sanitary District	Earthen Embankment	30	100
Clifton Court Forebay	Low	CA DWR	Earthen Embankment	34	29,000
Danville	Extremely High	East Bay Municipal Utility District	Earthen Embankment	75	45
Deer Creek	High	Contra Costa County Flood Control and Water Conservation District	Earthen Embankment	29	233
Dry Creek	High	Contra Costa County Flood Control and Water Conservation District	Earthen Embankment	30	330
Lafayette	Extremely High	East Bay Municipal Utility District	Earthen Embankment	132	4,250
Lake Orinda	High	Private	Earthen Embankment	45	111
Leland	High	East Bay Municipal Utility District	Earthen Embankment	41	60
Los Vaqueros	Extremely High	Contra Costa Water District	Earthen Embankment	230	160,000
Mallard	High	Contra Costa Water District	Earthen Embankment	30	3,113
Maloney	Extremely High	East Bay Municipal Utility District	Earthen Embankment	107	68
Marsh Creek	Extremely High	Contra Costa County Flood Control and Water Conservation District	Earthen Embankment	59	4,425
Moraga	High	East Bay Municipal Utility District	Earthen Embankment	37	36
North	Extremely High	East Bay Municipal Utility District	Earthen Embankment	82	244
Pine Creek	High	Contra Costa County Flood Control and Water Conservation District	Earthen Embankment	87	225
Pine Creek Detention	High	Contra Costa County Flood Control and Water Conservation District	Gravity	30	320
San Pablo	Extremely High	East Bay Municipal Utility District	Earthen Embankment	170	43,193
San Pablo Clearwell	Extremely High	East Bay Municipal Utility District	Earthen Embankment	42	17

Name	Significance	Owner	Dam Type	Structural Height (ft)	Maximum Storage (acre-ft)
Sobrante Clearwell	High	East Bay Municipal Utility District	Earthen Embankment	28	25
Upper Sand Creek Detention Basin	Extremely High	Contra Costa County Flood Control and Water Conservation District	Earthen Embankment	40	895
Vista Del Mar Detention Basin	High	Private	Earthen Embankment	42	33

Source: Cal OES, National Performance of Dams Program

*One acre foot equals 325,000 gallons

There are dams outside of Alameda and Contra Costa County that could also affect the Park District. While these dams are located in Fresno County, they do have inundation areas in the Park District due to their location on the San Joaquin River. Impacts are not of significant concern as impacts would likely be limited.

Table 4-48 EBRPD – Dams Outside of Alameda and Contra Costa Counties

Name	Owner	Hazard Classification	Dam Type	River/Stream	Structural Height (ft)	Maximum Storage (acre-ft)	EAP
Huntington Lake 1	South California Edison	Extremely High	Gravity	San Joaquin River	17	88,834	Y
Mammoth Pool	South California Edison	Extremely High	Earth	San Joaquin River	406	123,000	Y
Shaver Lake	South California Edison	Extremely High		San Joaquin River	180	135,283	Y
Vermilion Valley	South California Edison	Extremely High		San Joaquin River	167	125,000	Y

Source: Cal OES, National Performance of Dams Program; HMPC

*One acre foot equals 325,000 gallons

EBRPD Dam Inventory

Table 4-49 shows the dams owned by the Park District. Details on each dam are discussed below the table.

Table 4-49 EBRPD Owned Dam Inventory

Name	Owner	Hazard Classification	Dam Type	River/Stream	Structural Height (ft)	Maximum Storage (acre-ft)	EAP
C.L. Tilden	EBRPD	Extremely High	Earth	Wildcat Creek	88	268	Y

Name	Owner	Hazard Classification	Dam Type	River/Stream	Structural Height (ft)	Maximum Storage (acre-ft)	EAP
Lake Temescal	EBRPD	Extremely High	Earth	Temescal Creek	116	200	Y

Source: Cal OES, National Performance of Dams Program; HMPC
*One acre foot equals 325,000 gallons

C.L. Tilden Dam

The 2022 EAP for C.L. Tilden Dam noted that C.L. Tilden Park Dam was originally constructed in 1938 on Wildcat Creek as a recreational swimming lake and irrigation for the Tilden Park Golf Course within the East Bay Regional Park District. While the golf course no longer uses water from the lake, the remnants of the water system remain, but are no longer functional. The dam is a compacted earthen-fill embankment, with a concrete lined open channel spillway with ogee crest and is owned and operated by the EBRPD. Wildcat Creek provides uncontrolled inflow into Lake Anza. The dam is located in the Berkeley Hills just east of the City of Berkeley, along a portion of the western most edge of Contra Costa County, California.

The dam is an 88-foot-high earthen embankment, which is 355 feet long with a 15 ft. crest width. The reservoir capacity for this dam is 268 ac-ft at 88 ft. Upstream and downstream faces are constructed on 2½ horizontal to 1 vertical slopes. Both faces are well protected from erosion by vegetation – the upstream face by grass and the downstream face grass and California native shrubs. The downstream toe is constructed of heavy rock which extends to 12 feet. above the lowest point of the toe. Tilden Park Dam spillway is located in an excavation channel on the left embankment of the dam. The spillway controls the water level of the lake.

The drainage basin contains 1,000 acres. It measures 2 miles in the northwest direction and 0.9 miles in the northeast direction. The watershed consists of grass, trees and shrubs. It is located entirely within C. L. Tilden Regional Park, with almost no man-made improvement within the basin.

There are no existing reservoirs upstream of the Lake Anza/Tilden Park Dam watershed. The Contra Costa Flood Insurance Study dated March 21, 2017, indicates that the 100-year flow is contained within Wildcat Creek downstream of Tilden Park Dam.

Lake Temescal Dam

The 2022 EAP for Lake Temescal Dam noted that Temescal Lake Dam is an earthen dam built in 1869 but was turned into a recreational facility in 1934, with major dam improvements made in 1937, the 1960s, and again in the 1970s. Lake Temescal Dam is located in Oakland. The watershed area draining into the dam is 2.7 square miles (sq. mi.). The dam height is 116 feet, and the overall dam length is 650 feet with the crest width of 40 feet. The maximum water depth in the reservoir is set at a depth of 20 feet. The reservoir capacity for this dam is 200 ac-ft at 116 ft. Temescal Creek provides the inflow for Temescal Lake. Peak inflow as shown from the DSOD hydrology information is 1,612 cubic feet per second. Lake Temescal Dam has two spillways. The primary service spillway located on the right abutment consists of a series of a weir, and conduits. An emergency spillway consists of a depression on the left side of the dam which drains into a parking lot. The spillways control the water level of the lake.

Lake Temescal Dam and reservoir is in the Cerrito Creek-Frontal San Francisco Bay Estuaries watershed USGS National Hydrograph Dataset (NHD) and Watershed Boundary Dataset Hydrologic Unit 10. The watershed covers approximately 33.4 square miles and is a tributary to the San Francisco Bay. The local topography above and below Lake Temescal Dam ranges from moderately steep to steep hills and ridges of the Oakland hills, with elevations reaching 1,900 feet above mean sea level to the nearly level plains of the valley and into the San Francisco Bay with elevations 0.0 and below

There are no existing reservoirs upstream of the Lake Temescal Dam. The Alameda County Flood Insurance Study dated August 3, 2009 (panel number 06001C0080G) indicates that the 100-year flow is contained within the culvert structure downstream of Temescal dam.

Past Occurrences

Disaster Declaration History

There have been no disasters declarations related to dam failure in Alameda or Contra Costa County, as shown in Table 4-4 and Table 4-6.

NCDC Events

There have been no NCDC dam failure events in Alameda or Contra Costa 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 affecting the Park District.

Hazard Mitigation Planning Team Events

The HMPC noted no past dam failure events.

Likelihood of Future Occurrences

Unlikely– There have been no recorded events of dam failure or other issues of concern. Based on past occurrences and the rigorous monitoring and inspection requirements for dams, a dam failure may occur in the future that would impact the EBRPD is unlikely. The HMPC noted that it could be considered to be occasional based on aging dam systems and variety of dam owners, some with limited resources to properly maintain dams.

Climate Change and Dam Failure

Increases in precipitation in areas upstream of dams could increase the potential for dam failure and uncontrolled releases on the dam that could affect the Park District.

Vulnerability Assessment

Vulnerability—High

Dam failure flooding can occur as the result of a partial or complete collapse of an impoundment. Dam failures often result from prolonged rainfall and flooding. An earthquake event can also contribute to a dam failure. 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 generally 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. Dam failure flooding would vary by community depending on which dam fails and the nature and extent of the dam failure and associated flooding.

Vulnerability to and Impacts from Dam Failure

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, homes, and Park District Facilities. Electric generating facilities and transmission lines could also be damaged and affect 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.

A major dam failure and associated flooding could have a devastating impact on the EBRPD Planning Area. Dam failure flooding presents a threat to life and property, including structures, their contents, and their use. Large flood events can affect natural resources and livestock as well as lifeline critical utilities (e.g., water, sewerage, and power), transportation, the environment, and the local and regional economies. Park District staff and visitors to the parks could also be at risk to a dam failure event.

Vulnerability from C.L. Tilden – DSOD Publications and Emergency Action Plan

A review of California DSOD publications shows that the DSOD has performed a Condition Assessment for C.L. Tilden Dam and a Certification Status.

Certification statuses include four categories: Not Certified, Certified/Inoperable, and Certified. For the Certification Status, the dam's 2021 status was given the highest rating:

- Certified – Jurisdictional sized dams that may safely impound water to the elevation specified on the Certificate of Approval.

For the Condition Assessment, DSOD uses the US Army Corps of Engineer's National Inventory NID's condition assessment rating definitions (updated 2021) as a guideline in assigning condition assessments. A dam safety deficiency is defined as a load capacity limit or other issue that can result in a failure of the dam or appurtenant structure. It is a characteristic or condition that does not meet the applicable minimum

regulatory criteria. Normal operations are defined as loading on the dam resulting from day-to-day pool operations to achieve authorized purposes in accordance with minimum state or federal regulatory criteria.

Condition Assessment Ratings include five categories: Not Rated, Unsatisfactory, Poor, Fair, and Satisfactory. For the Condition Assessment the dam's 2021 condition assessment was given the highest rating:

- Satisfactory – No existing or potential dam safety deficiencies are recognized. Acceptable performance is expected under all loading conditions (static, hydrologic, seismic) in accordance with the minimum applicable state or federal regulatory criteria or tolerable risk guidelines. Typical Circumstances:
  - ✓ No existing deficiencies or potentially unsafe conditions are recognized, with the exception of minor operational and maintenance items that require attention.
  - ✓ Safe performance is expected under all loading conditions including the design earthquake and design flood.
  - ✓ Permanent risk reduction measures (reservoir restrictions, spillway modifications, operating procedures, etc.) have been implemented to eliminate identified deficiencies.

The Emergency Action Plan (EAP) for the C.L. Tilden Dam was provided by EBRPD and includes information on inundation areas potentially affected by a hypothetical dam failure. The water from Lake Anza flows through Wildcat Canyon (Wildcat Creek) and towards the cities of San Pablo, Richmond and North Richmond. Areas of concern include the low-lying areas along McBride Avenue (Wildcat Creek) and Riverside Ave. (San Pablo) where water can accumulate up to 20' deep. Additionally, low areas around Wildcat Creek may receive up to 5 feet of flood water: Food Max, Life Long Immediate Urgent Care, areas around Brookside Hospital and some areas along Bailey Street and Giant Avenue (San Pablo). Flood waters will also overflow Wildcat Creek and follow Maricopa Ave, Rheem Ave., Dunn Ave.; also, Manor Drive (North Richmond) westward towards San Pablo Bay. Most other areas, including portions of the Bay Area Rapid Transit line and rail maintenance yard in Richmond, will not see more than 1 to 2', this flow may be rapid in some areas until the flow reaches the marshy areas around San Pablo Bay. An inundation map for this dam can be seen in Figure 4-47 later in this section.

If a dam failure was to occur at C.L. Tilden Park Dam, the following jurisdictions could be impacted:

- Contra Costa County
- City of San Pablo
- City of Richmond
- City of Northern Richmond

San Pablo has an estimated population of 29,139 (US Census) and a total city area of 2.63 square miles. Richmond has an estimated population of 103,701 and a city area of 52.51 square miles. North Richmond, an unincorporated city, has an estimated population of 3,717 and total area of 1.55 square miles. Flows from the dam will follow Wildcat Creek, puddling to a depth of 20 feet or more in an area west of I-80 before continuing at a depth of 10 feet or more until reaching San Pablo where the flow will begin to fan out to depths of 2 feet or less throughout parts of San Pablo, Richmond and North Richmond before flowing into marshy areas of San Pablo bay, based upon terrain, size of the dam and volume of water stored.

The C.L. Dam EAP has a section for after action reports, as well as an area to address deficiencies. No dam deficiencies were noted in the EAP for the dam. The EAP did recommend that the rock riprap on sloped areas of the dam will need to be monitored to ensure against erosion. It also noted that vegetation maintenance is a persistent issue around the dam and structures.

Vulnerability from Lake Temescal Dam - Emergency Action Plan and DSOD Publications

A review of California DSOD publications shows that the DSOD has performed a Condition Assessment and a Certification Status for Lake Temescal Dam.

Certification statuses include four categories: Not Certified, Certified/Inoperable, and Certified. For the Certification Status the dam's 2021 status was given the highest rating:

- Certified – Jurisdictional sized dams that may safely impound water to the elevation specified on the Certificate of Approval.

For the Condition Assessment, DSOD uses the US Army Corps of Engineer's National Inventory NID's condition assessment rating definitions (updated 2021) as a guideline in assigning condition assessments. A dam safety deficiency is defined as a load capacity limit or other issue that can result in a failure of the dam or appurtenant structure. It is a characteristic or condition that does not meet the applicable minimum regulatory criteria. Normal operations are defined as loading on the dam resulting from day-to-day pool operations to achieve authorized purposes in accordance with minimum state or federal regulatory criteria.

Condition Assessment Ratings include Not Rated, Unsatisfactory, Poor, Fair, and Satisfactory. For the Condition Assessment the dam's 2021 status was given the highest rating:

Satisfactory – No existing or potential dam safety deficiencies are recognized. Acceptable performance is expected under all loading conditions (static, hydrologic, seismic) in accordance with the minimum applicable state or federal regulatory criteria or tolerable risk guidelines. Typical Circumstances:

- ✓ No existing deficiencies or potentially unsafe conditions are recognized, with the exception of minor operational and maintenance items that require attention.
- ✓ Safe performance is expected under all loading conditions including the design earthquake and design flood.
- ✓ Permanent risk reduction measures (reservoir restrictions, spillway modifications, operating procedures, etc.) have been implemented to eliminate identified deficiencies.

The EAP for the Lake Temescal Dam provided by EBRPD includes information on inundation areas potentially affected by a hypothetical dam failure. In a hypothetical dam failure, the potential impact would see the water from Lake Temescal flow through drainage pipes until it reached the north side of Highway 24. Then it would flow westward via drainage canals reaching depths over 15 feet along Chabot Road. Most areas westward would receive 1 to 2 feet of the flood water, with some areas ponding up to 5 feet deep as the flood waters flowed westward towards the bay. An inundation map for this dam can be seen in Figure 4-46 later in this document.

If a dam failure was to occur at Temescal Dam, the following jurisdictions could be impacted:

- Alameda County
- City of Oakland
- City of Emeryville

Potential impact areas downstream of Lake Temescal Dam are the Cities of Oakland and Emeryville to the west of the dam. Oakland has an estimated population of 412,040 (US Census, 2016) and a total city area of 77.86 square miles. Emeryville has an estimated population of 11,671 (US census). Flows from the dam are likely to follow the path of the drainage culvert, which has been routed under Hwy 24 or along Broadway, then the flows will follow an easterly direction towards San Francisco Bay. The flows will spread and persist in an easterly and south-easterly direction spreading through Emeryville and down through Oakland to the Oakland Inner Harbor; based on terrain, size of the dam, and volume of water stored. The area immediately west of the lake is an undeveloped hillside and trail; the eastern side has a trail, a PG&E Substation and HWY 13; the area to the north is a large parking lot and Hwy 24.

The Lake Temescal Dam EAP has a section for after action reports, as well as an area to address deficiencies. No deficiencies were noted in the EAP for the dam.

EBRPD Park Lands and Assets at Risk

Dam inundation areas were available for the High and Extremely High Hazard dams that could potentially affect the Park District and were used as the basis of this dam inundation analysis. Dams were grouped by hazard rating to perform the analysis. The depth of flooding due to the failure of these dams is unknown.

Methodology and Results

GIS was used to analyze EBRPD park lands and assets potentially at risk to a dam failure event. EBRPD park lands and assets data obtained from the Park District were intersected with CAL DWR DSOD 2022 dam inundation data to determine Park District lands and assets that fall into defined dam inundation areas. Separate analysis was performed for park lands (in acres) and park assets (as types of assets and replacement values). Affected park lands and assets are described below.

Extremely High Hazard dams and their inundations are shown on Figure 4-44. Table 4-50 shows the number of Park District lands that intersect these Extremely High Hazard Dam inundation areas, as well as the number of acres affected. Table 4-51 shows the number of Park Districts that have assets located in the Extremely High Hazard dam inundation areas and the replacement value of those assets.

High Hazard dams and their inundations are shown on Figure 4-45. Table 4-52 shows the number of Park District lands that intersect these High Hazard Dam inundation areas, as well as the number of acres affected. Table 4-53 shows the number of Park Districts that have assets located in the High Hazard dam inundation areas and the replacement value of those assets.

The EBRPD owns Lake Temescal dam, an Extremely High Hazard Dam, and its inundation area is shown in further detail on Figure 4-46. Table 4-54 shows the number of Park District lands that intersect the Lake Temescal Dam inundation areas, as well as the number of acres affected. Table 4-55 shows the number of Park District lands that have assets that lie in the High Hazard dam inundation areas and the replacement values of those assets.

The EBRPD owns C.L. Tilden Dam, an Extremely High Hazard Dam, and its inundation area is shown in further detail on Figure 4-47. Table 4-56 shows the number of Park District lands that intersect the C.L. Tilden Dam inundation areas, as well as the number of acres affected. Table 4-57 shows the number of Park District lands that have assets that lie in the C.L. Tilden Dam inundation areas and the replacement values of those assets.

More detail on specific Park District lands and assets in each dam failure flood inundation area can be found in Appendix F.

Figure 4-44 EBRPD – Extremely High Hazard Dams and Inundation Areas

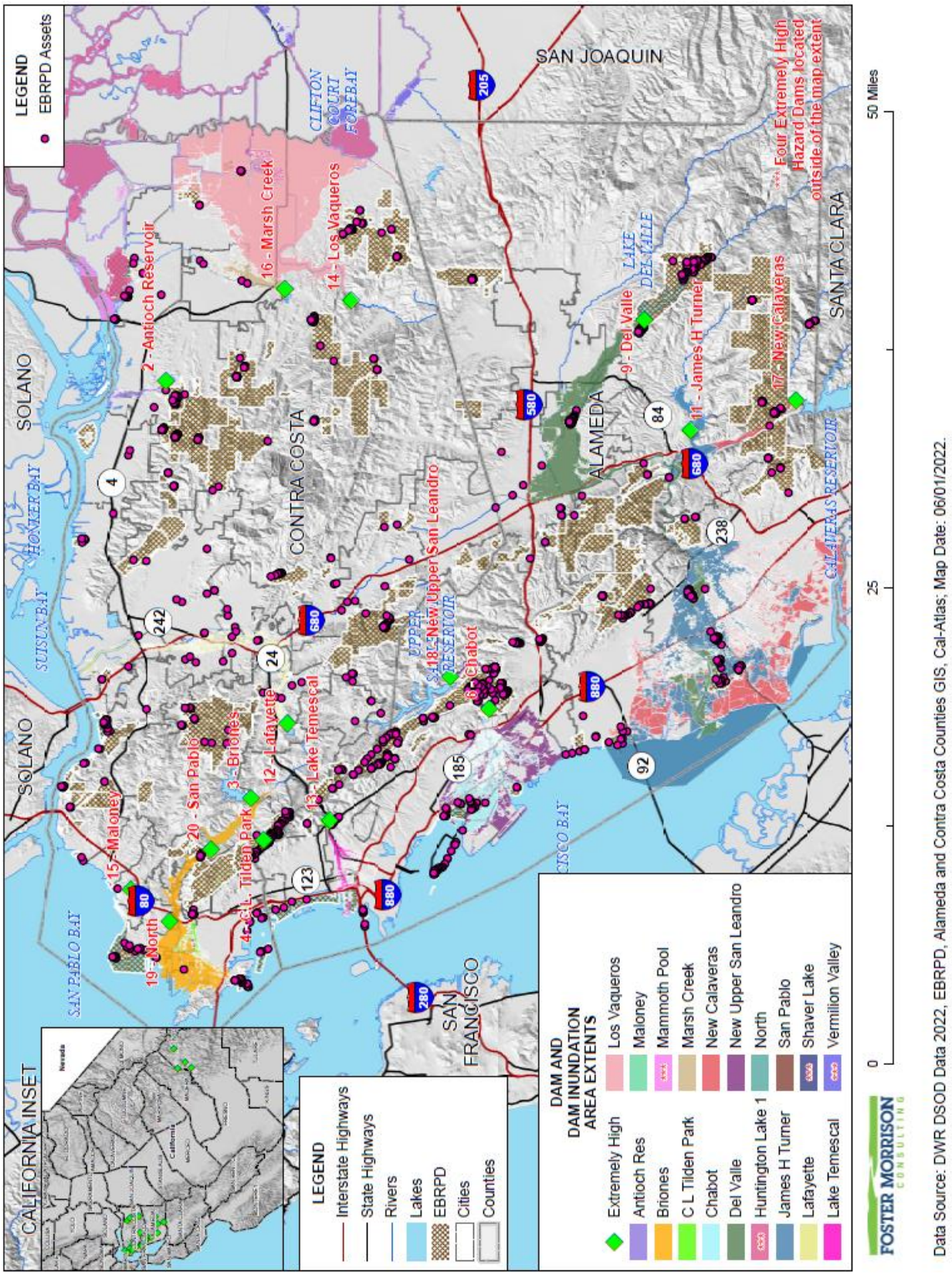


Table 4-50 EBRPD – Extremely High Hazard Dam Inundation Areas and Affected Park District Lands and Acres

EBRPD/ Dam Inundation Zone	Total Number of Park Lands	Affected Park Lands	Percent of Affected Park Lands	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
Extremely High Hazard Dams						
EBRPD – Alameda County (6)	43	18	41.9%	508,404	11,573	2.27%
EBRPD – Contra Costa County (9)	57	21	26.3%	530,785	6,512	1.23%
Total	**100**	**39**	**39.0%**	**1,039,189**	**18,085**	**1.74%**

Source: CA DWR/DSOD, EBRPD GIS

Table 4-51 EBRPD – Extremely High Hazard Dam Inundation Areas and Affected Park District Assets and Replacement Values

EBRPD / Park Lands	Affected Park Lands	Asset Count	Replacement Value
EBRPD Alameda County	10	245	$35,864,037
EBRPD Contra Costa County	5	57	$27,361,659
EBRPD Total	**17**	**302**	**$63,225,696.00**

Source: CA DWR/DSOD, EBRPD GIS

Figure 4-45 EBRPD – High Hazard Dams and Inundation Areas

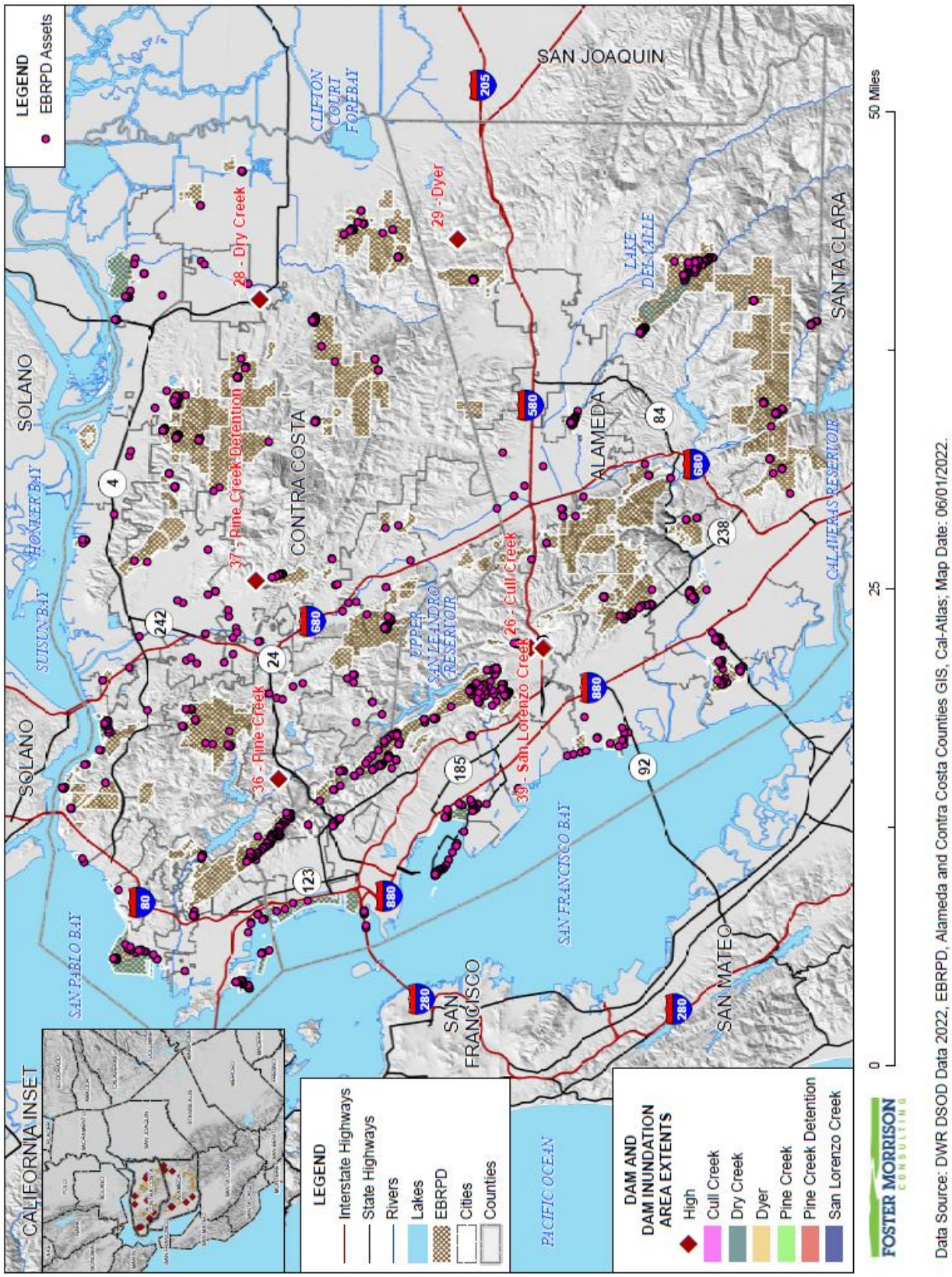


Table 4-52 EBRPD – High Hazard Dam Inundation Areas and Affected Park District Lands and Acres

EBRPD/ Dam Inundation Zone	Total Number of Park Lands	Affected Park Lands	Percent of Affected Park Lands	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
High Hazard Dams						
EBRPD – Alameda County (3)	43	2	4.7%	508,404	8	0.002%
EBRPD – Contra Costa County (3)	57	3	5.2%	530,785	20	0.002%
Total	**100**	**5**	**5.0%**	**1,039,189**	**28**	**0.002%**

Source: CA DWR/DSOD, EBRPD GIS

Table 4-53 EBRPD – High Hazard Dam Inundation Areas and Affected Park District Assets and Replacement Values

EBRPD / Park Lands	Affected Park Lands	Asset Count	Replacement Value
EBRPD Alameda County	0	0	$0
EBRPD Contra Costa County	3	14	$27,361,659
EBRPD Total	**17**	**14**	**$27,361,659**

Source: CA DWR/DSOD, EBRPD GIS

Figure 4-46 EBRPD – Lake Temescal Dam Inundation Area

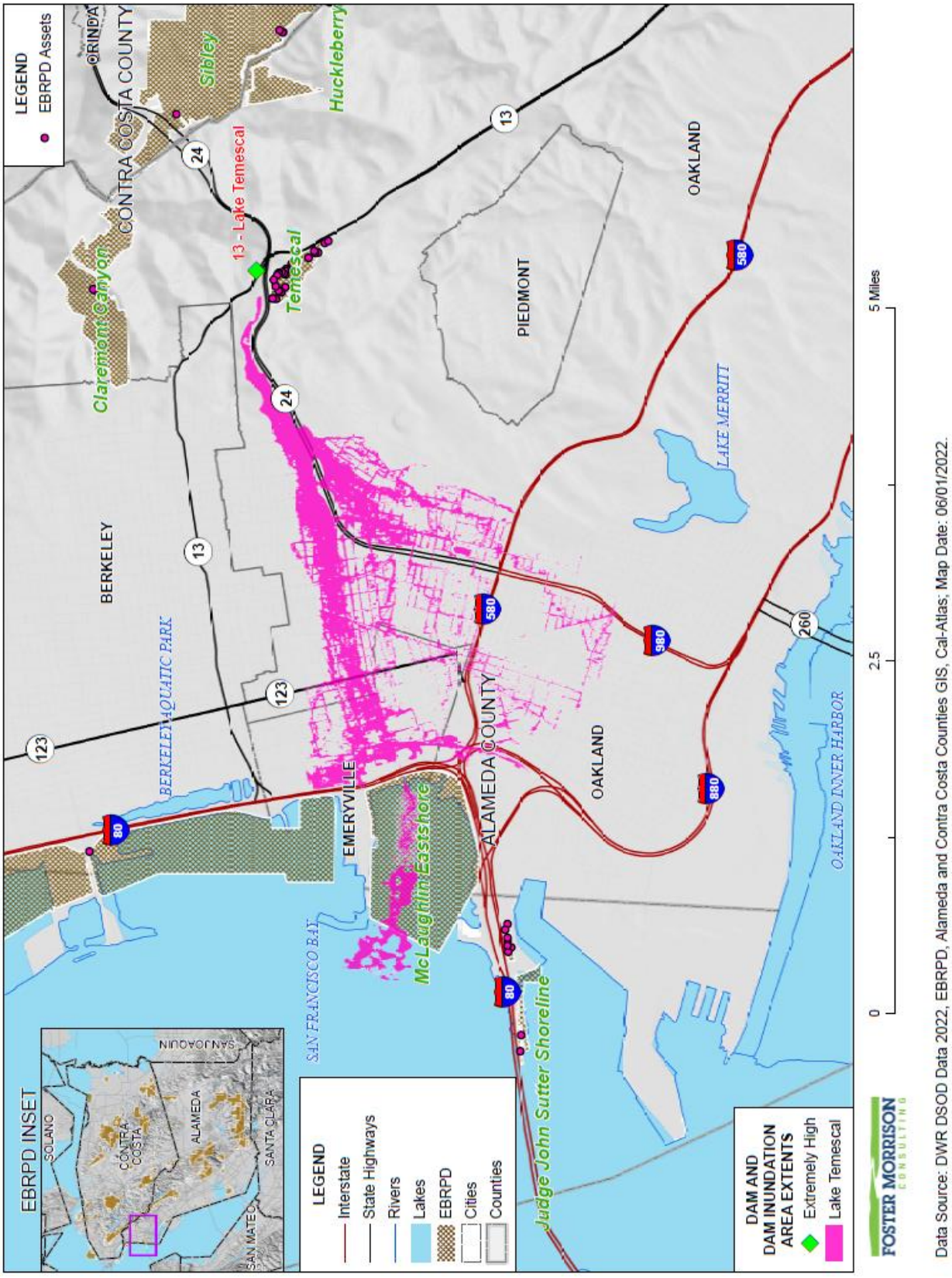


Table 4-54 Lake Temescal Dam Inundation Areas and Affected Park District Lands and Acres

Park Lands	Dam Inundation Area	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
McLaughlin Eastshore	Lake Temescal	1,830	69	3.76%

Source: CA DWR/DSOD, EBRPD GIS

Table 4-55 Lake Temescal Dam Inundation Areas and Affected Park District Assets and Replacement Values

Park Lands	Dam Inundation Area	Asset Count	Replacement Value
–	–	–	–

Source: CA DWR/DSOD, EBRPD GIS

Figure 4-47 EBRPD – CL Tilden Dam Inundation Area

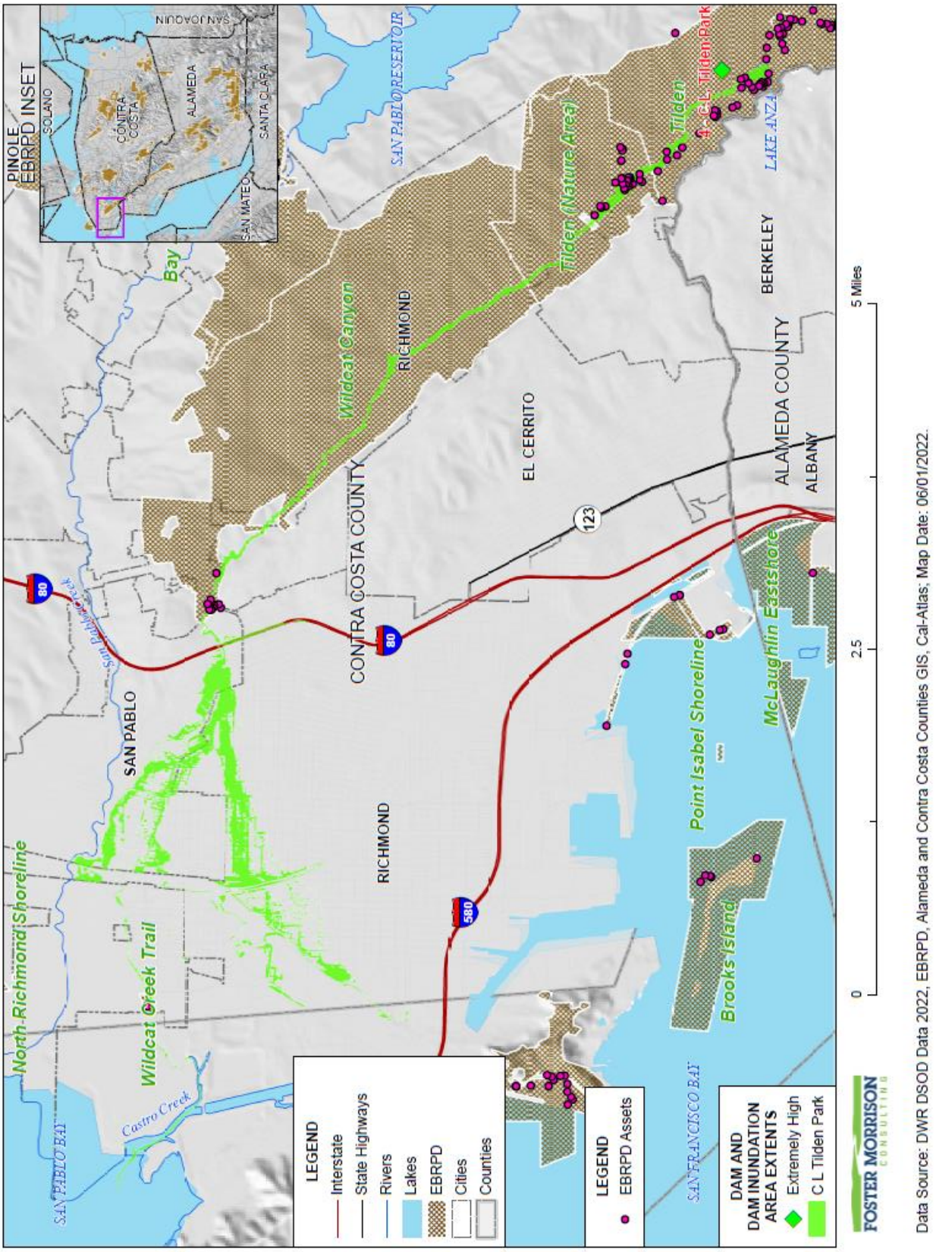


Table 4-56 CL Tilden Dam Inundation Areas and Affected Park District Lands and Acres

EBRPD/ Park Lands	Dam Inundation Area	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
Tilden	C L Tilden Park	1,468	30	2.07%
Tilden (Nature Area)	C L Tilden Park	1,419	33	2.32%
Wildcat Canyon	C L Tilden Park	4,760	55	1.15%
Wildcat Creek Trail	C L Tilden Park	6	1	8.80%

Source: CA DWR/DSOD, EBRPD GIS

Table 4-57 CL Tilden Dam Inundation Areas and Affected Park District Assets and Replacement Values

EBRPD / Park Lands	Dam Inundation Area	Asset Count	Replacement Value
Tilden	C L Tilden Park	12	$5,033,143

Source: CA DWR/DSOD, EBRPD GIS

There are four dams outside Alameda and Contra Costa counties that could affect the EBRPD. Table 4-58 shows the number of Park District lands that intersect these outside the County dam inundation areas, as well as the number of acres affected. These dams and the affected Park District assets and associated replacement values that lie in the inundation areas are shown on Table 4-59.

Table 4-58 EBRPD – Dam Inundation Areas from Extremely High Hazard Dams Outside the County and Affected Park District Lands and Acres

EBRPD/ Park Lands	Dam Inundation Area	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
Antioch/Oakley Shoreline	Mammoth Pool	9	0	0.00%
Antioch/Oakley Shoreline	Shaver Lake	26	0	0.00%
Antioch/Oakley Shoreline	Vermilion Valley	26	0	0.00%
Big Break Shoreline	Huntington Lake 1	26,517	1,314	4.96%
Big Break Shoreline	Mammoth Pool	26,517	1,328	5.01%
Big Break Shoreline	Marsh Creek	26,517	7	0.03%
Big Break Shoreline	Shaver Lake	26,517	1,330	5.02%
Big Break Shoreline	Vermilion Valley	26,517	1,365	5.15%

Source: CA DWR/DSOD, EBRPD GIS

Table 4-59 EBRPD – Dam Inundation Areas from Extremely High Hazard Dams Outside the County and Affected Park District Assets and Replacement Values

Outside of EBRPD / Park Lands	Dam Inundation Area	Asset Count	Replacement Value
EBRPD – Contra Costa County			
Antioch/Oakley	Mammoth Pool	1	$1,027,411
	Shaver Lake	1	$1,027,411
	Vermilion Valley	1	$1,027,411
Big Break	Huntington Lake 1	2	$882,723
	Mammoth Pool	2	$882,723
	Shaver Lake	2	$882,723
	Vermilion Valley	2	$882,723

Source: CA DWR/DSOD, EBRPD GIS

In addition to the summary tables above, the following is a list of park lands that lie in the following dam inundation areas. More detail on specific park lands and assets in these dam inundation areas can be found in Appendix F.

- **Extremely High Hazard Dam Inundation Areas**
  - ✓ Alameda Creek Trail
  - ✓ Anthony Chabot
  - ✓ Ardenwood Historic Farm
  - ✓ Brushy Peak
  - ✓ Camp Arroyo
  - ✓ Coyote Hills
  - ✓ Del Valle
  - ✓ Del Valle to Shadow Cliffs Trail
  - ✓ Don Castro
  - ✓ Hayward Shoreline
  - ✓ Lake Chabot
  - ✓ Martin Luther King Jr. Shoreline
  - ✓ McLaughlin Eastshore
  - ✓ Niles Canyon Trail
  - ✓ Oyster Bay Shoreline
  - ✓ Pleasanton Ridge
  - ✓ Quarry Lakes
  - ✓ SF Bay Trail (MLK to MESP)
  - ✓ Shadow Cliffs
  - ✓ Sunol
  - ✓ Vargas Plateau
  - ✓ Antioch/Oakley Shoreline
  - ✓ Big Break Shoreline
  - ✓ Briones to Las Trampas Trail
  - ✓ Castle Rock
  - ✓ Contra Costa Canal Trail
  - ✓ Contra Loma
  - ✓ Delta Access
  - ✓ Diablo Foothills
  - ✓ Iron Horse Trail
  - ✓ Kennedy Grove
  - ✓ Lafayette to Moraga Trail
  - ✓ North Richmond Shoreline
  - ✓ Point Pinole Shoreline
  - ✓ San Pablo Bay Shoreline
  - ✓ Sobrante Ridge
  - ✓ Tilden
  - ✓ Tilden (Nature Area)
  - ✓ Vasco Hills
  - ✓ Waterbird
  - ✓ Wildcat Canyon
  - ✓ Wildcat Creek Trail
- **High Hazard Dam Inundation Areas**
  - ✓ Diablo Foothills / Castle Rock
  - ✓ Contra Costa Trails

- ✓ East County Trails

Critical Facilities at Risk

EBRPD critical facilities are a subset of the total facilities (or assets) of the Park District as discussed in Section 4.2.4 above. Using the critical facility definition and GIS mapping of Park District assets, CA DWR dam inundation areas were overlayed on the critical facility layer. Those critical facilities that fall within the CA DWR dam inundation areas are detailed in Table 4-60 and Table 4-61 below. More information on critical facilities can be found in Appendix G and H.

Table 4-60 EBRPD – Critical Facilities in Extremely High Hazard Dam Inundation Areas

Dam Name/County	Park Lands	Asset Type	Asset Count
Briones Dam			
Contra Costa County	Kennedy Grove	Building	1
	Kennedy Grove Total		**1**
	Point Pinole	Roadways: Vehicular Bridges	4
	Point Pinole Total		**4**
C L Tilden Park Dam			
Contra Costa County	Tilden	Building	1
		Pedestrian Paving	4
		Sanitary Sewer	1
	Tilden Total		**6**
Chabot Dam			
Alameda County	Martin Luther King, Jr.	Piers & Docks	1
	Martin Luther King, Jr. Total		**1**
Del Valle Dam			
Alameda County	Alameda County Trails	Pedestrian Paving	1
	Alameda County Trails Total		1
	Camp Arroyo	Building	6
		Water Supply	1
	Camp Arroyo Total		**7**
	Shadow Cliffs	Building	4
		Pedestrian Paving	1
		Water Supply	3
	Shadow Cliffs Total		**8**
	Temescal	Pedestrian Paving	2
	Temescal Total		**2**
	Alameda County Total		**18**

Dam Name/County	Park Lands	Asset Type	Asset Count
James H Turner Dam			
Alameda County	Alameda County Trails	Building	3
	Alameda County Trails Total		3
	Ardenwood	Building	1
	Ardenwood Total		**1**
	Coyote Hills	Sanitary Sewer	1
		Water Supply	4
	Coyote Hills Total		**5**
	Quarry Lakes	Building	1
	Quarry Lakes Total		**1**
	Alameda County Total		**10**
Marsh Creek			
Contra Costa County	East County Trails	Pedestrian Paving	4
	East County Trails Total		**4**
	Contra Costa County Total		**4**
New Calaveras			
Alameda County	Alameda County Trails	Building	1
	Alameda County Trails Total		**1**
	Ardenwood	Building	5
	Ardenwood Total		**5**
	Coyote Hills	Building	2
		Sanitary Sewer	2
		Water Supply	4
	Coyote Hills Total		8
	Sunol / Ohlone Wilderness	Building	4
		Pedestrian Paving	1
	Sunol / Ohlone Wilderness Total		**5**
	Alameda County Total		**19**
New Upper San Leandro			
Alameda County	Lake Chabot	Building	6
		Pedestrian Paving	24
		Sanitary Sewer	2
		Water Supply	1
	Lake Chabot Total		**33**
	Martin Luther King, Jr.	Building	2
		Pedestrian Paving	5
		Piers & Docks	3

Dam Name/County	Park Lands	Asset Type	Asset Count
	Martin Luther King, Jr. Total		**10**
	Alameda County Total		**43**
San Pablo			
Contra Costa County	Kennedy Grove	Building	1
	Kennedy Grove Total		**1**
	Point Pinole	Roadways: Vehicular Bridges	3
	Point Pinole Total		**3**
	Contra Costa County Total		**4**
Shaver Lake			
Contra Costa County	Antioch/Oakley	Piers & Docks	1
	Antioch/Oakley Total		**1**
	Big Break	Piers & Docks	1
	Big Break Total		**1**
	Delta Access	Piers & Docks	1
	Delta Access Total		**1**
	Contra Costa County Total		**3**
Vermillion Valley			
Contra Costa County	Antioch/Oakley	Piers & Docks	1
	Antioch/Oakley Total		**1**
	Big Break	Piers & Docks	1
	Big Break Total		**1**
	Delta Access	Piers & Docks	1
	Delta Access Total		**1**
	Contra Costa County Total		**3**

Source: CAL DSOD, EBRPD GIS

Table 4-61 EBRPD – Critical Facilities in High Hazard Dam Inundation Areas

Dam Name/County	Park Lands	Asset Type	Asset Count
Pine Creek Dam			
Contra Costa County	Diablo Foothills / Castle Rock	Building	3
		Pedestrian Paving	3
		Water Supply	1
	Diablo Foothills / Castle Rock Total		**7**
	Contra Costa County Total		**7**
Dry Creek			
Contra Costa County	East County Trails	Pedestrian Paving	1

Dam Name/County	Park Lands	Asset Type	Asset Count
	East County Trails Total		**1**
	Contra Costa County Total		**1**

Source: CAL DSOD, EBRPD GIS

Overall EBRPD (Community) Impact

Dam failure floods and their impacts vary by location and severity of any given dam breach event and will likely only affect certain areas of the Park District and the area it serves. Based on the risk assessment, it is evident that a dam failure flood could have potentially devastating economic impacts to certain areas of the Park District. Impacts that are not quantified, but can be anticipated in future dam failure events, include:

- Injury and loss of life
- Damage to EBRPD Park Lands and Assets
- Disruption in EBRPD Operations
- Disruption of and damage to Park District critical infrastructure and services
- Health hazards associated with mold and mildew, contamination of drinking water, etc.
- Damage to roads/bridges resulting in loss of mobility inside the Park District
- Significant economic impact (jobs, sales, property values, tax revenue) to the Park District and communities it serves

Future Development

Future development in the Park District, as discussed above in Section 4.2.6, is occurring in multiple parks as a result of the Measure WW funding. This includes both new acquisitions and additional build outs of current Park District lands. Future development in the Park District will take dam failure (and the flooding it can cause) into account. The Park District will build any new facilities to current building codes (including floodplain ordinances) of the applicable jurisdiction. However, given the limited potential of a total dam failure and the large area that a dam failure would affect, development in the dam inundation area will continue to occur.

4.3.8. Drought and Water Shortage

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect the EBRPD. These sections include a hazard/problem description; description of location and extent; past occurrences of this hazard; and how climate change can affect this hazard.

Hazard/Problem Description

Drought

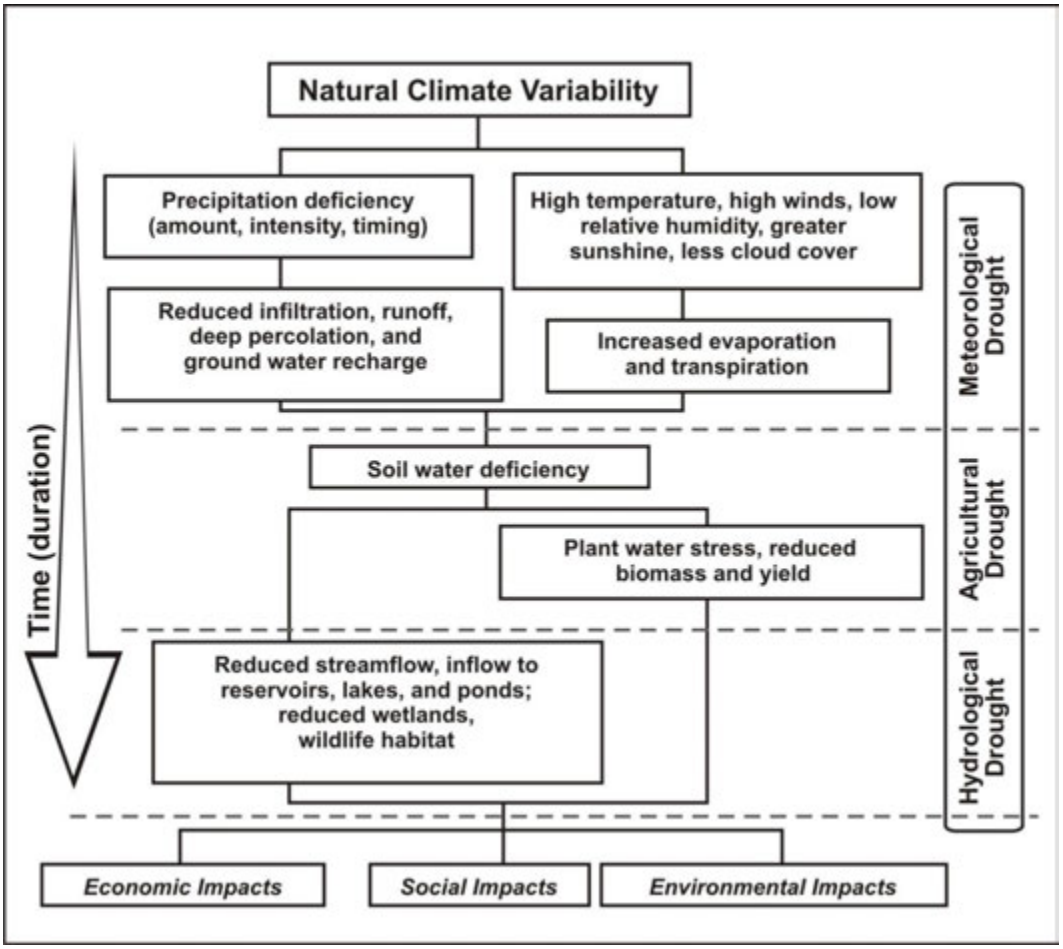
Drought is a gradual phenomenon. Although droughts are sometimes characterized as emergencies, they differ from typical emergency events. Most natural disasters, such as floods or forest fires, occur relatively

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.

Drought is a complex issue involving (see Figure 4-48) 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 4-48 Causes and Impact of Drought

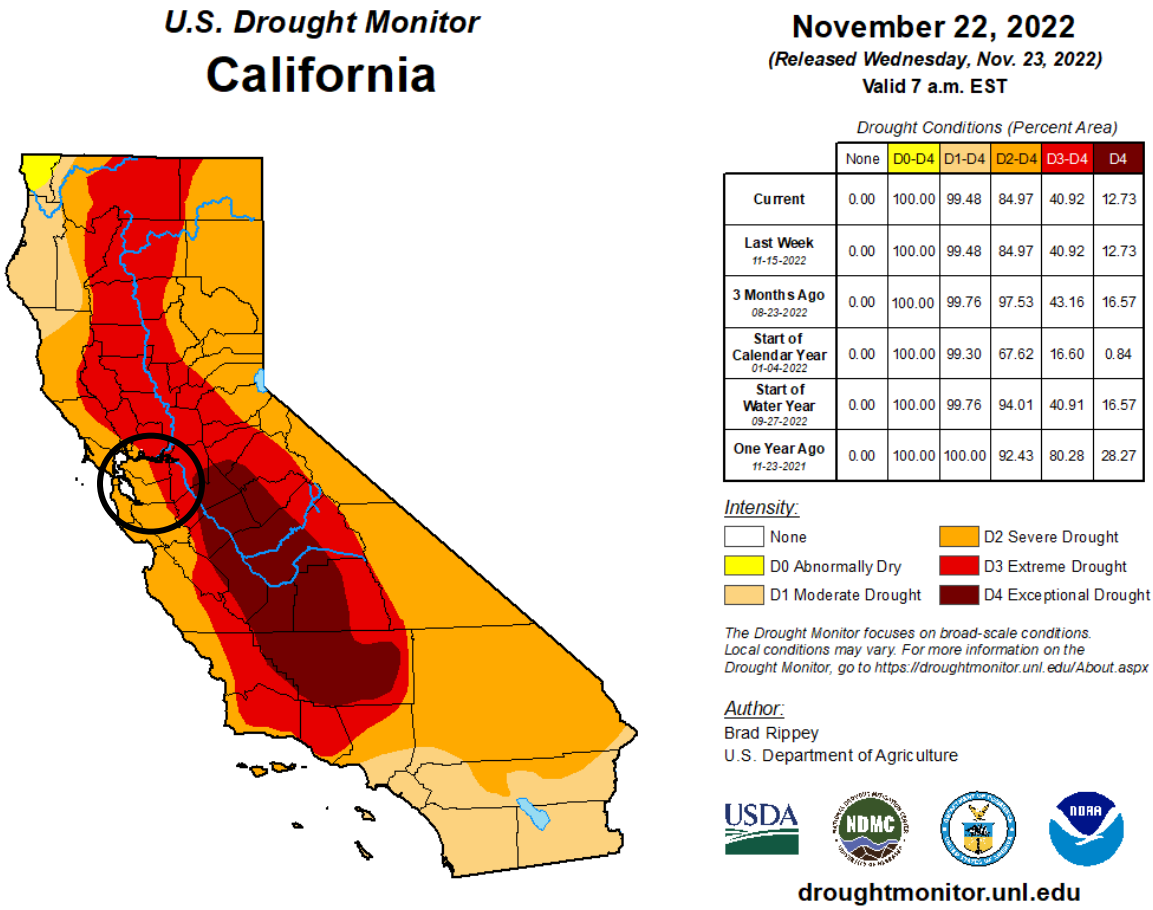


Source: National Drought Mitigation Center (NDMC)

Location and Extent of Drought

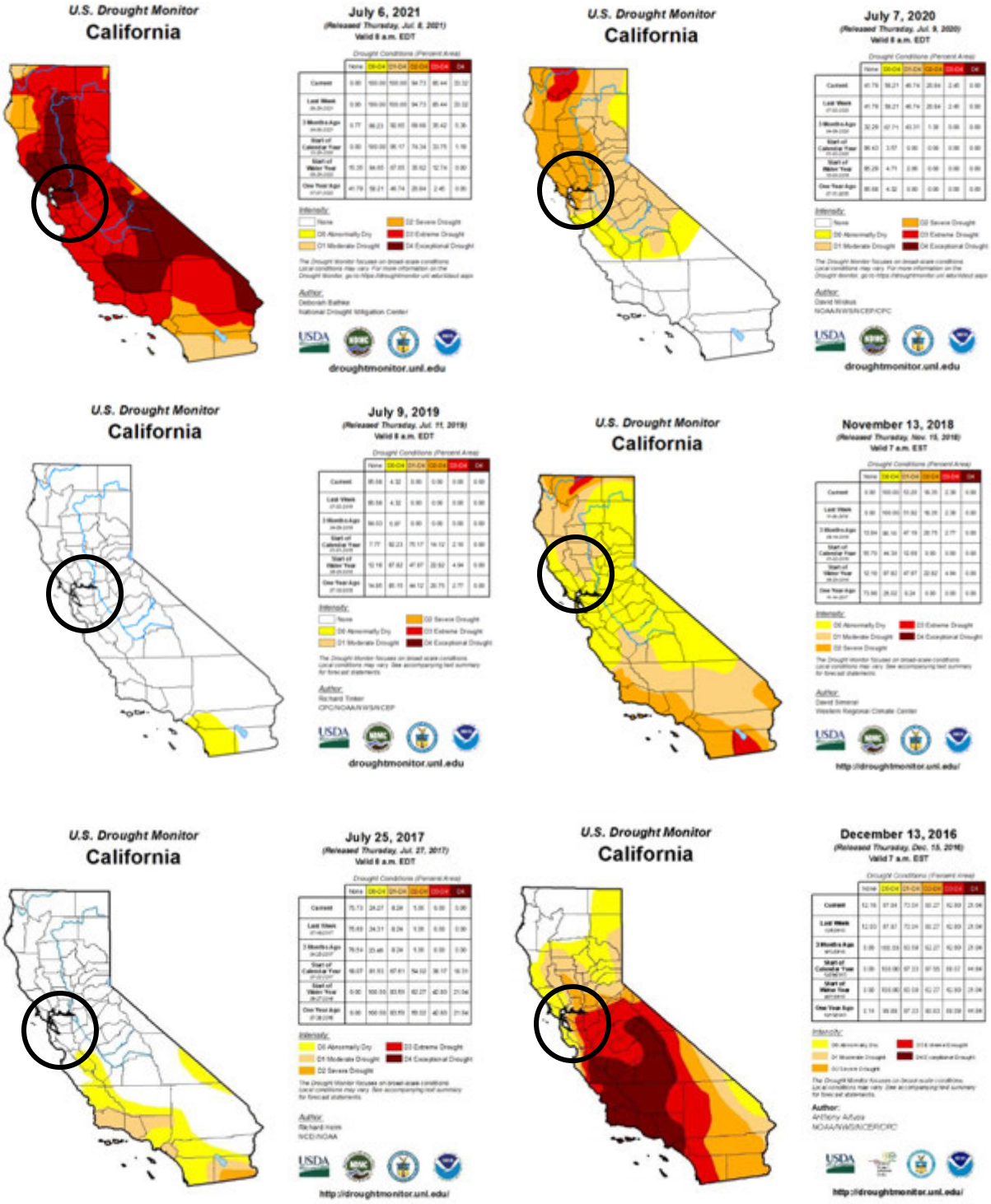
Drought is a regional phenomenon that affects the entire Park District. Drought in the United States is monitored by the National Integrated Drought Information System (NIDIS). A major component of this portal is the U.S. Drought Monitor. The Drought Monitor concept was developed jointly by the NOAA's 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 2022 drought conditions in California and the Park District can be found in Figure 4-49. Snapshots from 2016, 2017, 2018, 2019, 2020 and 2021 are shown in Figure 4-50. As seen in these figures and related data, the Park District has been in and out of drought over the past eight years since the last drought started in 2014.

Figure 4-49 Current Drought Status in the EBRPD



Source: US Drought Monitor

Figure 4-50 Previous Drought Status in the EBRPD



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 domestic uses, farming and federally protected fish habitats in California further contributes to this issue.

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 has a slow onset and long duration. 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. Drought has the potential to affect the entire Park District.

Water Shortage

Northern California communities, including the EBRPD, generally have sufficient groundwater and surface water supplies to mitigate even the severest droughts of the past century. Many other areas of the State, however, also place demands on these water resources during severe drought.

The Park District is fortunate to have access to a reasonably reliable and, for the most part, a contaminant-free drinking water supply. The Park District noted that East Bay Municipal Utility District (EBMUD) is the primary provider of municipal water. EBMUD water sources are mostly from surface water. Most drinking water and irrigation water utilizes municipal surface water. The Park District noted that there are also wells owned by Park District that supplement surface water sources. This is true in Briones Park and a few other areas that are on well water. In these areas, well water is the source for both drinking water and turf irrigation. It is estimated that 50-60 houses in the Park District Planning Area are on wells. The Park District also has a series of water storage tanks and ponds used for additional water supply throughout the

Park District. The Park District is currently adding a storage tank to reduce drought risk in the future. Del Valle is the only water treatment plant located on EBRPD lands.

Location and Extent of Water Shortage

Since water shortage generally happens on a regional scale, the entirety of the Park District is at risk. 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 and the status of the water sources going into the drought. The extent of the drought considers several factors, including the nature, source, and reliability of water. While drought conditions persist, the Park District indicates it has sufficient water supply from municipal water supplies from EBMUD to support Park District operations, which lessens the extent of water shortage impacts in the Park District.

Past Occurrences

Disaster Declaration History

There have been two state and one federal disaster declarations for Alameda and Contra Costa County. These are shown on Table 4-62 and Table 4-63.

Table 4-62 Alameda County – State and Federal Drought Disaster Declarations 1950-2021

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

Source: Cal OES, FEMA

Table 4-63 Contra Costa County – State and Federal Drought Disaster Declarations 1950-2021

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

Source: Cal OES, FEMA

NCDC Events

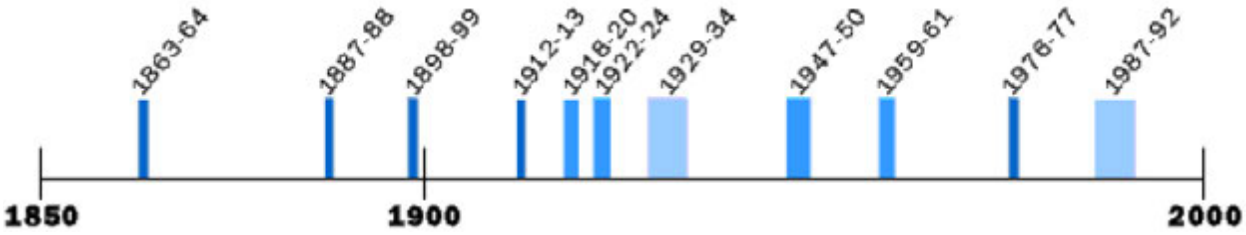
There have been no NCDC drought events in Alameda or Contra Costa County. This is most likely due to a lack of reporting by NCDC spotters in each County.

Cal-DWR (with Hazard Mitigation Planning Team Events)

Historically, California has experienced multiple severe droughts. According to the DWR, droughts exceeding three years are relatively rare in Northern California, the source of much of the State's developed water supply. Figure 4-51 depicts California's Multi-Year Historical Dry Periods, 1850-2000. The 1929-34 drought established the criteria commonly used in designing storage capacity and yield of large northern

California reservoirs. Figure 4-52 compares the 1929-34 drought to the 1976-77, 1987-92, 2007-09, and 2012-2016 droughts.

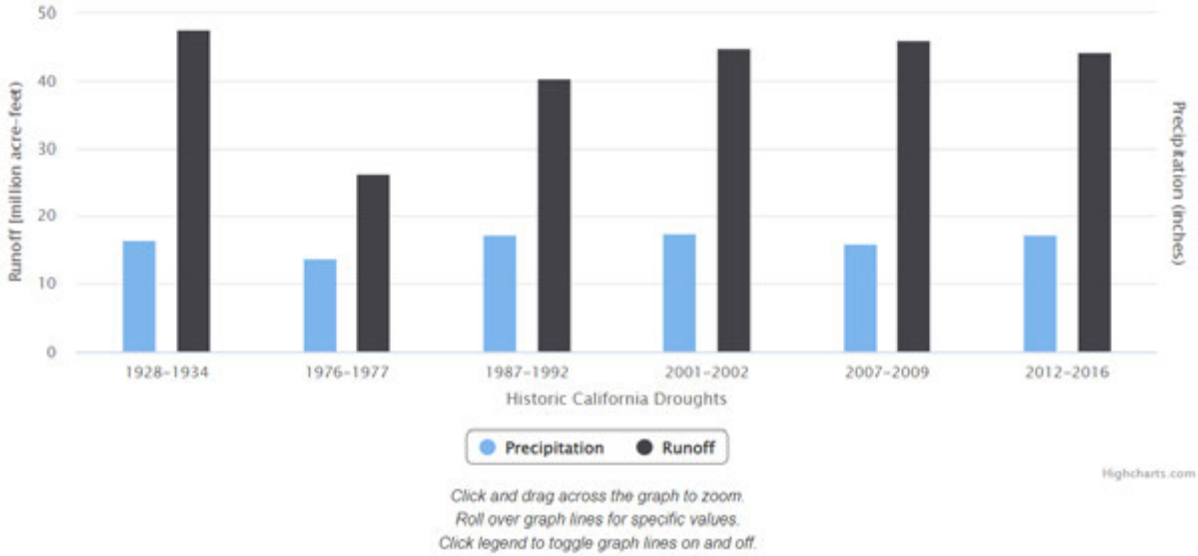
Figure 4-51 California's Multi-Year Historical Dry Periods, 1850-2000



Source: Cal DWR

Notes: Dry periods prior to 1900 estimated from limited data; covers dry periods of statewide or major regional extent

Figure 4-52 Average Annual Runoff and Precipitation for Historic Droughts

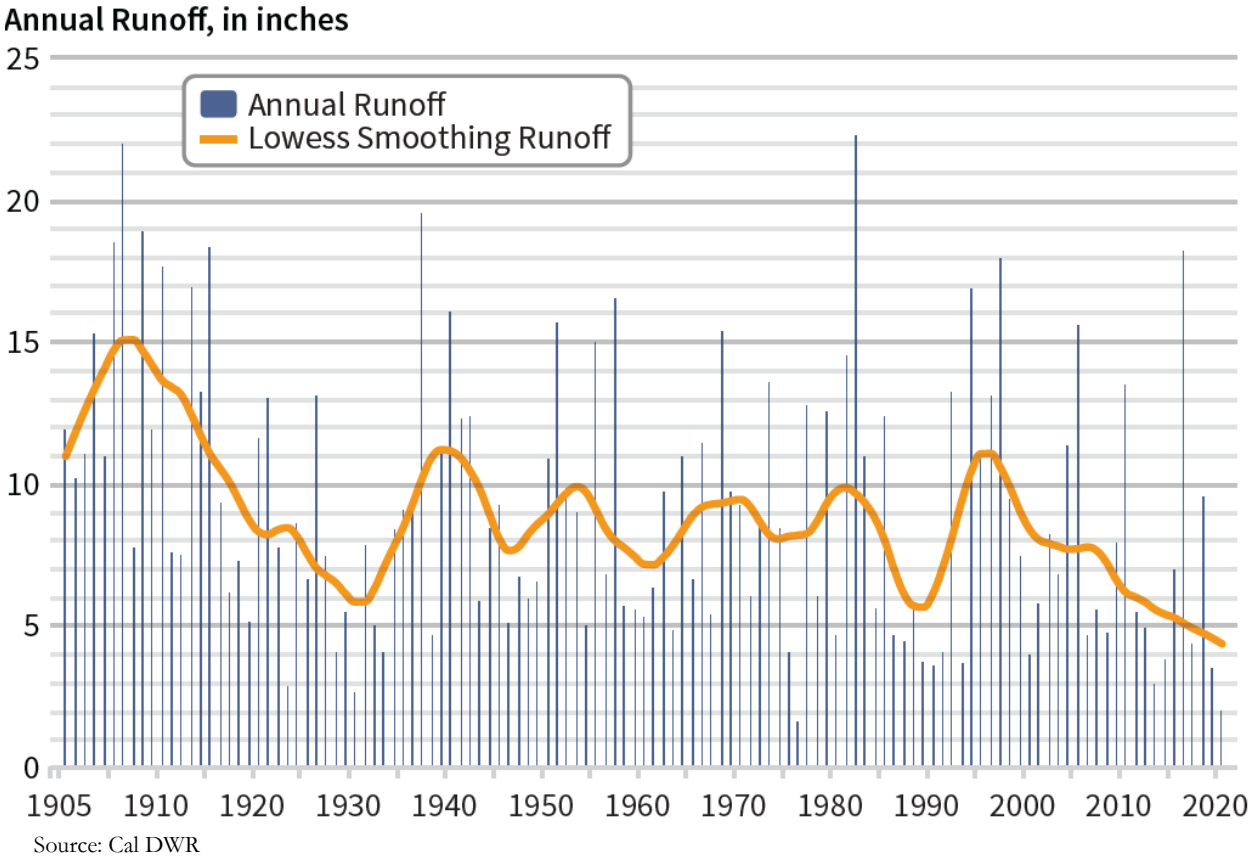


Runoff and precipitation conditions for California's six historical droughts. The most severe drought both in terms of precipitation and runoff was the drought of 1976-77. However, because it was just a two-year drought, the water supply impacts were not as severe as those associated with the longer duration droughts because shorter droughts can be partially mitigated by surface and groundwater storage.

Source: CA DWR – 2012-2016 California Drought: Historical Perspective (https://ca.water.usgs.gov/california-drought/california-drought-comparisons.html)

Figure 4-53 depicts runoff for the State from 1905 to 2021. This gives a historical context for the 2014-2015 drought to compare against past droughts.

Figure 4-53 Annual California Runoff –1905 to 2021



Source: Cal DWR

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 Park District noted no specific damages or issues during this drought could be recalled.

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 Park District noted no specific damages or issues during this drought could be recalled.

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 Park District noted no specific damages or issues during this drought could be recalled.

The 2012-2017 Drought (and still ongoing after a pause in 2017)

The statewide drought of 2012-2017, which is still ongoing, 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:

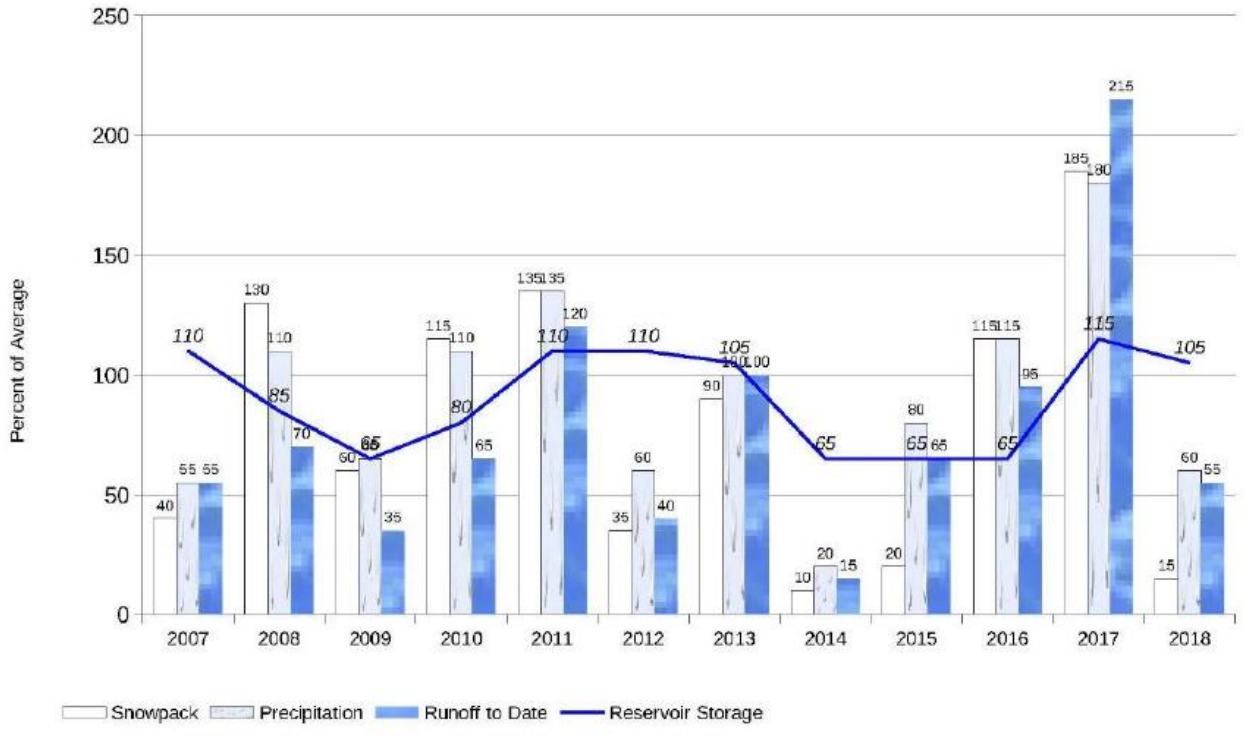
2014, 2015, and 2016 were California's first, second, and third warmest years in terms of statewide average temperatures. By the time the drought was declared officially over in April 2017, the state had expended $6.6 billion in drought response and mitigation programs and had been declared a federal disaster area.

During this time, Park District wells have gone dry on two homes – those had to have separate lines run from different wells in order for water to be provided. This occurred in Round Valley Park (2 wells gone dry) and Pleasanton Ridge where one well has gone to 0.5 gallons per minute (gpm). This is where the storage tanks are being added to help the well keep up. 2022 saw an additional well go dry requiring the Park District to truck in water. According to the EBRPD water provider, they have been trucking water to areas throughout the region due to wells going dry or other reduction in water supply resources. In addition, tree die back is increasing. The EBRPD noted mass vegetation dieback including large swaths of eucalyptus. By 2020, the Park District had 1,500 acres of dead standing trees, predominantly located in the WUI areas. One of the affected groves was struck by fire in summer of 2022.This drought also caused some turf areas in the Park District to be abandoned. Other issues attributed to drought included an increase in Cyanobacterial Algae creating issues for EBRPD fisheries and recreation areas. Drought conditions have also contributed to an explosion in tick populations, many of which carry disease.

Water Shortage

Figure 4-54 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 4-54 Water Supply Conditions, 2007 to 2018



Source: 2018 State of California Hazard Mitigation Plan

Beginning in 2012, snowpack levels in California dropped dramatically. 2015 estimates placed 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 began to return to California but were dampened by periods of above average rainfall in the first part of 2019. EBRPD has been in and out of drought conditions since 2019. Most recently drought in California is again a significant concern as evidenced by the lack of rain over the 2020/2021 rainy season and by the State's issuance of the 2021 Drought Emergency Proclamation.

Likelihood of Future Occurrence

Drought

Likely—Historical drought data for the Park District 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. Based on this data and given the multi-year length of droughts and future climate change affects, the EBRPD determined that future drought occurrence in the Park District continue to be likely.

Water Shortage

Occasional — Recent historical data for water shortage indicates that California and the Park District 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 Park District in the future during extreme drought conditions. New development, landscaping, and road paving put stress on water resources. The supply of water is currently sufficient, but as population grows and land use patterns shift, it will be necessary to consider the added stress that new development will put on water demand and quality.

Climate Change and Drought and Water Shortage

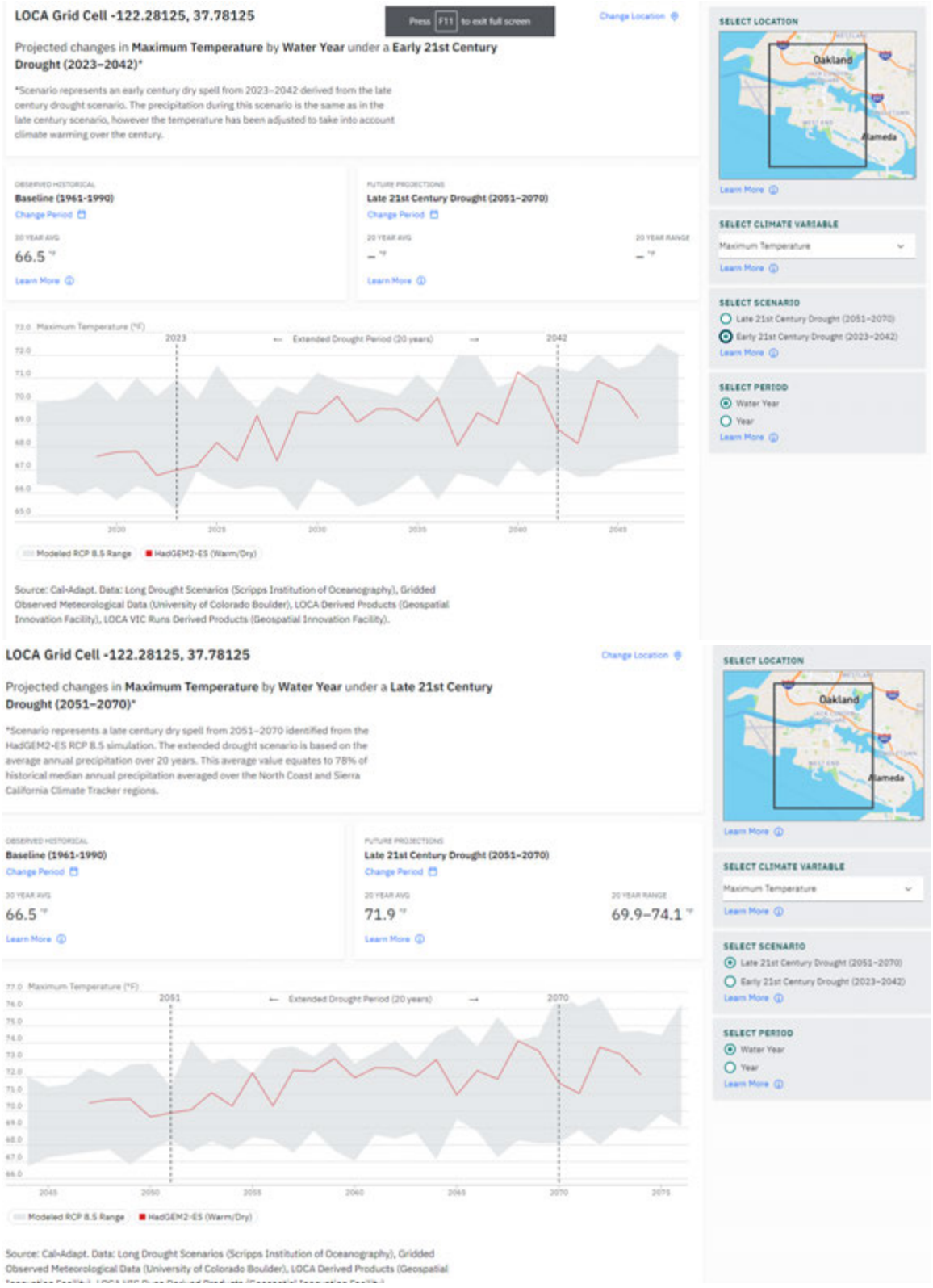
Climate scientists studying California find that drought conditions are likely to become more frequent and persistent over the 21st century due to climate change. The experiences of California during recent years underscore the need to examine more closely the state's water storage, distribution, management, conservation, and use policies. The 2021 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.

A 2018 report from the Public Policy Institute of California noted 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.

Cal-Adapt has modeled future risk of drought. Recent research suggests that extended drought occurrence ("mega-drought") could become more pervasive in future decades. This tool explores data for two 20-year drought scenarios (using the quad that contains the City of Oakland in Figure 4-55 and the quad north of Fremont in Figure 4-56) derived from LOCA downscaled meteorological and hydrological simulations – one for the earlier part of the 21st century, and one for the latter part:

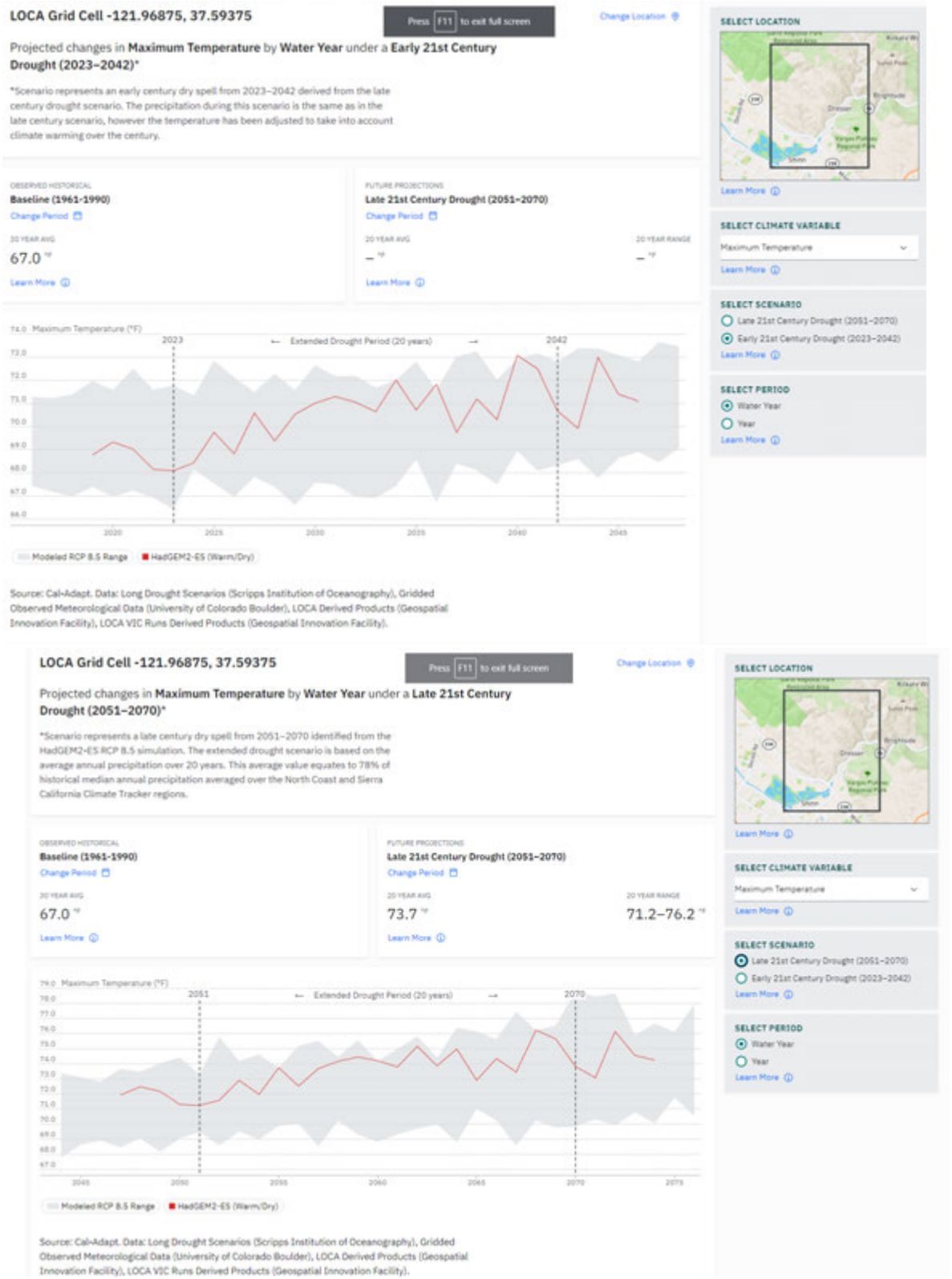
- The upper chart represents a mid-century dry spell from 2023-2042 identified from the HadGEM2-ES RCP 8.5 simulation. The extended drought scenario is based on the average annual precipitation over 20 years. This average value equates to 78% of historical median annual precipitation averaged over the North Coast and Sierra California Climate Tracker regions.
- The lower chart represents a late century dry spell from 2051–2070 identified from the HadGEM2-ES RCP 8.5 simulation. The extended drought scenario is based on the average annual precipitation over 20 years. This average value equates to 78% of historical median annual precipitation averaged over the North Coast and Sierra California Climate Tracker regions.

Figure 4-55 Alameda County – Future Extended Drought Scenarios



Source: Cal Adapt – Extended Drought Scenarios (retrieved 6/20/2022)

Figure 4-56 Contra Costa County – Future Extended Drought Scenarios



Source: Cal Adapt – Extended Drought Scenarios (retrieved 6/20/2022)

Vulnerability Assessment

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.

Vulnerability to and Impacts from Drought and Water Shortage

Based on historical information, the occurrence of drought in California, including the Park District, 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 EBRPD to drought is Districtwide, but impacts may vary and include reduction in water supply, turf losses, impacts to natural resources, and an increase in dry fuels and tree dieback. Park District ponds are drying during periods of drought. Wells have and continue to go dry due to droughts in the past as well. Drought is also increasing algae blooms (both cyanobacteria and traditional algae) in Park District waters. Mandatory conservation measures are typically implemented during extended droughts. Drought conditions can also cause soil to compact and not absorb water well, potentially making an area more susceptible to flooding.

Droughts impact the Park District in a variety of ways. Grazing is a big part of resource management, which puts additional pressure on water during times of drought. Cattle, sheep, and goat grazing are used as a vegetation management tool to reduce fire fuels and maintain or improve habitat conditions for resident plants and wildlife. Current research indicates that well-managed, moderately grazed areas generally display a greater diversity and density of native plant and animal life. This grazing keeps the coyote brush back. Approximately 65% of District land is grazed by 6,000 cattle, 1,500 sheep, and 1,600 goats, which are spread out over about half of the Park District's parks at any given time. Most of the cattle and sheep grazing takes place during the winter and early spring. Goats are typically used for fire fuel load reduction projects between March and August. Grazing is a significant resource management tool, both with respect to fuels management and overall resource management, keeping down invasive species and noxious weeds.

For the Park District, the most severe impacts of droughts are likely to be stress and damage to drought-sensitive ecosystems, the increase in tree die off and hazardous trees, and increased risk of wildland and wildland/urban interface fires. The dollar costs to the Park District from drought include increased costs for removal of dead trees, which could range from a few thousand dollars to $100,000 or more. The greatest potential for dollar costs is from more severe wildland/urban interface fires that may affect not only the Park District but adjacent high-density development. These costs could range from a few thousand dollars for very small fires, to several million dollars for larger fires. In extreme events, such as the 1991 Tunnel Fire in the Oakland Hills, the damages could be several billion dollars.

Additionally, the HMPC noted that wood tick populations have exploded as a result of recent droughts. Increase of tick-borne diseases has occurred as a result. This is both for humans, as well as for animals that reside in the Alameda and Contra Costa County areas.

Drought Impact Reporter

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 4-64 show drought impacts for the Park District and Alameda and Contra Costa County from 1850 to June 2022. The data represented is skewed, with the majority of these impacts from records within the past ten years. It is anticipated that drought impacts to the Park District lands and assets would be similar to those experienced in the Counties, though on a smaller scale and more focused on impacts to natural resources and open space lands.

Table 4-64 Alameda and Contra Costa County Drought Impacts 1850-6/20/2022

Category	Alameda County Number of Impacts	Contra Costa County Number of Impacts
Agriculture	510	510
Business and Industry	127	127
Energy	18	18
Fire	285	285
Plants & Wildlife	447	447
Relief, Response, and Restrictions	811	811
Society and Public Health	462	462
Tourism and Recreation	158	158
Water Supply and Quality	1,131	1,131
Total	**3,949**	**3,949**

Source: National Drought Mitigation Center

Tree Mortality and Die Back

One of the specific vulnerabilities of drought in the Park District and surrounding counties is the increased risk to trees from beetle kill and other insects, pathogens and parasites, and other tree mortality and die back issues. Drought weakens trees and makes them more susceptible to insect infestation and other pathogens. Insects, such as bark beetles and others, frequently attack trees weakened by drought, disease, injuries, or other factors that may stress the tree. These insects and other pathogens can contribute to the decline and eventual death of trees throughout the Park District.

In a May 2, 2021, article from Berkelyside, it was noted that

> ***"the wide variety of species that are struggling or dying, plus recent weather conditions and the geographic distribution of the die-backs, point to drought stress as a root cause, according to Natalie van Doorn, a research urban ecologist, and Susan Frankel, a plant pathologist, both at the US Forest Service's Pacific Southwest Research Station***

in Albany. The stress of drought makes trees more susceptible to pathogens and parasites, such as two fungi that researchers have seen damaging many of the acacia in the recent die-off."

This is happening in multiple areas of the EBRPD, as shown on Figure 4-57.

Figure 4-57 April 26, 2021, EBRPD Meeting Tree Mortality Slide

Affected East Bay Regional Parks	Acres Impacted
Anthony Chabot Regional Park	624
Carquinez Regional Shoreline	26
Garin Regional Park	2
Las Trampas Regional Preserve	12
Miller Knox Regional Shoreline	41
Point Pinole Regional Shoreline	14
Reinhardt Redwood Regional Park	177
Sibley Regional Preserve	43
Tilden Regional Park	62
Total Acreage on District Lands	1001

Source: Berkelyside (https://www.berkeleyside.org/2021/05/02/mass-tree-death-in-east-bay-parks-raises-alarm-ahead-of-fire-season)

According to an article in the East Bay Times from May 24, 2021:

The trees cover about 1,000 acres of the 124,909-acre district, and multiple species are affected, including acacia, eucalyptus, Monterey pines, manzanitas and others. Most of the trees, on about 624 acres, are in Castro Valley's Anthony Chabot Regional Park, where eucalyptus grow in some places so close together that game trails do not exist. The second biggest concentration, with about 177 acres, is in Reinhardt Redwood Regional Park in Oakland.

Many trees are in "interface" areas, or where parkland abuts residential neighborhoods, making the fire threat especially dangerous.

The Park District spent $2.3 million on vegetation work last year (2020), Erich Pfuehler, the Park District's chief of government and legislative affairs, told the citizens advisory committee. The committee's 21 appointed members offer advice and recommendations to the Park District board.

The Park District has spent $20.5 million in controlling vegetation over the past 10 years, Pfuehler said. Funding sources include grants from the Federal Emergency Management Agency and Measure FF, a parcel tax voters in Oakland, Berkeley,

Richmond, Alameda, San Pablo, El Cerrito, Albany, Emeryville, Piedmont, El Sobrante and Kensington passed in November 2018.

The tree mortality and dieback problem is a high priority because of the issue of hazardous trees and increased wildfire hazard in the wildland areas and the potential for worsening conditions and expansion into other forested sites in future years. Fuel loading and fire potential are greater in affected eucalyptus, acacia, and conifer stands as compared to healthy stands due to the higher proportion of dead and dying material. Removal of dead and dying trees near structures, powerlines, and roadways is also a high priority because of the immediate falling hazard.

University of California, Berkeley's Department of Environmental Science, Policy, and Management (ESPM) was commissioned in 2021 to investigate the symptoms and possible causes of the dieback. Preliminary results show that the dieback is driven mostly by environmental stressors, including but not limited to drought, predisposing trees to disease caused by opportunistic pathogens. The report includes best management practices to limit the spread of pathogens. It is important to continue investigating the causes of the tree mortality and dieback to help District staff track changes over time, recognize where other areas may potentially be susceptible to tree mortality, and apply appropriate best management practices.

In January 2022, the Park District's Fire Department inventoried several affected sites in Tilden to determine the proportion of blue gum eucalyptus trees that are either dead, stressed, or healthy, and to measure size and diameters within each stand. This information is critical for staff to be able to quantitatively and qualitatively document existing conditions and track changes over time. Similar inventories should be conducted in other affected park areas, especially Anthony Chabot, prior to fuels treatments.

Eucalyptus forests planted in the early 1900s in the East Bay are now extremely dense with deep surface fuel accumulations (10-25 tons/acre), large numbers of trees of varying sizes (200-2,000 stems/acre), and high potential for crown fire and long-range spotting due to the physical properties of leaves and strips of loose, shreddy bark accumulating at the base of trees. Wildfire hazard and surface and ladder fuel loading in eucalyptus stands is expected to increase as more trees die or decline in health, with more dead branches and shreddy bark accumulating on the forest floor and throughout the stand.

Affected standing trees that have lost all or some of their canopy leaves have already started sprouting suckers along their boles in response to the stress and increased sunlight. These epicormic sprouts are characteristically bushy and represent a significant addition to the ladder fuels and undesirable continuity between surface fuels and aerial (canopy) fuels. Suckers are not necessarily a sign of returning tree vigor or forest health.

Under current drought conditions, competition for resources within the eucalyptus forests will likely continue to intensify with greater stress increasing tree susceptibility to insect damage and disease, and ultimately increase mortality.

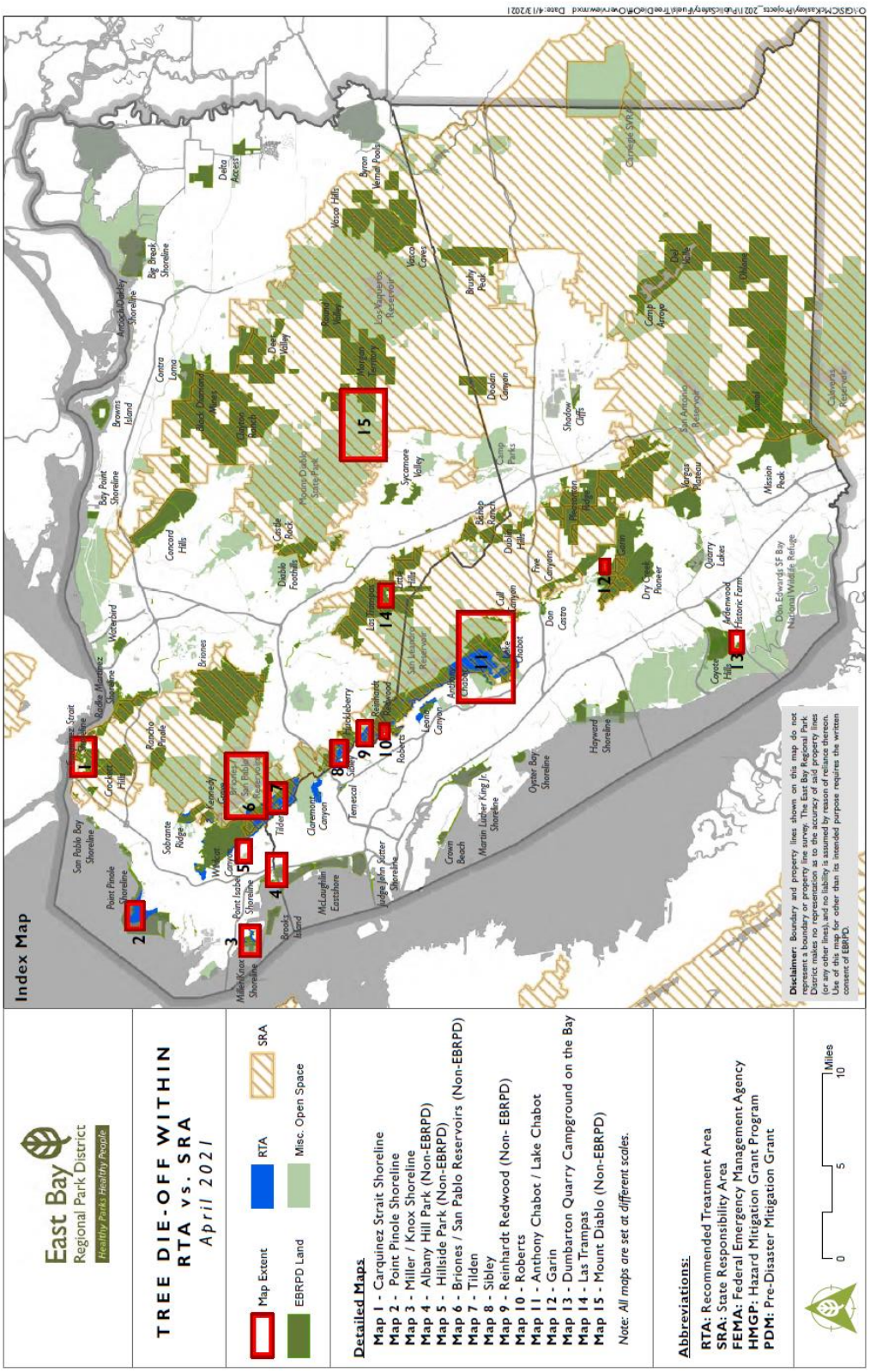
Extensive non-native conifer plantings that have occurred throughout the East Bay Hills over the past 100 years now characterize much of Tilden Park, as well as other regional parks to a lesser degree. Many of these stands suffer from overcrowding, accumulating surface fuels, and in some cases, significant tree

mortality and die back. Dead and dying conifers add considerable fuel loading to the forest, with standing specimens posing a threat of blow-down in storm or windy conditions.

In all vegetation types, drought extends the length of the fire season because of its effect on live and dead fuel moisture, with critical low fuel moisture levels occurring early in spring or summer and extending at least through the first significant rains that typically come in late fall.

Tree Die-off areas have been mapped by the Park District. These areas are generally shown on Figure 4-58. The EBRPD has additional maps that drill down to the specific issues in each highlighted area that can be consulted for additional detail.

Figure 4-58 EBRPD – Tree Die-Off Areas



Source: EBRPD

Drought and Power Shortage/PSPS

During periods of drought, vegetation can dry out which increases fire risk. Drought that occurs during periods of extreme heat and high winds can cause PSPS events to be declared in the County. More information on PSPS can be found in Section 4.3.1.

Future Development

The Park District has access to large quantities of water through its surface water sources, and as supplemented through groundwater wells. However, additional growth in Park District lands will add additional pressure to water companies and wells during periods of drought and water shortage. The EBRPD will need to continue to plan for and manage their water resources to support the future of the Park District. It is anticipated that the EBRPD will continue to add and develop Park lands throughout their Planning Area which will increase visitors to the parks as well as the demand for water. Turf areas are being reduced and better managed. Irrigation and well systems are being improved. Additional water infrastructure is being planned to accommodate future conditions. The Park District continues to make efforts to be proactive on future drought issues.

4.3.9. Earthquake and Liquefaction

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect the EBRPD. These sections include a hazard/problem description; description of location and extent; past occurrences of this hazard; and how climate change can affect this hazard.

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, the Park District could be susceptible to violent ground shaking, depending on the location of the event.

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.

Liquefaction Potential

Liquefaction occurs in saturated soils, that is, soils in which the space between individual particles is completely filled with water. This water exerts a pressure on the soil particles that influences how tightly the particles themselves are pressed together. Prior to an earthquake, the water pressure is relatively low. However, earthquake shaking can cause the water pressure to increase to the point where the soil particles can readily move with respect to each other. When liquefaction occurs, the strength of the soil decreases and, the ability of a soil deposit to support foundations for buildings and bridges is reduced. Liquefied soil also exerts higher pressure on retaining walls, which can cause them to tilt or slide. This movement can cause settlement of the retained soil and destruction of structures on the ground surface. Increased water pressure can also trigger landslides and cause the collapse of dams. Because liquefaction only occurs in saturated soil, its effects are most commonly observed in low-lying areas near bodies of water such as rivers, lakes, bays, and oceans.

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.

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 4.3.12.

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.

Location and Extent

The Park District is vulnerable to both a large damaging earthquake and smaller earthquake events. Specific areas of the Park District are also susceptible to the effects of earthquake liquefaction. Starting with the location of faults in the Park District, the areas most at risk are discussed in this section. According to the California Geological Survey (CGS) and US Geological Survey (USGS), multiple faults directly underlie the Park District. These are detailed below.

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.

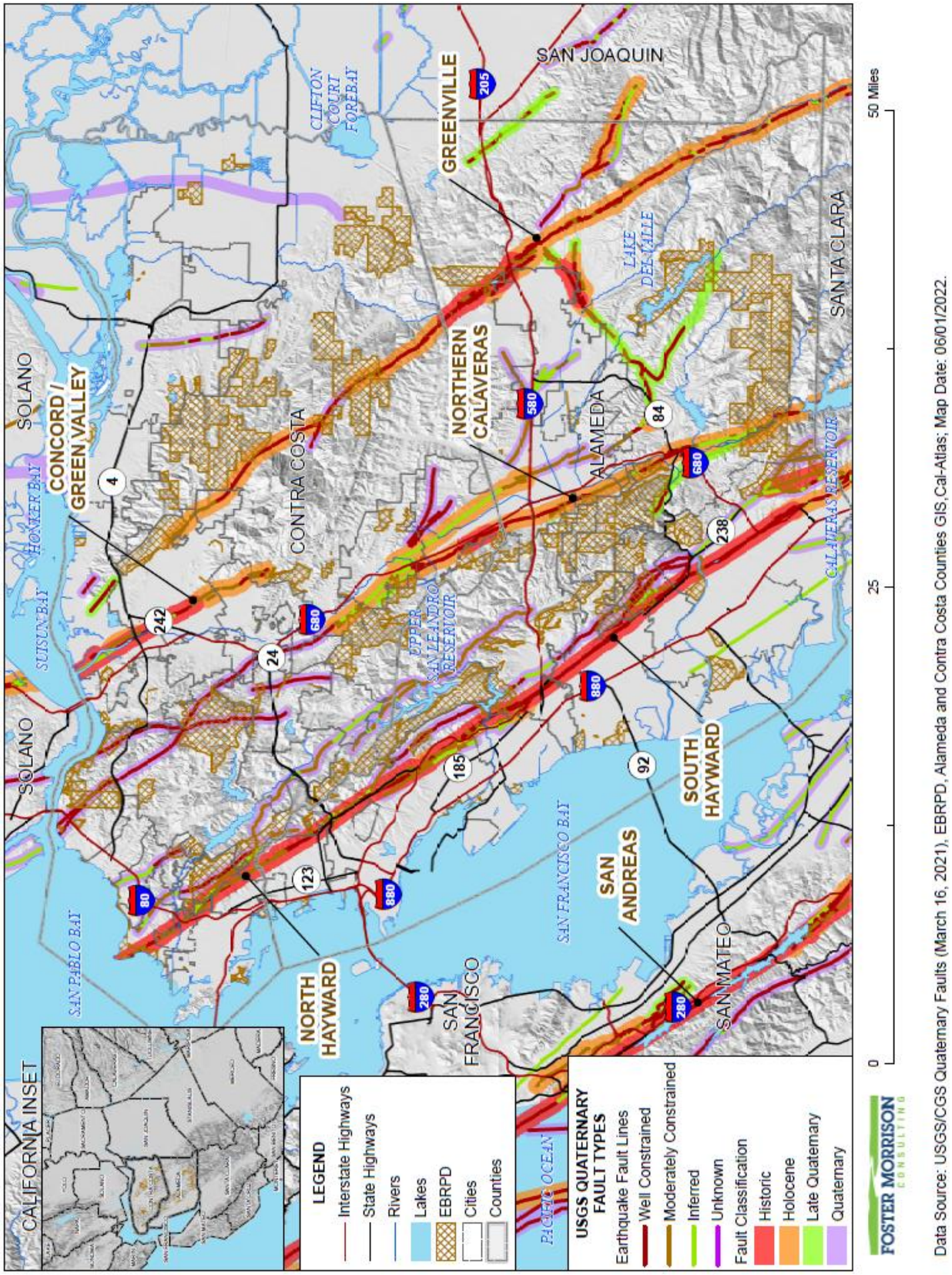
Two types of fault movement represent possible hazards to structures in the immediate vicinity of the fault: fault creep and sudden fault displacement. Fault creep, a slow movement of one side of a fault relative to the other, can cause cracking and buckling of sidewalks and foundations even without 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.

The San Francisco Bay Area is transected by a series of parallel faults that together accommodate the relative motion between the Pacific and North American plates over a width of more than 50 miles. The major fault zones that comprise this system include the San Andreas, Hayward, Calaveras, Concord-Green Valley, Greenville, Rodgers Creek, and San Gregorio Faults. These major faults are near vertical and generally exhibit right-lateral strike-slip movement (which means that the movement is predominantly horizontal and when viewed from one side of the fault, the opposite side of the fault is displaced to the right).

Earthquakes occur not only on faults mapped as active or potentially active, but also on unknown faults. Many significant earthquakes in the United States have occurred on previously unknown faults. Based on the historical seismicity in California and comparisons to other geologically similar areas, small to moderate crustal earthquakes up to about M5 or M5.5 are possible almost any place in the Bay Area. There is also the possibility of larger crustal earthquakes in the M6+ range on unknown faults, although the probability of such events is likely to be low.

Faults in and near the Park District can be seen on Figure 4-59.

Figure 4-59 EBRPD – Faults in and near the Park District



Alquist-Priolo Zones

According to the California Geological Survey, Alquist-Priolo earthquake fault zones are regulatory zones surrounding the surface traces of active faults in California. (A trace is a line on the earth's surface defining a fault.) Wherever an active fault exists, if it has the potential for surface rupture, a structure for human occupancy cannot be placed over the fault and must be a minimum distance from the fault (generally fifty feet). Surface fault rupture occurs when movement on a fault breaks through to the earth's surface. An active fault, for the purposes of the Alquist-Priolo Act, is one that has ruptured in the last 11,000 years.

Not all earthquakes result in surface rupture. The Loma Prieta Earthquake of 1989 caused major damage in the San Francisco Bay Area but the movement deep in the earth did not break through to the surface. Surface rupture almost always follows pre-existing faults. It may occur suddenly during an earthquake or slowly in the form of fault creep. Fault creep is slow rupture of the earth's crust. Examples of creep are well known along the Hayward Fault where it crosses highly developed areas in Contra Costa and Alameda Counties. Although the Hayward Fault ruptured suddenly in the 1868 earthquake, it also exhibits slow surface creep which offsets and deforms curbs, streets, buildings, and other structures that lie on top of the fault.

Earthquake fault zones were conceived in the Alquist-Priolo Earthquake Fault Zoning Act (Alquist-Priolo Act). The intent of the Alquist-Priolo Act is to reduce losses from surface fault rupture. California created this law following the destructive 1971 San Fernando earthquake (magnitude 6.6), which was associated with extensive surface fault ruptures that damaged numerous structures.

Some Park District facilities and parklands are located within Alquist-Priolo Act mapped fault zones. Table 4-65 describes the parks with land that cross mapped fault zones. These areas might experience fault rupture as a result of an earthquake on the identified fault, damaging roads, pipelines, levees, dams, and buildings or facilities that cross the fault. Figure 4-60 shows the Alquist-Priolo zones in the Park District.

Figure 4-60 EBRPD – Alquist-Priolo Fault Zones

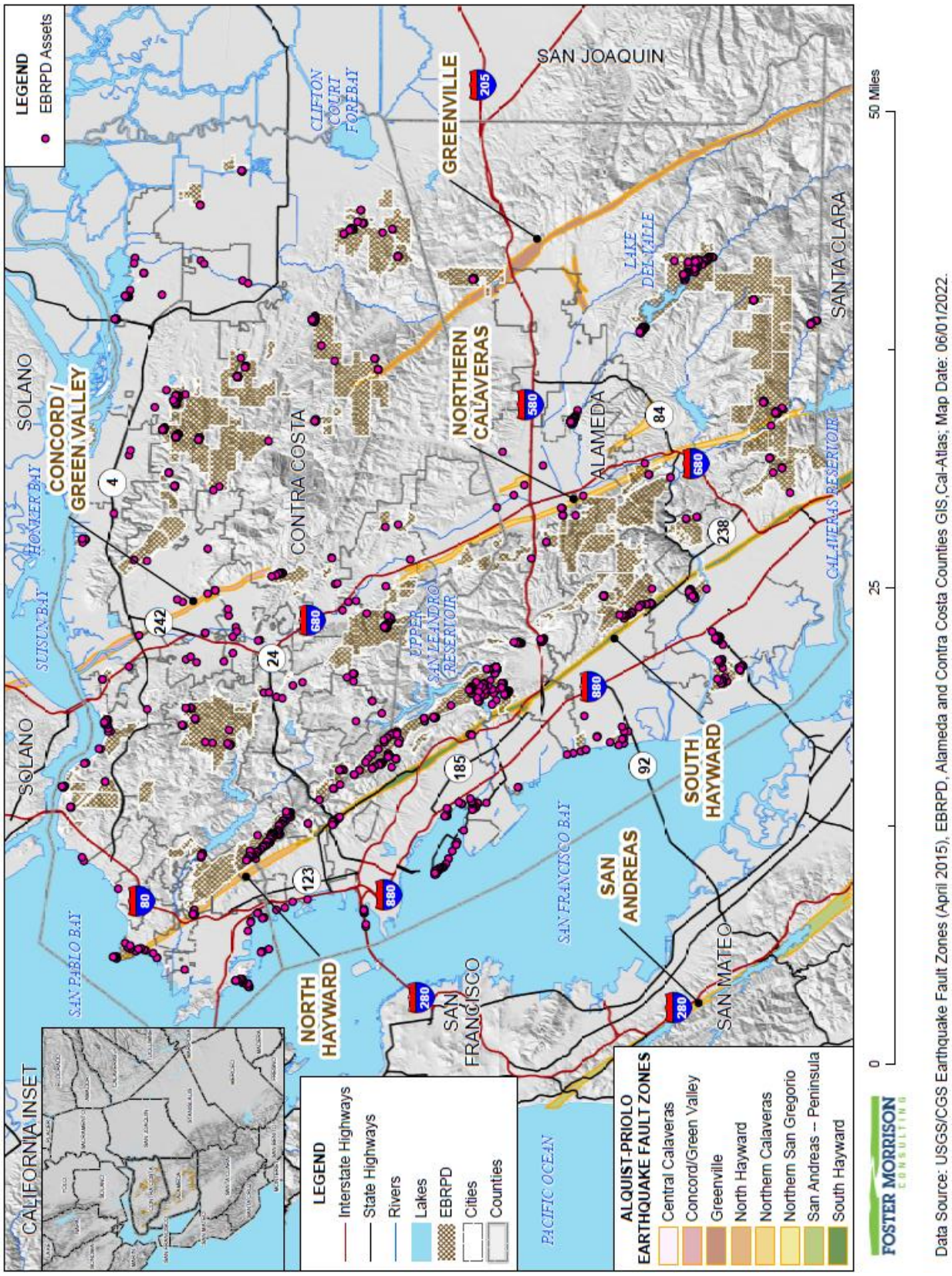


Table 4-65 Park District Lands within Alquist-Priolo Mapped Fault Zones

AP Fault Zone	Park District Land
Concord/Green Valley Fault	Delta/DeAnza Trail
	Diablo Foothills
Greenville Fault	Brushy Peak
	Morgan Territory
Hayward Fault	Claremont Canyon
	Dry Creek Pioneer
	Garin
	Lake Chabot
	Peralta Oaks Headquarters
	Point Pinole
	Quarry Lakes
	Temescal
	Wildcat Canyon
Northern Calaveras Fault	Bishop Ranch Open Space
	Las Trampas
	Pleasanton Ridge
	Sunol Wilderness

Source: 2017 EBRPD LHMP

The Alquist-Priolo Zone map delineates the Peralta Oaks area that may be subject to surface rupture in an earthquake on the Hayward Fault. The surface rupture offset could be as much as eight feet, per USGS estimates. The Peralta Oaks headquarters building is within the area where surface rupture is possible. If surface rupture were to occur through the headquarters building, the level of damage would be very high with substantial life safety risk and the building would have to be demolished. The likelihood of surface rupture through the building is probably low, given that the USGS mapped trace of the active fault is approximately 700 feet from the building. However, the possibility of surface rupture through the building cannot be ruled out.

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 4-66). Seismic shaking is typically the greatest cause of losses to structures during earthquakes.

Table 4-66 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

Past Occurrences

Disaster Declaration History

There has been one federal disaster declaration from earthquake (magnitude 6.9 Loma Prieta) in Alameda and Contra Costa counties, as shown in Table 4-67 and Table 4-68.

Table 4-67 Alameda County Earthquake Disaster Declarations 1950-2022

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Earthquake	0	–	1	1989

Source: Cal OES, FEMA

Table 4-68 Contra Costa County Earthquake Disaster Declarations 1950-2022

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Earthquake	0	–	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 Park District. Table 4-69 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 Park District (centering on Oakland). These 35 results are detailed in Table 4-70.

Table 4-69 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 4-70 Magnitude 5.0 Earthquakes or greater within 90 Miles of EBRPD **

Date	Richter Magnitude	Location
12/14/2016	5.01	10 km W of Cobb, California
8/24/2014	6.02	South Napa
10/31/2007	5.45	6 km NNE of East Foothills, California
8/12/1998	5.1	10 km SW of Ridgemark, California
4/18/1990	5.1	4 km E of Interlaken, California
4/18/1990	5.4	5 km NNW of Aromas, California
10/18/1989	5.1	7 km SW of Monte Sereno, California
10/18/1989	6.9	Loma Prieta, California Earthquake
8/8/1989	5.4	4 km ESE of Lexington Hills, California
6/27/1988	5.3	8 km ESE of Lexington Hills, California
6/13/1988	5.3	6 km E of East Foothills, California
2/20/1988	5.1	1 km NE of Tres Pinos, California
3/31/1986	5.7	15 km NE of East Foothills, California
1/26/1986	5.5	3 km ENE of Tres Pinos, California

Date	Richter Magnitude	Location
4/24/1984	6.2	14 km E of Seven Trees, California
1/27/1980	5.4	9 km NE of Livermore, California
1/24/1980	5.1	11 km E of Blackhawk, California
1/24/1980	5.8	8 km ENE of Blackhawk, California
8/6/1979	5.8	8 km ENE of San Martin, California
11/28/1974	5.2	9 km NW of Hollister, California
10/2/1969	5.3	Northern California
10/2/1969	5.26	3 km E of Bloomfield, California
12/18/1967	5.28	2 km W of Corralitos, California
11/16/1964	5.2	7 km WSW of San Martin, California
9/14/1963	5.4	4 km E of Aromas, California
1/20/1960	5	6 km WSW of Ridgemark, California
3/2/1959	5.3	3 km SW of Gilroy, California
3/22/1957	5.66	18 km W of Montara, California
9/5/1955	5.81	7 km NNW of Boulder Creek, California
4/25/1954	5.3	4 km ESE of Interlaken, California
6/24/1939	5.5	7 km SW of Hollister, California
12/13/1933	5	3 km SW of Los Gatos, California
2/15/1927	5	9 km SW of Davenport, California
10/24/1926	5.5	1 km WNW of Davenport, California
10/22/1926	6.31	16 km SW of Davenport, California
10/22/1926	6.35	22 km S of Davenport, California
10/22/1926	6.1	36 km W of Del Monte Forest, California
10/5/1920	5.2	5 km SSW of Spreckels, California
8/8/1916	5	2 km ESE of Pasatiempo, California
7/1/1911	6.45	2 km SE of Morgan Hill, California
12/31/1910	5	2 km SSW of Hollister, California
3/11/1910	5.8	4 km WSW of Watsonville, California
4/18/1906	7.9	The 1906 San Francisco Earthquake
8/3/1903	5.8	3 km ENE of Seven Trees, California
6/11/1903	5.8	3 km S of Milpitas, California
5/19/1902	5.4	5 km S of Elmira, California
7/6/1899	5.8	Near Hollister, California
6/2/1899	5.6	Near San Francisco, California
4/30/1899	6	Near San Juan Bautista, California
3/31/1898	6.4	South of Sonoma, California
6/20/1897	6.3	Near Gilroy, California
8/9/1893	5.6	Near Santa Rosa, California
11/13/1892	5.9	South of Hollister, California

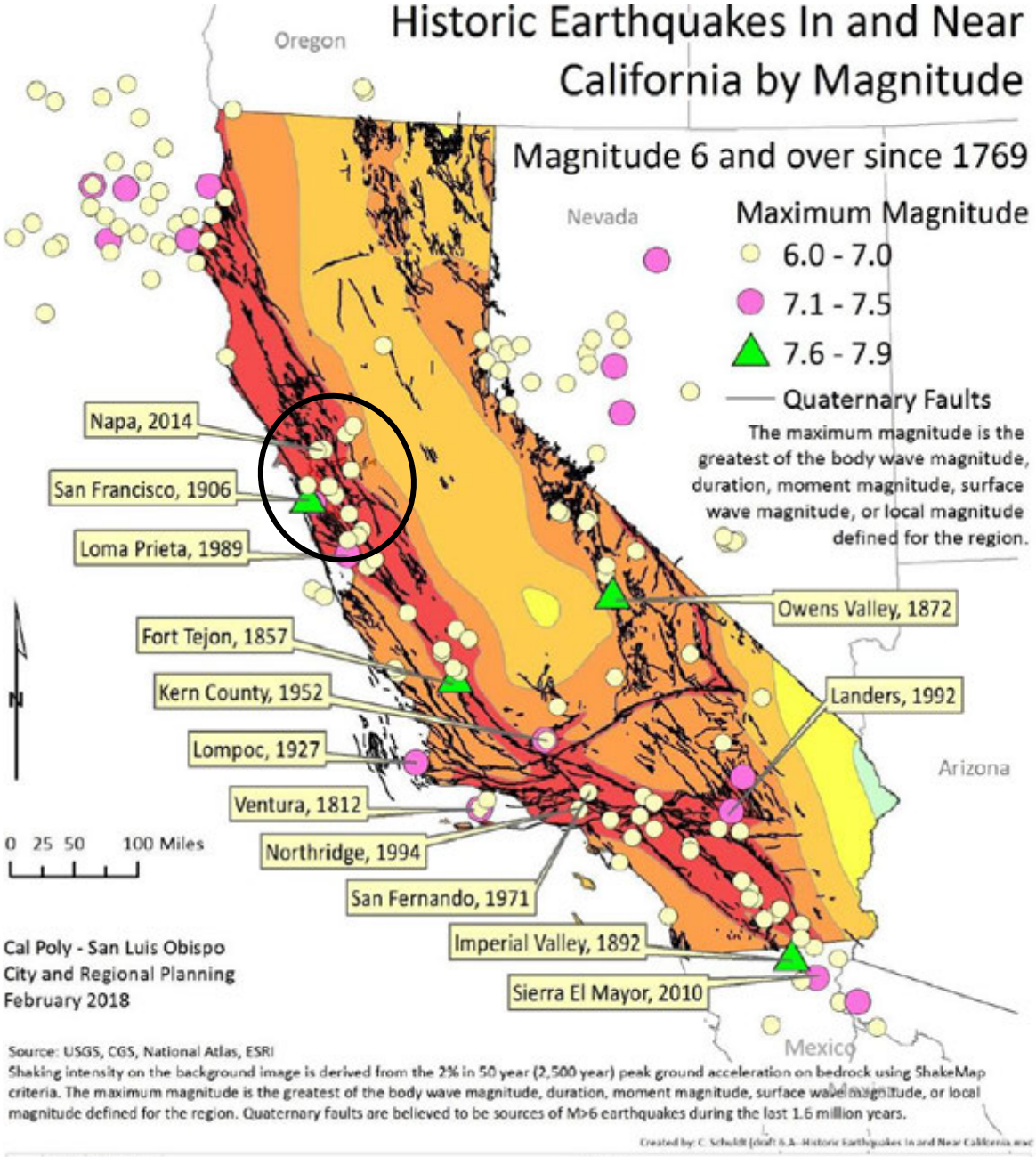
Date	Richter Magnitude	Location
4/30/1892	5.6	Near Dixon, California
4/21/1892	6.4	Near Winters, California
4/19/1892	6.6	Near Vacaville, California
10/12/1891	5.8	Near Napa, California
1/2/1891	5.8	Near San Jose, California
4/24/189	6.3	East of Watsonville, California
7/31/1889	5.6	San Francisco Bay area, California
5/19/1889	6	North of Antioch, California
4/15/1889	5.5	East of Gilroy, California
3/26/1884	5.9	West of Santa Cruz, California
3/30/1883	6	Near Hollister, California
6/27/1882	5.8	Santa Cruz Mountains, California
4/10/1881	6.3	Southwest of Modesto, California
4/2/1870	5.8	Near Berkeley, California
2/17/1870	5.9	North of Santa Cruz, California
10/21/1868	6.8	The 1868 Hayward Fault Earthquake, California
7/15/1866	6	Southwest of Stockton, California
3/26/1866	5.8	Near Gilroy, California
10/8/1865	6.5	South of San Jose, California
5/24/1865	5.9	South of San Jose, California
5/21/1864	5.8	Alameda County, California
3/5/1864	6	Alameda County, California
2/26/1864	6.1	Santa Clara County, California
7/4/1861	5.8	Near San Ramon, California
11/26/1858	6.2	North of San Jose, California
12/15/1856	5.9	San Mateo County, California
1/2/1856	5.7	Offshore San Mateo County, California
8/27/1855	5.5	North of San Francisco, California
5/15/1851	5	Near San Francisco, California

Source: USGS

*Search dates January 1, 1850 – July 1, 2022

Figure 4-61 shows major historical earthquakes in California from 1769 to 2017.

Figure 4-61 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 HMPC noted that damage in the 1989 Loma Prieta earthquake predominantly caused damage to parking lots at Crown Beach, Hayward Shores and Redwood parks from liquefaction and sand boils that damaged the asphalt. The HMPC noted that a historic bridge had a crack from Loma Prieta in Richmond at Wildcat Canyon Park. There were minor damages outside that. Shaking was felt by EBRPD staff at the time.

Likelihood of Future Occurrences

Occasional (major earthquake); Highly Likely (minor earthquake)—Seismic activity within the past two hundred years has shown absence of any major or damaging earthquake occurring on identified fault lines within the Park District that could affect the EBRPD. However, the possibility of an earthquake is an ever-present phenomenon facing the Park District. The combination of plate tectonics and associated California coastal mountain range geology essentially guarantees earthquake as a result of the periodic release of tectonic stresses. There have been earthquakes as a result of this activity in the historic past, and there will continue to be earthquakes in the future of the Bay Area. It is likely that the Park District will be subject to minor earthquakes in the future. Major earthquakes are considered to be less likely, or Occasional, in the Park District.

Mapping of Future Occurrences

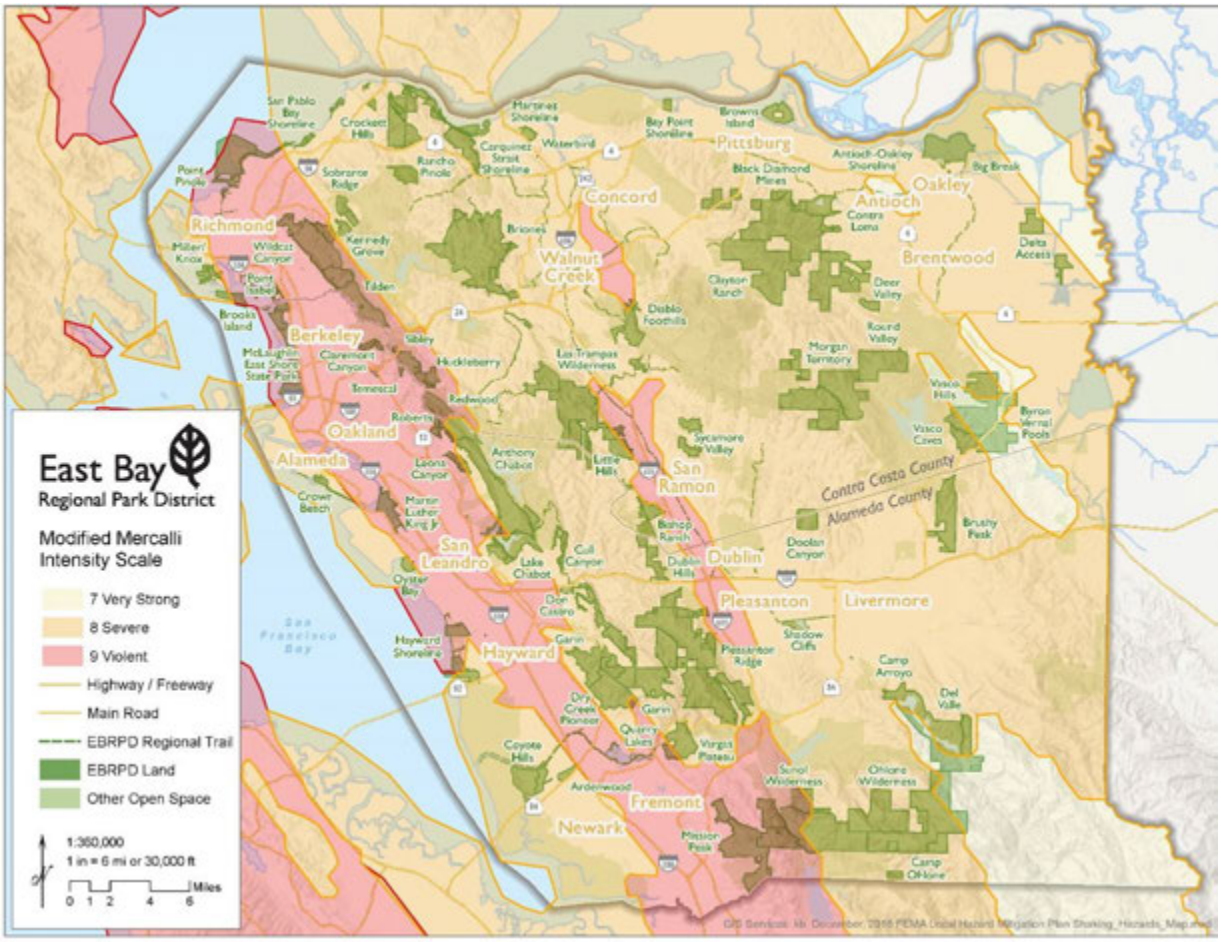
Mapping of future occurrences is presented in the following three sections:

- EBRPD Analysis
- CGS Analysis
- UCERF Analysis

EBRPD Analysis (2017 LHMP)

The current scientific understanding of earthquakes is incapable of predicting exactly where and when the next earthquake will occur. However, the long-term probability of earthquakes is well enough understood to make useful estimates of the probability of various levels of earthquake ground motions at a given location. Figure 4-62 shows the intensity of ground shaking that has a 10% likelihood of exceedance in 50 years.

Figure 4-62 EBRPD – Intensity of Earthquake Ground Shaking - 10% chance of Exceedance in 50 years



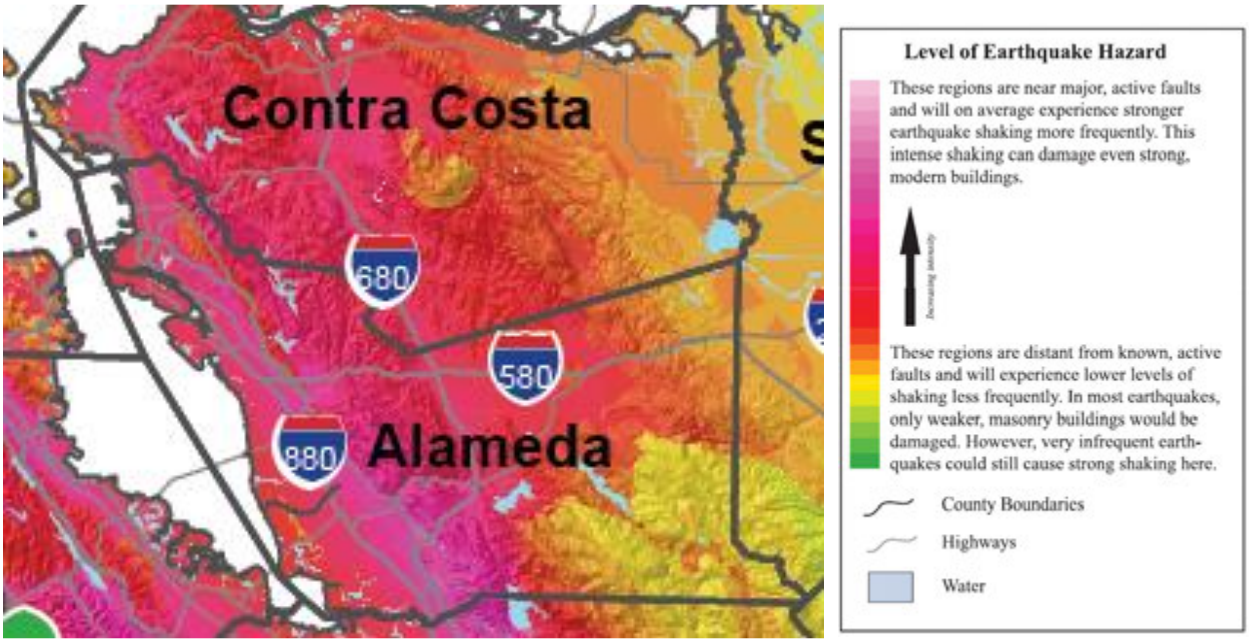
Source: EBRPD 2017 LHMP

The areas shown above in pink are in close proximity to the Hayward Fault or the other active faults shown previously in Figure 4-59 and, thus, will have very strong ground shaking when earthquakes occur on these faults. An important caveat on the above map is that the earthquake modeling is time independent. That is, it does not consider the time interval since the last earthquake on a given fault. The Park District noted that the probability of strong earthquakes on the faults in the East Bay are significantly higher now than the long-term averages, because of the long intervals since the last major earthquakes.

CGS Analysis

Maps indicating the maximum expectable intensity of ground shaking for the County and Park District are available through several sources. Figure 4-63, 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 4-63 Maximum Expectable Earthquake Intensity – 2% Chance in 50 Years

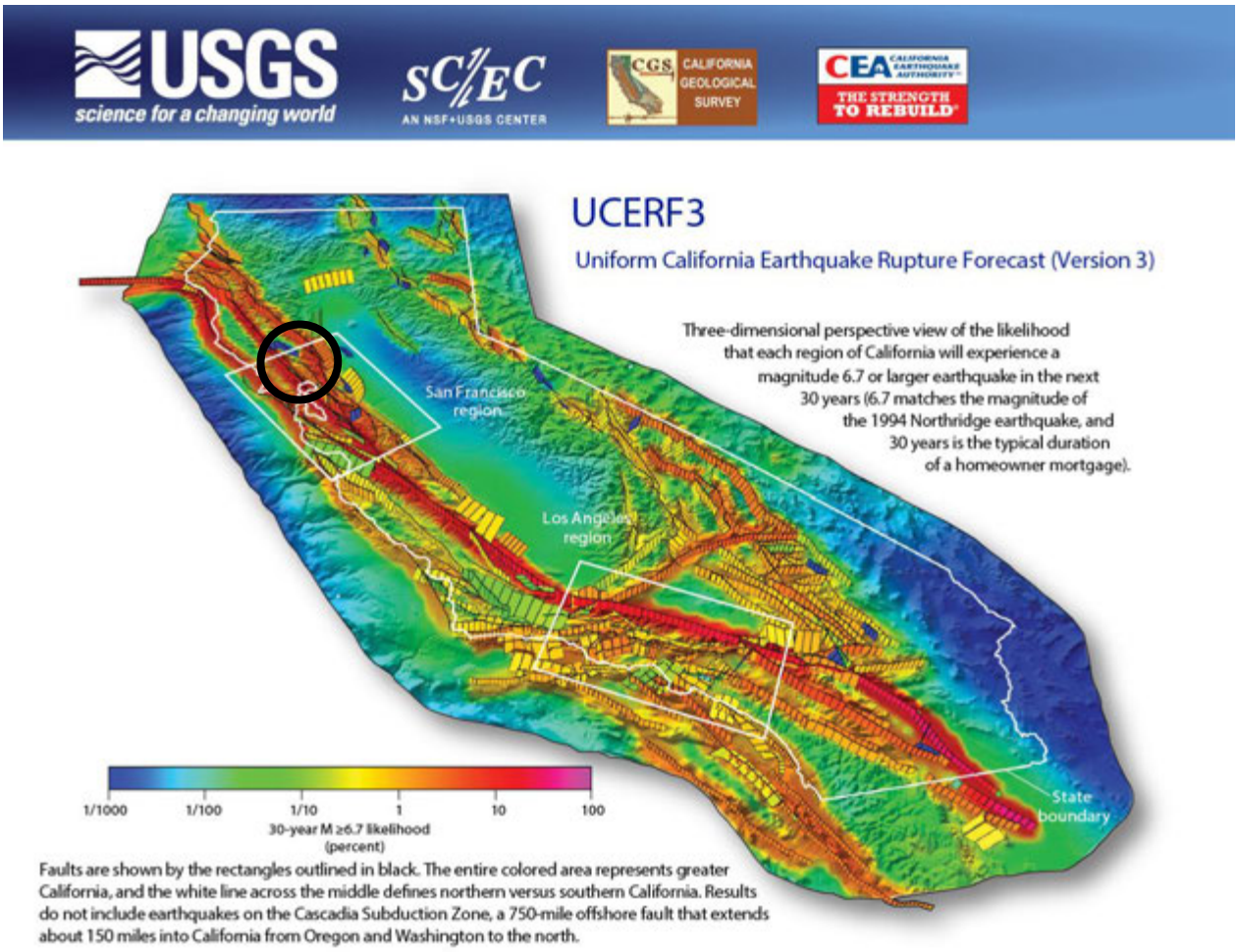


Source: California Division of Mines and Geology

UCERF Analysis

In 2014, the USGS and 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 4-64 and indicates that the Park District has a predominantly moderate to high risk of earthquake occurrence, which coincides with the likelihood of future occurrence rating of occasional.

Figure 4-64 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 change is unlikely to increase earthquake frequency or strength.

Vulnerability Assessment

Vulnerability—Extremely High

Earthquake vulnerability is primarily based on population and the built environment. Urban areas in high seismic hazard zones are the most vulnerable, while uninhabited areas are less vulnerable. The primary impacts of concern are life safety and property damage. Several faults are within and near the Park District, and seismic hazard mapping indicates that the Park District has high seismic hazard potential. Additionally, the Park District is located within a delineated Alquist-Priolo Earthquake Fault Zone. The most important Park District facility within Alquist-Priolo Zones is the Peralta Oaks headquarters building. The risks associated with earthquakes, such as surface fault rupture, within the EBRPD are considered high.

Seismic events can have particularly negative effects on older buildings constructed of URM, including materials such as brick, concrete and stone. The Uniform Building Code (UBC) identifies four seismic zones in the United States. The zones are numbered one through four, with Zone 4 representing the highest level of seismic hazard. The UBC establishes more stringent construction standards for areas within Zones 3 and 4. All of California lies within either Zone 3 or Zone 4. The Park District is within the more hazardous Zone 4.

Vulnerability to and Impacts from Earthquake and Earthquake Liquefaction

For the EBRPD, the most damaging earthquakes are those nearest to the Park District's lands, especially the Hayward Fault and the Calaveras Fault, but also the Concord and Greenville Faults. The 2017 LHMP noted that large earthquakes on the San Andreas fault would affect the Park District, but to a significantly lesser degree than the closer earthquakes because of the greater distance between the fault and the Park District's facilities. Earthquakes can strike without warning and cause dramatic changes to the landscape of an area that can have devastating impacts on the built environment. Impacts to the Park District would include damages to infrastructure such as roads, bridges, and dams; damages and loss of services to utilities and critical infrastructure, including those related to gas, power, water, wastewater and communication systems; damages to structures and other park development; and possible loss of life and injuries. A large nearby earthquake can also increase the likelihood of secondary earthquake hazards affecting the Park District, including a surface fault rupture, liquefaction, landslides, and fire following earthquakes.

Earthquakes can also induce landslides, especially if an earthquake occurs during the rainy season and soils are saturated with water. The areas prone to earthquake-induced landslides are largely the same as those areas prone to landslides in general. As with all landslides, areas of steep slopes with loose rock or soils and high water tables are most prone to earthquake-induced landslides. The Park District has locations with significant landslide risk. These are discussed in Section 4.3.12.

Earthquakes can also cause failure of dams, levees, and reservoirs. Facilities and land downslope from dams or water reservoirs or behind levees might be subject to flooding, if the dams, reservoirs, or levees fail as a result of an earthquake. The Park District has locations with significant flood risk that include facilities downslope from dams or reservoirs or behind levees. Further information can be found in Section 4.3.6.

Large underwater displacements from major underwater earthquake fault ruptures or landslides can lead to ocean waves called "tsunamis." Since tsunamis have high velocities, the damage from a particular level of inundation is far greater than in a normal flood event. Similarly, water sloshing in lakes during an earthquake, called a "seiche," is also capable of producing damage. Tsunamis can result from offshore earthquakes within the Bay Area or from distant events. It is most common for tsunamis to be generated by offshore subduction faults such as those in Washington, Alaska, Japan, and South America. Tsunami waves generated at those far-off sites can travel across the ocean and can reach the California coast with several hours of warning time. Tsunami is discussed in Section 4.3.15.

Earthquakes are often responsible for igniting fires that can contribute to a considerable share of the overall damage in a disaster. The fires can start from a variety of sources: appliances with natural gas pilot lights might tip, damaged electrical equipment might spark, and gas line connections might break. Recently, in

the South Napa Earthquake, a number of mobile homes were destroyed and damaged when the gas connection to a home broke. In the Loma Prieta Earthquake, 36 fires broke out in San Francisco alone but luckily were quickly contained in large part due to the abnormally calm wind that evening, and the fires' proximity to the Bay that allowed a fire boat to pump water to the fire where the water lines had failed. In the 1906 earthquake, over 3.5 square miles of San Francisco burned, representing 80 percent of San Francisco's property value at the time.

Fire following earthquake is especially tricky, because there are often multiple ignitions at once (overwhelming fire crews), typical water supply for fighting fire might be reduced or unavailable, and maneuvering fire crews to the ignition can be difficult if streets are blocked by road damage or debris. Fire following earthquake is an issue that could impact any Bay Area community that experiences an earthquake – both urban and rural. The problem is heightened for urban environments, where many simultaneous ignitions can lead to a firestorm, and single fires can more quickly and easily move structure to structure.

A few characteristics can make specific facilities more vulnerable to fire following earthquake. If a building collapses, there is a high risk for gas or electrical lines to start "seed" fires that then impact undamaged neighboring structures or start wildfires. Areas of liquefaction, fault rupture, and landslide are more vulnerable to fire. There is a greater potential for underground gas mains to break due to ground displacements, and water lines in the area might also be damaged, which could prevent the ability to fight a fire with regular water resources. Areas that are largely built with wood frames or shingle roofs might be less prone to earthquake damage but are at a heightened risk for the spread of fires. Wildfire is discussed in greater detail in Section 4.3.16.

Park Lands and Assets at Risk from Earthquake

The earthquake hazard maps previously shown indicate that all of the Park District's facilities are located in high or very high seismic hazard areas. All of the Park District's facilities, including buildings, roads, trails, bridges and utility infrastructure have some level of seismic risk – the potential for damage, casualties, and loss of function.

However, the level of seismic risk depends not only on the seismic hazard but also on the seismic vulnerability of each building or infrastructure component. Thus, the seismic vulnerability of the Park District's facilities varies markedly from facility to facility, depending on each facility's structural and nonstructural characteristics and condition.

In general, older facilities are more likely to have higher seismic vulnerabilities, because seismic design requirements for new construction have increased over time. For buildings, seismic vulnerability also varies with the structural system. In general, light wood frame buildings have lower seismic vulnerability than building types such as unreinforced masonry, lightly reinforced masonry, and some concrete buildings including concrete moment frame or tilt-up concrete buildings.

Headquarters Building

The Park District completed a seismic evaluation of the headquarters building as part of the 2017 update of the Park District's Hazard Mitigation Plan. The likely building performance was compared with performance standards established by the American Society of Civil Engineers in ASCE 41-13 Seismic

Evaluation and Retrofit of Existing Buildings, which is the industry standard for seismic evaluations of existing buildings. The evaluation was performed by G&E Engineering Systems Inc. as reported in G&E Report 32.55.01 Revision A, November 11, 2016.

The G&E report includes the following findings:

- The existing building meets the ASCE 41-13 Life Safety Performance Objective for the ground motion with a 20 percent chance of being exceeded in 50 years but does not meet the ASCE 41-13 Immediate Occupancy Performance Objective for this level of ground motion. At this level of ground shaking, the building would likely require significant repairs and would perhaps have to be vacated for the repairs to be made.
- The existing building does not meet either the Life Safety or Immediate Occupancy Performance Objectives for the ground motion with a 5 percent chance of being exceeded in 50 years. At this level of ground shaking, the building would likely have major damage, with possible partial collapse and a likelihood of injuries or deaths if the building were occupied at the time of the earthquake. The building might or might not be repairable.

These results mean that the existing building is expected to perform relatively well for earthquakes on faults such as the San Andreas Fault, the Calaveras Fault, and other faults that are a significant distance from the headquarters building.

However, the building is not expected to perform well for a large magnitude M7+ earthquake on the Hayward Fault, which is located only about 700 feet from the building. The building is also within the Alquist-Priolo surface rupture zone as shown previously in Figure 4-60. The possibility of fault rupture increases the risk of major damage and life safety risk. In a major earthquake on the Hayward Fault, it is likely that this building would suffer substantial damage, likely severe enough that the building would probably not be economically feasible to repair.

The Working Group on California Earthquake Probabilities (WGCEP) has developed authoritative estimates of the magnitude, location, and frequency of future earthquakes in California. As shown previously in Figure 6.3, there is an estimated 33 percent chance of a large magnitude earthquake on the Hayward Fault in the next 30 years.

The Park District is in the decision-making process about mitigation measures for the headquarters building, including possible retrofit performance objectives or replacing the building with a new, current code building, most likely in a different location.

Other District Buildings

The earthquake risk assessment for other Park District buildings is necessarily more qualitative, because the Park District does not yet have sufficiently detailed building data to make a more quantitative risk assessment using HAZUS or other quantitative methods for evaluating earthquake risk.

The Park District's Catastrophe Risk Assessment (AmWINS Group, Inc., 2015) has an estimated total insured value for buildings and contents of about $125,000,000. The statistical average annual losses are estimated to be about $344,000. Earthquakes with return periods of 50 and 100 years are estimated to result

in losses of about $5 million and $10 million, respectively. Given the limited building-specific data, these estimates are best interpreted as rough estimates. These estimates don't include possible damage from earthquake-induced landslides or flooding from dam or reservoir failures.

The expected consequences of a major earthquake within the Park District Planning Area include not only building damage but also casualties (injuries and deaths) and loss of important functions. The buildings at most risk are older buildings, designed to lower seismic performance standards than current or recent code buildings, especially buildings that are non-ductile such as masonry buildings. The important buildings where significant damage is likely include the lightly reinforced masonry buildings in the two corporation yards and historically important buildings including the Tilden, Sunol and Crab Cove Visitor Centers, Temescal Beach House, Tilden Carousel and Brazil Room. A more detailed building inventory would enable the Park District to facilitate a more quantitative earthquake risk assessment.

Park District Infrastructure

In addition to buildings, the Park District's facilities include roads, trails, bridges, dams, and utility infrastructure (water and wastewater). The earthquake risk assessment for the Park District's infrastructure is necessarily qualitative, because the Park District does not yet have sufficiently detailed infrastructure data to make a more quantitative risk assessment using HAZUS or other quantitative methods for evaluating earthquake risk.

The Park District's infrastructure is subject to damage from earthquake ground shaking, from earthquake-induced landslides and from flooding from dam or reservoir failures. For much of the Park District's infrastructure, damage from earthquake induced landslides may be the largest fraction of total earthquake damages.

The Park District infrastructure of most concern includes the Del Valle sewage ponds because failure would contaminate a major drinking water supply, the Del Valle potable water system and several dams including: Lake Anza Dam, Temescal Dam, Jewel Lake Dam, and Sunol Dam.

For a major earthquake on the Hayward fault, with very strong ground shaking in areas that contain much of the Park District's infrastructure and widespread earthquake induced damages, damages would be several million dollars or perhaps $10 million dollars or more.

The impacts of earthquake damage to the Park District's infrastructure would include not only repair costs, but also loss of function and life safety risk. Life safety risk would be substantial for park visitors or staff in locations where earthquake-induced landslides occur or for people on bridges that fail.

Park Lands and Assets at Risk From Liquefaction

GIS was used to analyze EBRPD park lands and assets potentially at risk to liquefaction. EBRPD park lands and assets data obtained from the Park District were intersected with USGS/CGS Liquefaction Susceptibility 2006 data to determine Park District lands and assets that fall into defined liquefaction areas. Separate analysis was performed for park lands (in acres) and park assets (as types of assets and replacement values). Affected Park District lands and assets are described below.

Figure 4-65 shows the liquefaction susceptibility zones in the Park District. Table 4-71 shows the Park District lands at risk to moderate or higher liquefaction. Table 4-72 shows the Park District structures at risk to moderate or higher liquefaction. More detail on specific park lands and assets in these liquefaction zones can be found in Appendix F.

Figure 4-65 EBRPD – Liquefaction Susceptibility Zones

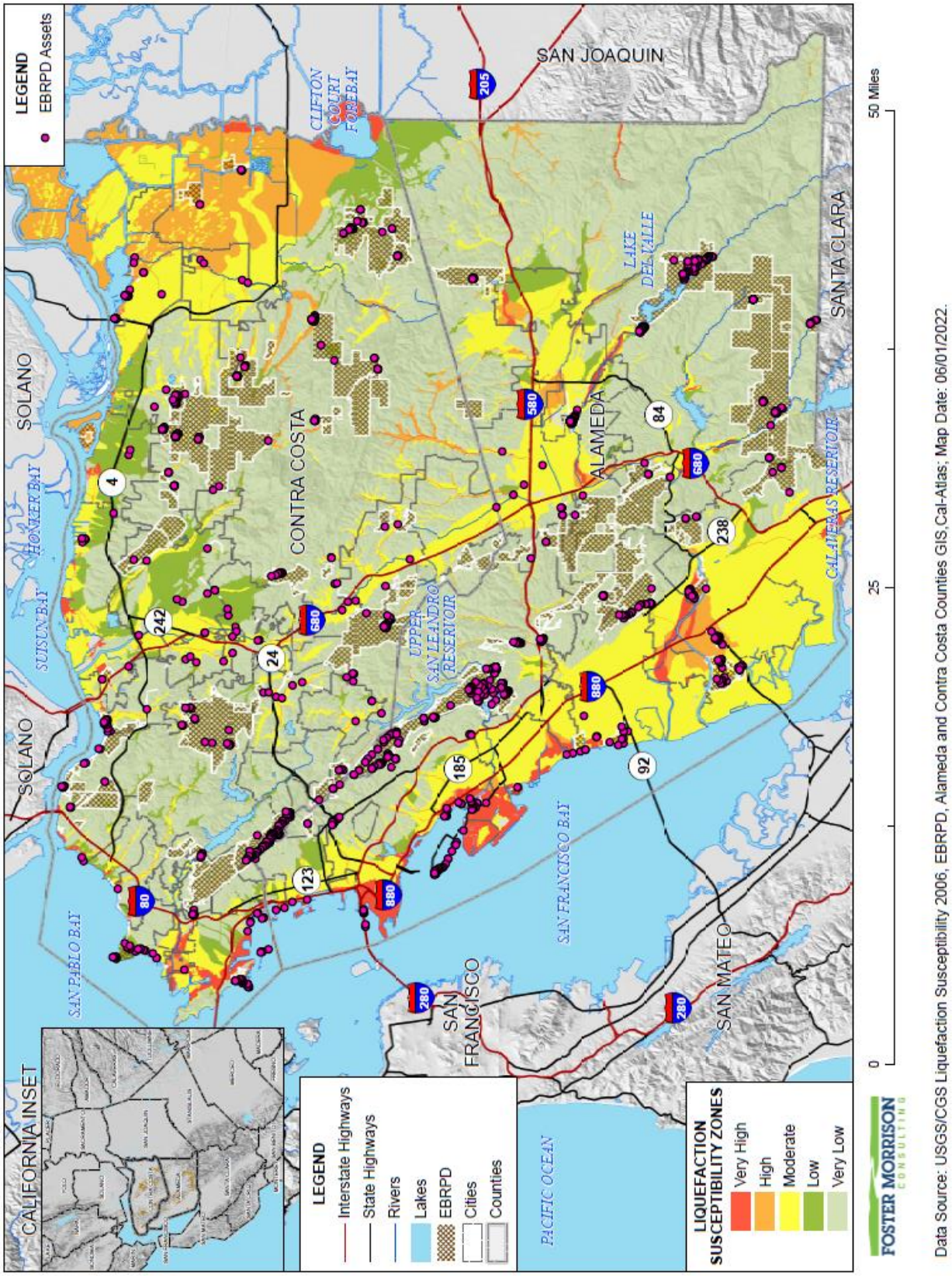


Table 4-71 EBRPD – Liquefaction Susceptibility Zones and Affected Park District Lands and Acres

EBRPD / Liquefaction Susceptibility Zone	Total Number of Park Lands	Affected Park Lands	Percent of Affected Park Lands	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
Very High						
EBRPD – Alameda County	43	23	53.4%	508,404	1,039	0.20%
EBRPD – Contra Costa County	57	27	47.3%	530,785	449	0.08%
EBRPD Total	**100**	**50**	**50.0%**	**1,039,189**	**1,488**	**0.14%**
High						
EBRPD – Alameda County	43	11	25.5%	508,404	575	0.11%
EBRPD – Contra Costa County	57	5	8.7%	530,785	1,715	0.32%
EBRPD Total	**100**	**16**	**16.0%**	**1,039,189**	**2,290**	**0.22%**
Moderate						
EBRPD – Alameda County	43	29	67.4%	508,404	2,516	0.49%
EBRPD – Contra Costa County	57	39	68.4%	530,785	1,445	0.27%
EBRPD Total	**100**	**68**	**68.0%**	**1,039,189**	**3,961**	**0.38%**

Source: USGS/CGS, EBRPD GIS

Table 4-72 EBRPD – Liquefaction Susceptibility Zones and Park District Assets and Replacement Values

EBRPD / Liquefaction Susceptibility Zone	Number of Affected Park Lands	Asset Count	Replacement Value
Very High			
EBRPD – Alameda County	9	89	$39,659,264
EBRPD – Contra Costa County	14	69	17,405,662
EBRPD Very High Total	**23**	**158**	**$57,064,926**
High			
EBRPD – Alameda County	4	12	$1,987,184
EBRPD – Contra Costa County	4	26	1,768,673
EBRPD High Total	**8**	**38**	**$3,755,857**
Moderate			
EBRPD – Alameda County	14	156	25,083,775
EBRPD – Contra Costa County	14	142	$36,618,114
EBRPD Moderate Total	**28**	**298**	**$61,701,889**

Source: USGS/CGS, EBRPD GIS

In addition to the tables above, the following is a list of parks that lie in the following moderate or higher liquefaction susceptibility zones. More detail on specific parks and assets in these liquefaction zones can be found in Appendix F.

- **Very High Liquefaction Susceptibility Zone**
  - ✓ Anthony Chabot
  - ✓ Camp Arroyo
  - ✓ Del Valle
  - ✓ Don Castro
  - ✓ Hayward Shoreline
  - ✓ Lake Chabot
  - ✓ Martin Luther King Jr. Shoreline
  - ✓ McLaughlin Eastshore
  - ✓ Niles Canyon Trail
  - ✓ Oyster Bay Shoreline
  - ✓ Quarry Lakes
  - ✓ SF Bay Trail (MLK to MESP)
  - ✓ Shadow Cliffs
  - ✓ Sunol
  - ✓ Vargas Plateau
  - ✓ Alameda Point Shoreline Trail
  - ✓ Crown Beach
  - ✓ Cull Canyon
  - ✓ Dry Creek Pioneer
  - ✓ Judge John Sutter Shoreline
  - ✓ Mission Peak
  - ✓ Reinhardt Redwood
  - ✓ Tassajara Creek Trail
- **High Liquefaction Susceptibility Zone**
  - ✓ Alameda Creek Trail
  - ✓ Ardenwood Historic Farm
  - ✓ Brushy Peak
  - ✓ Camp Arroyo
  - ✓ Coyote Hills
  - ✓ Del Valle
  - ✓ Del Valle to Shadow Cliffs Trail
  - ✓ Niles Canyon Trail
  - ✓ Quarry Lakes
  - ✓ Shadow Cliffs
  - ✓ Creative Design Group Building
  - ✓ Doolan Canyon
- **Moderate Liquefaction Susceptibility Zone**
  - ✓ Anthony Chabot
  - ✓ Brushy Peak
  - ✓ Camp Arroyo
  - ✓ Coyote Hills
  - ✓ Del Valle
  - ✓ Don Castro
  - ✓ Hayward Shoreline
  - ✓ Lake Chabot
  - ✓ Martin Luther King Jr. Shoreline
  - ✓ McLaughlin Eastshore
  - ✓ Pleasanton Ridge
  - ✓ Quarry Lakes
  - ✓ SF Bay Trail (MLK to MESP)
  - ✓ Shadow Cliffs
  - ✓ Sunol
  - ✓ Creative Design Group Building
  - ✓ Vargas Plateau
  - ✓ Crown Beach
  - ✓ Cull Canyon
  - ✓ Dry Creek Pioneer
  - ✓ Garin
  - ✓ Helicopter Unit
  - ✓ Leona Canyon
  - ✓ Mission Peak
  - ✓ Ohlone
  - ✓ Reinhardt Redwood
  - ✓ Tassajara Creek Trail
  - ✓ Temescal

Critical Facilities at Risk from Liquefaction

EBRPD critical facilities are a subset of the total facilities (or assets) of the Park District as discussed in Section 4.2.4 above. Using this definition and GIS mapping of Park District assets, USGS/CGS Liquefaction Susceptibility Zones were overlayed on the critical facility layer. Those critical facilities that

fall within the USGS/CGS Liquefaction Susceptibility Zones are detailed on Table 4-73 below. More information on critical facilities can be found in Appendix G and H.

Table 4-73 EBRPD – Critical Facilities in Moderate or Higher Liquefaction Susceptibility Zones

Park Lands	Liquefaction Susceptibility / Asset Type	Asset Count
Alameda County		
Alameda County Trails	**Very High**	
	Building	3
	Pedestrian Paving	1
	High	
	Pedestrian Paving	1
	Moderate	
	Pedestrian Paving	3
	Alameda County Trails Total	**8**
Ardenwood	**High**	
	Building	6
	Ardenwood Total	**6**
Coyote Hills	**Moderate**	
	Building	2
	Sanitary Sewer	2
	Water Supply	4
	Coyote Hills Total	**8**
Crown Beach	**Very High**	
	Building	6
	Sanitary Sewer	1
	Water	1
	Pedestrian Paving	1
	Crown Beach Total	**9**
Cull Canyon	**Moderate**	
	Building	1
	Cull Canyon Total	**1**
Garin/Dry Creek Pioneer	**Moderate**	
	Building	3
	Pedestrian Paving	11
	Sanitary Sewer	1
	Water Supply	1
	Garin/Dry Creek Pioneer Total	**16**

Park Lands	Liquefaction Susceptibility / Asset Type	Asset Count
Hayward Shoreline	**Moderate**	
	Pedestrian Paving	3
	Storm Sewer	7
	Water	4
	Pedestrian Paving	3
	Storm Sewer	1
	Hayward Shoreline Total	**18**
Judge John Sutter	**Very High**	
	Building	3
	Judge John Sutter Total	**3**
Lake Chabot	**Very High**	
	Pedestrian Paving	12
	Moderate	
	Building	4
	Lake Chabot Total	**16**
Martin Luther King, Jr.	**Very High**	
	Building	4
	Pedestrian Paving	3
	Piers & Docks	3
	Moderate	
	Pedestrian Paving	2
	Piers & Docks	1
	Water	3
	Pedestrian Paving	1
	Piers & Docks	2
	Martin Luther King, Jr. Total	**19**
Quarry Lakes	**Very High**	
	Building	2
	High	
	Building	1
	Water Supply	1
	Quarry Lakes Total	**4**
Reinhardt Redwood	**Very High**	
	Building	1
	Pedestrian Paving	1
	Moderate	
	Building	1

Park Lands	Liquefaction Susceptibility / Asset Type	Asset Count
	Pedestrian Paving	3
	Water Supply	1
	Reinhardt Redwood Total	**7**
Shadow Cliffs	**Moderate**	
	Building	4
	Pedestrian Paving	1
	Water Supply	2
	Water	1
	Water Supply	1
	Shadow Cliffs Total	**9**
Sunol / Ohlone Wilderness	**Very High**	
	Pedestrian Paving	1
	Moderate	
	Building	4
	Water Supply	1
	Sunol / Ohlone Wilderness Total	**6**
Temescal	**Moderate**	
	Building	3
	Pedestrian Paving	2
	Sanitary Sewer	1
	Service & Pedestrian Tunnel	1
	Water Supply	1
	Temescal Total	**8**
Contra Costa County		
Antioch/Oakley	**Very High**	
	Sanitary Sewer	1
	Antioch/Oakley Total	**1**
Bay Point	**Moderate**	
	Pedestrian Paving	1
	Bay Point Total	**1**
Big Break	**Moderate**	
	Building	1
	Big Break Total	1
Black Diamond Mines	**Very High**	
	Building	3
	Moderate	
	Building	22

Park Lands	Liquefaction Susceptibility / Asset Type	Asset Count
	Water Supply	1
	Black Diamond Mines Total	**26**
Briones	**Moderate**	
	Roadways: Vehicular Bridges	1
	Briones Total	**1**
Carquinez Strait	**Moderate**	
	Building	1
	Carquinez Strait Total	**1**
Contra Costa Trails	**Moderate**	
	Building	1
	Contra Costa Trails Total	**1**
Diablo Foothills / Castle Rock	**Very High**	
	Building	2
	Pedestrian Paving	1
	Diablo Foothills / Castle Rock Total	**3**
East County Trails	**Very High**	
	Pedestrian Paving	3
	Moderate	
	Building	2
	Pedestrian Paving	2
	Sanitary Sewer	1
	East County Trails Total	**8**
Kennedy Grove	**Moderate**	
	Building	1
	Kennedy Grove Total	**1**
Las Trampas	Moderate	7
	Building	4
	Pedestrian Paving	1
	Sanitary Sewer	1
	Water Supply	1
	Las Trampas Total	**15**
McLaughlin Eastshore	Very High	2
	Pedestrian Paving	2
	Water	1
	Pedestrian Paving	1
	McLaughlin Eastshore Total	**3**
Miller/Knox	**Very High**	

Park Lands	Liquefaction Susceptibility / Asset Type	Asset Count
	Building	1
	Sanitary Sewer	2
	Moderate	
	Water Supply	1
	Miller/Knox Total	**5**
Point Isabel	**Very High**	
	Building	1
	Water	1
	Pedestrian Paving	1
	Point Isabel Total	**3**
Point Pinole	**Very High**	
	Pedestrian Paving	1
	Moderate	
	Roadways: Vehicular Bridges	3
	Point Pinole Total	**13**
Radke Martinez	**Very High**	
	Building	1
	Pedestrian Paving	1
	Moderate	
	Pedestrian Paving	3
	Water	2
	Pedestrian Paving	2
	Radke Martinez Total	**9**
Round Valley	**Very High**	
	Pedestrian Paving	1
	High	
	Building	1
	Water Supply	2
	Round Valley Total	**4**
Sycamore Valley	**Very High**	
	Pedestrian Paving	1
	Sycamore Valley Total	**1**
Tilden	**Very High**	
	Pedestrian Paving	1
	Moderate	
	Building	1
	Pedestrian Paving	1

Park Lands	Liquefaction Susceptibility / Asset Type	Asset Count
	Sanitary Sewer	1
	Tilden Total	**4**

Source: CGS/USGS, EBRPD

Overall EBRPD (Community) Impact

The overall impact to the EBRPD community from earthquake (and liquefaction) includes:

- Injury and loss of life;
- Damage to Park District facilities and infrastructure
- EBRPD structural and property damage;
- Damage to natural resource habitats and other natural resources;
- Disruption of and damage to infrastructure and services; and
- Loss of water, power, roads, phones, and transportation, which could impact, strand, and/or impair mobility for Park District personnel, emergency responders and/or area residents.

Secondary hazards from earthquake include tsunami (see Section 4.3.15) landslide (see Section 4.3.12), and levee failure (see Section 4.3.13).

Future Development

Future development in the Park District, as discussed above in Section 4.2.6, is occurring in multiple parks as a result of the Measure WW funding. This includes both new acquisitions and additional build outs of current Park District lands. Future development in the Park District will take earthquake (and earthquake liquefaction) into account. The Park District will build any new facilities to current building codes of the applicable jurisdiction. Future Park District facilities will be built to codes which take earthquake vulnerability into account when siting, designing, and constructing new facilities and infrastructure.

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

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect EBRPD. These sections include a hazard/problem description; description of location and extent; past occurrences of this hazard; and how climate change can affect this hazard.

Hazard/Problem Description

Flooding is the rising and overflowing of a body of water onto normally dry land. Floods are among the costliest natural disasters in terms of human hardship and economic loss nationwide. Floods can cause substantial damage to structures, landscapes, and utilities and can cause life safety issues. Floods can be extremely dangerous. 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. 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, such as dam spillways. Ground saturation can result in instability, collapse, or other damage. Objects can also be buried or destroyed through sediment deposition. Floodwaters can also break utility 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.

There are three primary types of freshwater flood events in the Park District: riverine and lake, flash flooding, 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 and lake 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.
- 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 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.
- **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 4.3.11 below.

The Park District is also at risk to flooding resulting from dam and levee failures. Dam failure flooding is discussed separately in Section 4.3.6 of this document, while levee failures are discussed in Section 4.3.13. 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. Areas of the Park District are also at risk to Coastal Flooding and Sea Level Rise, which is discussed in Section 4.3.6 of this document.

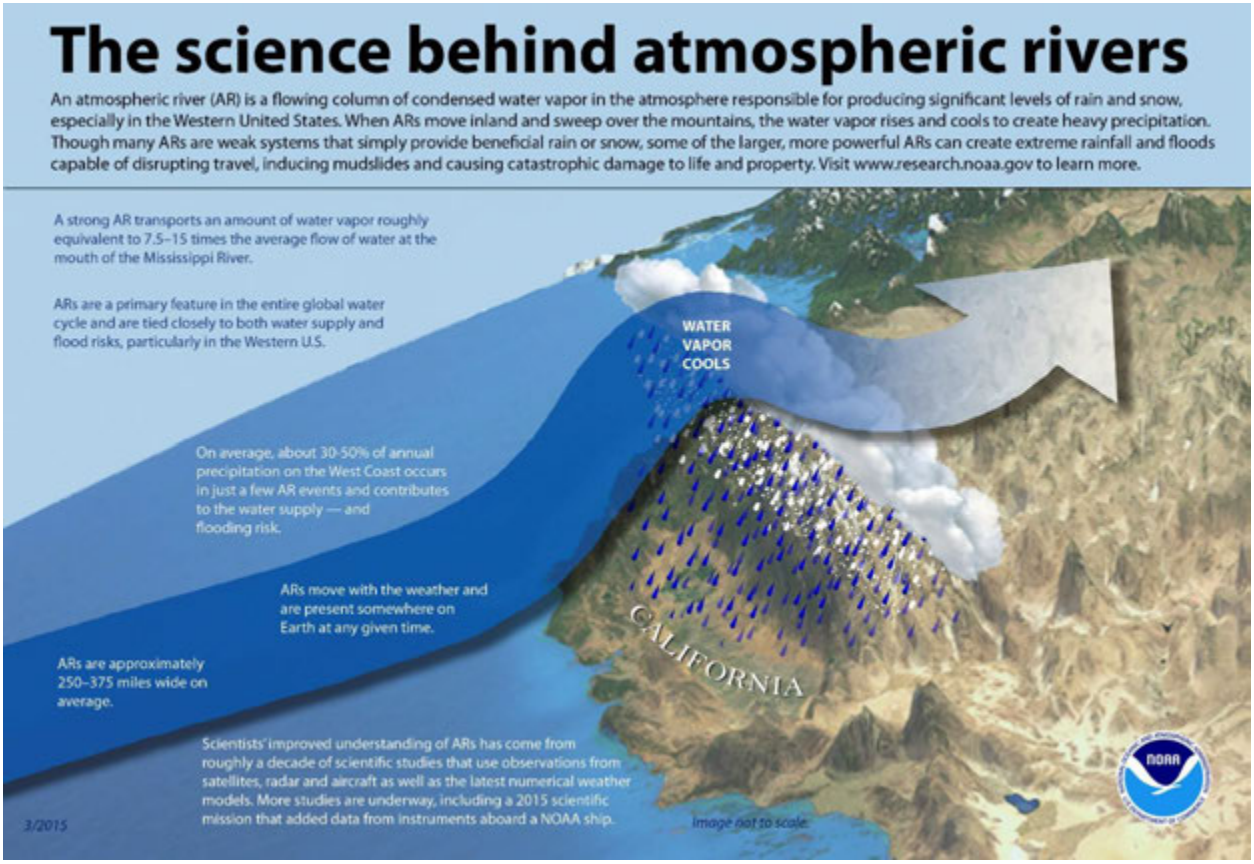
The potential for flooding can change and increase through various land use changes and changes to land surface, resulting in a change to the floodplain. Environmental changes can create localized flooding problems in and outside of natural floodplains by altering or confining natural drainage channels.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

Special Types of Flooding

EBRPD and much of Northern California can be affected by a phenomenon known as an atmospheric river. According to the NOAA, atmospheric rivers are relatively long, narrow regions in the atmosphere – like rivers in the sky – that transport most of the water vapor outside of the tropics. These columns of vapor move with the weather, carrying an amount of water vapor roughly equivalent to the average flow of water

at the mouth of the Mississippi River. When the atmospheric rivers make landfall, they often release this water vapor in the form of rain or snow. This can be seen in Figure 4-66.

Figure 4-66 Atmospheric Rivers



Source: NOAA

Although atmospheric rivers come in many shapes and sizes, those that contain the largest amounts of water vapor and the strongest winds can create extreme rainfall and floods, often by stalling over watersheds vulnerable to flooding. These events can disrupt travel, induce mudslides and cause catastrophic damage to life and property. A well-known example is the "Pineapple Express," a strong atmospheric river that is capable of bringing moisture from the tropics near Hawaii over to the U.S. West Coast.

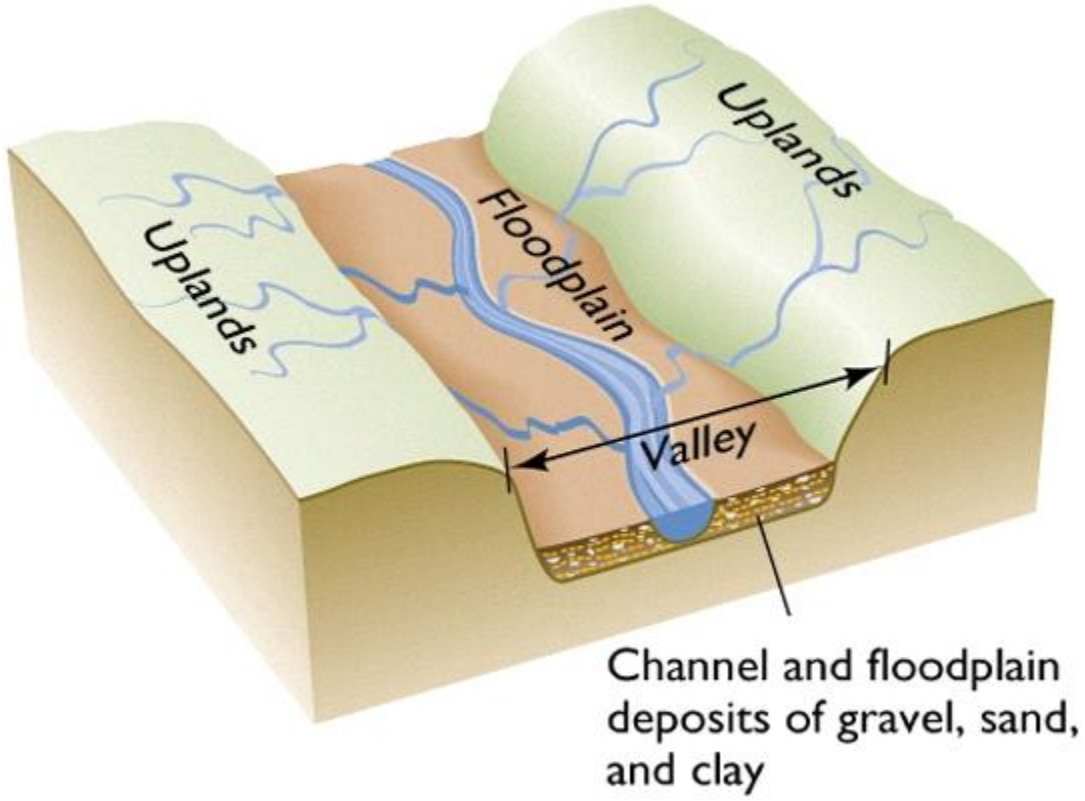
Not all atmospheric rivers cause damage; most are weak systems that often provide beneficial rain or snow that is crucial to the water supply. Atmospheric rivers are a key feature in the global water cycle and are closely tied to both water supply and flood risks — particularly in the western United States.

While atmospheric rivers are responsible for great quantities of rain that can produce flooding, they also contribute to beneficial increases in snowpack. A series of atmospheric rivers fueled the strong winter storms that battered the U.S. West Coast from western Washington to southern California from Dec. 10–22, 2010, producing 11 to 25 inches of rain in certain areas. These rivers also contributed to the snowpack in the Sierras, which received 75 percent of its annual snow by Dec. 22, the first full day of winter.

Location and Extent

The area adjacent to a channel is the floodplain (see Figure 4-67). 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 (NFIP). 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.

Figure 4-67 Floodplain Schematic



Source: FEMA

Hydrologic Regions

According to Cal DWR, California is divided into 10 hydrologic regions. The Park District is traversed by one hydrologic region – the San Francisco Bay Hydrologic Region:

- The San Francisco Bay Hydrologic Region covers approximately 2.88 million acres (4,500 square miles) and includes all of San Francisco and portions of Marin, Sonoma, Napa, Solano, San Mateo,

Santa Clara, Contra Costa, and Alameda counties (Figure 27). The region corresponds to the boundary of RWQCB 2. Significant geographic features include the Santa Clara, Napa, Sonoma, Petaluma, Suisun-Fairfield, and Livermore valleys; the Marin and San Francisco peninsulas; San Francisco, Suisun, and San Pablo bays; and the Santa Cruz Mountains, Diablo Range, Bolinas Ridge, and Vaca Mountains of the Coast Range. While being the smallest in size of the 10 Hydrologic Regions, the region has the second largest population in the State. Major population centers include the cities of San Francisco, San Jose and Oakland.

A map of the California's hydrological regions is provided in Figure 4-68.

Figure 4-68 California Hydrologic Regions

Source: California Department of Water Resources

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.

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 Park District is covered by the Alameda County FIS (dated 12/21/2018) and Contra Costa County FIS (dated 3/21/2017).

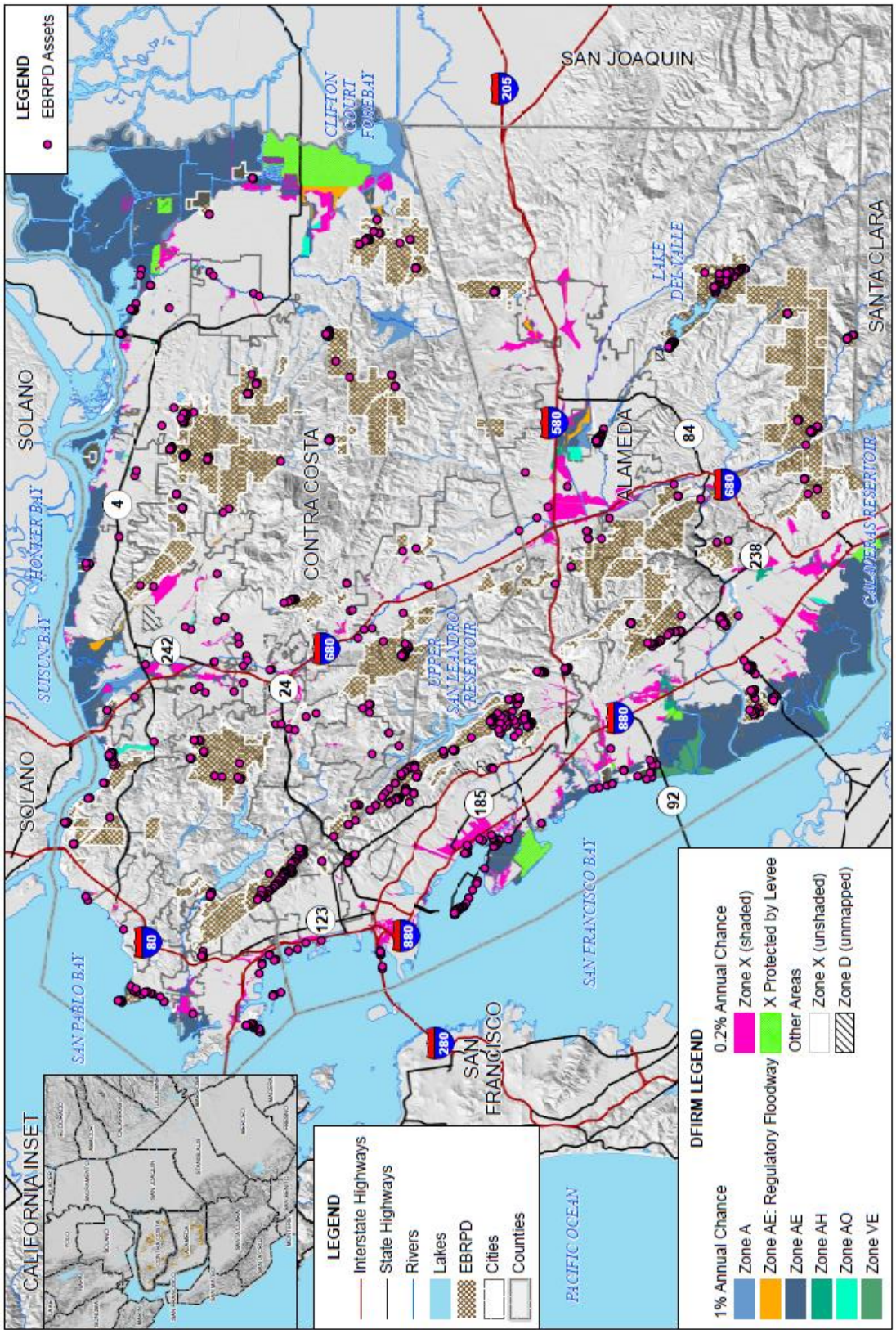
Digital Flood Insurance Rate Maps (DFIRM)

As part of its Map Modernization program, FEMA has been converting paper FIRMS to digital FIRMs (DFIRMs). These digital maps:

- Incorporate the latest updates (Letters of Map Revision (LOMRs) and Letters of Map Amendment (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
- Solicit community participation

DFIRMs for each county have been developed and are being used for the flood analysis for this LHMP. The Park District is covered by the Alameda County DFIRM (dated 12/21/2018) and Contra Costa County DFIRM (dated 3/21/2017). FEMA DFIRM flood zones and Park District lands and assets are shown in Figure 4-69.

Figure 4-69 EBRPD – FEMA DFIRM Flood Zones



Department of Water Resource (DWR) Floodplain Mapping

FEMA DFIRMs are just one measure of flood risk in a community. Also to be considered when evaluating the flood risks in the Park District are various floodplain maps developed by Cal DWR for various areas throughout California, including EBRPD.

DWR Best Available Maps

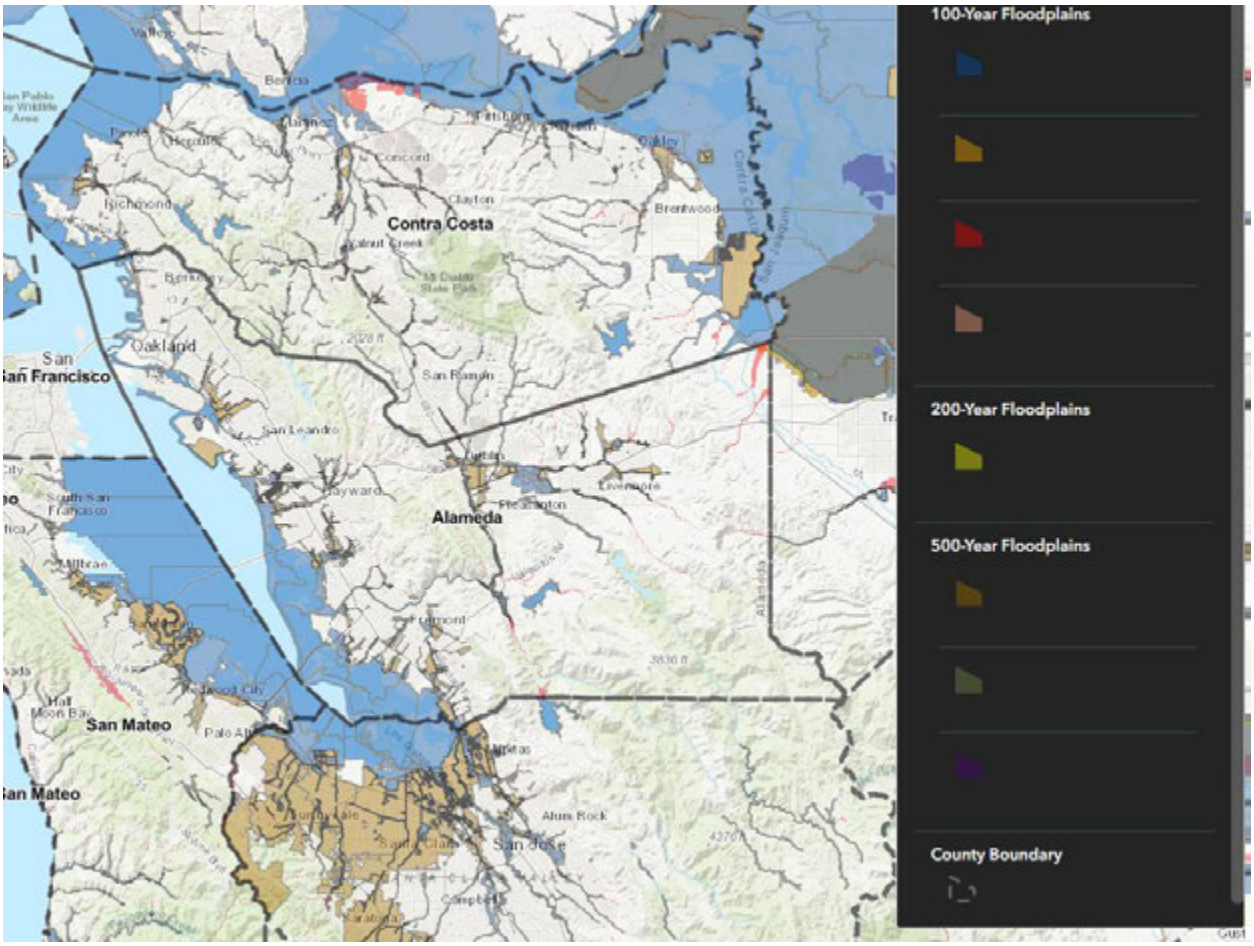
The FEMA regulatory maps provide just one perspective on flood risks in the Park District. Senate Bill 5 (SB 5), enacted in 2007, authorized the California DWR to develop the Best Available Maps (BAM) displaying 100- and 200-year floodplains originally for areas located within the Sacramento-San Joaquin (SAC-SJ) Valley watershed. DWR has expanded the BAM to cover all counties in the State and to include 500-year floodplains.

Different than the FEMA DFIRMs which have been prepared to support the NFIP and determining the need for flood insurance, the BAMs are provided for informational purposes and are intended to reflect current 100- and 500-year (0.2%) 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 Park District 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. Informed land use planning will also assist in identifying levee maintenance needs and levels of protection. By including the FEMA 100-year floodplain, it also supports identification of the need and requirement for flood insurance.

These BAM floodplain maps for EBRPD can be seen in Figure 4-70.

Figure 4-70 EBRPD – Best Available Map



Source: California DWR, map created 11/13/2019

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).

Flood extents are usually measured in depths of flooding, aerial extent of the floodplain, as well as flood zones that a location falls in (i.e., 1% or 0.2% annual chance flood). Expected flood depths in the Park District vary and are not well defined. Flood durations in the Park District tend to be short to medium term, or until either the storm drainage system can catch up or flood waters move downstream. Aerial flood extent from the FEMA DFIRMs is shown on Table 4-79 in the Vulnerability Assessment below. As shown in the table, 0.75% of the Park District lies in the 1% annual chance floodplain, while another 0.03% lies in the 0.2% annual chance floodplain.

Past Occurrences

Disaster Declaration History

There have been 19 state and 17 federal disaster declarations due to flooding in Alameda County as shown in Table 4-74. There have been 24 state and 20 federal disaster declarations due to flooding in Contra Costa County as shown in Table 4-75. Of the three disaster declarations occurring since the 2017 LHMP, the EBRPD declared for two of the three 2017 events (DR-4305 and DR-4308).

Table 4-74 Alameda County Disaster Declarations 1950-2022 from Flood

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Flood (including heavy rains and storms)	19	1950, 1955, 1957, 1958 (twice), 1962, 1963, 1970, 1982, 1983 (twice), 1986, 1995 (twice), 1997, 1998, 2008, 2017 (twice)	17	1955, 1958, 1962 (twice), 1970, 1982, 1983, 1986, 1995 (twice), 1997, 1998, 2005, 2006, 2017 (three)

Source: Cal OES, FEMA

Table 4-75 Contra Costa County Disaster Declarations 1950-2022 from Flood

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Flood (including heavy rains and storms)	24	1950, 1955, 1957, 1958 (twice), 1962, 1963, 1969, 1970, 1980, 1982 (twice), 1983 (twice), 1984, 1986, 1992, 1995 (twice), 1997, 1998, 2008, 2017 (twice)	20	1955, 1958, 1962 (twice), 1969, 1970, 1980, 1982, 1983, 1986, 1992, 1995 (twice), 1997, 1998, 2005, 2006, 2017 (three)

Source: Cal OES, FEMA

NCDC Events

The NCDC tracks flood events for each County since 1996. These are shown on Table 4-76 for Alameda County and on Table 4-77 for Contra Costa County.

*Table 4-76 Alameda County NCDC Flooding Events 1/1/1996-1/31/2022**

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Flash Flood	12	0	0	0	0	$100,000	$0
Flood	43	0	0	0	0	$44,325,500	$0
Heavy Rain	5	0	2	0	1	$60,000	$30,000
Total	**60**	**0**	**2**	**0**	**1**	**$44,485,500**	**$30,000**

Source: NCDC

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

*Table 4-77 Contra Costa County NCDC Flooding Events 1/1/1996-1/31/2022**

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	99	0	0	0	0	$17,647,500	$0
Heavy Rain	9	1	1	0	5	$2,075,000	$0
Total	**134**	**1**	**1**	**0**	**5**	**$20,423,500**	**$ 0**

Source: NCDC

*Note: Losses reflect totals for all impacted areas, some of which fell outside of the Park District and outside of Contra Costa County.

Hazard Mitigation Planning Committee Events

The Park District noted the following events that have directly affected the Park District:

- Winter of **1996** heavy flood damage at Del Valle Lake. Detailed damage estimates are not available for this event.
- **February 2, 1998** – El Nino – FEMA DR 1203. The Park District suffered nearly $1.2 million in damages to 34 sites due to this disaster due to flooding, landslides, debris flows and erosion.
- **December 17, 2005 to January 12, 2006** – Winter Storms – FEMA DR 1628. The Park District suffered over $6 million in damages to 52 sites due to flooding, landslides, debris flows and erosion.
- **March 2016** – severe winter storms occurred with flooding, landslides, debris flows, and erosion. Major landslides occurred in Wildcat Canyon, Richmond and Claremont Canyon.
- **Spring 2017** – severe winter storms occurred with flooding, landslides, debris flows, and erosion. Damages were recorded throughout the Park District including in Anthony Chabot, Bay Area Ridge Trail near Martinez, Big Break, Black Diamond, Camp Arroyo, Claremont Canyon, Contra Costa Trails, Contra Loma, Deer Valley, Del Valle, Diablo Foothills, Eckley Pier, Garin, Hayward, Huckleberry, Huckleberry (Sibley), Kennedy Grove, Lake Chabot, Las Trampas, Leona Canyon , Miller/Knox, Mission Peak, Morgan Territory, Pleasanton Ridge, Redwood Park, Roberts, Shadow Cliffs, Sibley (McCosker), Sobrante Ridge, Tilden, Vasco Hills /Byron, and Wildcat Canyon. In total, $7.3 million damages were recorded. These were associated with the two storm and flood events the Park District declared for in 2017 as detailed in Table 4-74 and Table 4-75.

More information on many of these events can be found in the Localized Flood (Section 4.3.11) past events below.

Likelihood of Future Occurrences

1% Annual Chance Flood

Occasional—This is the flood that has a 1- percent chance of being equaled or exceeded in the Park District in any given year. Thus, the 1% annual chance flood could occur more than once in a relatively short period of time.

0.2% Annual Chance Flood

Unlikely—The flood has a 0.2 percent chance of being equaled or exceeded in the Park District in any given year.

Climate Change and Flood

The 2017 EBRPD LHMP noted that the frequency and severity of coastal flooding is expected to gradually increase as sea level gradually rises. For riverine flooding, flood risk in a given location often increases with time because increasing development within the watershed increases runoff, and because development and fill within floodplains or sedimentation in a river channel may increase flood elevations. Flood risk at a given location may also decrease over time if flood control structures such as levees or upstream dams for flood control are constructed or improved. Climate change and its effect on flooding is discussed using three sources:

- 2021 CAS
- Cal-Adapt
- National Center for Atmospheric Research

California Climate Adaptation Strategy

According to the CAS, climate change may affect flooding in California and the Park District. 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 were shown in Figure 4-31 and Figure 4-32 in Section 4.3.3. These could affect flooding in the Park District.

National Center for Atmospheric Research

Also, according to the National Center for Atmospheric Research in Boulder, Colorado, atmospheric rivers are likely to grow more intense in coming decades, as climate changes warms the atmosphere enabling it to hold more water.

Vulnerability Assessment

Vulnerability—Medium

Historically, the Park District has always been at risk to flooding during the rainy season from November through April. The Alameda County FIS and the Contra Costa County FIS noted that floods result from prolonged heavy rainfall and are characterized by high peak flows of moderate duration and by a large

volume of runoff. Flooding is more severe when antecedent rainfall has resulted in saturated ground conditions. Several areas of the Park District are subject to flooding by the overtopping of rivers and creeks, levee failures, and the failure of urban drainage systems that cannot accommodate large volumes of water during severe rainstorms. In addition to the major rivers, there are many streams, channels, canals, and creeks that serve the drainage needs of the EBRPD and communities surrounding it. There is significant threat of flooding in areas of the Park District from several of these streams. These streams can be prone to rapid flooding with little notice.

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 other livestock 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 structure 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.

Vulnerability to and Impacts from Flood

Floods are one of the more significant natural hazards impacting the Park District. 19 of the Park District's 65 parks are located along low lying areas on the Bay and Delta shoreline. These parks are most at risk from flooding resulting from storm events (Section 4.3.3), tsunamis (Section 4.3.15), levee failures (Section 4.3.13), and sea level rise (Section 4.3.6). These parks may also be subject to riverine flooding and local

stormwater drainage flooding. The Park District's 46 inland parks may experience riverine flooding and/or stormwater water drainage flooding, which is the primary focus of this section.

Floods are one of the more significant natural hazards impacting the Park District. 19 of the Park District's 65 parks are located along low lying areas on the Bay and Delta shoreline. These parks are most at risk from flooding resulting from storm events (Section 4.3.3), tsunamis (Section 4.3.15), levee failures (Section 4.3.13), and sea level rise (Section 4.3.6). These parks may also be subject to riverine flooding and local stormwater drainage flooding. The Park District's 46 inland parks may experience riverine flooding and/or stormwater water drainage flooding, which is the primary focus of this section.

Major floods in the Park District, caused by heavy rains, can affect EBRPD properties, parks, and trails, and also affect District assets and operations, including critical facilities. Streets, roads, and highways can be overtopped, washed out, or covered with debris causing the temporary cessation of traffic flow and access to Park District lands. Erosion and landslides often occur throughout the Park District during heavy rains and flood events. The Park District spends money annually repairing these damaged areas. Significant flood events can also be a life safety issue affecting both Park District staff, workers, and visitors to the parks. Park District water and wastewater systems may be damaged during flood events; water quality issues may also occur.

The Park District also noted that failures of reservoirs for potable water systems can occur, especially from earthquakes. These reservoirs typically have much smaller storage volumes than dams, so flooding from failures is generally localized, but may be severe where flows are confined in narrow channels which contain structures or infrastructure. Similar localized flooding may occur from failures of large diameter water pipes.

Park Lands and Assets at Risk

The Park District has mapped FEMA flood hazard areas. GIS was used to determine the possible impacts of flooding within the Park District and how the risk varies across the EBRPD. The following methodology was utilized in determining park lands and assets at risk to the 1% annual chance flood event and 0.2% annual chance flood event.

Each of the DFIRM flood zones that begins with the letter 'A' depict the Special Flood Hazard Area, or the 1% annual chance flood event (commonly referred to as the 100-year flood). Each of the flood zones that begins with the letter 'V' depict coastal flooding areas. Table 4-78 explains the difference between DFIRM mapped flood zones within the 1% annual chance flood zone as well as other flood zones located within the EBRPD. The effective DFIRM map is shown on Figure 4-71, with Coastal VE Zones only shown on Figure 4-38.

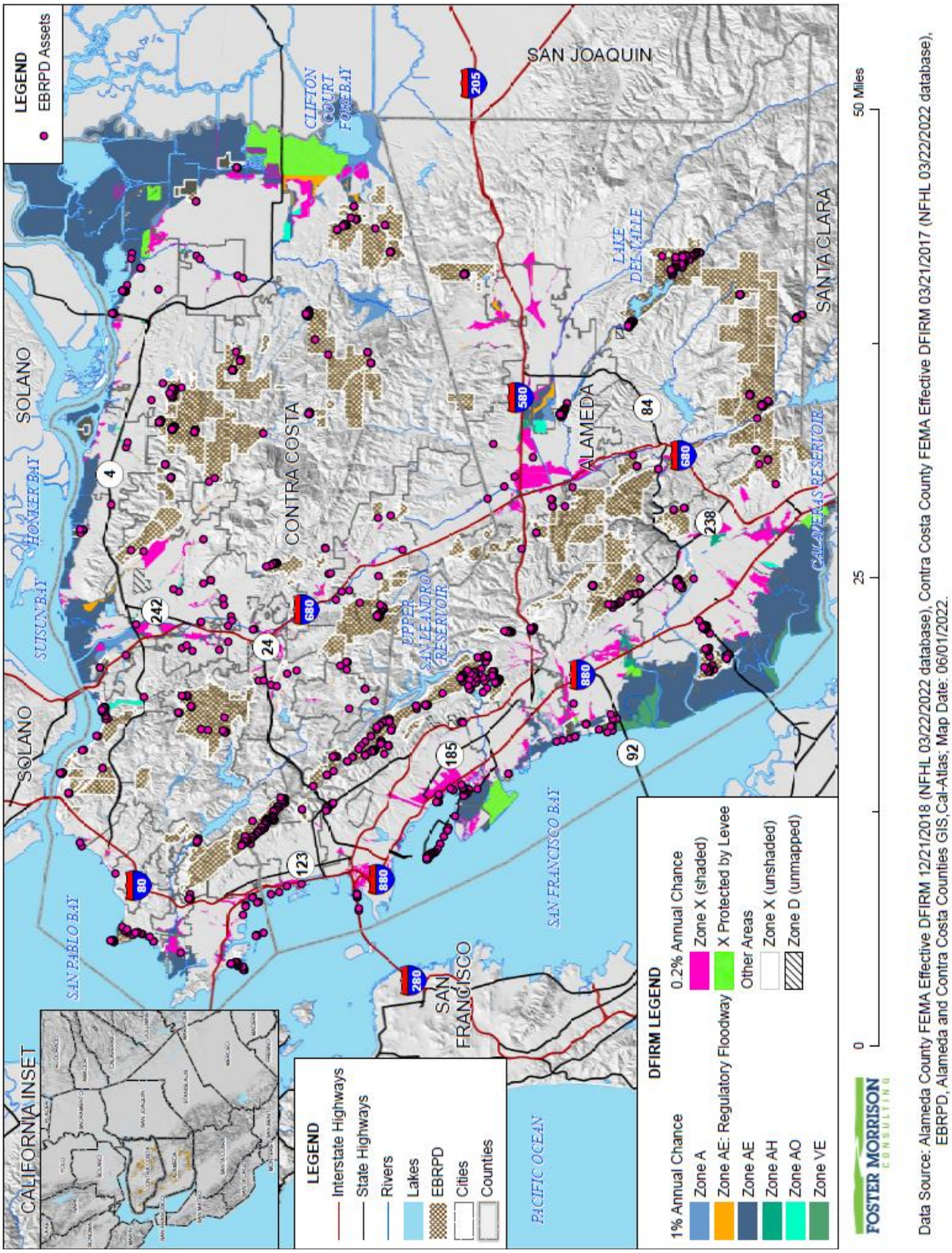
Table 4-78 EBRPD – FEMA DFIRM Flood Zones

Flood Zone	Description
AE	1% annual chance flood: Base flood elevations provided
AE Floodway	1% annual chance flood: Regulatory floodway; Base flood elevations provided

Flood Zone	Description
AH	River or stream flood hazard areas, and areas with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet. Average flood depths derived from detailed analyses are shown within these zones.
AO	1% annual chance flood: River or stream flood hazard areas, and areas with a 1% or greater chance of shallow flooding each year, usually in the form of sheet flow, with an average depth ranging from 1 to 3 feet.
VE	Coastal areas with a 1% or greater chance of flooding and an additional hazard associated with storm waves. Base flood elevations derived from detailed analyses are shown at selected intervals within these zones.
X Protected by Levee	Areas where levees protect against the 1% annual chance flood. These are considered to be in the 0.2% annual chance flood zone.
Shaded X	0.2% annual chance flood: The areas between the limits of the 1% annual chance flood and the 0.2-percent-annual-chance (or 500-year) flood
X (unshaded)	No flood hazard
D	Unmapped Areas

Source: FEMA

Figure 4-71 EBRPD – FEMA DFIRM Flood Zones



EBRPD Flood Analysis

EBRPD has mapped FEMA flood hazard areas. GIS was used to determine the possible impacts of flooding to EBRPD. This analysis focused on values at risk to the 1% annual chance flood event and 0.2% annual chance flood events. An analysis was performed on the Park District lands and assets. Methodology and results are presented below.

Methodology for EBRPD Analysis and Results

GIS was used to analyze EBRPD park lands and assets potentially at risk to DFIRM flooding. EBRPD park lands and assets data obtained from the Park District were intersected with FEMA Effective Alameda County DFIRM 12/21/2018 and Contra Costa County FEMA Effective DFIRM 03/21/2017 data to determine Park District lands and assets that fall into defined FEMA DFIRM flood zones. Separate analysis was performed for park lands (in acres) and park assets (as types of assets and replacement values). Affected Park District lands and assets are described below.

Table 4-79 shows the number of Park District lands that intersect these DFIRM flood zones, as well as the number of acres affected. Table 4-80 shows the number of Park District lands that have assets located within the DFIRM flood zones and the replacement values of those assets. More detail on specific Park District lands and assets in DFIRM flood zones can be found in Appendix F.

Table 4-79 EBRPD – DFIRM Flood Zones and Affected Park District Lands and Acres

Flood Zone/ EBRPD Park Lands	Total Number of Park Lands	Affected Park Lands	Percent of Affected Park Lands	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Acres Affected
1% Annual Chance						
EBRPD – Alameda County	43	20	46.5%	508,404	3,024	0.59%
EBRPD – Contra Costa County	57	38	66.7%	530,785	4,789	0.90%
EBRPD 1% Annual Chance Total	**100**	**58**	**58.0%**	**1,039,189**	**7,813**	**0.75%**
0.2% Annual Chance						
EBRPD – Alameda County	43	13	30.2%	508,404	170	0.03%
EBRPD – Contra Costa County	57	11	19.3%	530,785	127	0.02%
EBRPD 0.2% Annual Chance Total	**100**	**24**	**24%**	**1,039,189**	**297**	**0.03%**

Source: FEMA Alameda County DFIRM 12/21/2018, Contra Costa County DFIRM 3/21/2017, EBRPD GIS

Table 4-80 EBRPD – DFIRM Flood Zones and Affected Park District Assets and Replacement Values

DFIRM Flood Zone/ EBRPD Park Values	Number of Park Lands Affected	Asset Count	Replacement Value
1% Annual Chance			
EBRPD – Alameda County	9	212	$78,352,356
EBRPD – Contra Costa County	21	126	$51,478,036
Total	**30**	**338**	**$129,830,392**
0.2% Annual Chance			
EBRPD – Alameda County	4	26	$16,788,574
EBRPD – Contra Costa County	2	7	$1,402,666
Total	**6**	**33**	**$18,191,240**

Source: FEMA Alameda County DFIRM 12/21/2018, Contra Costa County DFIRM 3/21/2017, EBRPD GIS

In addition to the tables above, the following is a list of parks located within the DFIRM 1% or 0.2% annual chance flood zones. More detail on specific Park District lands and assets in these DFIRM flood zones can be found in Appendix F.

- **1% Annual Chance Flood Zone**
  - ✓ Alameda Creek Trail
  - ✓ Camp Arroyo
  - ✓ Coyote Hills
  - ✓ Del Valle
  - ✓ Don Castro
  - ✓ Hayward Shoreline
  - ✓ Martin Luther King Jr. Shoreline
  - ✓ McLaughlin Eastshore
  - ✓ Niles Canyon Trail
  - ✓ Oyster Bay Shoreline
  - ✓ Quarry Lakes
  - ✓ SF Bay Trail (MLK to MESP)
  - ✓ Shadow Cliffs
  - ✓ Alameda Point Shoreline Trail
  - ✓ Crown Beach
  - ✓ Dry Creek Pioneer
  - ✓ Judge John Sutter Shoreline
  - ✓ SF Bay Trail
  - ✓ Tassajara Creek Trail
  - ✓ Temescal
  - ✓ Antioch/Oakley Shoreline
  - ✓ Big Break Shoreline
  - ✓ Briones to Las Trampas Trail
  - ✓ Castle Rock
  - ✓ Delta Access
  - ✓ Diablo Foothills
  - ✓ Kennedy Grove
  - ✓ Lafayette to Moraga Trail
  - ✓ McLaughlin Eastshore
  - ✓ North Richmond Shoreline
  - ✓ Point Pinole Shoreline
  - ✓ San Pablo Bay Shoreline
  - ✓ Tilden (Nature Area)
  - ✓ Vasco Hills
  - ✓ Waterbird
  - ✓ Wildcat Canyon
  - ✓ Wildcat Creek Trail
  - ✓ Bay Point Shoreline
  - ✓ Big Break Delta Shoreline Trail
  - ✓ Black Diamond Mines
  - ✓ Briones
  - ✓ Browns Island
  - ✓ Byron Vernal Pools
  - ✓ CA State Riding & Hiking Trail
  - ✓ Carquinez Strait Shoreline
  - ✓ Contra Costa Trails
  - ✓ Deer Valley
  - ✓ Delta de Anza Trail

- ✓ Huckleberry
- ✓ Las Trampas
- ✓ Little Hills
- ✓ Miller/Knox Shoreline
- ✓ Morgan Territory
- ✓ Point Isabel Shoreline
- ✓ Radke Martinez Shoreline
- ✓ Round Valley
- ✓ SF Bay Trail
- ✓ Thurgood Marshall
- ✓ Vasco Caves
- ✓ Brooks Island

➢ **0.2% Annual Chance Flood Zone**

- ✓ Brushy Peak
- ✓ Camp Arroyo
- ✓ Del Valle
- ✓ Hayward Shoreline
- ✓ Martin Luther King Jr. Shoreline
- ✓ McLaughlin Eastshore
- ✓ Oyster Bay Shoreline
- ✓ Pleasanton Ridge
- ✓ SF Bay Trail (MLK to MESP)
- ✓ Vargas Plateau
- ✓ Alameda Point Shoreline Trail
- ✓ Crown Beach
- ✓ Judge John Sutter Shoreline
- ✓ Briones to Las Trampas Trail
- ✓ Lafayette to Moraga Trail
- ✓ McLaughlin Eastshore
- ✓ Point Pinole Shoreline
- ✓ San Pablo Bay Shoreline
- ✓ Wildcat Creek Trail
- ✓ Briones to Mt Diablo Trail
- ✓ Point Isabel Shoreline
- ✓ Radke Martinez Shoreline
- ✓ SF Bay Trail
- ✓ Brooks Island

Critical Facilities at Risk from DFIRM Flooding

EBRPD critical facilities are a subset of the total facilities (or assets) of the Park District as discussed in Section 4.2.4 above. Using this definition and GIS mapping of Park District assets, DFIRM Flood Zones were overlayed on the critical facility layer. Those critical facilities that fall within DFIRM Flood Zones are detailed on Table 4-81 below. More information on critical facilities can be found in Appendix G and H.

Table 4-81 EBRPD – Critical Facilities in 1% and 0.2% Annual Chance DFIRM Flood Zones

County/Park Lands	Flood Zone / Asset Type	Asset Count
Alameda County		
Alameda County Trails	**1% Annual Chance Flood Hazard**	
	Zone A	
	Pedestrian Paving	2
	Zone A Total	***2***
	Zone AE Floodway	
	Pedestrian Paving	2
	Zone AE Floodway Total	***2***
	1% Annual Chance Flood Hazard Total	**4**
	0.2% Annual Chance Flood Hazard	
	Zone X (shaded)	
	Pedestrian Paving	1

County/Park Lands	Flood Zone / Asset Type	Asset Count
	Zone X (shaded) Total	***1***
	0.2% Annual Chance Flood Hazard Total	**1**
	Alameda County Trails Total	**1**
Crown Beach	**1% Annual Chance Flood Hazard**	
	Zone AE	
	Pedestrian Paving	1
	Zone AE Total	***1***
	1% Annual Chance Flood Hazard Total	**1**
	Crown Beach Total	**1**
Hayward Shoreline	**1% Annual Chance Flood Hazard**	
	Zone AE	
	Pedestrian Paving	5
	Storm Sewer	8
	Zone AE Total	***13***
	1% Annual Chance Flood Hazard Total	**13**
	Hayward Shoreline Total	**13**
Judge John Sutter	**1% Annual Chance Flood Hazard**	
	Zone AE	
	Building	2
	Zone AE Total	***2***
	1% Annual Chance Flood Hazard Total	**2**
	0.2% Annual Chance Flood Hazard	
	Zone X (shaded)	
	Building	1
	Zone X (shaded) Total	***1***
	0.2% Annual Chance Flood Hazard Total	**1**
Martin Luther King, Jr.	**1% Annual Chance Flood Hazard**	
	Zone AE	
	Pedestrian Paving	2
	Piers & Docks	6
	Zone AE Total	***8***
	1% Annual Chance Flood Hazard Total	**8**
	0.2% Annual Chance Flood Hazard	
	Zone X (shaded)	
	Building	3
	Pedestrian Paving	2
	Zone X (shaded) Total	***5***

County/Park Lands	Flood Zone / Asset Type	Asset Count
	0.2% Annual Chance Flood Hazard Total	**5**
	Martin Luther King, Jr. Total	**13**
Shadow Cliffs	**1% Annual Chance Flood Hazard**	
	Zone A	
	Building	4
	Pedestrian Paving	1
	Water Supply	2
	Zone A Total	***7***
	1% Annual Chance Flood Hazard Total	**7**
	Shadow Cliffs Total	**7**
Temescal	**1% Annual Chance Flood Hazard**	
	Zone AE	
	Building	2
	Sanitary Sewer	1
	Storm Sewer	1
	Zone AE Total	***4***
	1% Annual Chance Flood Hazard Total	**4**
	Temescal Total	**4**
Contra Costa County		
Bay Point	**1% Annual Chance Flood Hazard**	
	Zone AE	
	Pedestrian Paving	1
	Zone AE Total	***1***
	1% Annual Chance Flood Hazard Total	**1**
	Bay Point Total	**1**
Big Break	**1% Annual Chance Flood Hazard**	
	Zone AE	
	Building	1
	Zone AE Total	***1***
	1% Annual Chance Flood Hazard Total	**1**
	Big Break Total	**1**
Black Diamond Mines	**1% Annual Chance Flood Hazard**	
	Zone A	
	Building	1
	Zone A Total	***1***
	1% Annual Chance Flood Hazard Total	**1**
	Black Diamond Mines Total	**1**

County/Park Lands	Flood Zone / Asset Type	Asset Count
Briones	**1% Annual Chance Flood Hazard**	
	Zone A	
	Roadways: Vehicular Bridges	1
	Zone A Total	***1***
	1% Annual Chance Flood Hazard Total	**1**
	Briones Total	**1**
Brooks Island	**1% Annual Chance Flood Hazard**	
	Zone VE	
	Service & Pedestrian Tunnel	1
	Zone VE Total	***1***
	1% Annual Chance Flood Hazard Total	**1**
	Brooks Island Total	**1**
Contra Costa Trails	**1% Annual Chance Flood Hazard**	
	Zone A	
	Building	1
	Zone A Total	***1***
	1% Annual Chance Flood Hazard Total	**1**
	Contra Costa Trails Total	**1**
Diablo Foothills / Castle Rock	**1% Annual Chance Flood Hazard**	
	Zone A	
	Building	2
	Pedestrian Paving	3
	Water Supply	1
	Zone A Total	***6***
	1% Annual Chance Flood Hazard Total	**6**
	Diablo Foothills / Castle Rock Total	**6**
East County Trails	**1% Annual Chance Flood Hazard**	
	Zone AE Floodway	
	Pedestrian Paving	4
	Zone AE Floodway Total	***4***
	Zone AE	
	Pedestrian Paving	2
	Zone AE Total	***2***
	1% Annual Chance Flood Hazard Total	**6**
	East County Trails Total	**10**
Las Trampas	**1% Annual Chance Flood Hazard**	
	Zone A	

County/Park Lands	Flood Zone / Asset Type	Asset Count
	Building	4
	Pedestrian Paving	1
	Zone A Total	***5***
	1% Annual Chance Flood Hazard Total	**5**
	Las Trampas Total	**5**
McLaughlin Eastshore	**1% Annual Chance Flood Hazard**	
	Zone AE	
	Pedestrian Paving	1
	Zone AE Total	***1***
	1% Annual Chance Flood Hazard Total	**1**
	McLaughlin Eastshore Total	**1**
Point Isabel	**1% Annual Chance Flood Hazard**	
	Zone AE	
	Pedestrian Paving	1
	Zone AE Total	***1***
	1% Annual Chance Flood Hazard Total	**1**
	Point Isabel Total	**1**
Point Pinole	**1% Annual Chance Flood Hazard**	
	Zone AE	
	Roadways: Vehicular Bridges	2
	Zone AE Total	***2***
	Zone AH	
	Roadways: Vehicular Bridges	1
	Zone AH Total	***1***
	1% Annual Chance Flood Hazard Total	**3**
	0.2% Annual Chance Flood Hazard	
	Zone X (shaded)	
	Roadways: Vehicular Bridges	1
	Zone X (shaded) Total	***1***
	0.2% Annual Chance Flood Hazard Total	**1**
	Point Pinole Total	**1**
Radke Martinez	**1% Annual Chance Flood Hazard**	
	Zone AE	
	Building	1
	Pedestrian Paving	6
	Zone AE Total	***7***
	1% Annual Chance Flood Hazard Total	**7**

County/Park Lands	Flood Zone / Asset Type	Asset Count
	Radke Martinez Total	**7**
Round Valley	**1% Annual Chance Flood Hazard**	
	Zone A	
	Building	1
	Pedestrian Paving	2
	Water Supply	2
	Zone A Total	***5***
	1% Annual Chance Flood Hazard Total	**5**
	Round Valley Total	**5**
Sycamore Valley	**1% Annual Chance Flood Hazard**	
	Zone A	
	Pedestrian Paving	1
	Zone A Total	***1***
	1% Annual Chance Flood Hazard Total	**1**
	Sycamore Valley Total	**1**
Wildcat Canyon	**1% Annual Chance Flood Hazard**	
	Zone A	
	Roadways: Vehicular Bridges	1
	Zone A Total	***1***
	1% Annual Chance Flood Hazard Total	**1**
	Wildcat Canyon Total	**1**

Source: FEMA Alameda County DFIRM 12/21/2018, Contra Costa County DFIRM 3/21/2017, EBRPD GIS

Overall EBRPD (Community) Impact

Floods and their impacts vary by location and severity of any given flood event and will likely only affect certain areas of the EBRPD during specific times. Based on the risk assessment, it is evident that floods will continue to have potentially significant economic impacts to certain areas of the EBRPD. However, while flooding can cause significant impacts depending on the duration and volume of precipitation and the drainage in any give area, many of the floods in the Park District are minor, localized flood events that are more of a nuisance than a disaster. Impacts that are not quantified, but can be anticipated in large future flood events, include:

- Injury and loss of life
- Damage to Park District facilities, infrastructure, and other assets
- Damage to natural resource habitats and other natural resources
- Disruption of and damage to critical infrastructure and services
- Loss of water, power, roads, phones, and transportation, which could impact, strand, and/or impair mobility for Park District staff, emergency responders, and/or those who use District Parks.

Future Development

Future development in the Park District, as discussed above in Section 4.2.6, is occurring in multiple parks as a result of the Measure WW funding. This includes both new acquisitions and additional build outs of current Park District lands. Future development in the Park District may be built in the floodplain, as long as it conforms to the standards of the applicable floodplain ordinance. Each county and city where Park District lands are located should be enforcing their floodplain ordinances on new development and substantial improvements for development in the Park District. New EBRPD facilities will be sited, designed and constructed in such a way as to reduce the risk from flooding to the facility.

4.3.11. Flood: Localized/Stormwater

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect the EBRPD. These sections include a hazard/problem description; description of location and extent; past occurrences of this hazard; and how climate change can affect this hazard.

Hazard/Problem Description

Localized, stormwater flooding also occurs throughout the Park District, primarily during the rainy season from November through April. Prolonged heavy rainfall contributes to a large volume of runoff resulting in high peak flows of moderate duration. Flooding is more severe when previous rainfall has created saturated ground conditions. Storm drain culverts and drainage systems have a finite capacity. When rainfall exceeds this capacity, or the system is clogged, water accumulates in areas until it reaches a level of overland release. This type of flooding may occur when intense storms occur over areas of developed areas.

The Park District is traversed by several streams and drainage throughout their Planning Area. The development that has occurred during the past forty years has accentuated existing drainage problems and has increased the potential for localized flooding. Continued construction of new buildings increases the area of impermeable surface and thus the amount of storm water that flows through the Park District's storm drain systems.

Location and Extent

According to the Park District, numerous locations and roads throughout the Park District not included in the FEMA 1% and 0.2% annual chance floodplains are subject to flooding in heavy rains. These are delineated in Table 4-82. In addition to flooding, damage to these areas during heavy storms includes pavement deterioration, washouts, landslides, debris areas, erosion, and downed trees. The frequency and type of damage or flooding that occurs varies from year to year, depending on the quantity of precipitation and runoff.

Table 4-82 EBRPD – Localized Flooding Areas

Road/Area Name	Flooding	Pavement Deterioration	Washouts	High Water/ Creek Crossing	Landslides/ Mudslides/ Erosion	Debris	Downed Trees
Site 06: Cow Hollow	X		X			X	
Site 1: Big Bear Loop	X		X			X	
Site 10: Brandon Trail	X		X			X	
Site 11: Lost Ridge Trail	X		X			X	
Site 12: Columbine Trail	X		X			X	
Site 4: Red Tail Trail	X		X			X	
Skyline Ranch Stables	X						
Site 15: Feeder Trail #1	X		X				
Big Break Trail	X						
Site 3: Ang Property	X						
Site 1: Oil Canyon Culvert	X		X			X	
3 Cattle Ponds in Black Diamond	X		X	X		X	
Old Sand Mine/ Nortonville Opening	X						
Site #3 - Chaparral Spring	X					X	
Site 2: Mott Peak Trail	X						
Site 2: Abrigo Valley Trail Culvert	X						
Lafayette Ridge Trail	X				X	X	
Pine Tree Trail	X		X				
Site 1: Seaborg Trail	X		X			X	
Yurt	X					X	

Road/Area Name	Flooding	Pavement Deterioration	Washouts	High Water/ Creek Crossing	Landslides/ Mudslides/ Erosion	Debris	Downed Trees
Site 07: Camp Arroyo Culvert	X		X			X	
Pathway	X	X	X			X	
Site 07: Dumpster	X						
Gelston Road	X	X				X	
Site 18: Briones to Las Trampas Trail	X				X	X	
Site 05: Briones to Las Trampas Trail -(Macedo)	X						
Site 17: Old Moraga Ranch Trail	X	X	X			X	
Site 5: Green Valley Trail at Diablo Lakes	X						
Site #1 - Los Charros Pond	X	X	X	X		X	
Site #2 - Horse Valley Pond	X					X	
Dog-run Landslide	X	X	X		X	X	
Site 2: Castle Rock Single Track Trail	X		X			X	
Debris Removal	X					X	
South Playground Structure & Swim Beach	X		X			X	
Site 8: Eckley Pier	X						
Site 2: Llama Lane (North Garin)	X		X		X	X	
Site 07: Meyers Ranch Trail	X		X			X	
Site 08: Chabot to Garin Culvert	X					X	
Site 3: Marsh Levee	X				X	X	
Skyline National Trail	X						
Site 11: Lower Pinehurst Culvert	X		X			X	

Road/Area Name	Flooding	Pavement Deterioration	Washouts	High Water/ Creek Crossing	Landslides/ Mudslides/ Erosion	Debris	Downed Trees
Patra Drive	X	X	X		X	X	X
Site 01: Eastshore Trail	X				X	X	
Redwood Canyon Golf Course (40 Sites)	X		X			X	X
Site 2: Cameron Loop Trail	X				X	X	
Rocky Ridge Road	X	X	X	X		X	
Site 9: Leona Trail	X						
Model Railway Building	X						
Site 1: Peak Trail	X						
Site 4: Finley Road	X						
Site 09: Bay Creek Trail	X		X			X	
Site 6: Tehan Canyon	X	X	X			X	
Tehan Canyon	X	X	X			X	
Site 16: Star Flower Trail	X	X	X		X	X	
Site 2: East Ridge Trail	X				X	X	
Site 14: Lower Stream and Mill Trail	X		X			X	
Site 13: Upper Stream Trail	X		X		X	X	
Site 14: Golden Spike (Near Aweeka)	X		X		X	X	
Site 04: Piedmont Stables	X					X	
Site 10: Golden Spike Crib Wall	X		X			X	
Manzanita Picnic Area Fence	X					X	X
Battery Shed	X						
Site 13: Lake Trail	X				X	X	

Road/Area Name	Flooding	Pavement Deterioration	Washouts	High Water/ Creek Crossing	Landslides/ Mudslides/ Erosion	Debris	Downed Trees
CEMEX	X				X	X	
Site 03: McCosker Loop Trail	X				X	X	
Site 6: Sobrante Ridge Trail	X	X	X			X	
Site 7: Golf Course Road	X	X	X		X	X	
Site 8: Lone Oak Road (2 Locations)	X		X			X	
Lifeguard Station at Lake Anza	X						
Staff Entrance to Tilden Golf Course	X	X	X			X	
Site 5: Upper Packrat Trail	X				X	X	
8 Ponds in the Vasco	X			X		X	
Site 9: Monte Cresta Trail	X				X	X	
Nimitz Way at Inspiration Point	X	X					
Site 10: Wildcat Creek Trail (2 Locations)	X					X	
Site 1: Mezue Trail	X				X	X	
Site 12: Old Nimitz Way	X					X	

Source: EBRPD, 2017 Disaster Declarations (PA)

Vulnerable areas are mostly adjacent to creeks that flow through the Park District; although other areas can be affected where water is conveyed and collected. There is no established scientific scale or measurement system for localized flooding. Localized flooding is generally measured by depth of flooding, volume of water, runoff velocity, and the area affected. Localized flooding often happens quickly and has a short speed of onset and short duration, with flood waters receding when the storm drainage system can catch up or when the water is absorbed into the ground.

Past Occurrences

Disaster Declaration History

There have been 19 state and 17 federal disaster declarations due to flooding (and localized flooding) in Alameda County as shown in Table 4-83. There have been 24 state and 20 federal disaster declarations due to flooding in Contra Costa County as shown in Table 4-84. Of the three disaster declarations occurring since the 2017 LHMP, the EBRPD declared for two of the three 2017 events (DR-4305 and DR-4308).

Table 4-83 Alameda County Disaster Declarations 1950-2022 from Flood

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Flood (including heavy rains and storms)	19	1950, 1955, 1957, 1958 (twice), 1962, 1963, 1970, 1982, 1983 (twice), 1986, 1995 (twice), 1997, 1998, 2008, 2017 (twice)	17	1955, 1958, 1962 (twice), 1970, 1982, 1983, 1986, 1995 (twice), 1997, 1998, 2005, 2006, 2017 (three)

Source: Cal OES, FEMA

Table 4-84 Contra Costa County Disaster Declarations 1950-2022 from Flood

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Flood (including heavy rains and storms)	24	1950, 1955, 1957, 1958 (twice), 1962, 1963, 1969, 1970, 1980, 1982 (twice), 1983 (twice), 1984, 1986, 1992, 1995 (twice), 1997, 1998, 2008, 2017 (twice)	20	1955, 1958, 1962 (twice), 1969, 1970, 1980, 1982, 1983, 1986, 1992, 1995 (twice), 1997, 1998, 2005, 2006, 2017 (three)

Source: Cal OES, FEMA

NCDC Events

The NCDC does not track localized flooding.

Hazard Mitigation Planning Committee Events

The HMPC noted major events that occurred in 2017 associated with the two EBRPD disaster declarations. These were associated with the floods shown in Table 4-4 and Table 4-6. Specific problem areas are discussed below in Table 4-85.

Table 4-85 EBRPD – 2017 Localized Flood Problem Areas and Damages

Park	Area	Description Of Damage And Scope Of Work
Anthony Chabot	Site 06: Cow Hollow	DEBRIS REMOVAL - Entrance Road washout by landslide

Park	Area	Description Of Damage And Scope Of Work
Anthony Chabot	Site 1: Big Bear Loop	Clogged 36 CMP caused storm water to scour embankment in a loss of area 26 FT x 25 FT x 10 FT (241 CY) and losing support for a 20' section of 36" CMP. Also, a 20' by 1" section of PVC pipe was damaged. This 1" pipe is the water fill line for a fire water tank. The repair will be replaced culvert, backfill area loss with retaining wall and fill, install articulated ford above water crossing."
Anthony Chabot	Site 10: Brandon Trail	"Partial loss of trail and shoulder. 2' thick by 17' long by 17' wide slide. Repair of Rock Slope protection and regrading for trail."
Anthony Chabot	Site 11: Lost Ridge Trail	Trail slip resulting in loss of an area 25' wide x 25' down x 3.5' thick. The repair will be Rock Slope Protection and fill for the road and shoulder.
Anthony Chabot	Site 12: Columbine Trail	Damaged Single Track Trail. 45' x 2' of trail, loss extending 20' downslope. Rock Slope Protection for repair. Mitigation of 75' of RSP to protect the 6" water main located adjacent to the trail.
Anthony Chabot	Site 4: Red Tail Trail	Two trails slipouts. Site 1: 17' x 10' x 2' Repair with Rock Slope Protection. Site 2: 6' x 4' x 4.5'. Repair with Geotech wall"
Anthony Chabot	Skyline Ranch Stables	Landslide approximately 30 feet long with approximate loss of material is 10 cubic yards. Lost integral ground for parking lot. Install rock slope protection.
Bay Area Ridge Trail near Martinez	Site 15: Feeder Trail #1	The water runoff scoured/gouged the trail along approximately 302' x 1.5' W x 1' D. 12 Inch Transite culvert was exposed. Remove culvert and outslope trail. There are two additional trail slip outs located further along the trail. Repair with rock slope protection. Site 1 20ft L x 15ft W x 5ft. Site 2 15ft L x 6ft W x 6ft D
Big Break	Big Break Trail	The base levee on Big Break Trail settled and caused cracking in the pavement of 300 feet. The repair will be to remove the damaged surface and damage base rock. Compact sub-base, install and compact 6"" new base rock, and re-asphalt 3"" AC surface.
Black Diamond	Site 3: Ang Property	18" x 20' culvert was blocked underneath trail. Replace culvert. Mitigation: Upsize culvert to 24"" with head and tail walls."
Black Diamond	Site 1: Oil Canyon Culvert	A 36" by 30' CMP was blocked and scoured out, losing the structure of the area surrounding the culvert. The headwall of concrete bags was displaced as was the tail wall of native rocks. Mitigation will be to install an articulated ford 40' x 30' with rock protection above and below.
Black Diamond	3 Cattle Ponds in Black Diamond	"1) Old Homestead: Pond berm blew out. Scoured an area of 91' long by 15' wide by 15' deep. Repair with compacted fill and rock. 2) Oil Canyon: Pond berm blew out. Scoured and area of 120' long by 15' average width by 15' average depth. Repair with compacted fill and rock. 3) Corcoran Pond: Pond Berm over filled leaving a 3' deep by 22' wide by 60' long gouge on the berm top and face. Rock Slope Protection and hydroseed for repair. "
Black Diamond	Old Sand Mine/ Nortonville Opening	There were two mine openings that occurred due to the storms. 1) Sand Mine in Somerville: subsidence due to storm runoff occurred near Level B sand mine. The original area was enclosed by a barbed wire fence and the subsidence swallowed the existing fence. A new 5 strand barbed wire fence was installed as an EPM outside of the affected area. The opening will be filled in with expanding structural foam. 2) Coal Mine in Nortonville: Rain and water runoff caused an opening of the old coal mines. The affected area is approximately 3' wide by 18' long by 8' feet deep. The area has been cordoned off with a fence as an EPM. Move in fill from nearby stockpile, grade area and hydroseed."

Park	Area	Description Of Damage And Scope Of Work
Black Diamond - Clayton Ranch	Site #3 - Chaparral Spring	The cattle pond at Chaparral Spring had damage on the spillway due to the excessive water runoff. The dimensions of the damage are 85' long, by 5' wide, by 1 foot deep on average. The repair is to back fill the gouge with rock and fill.
Briones	Site 2: Mott Peak Trail	24" culvert plugged, over topped and eroded trail. Replace existing culvert and head wall. Mitigation: Upsize culvert to 36" and install tail wall.
Briones	Site 2: Abrigo Valley Trail Culvert	A 36" culvert 130 LF plugged causing erosion to trail and drainage area downslope of trail. Install soldier pile retaining wall and repair erosion below wall. Mitigation: Upsize culvert to 48" and install rip rap energy dissipater.
Briones	Lafayette Ridge Trail	(21) slip outs at the Lafayette Ridge Staging Area. Grade and repair with rock, jut needing and hydroseed. Two additional slip outs near Springhill Drive (approximately 2,500 each) will require buttress fill with hydroseed and erosion control matting and wattle.
Briones	Pine Tree Trail	Twin 36" x 40' culverts plugged, and water scoured out the entire area leaving a void of 15' deep by 30' across and 40' wide. Repair with bridge.
Briones	Site 1: Seaborg Trail	A 24" culvert 40 LF plugged causing erosion to trail and drainage area downslope of trail. Install soldier pile retaining wall and repair erosion below wall. Mitigation: Upsize culvert to 30" and install rip rap energy dissipater.
Camp Arroyo	Yurt	Residential yurt destroyed. Replace canvas cover, kitchen, bathroom, sheet rock, flooring, electrical with possible ADA and other code required up grades.
Camp Arroyo	Site 07: Camp Arroyo Culvert	Emergency access road erosion, Culvert blowout
Camp Arroyo	Pathway	1) Pathway: Decomposed Granite path rutted and washed out by the rain. Replace entire DG trail. Mitigation: Replace with stamped concrete path for ADA. 2) Dumpster enclosure: Gates on dumpster blew open wrenching them from the hinges. Install steel cap on wall corners and affix gates to steel cap. Mitigation: Install door swing limiters to prevent 180 degree opening. 3) Fire Road 36" culvert 40 LF blocked and scoured. Replace culvert. Mitigation: Upsize culvert to 48"" and install head and tall walls.
Camp Arroyo	Site 07: Dumpster	1) Pathway: Decomposed Granite path rutted and washed out by the rain. Replace entire DG trail. Mitigation: Replace with stamped concrete path for ADA. 2) Dumpster enclosure: Gates on dumpster blew open wrenching them from the hinges. Install steel cap on wall corners and affix gates to steel cap. Mitigation: Install door swing limiters to prevent 180 degree opening. 3) Fire Road 36" culvert 40 LF blocked and scoured. Replace culvert. Mitigation: Upsize culvert to 48"" and install head and tall walls.
Claremont Canyon	Gelston Road	Landslide along 200-foot section of 20-25' acres roadway worsened. Road was 50% gone from spring 2016 rain event; now 100% gone in several areas.
Contra Costa Trails	Site 18: Briones to Las Trampas Trail Near Moraga Way (3rd Street)	Las Trampas Creek scoured the embankment supporting the trail and displaced rock armoring (riprap) located at the base/toe. The area scoured is approximately 32 feet long by 30 feet downslope by 5 feet deep. The rock armoring is scattered into the creek, 5 CY. Look to install retaining wall 32 x 30.

Park	Area	Description Of Damage And Scope Of Work
Contra Costa Trails	Site 05: Briones to Las Trampas Trail - (Macedo)	3 Single track trail slip outs 1) 20 LF x 7 ft. w x 1.5 ft. d for 8 CY and replace existing articulated ford 2) 14 LF x 19 ft. w x 2.5 ft. d for 25 CY with Rocks Slope Protection 3) 14 LF x 2 ft. w x 2 ft. d for 2 CY with Rocks Slope Protection
Contra Costa Trails	Site 17: Old Moraga Ranch Trail	4 slipouts on a single track. 1) 16' of trail loss. 15' of land lost. Will require a Geo Tech wall to stabilize. Possible reroute of trail in this section. 2) 44' of trail loss. 10' of land lost. Will require a Geo Tech wall to stabilize. Possible reroute of trail in this section. 3) 10' section of trail scoured with 8' by 6' feet of fill needed to restore trail and shoulder. 4) Trail slumped 4' down and 45' long. Repair with Rock Slope Protection and fill to return to trail height. Access will be an issue.
Contra Costa Trails	Site 5: Green Valley Trail at Diablo Lakes	Excessive runoff caused overtopping of a culvert and scoured out the outlet side of the 24-inch CMP. The CMP should be reused if possible. The area and culvert will need to be excavated, backfilled, CMP replacement if necessary. Mitigation: Install head and tail wall.
Contra Loma	Site #1 - Los Charros Pond	Pond culvert blow out. Approximately 30' long by 10' wide and 3.5 feet deep with a 24" culvert. Install unclassified fill on berm and replace culvert. Mitigation: Install head and tail walls.
Deer Valley	Site #2 - Horse Valley Pond	There was an extensive washout on the face of the pond berm (50 Ft L x 9 Ft W x 4 Ft D). The repair will be compacted fill of approximately 67 cubic yards.
Del Valle	Dog-run Landslide	Landslide on Dog Run Trail near high voltage power line. The raw water line which provides water for the entire park runs through the area and that both lines are threatened by the slide. Scope of work is based on 2015 repair of Dog Run.
Diablo Foothills	Site 2: Castle Rock Single Track Trail	There was a significant slip out along the single track Castle Rock trail. Approximately 50' of trail was lost and the slip out was over 100' down. The repair will be Geotech wall, to stabilize the hill side, and a possible trail reroute.
District Wide	Debris Removal	Debris Removal
District Wide	South Playground Structure & Swim Beach	Replace 100 tons of sand.
Eckley Pier	Site 8: Eckley Pier	DEBRIS CLEARING 18" culvert blowout, displaced 15 cu yards of debris, needs an additional 10 cu yards of removal and possibly upsize culvert. Clean-up and repair.
Garin	Site 2: Llama Lane (North Garin)	The hill above the Garin to Chabot Trail (at Llama Lane) slid out, damaging the trail below and depositing debris 950' at the bottom of the hill. The slide was cleared off the road, the trail was restored, hydroseed and burlap wattle install on hillside.
Garin	Site 07: Meyers Ranch Trail	Scouring activity removed material from behind the 2nd vehicle bridge's southern abutment. Emergency Protective Measures have been placed. Tarps were placed in the area and the void was filled with rip rap. The permanent repair will install backfill of the area and armoring of the creek embankment with more rip rap.

Park	Area	Description Of Damage And Scope Of Work
Garin	Site 08: Chabot to Garin Culvert	Culvert 24" x 40' blocked. Replace culvert. Mitigation: Install 20' by 20' articulated ford with rip rap below and stream cleared of debris up stream of 20' by 10' and downstream of 10' by 10'."
Hayward	Site 3: Marsh Levee	2 sections of the levee were damaged. 1) Approx 30' long by 3' wide section of trail was lost. 2) Approx 25' long by 3' wide section of trail was lost. Repair with rip rap and rock fill. Restore trail.
Huckleberry	Skyline National Trail	Trail slip out. Part of trail is gone above Upper San Leandro Creek
Huckleberry (Sibley)	Site 11: Lower Pinehurst Culvert	Culvert undermined scouring out approximately 1/3 of the trail width on the headwall and tail-wall. "Replace culvert 24" x 20' with head and tail walls. Replace base rock 6" x 10' X 20'. Mitigation: Upsize culvert to 36"
Kennedy Grove	Patra Drive	2542 Patra Drive (Lot 46). Mudslide, failure of creek bank, downed trees and vegetation partially blocking creek Cost estimate to repair $500,000. Patra Drive, Lot 47, blown storm drain and downed trees on creek bank. Cost estimate $60,000.
Lake Chabot	Site 01: Eastshore Trail	Major slip out. Roads and Trails has already surveyed the site and recommends the damage to be engineered. Approximately 100FT long and we have lost 4 to 5 feet of trail tread. The trail is very unstable with undermining issues."
Lake Chabot	Redwood Canyon Golf Course (40 Sites)	Extensive flooding and siltation in golf course and drainage. Will need to remove 80 acres of silt (of which 60 acres are irrigated) and 10 fallen trees. Need to replace 6 irrigation system satellites, 18 bunkers on course, reseed 50 acres of damaged golf course. Bridge on hole #5 was damaged (washed out footings) and will need to be replaced. Multiple gravel cart paths washed out. 17 cart crossings were damaged. Entryway berm damaged
Lake Chabot	Site 2: Cameron Loop Trail	Slip out at three areas that are 10 to 12 FT wide and the trail tread has eroded 2 to 4 feet into the trail.
Las Trampas	Rocky Ridge Road	Road collapse. Will need to repair 60-foot section of roadway.
Leona Canyon	Site 9: Leona Trail	Culvert blowout. Will need to replace 36" x 45' corrugated metal culverts and clear 60 cubic yards of debris.
Miller/Knox	Model Railway Building	Two fallen blue gum eucalyptus destroyed fence.
Mission Peak	Site 1: Peak Trail	Outboard edge road slipping. "There are two trail slip outs on Peak Trail loosing integral support for the trail 1) 47 LF x 4 LF x 2 FT 2)67 LF x 6 LF x 3 FT Repair will be Rock Slope Protection and hydroseed. The water runoff from above the damaged are needs to be regraded to allow water to divert to existing watershed."
Morgan Territory	Site 4: Finley Road	Old Finley Road 66' damage along creek by 32' across by 12' deep. Two 44' long culverts, one of 5' and the other 3' width with head and tail walls damaged. Need additional rock on creek bank. Mitigation: Replace with bridge.

Park	Area	Description Of Damage And Scope Of Work
Morgan Territory	Site 09: Bay Creek Trail	The culvert crossing at Bay Creek Trail was plugged scouring out fill material and rocks from the riprap head wall. There was also a loss of AB Rock road. Repair is to reuse the existing rocks for the headwall, replace the lost fill 20 CY and build back up the AB road surface 5 CY.
Pleasanton Ridge	Site 6: Tehan Canyon	Blocked a 48 inch by 30 feet long culvert with sediment, a large boulder, and debris, culvert stream crossing has severely eroded the downstream road shoulder. This road is the only access to private residence and currently is impassable for large or emergency vehicles. Will need to repair or replace culvert and repair the road.
Pleasanton Ridge	Tehan Canyon	Blocked a 48 inch by 30 feet long culvert with sediment, a large boulder, and debris, culvert stream crossing has severely eroded the downstream road shoulder. This road is the only access to private residence and currently is in passible for large or emergency vehicles. Will need to repair or replace culvert and repair the road.
Redwood Park	Site 16: Star Flower Trail	Trail Erosion 85' long erosion by 4' tall and 2.5-foot depth. "Storm damage to creek embankment scouring out a section of trail. 85' long x 4' Down x 2.5'D. Repair of creek embankment and stabilization and regrade of trail, with possible reroute.
Redwood Park	Site 2: East Ridge Trail	Trail slump with loss of 420 SF of trail and 86 CY of integral ground support. Repair will be buttress fill.
Redwood Park	Site 14: Lower Stream and Mill Trail	A large bay tree has fallen along the creek bank and along the water line on Mill trail. It has reduced the size of the trail in two places, where the root ball broke loose and where the main trunk impacted the trail and broke off a section of trail. It has exposed and potentially compromised the main water line.
Redwood Park	Site 13: Upper Stream Trail	2 places of trailside to creek erosion. Total Linear feet approximately 40+ feet plus approximately 50 feet of split rail fence
Redwood Park	Site 14: Golden Spike (Near Aweeka)	Trail erosion and blowout. Approximately 50' long, 4' wide and 1.5' deep.
Redwood Park	Site 04: Piedmont Stables	Drainage ditch was filled in with debris and water topped the banks, scoured the wash rack (cleaning station for horses) and filled in in the ditch further downstream. Mix of Debris Clearing and engineering. Will need equipment to remove the debris
Redwood Park	Site 10: Golden Spike Crib Wall	Drainage blew out sides of crib wall crossing, eroding tread and making wall unstable.
Roberts	Manzanita Picnic Area Fence	Tree fell on chain link fence. Tree has been removed by contractor ($3,600) and fence repair request in progress ($2,400).
Shadow Cliffs	Battery Shed	Floor of "battery shed" warped due to water damage (flooding). Will need to replace floor.
Shadow Cliffs	Site 13: Lake Trail	Lake Trail slides and erosion between second and third dock. Retaining wall to protect levee. 50' slip out 3' depth 1200' length with repairs to retaining wall for 10' of 2"x12" plus brackets and hardware
Shadow Cliffs	CEMEX	Landslide threatening park utilities and adjacent industrial property. Park irrigation line damaged and possibly other utilities. 31' across by 67' down by 27' depth impacting a 6" steel pipe for 25' and one 3" PVC pipe for 40' and one 2" PVC pipe for 40' and one 1" electrical conduit for 40'. And with a power pole 2' from the edge of the slide.

Park	Area	Description Of Damage And Scope Of Work
Sibley (McCosker)	Site 03: McCosker Loop Trail	Trail slip out eroding trail, possibly an EVMA
Sobrante Ridge	Site 6: Sobrante Ridge Trail	An articulated ford was washed out at a trail crossing over a watershed. Repair will be to stabilize the trail and drainage and install another articulated ford.
Tilden	Site 7: Golf Course Road	Landslide. Rebuild 30 linear feet of shoulder and clear debris. Sandbags placed as emergency response.
Tilden	Site 8: Lone Oak Road (2 Locations)	Road washout (opening the size of a medium size car) due to drainage system failure. Lost one lane of traffic. 20-25 yards of hardened material (boulders) installed as an emergency fix. Will need to completely repair road. Second site is Wildcat Gorge Trail erosion. We have a design for a bridge.
Tilden	Lifeguard Station at Lake Anza	Steel roof cap blew off in storm. New cap will need to be fabricated and installed.
Tilden	Staff Entrance to Tilden Golf Course	At an historic stone retaining wall and ditch a sinkhole has developed because of the failing culvert that is fed by the ditch upstream and the retaining wall is adjacent. This was all originally installed in the mid-thirties by the W.P.A./ Civilian Conservation Corp and will need reconstructing with the restoration and road drainage component added. 86' long x 2.5' high 2.5 wide of a 1'wide wall with a culvert of 12" x 80' long with 32' of asphalt road
Tilden (TNA)	Site 5: Upper Packrat Trail	Landslide. Retaining wall to repair. Trail loss 13' x 3' x 4' Fence loss 16' fence two 4x4 8' posts and four 2x6 rails.
Vasco Hills /Byron	8 Ponds in the Vasco	Erosion and spillway damage. Pond X1, Repair 450 sf of spillway with Pyramat. (HCP) Pond X2, Repair 550 sf of spillway with Pyramat. Remove culvert and do not replace. (HCP) Pond X3, Replace 10" culvert, repair berm and spillway 250 sf with Pyramat. (HCP) Pond 4, Road crosses culvert. Culvert and rip rap blown out. Replace culvert 48" x 60 and replace rip rap and compact unclassified fill on levee road 200 CY. (EBRPD) Pond 5 (X4), Repair 75 sf section of berm, repair 200 sf section spillway with Pyramat. (HCP) Pond 6 (X5), Replace 12" culvert and repair 245 sf section of berm & 200 sf section of spillway with Pyramat. (HCP) Pond 7 (X6), Repair 1000 sf section of pond berm with road repair. Repair 450 sf section of pond berm. Replace 24" culvert. (HCP) Pond 8, 450 SF of Berm compromised. Remove and replace 24" culvert.
Wildcat Canyon	Site 9: Monte Cresta Trail	45' x 18' trail slumping, Temporary repair has been completed. Additional gravel and grading still needed.
Wildcat Canyon	Nimitz Way at Inspiration Point	Road Failure on EVMA road and blocking access for grazer
Wildcat Canyon	Site 10: Wildcat Creek Trail (2 Locations)	3 Locations Site 1: Culvert blowout caused slump of road. Temp repair to regrade area completed. Replace 24" culvert, 60 LF. Install rip rap head and tail walls. Site 2: EPM completed. Gravel installed on trail finished. Site 3: Plugged culvert. Washed out a significant section of trail, impassable by trucks. EPM work is to be initiated in Dec 2017. Replace 36" culvert 20 LF and backfill area 70 CY. Mitigation: Upsize culvert and install drop inlet box.

Park	Area	Description Of Damage And Scope Of Work
Wildcat Canyon	Site 1: Mezue Trail	Trail slip out 26' long and 5' of shoulder and trail loss 9' deep. The slope failure extends more than 200'. Rock Slope protection or wall will be needed for repair.
Wildcat Canyon	Site 12: Old Nimitz Way	Two spots on trail for loss. Site #1) 15' x 7' x4'. Site #2) 32' x 10' x 2'. Repair will be Rock Slope Protection.

Source: EBRPD

Likelihood of Future Occurrences

Highly Likely—Natural drainage systems located throughout the Park District have a finite capacity to convey water. Likewise, storm drainage systems have a finite capacity generally based on the design criteria. When rainfall exceeds the capacity of natural and storm drainage systems or systems clog, water accumulates until it reaches a level of overland release. Due to aging and often undersized infrastructure, this type of flooding will continue to occur annually during heavy rains.

Climate Change and Localized Flood

Cal Adapt future precipitation projections were shown in Figure 4-31 in Section 4.3.3. 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.

Vulnerability Assessment

Vulnerability—Medium

In addition to the 1% and 0.2% annual chance flooding described in the previous section, localized flooding also occurs throughout the Park District at various times throughout the year with several areas of primary concern.

Vulnerability to and Impacts from Localized Flooding

Flood vulnerability and their impacts vary by location and severity of any given flood event and will likely only affect certain areas of the EBRPD during specific times. Based on the risk assessment, it is evident that floods will continue to have potentially significant economic impacts to certain areas of the EBRPD. However, while flooding can cause significant impacts depending on the duration and volume of precipitation and the drainage in any give area, many of the floods in the Park District are minor, localized flood events that are more of a nuisance than a disaster.

The Park District has many locations where flows in small, unnamed drainage channels and more developed areas of the Park District may exceed the capacity of culverts resulting in scour, erosion and damage to culverts, creek crossings, and trails. Severe events may result in damages and closures to trails, roads and bridges. Table 4-85 above described locations and types of damages and impacts during the 2017 storms that resulted in flooding, pavement deterioration, washouts, erosion, landslides, mudslides, debris areas and downed trees.

EBRPD water and wastewater systems can also be vulnerable to heavy rains and flood events. Rainfall creates a high water table, surging streams and creeks, and saturates soil. Infiltration of stormwater into water and wastewater systems may occur and presents a threat to public health and safety, when the infrastructure is no longer able to meet demands. Repetitive loss claims, interruption of traffic flow, public use of impacted park areas, as well as ongoing infrastructure and property repair costs impact the Park District during these heavy rains and localized storm events. Impacts primarily include damages to infrastructure, property, and natural systems. Life safety issues from localized flooding would be more limited.

The amount and type of damage or flooding that occurs varies from year to year and from storm to storm, depending on the quantity of precipitation and runoff. These areas and the types of damage are presented in Table 4-82.

Future Development

Future development in the Park District, as discussed above in Section 4.2.6, is occurring in multiple parks as a result of the Measure WW funding. This includes both new acquisitions and additional build outs of current Park District lands. The Park District noted that post-construction runoff impact occurs by changing the natural hydrology of a land area through the creation of new impervious surfaces during development. Increased impervious surfaces interrupt the natural cycle of gradual percolation of water through vegetation and soil by altering the timing and quantity of peak flows. Instead, water is collected from surfaces such as asphalt and concrete and routed to drainage systems where large volumes of runoff quickly flow to the nearest receiving waterway. The effects of this process include stream bank scouring, bank erosion and downstream flooding, which often lead to a loss of aquatic life and damage to property. The risk of stormwater/localized flooding to future development can be minimized by accurate recordkeeping of repetitive localized storm activity and design and construction of improved drainage systems. 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. Future development in the Park District and surrounding communities will add to the drainage issues already faced by the Park District, unless adequate drainage facilities are ensured at new development locations.

4.3.12. Landslide, Mudslide, and Debris Flows

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect the EBRPD. These sections include a hazard/problem description; description of location and extent; past occurrences of this hazard; and how climate change can affect this hazard.

Hazard/Problem Description

Like its earthquake-generating faults, California's mountainous terrain is a consequence of dynamic geologic processes in operation as the North American Plate grinds past the Pacific Plate. 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. The Park District also sees landslide areas in and around creekbanks. These areas can erode, causing greater risk to landslide events. This was the case in 2017, when streambank erosion and large amounts of rain caused landslide issues in the Park District.

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

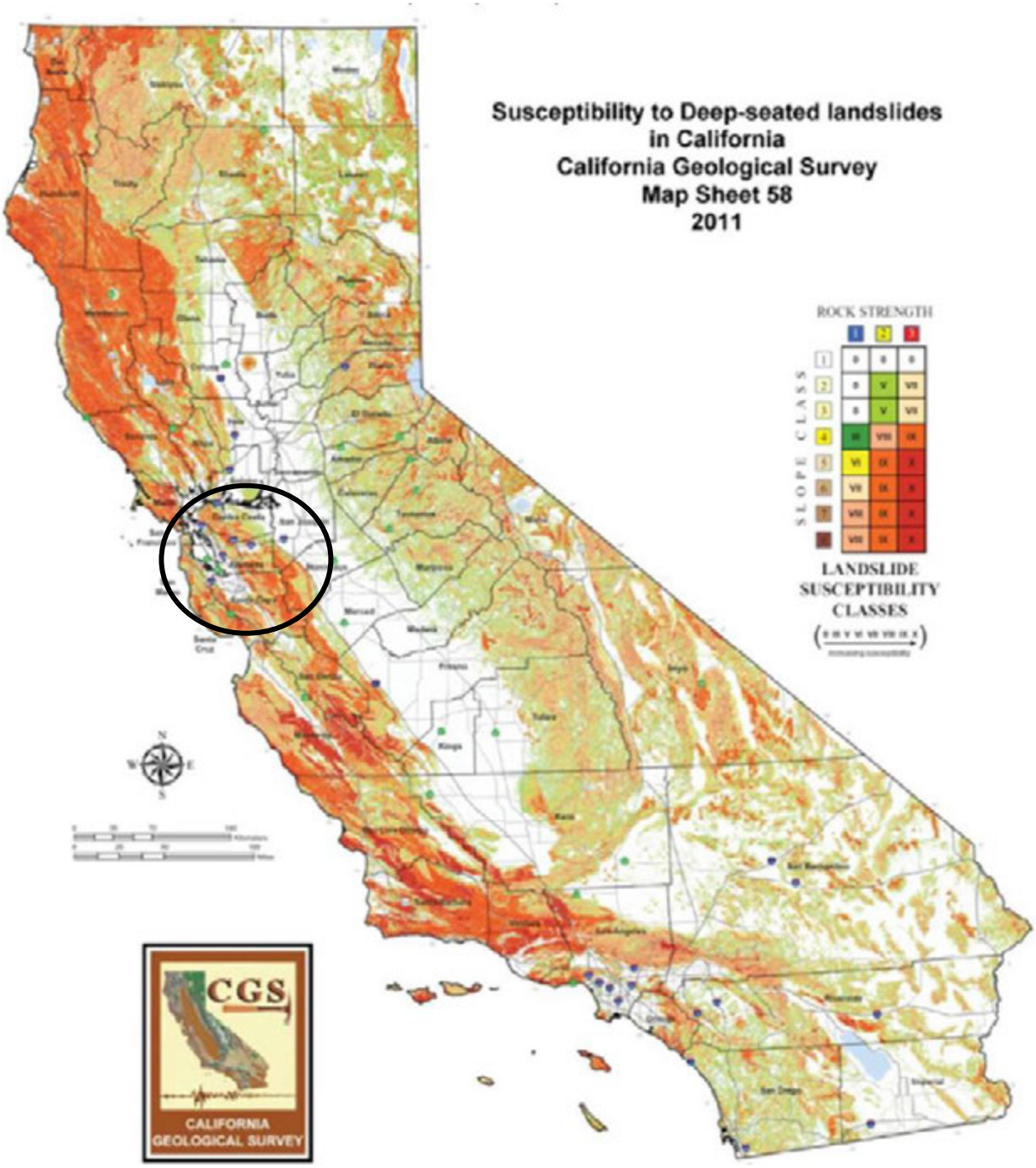
- Degree of slope
- Water (heavy rain, river flows, or wave action)
- Unconsolidated soil or soft rock and sediments
- Lack of vegetation (no stabilizing root structure)
- Previous wildfires and other forest disturbances (discussed in Section 4.3.16)
- Road building, excavation, and grading
- Earthquake

The 2018 State 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. Steep topography, weak rocks, heavy winter rains, and occasional earthquakes all lead to slope failures more frequently than would otherwise occur under gravity alone. This is true in the sloped areas bordering the Park District where the topography is characterized by rolling hills and ridges.

Location and Extent

Landslides can be expected in areas with steep slopes and weak soils. It can also occur in areas where streambank erosion has occurred. Both winter storm and earthquake triggered landslides tend to occur in or near places that have experienced previous landslides. However, landslides may also occur in other locations. Figure 4-72 was included in the 2018 California State Hazard Mitigation Plan. It indicates that portions of the Park District and surrounding area are moderate susceptibility areas for landslides. 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. Destructive landslides, mudslides, and debris flows usually occur very suddenly with little or no warning time and are short in duration. But sometimes, they can continue over a prolonged period of time (as with streambank erosion).

Figure 4-72 Landslide Susceptibility Areas



Source: 2018 State Plan

The legend on Figure 4-72 shows the measurement system that the California Geological Survey 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. Geographic landslide extents are shown in the Vulnerability Assessment below in Table 4-87.

Landslides are possible in most of the Park District's parks with sloped areas. The parks with a history of relatively frequent landslides include:

- Wildcat Canyon,
- Lake Chabot,
- Mission Peak,
- Bishop Ranch,
- Las Trampas,
- Briones,
- Alhambra Valley,
- Shadow Cliffs, and
- Lafayette-Moraga Trail.

Past Occurrences

Disaster Declaration History

There have been no disaster declarations associated with landslides in Alameda or Contra Costa County, as shown in Table 4-4 and Table 4-6. However, many of the flood and heavy rain and storm disaster declarations likely resulted in some landslide issues in the EBRPD.

NCDC Events

The NCDC contains no records for landslides in Alameda or Contra County.

Hazard Mitigation Planning Team Events

There have been past landslide events that have affected Park District lands. Since 1997, the Park District has sustained major damage from declared disasters related to severe storms, that also caused landslides. In these disasters, the Park District suffered damage due to flooding, landslides, debris flows and erosion. In each of these storms, heavy rainfall was correlated with locations of high concentrations of landslides. Damages to the Park District from storm and flood disaster declarations and other storm related events are discussed in more detail below.

- **February 2, 1998, El Niño** (DR-1203) – EBRPD suffered nearly $1.2 million in damages to 34 sites due to this disaster. Landslides were widespread throughout the entire Bay Area. However, the concentration of landslides was particularly high in the East Bay hills. The USGS documented approximately 300 landslides in the Bay Area and Santa Cruz County, with approximately $150 million in damage (Godt, 1999).
- **December 17, 2005 to January 12, 2006** Winter Storms (DR 1628) – The EBRPD suffered over $6 million in damages to 52 sites due to this disaster from flooding, landslides, debris flows and erosion.
- **2011 –** More recently, severe storms in the winter of 2011 resulted in landslides at Lake Chabot. The repairs costs in 2011 at Lake Chabot were $165,000.

- **March 2016 –** severe storms in March of 2016 resulted in extensive landslides in Wildcat Canyon, Richmond and Claremont Canyon. The preliminary estimates for landslide repairs in the March 2016 heavy rainfall events are $1,548,000, based on damage estimates that the Park District has submitted to Cal OES and FEMA. The largest damage, $1,000,000, occurred in Claremont Canyon on Gelston Road.
- **Spring 2017** – Three federal disaster declarations were declared for spring flooding in 2017 (DR-4308, DR-4305, DR-4301). The EBRPD only declared damages associated with two (DR-4305 and DR -4308) of these three events: Many areas of the Park District saw landslides during these storm events. These are shown on Table 4-86.

Table 4-86 EBRPD – 2017 Landslide Damages

Park	Area	Description Of Damage And Scope Of Work
Anthony Chabot	Site 06: Cow Hollow	DEBRIS REMOVAL - Entrance Road washout by landslide
Anthony Chabot	Site 1: Big Bear Loop	Clogged 36 CMP caused storm water to scour embankment in a loss of area 26 FT x 25 FT x 10 FT (241 CY) and losing support for a 20' section of 36" CMP. Also, a 20' by 1" section of PVC pipe was damaged. This 1" pipe is the water fill line for a fire water tank. The repair will be replace culvert, backfill area loss with retaining wall and fill, install articulated ford above water crossing."
Anthony Chabot	Site 10: Brandon Trail	Partial loss of trail and shoulder. 2' thick by 17' long by 17' wide slide. Repair of Rock Slope protection and regrading for trail.
Anthony Chabot	Site 11: Lost Ridge Trail	Trail slip resulting in loss of an area 25' wide x 25' down x 3.5' thick. The repair will be Rock Slope Protection and fill for the road and shoulder.
Anthony Chabot	Site 12: Columbine Trail	Damaged Single Track Trail. 45' x 2' of trail, loss extending 20' downslope. Rock Slope Protection for repair. Mitigation of 75' of RSP to protect the 6" water main located adjacent to the trail.
Anthony Chabot	Site 4: Red Tail Trail	Two trails slipouts. Site 1: 17' x 10' x 2' Repair with Rock Slope Protection. Site 2: 6' x 4' x 4.5'. Repair with Geotech wall"
Anthony Chabot	Skyline Ranch Stables	Landslide approximately 30 feet long with approximate loss of material is 10 cubic yards. Lost integral ground for parking lot. Install rock slope protection.
Bay Area Ridge Trail near Martinez	Site 15: Feeder Trail #1	The water runoff scoured/gouged the trail along approximately 302' x 1.5' W x 1' D. 12 Inch Transite culvert was exposed. Remove culvert and outslope trail. There are two additional trail slip outs located further along the trail. Repair with rock slope protection. Site 1 20ft L x 15ft W x 5ft. Site 2 15ft L x 6ft W x 6ft D
Black Diamond	Site 1: Oil Canyon Culvert	A 36" by 30' CMP was blocked and scoured out, losing the structure of the area surrounding the culvert. The headwall of concrete bags was displaced as was the tail wall of native rocks. Mitigation will be to install an articulated ford 40' x 30' with rock protection above and below.
Briones	Site 2: Abrigo Valley Trail Culvert	A 36" culvert 130 LF plugged causing erosion to trail and drainage area downslope of trail. Install soldier pile retaining wall and repair erosion below wall. Mitigation: Upsize culvert to 48" and install rip rap energy dissipater.
Briones	Lafayette Ridge Trail	(21) slip outs at the Lafayette Ridge Staging Area. Grade and repair with rock, jut needing and hydroseed. Two additional slip outs near Springhill Drive (approximately 2,500 each) will require buttress fill with hydroseed and erosion control matting and wattle.

Park	Area	Description Of Damage And Scope Of Work
Briones	Pine Tree Trail	Twin 36" x 40' culverts plugged and water scoured out the entire area leaving a void of 15' deep by 30' across and 40' wide. Repair with bridge.
Briones	Site 1: Seaborg Trail	A 24" culvert 40 LF plugged causing erosion to trail and drainage area downslope of trail. Install soldier pile retaining wall and repair erosion below wall. Mitigation: Upsize culvert to 30" and install rip rap energy dissipater.
Camp Arroyo	Site 07: Camp Arroyo Culvert	Emergency access road erosion, Culvert blowout
Claremont Canyon	Gelston Road	Landslide along 200 foot section of 20-25' acres roadway worsened. Road was 50% gone from spring 2016 rain event; now 100% gone in several areas.
Contra Costa Trails	Site 18: Briones to Las Trampas Trail Near Moraga Way (3rd Street)	Las Trampas Creek scoured the embankment supporting the trail and displaced rock armoring (riprap) located at the base/toe. The area scoured is approximately 32 feet long by 30 feet downslope by 5 feet deep. The rock armoring is scattered into the creek, 5 CY. Look to install retaining wall 32 x 30.
Contra Costa Trails	Site 05: Briones to Las Trampas Trail - (Macedo)	3 Single track trail slip outs 1) 20 LF x 7 ft. w x 1.5 ft. d for 8 CY and replace existing articulated ford 2) 14 LF x 19 ft. w x 2.5 ft. d for 25 CY with Rocks Slope Protection 3) 14 LF x 2 ft. w x 2 ft. d for 2 CY with Rocks Slope Protection
Contra Costa Trails	Site 17: Old Moraga Ranch Trail	4 slipouts on a single track. 1) 16' of trail loss. 15' of land lost. Will require a Geo Tech wall to stabilize. Possible reroute of trail in this section. 2) 44' of trail loss. 10' of land lost. Will require a Geo Tech wall to stabilize. Possible reroute of trail in this section. 3) 10' section of trail scoured with 8' by 6' feet of fill needed to restore trail and shoulder. 4) Trail slumped 4' down and 45' long. Repair with Rock Slope Protection and fill to return to trail height. Access will be an issue.
Del Valle	Dog-run Landslide	Landslide on Dog Run Trail near high voltage power line. The raw water line which provides water for the entire park runs through the area and both lines are threatened by the slide. Scope of work is based on 2015 repair of Dog Run.
Diablo Foothills	Site 2: Castle Rock Single Track Trail	There was a significant slip out along the single track Castle Rock trail. Approximately 50' of trail was lost and the slip out was over 100' down. The repair will be Geotech wall, to stabilize the hill side, and a possible trail reroute.
Garin	Site 2: Llama Lane (North Garin)	The hill above the Garin to Chabot Trail (at Llama Lane) slid out, damaging the trail below and depositing debris 950' at the bottom of the hill. The slide was cleared off the road, the trail was restored, hydroseed and burlap wattle install on hillside.
Huckleberry	Skyline National Trail	Trail slip out. Part of trail is gone above Upper San Leandro Creek
Kennedy Grove	Patra Drive	2542 Patra Drive (Lot 46). Mudslide, failure of creek bank, downed trees and vegetation partially blocking creek Cost estimate to repair $500,000. Patra Drive, Lot 47, blown storm drain and downed trees on creek bank. Cost estimate $60,000.

Park	Area	Description Of Damage And Scope Of Work
Lake Chabot	Site 01: Eastshore Trail	Major slip out. Roads and Trails has already surveyed the site and recommends the damage to be engineered. Approximately 100FT long and we have lost 4 to 5 feet of trail tread. The trail is very unstable with undermining issues."
Lake Chabot	Site 2: Cameron Loop Trail	Slip out at three areas that are 10 to 12 FT wide and the trail tread has eroded 2 to 4 feet into the trail.
Las Trampas	Rocky Ridge Road	Road collapse. Will need to repair 60 foot section of roadway.
Mission Peak	Site 1: Peak Trail	Outboard edge road slipping. "There are two trail slip outs on Peak Trail loosing integral support for the trail 1) 47 LF x 4 LF x 2 FT 2)67 LF x 6 LF x 3 FT Repair will be Rock Slope Protection and hydroseed. The water runoff from above the damaged are needs to be regraded to allow water to divert to existing watershed."
Morgan Territory	Site 4: Finley Road	Old Finley Road 66' damage along creek by 32' across by 12' deep. Two 44' long culverts, one of 5' and the other 3' width with head and tail walls damaged. Need additional rock on creek bank. Mitigation: Replace with bridge.
Redwood Park	Site 16: Star Flower Trail	Trail Erosion 85' long erosion by 4' tall and 2.5 foot depth. Storm damage to creek embankment scouring out a section of trail. 85' long x 4' Down x 2.5'D. Repair of creek embankment and stabilization and regrade of trail, with possible reroute.
Redwood Park	Site 2: East Ridge Trail	Trail slump with loss of 420 SF of trail and 86 CY of integral ground support. Repair will be buttress fill.
Redwood Park	Site 14: Lower Stream and Mill Trail	A large bay tree has fallen along the creek bank and along the water line on Mill trail. It has reduced the size of the trail in two places, where the root ball broke loose and where the main trunk impacted the trail and broke off a section of trail. It has exposed and potentially compromised the main water line.
Redwood Park	Site 13: Upper Stream Trail	2 places of trailside to creek erosion. Total Linear feet approximately 40+ feet plus approximately 50 feet of split rail fence
Redwood Park	Site 14: Golden Spike (Near Aweeka)	Trail erosion and blowout. Approximately 50' long, 4' wide and 1.5' deep.
Redwood Park	Site 10: Golden Spike Crib Wall	Drainage blew out sides of crib wall crossing, eroding tread and making wall unstable.
Shadow Cliffs	Site 13: Lake Trail	Lake Trail slides and erosion between second and third dock. Retaining wall to protect levee. 50' slip out 3' depth 1200' length with repairs to retaining wall for 10' of 2"x12" plus brackets and hardware
Shadow Cliffs	CEMEX	Landslide threatening park utilities and adjacent industrial property. Park irrigation line damaged and possibly other utilities. 31' across by 67' down by 27' depth impacting a 6" steel pipe for 25' and one 3" PVC pipe for 40' and one 2" PVC pipe for 40' and one 1" electrical conduit for 40'. And with a power pole 2' from the edge of the slide.
Sibley (McCosker)	Site 03: McCosker Loop Trail	Trail slip out eroding trail, possibly an EVMA
Tilden	Site 7: Golf Course Road	Landslide. Rebuild 30 linear feet of shoulder and clear debris. Sandbags placed as emergency response.

Park	Area	Description Of Damage And Scope Of Work
Tilden	Site 8: Lone Oak Road (2 Locations)	Road washout (opening the size of a medium size car) due to drainage system failure. Lost one lane of traffic. 20-25 yards of hardened material (boulders) installed as an emergency fix. Will need to completely repair road. Second site is Wildcat Gorge Trail erosion. We have a design for a bridge.
Tilden	Staff Entrance to Tilden Golf Course	At an historic stone retaining wall and ditch a sinkhole has developed because of the failing culvert that is fed by the ditch upstream and the retaining wall is adjacent. This was all originally installed in the mid-thirties by the W.P.A./ Civilian Conservation Corp and will need reconstructing with the restoration and road drainage component added. 86' long x 2.5' high 2.5 wide of a 1'wide wall with a culvert of 12" x 80' long with 32' of asphalt road
Tilden (TNA)	Site 5: Upper Packrat Trail	Landslide. Retaining wall to repair. Trail loss 13' x 3' x 4' Fence loss 16' fence two 4x4 8' posts and four 2x6 rails.
Wildcat Canyon	Site 9: Monte Cresta Trail	45' x 18' trail slumping, Temporary repair has been completed. Additional gravel and grading still needed.
Wildcat Canyon	Site 1: Mezue Trail	Trail slip out 26' long and 5' of shoulder and trail loss 9' deep. The slope failure extends more than 200'. Rock Slope protection or wall will be needed for repair.
Wildcat Canyon	Site 12: Old Nimitz Way	Two spots on trail for loss. Site #1) 15' x 7' x4'. Site #2) 32' x 10' x 2'. Repair will be Rock Slope Protection.

Source: EBRPD PA - 2017 Storm Declarations

Likelihood of Future Occurrences

Highly Likely— There are multiple areas with vulnerability to landslides, mudslides, and debris flows to the Park District. Due to the topography in and around the Park District and the rainfall the area receives during the winter, future occurrences of landslide, mudslide, and debris flow will occur annually and are considered Highly Likely.

Climate Change and Landslides

According to the 2021 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 4.3.3.

Vulnerability Assessment

Vulnerability—Medium

The most common type of landslide in the East Bay hills are debris flows and mudslides in which a combination of loose soil, rock, organic matter, air, and water mobilize as a slurry that flows downslope. Mudflows are differentiated from debris flows by more than half of the material containing sand-, silt-, and clay-size particles. Debris flows and mudslides are commonly initiated during heavy rainfall events that mobilize loose soil or rock on steep slopes. Debris flows in the Park District can move very rapidly, at rates ranging from meters per hour to meters per second and travel relatively long distances, making them a significant threat to life and property.

Landslides, debris flows and mudslides are closely related to flooding, as both processes are related to precipitation, runoff, and the saturation of ground by water. In addition, landslides and mudflows usually occur on small, steep stream channels and are often mistaken for floods. However, landslides and mudslides may be much more destructive than floods because of their higher densities, high debris loads, and high velocities.

The East Bay hills are also susceptible to deep seated landslides, translational or rotational earth slides and rockslides, especially following long periods of cumulative rainfall. Deep seated landslides can occur long after the rain has stopped. Deep seated landslides tend to be on the order of a few meters to tens of meters deep. This type of landslide tends to fail the hillside a little at a time and to move more slowly than debris flows, but some of these landslides can move quickly.

Any type of landslide may result in damages or complete destruction of buildings in their path, as well as deaths and injuries. Landslides frequently cause road blockages by depositing debris on road surfaces or road damage if the road surface itself slides downhill. Utility lines and pipes are also prone to breakage in slide areas.

Vulnerability to and Impacts from Landslide

The potential impacts of future landslides on the Park District's lands and assets include damage to trails, roads, bridges, buildings and other Park District facilities and critical infrastructure, including water and wastewater systems. Most landslides within the Park District's lands are small landslides and many occur in undeveloped areas of the Park District, with no buildings or infrastructure affected. The most common impact is damage to trails and other resource areas from small these small landslides. Previous landslides have not damaged major buildings or facilities but is possible depending on the location of future landslides. In addition to damage and loss of function of park areas and facilities, injuries or deaths are possible. The likelihood of injuries and deaths is generally low, because landslides tend to occur during heavy rains when the number of people in parks is much lower than during better weather and again, often occur in more remote, sloped areas of the Park District. However, landslides can occur without warning and the possibility of future injuries or deaths cannot be excluded.

Small landslides in undeveloped areas are part of the natural evolution of the landscape and may not require any repairs. Small landslides affecting trails and roads typically require only removal of debris from the trail or road. Larger landslides affecting trails, roads, bridges, other infrastructure and building require debris removal and stabilization of the affected area and repair – or relocation – of the damaged facilities.

The total repair costs for landslide events can range from nothing for small landslides undeveloped areas of the park, to low costs for minor debris removal, to very high costs major repairs. In dollar terms, repair costs can range from a few thousand dollars to several million dollars. Similarly, a major earthquake on one of the many faults within the Park District's Planning Area that occurs during rainy months could result in a major landslide costing millions of dollars to repair. The worst-case earthquake scenario that would likely cause significant landslide damage would be a major earthquake on the Hayward Fault during the raining months because of the very strong ground shaking in the East Bay hills, including many areas with very high landslide hazards.

Park Lands and Assets at Risk

GIS was used to analyze EBRPD park lands and assets potentially at risk to landslides. EBRPD park lands and assets data obtained from the Park District were intersected with USGS Landslide 2001 data to determine Park District lands and assets that fall into defined landslide incidence and susceptibility areas. Separate analysis was performed for park lands (in acres) and park assets (as types of assets and replacement values). Affected park lands and assets are described below.

Figure 4-73 shows the Park District and Landslide Incidence and Susceptibility Areas overlaid on park lands and assets. Table 4-87 shows the number of Park District lands that intersect Landslide Incidence and Susceptibility Areas, as well as the number of acres affected. Table 4-88 shows the number of affected Park Districts that have assets that are located within the Landslide Incidence and Susceptibility areas and the replacement values of those assets. More detail on specific park lands and assets in Landslide Incidence and Susceptibility Areas can be found in Appendix F.

Figure 4-73 EBRPD – Landslide Incidence and Susceptibility Areas

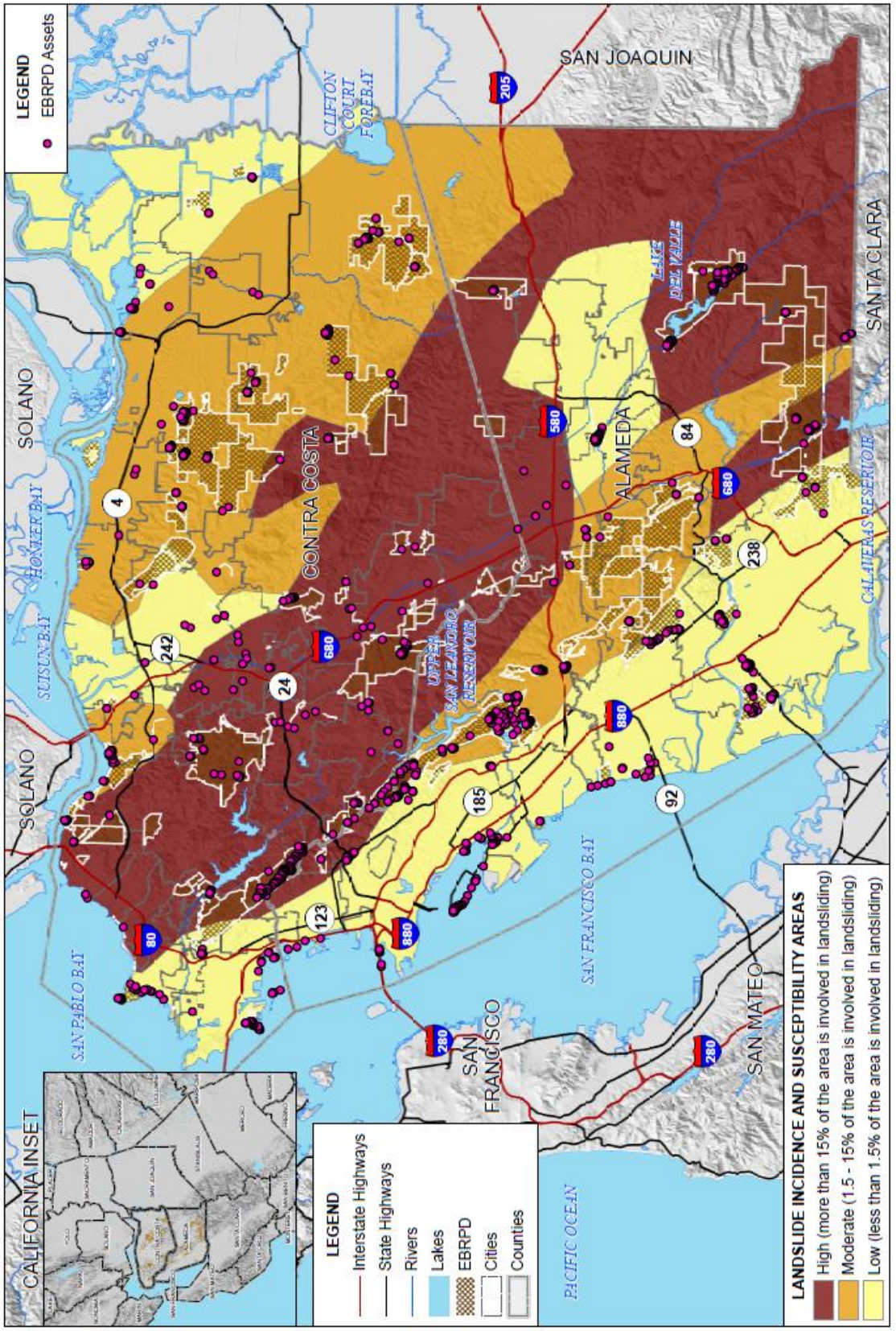


Table 4-87 EBRPD – Landslide Incidence and Susceptibility Areas and Affected Park District Lands and Acres

Landslide Incidence and Susceptibility Area/ EBRPD	Total Number of Park Lands	Affected Park Lands	Percent of Affected Park Lands	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
High						
EBRPD – Alameda County	43	16	37.2%	508,404	23,807	4.68%
EBRPD – Contra Costa County	57	30	52.6%	530,785	27,044	5.10%
EBRPD High Total	**100**	**46**	**46.0%**	**1,039,189**	**50,851**	**4.89%**
Moderate						
EBRPD – Alameda County	43	16	37.2%	508,404	21,078	4.15%
EBRPD – Contra Costa County	57	16	28.1%	530,785	26,613	5.01%
EBRPD Moderate Total	**100**	**32**	**32.0%**	**1,039,189**	**47,691**	**4.59%**

Source: USGS Landslide Data, EBRPD GIS

Table 4-88 EBRPD – Landslide Incidence and Susceptibility Area and Park District Assets and Replacement Values

Landslide Incidence and Susceptibility Area/ EBRPD	Number of Affected Park Lands	Asset Count	Replacement Value
High			
EBRPD – Alameda County	10	216	$47,029,846
EBRPD – Contra Costa County	15	314	$58,762,186
EBRPD High Total	**25**	**530**	**$105,792,032**
Moderate			
EBRPD – Alameda County	7	200	$40,849,437
EBRPD – Contra Costa County	17	234	$36,454,868
EBRPD Moderate Total	**24**	**434**	**$77,304,305**

Source: USGS Landslide Data, EBRPD GIS

In addition to the tables above, the following is a list of parks that lie in the Moderate or High Landslide Incidence and Susceptibility Areas. More detail on specific Park District lands and assets in these landslide areas can be found in Appendix F.

- **High Landslide Incidence and Susceptibility Areas**
  - ✓ Anthony Chabot
  - ✓ Brushy Peak
  - ✓ Camp Arroyo
  - ✓ Del Valle
  - ✓ Pleasanton Ridge
  - ✓ Sunol
  - ✓ Claremont Canyon
  - ✓ Creative Design Group Building
  - ✓ Doolan Canyon
  - ✓ Dublin Hills
  - ✓ Ohlone
  - ✓ Reinhardt Redwood

- ✓ Roberts
- ✓ Skyline National Trail
- ✓ Tassajara Creek Trail
- ✓ Temescal
- ✓ Briones to Las Trampas Trail
- ✓ Castle Rock
- ✓ Contra Loma
- ✓ Diablo Foothills
- ✓ Iron Horse Trail
- ✓ Kennedy Grove
- ✓ Lafayette to Moraga Trail
- ✓ Point Pinole Shoreline
- ✓ Sobrante Ridge
- ✓ Tilden
- ✓ Tilden (Nature Area)
- ✓ Wildcat Canyon
- ✓ Bay Area Ridge Trail (KG to SO)
- ✓ Bishop Ranch
- ✓ Briones
- ✓ Briones to Martinez Trail
- ✓ Briones to Mt Diablo Trail
- ✓ Calaveras Ridge Trail (LT to PR)
- ✓ Carquinez Strait Shoreline
- ✓ Clayton Ranch
- ✓ Crockett Hills
- ✓ Las Trampas
- ✓ Las Trampas to Mt Diablo Trail
- ✓ Little Hills
- ✓ Morgan Territory
- ✓ Rancho Pinole
- ✓ Sibley
- ✓ Sycamore Valley
- ✓ Tilden (Botanic Garden)

➢ **Moderate Landslide Incidence and Susceptibility Areas**

- ✓ Anthony Chabot
- ✓ Brushy Peak
- ✓ Don Castro
- ✓ Lake Chabot
- ✓ Niles Canyon Trail
- ✓ Sunol
- ✓ Vargas Plateau
- ✓ Bay Area Ridge Trail (GD to LC)
- ✓ Cull Canyon
- ✓ Dry Creek Pioneer
- ✓ Five Canyons
- ✓ Garin
- ✓ Leona Canyon
- ✓ Ohlone
- ✓ Reinhardt Redwood
- ✓ Antioch/Oakley Shoreline
- ✓ Big Break Shoreline
- ✓ Diablo Foothills
- ✓ Vasco Hills
- ✓ Waterbird
- ✓ Bay Point Shoreline
- ✓ Black Diamond Mines
- ✓ Byron Vernal Pools
- ✓ CA State Riding & Hiking Trail
- ✓ Carquinez Strait Shoreline
- ✓ Clayton Ranch
- ✓ Deer Valley
- ✓ Morgan Territory
- ✓ Radke Martinez Shoreline
- ✓ Round Valley
- ✓ SF Bay Trail
- ✓ Thurgood Marshall
- ✓ Vasco Caves

Critical Facilities at Risk from Landslide, Mudslide, and Debris Flow

EBRPD critical facilities are a subset of the total facilities (or assets) of the Park District as discussed in Section 4.2.4 above. Using this definition and GIS mapping of Park District assets, Landslide Incidence and Susceptibility Areas were overlayed on the critical facility layer. Those critical facilities that fall within the moderate and high Landslide Incidence and Susceptibility Areas are detailed on Table 4-89 below. More information on critical facilities can be found in Appendix G and H.

Table 4-89 EBRPD – Critical Facilities in Moderate and High Landslide Incidence and Susceptibility Areas

County/Park Lands	Landslide Susceptibility and Incidence Area / Asset Type	Asset Count
Alameda County		
Alameda County Trails	**High**	
	Pedestrian Paving	4
	High Total	**4**
	Alameda County Trails Total	**4**
Anthony Chabot	High	
	Pedestrian Paving	1
	High Total	**1**
	Moderate	
	Building	6
	Pedestrian Paving	3
	Sanitary Sewer	4
	Water Supply	3
	Moderate Total	**16**
	Anthony Chabot Total	**17**
Camp Arroyo	**High**	
	Building	20
	Sanitary Sewer	1
	Water Supply	2
	High Total	**23**
	Camp Arroyo Total	**23**
Claremont Canyon	**High**	
	Building	2
	High Total	**2**
	Claremont Canyon Total	**2**
Cull Canyon	**Moderate**	
	Building	5
	Pedestrian Paving	1
	Sanitary Sewer	1
	Moderate Total	**7**
	Cull Canyon Total	**7**
Del Valle	**High**	
	Building	7
	Pedestrian Paving	1

County/Park Lands	Landslide Susceptibility and Incidence Area / Asset Type	Asset Count
	Sanitary Sewer	8
	Tank	5
	Water Supply	2
	High Total	**23**
	Del Valle Total	**23**
Don Castro	Moderate	
	Building	2
	Sanitary Sewer	2
	Moderate Total	**4**
	Don Castro Total	**4**
Garin/Dry Creek Pioneer	**Moderate**	
	Water Supply	1
	Moderate Total	**1**
	Garin/Dry Creek Pioneer Total	**1**
Lake Chabot	**Moderate**	
	Building	22
	Pedestrian Paving	24
	Sanitary Sewer	2
	Water Supply	3
	Moderate Total	**51**
	Lake Chabot Total	**51**
Pleasanton Ridge	**Moderate**	
	Building	7
	Moderate Total	**7**
	Pleasanton Ridge Total	**7**
Reinhardt Redwood	**High**	
	Building	4
	Pedestrian Paving	3
	Water Supply	2
	High Total	9
	Moderate	
	Building	3
	Pedestrian Paving	2
	Moderate Total	**5**
Sunol / Ohlone Wilderness	**High**	
	Building	4

County/Park Lands	Landslide Susceptibility and Incidence Area / Asset Type	Asset Count
	Pedestrian Paving	1
	Water Supply	4
	Windmill	1
	High Total	**10**
	Sunol / Ohlone Wilderness Total	**10**
Temescal	**High**	
	Building	6
	Sanitary Sewer	3
	Service & Pedestrian Tunnel	1
	Storm Sewer	1
	Water Supply	1
	High Total	**12**
	Temescal Total	**12**
Contra Costa County		
Antioch/Oakley	**Moderate**	
	Sanitary Sewer	1
	Moderate Total	**1**
	Antioch/Oakley Total	**1**
Bay Point	Moderate	
	Pedestrian Paving	1
	Water Supply	1
	Moderate Total	**2**
	Bay Point Total	**2**
Black Diamond Mines	**Moderate**	
	Building	32
	Water Supply	5
	Moderate Total	**37**
	Black Diamond Mines Total	**37**
Briones	High	
	Building	3
	Roadways: Vehicular Bridges	1
	Water Supply	4
	High Total	**8**
	Briones Total	**8**
Byron Vernal Pools	**Moderate**	
	Water Supply	1

County/Park Lands	Landslide Susceptibility and Incidence Area / Asset Type	Asset Count
	Moderate Total	**1**
	Byron Vernal Pools Total	**1**
Carquinez Strait	Moderate	
	Building	2
	Pedestrian Paving	1
	Moderate Total	**3**
	Carquinez Strait Total	**3**
Clayton Ranch	Moderate	
	Pedestrian Paving	1
	Moderate Total	**1**
	Clayton Ranch Total	**1**
Contra Loma	**Moderate**	
	Building	2
	Sanitary Sewer	1
	Water Supply	4
	Moderate Total	**7**
	Contra Loma Total	**7**
Deer Valley	Moderate	
	Water Supply	3
	Moderate Total	**3**
	Deer Valley Total	**3**
Diablo Foothills / Castle Rock	**High**	
	Building	6
	Pedestrian Paving	3
	Water Supply	1
	High Total	**10**
	Diablo Foothills / Castle Rock Total	**10**
East County Trails	Moderate	
	Pedestrian Paving	10
	Moderate Total	**10**
	East County Trails Total	**10**
Kennedy Grove	High	
	Building	1
	High Total	1
	Kennedy Grove Total	**1**
Las Trampas	**High**	

County/Park Lands	Landslide Susceptibility and Incidence Area / Asset Type	Asset Count
	Building	5
	Pedestrian Paving	1
	Sanitary Sewer	1
	Water Supply	8
	High Total	**15**
	Las Trampas Total	**15**
Morgan Territory	High	
	Building	1
	High Total	1
	Morgan Territory Total	**1**
Point Pinole	**High**	
	Pedestrian Paving	1
	High Total	**1**
	Point Pinole Total	**1**
Radke Martinez	Moderate	
	Building	1
	Pedestrian Paving	6
	Moderate Total	**7**
	Radke Martinez Total	**7**
Reinhardt Redwood	High	
	Pedestrian Paving	3
	High Total	**3**
	Reinhardt Redwood Total	**3**
Round Valley	**Moderate**	
	Building	1
	Pedestrian Paving	2
	Water Supply	2
	Moderate Total	**5**
	Round Valley Total	**5**
Sibley	**High**	
	Building	1
	Water Supply	1
	High Total	2
	Sibley Total	**2**
Sycamore Valley	**High**	
	Pedestrian Paving	2

County/Park Lands	Landslide Susceptibility and Incidence Area / Asset Type	Asset Count
	High Total	**2**
	Sycamore Valley Total	**2**
Tilden	**High**	
	Building	26
	Pedestrian Paving	19
	Sanitary Sewer	5
	Service & Pedestrian Tunnel	3
	Storm Sewer	2
	Water Supply	5
	High Total	**60**
	Tilden Total	**60**
Vasco Caves	**Moderate**	
	Building	1
	Moderate Total	**1**
	Vasco Caves Total	**1**
Vasco Hills	**Moderate**	
	Building	3
	Tank	2
	Water Supply	2
	Moderate Total	**7**
	Vasco Hills Total	**7**

Source: USGS Landslide Data, EBRPD GIS

Future Development

Future development in the Park District, as discussed above in Section 4.2.6, is occurring in multiple parks as a result of the Measure WW funding. This includes both new acquisitions and additional build outs of current Park District lands. Future development in the Park District will take landslides into account. The Park District will build any new facilities to current building standards of the applicable jurisdiction. Future Park District facilities will be built to codes which take landslide vulnerability into account when siting, designing, and constructing new facilities and infrastructure.

4.3.13. Levee Failure

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect the EBRPD. These sections include a hazard/problem description; description of location and extent; past occurrences of this hazard; and how climate change can affect this hazard.

Hazard/Problem Description

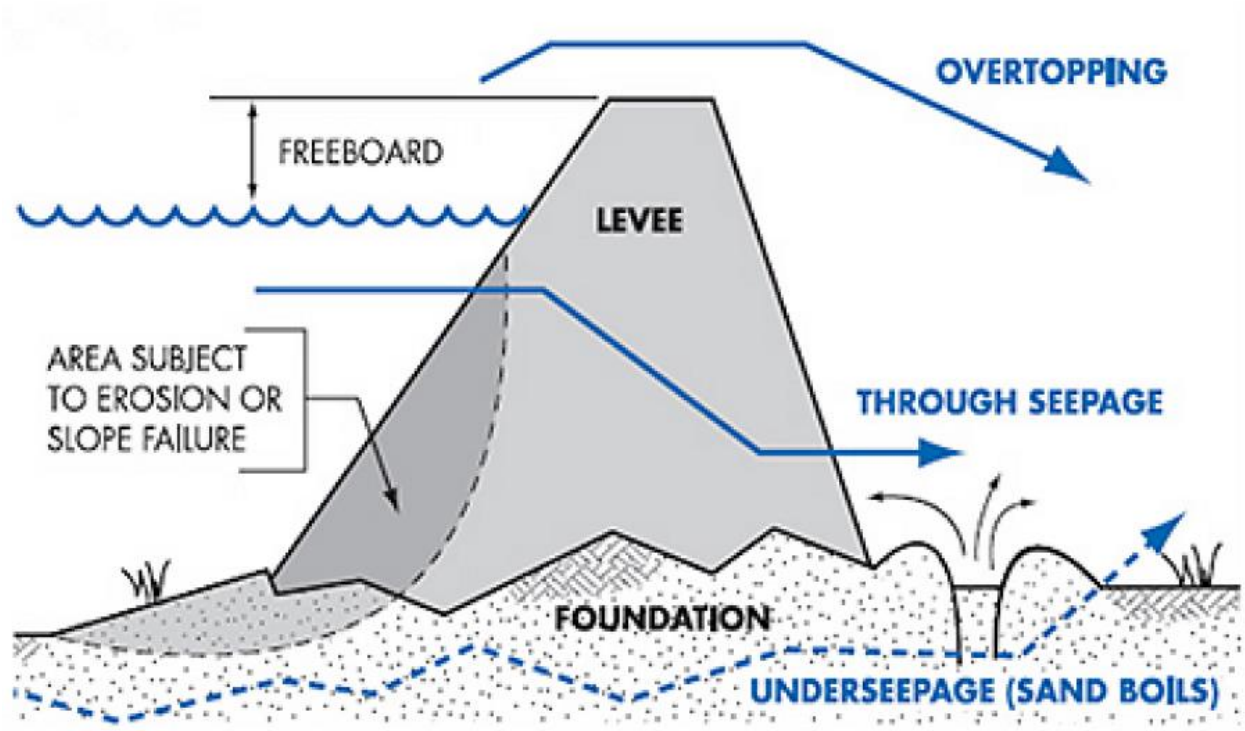
A levee is a raised area that runs along the banks of a stream or canal. Levees reinforce the banks and help prevent flooding by containing higher flow events to the main stream channel. By confining the flow to a narrower steam channel, levees can also increase the speed of the water. Levees can be 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. Man-made levees are formed by the hauling of sediment and fill in order to protect the area behind the levee.

Levees can provide strong flood protection, but they are not failsafe. Levees are often designed to protect against a specific flood level and could be overtopped during severe weather events or a 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.

Under-seepage refers to water flowing under the levee through the levee foundation materials, often emanating from the bottom of the landside slope and ground surface and extending landward from the landside toe of the levee. Through-seepage refers to water flowing through the levee prism directly, often emanating from the landside slope of the levee. Both conditions can lead to failure by several mechanisms, including excessive water pressures causing foundation heave and slope instabilities, slow progressing internal erosion, and piping leading to levee slumping.

Rodents burrowing into and compromising the levee system can also contribute to a levee failure as can erosion of the leveed area. Levee failure can also be caused by high winds creating wave action and high tides, especially combined with storm events. Figure 4-74 depicts the causes of levee failure.

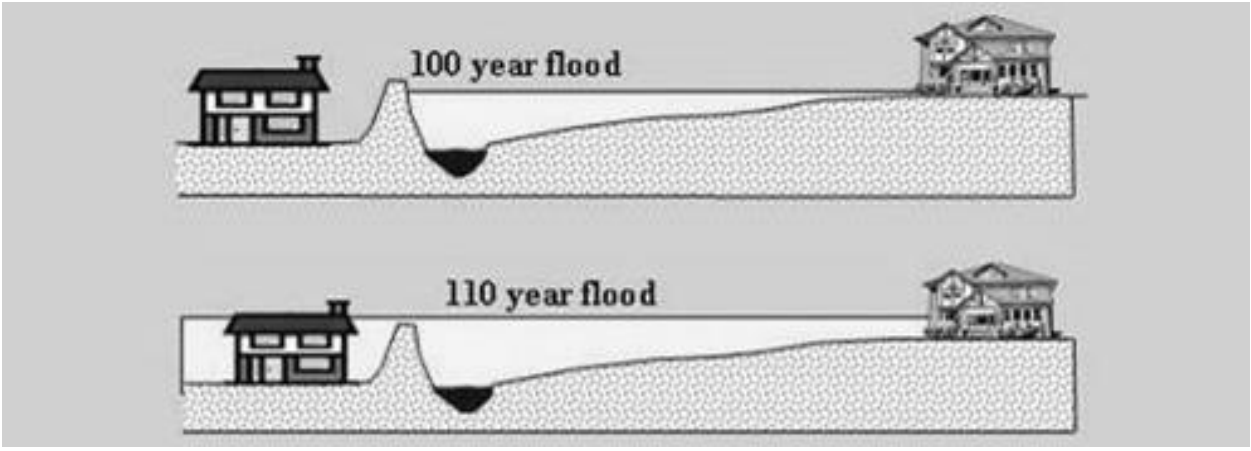
Figure 4-74 Potential Causes of Levee Failure



Source: USACE

Overtopping failure occurs when the flood water level rises above the crest of a levee. As shown in Figure 4-75, overtopping of levees can cause greater damage than a traditional flood due to the often lower topography behind the levee.

Figure 4-75 Flooding from Levee Overtopping

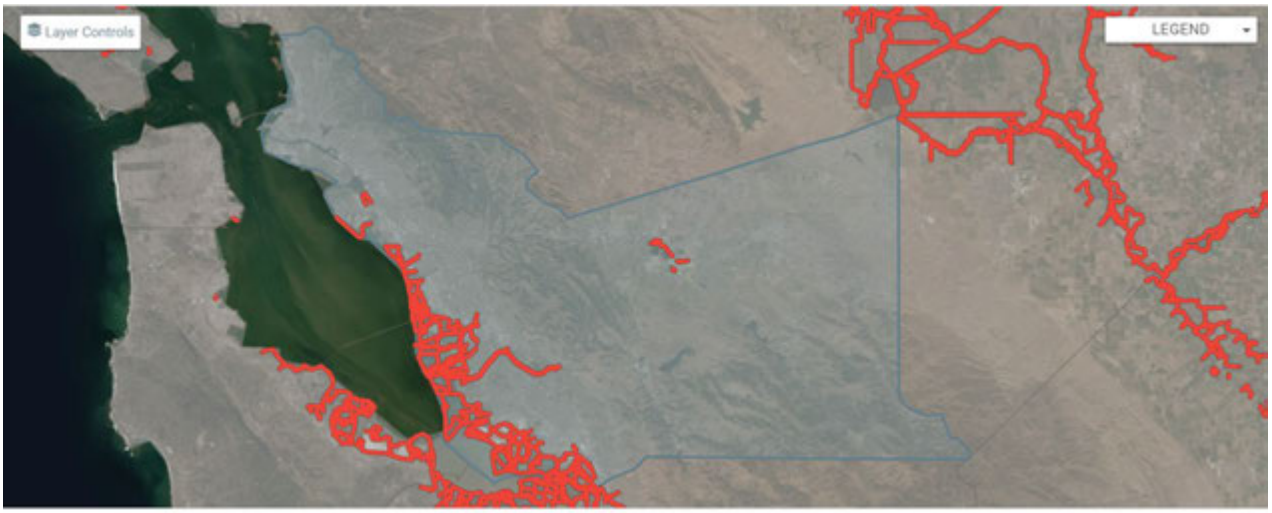


Source: Levees in History: The Levee Challenge. Dr. Gerald E. Galloway, Jr., P.E., Ph.D., Water Policy Collaborative, University of Maryland, Visiting Scholar, USACE, IWR.

Location and Extent

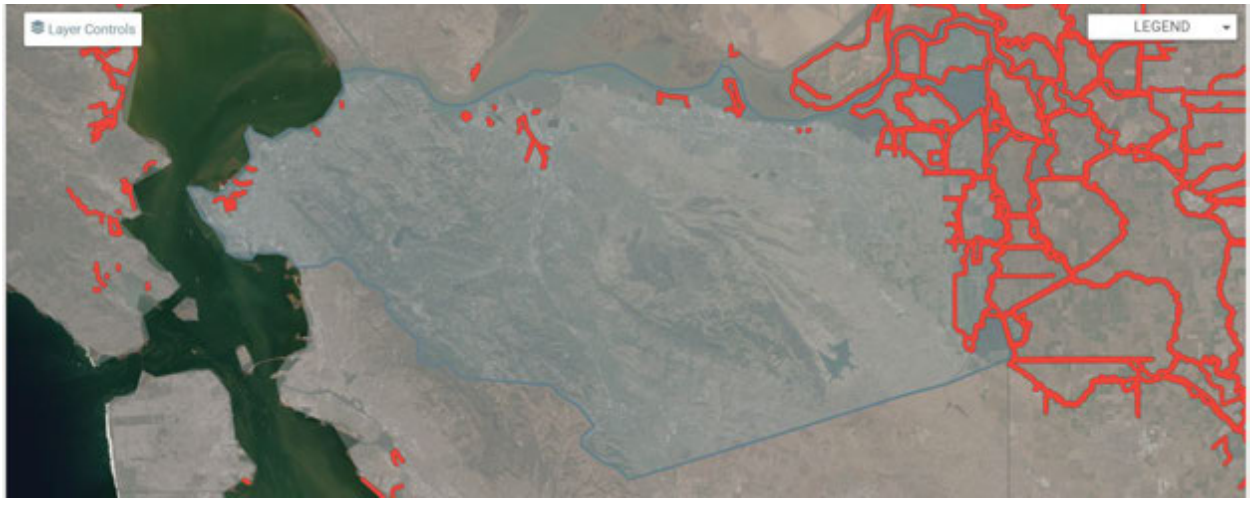
The National Levee Database, the Alameda County FIS, and the Contra Costa County FIS were searched for levee locations in and near the Park District. According to the National Levee Database, there are 130 levees in Alameda County. This can be seen in Figure 4-76. According to the National Levee Database, there are 66 levees in Contra Costa County. This can be seen in Figure 4-77. The red lines indicate the levee segments. Levee failure in the Park District would likely have a short onset, and the duration would be short. However, if the levee failed during an atmospheric river event, the duration could be prolonged.

Figure 4-76 EBRPD – Levees in Alameda County



Source: National Levee Database. Map created 7/25/2022

Figure 4-77 EBRPD – Levees in Contra Costa County



Source: National Levee Database. Map created 7/25/2022

In the Park District, land along the San Francisco Bay has many areas where levees protect inland areas. The Park District has trails that run on the tops of these levees. In addition, much of the land in the Sacramento-San Joaquin Delta Region is below sea level and is protected by approximately 1,115 miles of

levees in the Delta and 230 miles of levees in the Suisun Marsh. Many of these levees were constructed at heights of three to five feet high and were maintained by local landowners over the past 100 plus years to protect farmland from flooding. Park District assets and levee locations, also based on the data from the National Levee Database, are shown on Figure 4-78 and detailed on Table 4-90.

Figure 4-78 EBRPD – Levee Locations

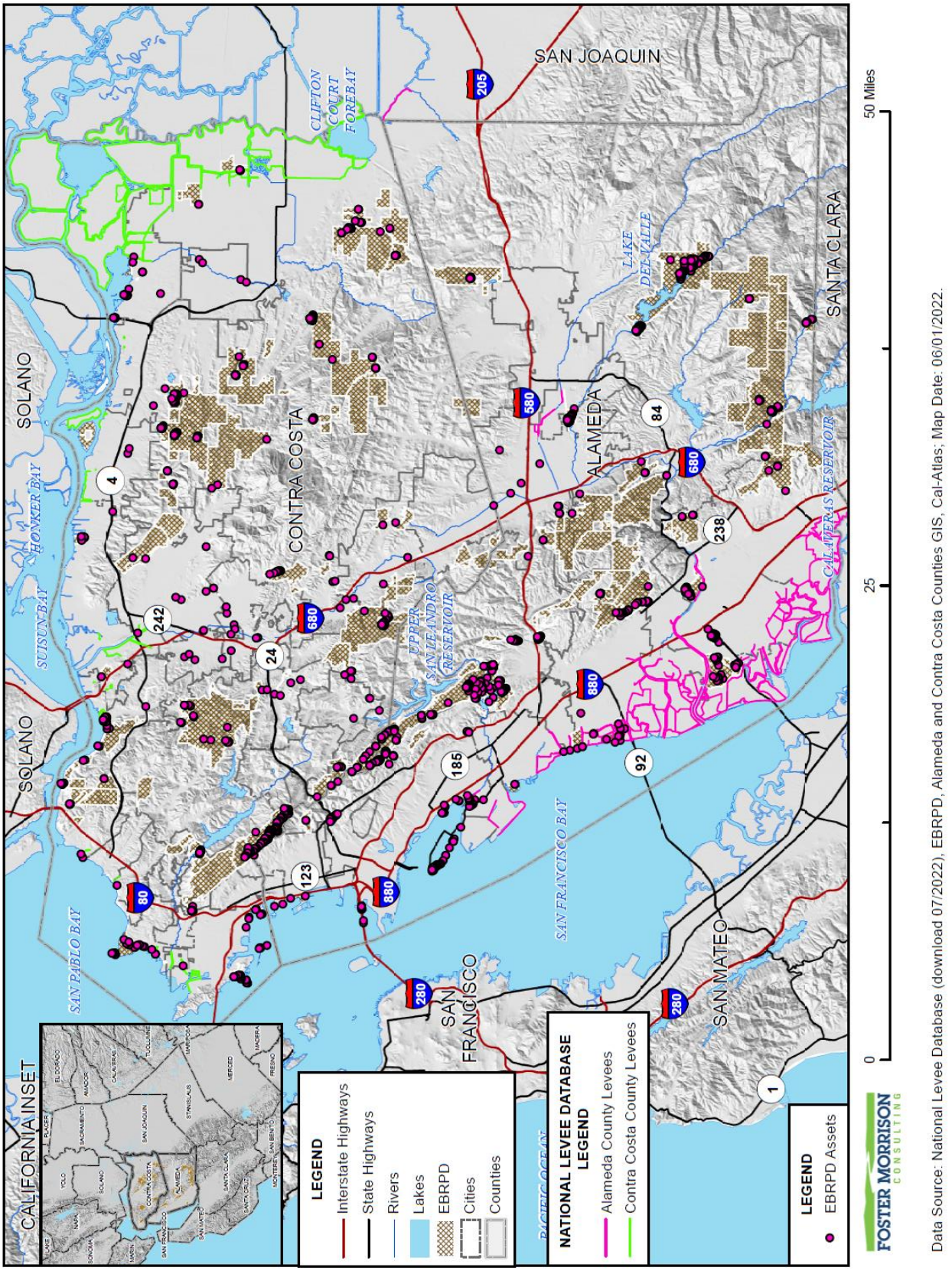


Table 4-90 EBRPD – Levees on EBRPD Lands

NLD Levee Name	Park Lands
Alameda County	
Alameda County Levee 100	Hayward Regional Shoreline
Alameda County Levee 11	Hayward Regional Shoreline
Alameda County Levee 110	Shadow Cliffs Regional Recreation Area
Alameda County Levee 111	Hayward Regional Shoreline
Alameda County Levee 114	Hayward Regional Shoreline
Alameda County Levee 119	Hayward Regional Shoreline
Alameda County Levee 131	Hayward Regional Shoreline
Alameda County Levee 14	Hayward Regional Shoreline
Alameda County Levee 158	Hayward Regional Shoreline
Alameda County Levee 16	Hayward Regional Shoreline
Alameda County Levee 161	Martin Luther King Jr. Regional Shoreline
Alameda County Levee 163	Hayward Regional Shoreline
Alameda County Levee 27	Hayward Regional Shoreline
Alameda County Levee 31	Hayward Regional Shoreline
Alameda County Levee 46	Hayward Regional Shoreline
Alameda County Levee 49	Hayward Regional Shoreline
Alameda County Levee 6	Hayward Regional Shoreline
Alameda County Levee 89	Hayward Regional Shoreline
Alameda County Levee 90	Hayward Regional Shoreline
Alameda Creek - LB	Quarry Lakes Regional Recreation Area
Coyote Hills Regional Park	Coyote Hills Regional Park
Line K, Zone 2 Project	Hayward Shoreline
Contra Costa County	
Contra Costa County Levee 14	Big Break Shoreline
Contra Costa County Levee 215	Radke Martinez Shoreline
Contra Costa County Levee 64	Radke Martinez Shoreline
Contra Costa County Levee 7	Delta Access
Contra Costa County Levee 9	Delta Access
Rheem Creek - LB	Point Pinole Shoreline
Rheem Creek - RB	Point Pinole Shoreline
Walnut Creek - Clayton Valley Drain, left bank	Delta de Anza Trail
Walnut Creek - Clayton Valley Drain, right bank	Delta de Anza Trail
Wildcat Creek - RB	Wildcat Creek Trail

Source: National Levee Database

Past Occurrences

Disaster Declaration History

There have been no disaster declarations for levee failure in either Alameda or Contra Costa County, as shown on Table 4-4 and Table 4-6.

NCDC Events

The NCDC does not track levee failure events.

Hazard Mitigation Planning Committee Events

The HMPC noted the following events, as shown on Table 4-91. It is important to note that no levee failures occurred during 2017.

Table 4-91 EBRPD – 2017 Levee Damages

Park	Area	Description Of Damage And Scope Of Work
Big Break	Big Break Trail	The base levee on Big Break Trail settled and caused cracking in the pavement of 300 feet. The repair will be to remove the damaged surface and damage base rock. Compact sub-base, install and compact 6"" new base rock, and re-asphalt 3"" AC surface.
Hayward	Site 3: Marsh Levee	2 sections of the levee were damaged. 1) Approx 30' long by 3' wide section of trail was lost. 2) Approx 25' long by 3' wide section of trail was lost. Repair with rip rap and rock fill. Restore trail.
Shadow Cliffs	Site 13: Lake Trail	Lake Trail slides and erosion between second and third dock. Retaining wall to protect levee. 50' slip out 3' depth 1,200' length with repairs to retaining wall for 10' of 2"x12" plus brackets and hardware

Source: EBRPD PA for 2017 Storm Declarations

Likelihood of Future Occurrences

Occasional – The HMPC determined the likelihood of levee failure is occasional. This rating was in part determined due to issues surrounding ongoing maintenance of the levee system. It was noted that other hazards like earthquakes, floods, and coastal flooding and sea level rise could increase the likelihood of future occurrence.

Climate Change and Levee Failure

In general, increased flood frequency in California is a predicted consequence of climate change. Mechanisms whereby climate change leads to an elevated flood risk include more extreme precipitation events and shifts in the seasonal timing of river flows. This threat may be particularly significant because recent estimates indicate the additional force exerted upon the levees is equivalent to the square of the water level rise. These extremes are most likely to occur during storm events, leading to more severe damage from waves and floods.

Vulnerability Assessment

Vulnerability—Medium

The probability of levee failure is increasing over time due to sea level rise, increased storms and flooding potential from global climate range resulting in early winter snow melts, and the likelihood of a future earthquake. Levee failure flooding can occur as the result of partial or complete collapse of an impoundment, and often results from prolonged rainfall and flooding. A levee failure can range from a small, uncontrolled release to a catastrophic failure. The primary danger associated with levee failure is the high velocity flooding of those properties downstream of the breach. Vulnerability to levee failures is generally confined to the areas subject to inundation downstream of the levee.

Vulnerability to and Impacts from Levee Failure

The leveed areas along the San Francisco Bay (both in Alameda and Contra Costa counties) are at risk during large storm events. The EBRPD has conducted various coastal flooding and sea level rise studies that identify the potential for levee impacts and failures of levees located throughout the shoreline areas. These types of failures can affect EBRPD lands and assets. Many areas of the Bay Trail run along the tops of these levees. The levees in the Delta area, should they fail, could also see impacts to the Park District. Today, most of these Delta levees retain water 365 days a year. Several Park District trails and other areas are located within or near these leveed areas.

While the FEMA DFIRMs identified several levee segments adjacent to Park District lands as being certified for protecting against the 1% annual chance flood, they actually provide protection for the areas on the non-EBRPD side of the levee. The Park District does not own or maintain any of these certified levees but does have ownership and maintenance responsibility for several non-certified levees; although the specific levees owned and maintained by the Park District is unknown. Of the 130 total number of levee segments located in Alameda County, 23 levee segments are located within or adjacent to identified Park District lands, and in Contra Costa County, of the 64 total number of levee segments, 10 are located within or adjacent to Park District lands as shown in Table 4-92. Table 4-92 shows the name of the levee segment, affected Park District land and whether the levee is certified as providing 1% annual chance flood protection for the non-Park District side of the levee. It should be noted that within the EBRPD Planning Area, of the remaining 107 Alameda County levee segments that are not located in or adjacent to Park District lands, another 9 are certified as providing 1% annual chance flood protection and in Contra Costa County, of the 54 remaining levee segments, only 3 are certified to the 1% annual chance flood.

Table 4-92 EBRPD – Levee Segments and Affected Park District Lands

Levee Segments	Affected Park District Lands	0.2% Annual Chance Flood, X-Protected by Levee Flood Zone
Alameda County		
Alameda County Levee 6	Hayward Regional Shoreline	No
Alameda County Levee 11	Hayward Regional Shoreline	No
Alameda County Levee 14	Hayward Regional Shoreline	No
Alameda County Levee 16	Hayward Regional Shoreline	No

Levee Segments	Affected Park District Lands	0.2% Annual Chance Flood, X-Protected by Levee Flood Zone
Alameda County Levee 27	Hayward Regional Shoreline	Yes
Alameda County Levee 31	Hayward Regional Shoreline	No
Alameda County Levee 46	Hayward Regional Shoreline	No
Alameda County Levee 49	Hayward Regional Shoreline	No
Alameda County Levee 89	Hayward Regional Shoreline	Yes
Alameda County Levee 90	Hayward Regional Shoreline	No
Alameda County Levee 93	Hayward Regional Shoreline	No
Alameda County Levee 100	Hayward Regional Shoreline	No
Alameda County Levee 110	Shadow Cliffs Regional Recreation Area	No
Alameda County Levee 111	Hayward Regional Shoreline	No
Alameda County Levee 114	Hayward Regional Shoreline	No
Alameda County Levee 119	Hayward Regional Shoreline	No
Alameda County Levee 131	Hayward Regional Shoreline	No
Alameda County Levee 158	Hayward Regional Shoreline	No
Alameda County Levee 161	Martin Luther King Jr. Regional Shoreline	No
Alameda County Levee 163	Hayward Regional Shoreline	No
Line K Zone 2 Project	Hayward Regional Shoreline	Yes
Alameda Creek LB	Quarry Lakes Regional Recreation Area	No
Coyote Hills Regional Park	Coyote Hills Regional Park	No
Contra Costa County		
Contra Costa County Levee 7	Delta Access	No
Contra Costa County Levee 9	Delta Access	No
Contra Costa County Levee 14	Big Break Shoreline	No
Contra Costa County Levee 64	Radke Martinez Shoreline	No
Contra Costa County Levee 215	Radke Martinez Shoreline	No
Rheem Creek LB	Point Pinole Shoreline	No
Rheem Creek RB	Point Pinole Shoreline	No
Walnut Creek Clayton Valley Drain LB	Delta Deanza Trail	No
Walnut Creek Clayton Valley Drain RB	Delta Deanza Trail	No
Wildcat Creek RB	Wildcat Creek Trail	No

Source:

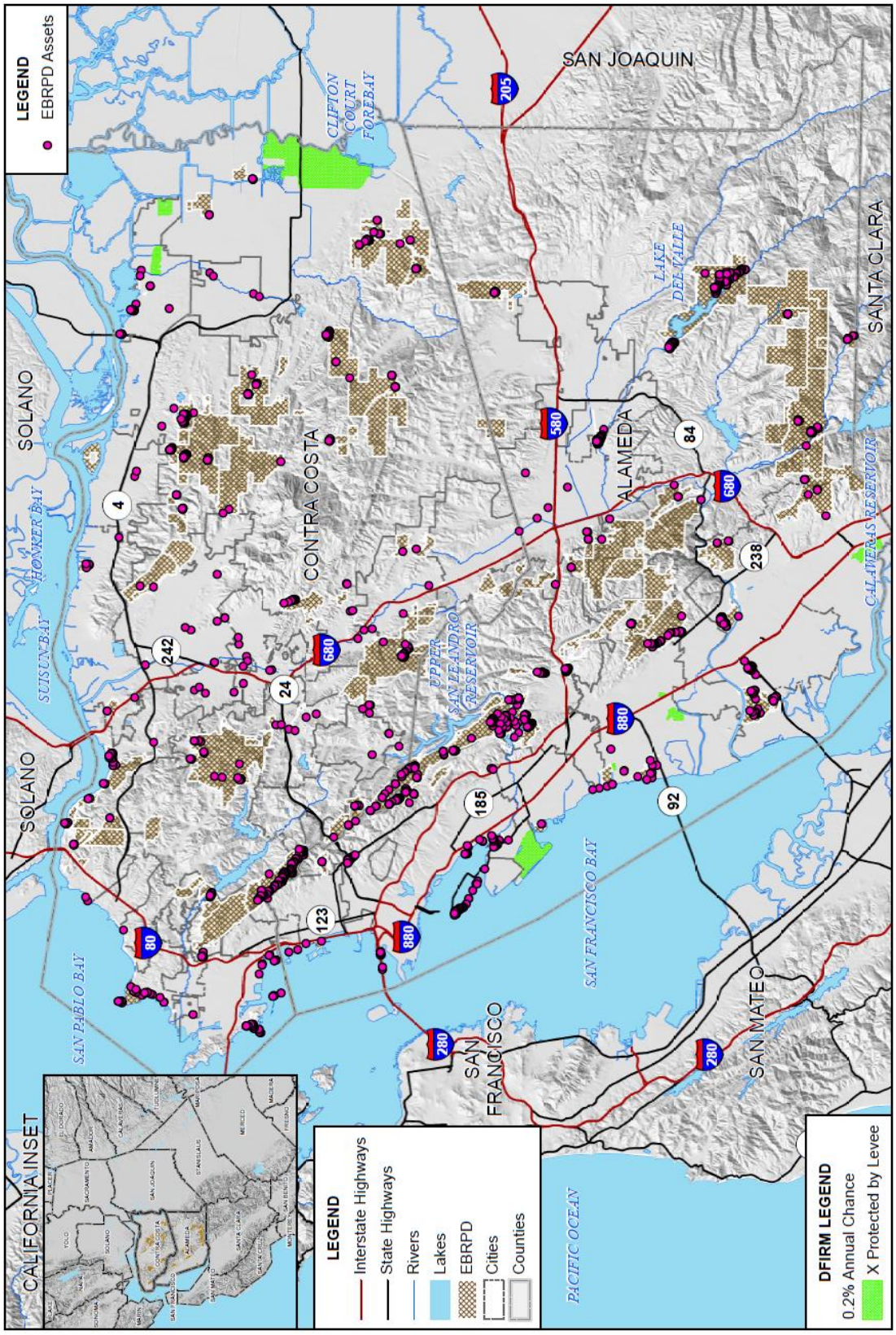
Failure of these levees could cause damage to areas within and surrounding Park District lands. A levee failure and resulting flooding can affect EBRPD properties, parks, and trails, and also affect District assets

and operations, including critical facilities. Streets, roads, and highways can be overtopped, washed out, or covered with debris causing the temporary cessation of traffic flow and access to Park District lands. Natural resources, including marshlands, beaches, and other resources can also be damaged or lost. Significant levee failure events can also be a life safety issue affecting both Park District staff, workers, and visitors to the parks. Park District water and wastewater systems may be damaged during flood events; water quality issues may also occur.

Park Lands and Assets at Risk

Figure 4-79 shows the FEMA DFIRM X-Protected by Levee Flood Zone overlayed on the Park District Planning Area. GIS analysis was performed, and no park lands or structures were shown to fall in the X Protected by Levee flood zone. Based on this analysis, while some levees certified as providing protection against the 1% annual chance flood may border Park District lands, the area being protected is on the other (non-Park District) side of the levee. As such, no tabular analysis is shown.

Figure 4-79 EBRPD – DFIRM X-Protected by Levee Flood Zone



Overall EBRPD (Community) Impact

Floods and their impacts vary by location, including the added impacts associated with a levee failure flood event and will only affect certain areas of the EBRPD where levees are located. Based on the levee data, it is evident that levee failure floods could potentially have significant impacts to leveed areas of the EBRPD, depending on the severity of the event. Impacts that are not quantified, but can be anticipated in large future levee failure events, include:

- Injury and loss of life
- Damage to Park District facilities and infrastructure
- Damage to natural resource habitats and other natural resources
- Disruption of and damage to public infrastructure and services
- Loss of water, power, trails, roads, and transportation, which could impact, strand, and/or impair mobility for Park District staff, emergency responders, and/or area residents

Future Development

Future development in the Park District, as discussed above in Section 4.2.6, is occurring in multiple parks as a result of the Measure WW funding. This includes both new acquisitions and additional build outs of current Park District lands. Future development in the Park District may be built in leveed areas, as long as it conforms to the standards of the applicable floodplain and other development standards. New EBRPD facilities will be sited, designed and constructed in such a way as to reduce the risk from levee failure flooding to the facility.

4.3.14. Pandemic

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect the EBRPD. These sections include a hazard/problem description; description of location and extent; past occurrences of this hazard; and how climate change can affect this hazard.

Hazard/Problem Description

According to the World Health Organization (WHO), a disease epidemic occurs when there are more cases of that disease than normal. A pandemic is a worldwide epidemic of a disease. A pandemic may occur when a new virus appears against which the human population has no immunity.

A pandemic occurs when a new virus emerges for which people have little or no immunity, and for which there is no vaccine. A pandemic disease or virus spreads easily from person-to-person, causes serious illness, and can sweep across the country and around the world in a very short time. The U.S. Centers for Disease Control and Prevention (CDC) has been working closely with other countries and the WHO to strengthen systems to detect outbreaks of that might cause a pandemic and to assist with pandemic planning, preparation, and response. An especially severe pandemic could lead to high levels of illness, death, social disruption, and economic loss.

Since 2020, when Covid-19 impacts began being felt, the District has seen changes to Park use. Amidst the pandemic and changing local health orders, EBRPD had steadfastly kept most of the regional parks and trails open.

Location and Extent

During a pandemic, the whole of the Park District is at risk, as pandemic is a regional, national, and international event. The speed of onset of a pandemic is usually short, while the duration is variable, but can last for more than a year as shown in the 1918/1919 Spanish Flu and as is the case with the current COVID-19 pandemic. There is no scientific scale to measure the magnitude of pandemic. Pandemics are usually measured in numbers affected by the pandemic, and by the number of deaths who get severely ill and those who die.

Past Occurrences

Disaster Declaration History

There have been two state and federal disaster declarations due to pandemic (from Covid-19), as shown in Table 4-93 and Table 4-94.

Table 4-93 Alameda County – State and Federal Pandemic Disaster Declarations 1950-2022

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Pandemic	2	2020	2	2020

Source: Cal OES, FEMA

Table 4-94 Contra Costa County – State and Federal Pandemic Disaster Declarations 1950-2022

Disaster Type	Federal Declarations		State Declarations	
	Count	Years	Count	Years
Pandemic	2	2020	2	2020

Source: Cal OES, FEMA

NCDC Events

The NCDC does not track pandemic.

WHO Events

The 20th century saw three outbreaks of pandemic flu.

- The **1918-1919 Influenza Pandemic (H1N1),** (aka the Spanish Flu**),** is the catastrophe against which all modern pandemics are measured. It is estimated that approximately 20 to 40 percent of the worldwide population became ill and that over 50 million people died. Approximately 675,000 deaths from the flu occurred in the U.S. alone.

- The **February 1957-1958 Influenza Pandemic (H2N2)** (aka the Asian Flu) was first identified in the Far East. Immunity to this strain was rare in people less than 65 years of age, and a pandemic was predicted. In preparation, vaccine production began in late May 1957, and health officials increased surveillance for flu outbreaks. Unlike the virus that caused the 1918 pandemic, the 1957 pandemic virus was quickly identified, due to advances in scientific technology. Vaccine was available in limited supply by August 1957. The virus came to the U.S. quietly, with a series of small outbreaks over the summer of 1957. When U.S. children went back to school in the fall, they spread the disease in classrooms and brought it home to their families. Infection rates were highest among school children, young adults, and pregnant women in October 1957. Most influenza-and pneumonia-related deaths occurred between September 1957 and March 1958. The elderly had the highest rates of death. By December 1957, the worst seemed to be over. However, during January and February 1958, there was another wave of illness among the elderly. This is an example of the potential "second wave" of infections that can develop during a pandemic. The disease infects one group of people first, infections appear to decrease and then infections increase in a different part of the population. Although the Asian flu pandemic was not as devastating as the 1918-1919 flu, about 69,800 people in the U.S. died.
- The **1968 Influenza Pandemic (H3N2)** was first detected in Hong Kong (aka the Hong Kong Flu). The first cases in the U.S. were detected as early as September of that year, but illness did not become widespread in the U.S. until December. Deaths from this virus peaked in December 1968 and January 1969. Those over the age of 65 were most likely to die. The same virus returned in 1970 and 1972. The number of deaths between September 1968 and March 1969 for this pandemic was 33,800, making it the mildest pandemic in the 20th century.

To date, the 21st century has seen two acknowledged pandemics.

- **2009 Swine Flu (H1N1**)— 2009 H1N1 (sometimes called "swine flu") was a new influenza virus causing illness in people. This virus was originally referred to as "swine flu" because laboratory testing showed that many of the genes in this new virus were very similar to influenza viruses that normally occur in pigs (swine) in North America. But further study showed that this virus was very different from what normally circulates in North American pigs. It had two genes from flu viruses that normally circulate in pigs in Europe and Asia and bird (avian) genes and human genes. Scientists call this a "quadruple reassortant" virus. This virus spread from person-to-person worldwide, probably in much the same way that regular seasonal influenza viruses spread. On June 11, 2009, the WHO) signaled that a pandemic of 2009 H1N1 flu was underway. It was first detected in the United States in early 2009 and spread to the world later that year. About 70 percent of people who were hospitalized with this 2009 H1N1 virus had one or more medical conditions previously recognized as placing people at "high risk" of serious seasonal flu-related complications. This included pregnancy, diabetes, heart disease, asthma, and kidney disease. Young children were also at high risk of serious complications from 2009 H1N1, just as they are from seasonal flu. And while people 65 and older were the least likely to be infected with 2009 H1N1 flu, if they got sick, they were also at "high risk" of developing serious complications from their illness. Some studies estimated that 11 to 21 percent of the global population at the time—or around 700 million to 1.4 billion people (of a total 6.8 billion)—contracted the illness. This was more than the number of people infected by the Spanish flu pandemic, but only resulted in about 150,000 to 575,000 fatalities for the 2009 pandemic. A follow-up study done in September 2010 showed that the risk of serious illness resulting from the 2009 H1N1 flu was no higher than that of the yearly seasonal flu. For comparison, the WHO estimates that 250,000 to 500,000 people die of seasonal flu annually.

- **2019/2020** COVID 19 – During the creation of this LHMP Update, the world was under various forms of lockdown due to COVID-19 (known also as coronavirus). Coronaviruses are a large family of viruses which may cause illness in animals or humans. In humans, several coronaviruses are known to cause respiratory infections ranging from the common cold to more severe diseases such as Middle East Respiratory Syndrome (MERS) and Severe Acute Respiratory Syndrome (SARS). The most recently discovered coronavirus causes coronavirus disease COVID-19. COVID-19 is the infectious disease caused by the most recently discovered coronavirus. This new virus and disease were unknown before the outbreak began in Wuhan, China, in December 2019. The most common symptoms of COVID-19 are fever, tiredness, and dry cough. Some patients may have aches and pains, nasal congestion, runny nose, sore throat or diarrhea. These symptoms are usually mild and begin gradually. Some people become infected but don't develop any symptoms and don't feel unwell. Most people (about 80%) recover from the disease without needing special treatment. During the earlier stages of this pandemic, around 1 out of every 6 people who got COVID-19 became seriously ill and developed difficulty breathing. Older people, and those with underlying medical problems like high blood pressure, heart problems or diabetes, are more likely to develop serious illness. People with fever, cough and difficulty breathing should seek medical attention. Two and a half years after this pandemic started, vaccines, medicines, and the natural mutation of the virus has changed resulting in a more contagious virus, but with less occurrence of serious disease. As of August 2022, there had been roughly 607 million cases worldwide, with 6.5 million deaths. In Alameda County, there have been roughly 349,169 cases with 2012 deaths as of August 2022. In Contra Costa County, there have been 1,434 deaths as of August 2022.

Hazard Mitigation Planning Team Events

The Park District was affected by the Covid-19 Pandemic. On one hand, park usage actually increased during Covid – as the EBRPD areas were cleaned to CDC guidelines and were areas where social distancing could occur. The State of California actually asked the Park District to remain open during the pandemic. For people who worked and schooled from home, using the EBRPD parks and trails was a respite from being at home.

Likelihood of Future Occurrence

Likely – The calculation for future occurrence of pandemic must first be considered in light of circumstances. The diseases are naturally occurring in the populations that reside in and around the EBRPD. In addition, this Plan is not examining the pandemic potential of these diseases, but instead examines when these diseases manifest in severe injury or fatalities, and causes direct or secondary impacts to the EBRPD. Given these assumptions and the five outbreaks since 1900, the likelihood of future occurrence is considered likely.

Climate Change and Pandemic

According to the WHO, there are three categories of research into the linkages between climatic conditions and infectious disease transmission. The first examines evidence from the recent past of associations between climate variability and infectious disease occurrence. The second looks at early indicators of already-emerging infectious disease impacts of long-term climate change. The third uses the above

evidence to create predictive models to estimate the future burden of infectious disease under projected climate change scenarios.

Early Impacts of Climate Change

There is much evidence of associations between climatic conditions and infectious diseases. These include several infectious diseases, health impacts of temperature extremes and impacts of extreme climatic and weather events. Changes in infectious disease transmission patterns are a likely major consequence of climate change. A greater understanding about the underlying complex causal relationships is required, in order to apply this information to the prediction of future impacts, using more complete, better validated, integrated models.

Vulnerability Assessment

Vulnerability—Medium

Pandemics have and will continue to have impacts on human health in the region. A pandemic occurs when a new virus emerges for which there is little or no immunity in the human population; the virus causes serious illness and spreads easily from person-to-person worldwide. There are several strategies that public health officials can use to combat a pandemic. Constant surveillance regarding current pandemic, use of infection control techniques, and administration of vaccines once they become available. Citizens can help prevent spread of a pandemic by staying home, or "self-quarantining," if they suspect they are infected. A Pandemic does not affect the buildings, critical facilities, and infrastructure in the EBRPD, but can affect the Park District staff, workers, and park visitors.

Vulnerability to and Impacts from Pandemic

Overall community impacts range from school and business closings to the interruption of basic services such as public transportation, health care, and the delivery of food and essential medicines. Hospitalizations and deaths occur, especially to the elderly or those with pre-existing underlying conditions. As seen with Covid-19, multiple businesses were forced to close temporarily (some permanently), and unemployment rose significantly. Supply chains for food and other goods can also be interrupted. The Park District was affected by many of these issues.

Specific to the Park District, a labor narrative supplied by the EBRPD noted that:

> ***Weekday attendance is 2-3x higher than pre-COVID and weekend attendance often mimics holiday attendance figures. This demands frequent cleaning, trash removal, and patrol. Process for cleaning the restroom takes 2-3x long than usual in part due to donning appropriate PPE as well as a more rigorous cleaning/disinfecting process has been implemented; CDC recommended if parks are open with restrooms, they should be disinfected daily or more often if possible. For EBRPD police officers, ensuring staff and public safety with additional patrol units due to exponential increase in park use on weekdays and weekends caused overtime costs.***

The Park District did have to switch to working from home for many of their staff. Additional costs were also borne by the Park District for cleaning costs, staff overtime, PPE, public service announcements and signage, and safety supplies. Costs through the end of 2021 were estimated at around $3 million. Additional costs have been borne in 2022. Overtime costs were a significant portion of the impact to the EBRPD from Covid.

Future Development

Future development is not expected to be significantly impacted by this hazard, though population growth in each County could increase exposure to a pandemic, and increase the ability of each disease to be transmitted among the population of the counties served by the Park District. If the median age of each county residents continues to increase, vulnerability to pandemic diseases may increase, due to the fact that these diseases are often more deadly to senior citizens. During 2020, it was reported that one in five adults moved due to COVID-19 or know someone who did according to Pew Research. Many college aged students moved back home, which increased populations in the areas in which they returned. This caused the EBRPD daily park use numbers to increase. This may be the case again if the current pandemic surges and for future pandemic events. The EBRPD will need to consider mechanisms to address future pandemics, which may change how they design and construct new facilities. The Park District will continue to follow pandemic related cleaning and other policies as needed to reduce future harm to the EBRPD from pandemics.

4.3.15. Tsunami

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect the EBRPD. These sections include a hazard/problem description; description of location and extent; past occurrences of this hazard; and how climate change can affect this hazard.

Hazard/Problem Description

The 2018 State of California Hazard Mitigation Plan defines a tsunami as a wave triggered by any form of land displacement along the edge or bottom of an ocean or lake. This can be submarine landslides or submarine dip slip fault ruptures that result in seafloor uplift or down-drop. This mass movement often translates to a tsunami or gravity wave within the overlying water. The coastline of California and the San Francisco Bay are at risk to tsunami both from land displacement events occurring locally or from those from many miles away.

Tsunamis travel radially outward from the point of initiation. The size of a tsunami is proportional to the mass movement that generated the tsunami. The speed of a tsunami is proportional to the depth of the water in which the tsunami originated. Tsunamis can travel at great speeds but in the open ocean result in relatively little wave height above the mean sea level as the energy is distributed throughout the water column. The wave length of a tsunami is much longer than wind generated waves, making it hard to detect in the open ocean.

As a tsunami approaches the shore and the depth of the water column decreases, the energy in the wave pushes the wave crest above the water surface resulting in a large wave height. Wave run-up is the elevation above mean sea level on dry land that a tsunami reaches. Run-up is what causes inundation of coastal areas that are below the run-up height. Identifying tsunami hazards requires 1) evaluating the potential for submarine mass movement both locally and at great ocean distances, and 2) identifying coastal regions within the direct or indirect path of a potential tsunami wave that are below the run-up height.

There are two types of tsunamis—local and distant. Local tsunamis are more threatening because they afford at-risk populations only a few minutes to find safety. Distant tsunamis allow for more notice to at-risk populations that a tsunami is inbound. California is vulnerable to, and must consider, both types.

Tsunamis can travel at speeds of over 600 miles per hour in the open ocean and can grow to over 50 feet in height when they approach a shallow shoreline, causing severe damage to coastal development. Recent studies of the continental shelf off the California coast indicate a potential for underwater landslides capable of generating damaging tsunamis that could threaten coastal communities. As well, tsunami events originating as far away as Alaska and Japan can also trigger events that could be damaging to California coastal areas.

Location and Extent

Tsunami can affect lower lying areas of the Park District adjacent to the Bay or tidally influenced rivers. This occurs in both Alameda and Contra Costa counties along the San Francisco Bay and into the Delta area. There is no scientific scale for tsunami, only depth of inundation and measure of the water penetration inland.. Speed of onset can be short (minutes to hours). Estimates of those can be found in Table 4-97 below.

Past Occurrences

Disaster Declaration History

There have been no past federal or state disaster declarations due to tsunami, according to Table 4-4 and Table 4-6.

NCDC Events

The NCDC has tracked tsunami events in each County dating back to 1996. The events in Alameda County are shown in Table 4-95, while those events in Contra Costa County are shown in Table 4-96. This is from a March 11, 2011, event. This was from an earthquake off the coast of Japan. This is often referred to as the Fukushima earthquake, as the tsunami caused a meltdown of three reactors at the Fukushima Daiichi nuclear power plant. More information can be found in the Hazard Mitigation Planning Team events section below.

*Table 4-95 Alameda County NCDC Tsunami Events 1/1/1996–1/31/2022**

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Tsunami	1	0	0	0	0	$50,000	$0
Total	**1**	**0**	**0**	**0**	**0**	**$50,000**	**$ 0**

Source: NCDC

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

*Table 4-96 Contra Costa County NCDC Tsunami Events 1/1/1996–1/31/2022**

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Tsunami	1	0	0	0	0	$50,000	$0
Total	**1**	**0**	**0**	**0**	**0**	**$50,000**	**$ 0**

Source: NCDC

*Note: Losses reflect totals for all impacted areas, some of which fell outside of the Park District and outside of Contra Costa County.

Hazard Mitigation Planning Team Events

The HMPC stated that the 2021 Alameda County LHMP reported that more than 71 tsunamis have been recorded in San Francisco Bay since 1854. Most of these tsunamis were generated by earthquakes in distant subduction zones near Russia, Japan, or Alaska. The worst tsunami to hit the Bay Area was generated in Alaska by a M 9.2 earthquake on March 27, 1964. This event produced a 2-foot runup in the city of Alameda and a 4-foot runup in the city of Oakland. On March 11, 2011, a tsunami generated in Japan from the Fukushima earthquake resulted in a 2-foot runup in the cities of Alameda and Berkeley. Minor damage to docks and piles were reported. The Park District noted that no damage was reported to Park District lands or assets from any of these events.

Likelihood of Future Occurrence

Occasional – Strong earthquakes, or other major land displacement events, occurring near the Park District or elsewhere on the Pacific "Ring of Fire," especially Alaska, give the EBRPD limited warning of the overwhelming waves that move up to 600 mph. A massive earthquake in the central Aleutian Islands of Alaska could send 30-foot waves to the nearby coast within about five hours. Since earthquakes of this magnitude are somewhat rare, the likelihood of future occurrence is occasional. This is further shown in the fact that there have been two damaging tsunamis to the District areas since 1854.

Climate Change and Tsunami

Earthquakes are the main cause of tsunamis in the Pacific Ocean. According to the CAS, climate change is unlikely to increase earthquake frequency or strength.

Vulnerability Assessment

Vulnerability—Medium

Tsunamis arrive as a series of successive crests (high water levels) and troughs (low water levels). These successive crests and troughs can occur anywhere from 5 to 90 minutes apart; however, they usually occur 10 to 45 minutes apart. As a tsunami enters the shoaling waters near a coastline, its speed diminishes, its wavelength decreases, and its height increases greatly. The first wave usually is not the largest. Several larger and more destructive waves often follow the first one. As tsunamis reach the shoreline, they may take the form of a fast-rising tide, a cresting wave, or a bore (a large, turbulent wall-like wave). The bore phenomenon resembles a step-like change in the water level that advances rapidly (from 10 to 60 miles per hour).

Vulnerability to and Impacts from Tsunami

The 2021 Alameda County LHMP Update noted that tsunamis not only affect beaches that are open to the ocean, but also bay mouths, tidal flats, and the shores of large coastal rivers. Tsunami waves can also diffract around land masses. Because tsunamis are asymmetrical, the waves may be much stronger in one direction than another, depending on the nature of the source and the surrounding geography. However, tsunamis propagate outward from their source, so coasts in the shadow of affected land masses are safer.

In the Bay Area, tsunamis are most likely to be generated by very distant subduction faults (such as those in Washington, Alaska, Japan, and Russia) than by local strike-slip faults (such as the San Andreas Fault). Most tsunami damage and destruction, including that to the Bay Area, is caused by flooding, wave impacts, erosion, strong currents, and floating debris.

Parts of the Park District are subject to several types of floods, including storm surge and tsunami flooding for locations adjacent to San Francisco Bay. Areas along the Delta are also at risk to tsunami flooding. The Park District has many trails along these coastal areas. Tsunami could cause erosion impacts at the trail sites and other park lands that lie along lower coastal areas of the EBRPD. Additionally, natural resource areas, marsh areas, and wetlands lie along the coastal areas, and could be negatively impacted by tsunami inundation. Tsunami can also cause loss of life, as well as damages to property, roads, and critical facilities and infrastructure.

Park Lands and Assets at Risk

GIS was used to analyze EBRPD park lands and assets potentially at risk to a tsunami event. EBRPD park lands and assets data obtained from the Park District were intersected with CGS Tsunami Inundation Areas (Potential) for Evacuation Planning 2021 data to determine Park District lands and assets that fall into defined Tsunami Coastal Evacuation Zones. Separate analysis was performed for park lands (in acres) and park assets (as types of assets and replacement values). Affected park lands and assets are described below.

Figure 4-80 shows the Tsunami Coastal Evacuation Zones in the Park District. Table 4-97 summarizes the Park District park lands and acres that lie in the Tsunami Coastal Evacuation Zones, while Table 4-98 summarizes the Park District assets and their replacement values that lie in the Tsunami Coastal Evacuation Zones. More detail on specific park lands and assets in these Zones can be found in Appendix F.

Figure 4-80 EBRPD – Tsunami Coastal Evacuation Zones

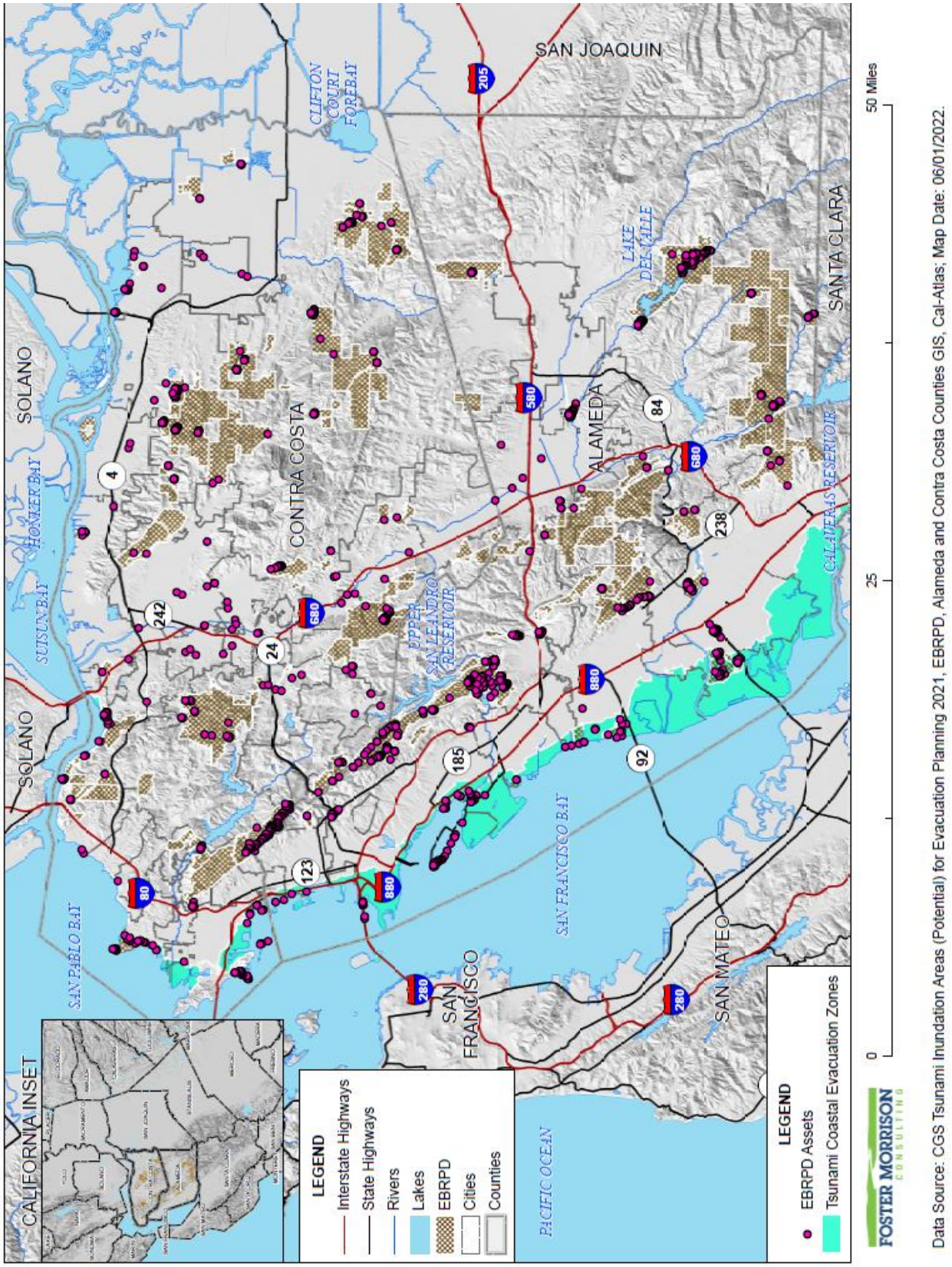


Table 4-97 EBRPD – Tsunami Coastal Evacuation Zones and Affected Park District Lands and Acres

Tsunami Zone / EBRPD	Total Number of Park Lands	Affected Park Lands	Percent of Affected Park Lands	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
Tsunami Coastal Evacuation Zone						
EBRPD – Alameda County Total	43	10	23.2%	7,474	5,368	71.83%
EBRPD – Contra Costa County Total	57	10	17.5%	7,306	2,888	39.54%
EBRPD Total	**100**	**20**	**20.0%**	**14,780**	**8,257**	**55.86%**

Source: CGS Tsunami Inundation Areas, EBRPD GIS

Table 4-98 EBRPD – Tsunami Coastal Evacuation Zones and Affected Park District Assets and Replacement Values

Tsunami Coastal Evacuation Zone/EBRPD	Affected Park Lands	Asset Count	Replacement Value
Tsunami Coastal Evacuation Zone			
EBRPD –Alameda County Total	6	0	$54,157,646
EBRPD – Contra Costa County Total	7	0	$22,612,481
EBRPD Total	**13**	**0**	**$76,770,127**

Source: CGS Tsunami Inundation Areas, EBRPD GIS

In addition to the tables above, the following is a list of Park District lands that lie in the Tsunami Coastal Evacuation Zone. More detail on specific Park District lands and assets in these Tsunami Coastal Evacuation Zones can be found in Appendix F.

- Alameda Creek Trail
- Coyote Hills
- Hayward Shoreline
- Martin Luther King Jr. Shoreline
- McLaughlin Eastshore
- Oyster Bay Shoreline
- SF Bay Trail (MLK to MESP)
- Alameda Point Shoreline Trail
- Crown Beach
- Judge John Sutter Shoreline
- North Richmond Shoreline
- Point Pinole Shoreline
- San Pablo Bay Shoreline
- Wildcat Creek Trail
- Carquinez Strait Shoreline
- Miller/Knox Shoreline
- Point Isabel Shoreline
- Radke Martinez Shoreline
- SF Bay Trail
- Brooks Island

Critical Facilities at Risk from Tsunami

EBRPD critical facilities are a subset of the total facilities of the Park District. The Park District reviewed the total EBRPD assets and determined that the following types of Park District assets would be considered critical facilities, as discussed in Section 4.2.4 above. Using this definition and mapping from of Park

District assets, Tsunami Coastal Evacuation Zones were overlayed on the critical facility layer. Those critical facilities that fall within the Tsunami Coastal Evacuation Zones can be seen in Figure 4-80 (which shows all mapped assets including critical facilities) and detailed on Table 4-99 below. More information on critical facilities can be found in Appendix G and H.

Table 4-99 EBRPD – Critical Facilities Inside Tsunami Coastal Evacuation Zones

County/Park Lands	Tsunami Hazard Area Coastal Evacuation Zone / Asset Type	Asset Count
Alameda County		
Coyote Hills	**Tsunami Coastal Evacuation Zone**	
	Building	4
	Sanitary Sewer	2
	Water Supply	4
	Tsunami Coastal Evacuation Zone Total	10
	Coyote Hills Total	**10**
Crown Beach	**Tsunami Coastal Evacuation Zone**	
	Building	6
	Pedestrian Paving	1
	Sanitary Sewer	1
	Tsunami Coastal Evacuation Zone Total	**8**
	Crown Beach Total	**8**
Hayward Shoreline	**Tsunami Coastal Evacuation Zone**	
	Pedestrian Paving	6
	Storm Sewer	8
	Tsunami Coastal Evacuation Zone Total	**14**
	Hayward Shoreline Total	**14**
Judge John Sutter	**Tsunami Coastal Evacuation Zone**	
	Building	3
	Tsunami Coastal Evacuation Zone Total	**3**
	Judge John Sutter Total	**3**
Martin Luther King, Jr.	**Tsunami Coastal Evacuation Zone**	
	Building	4
	Pedestrian Paving	6
	Piers & Docks	6
	Tsunami Coastal Evacuation Zone Total	**16**
	Martin Luther King, Jr. Total	**16**
McLaughlin Eastshore	**Tsunami Coastal Evacuation Zone**	
	Pedestrian Paving	1
	Tsunami Coastal Evacuation Zone Total	**1**

County/Park Lands	Tsunami Hazard Area Coastal Evacuation Zone / Asset Type	Asset Count
	McLaughlin Eastshore Total	**1**
Alameda County Total		**52**
Contra Costa County		
Brooks Island	**Tsunami Coastal Evacuation Zone**	
	Service & Pedestrian Tunnel	1
	Water Supply	1
	Tsunami Coastal Evacuation Zone Total	**2**
	Brooks Island Total	**2**
McLaughlin Eastshore	**Tsunami Coastal Evacuation Zone**	
	Pedestrian Paving	3
	Tsunami Coastal Evacuation Zone Total	**3**
	McLaughlin Eastshore Total	**3**
Miller/Knox	**Tsunami Coastal Evacuation Zone**	
	Building	1
	Sanitary Sewer	2
	Water Supply	1
	Tsunami Coastal Evacuation Zone Total	**4**
	Miller/Knox Total	**4**
Point Isabel	**Tsunami Coastal Evacuation Zone**	
	Building	1
	Pedestrian Paving	1
	Tsunami Coastal Evacuation Zone Total	2
	Point Isabel Total	**2**
Point Pinole	**Tsunami Coastal Evacuation Zone**	
	Roadways: Vehicular Bridges	4
	Tsunami Coastal Evacuation Zone Total	4
	Point Pinole Total	4
Radke Martinez	**Tsunami Coastal Evacuation Zone**	
	Pedestrian Paving	6
	Tsunami Coastal Evacuation Zone Total	**6**
	Radke Martinez Total	6
Contra Costa County Total		**21**
Grand Total		**73**

Source: CGS Tsunami Inundation Areas, EBRPD GIS

Overall Community Impact

The overall impact to the Park District from a tsunami would potentially include:

- Injury and loss of life to EBRPD staff and visitors;
- Park District structural and property damage;
- Damage to natural resource habitats and other resources; and
- Loss of water, power, trails, roads, and transportation, which could impact, strand, and/or impair mobility for emergency responders and/or area residents.

Future Development

New EBRPD facilities will be sited, designed and constructed in such a way as to reduce the risk from tsunami to the facility.

4.3.16. Wildfire

Hazard Profile

This hazard profile contains multiple sections that detail how this hazard can affect the EBRPD. These sections include a hazard/problem description; description of location and extent; past occurrences of this hazard; and how climate change can affect this hazard.

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 the Park District. Generally, the fire season extends 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. The Park District noted that additional losses could occur if PG&E initiates a power shutdown during extreme fire weather conditions. This is discussed in greater detail at the end of Section 4.3.1.

Location and Extent

Wildfire is part of California's natural ecology. However, its danger and cost have increased as fire-prone areas across the State have been increasing as well. This is especially true in the Park District. Over the years, fire suppression practices and invasive plants have contributed to fuel build-up and increased the risk of more catastrophic wildfire events.

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. 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 a primary factor that is under human control. The 2010 EBRPD Wildfire Hazard Reduction and Resource Management Plan (WHRRMP) noted that in and near the Park District, there are open space areas, vegetation, and forested areas that can increase the potential for structural losses in fires. In the early 1900s, plantations of eucalyptus and pine were planted for hardwood production and to forest the primarily grass-covered hills in preparation for coming real estate development. As these trees have grown and aged since their initial planting, many of the older pines have begun to fail as they reach the end of their lifespan or are attacked by insect pests or disease (for example, bark beetles and pine pitch canker). The increasing numbers of trees affected by these ailments create an elevated fuel load in the Park District. Similarly, eucalyptus trees planted for hardwood production have become dense and flammable woodlands. As the vegetation ages and less land is grazed or burned by prescribed fire, Park District staff has noted that it is increasingly difficult to cost-effectively manage the vegetation to reduce wildfire hazards. The Park District also noted that tree die-back provides fuel for wildfires in the EBRPD.
- **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 2010 WHRRMP noted that the periphery of the Park District is a wildland urban interface (WUI) area where structures are at significant risk of fire exposure. These areas are in and around canyons and ridges, or can be in sloping or step hillside areas. The steep and windy nature of local roads make it difficult for fire suppression vehicles. This is true in areas like the Oakland Hills, which was the site of the 1991 Oakland Hills Fire that burned thousands of homes and killed 25 people.
- **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. Wind is 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. Winds have caused power lines to arc and become fire risks to the Park District. Lightning also ignites wildfires. Lightning can come both during thunderstorms, or can be dry lightning. In 2020, a lightning siege caused multiple fires in the Park District. This is discussed in the Past Occurrences section (under HMPC Events) in Section 4.3.3 above and in the same section below. During much of the year (winter and spring months), temperatures in the East Bay are moderate, and vegetation is relatively moist and less prone to catastrophic wildfires. Summers often bring overnight and morning fog along the hills until around noon, with moist midday winds blowing westerly in from the coast. However, with limited precipitation during Summer and Fall, vegetation dries out and is more susceptible to wildfire ignitions and spread. When combined with a phenomenon known as "Diablo winds" the potential for an out of control wildfire exists. 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 limited 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 often occur in the fall months.

- **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.

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 Park District; however, CAL FIRE has mapped areas in California that are at risk to wildfire. Methodologies for this analysis and maps showing the various Fire Hazard Severity Zones, which range from Urban-Unzoned to Very High, can be found in the Vulnerability Assessment below. Geographic extents of wildfire can be seen in Table 4-107 in the Vulnerability Assessment below.

Past Occurrences

Disaster Declaration History

There have been 1 federal and 2 state disaster declarations due to wildfire in both Alameda and Contra Costa County. This can be seen in Table 4-100 and Table 4-101, respectively. These were from the 1991 Tunnel Fire and the 1970 Fish Canyon Fire.

Table 4-100 Alameda County Disaster Declarations 1950-2022 from Wildfire

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

Source: Cal OES, FEMA

Table 4-101 Contra Costa County Disaster Declarations 1950-2022 from Wildfire

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

Source: Cal OES, FEMA

NCDC Events

The NCDC has tracked wildfire events in each County dating back to 1993. The events in Alameda and Contra Costa County are shown in Table 4-102 and Table 4-103, respectively.

*Table 4-102 Alameda County NCDC Storm Events 1/1/1950-1/31/2022**

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Wildfire	17	0	0	6	1	$10,000	$0

Source: NCDC

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

*Table 4-103 Contra Costa County NCDC Storm Events 1/1/1950-1/31/2022**

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Wildfire	17	0	0	6	1	$10,000	$0

Source: NCDC

*Note: Losses reflect totals for all impacted areas, some of which fell outside of the Park District and outside of Contra Costa County.

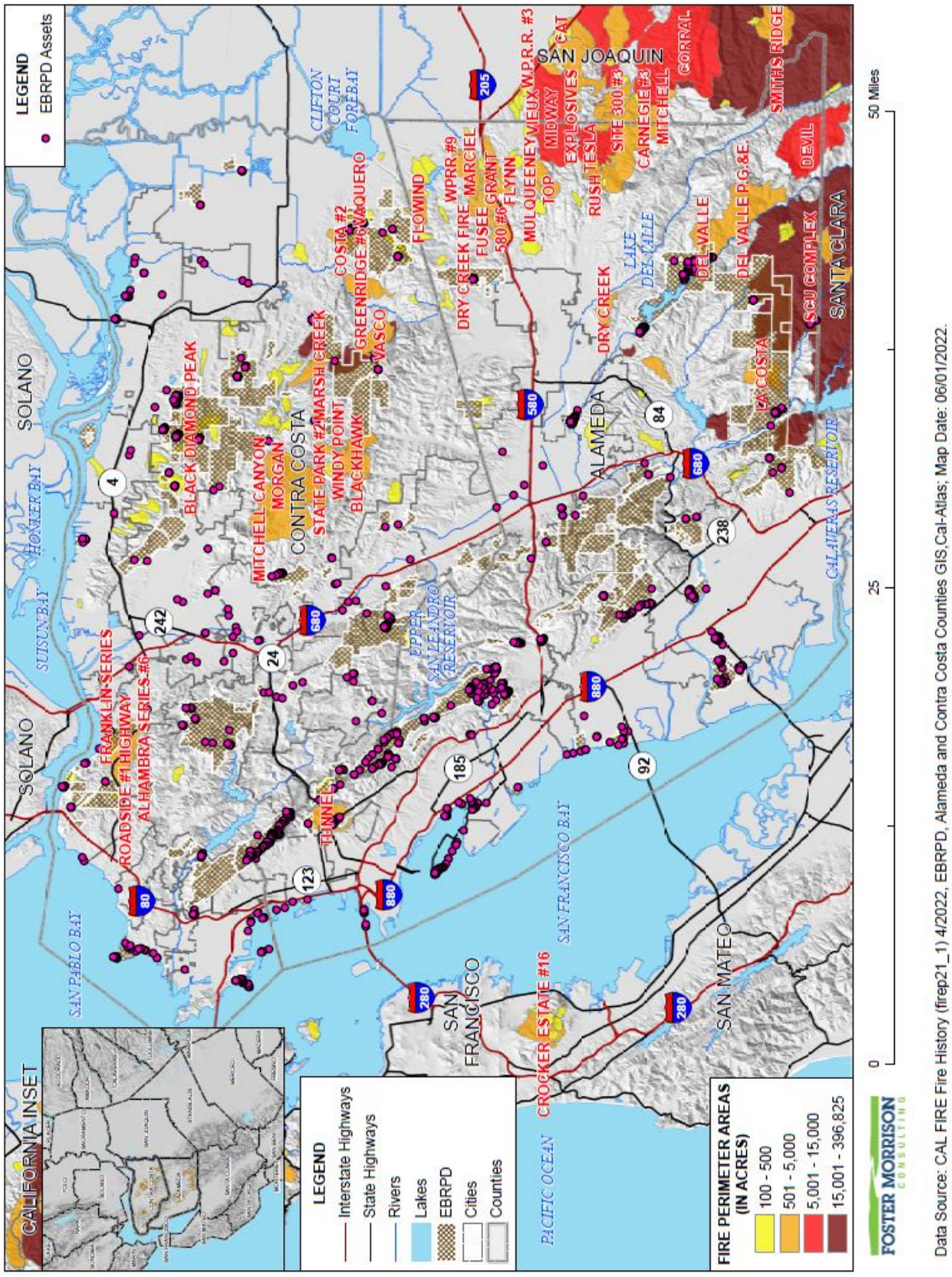
CAL FIRE Events

CAL FIRE, USDA Forest Service Region 5, Bureau of Land Management (BLM), the National Park Service (NPS), Contract Counties and other agencies jointly maintain a comprehensive fire perimeter GIS layer for public and private lands throughout the state. The data covers fires going back to 1878. For the National Park Service, Bureau of Land Management, and US Forest Service, fires of 10 acres and greater are reported. For CAL FIRE, timber fires greater than 10 acres, brush fires greater than 50 acres, grass fires greater than 300 acres, and fires that destroy three or more residential dwellings or commercial structures are reported. CAL FIRE recognizes the various federal, state, and local agencies that have contributed to this dataset, including USDA Forest Service Region 5, BLM, National Park Service, and numerous local agencies.

Fires may be missing altogether or have missing or incorrect attribute data. Some fires may be missing because historical records were lost or damaged, fires were too small for the minimum cutoffs, documentation was inadequate, or fire perimeters have not yet been incorporated into the database. Also, agencies are at different stages of participation. For these reasons, the data should not be used for statistical or analytical purposes.

The data provides a reasonable view of the spatial distribution of past large fires in California Figure 4-81 shows fire history for the area surrounding the Park District, colored by the size of the acreage burned. This map contains fires from 1950 to 2021. Each of them was tracked by CAL FIRE. Many more small fires have occurred but were not included in the analysis.

Figure 4-81 EBRPD – Wildfire History 1950 to 2021



Hazard Mitigation Planning Team Events

The HMPC noted that fire has played a significant historical role in defining the current vegetative strata in the Park District. Fire records for the East Bay Hills are incomplete, but historic newspaper articles and old fire planning studies document an active and dangerous fire history for the area going back centuries. The HMPC noted that under normal conditions, most fires that start in the East Bay Hills are efficiently controlled by firefighters with no loss of life or structures. 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 "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.

The 2017 EBRPD LHMP noted that during the 75-year period between 1923 and 1998, 11 Diablo wind-driven fires in the Berkeley/Oakland hills burned a total of 9,840 acres, destroyed more than 4,000 homes, took 26 lives, and resulted in over $2 billion in financial losses. The most significant fire in this period was the October 20, 1991 Tunnel Fire in the Oakland-Berkeley hills, which ranks as one of the worst wildland-urban firestorm disasters to ever strike the United States. The fire resulted in 25 deaths, 150 injuries, and the displacement of over 10,000 persons. With destruction and damage to over 3,400 residential units, losses were in excess of $1.5 billion in 1991 dollars (approximately $3.3 billion in 2022 dollars). Four Park District parks were impacted by this fire: Temescal Regional Recreation Area, Sibley Volcanic Regional Preserve, Claremont Canyon Regional Preserve, and Huckleberry Botanical Regional Preserve. Most of the damage was in the Temescal Regional Recreation Area.

In 2018, although there were no wildfires in the Park District, there were 13 days of very poor air quality in the Bay Area. Parks were closed due to lack of visibility, even though there were no fires in the EBRPD. Wildfires occurred in areas surrounding the EBRPD, but many were not initially reported because of existing smoke in the air from other wildfires.

Past occurrences the HMPC noted are shown on Figure 4-82 and in Table 4-104.

Figure 4-82 EBRPD – Fire History 1900 to 2009

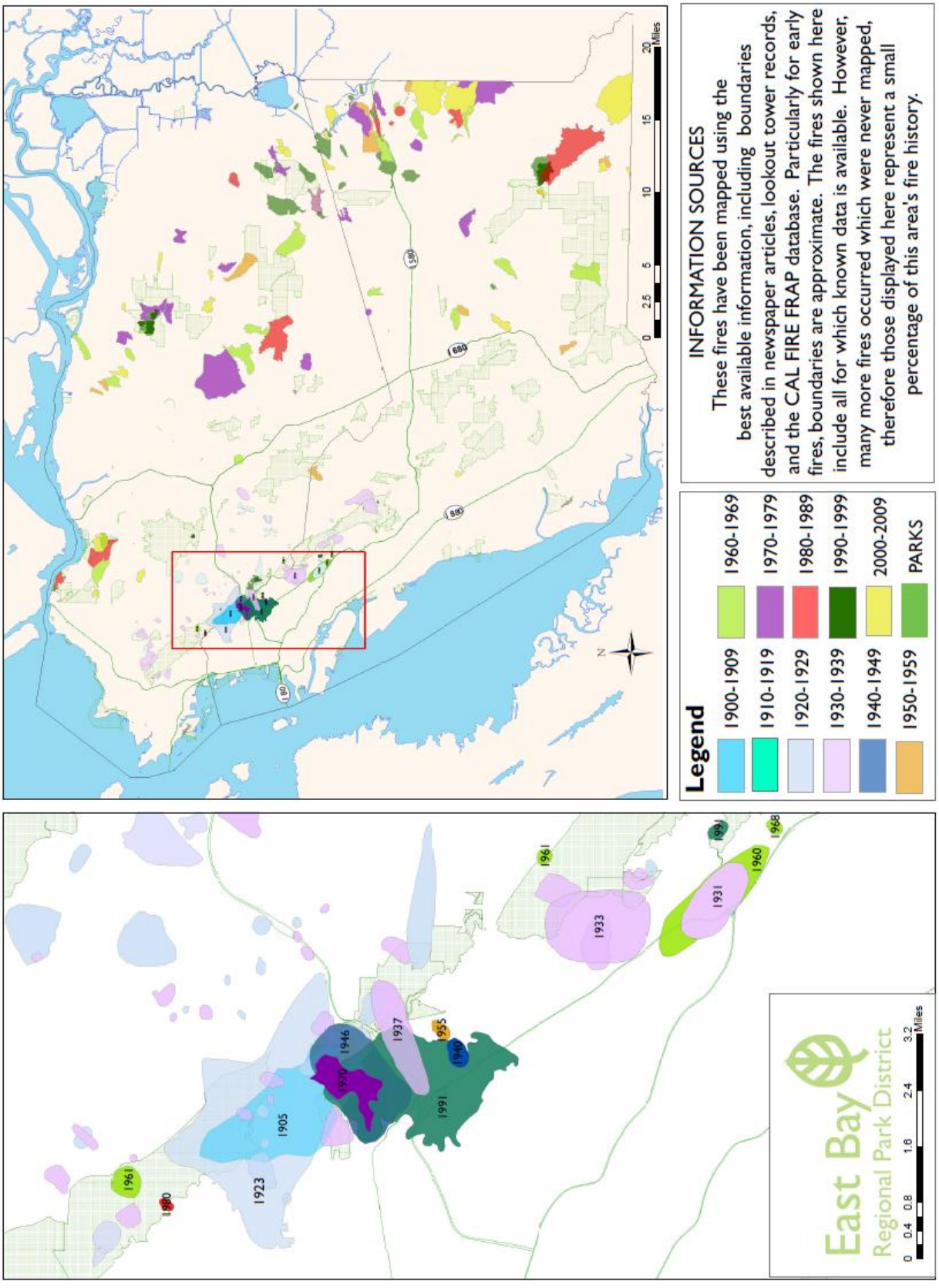


Table 4-104 EBRPD – Historical Major Fires

Historical fires within Park District jurisdiction before its creation					
September 1923	North of UC Berkeley Campus	Berkeley	584 homes, 130 acres	Smoker	Diablo wind
June 1929	Lake Temescal	Oakland	300 acres grassland	Unknown	West wind
November 1931	Leona	Oakland	5 homes, 1800 acres	Unknown	Diablo wind
November 1933	Redwood/Joaquin Miller	Oakland	1 life, 5 homes, 1000 acres	Smoker	Diablo wind
Historical fires within Park District jurisdiction since its creation					
September 1937	Broadway Terrace	Oakland	4 homes, 700 acres	Backyard fire	West wind
September 1940	Broadway Terrace	Oakland	30 acres	Unknown	West wind
September 1946	Buckingham/Norfolk	Oakland/ Berkeley	1,000 acres	Arson and rekindle	Diablo wind
November 1955	Montclair	Oakland	10 acres	Unknown	West wind
October 1960	Leona	Oakland	2 homes, 1,200 acres	Unknown	Diablo wind
November 1961	Tilden, Briones, Roberts, and Chabot	Berkeley, Martinez Oakland, Castro Valley	4 fires, 400 acres	Arson	South-west wind
October 1968	Oak Knoll	Oakland	204 acres	Unknown	West wind
September 1970	Fish Canyon Fire	Oakland	37 homes destroyed, 21 homes damaged, 204 acres	Arson	Diablo wind
December 1980	Wildcat Canyon Fire	Berkeley	5 homes, 2 acres	Power line	Diablo wind
October 1990	Leona	Oakland	200 acres	Vehicle accident	West wind
October 1991	Tunnel Fire	Oakland/ Berkeley	25 lives, 3,354 homes, 456 apartments, 1,600 acres	Rekindle	Diablo wind

Source: EBRPD 2017 LHMP

The Park District noted the following ignitions and fires since 2017, as shown in Table 4-105. None of these events affected Park District structures, only open space.

Table 4-105 EBRPD – Wildland Fires

Years	Wildland Fires W/Incident Command System
2017	157
2018	122
2019	108
2020	121
2021	72

Years	Wildland Fires W/Incident Command System
2022	50*

Source: EBRPD Fire
*As of July 26, 2022

The HMPC noted that in 2020, the Lightning Complex Fire affected the Park District. The fire was so named because it started from a lightning siege (a period of very high lightning activity that occurs during a short time). The Park District noted that CAL FIRE stated that on August 15, 2020, there were 12,000 lightning strikes in the State that ignited 560 fires, including the Lightning Complex Fire. Affecting over 6,900 acres, lightning caused more than 5 fires on Park District lands. During this event, the resulting smoke caused significant visibility issues, creating a strain on Park District resources. These fires ultimately burned 1.35 million acres in the State. Areas in and near the Park District burned, and wildfire smoke was very thick in the Park District. This can be seen in Figure 4-83 and Figure 4-84.

Figure 4-83 EBRPD – Smoke from 2020 Lightning Complex Fire

Source: EBRPD

Figure 4-84 EBRPD – Smoke from 2020 Lightning Complex Fire

Source: EBRPD

From the table above, the EBRPD noted that California's 2020 Fire Season was the largest on record, with 4,177,855 total acres burned. The March-April 2021 EBRPD Regional in Nature Activity Guide noted the following:

> ***In the East Bay, the SCU Lightning Complex Fire, started by lightning in August, included fires in five regional parks – Mission Peak, Morgan Territory, Ohlone Wilderness, Round Valley, and Sunol Wilderness – and burned 396,624 total acres.***

Luckily, the SCU fire was "best case" scenario in terms of intensity, which allowed wildlife time to burrow or escape to safer areas and seedlings to survive for future regrowth. That is not to say that there weren't spots of high-intensity fire where vegetation was completely burned and wildlife impacted.

Grazing and properly managed fire roads likely reduced the intensity of the SCU fire in many areas. In many cases, the fire was seen burning itself out at maintained fire roads and slowing down in grazed areas, giving wildlife time to seek shelter and firefighters a fighting chance.

Grasslands, depending on final winter rain totals, are anticipated to produce an exceptional native wildflower bloom. Animals should also be abundant as wildlife has started branching out after finding refuge in habitat islands not affected by the fires. Some plants require fire or smoke to germinate – these plants are called "fire followers" and are associated with chaparral. They only bloom for a short time, then disappear until the next fire. District vegetation staff will be surveying for and recording these species in 2021. The Park District has also established a Post Fire Monitoring Task Force within its Stewardship Department to track the recovery of vegetation and wildlife, and to help coordinate management needs for the burned areas. There are many protected species in the area, such as Golden Eagles which nest high up in the trees. It is unknown whether they will re-nest in the area if the fire destroyed their original nests.

The Park District also noted the following red flag days that have occurred since 2017.

- 2017 0 days
- 2018 0 days
- 2019 1 day
- 2020 0 days
- 2021 6 days

Likelihood of Future Occurrences

Highly Likely — Conventional thought states that from May to October of each year, the Park District faces a serious wildland fire threat. Recently, it is as though the fire threat is almost year around. Fires will continue to occur on an annual basis in and near the Park District. 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 high fuel load and long, dry summers, the Park District continues to be at risk from wildfire. The Park District typically has multiple fires in a given year. The likelihood that fires will occur in a given year is almost 100%. Most of the fires are extinguished quickly and burn less than an acre or only a few acres. Larger fires burning tens of acres, hundreds of acres or more occur much less frequently.

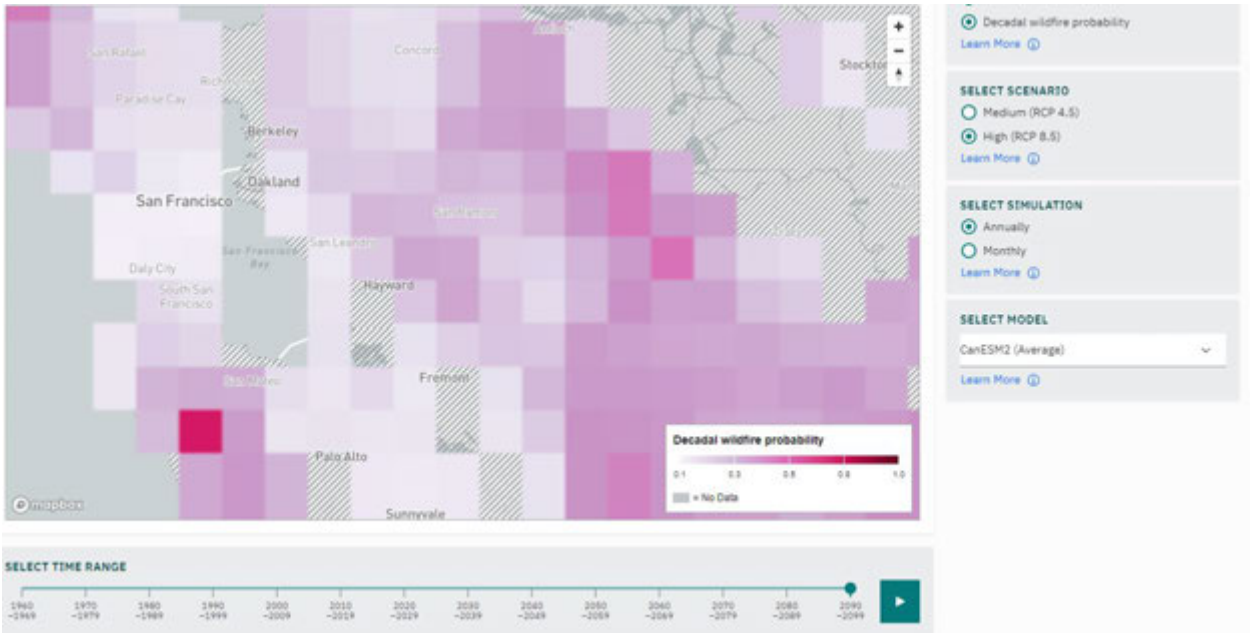
Climate Change and Wildfire

Climate change and its effect on wildfire near the Park District has been discussed by Cal-Adapt.

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 2090-2099, as compared to recent (2010) conditions. This is shown in Figure 4-85. Based on this model, Cal-Adapt predicts that wildfire risk in both Alameda and Contra Costa County will increase moderately at the end of the 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 the EBRPD, precipitation patterns, high levels of heat, topography, and fuel load will determine the frequency and intensity of future wildfire.

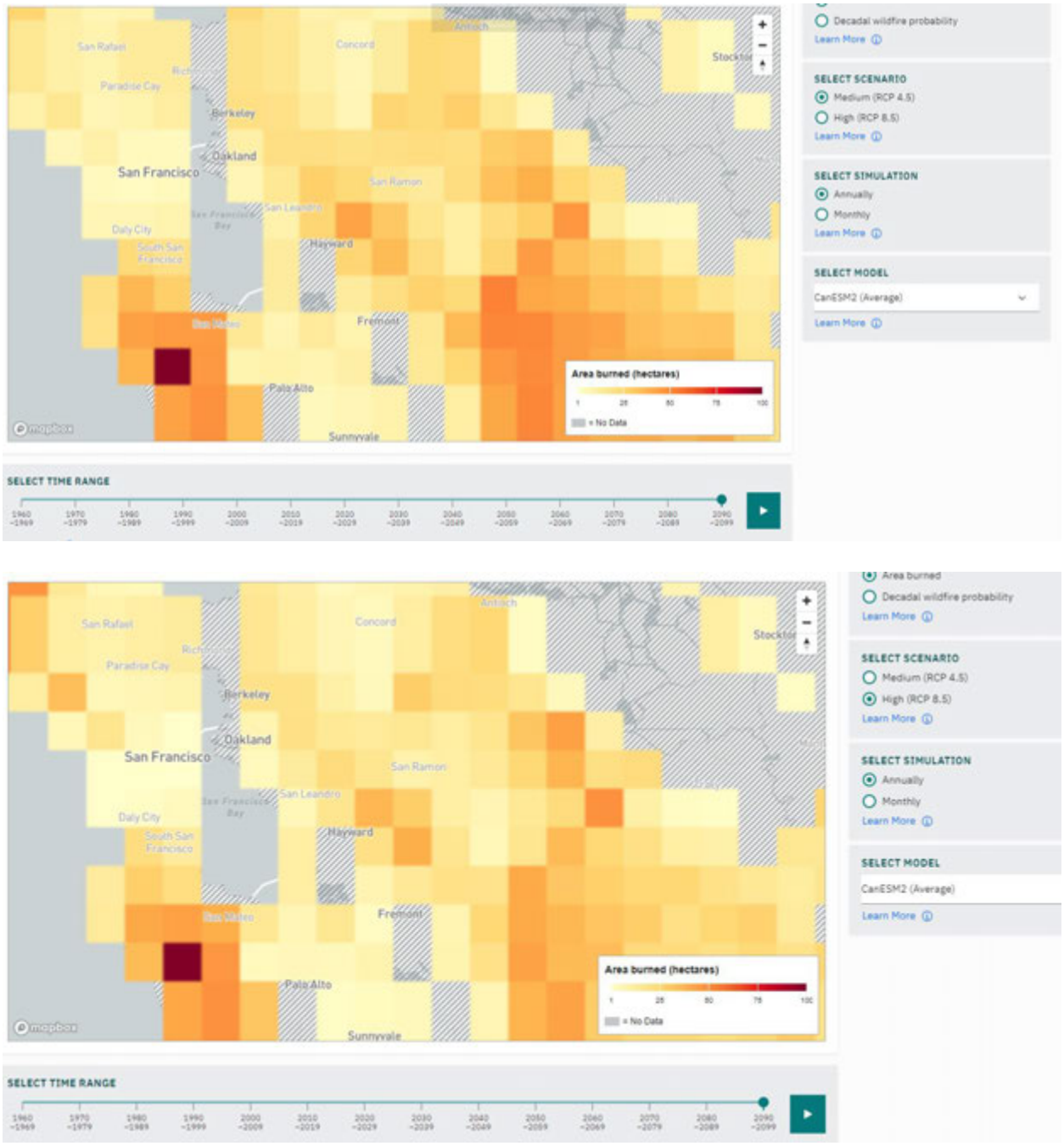
Figure 4-85 EBRPD – Projected Increase in Wildfire Burn Areas



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 4-86. The upper chart shows modeled annual averages of area burned for the Park District under the RCP 4.5 scenario, while the lower chart shows modeled annual averages of area burned for the Park District under the RCP 8.5 scenario.

Figure 4-86 EBRPD – Future Annual Averages of Acres Burned under RCP 4.5 and 8.5 Scenarios



Source: Cal-Adapt

Vulnerability Assessment

Vulnerability—Extremely High

Risk and vulnerability to the EBRPD from wildfire is of significant concern. Wildfire is not the only hazard that the EBRPD faces, but it is one of the most significant hazards, based on the number, severity, and proximity of wildfires to the Park District over the last several years and the increasing potential for a large catastrophic wildfire. Wildfires that occur in the EBRPD Planning Area are predominantly human caused and include both those fires that start on Park District lands as well as those that start elsewhere and move into the Park District. As growth continues and populations increase in the areas served by the Park District (i.e., Alameda and Contra Costa County), the potential for wildfires will also increase.

Vulnerability to and Impacts from Wildfire

The East Bay Hills currently has a complex mosaic of native and introduced vegetation that presents a severe fire hazard for residents and structures in the WUI. One of the most dramatic influences in the fire regime is the result of the introduction of non-native blue gum eucalyptus to the East Bay Hills. The existing fire regime for most of the vegetation in the East Bay Hills is considered a Fire Regime IV8—a high-severity, stand-replacing regime. Although fire frequency has decreased over time due to fire suppression efforts, changes in vegetation from suppression efforts promote fires that burn with greater intensity and greater severity when ignited.

Under "normal" conditions–without unusually high temperatures, unusually low humidity and high winds–the vast majority of wildland or wildland/urban interface fires are extinguished quickly within the Park District. The burned acreage is typically small from a fraction of an acre to a few tens of acres. Damage to structures is most often limited. If structures are damaged in these small fires, the damage is typically limited to one structure or a small number of structures. Life safety risk is minimal, if any. For these smaller wildland or wildland/urban interface fires that occur every year and are put out quickly, the total environmental impacts and property damage are usually minor.

However, some wildfires can occur under less favorable conditions such as high temperatures, low humidity and high winds. These fires can spread quickly and devastate thousands of acres of land. Larger, out of control wildfires can result in loss of life, injuries, damage to structures, and can cause short-term and long-term disruption to the Park District. EBRPD impacts from a significant wildfire event can include significant damage to Park District lands and assets, including critical facilities and infrastructure. Fires can have devastating effects on watersheds through loss of vegetation and soil erosion, which may impact the Park District by changing runoff patterns, increasing sedimentation, reducing natural and reservoir water storage capacity, and degrading water quality. Potential losses from wildfire can also include damage to grazing lands in the Park District as well as to natural resources such as wildlife and habitat areas. A significant wildfire on Park District lands also has the potential to move off Park District lands destroying and damaging the homes and other structures located adjacent to the EBRPD and becoming a life safety issue to the surrounding communities served by the Park District.

Although the physical damages and casualties arising from wildfires may be severe, it is important to recognize that they also can 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 and communication systems. Temporary and extended park closures can also occur during large wildfire events. In some of the more remote areas of the Park District, firefighting and communications can be a challenge. In addition, catastrophic wildfire can create favorable conditions for other hazards such as flooding, landslides and mudflows, and erosion during the rainy season.

The EBRPD also noted that wildfires in the areas adjacent to Park District lands are often human caused. Wildfires often start in areas outside of EBRPD property, but burn into EBRPD lands. Communications are often affected during times of PSPS events. Low band radios have worked, but cell phones are often rendered useless.

Wildfire Smoke and Air Quality

Smoke from wildfires is made up of gas and particulate matter, which can be easily observed in the air. Air quality standards have been established to protect human health with the pollutant referred to as PM2.5 which consists of particles 2.5 microns or less in diameter. These smaller sizes of particles are responsible for adverse health effects because of their ability to reach the lower regions of the respiratory tract.

Wildfire smoke can have negative effects to those who live in or near a fire burn area, as well as to EBRPD staff and contractors. It can also affect visitors recreating in Park District lands. Smoke and air pollution from wildfires can be a severe health hazard. Significant wildfires occurring in nearby northern California communities since the 2017 LHMP have created significant air pollution affecting area residents and the Park District. The Park District staff and visitors and Planning Area residents have been affected by wildfire smoke and poor air quality, from fires both within the East Bay area and from those much further away. During 2018 during the Camp Fire in Butte County, the EBRPD experienced 13 days of the worst air quality previously experienced in the region. Parks were closed due to the potential for respiratory issues, but also due to the danger associated with not being able to see. It was reported that during this period, visitors to the parks could not see to drive or bike or hike as one could not see the trails, or trees, or cars, or other people. This in part contributed to rare, offshore winds bringing smoke into the area where it settled.

Values at Risk

The EBRPD has mapped CAL FIRE data which provides a variety of fire hazard information for California communities. 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. Utilizing this data from CAL FIRE, GIS was used to determine the risk of wildfire within EBRPD and how the wildfire risk varies throughout the EBRPD. Two primary CAL FIRE datasets and associated analysis was used for this LHMP Update:

- Fire Responsibility Areas
- Fire Hazard Severity Zones

Fire Responsibility Areas

There are numerous state and federal wildland fire protection agencies that have responsibility within Alameda and Contra Costa County and the EBRPD, 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 local 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. EBRPD has its own fire department. Fire Responsibility Areas are generally categorized by Federal Responsibility Areas (FRA), State Responsibility Areas (SRA) and Local Responsibility Areas (LRA).

Methodology

CAL FIRE's Fire Responsibility Area layer was used in this analysis to show EBRPD's parcel counts and values by FRA, SRA, and LRA. GIS was used to analyze EBRPD park lands and assets potentially at risk to wildfire. EBRPD park lands and assets data obtained from the Park District were intersected with CAL FIRE Responsibility Areas to determine Park District lands and assets that fall into defined FRA, SRA, or LRA. Locations of each responsibility area are shown in Figure 4-87. As shown, the EBRPD falls in each zone, with most of the Park District falling within the SRA, followed by the LRA, and then a much smaller area within the FRA.

Figure 4-87 EBRPD – Fire Responsibility Areas by FRA, SRA, LRA

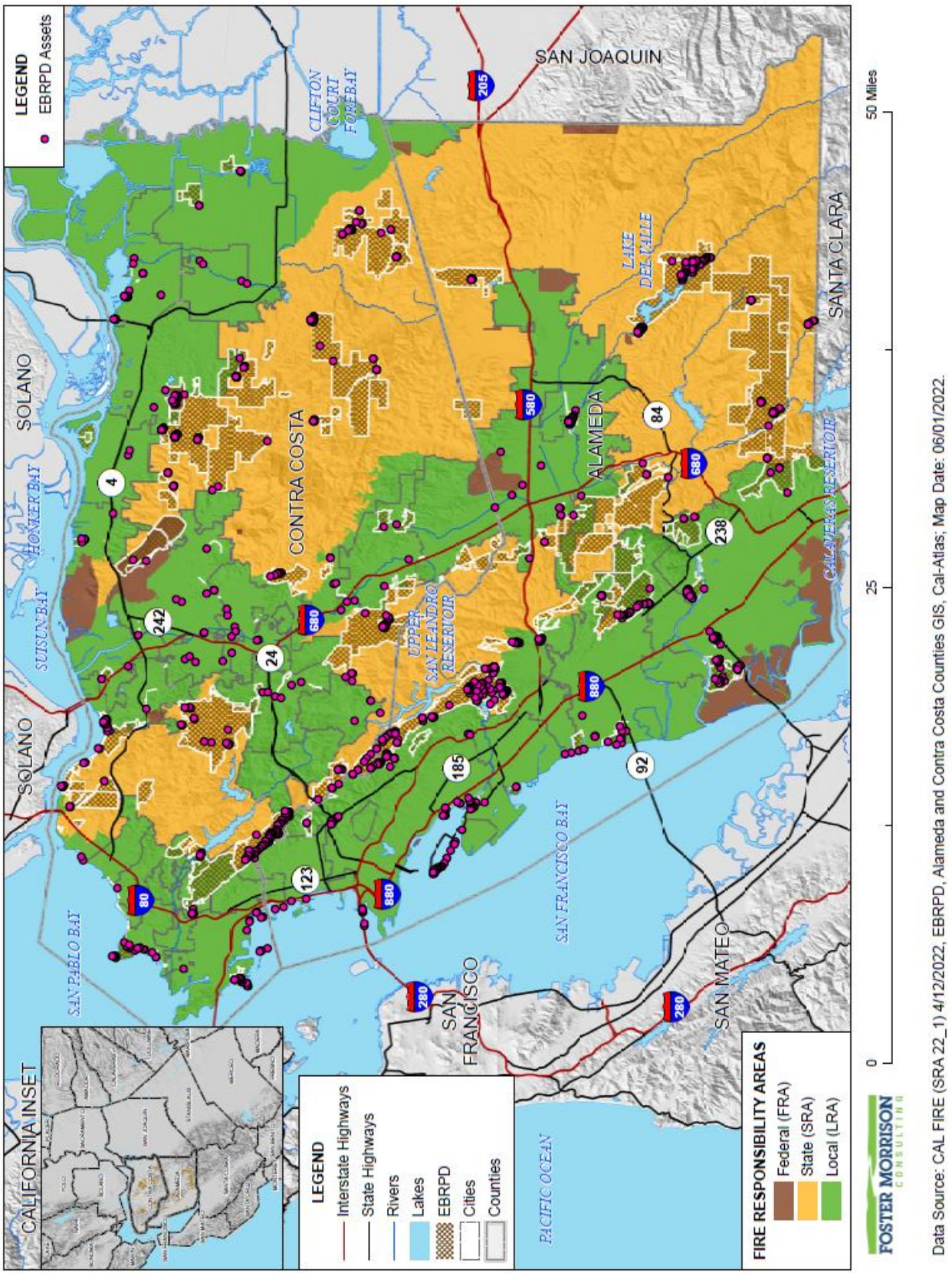


Table 4-106 EBRPD – FRA, SRA, and LRA and Affected Park District Lands and Acres

EBRPD / Park Lands	Total Number of Park Lands	Affected Park Lands	Percent of Affected Park Lands	Total Park Lands (in Acres)	Park Lands in Fire Responsibility Areas (in Acres)	Percent Park Lands in Fire Responsibility Areas
FRA						
EBRPD – Alameda County	43	0	0.0%	508,404	0	0.0%
EBRPD – Contra Costa County	57	4	0.0%	530,785	682.40	0.01%
EBRPD FRA Total	**100**	**4**	**4.0%**	**1,039,189**	**682.4**	**0.01%**
SRA						
EBRPD – Alameda County	43	21	48.8%	508,404	40,432.52	7.95%
EBRPD – Contra Costa County	57	29	50.9%	530,785	46,877.36	8.83%
EBRPD SRA Total	**100**	**50**	**50.0%**	**1,039,189**	**87,309.88**	**8.40%**
LRA						
EBRPD – Alameda County	43	37	86.0%	508,404	17,824.73	3.51%
EBRPD – Contra Costa County	57	44	77.2%	530,785	10,941.84	2.00%
EBRPD SRA Total	**100**	**81**	**81.0%**	**1,039,189**	**28,766.57**	**2.77%**

Source: CAL FIRE, EBRPD GIS

The HMPC noted that in some areas, such as Point Pinole Regional Shoreline, Wildcat Canyon Regional Park, Claremont Canyon Regional Preserve, Leona Canyon Regional Open Space Preserve and land immediately northwest of Lake Chabot Regional Park, are designated as Local Responsibility Areas (LRAs). Local fire jurisdictions, such as the Richmond, Berkeley, or Oakland Fire Departments, have the legal responsibility to provide fire protection on LRA lands. In coordination with these firefighting agencies, the Park District Fire Department provides a strong secondary wildland fire response in support of CalFire on SRAs and to the local fire departments on LRAs. In actuality, the Park District fire suppression resources are often the first "on scene" to Park District fires, and many times are the only resources used

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 wildland fuels. Fuel is that part of the natural vegetation that burns during 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 2008, 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.

The CAL FIRE data, detailing FHSZs within the EBRPD, was utilized to determine the locations, numbers, types, and values of land and assets falling within each FHSZ. The following sections provide details on the methodology and results for this analysis.

Methodology and Results

As previously described, CAL FIRE mapped the SRA Fire Hazard Severity Zones (FHSZs), or areas of significant fire hazard, based on fuels, terrain, weather, and other relevant factors. Within the EBRPD, the Alameda Draft (c1fhszl06_1) and Adopted (fhszs06_3_1) and Contra Costa Draft (c7fhszl06_1) and Adopted (fhszs06_3_7) datasets were utilized for the analysis and contained all FHSZ hazard classes from Very High to Urban Unzoned.

GIS was used to analyze EBRPD park lands and assets potentially at risk to wildfire. EBRPD park lands and assets data obtained from the Park District were intersected with CAL FIRE FHSZ's to determine Park District lands and assets that fall into defined FHSZs. Separate analysis was performed for park lands (in acres) and park assets (as types of assets and replacement values). Affected park lands and assets are described below.

The FHSZs are shown in Figure 4-88. Analysis results for the EBRPD Planning Area is summarized in Table 4-107 shows the number of Park District lands that intersect the FHSZs, as well as the number of acres affected. Table 4-108 shows the number of Park District assets that fall within the FHSZs and their replacement values. More detail on specific Park District lands and assets in FHSZs can be found in Appendix F.

Figure 4-88 EBRPD– SRA - Fire Hazard Severity Zones

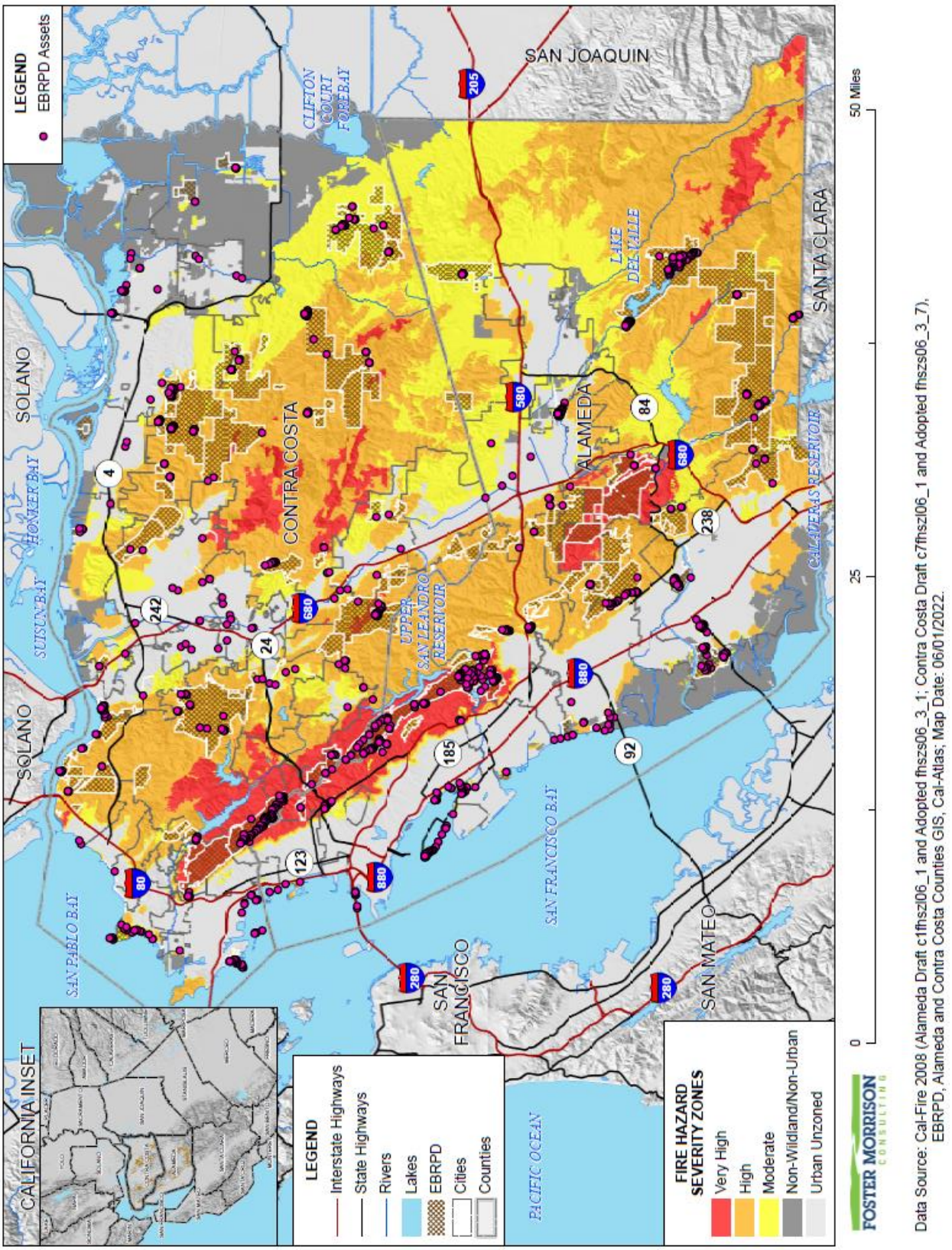


Table 4-107 EBRPD – FHSZs and Affected Park District Lands and Acres

Fire Hazard Severity Zone/ EBRPD	Total Number of Park Lands	Affected Park Lands	Percent of Affected Park Lands	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
Very High						
EBRPD – Alameda County	43	15	34.9%	508,404	5,006	0.98%
EBRPD – Contra Costa County	57	10	17.5%	530,785	2,854	0.54%
Total	**100**	**25**	**25%**	**1,039,189**	**7,860**	**0.76%**
High						
EBRPD – Alameda County	43	34	79.1%	508,404	36,873	7.25%
EBRPD – Contra Costa County	57	41	71.9%	530,785	42,486	8.0%
Total	**100**	**75**	**75.0%**	**1,039,189**	**79,359**	**7.62%**
Moderate						
EBRPD – Alameda County	43	22	51.2%	508,404	5,005	0.98%
EBRPD – Contra Costa County	57	30	52.6%	530,785	6,380	1.2%
Total	**100**	**52**	**52.0%**	**1,039,189**	**11,385**	**1.09%**

Source: CAL FIRE, EBRPD GIS

Table 4-108 EBRPD – FHSZs and Affected Park District Assets and Replacement Values

Fire Hazard Severity Zone/ EBRPD	Number of Affected Park Lands	Asset Count	Replacement Value
Very High			
EBRPD – Alameda County	9	216	$59,714,852
EBRPD – Contra Costa County	7	184	$33,887,537
Total	**16**	**400**	**$93,602,389**
High			
EBRPD – Alameda County	20	297	$55,564,956
EBRPD – Contra Costa County	2	243	$34,719,507
Total	**22**	**540**	**$90,284,463**
Moderate			
EBRPD – Alameda County	8	80	$20,103,854
EBRPD – Contra Costa County	13	117	$20,044,494
Total	**21**	**197**	**$40,148,348**

Source: CAL FIRE, EBRPD GIS

In addition to the tables above, the following is a list of Park District lands that fall within the Fire Hazard Severity Zones. More detail on specific Park District lands and assets in these Fire Hazard Severity Zones can be found in Appendix F.

- **Very High**
  - ✓ Anthony Chabot
  - ✓ Lake Chabot
  - ✓ Niles Canyon Trail
  - ✓ Pleasanton Ridge
  - ✓ Tilden
  - ✓ Claremont Canyon
  - ✓ Garin
  - ✓ Huckleberry
  - ✓ Leona Canyon
  - ✓ Mission Peak
  - ✓ Peralta Oaks Headquarters
  - ✓ Reinhardt Redwood
  - ✓ Roberts
  - ✓ Sibley
  - ✓ Skyline National Trail
  - ✓ Kennedy Grove
  - ✓ Point Pinole Shoreline
  - ✓ Tilden
  - ✓ Tilden (Nature Area)
  - ✓ Wildcat Canyon
  - ✓ Briones
  - ✓ CA State Riding & Hiking Trail
  - ✓ Carquinez Strait Shoreline
  - ✓ Claremont Canyon
  - ✓ Clayton Ranch
  - ✓ Huckleberry
  - ✓ Las Trampas
  - ✓ Las Trampas to Mt Diablo Trail
  - ✓ Little Hills
  - ✓ Morgan Territory
  - ✓ Reinhardt Redwood
  - ✓ Roberts
  - ✓ Sibley
  - ✓ Sycamore Valley
  - ✓ Tilden (Botanic Garden)
- **High**
  - ✓ Anthony Chabot
  - ✓ Ardenwood Historic Farm
  - ✓ Brushy Peak
  - ✓ Camp Arroyo
  - ✓ Coyote Hills
  - ✓ Del Valle
  - ✓ Don Castro
  - ✓ Hayward Shoreline
  - ✓ Lake Chabot
  - ✓ Martin Luther King Jr. Shoreline
  - ✓ McLaughlin Eastshore
  - ✓ Niles Canyon Trail
  - ✓ Oyster Bay Shoreline
  - ✓ Pleasanton Ridge
  - ✓ Quarry Lakes
  - ✓ Shadow Cliffs
  - ✓ Sunol
  - ✓ Vargas Plateau
  - ✓ Bay Area Ridge Trail (GD to LC)
  - ✓ Bishop Ranch
  - ✓ Calaveras Ridge Trail (LT to PR)
  - ✓ Cull Canyon
  - ✓ Doolan Canyon
  - ✓ Dry Creek Pioneer
  - ✓ Dublin Hills
  - ✓ Five Canyons
  - ✓ Garin
  - ✓ Las Trampas
  - ✓ Leona Canyon
  - ✓ Mission Peak
  - ✓ Ohlone
  - ✓ SF Bay Trail
  - ✓ Briones to Las Trampas Trail
  - ✓ Castle Rock
  - ✓ Contra Loma
  - ✓ Diablo Foothills
  - ✓ Kennedy Grove
  - ✓ Lafayette to Moraga Trail
  - ✓ Point Pinole Shoreline
  - ✓ Sobrante Ridge
  - ✓ Tilden (Nature Area)
  - ✓ Vasco Hills
  - ✓ Waterbird
  - ✓ Wildcat Canyon
  - ✓ Wildcat Creek Trail
  - ✓ Bay Area Ridge Trail (KG to SO)
  - ✓ Bishop Ranch
  - ✓ Black Diamond Mines

- ✓ Briones
- ✓ Briones to Martinez Trail
- ✓ Briones to Mt Diablo Trail
- ✓ Byron Vernal Pools
- ✓ CA State Riding & Hiking Trail
- ✓ Calaveras Ridge Trail (LT to PR)
- ✓ Carquinez Strait Shoreline
- ✓ Clayton Ranch
- ✓ Crockett Hills
- ✓ Deer Valley
- ✓ Doolan Canyon
- ✓ Dublin Hills
- ✓ Las Trampas
- ✓ Las Trampas to Mt Diablo Trail
- ✓ Little Hills
- ✓ Morgan Territory
- ✓ Radke Martinez Shoreline
- ✓ Rancho Pinole
- ✓ Round Valley
- ✓ SF Bay Trail
- ✓ Sibley
- ✓ Sycamore Valley
- ✓ Thurgood Marshall
- ✓ Vasco Caves
- ✓ Brooks Island

➢ **Moderate**

- ✓ Alameda Creek Trail
- ✓ Anthony Chabot
- ✓ Ardenwood Historic Farm
- ✓ Brushy Peak
- ✓ Camp Arroyo
- ✓ Del Valle
- ✓ Del Valle to Shadow Cliffs Trail
- ✓ Hayward Shoreline
- ✓ Lake Chabot
- ✓ Martin Luther King Jr. Shoreline
- ✓ McLaughlin Eastshore
- ✓ Oyster Bay Shoreline
- ✓ Pleasanton Ridge
- ✓ Quarry Lakes
- ✓ Shadow Cliffs
- ✓ Sunol
- ✓ Vargas Plateau
- ✓ Doolan Canyon
- ✓ Five Canyons
- ✓ Mission Peak
- ✓ Ohlone
- ✓ Tassajara Creek Trail
- ✓ Big Break Shoreline
- ✓ Briones to Las Trampas Trail
- ✓ Delta Access
- ✓ Diablo Foothills
- ✓ Lafayette to Moraga Trail
- ✓ North Richmond Shoreline
- ✓ Point Pinole Shoreline
- ✓ San Pablo Bay Shoreline
- ✓ Sobrante Ridge
- ✓ Vasco Hills
- ✓ Waterbird
- ✓ Wildcat Creek Trail
- ✓ Big Break Delta Shoreline Trail
- ✓ Black Diamond Mines
- ✓ Briones
- ✓ Briones to Mt Diablo Trail
- ✓ Byron Vernal Pools
- ✓ CA State Riding & Hiking Trail
- ✓ Carquinez Strait Shoreline
- ✓ Clayton Ranch
- ✓ Crockett Hills
- ✓ Deer Valley
- ✓ Doolan Canyon
- ✓ Las Trampas
- ✓ Las Trampas to Mt Diablo Trail
- ✓ Miller/Knox Shoreline
- ✓ Radke Martinez Shoreline
- ✓ Round Valley
- ✓ SF Bay Trail
- ✓ SF Bay Trail (PP to CS)
- ✓ Sycamore Valley
- ✓ Vasco Caves

EBRPD Very High Fire Hazard Severity Zones

An additional analysis was performed on the EBRPD lands and assets located in the LRA utilizing the Very High FHSZs dataset. Within the EBRPD, the Alameda Recommended (c1fhszl06_3) and Contra Costa Recommended (c7fhszl06_3) datasets were utilized for the analysis and contained the VHFHSZ hazard classes comprised of Very High and Non-Very High. The Very High FHSZs are shown in Figure 4-89. Table 4-109 shows the number of Park District lands that intersect the Very High FHSZs, as well as the number of acres affected Table 4-110 shows the number of Park District assets that that fall within the Very High FHSZs and their replacement values. More detail on specific Park District lands and assets in Very High FHSZs layer can be found in Appendix F. A list of the parks affected by the Very High FHSZs was shown above.

Figure 4-89 EBRPD – LRA - Very High Fire Hazard Severity Zones

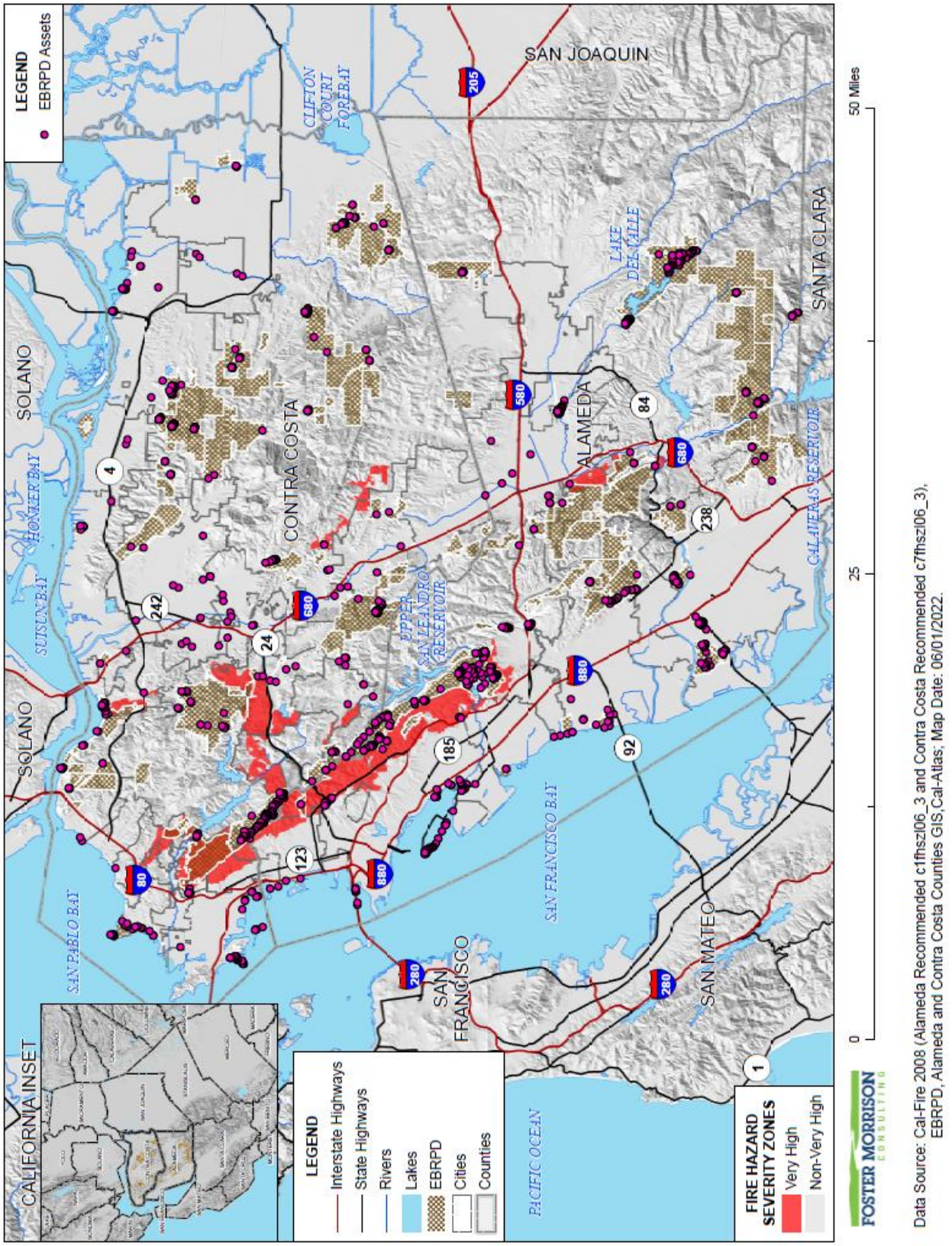


Table 4-109 EBRPD – VHFHSZs and Affected Park District Lands and Acres

Fire Hazard Severity Zone/ EBRPD Park Lands	Total Number of Park Lands	Affected Park Lands	Percent of Affected Park Lands	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
Very High						
Alameda County Total	43	13	30.2%	20,578	832	4.04%
Contra Costa County Total	57	15	26.3%	30,763	3,709	12.06%
Grand Total	**100**	**28**	**28.0%**	**51,340**	**4,540**	**8.84%**

Source: CAL FIRE, EBRPD GIS

Table 4-110 EBRPD – VHFHSZs and Affected Park District Assets and Replacement Values

Fire Hazard Severity Zone/ EBRPD Park Values	Number of Affected Park Lands	Asset Count	Replacement Value
Very High			
EBRPD - Alameda County Total	4	746	$192,893,264
EBRPD - Contra Costa County Total	3	655	$137,649,852
EBRPD VHFHSZ Total	**7**	**1,401**	**$330,543,116**

Source: CAL FIRE, EBRPD GIS

Critical Facilities at Risk from Wildfire

EBRPD critical facilities are a subset of the total facilities of the Park District. The Park District reviewed the total EBRPD assets and determined that the following types of Park District assets would be considered critical facilities, as discussed in Section 4.2.4 above. Using this definition and mapping from of Park District assets, CAL FIRE FHSZs were overlayed on the critical facility layer. Those critical facilities that fall within the FHSZs can be seen in Figure 4-88 (which shows all mapped assets including critical facilities) and detailed on Table 4-99 below. More information on critical facilities can be found in Appendix G and H.

Table 4-111 EBRPD – Critical Facilities Inside Moderate or Higher FHSZs

County/Park Lands	Fire Hazard Severity Zone / Asset Type	Asset Count
Alameda County		
Alameda County Trails	**High**	
	Building	3
	Moderate	
	Pedestrian Paving	1
	Alameda County Trails Total	**4**
Anthony Chabot	**Very High**	

County/Park Lands	Fire Hazard Severity Zone / Asset Type	Asset Count
	Building	3
	Pedestrian Paving	4
	Water Supply	4
	High	
	Building	3
	Sanitary Sewer	4
	Water Supply	1
	Anthony Chabot Total	**19**
Ardenwood	**High**	
	Building	5
	Ardenwood Total	**6**
Camp Arroyo	**High**	
	Building	14
	Sanitary Sewer	1
	Water Supply	1
	Moderate	
	Building	6
	Water Supply	1
	Camp Arroyo Total	**23**
Claremont Canyon	**Very High**	
	Building	2
	Claremont Canyon Total	**2**
Coyote Hills	**High**	
	Building	6
	Coyote Hills Total	**6**
Crown Beach	**High**	
	Pedestrian Paving	1
	Crown Beach Total	**1**
Cull Canyon	**High**	
	Building	5
	Pedestrian Paving	1
	Sanitary Sewer	1
	Cull Canyon Total	**7**
Del Valle	**High**	
	Building	6
	Pedestrian Paving	1
	Sanitary Sewer	5

County/Park Lands	Fire Hazard Severity Zone / Asset Type	Asset Count
	Tank	5
	Water Supply	1
	Moderate	
	Building	1
	Sanitary Sewer	3
	Water Supply	1
	Del Valle Total	**23**
Don Castro	**High**	
	Building	2
	Sanitary Sewer	2
	Don Castro Total	**4**
Garin/Dry Creek Pioneer	**High**	
	Building	4
	Pedestrian Paving	15
	Sanitary Sewer	1
	Water Supply	4
	Garin/Dry Creek Pioneer Total	**24**
Lake Chabot	**Very High**	
	Building	22
	Pedestrian Paving	22
	Sanitary Sewer	2
	Water Supply	3
	High	
	Pedestrian Paving	1
	Moderate	
	Pedestrian Paving	1
	Lake Chabot Total	**51**
Martin Luther King, Jr.	**High**	
	Pedestrian Paving	1
	Piers & Docks	2
	Moderate	
	Pedestrian Paving	1
	Martin Luther King, Jr. Total	**16**
Mission Peak	**High**	
	Water Supply	1
	Mission Peak Total	**1**
Peralta Oaks	**Very High**	

County/Park Lands	Fire Hazard Severity Zone / Asset Type	Asset Count
	Building	1
	Peralta Oaks Total	**1**
Peralta Oaks North	**Very High**	
	Building	1
	Peralta Oaks North Total	**1**
Pleasanton Ridge	**Very High**	
	Building	1
	High	
	Building	6
	Pleasanton Ridge Total	**7**
Quarry Lakes	**High**	
	Water Supply	1
	Moderate	
	Building	1
	Quarry Lakes Total	**2**
Reinhardt Redwood	**Very High**	
	Building	9
	Pedestrian Paving	8
	Water Supply	2
	Reinhardt Redwood Total	**19**
Roberts	**Very High**	
	Building	4
	Water Supply	1
	Roberts Total	**5**
Sunol / Ohlone Wilderness	**High**	
	Building	4
	Pedestrian Paving	1
	Water Supply	4
	Windmill	1
	Sunol / Ohlone Wilderness Total	**10**
Temescal	**Very High**	
	Building	5
	Sanitary Sewer	3
	Storm Sewer	1
	Water Supply	1
	High	
	Building	1

County/Park Lands	Fire Hazard Severity Zone / Asset Type	Asset Count
	Service & Pedestrian Tunnel	1
	Temescal Total	**14**
Vargas Plateau	**Moderate**	
	Water Supply	1
	Vargas Plateau Total	**1**
Contra Costa County		
Big Break	**Moderate**	
	Building	1
	Big Break Total	**1**
Black Diamond Mines	**High**	
	Building	32
	Water Supply	4
	Moderate	
	Water Supply	1
	Black Diamond Mines Total	**37**
Briones	**High**	
	Building	3
	Roadways: Vehicular Bridges	1
	Water Supply	4
	Briones Total	**8**
Brooks Island	**High**	
	Water Supply	1
	Non-Wildland/Non-Urban	1
	Service & Pedestrian Tunnel	1
	Brooks Island Total	**2**
Byron Vernal Pools	**Moderate**	
	Water Supply	1
	Byron Vernal Pools Total	**1**
Carquinez Strait	**High**	
	Building	2
	Pedestrian Paving	1
	Carquinez Strait Total	**3**
Clayton Ranch	**High**	
	Pedestrian Paving	1
	Clayton Ranch Total	**1**
Contra Loma	**High**	
	Building	2

County/Park Lands	Fire Hazard Severity Zone / Asset Type	Asset Count
	Sanitary Sewer	1
	Contra Loma Total	**7**
Deer Valley	**Moderate**	
	Water Supply	3
	Deer Valley Total	**3**
Diablo Foothills / Castle Rock	**High**	
	Building	6
	Pedestrian Paving	3
	Water Supply	1
	Diablo Foothills / Castle Rock Total	**10**
East County Trails	**High**	
	Pedestrian Paving	1
	Moderate	
	Building	2
	Pedestrian Paving	1
	Sanitary Sewer	1
	East County Trails Total	**15**
Kennedy Grove	**High**	
	Building	1
	Kennedy Grove Total	**1**
Las Trampas	**Very High**	
	Building	2
	Sanitary Sewer	1
	Water Supply	5
	High	
	Building	3
	Pedestrian Paving	1
	Water Supply	3
	Las Trampas Total	**15**
Morgan Territory	**High**	
	Building	1
	Morgan Territory Total	**1**
Point Pinole	**High**	
	Roadways: Vehicular Bridges	1
	Moderate	
	Building	5
	Roadways: Vehicular Bridges	2

County/Park Lands	Fire Hazard Severity Zone / Asset Type	Asset Count
	Sanitary Sewer	1
	Point Pinole Total	**13**
Radke Martinez	**High**	
	Pedestrian Paving	2
	Moderate	2
	Pedestrian Paving	2
	Radke Martinez Total	**7**
Reinhardt Redwood	**Very High**	
	Pedestrian Paving	3
	Reinhardt Redwood Total	**3**
Round Valley	**High**	
	Pedestrian Paving	1
	Moderate	
	Building	1
	Pedestrian Paving	1
	Water Supply	2
	Round Valley Total	**5**
Sibley	**Very High**	
	Building	1
	Water Supply	1
	Sibley Total	**2**
Sycamore Valley	**High**	
	Pedestrian Paving	1
	Moderate	
	Pedestrian Paving	1
	Sycamore Valley Total	**2**
Tilden	**Very High**	
	Building	26
	Pedestrian Paving	19
	Sanitary Sewer	5
	Service & Pedestrian Tunnel	3
	Storm Sewer	2
	Water Supply	5
	Tilden Total	**60**
Vasco Caves	**Moderate**	
	Building	1
	Vasco Caves Total	**1**

County/Park Lands	Fire Hazard Severity Zone / Asset Type	Asset Count
Vasco Hills	**Moderate**	
	Building	3
	Tank	2
	Water Supply	2
	Vasco Hills Total	**7**
Wildcat Canyon	**High**	
	Building	1
	Roadways: Vehicular Bridges	1
	Sanitary Sewer	1
	Wildcat Canyon Total	**3**

Source: CAL FIRE, EBRPD GIS

Overall EBRPD (Community) Impact

The overall impact to the Park District from a severe wildfire includes:

- Injury and loss of life to staff and visitors
- Smoke and air quality issues
- Damage to District facilities and infrastructure
- Damage to natural resource habitats and other natural resources
- Damages to sensitive cultural 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 Park District staff, emergency responders, and/or area residents

Future Development

Future EBRPD facilities will take wildfire into account when siting new facilities. Fire hydrants, defensible space, ignition resistant construction, well production, water storage, and on-going maintenance are all wildfire considerations when assessing future development. New facilities will be built to the most current CBC standards of the applicable jurisdiction, which takes wildfire into account during building design and construction. In addition, the Park District is replacing older redwood tanks with steel tanks, making the Park District systems more fire resilient.

4.3.17. Natural Hazards Summary

Table 4-112 summarizes the results of the hazard identification and hazard profile for the EBRPD 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 considered a priority hazard for the Park District based on the hazard profiles and vulnerability assessment.

Priority Hazards

As detailed in the hazard identification section, those hazards identified as a high or medium significance in Table 4-112 are considered priority hazards for mitigation planning. Those hazards that occur infrequently or have little or no impact on the EBRPD Planning Area 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, extent, and resulting damage, including deaths/injuries and property, crop, and economic damage. The ability of a jurisdiction to reduce losses through implementation of existing and new mitigation measures was also considered as to the significance of a hazard. This assessment was used by the HMPC to prioritize those hazards of greatest significance to the EBRPD Planning Area, enabling the Park District to focus resources where they are most needed.

Note: that while included in the initial hazard identification, based on the updated risk assessment, Pandemic and Tsunami are considered low priority hazards to the EBRPD for this 2023 LHMP Update and will not be addressed further in the development of the mitigation strategy portion of this Plan.

Table 4-112 Hazard Identification and Initial Determination of Priority Hazards

Hazard	Likelihood of Future Occurrence	Priority Hazard
Climate Change	Likely	Y
Coastal Flooding and Sea Level Rise	Likely	Y
Dam Failure	Unlikely	Y
Drought & Water Shortage (with tree mortality)	Likely	Y
Earthquakes (and earthquake liquefaction)	Occasional	Y
Flood: 1%/0.2% annual chance	Occasional/ Unlikely	Y
Flood: Localized/Stormwater Flooding	Highly Likely	Y
Landslide, Mudslide, Debris Flow	Highly Likely	Y
Levee Failure	Occasional	Y
Pandemic	Occasional	N
Severe Weather: Extreme Heat	Highly Likely	Y
Severe Weather: Heavy Rain and Storms	Highly Likely	Y
Severe Weather: High Winds and Tornadoes	Highly Likely	Y
Tsunami	Occasional	N
Wildfire (with smoke/ air quality)	Highly Likely	Y

Source: EBRPD

4.4 Capability Assessment

Thus far, the planning process has identified the natural hazards posing a threat to the EBRPD and described the vulnerability of the Park District 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 Park District's net

vulnerability to disasters, and more accurately focuses the goals, objectives, and proposed actions of this Plan.

Similar to the effort to describe hazards, risks, and vulnerability of the Park District, this mitigation capability assessment describes the Park District'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. These capabilities are in addition to, include, and supplement the many plans, reports, and technical information reviewed and used for this LHMP Update.

4.4.1. EBRPD Regulatory Mitigation Capabilities

Table 4-113 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 Park District. Also, note in the capabilities. Many of the regulatory capabilities below address hazards, projects, and can be used to implement mitigation actions.

Table 4-113 EBRPD Regulatory Mitigation Capabilities

Plans	Y/N Year	Date/Explanation
General Plan	Y	2013 Master Plan
Capital Improvements Plan	Y	2022 Projects & Programs Budget
Economic Development Plan	Y	EBRPD Grants Schedule 2017 Economic Analysis Plan
Local Emergency Operations Plan	Y	2004 Emergency Operations Plan 2017 LHMP identifies hazards and has a mitigation strategy (mostly preparedness). 2012 Fire Danger Operation Plan (contains a lightning protocol and a high wind protocol. Heat Illness Prevention Policy
Continuity of Operations Plan	N	
Transportation Plan	Y	See Regional Trails in 2013 Master Plan map
Stormwater Management Plan/Program	N	Though no plan exists per se, the District has identified areas for drainage systems and culvert replacements.
Engineering Studies for Streams	N	
Community Wildfire Protection Plan	Y	EBRPD Wildfire Hazard Reduction and Resource Management Plan (2010) Fire Danger Operating Plan (2012; updated in 2021) Vegetation Management Plan (2010)

Other special plans (e.g., brownfields redevelopment, disaster recovery, coastal zone management, climate change adaptation)	Y	2013 Hazardous Fire Risk Reduction EIS Tree Die Back Plan Hazardous Tree Removal Plan Coyote Hills Restoration and Public Access Project (2018) Annual Integrated Pest Management Reports Park Watch Reports (Annual – Public Safety) Emergency Action Plans for dams owned by District – Lake Temescal (2022) and C.L. Tilden (2022) 2020 Adapting to Rising Tides Bay Area: Summary of Regional SLR Vulnerability and Adaptation Study SF Bay Trail Risk Assessment and Adaptation Prioritization Plan (2022) EBRPD and Sea Level Rise - Hayward Regional Shoreline Adaptation Plan Park Specific Land Use Plans High Wind Protocol
Building Code, Permitting, and Inspections	**Y/N**	**Are codes adequately enforced?**
Building Code	N	EBRPD does not perform code enforcement.
Building Code Effectiveness Grading Schedule (BCEGS) Score	N/A	
Fire department ISO rating:	N	
Site plan review requirements	N	Land Acquisition Evaluation Protocol Capital Improvement Program Criteria
Land Use Planning and Ordinances		
Zoning ordinance	N	EBRPD does not enforce ordinances. Land Use Plans for many but not all parks. District generally follows the ordinances in force in the many local jurisdictions where their Park District lands are located.
Subdivision ordinance	N	See above
Floodplain ordinance	N	See above
Natural hazard specific ordinance (stormwater, steep slope, wildfire)	N	See above
Flood insurance rate maps	Y	The Alameda and Contra Costa County DFIRMs cover Park District lands.
Elevation Certificates	N	If available on file with permitting jurisdiction
Acquisition of land for open space and public recreation uses	Y	All Park District land is for open space. The Park District acquisitions include areas prone to hazards. See Master Plan map.
Erosion or sediment control program	Y	Erosion is dealt with on case-by-case basis within the EBRPD.
Other		

How can these capabilities be expanded and improved to reduce risk?
The Park District continues to work through many of its existing plans. The Park District will continue to look at Recommended Treatment Areas for wildfire, reduce erosion and sediment by replacing culverts and doing bank stabilization, reduce shoreline erosion by completing planned shoreline improvements. The Park District will also continue to look for efforts to support adjacent communities in their risk reduction efforts, which benefits the Park District as well.

Source: EBRPD

As indicated in the tables above, EBRPD has several plans and programs that guide the Park District's mitigation of development of hazard-prone areas.

4.4.2. EBRPD Administrative/Technical Mitigation Capabilities

Table 4-114 identifies the Park District personnel responsible for activities related to mitigation and loss prevention in the Park District.

Table 4-114 EBRPD Administrative/Technical Mitigation Capabilities

Administration	Y/N	Describe capability Is coordination effective?
Planning Commission	N	
Disaster Council	N	
Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems)	Y	Hazardous Tree Program
Mutual aid agreements	Y	Mutual Aid with Hills Emergency Forum including CAL FIRE. Our fire department often goes to other fires including Camp Fire
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	N	
Floodplain Administrator	N	Work with staff from Alameda and Contra Costa County for floodplain administration.
Emergency Manager	Y	Fire Chief Aillen Theile
Community Planner	Y	Chief of Planning Brian Holt
Civil Engineer	Y	Chief of Design and Construction Lisa Goorjian
GIS Coordinator	Y	GIS Coordinator Dave Drueckhammer
Other	Y	Grants Manager Katy Hornbeck

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	We have a police dispatch. 911 from the parks go straight to our dispatch. We have reverse 911 in 2950 Peralta Oaks
Hazard data and information	Y	Hazard data is developed and used for specific studies and plans.
Grant writing	Y	Grants staff of 3, plus contract grant writers
Hazus analysis	N	
Other		
How can these capabilities be expanded and improved to reduce risk?		
Like many entities since the beginning of the Covid-19 pandemic, the Park District has been running on limited staff. Adding additional staff would help to increase police and fire staff, as well as staff who do day to day mitigation activities.		

Source: EBRPD

The East Bay Regional Park District has the necessary human resources to ensure that the mitigation plan continues to be an actively used planning document. Key Park District staff members with management-level positions in the divisions most involved in mitigation have been active in the preparation of the plan, including: Finance and Management Services; Acquisitions, Stewardship and Development; Operations; Public Safety; and Public Affairs. These key staff have gained a thorough understanding of the mitigation planning process and understand the importance of integrating the plan into ongoing programs and capital budget planning. Through this linkage, the Park District's hazard mitigation plan will be kept active and provide pragmatic guidance for implementing mitigation measures. Park District staff has broad experience with maintaining existing lands and facilities, planning new facilities and new parks, as well as facilitation of community inputs. This broad experience is directly applicable to hazard mitigation planning and to implementation of mitigation projects. Furthermore, if specialized expertise is necessary for a particular mitigation project, the Park District contracts with subject matter experts on an as-needed basis.

4.4.3. EBRPD Fiscal Mitigation Capabilities

Table 4-115 identifies financial tools or resources that the Park District could potentially use to help fund mitigation activities.

Table 4-115 EBRPD 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	Yes, the 2022 budget shows line items for multiple capital improvement projects. This has been used in the past to mitigate hazards.
Authority to levy taxes for specific purposes	Y	See Measure FF Forest Health is for fuels management
Fees for water, sewer, gas, or electric services	N	

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?
Impact fees for new development	N	
Storm water utility fee	N	
Incur debt through general obligation bonds and/or special tax bonds	Y	WW Bond is an example of this.
Incur debt through private activities	N	
Community Development Block Grant	Y	District has access to these grants and has used in the past.
Other federal funding programs	Y	District uses multiple federal sources for grants, including BRIC, HMGP, PDM, FMA, and other sources.
State funding programs	Y	District uses multiple state funding programs.
Other		
How can these capabilities be expanded and improved to reduce risk?		
The Park District is expanding capabilities by continuing to complete WW bond work, which helps reduce risk. Capital improvements are continuing to be expanded, as evidenced by the 2022 budget. The Park District continues to seek additional revenue in the form of state and federal grants. The EBRPD doggedly pursues those grants and has the expertise to complete them.		

Source: EBRPD

4.4.4. EBRPD Mitigation Education, Outreach, and Partnerships

Table 4-116 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 4-116 EBRPD 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	Hills Emergency forum, MLK Shoreline Partners
Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	Y	While not a formal program, the Park District provides hazard related information on their website and via newsletters.
Natural disaster or safety related school programs	Y	Naturalist Programs in Schools and at Parks
StormReady certification	N	
Firewise Communities certification	N	
Public-private partnership initiatives addressing disaster-related issues	N	

Program/Organization	Yes/No	Describe program/organization and how relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?
Other	Y	Annual community reports are done by the Park District each year. Hazard related information has been featured in the past.
How can these capabilities be expanded and improved to reduce risk?		
The Park District could expand the amount of hazard related information in their website and via newsletters. The Park District is always seeking new partners in surrounding communities to partner with. EBRPD will continue to look for those entities to partner with on hazard mitigation efforts.		

Source: EBRPD

The Park District relies on several sources of funding to acquire, develop, operate, and maintain the regional parklands. Eighty percent (80%) of the Park District's operating budget is from property tax revenues that are provided to the Park District in accordance with tax sharing agreements with both Alameda and Contra Costa Counties. The Park District received funds from eastern Alameda County through another tax sharing agreement with the Livermore Area Parks and Recreation District, and in eastern Contra Costa County through a Landscaping and Lighting District that was established to provide a funding source for Park District. The Park District also collects revenue from parking and entry fees, fees for interpretive and recreational services and other miscellaneous items based upon the Park District fee schedule. Revenue from these charges for services provides over 7 percent of the operating budget.

Property-related assessments and a special excise tax are collected to fund approximately 5 percent of the cost of operations. These include two Landscape and Lighting Districts, multiple Zones of Benefits, and Measure CC.

4.4.5. Other Mitigation Efforts

The next sections detail those mitigation efforts the EBRPD pursues that haven't been previously discussed in the tables above. This includes:

Multi-Hazard Mitigation Efforts

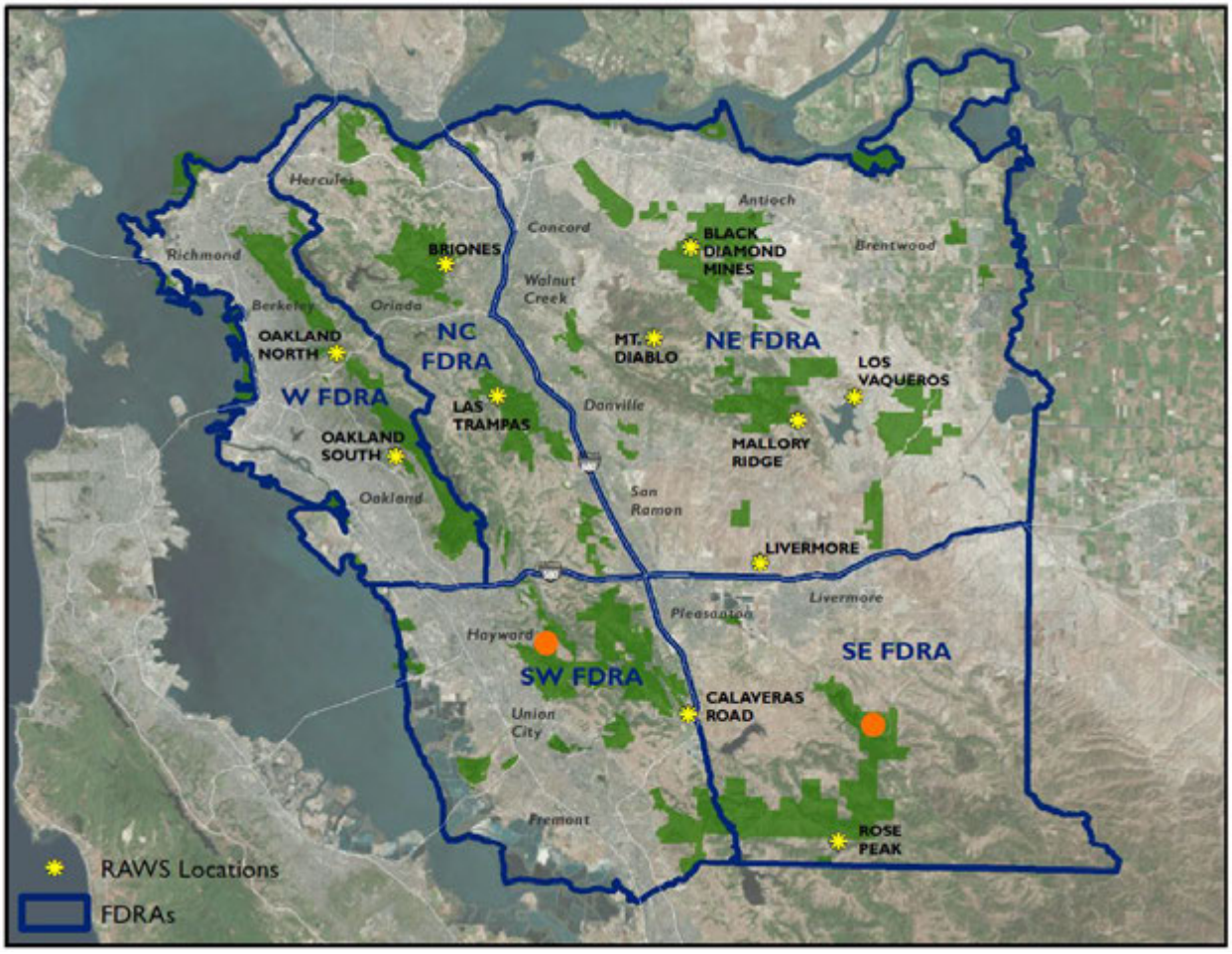
The Park District has sought and completed many other mitigation activities not captured above. These include:

- Multiple projects are worked on each year from Measure CC, Measure FF, and Measure WW funds.
- The Park District completes multiple grant applications each year for hazard related measures. The Park District has secured funds in the past for mitigation from BRIC, PDM, HMGP, Cal OES, CA DWR, and other sources.
- The Park District uses livestock to mitigate wildfire. Livestock grazing reduces grassland fuels.
- Wildfire prevention efforts are sought by using fuels management and defensible space, as well as removing hazardous trees.
- In 1991 and 1993, respectively, the Park District established the East Contra Costa County and the Alameda/Contra Costa County Regional Trails Landscape and Lighting Benefit Assessment Districts.

Both Assessment Districts were reaffirmed by the electorate in 1996 with a positive vote of 67 percent and 78 percent, respectively. These assessments augment funding for servicing parks and trails located within these geographic locations.

- Zones of Benefit are formed to provide operating resources for specific park properties located in close proximity to assessed parcels.
- In 2004, two-thirds of the voters in the western portion of the Park District approved Measure CC, which provides approximately $3.3 million in annual revenue for listed Park District projects in the area from Oakland through Richmond. The funds provide both operational and project funding through 2020.
- Other operating revenues include investment income, property usage, inter-agency agreements and donations. In 1998, voters approved the $225 million Measure AA general obligation bond, the proceeds of which were to be used for Park District property acquisition and park development.
- In 2008, voters approved an additional $500 million general obligation bond for property acquisition and park development by supporting the Regional Open Space, Wildlife, Shoreline and Park Bond (Measure WW). The Park District has funded significant acquisitions and park construction through the Measure WW bond program that will continue through the final sale of bonds, anticipated to be after 2022.
- In 2012, $25 million of limited obligation bonds were issued by the Park District to fund Field and Administrative Facility Replacement and Renovation. Many of these sources of funding summarized above are restricted to defined types of projects and activities. However, mitigation measures have been funded from many of these revenue sources and the hazard and risk information in the mitigation plan helps the Park District avoid building new facilities in high hazard areas whenever possible.
- The Park District uses Remote Automated Weather Stations (RAWS) to track climate and weather conditions. Figure 4-90 shows existing RAWS locations and potential new sites. The' yellow stars represent stations owned by EBRPD, while orange dots mark the newly proposed RAWS sites. These new proposed sites would enhance fire danger forecasting for all of the agencies in the region; the new locations would also provide weather data acquisition within one of our existing Fire Danger Rating Areas (FDRA). The Park District currently does not have a station that offers adequate weather readings within the South West (FDRA).

Figure 4-90 EBRPD – RAWS Locations



Source: EBRPD

Climate Change Mitigation Efforts

EBRPD has always been a "green" agency. "Green" Initiatives Undertaken include

- Camp Arroyo

5. Youth environmental education camp in Livermore
   - ✓ $10 million dollar state of the art construction project includes six 24 person cabins, dining hall/multipurpose room, two bathhouses, swimming complex built on 138-acre site
   - ✓ Environmentally innovative design includes "green" features such as straw bale insulation, solar heating and gunned-earth construction for the pool, metal roofs to catch runoff water for irrigation, composting through an organic garden and use of recycled materials wherever possible
   - ✓ The educational curriculum focuses on teaching about "green" practices
   - ✓ Recognized with several innovation awards for green technology
   - ✓ 2005 Governor's Office Award for environmental leadership
   - ✓ 2002 Earth Day Top Ten Award, National AIA Committee on the Environment
   - ✓ 2002 Savings By Design Honor Award, California Council AIA

- Water Conservation

6. Native plant and Wildlife friendly landscaping
   - ✓ Use of "blue" non-potable water in some turf areas
   - ✓ Waterless urinals save 40,000 gallons of water annually

1. Energy Conservation
   - ✓ At the Park District Administration building
   - ✓ Photovoltaic system (solar panels) reduced energy usage by half from 1996 - 2006
   - ✓ Replaced lighting and HVAC system to reduce consumption
   - ✓ Worked with PGE on energy savings and financing/rebate incentives
   - ✓ Reduced greenhouse gas CO2 = over 2000 tons
   - ✓ $1 million dollars projected savings to District over 25 years of solar usage

- Recycling Efforts

7. 142 containers in 34 active recreation parks (i.e., picnic and play areas), capturing aluminum cans, glass and plastic bottles
   - ✓ Administration building recycling = over 12 tons of paper recycling in 2006
   - ✓ Composting available at all park employee offices, and public facilities
   - ✓ Battery recycling containers distributed for collection and disposal with Alameda County Household Hazardous Waste Facility
   - ✓ Special recycling efforts for E-waste, computers, scrap metals
   - ✓ "Grass-cycling" - leaving grass cuttings on lawns is standard practice

- Vehicle Fleet

8. Administration pool cars include hybrid vehicles
   - ✓ Testing use of biodiesel for park trucks
   - ✓ Electric vehicles for inner park travel and rubbish removal

2. Chemical Use
   - ✓ Have environmentally focused integrated pest management program
   - ✓ Ongoing research coordination with academia including U.C. Berkeley, U.C. Davis on grassland studies, native plants, sudden death oak syndrome, etc.
   - ✓ Use Green certified building chemicals, cleaners and janitorial supplies

- Environmental Construction

9. Eight chemical toilets and numerous bluebird nesting boxes were built with reclaimed lumber deconstructed from park shade structures
   - ✓ Redwood lumber is no longer used for District picnic tables. Cedar is now the material used
   - ✓ Waterless urinals have been placed in three parks and the administration building
   - ✓ Free, recycled paint used to paint park structures and cover graffiti

- Environmentally-Preferred Purchasing Policy

10. Cross divisional team developed with board input
    - ✓ Preference for recycled and recyclable products
    - ✓ Energy/water saving appliances
    - ✓ Sustainably harvested/grown materials
    - ✓ Rechargeable batteries and chargers regular stock supplies and staff is encouraged to use this environmentally preferable alternative

- Environmental Education

11. Six visitor centers teaching Bay Eco-system, watershed protection, sustainable farming, historical and cultural resources

- Environmental Acknowledgements

12. District Equipment Shops have earned certification as Green Businesses by counties
    - ✓ Butterfly Garden certified as Bay Friendly Garden by the county Waste Management Authority
    1. Crab Cove Visitor Center certified by Alameda County as a green business, 2012

In addition, there are many potential hazards, the Park District has identified wildfire, extreme heat, sea level rise, flooding, drought, and increased pest and disease, as the primary hazards that could affect our parklands.

- Wildfire – With rising temperatures and drought, wildfire risk increases. While fire is a natural process and vital for some habitats, uncontrolled or intense wildfire poses a risk to our parklands and neighboring communities. The Park District is proactively mitigating wildfire risk through a robust fuels management program and education campaign.
- Extreme Heat – Extreme heat is when temperatures are significantly higher than normal. Extreme heat events threaten biodiversity and public health. The vegetation in Park District's help to reduce temperatures in the region. The Park District's shaded trails and swim facilities are also great places to escape the heat.
- Sea Level Rise – The Park District has over 55 miles of bay shoreline, some of which is threatened by sea level rise. The Park District is designing shoreline and tidal wetland restoration projects considering future sea levels. These projects help protect nearby parklands and communities from flooding while providing habitat benefits that adapt to the changing conditions. The Park District is also conducting a study to better understand vulnerabilities along the Bay Trail (SF Bay Trail Risk Assessment and Adaptation Prioritization Plan) and working to develop the Hayward Shoreline Adaptation Master Plan to identify multi-benefit strategies to address sea level rise. Explore our storybook on the East Bay Regional Parks and Sea Level Rise.
- Flooding – An increase in extreme weather events may result in flooding that affects infrastructure, habitat, and park users. Combined with drought, the hardened ground may be less able to absorb rainwater leading to increased erosion or mudslides. The Park District considers flooding potential in new designs and construction and is modifying trails and drainages to reduce potential damage from erosion. In 2018, voters approved Measure FF, which supports numerous erosion control projects that will help parks prepare for future funding.
- Drought – Increased temperatures and changes in rainfall patterns may lead to prolonged periods of drought. Wildlife and plant species are threatened by decreased water sources and the risk of wildfire is increased. The Park District is installing rain catchment systems and repairing ponds to hold water for longer periods of time. These supplemental water sources during periods of drought.
- Pests & Disease – Drought and other extreme weather events weaken species and increase the vulnerability of ecosystems to pests and disease. Pests that affect our parks include invasive plants and animals, insects, soil pathogens, blue-green algae, and disease. The Park District's Integrated Pest Management Program focuses on prevention through reducing the potential for introduction and spread of pests and pathogens. When necessary, the Park District utilizes the most current science and best management practices to treat disease and control pests.

High Heat Mitigation Efforts

The Park District has a high heat illness policy (dated 2015) that is enacted when EBRPD staff are working in high heat conditions. Access to cool drinking water, procedures for access to shade, procedures for monitoring weather, and high heat procedures are all detailed in this policy.

Wildfire Mitigation Efforts

Fuels Treatment (2022)

Every year the Park performs fuels treatment. There are areas that the Park District has CEQA permits. These are known as Recommended Treatment Areas (RTAs). An example of what occurred in 2022 follows:

Grazing

- March-August

13. 4 Goat Grazing Companies
    - ✓ 837 acres, 52 different sites within 13 parks.

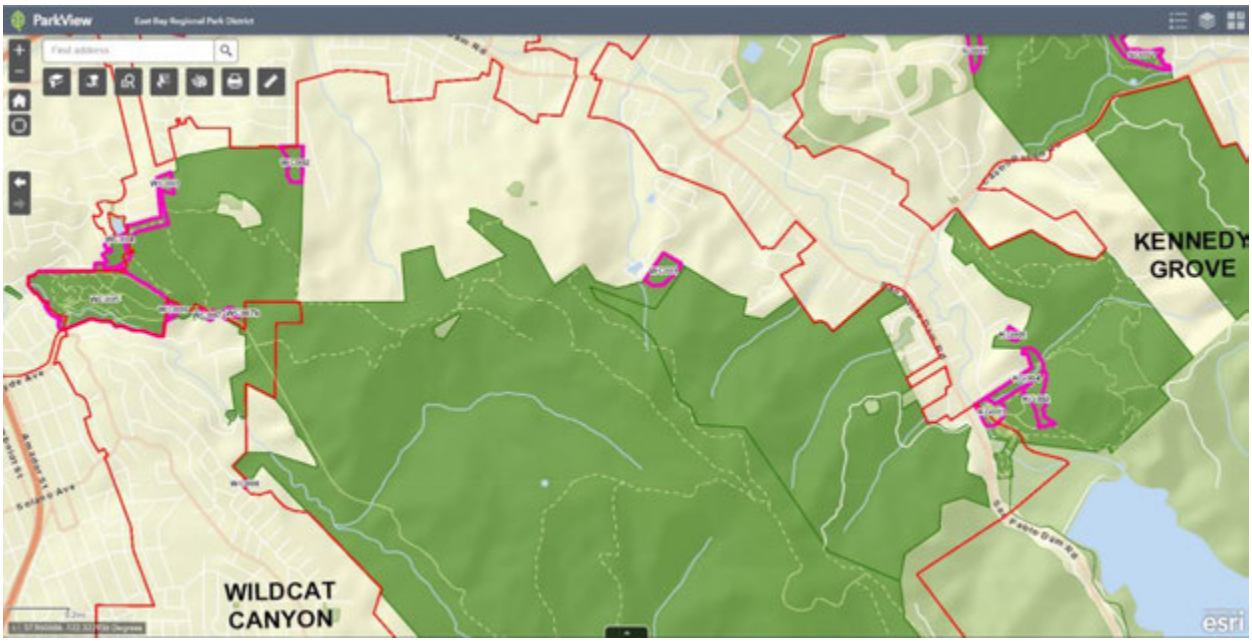
Grazing

- Miller Knox, Crest Ave 8/15/2022
- Wildcat Canyon, Park Ave. 7/20/2022
- Wildcat Canyon, Monte Cresta 7/20/2022
- Wildcat Canyon, La Colina 7/20/2022
- Wildcat Canyon, Purdue Meadow 7/1/2022
- Wildcat Canyon WC002 (La Cima Rd, Magnolia Ln Los Arboles)
- Wildcat Canyon WC003 (Jerliynn Ave)
- Wildcat Canyon WC004 (Grand Canyon Ave, Arlington Dr., Monte Cresta)

Initial Treatment

- Wildcat Canyon WC007 (Park View)
- Wildcat Canyon WC009 (Vista Heights Rd)
- Wildcat Canyon WC010 (Wildcat Dr)
- Wildcat Canyon WC011 (Kensington Dr)
- Miller Knox MK005, MK006, MK007

Figure 4-91 EBRPD – RTAs for Fuels Treatment



Source: EBRPD Fire

PSPS Shutdown Protocol

The EBRPD has a PSPS Protocol Facility Use Assessment. This Assessment tracks facilities, parks, locations, types, occupancies, impacted services, and generator needs. The Park District uses this protocol during PSPS events to minimize risk to staff and to those who are in EBRPD buildings.

Chapter 5 Mitigation Strategy

Requirement §201.6(c)(3) and §201.7(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 EBRPD Local Hazard Mitigation Plan (LHMP) Update. It describes how the Park District 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 Update. As part of the LHMP Update process, a comprehensive review and update of the mitigation strategy portion of the 2017 LHMP was conducted by the HMPC. Some of the initial goals and objectives from the 2017 EBRPD LHMP were refined and reaffirmed, some were deleted, and others were added. The end result was a new set of goals and objectives, reorganized to reflect the completion of progress towards the 2017 actions, the updated risk assessment and the new priorities of this 2022 LHMP Update. To support the new LHMP goals, the mitigation actions from 2017 were reviewed and assessed for their value in reducing risk and vulnerability to the EBRPD Planning Area from identified hazards and evaluated for their inclusion in this LHMP Update (See Chapter 2 What's New). Section 5.2 below identifies the new goals and objectives of this LHMP Update and Section 5.4 details the new mitigation action plan.

Taking all of the above into consideration, the HMPC developed the following umbrella mitigation strategy for this LHMP Update:

- Communicate the hazard information collected and analyzed through this planning process as well as mitigation success stories so that the Park District and larger 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 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. 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 recovery efforts so that at-risk infrastructure, development, and other community assets are stronger and more resilient for the next severe hazard 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 communities 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 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 all communities as part of their post disaster redevelopment and mitigation policies and procedures. As detailed in Section 4.4, the Capability Assessment for the Park District, post-disaster redevelopment and mitigation policies and procedures are evaluated and updated as part of the Emergency Operations Plan (EOP) updates and other emergency management plans for the Park District.

The EOP and other emergency management plans, through their 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 the Park District to their 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 Park District 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. FEMA mitigation grant funding opportunities available pre- and post- disaster include the following.

FEMA HMA Grants

Cal OES administers three main types of HMA grants: (1) Hazard Mitigation Grant Program, (2) Building Resilient Infrastructure and Communities (BRIC), replacing the former Pre-Disaster Mitigation (PDM) 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 High Hazard Potential Dam (HHPD) Program Grant

FEMA's Rehabilitation of High Hazard Potential Dam (HHPD) grant program provides technical, planning, design, and construction assistance for eligible rehabilitation activities that reduce dam risk and increase community preparedness. For the purposes of the HHPD program, the term "rehabilitation" means the repair, replacement, reconstruction, or removal of a dam that is carried out to meet applicable state dam safety and security standards.

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) and §201.7(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 the 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 EBRPD Planning Area.

Goals were defined for the purpose of this mitigation plan as broad-based public policy statements that:

- Represent basic desires of the EBRPD;
- Encompass all aspects of the EBRPD community, 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
- 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 goals and objectives from the 2017 LHMP as well as a list of other sample goals to consider. The team was told that they could use, combine, or revise the statements provided or develop new ones, keeping the risk assessment in mind. Each member was asked to provide three goal statements. Goal statements were collected and grouped into similar themes and provided to the HMPC. 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. Edits and refinements to these new goals and resulting objectives were included until the team came to consensus on the final goals and objectives for this 2022 LHMP Update. It should be noted that many of the original actions from the 2017 LHMP were determined to be more of an overarching mitigation policy or objective to the mitigation strategy development process and not an implementable action. Many of these "actions" are carried out as a common business practice of the Park District. As such, given the value of these to guide mitigation in the Park District, 21 of the 45 actions from 2017 have become objectives for this 2022 LHMP Update. Based on the risk assessment review and goal setting process, the HMPC identified an overarching mission statement and the following goals and objectives (Table 5-1), which provide the direction for reducing future hazard-related losses within the EBRPD Planning Area.

Mission Statement:

This Local Hazard Mitigation Plan assesses natural hazards of concern to the EBRPD, including consideration of climate change effects on hazards; evaluates risk to life safety, public health, property, and the environment; and evaluates mitigation measures to reduce risks and vulnerabilities, minimize losses, and increase EBRPD resilience and sustainability.

Goal 1: Reduce Threats to Life Safety for Visitors, Staff and Residents Adjacent to the Park District's Parks

Goal 2: Reduce Damage to the Park District's Lands and Facilities, Critical Infrastructure, and Adjacent Areas from Future Natural Hazard Events

Goal 3: Protect Environmentally Important Lands and Facilities and Sites with Historical/Cultural Significance and to Ensure the Long-Term Viability of Important Natural Resources

Goal 4: Enhance Emergency Planning, Disaster Response and Post-Disaster Recovery Efforts to Increase Park District Capabilities and Leverage Interagency and Public-Private Coordination and Resources to be Prepared for, Respond to, and Recover from Future Natural Hazard Events

Goal 5: Increase Education, Awareness and Understanding of Natural Hazards and Mitigation

Table 5-1 East Bay Regional Park District LHMP Update: 2022 Mitigation Objectives

Mitigation Strategy Objectives	Goals Addressed
Retrofit or replace facilities, with a high vulnerability, with new current-code facilities or relocate them out of high hazard areas to protect lives, reduce damage, loss of function, economic loss, and disruptions in future natural hazard events	1, 2
Locate new facilities outside of high hazard areas whenever possible and design them to minimize risk and vulnerability from future natural hazard events	1, 2
Minimize threats to important lands, resources, facilities, and sites from future natural hazard events	3
Manage, maintain and restore park lands so that they retain their important scenic, natural and cultural values.	3
Maintain, acquire and preserve significant biologic, geologic, scenic and historic resources within Alameda and Contra Costa counties.	3
Enhance collaboration and coordination between the Park District, local governments, utilities, businesses and citizens to prepare for, respond to, and recover from future natural hazard events	1, 2, 3, 4
Enhance emergency planning to facilitate effective preparedness, response and rapid recovery from future natural hazard events	1, 2, 3, 4
Develop robust disaster response and evacuation plans for Park District staff, workers, and visitors and conduct frequent practice drills using hazard and risk information in the mitigation plan	1, 2, 3, 4

Mitigation Strategy Objectives	Goals Addressed
Systematically track natural hazard events that result in damage to Park District facilities to help target mitigation actions	1, 2, 3, 4, 5
Enhance and complete the Park District's inventory of facilities, resources, and sites to more accurately evaluate risks from natural hazards	2, 3
Implement education and outreach efforts to increase awareness of natural hazards throughout the Park District, including those that pose substantial life safety risk, to Park District staff, visitors and communities served by the Park District	1, 2, 5
Increase awareness and understanding of natural hazards by creating, maintaining, and publicizing a natural hazards page on the Park District's website with links to more information about natural hazards and mitigation activities to reduce risks from natural hazards	1, 2, 3, 5
Keep the Park District's LHMP on the website and encourage comments from stakeholders for the periodic review and update of the mitigation plan	1, 2, 5
Continue outreach and education programs through the Hills Emergency Forum, the Fire Wise Program, Local Fire Safe Councils and other organizations	1, 2, 3, 5
Integrate and implement the findings and mitigation actions in the mitigation plan into ongoing programs, plans and practices for the Park District	1, 2, 3, 4, 5
Continue to refine the Park District's mitigation strategies to maximize risk reduction, while minimizing possible impacts on the natural environment	1, 2, 3, 4, 5
Pursue mitigation grants from FEMA's pre- and post-disaster programs, CAL FIRE, US Forest Service, California Fire Safe Council, and from other grant sources	1, 2, 3, 4, 5
Pursue FEMA Public Assistance grants if Park District facilities suffer damage in a FEMA declared disaster and include mitigation measures in addition to repairs	2, 3

5.3 Identification and Analysis of Mitigation Actions

Requirement §201.6(c)(3)(ii) and §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 and objectives, each hazard identified in Section 4.1 was evaluated at the completion of the risk assessment as part of the second prioritization process to determine which hazards were priorities for mitigation strategy planning. Only those hazards that were determined to be a priority hazard for the EBRPD were considered further in the development of hazard-specific mitigation actions.

The priority hazards (in alphabetical order) are:

- Climate Change
- Coastal Flooding and Sea Level Rise
- Dam Failure
- Drought & Water Shortage (with tree mortality)
- Earthquakes (and earthquake liquefaction)
- Flood: 1%/0.2% annual chance

- Flood: Localized/Stormwater Flooding
- Landslide, Mudslide, Debris Flow
- Levee Failure
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rain and Storms
- Severe Weather: High Winds and Tornadoes
- Wildfire (with smoke/ air quality)

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 Park District is unlikely or nonexistent, the vulnerability of the Park District is low, capabilities are already in place to mitigate negative impacts, or the Park District does not have the authority or control over mitigation of the hazard. The eliminated hazards are:

- Pandemic
- Tsunami

The resulting mitigation strategy presented in this Chapter focuses on those mitigation actions that the EBRPD has the authority, resources, and capacity to consider for implementation over the next 5-years covered by this LHMP Update. **It is important to note, however, that all the Hazards addressed in this Plan are included in the Park District multi-hazard public awareness mitigation action as well as in other multi-hazard, emergency management actions, and other hazard-specific 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 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 and assets 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 and other action benefits
- Availability of funding and perceived cost-effectiveness
- Available resources for implementation
- Ability of the action to address the problem

The initial list of mitigation actions from the 2017 LHMP and new actions identified during this planning process were reviewed and prioritized via an LHMP mitigation action voting website for inclusion in this 2022 LHMP Update. The EBRPD mitigation action voting website established at https://fostermorrison.aweeba.com/ included the list of actions brainstormed during the mitigation strategy meetings and provided a mechanism for everyone to vote on their priority actions for further development as detailed below. This comprehensive review of mitigation measures was performed using the criteria (alternatives and selection criteria) in Appendix C.

With these criteria in mind, HMPC members were each provided with nine weighted votes, indicating High (worth 5 points), Medium (worth 3 points), and Low (worth 1 point) priorities. The team was asked to use the votes 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 LHMP Update.

Recognizing the limitations in prioritizing actions from multiple divisions 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 mitigation action plan for the EBRPD Planning Area.

5.4 Mitigation Action Plan

Requirement §201.6(c)(3)(iii) and §201.7(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 mitigation action plan was developed to present the recommendations developed by the HMPC for how the EBRPD 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. This mitigation 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 mitigation actions to be included in this LHMP Update. For each mitigation action item included in Table 5-2, a detailed mitigation implementation strategy has been developed.

The mitigation action plan detailed below contains both new action items developed for this LHMP Update as well as old actions that were carried forward from the 2017 Plan. Table 5-2 indicates whether the action is new or from the 2017 LHMP and Chapter 2 contains the details for each 2017 mitigation action item indicating whether a given action item has been completed, deleted, or deferred.

As described throughout this LHMP Update, EBRPD 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 Update focuses only on those mitigation actions that are both reasonable and realistic for the EBRPD to consider for implementation over the next 5-years covered by this 2022 Update. 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 LHMP Update came down to the actual priorities of the Park District management 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 EBRPD has numerous existing, detailed action descriptions, which include benefit-cost estimates, in other planning documents, such as fire plans, flood and water management 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 Plan.

Further, it should be clarified that the actions included in this mitigation strategy are subject to further review and refinement; alternatives analyses; and reprioritization due to funding availability and/or other criteria. The EBRPD is not obligated by this document to implement any or all of these projects. Rather this mitigation strategy represents the desires of the Park District 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. Collectively, this mitigation strategy includes those actions and projects which reflect the actual priorities and capacity of the EBRPD to implement over the next 5-years covered by this Plan.

Table 5-2 East Bay Regional Park District Mitigation Actions

Action Title	New Action/ 2017 Action	Address Current Development	Address Future Development	Mitigation Category
Multi-Hazard Actions				
Action 1. Ingress/egress improvements	New Action	X	X	Property Protection Emergency Services
Action 2. Upgrade and replace the Channel 3 (Fire and Park Operations) base station radio receivers and/or transmitters.	New Action	X	X	Emergency Services
Action 3. Backup power supply for critical facilities and infrastructure: Generator/solar/battery projects	New Action	X	X	Property Protection Emergency Services
Action 4. Park District wide Vegetation Map and Landscape Database project - conduct mapping of all areas and implement resulting projects	New Action	X	X	Prevention Natural Resource Protection
Action 5. Enhance public education and awareness of EBRPD priority hazards including the role of effective mitigation on Park District lands	2017 Action	X	X	Public Information
Climate Change Actions				
Action 6. Implementation of "green" projects, including greenhouse gas reduction projects and implementation of Green Fleet Management Plan	New Action	X	X	Prevention Property Protection
Climate Change, Coastal Flooding and Sea Level Rise, and Levee Failure Actions				
Action 7. Implementation of Hayward shoreline projects to address climate change, coastal flooding, sea level rise	New Action	X	X	Prevention Property Protection Structural Projects Natural Resource Protection
Drought and Water Shortage Actions				
Action 8. Water supply/source redundancy, storage, and reliability projects	New Action	X	X	Prevention Property Protection Natural Resource Protection
Earthquake Actions				
Action 9. Conduct seismic evaluation of vulnerable structures and structural retrofits of EBRPD facilities and infrastructure	2017 Action	X	X	Property Protection Structural Projects

Action Title	New Action/ 2017 Action	Address Current Development	Address Future Development	Mitigation Category
Flood, Localized Flood, Heavy Rains and Storms, Landslides, and Dam Failure Actions				
Action 10. Implementation of the Lake Temescal Dam Restoration Plan	New Action	X	X	Property Protection Structural Projects Natural Resource Protection
Action 11. Flood and Storm Mitigation Inland Areas	2017 Action	X	X	Property Protection Structural Projects Natural Resource Protection
Action 12. Drainage System Improvements and Culvert Replacement Action	2017 Action	X	X	Property Protection Structural Projects Natural Resource Protection
Wildfire, Drought and Water Shortage, Extreme Heat, Climate Change, and High Winds Actions				
Action 13. Implement the vegetation management/fuel reduction projects from the Wildfire Hazard Reduction and Resource Management Plan	2017 Action	X	X	Prevention Property Protection Natural Resource Protection
Action 14. Continued implementation of the EBRPD Tree Die-Back and Hazardous Trees Abatement Plans and Programs	2017 Action	X	X	Prevention Property Protection Natural Resource Protection
Action 15. Defensible space and ignition resistant construction projects	2017 Action	X	X	Prevention Property Protection Natural Resource Protection
Action 16. Continued update and implementation of grazing program and grazing plan	New Action	X	X	Prevention Property Protection Natural Resource Protection
Action 17. Planting of more native and fire tolerant vegetation and shaded fuel breaks	New Action	X	X	Prevention Property Protection Natural Resource Protection

Multi-Hazard Actions

Action 1. Ingress/egress improvements

Hazards Addressed: Multi-hazard – Climate Change, Dam Failure, Drought & Water Shortage (with tree mortality), Earthquakes (and earthquake liquefaction), Flood: 1%/0.2% annual chance, Flood: Localized/Stormwater Flooding, Landslide, Mudslide, Debris Flow, Levee Failure, Pandemic, Sea Level Rise, Severe Weather: Extreme Heat, Severe Weather: Heavy Rain and Storms, Severe Weather: High Winds and Tornadoes, Tsunami, Wildfire (with smoke/ air quality)

Issue/Background: During hazard events, it is imperative for Park District staff, workers, and visitors, and populations in surrounding communities be able to evacuate to a safe place. Ingress and egress improvements will also enable responders to better access affected areas to limit impacts and facilitate recovery. In some areas of the Park District, access is limited to one way in and out. Narrow and unimproved roads compound the ability to quickly vacate an area.

Project Description: Ingress/egress improvements are needed throughout the EBRPD boundaries to ensure efficient and safe evacuation and to provide sufficient access to incident responders. Improvement includes the grading and removal of flammable vegetation on all EBRPD fire roads and trails, approximately 1,330-miles.

Other Alternatives: Limit access to certain park areas during hazard prone seasons; No action – continue to utilize existing roads for ingress/egress of park areas. Roads will continue to degrade and become closed off by vegetation if they are not improved.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Includes Strategic Fire Routes from Wildfire Hazard Reduction and Resource Management Plan. For the purposes of the Plan, EBRPD staff identified strategic fire routes to facilitate and support wildfire response and emergency access as well as evacuation during an emergency incident. Strategic fire routes primarily include those roadways and trails on District lands including unpaved roads and trails within the parks as well as some paved roads that connect and pass-through parks.

Responsible Division/Partners: EBRPD Fire, EBRPD Operations, EBRPD Maintenance & Skilled Trades

Cost Estimate: $3,000,000 TO $6,000,000

Benefits (Losses Avoided): Improved ingress/egress of Park District lands will reduce loss of life and injuries during a disaster event and reduce damages to property, critical facilities and infrastructure, and the environment.

Potential Funding: FEMA HMGP and BRIC grants, CAL FIRE grants, EBRPD Budget

Timeline: 1-5 years

Project Priority (H, M, L): High

Action 2. Upgrade and replace the Channel 3 (Fire and Park Operations) base station radio receivers and/or transmitters.

Hazards Addressed: Multi-hazard – Climate Change, Dam Failure, Drought & Water Shortage (with tree mortality), Earthquakes (and earthquake liquefaction), Flood: 1%/0.2% annual chance, Flood: Localized/Stormwater Flooding, Landslide, Mudslide, Debris Flow, Levee Failure, Pandemic, Sea Level Rise, Severe Weather: Extreme Heat, Severe Weather: Heavy Rain and Storms, Severe Weather: High Winds and Tornadoes, Tsunami, Wildfire (with smoke/ air quality)

Issue/Background: EBRPD uses radio systems for Park Staff to communicate. These radios are used in day to day activity but are especially useful during hazard events. Several base stations have reached their end of life and need to be replaced with upgraded equipment to maintain the Low Band radio system utilized by all Park Staff for communication from the parks to the Communications Center.

Project Description: Project is to upgrade and replace the Channel 3 (Fire and Park Operations) base station radio receivers and/or transmitters. Several base stations have reached their end of life and need to be replaced with upgraded equipment to maintain the Low Band radio system utilized by all Park Staff for communication from the parks to the Communications Center.

Other Alternatives: Continue to fix and maintain existing radio system.

Existing Planning Mechanism(s) through which Action Will Be Implemented: In 2012, the Board of Directors created the Major Infrastructure Renovation and Replacement Fund (553) to address of the financial liability posed to the District by the aging infrastructure and target annual funding appropriation that will be necessary to mitigate and articulate the intent and uses of the fund. The District divides and funds its assets within four asset categories: 1. Paving. 2.Buildings/Structures, 3. Bridges/Docks and Piers, 4. Utilities/Communication.

Responsible Division/Partners: EBRPD Police, Fire

Cost Estimate:

- Equipment cost $60-100K
- Installation cost $15K
- Miss/Contingency cost $5K
- Project estimate $80-120K

Benefits (Losses Avoided): Radios can assist the Park District in coordinating and responding to hazard events and evacuating Park District lands. Police, Fire, and others use radios to coordinate efforts. This will reduce the potential for loss of life, injuries

Potential Funding: FEMA HMGP and BRIC grants, Cal OES grants, Homeland Security grants, CAL FIRE grants, UASI grants, EBRPD Budget

Timeline: Within 1-3 years

Project Priority (H, M, L): Medium

Action 3. Backup power supply for critical facilities and infrastructure: Generator/solar/battery projects

Hazards Addressed: Multi-hazard – Climate Change, Dam Failure, Drought & Water Shortage (with tree mortality), Earthquakes (and earthquake liquefaction), Flood: 1%/0.2% annual chance, Flood: Localized/Stormwater Flooding, Landslide, Mudslide, Debris Flow, Levee Failure, Pandemic, Sea Level Rise, Severe Weather: Extreme Heat, Severe Weather: Heavy Rain and Storms, Severe Weather: High Winds and Tornadoes, Tsunami, Wildfire (with smoke/ air quality)

Issue/Background: Critical facilities and infrastructure without back-up power will be exposed to potential shut-downs during an electrical outage event. A loss of power can be brought about in a number of ways. EBRPD's history of floods, heavy rains and storms, high winds, wildfire, and PSPS events are a testimony to the high risk of local power loss. In the event of a regional or local power outage, EBRPD's ability to operate will be compromised. The Park District owns and operates water and wastewater utilities and other critical facilities and infrastructure. It is imperative to ensure these facilities are up and running even during periods of power loss. While some of these facilities have backup power supply, additional backup power for others is still needed. Given the increase in extreme hazard events in the recent past and the potential for future hazard events including power outages, backup power supply options will need to be identified and installed for key facilities

Project Description: Identify vulnerable facilities and infrastructure that need backup power supply. Evaluate the feasibility and options for backup power to identified facilities. This includes solar/battery backup power systems as well as permanent internal combustion powered backup generators as well as connections for temporary generators.

Other Alternatives: No action. Rent/Use mobile backup power supply for key facilities during power outages.

Existing Planning Mechanism(s) through which Action Will Be Implemented: EBRPD 553 Major Infrastructure Renovation and Replacement fund, EBRPD Major Equipment Replacement fund.

Responsible Division/Partners: EBRPD MAST, EBRPD DECO, EBRPD Management Services

Cost Estimate: $200,000 per site

Benefits (Losses Avoided): Backup power will provide redundancy and ensure continuity of power during hazard events. This will help reduce the threat to public safety and will reduce property loss. This effort will also assist in disaster response and recovery efforts.

Potential Funding: FEMA HMGP and BRIC grants, EBRPD Budgets, Capital Improvement funding,

Timeline: 1-3 years

Project Priority (H, M, L): High

Action 4. Park District wide Vegetation Map and Landscape Database project – conduct mapping of all areas and implement resulting projects

Hazards Addressed: Multi-hazard – Climate Change, Dam Failure, Drought & Water Shortage (with tree mortality), Earthquakes (and earthquake liquefaction), Flood: 1%/0.2% annual chance, Flood: Localized/Stormwater Flooding, Landslide, Mudslide, Debris Flow, Levee Failure, Pandemic, Sea Level Rise, Severe Weather: Extreme Heat, Severe Weather: Heavy Rain and Storms, Severe Weather: High Winds and Tornadoes, Tsunami, Wildfire (with smoke/ air quality)

Issue/Background: EBRPD has responsibility for managing their natural and ecological resources found on their Park District lands located throughout Alameda and Contra Costa Counties. The health of each county's natural and built landscapes are impacted by growing populations, global climate change, drought, altered fire regimes, invasive/non-native plants and animals, habitat fragmentation, plant diseases and pathogens, noise, light, and air pollution, and other human and natural impacts. To effectively care for the county's ecosystems and infrastructure, the Park District and other responsible agencies must know the location and distribution of resources across the landscape, and they must monitor change over time. There are serious gaps in knowledge about the landscapes of Alameda and Contra Costa counties. Existing vegetation maps are piecemeal, inconsistent, out of date, or at a statewide scale which cannot support local decision making. Topographic data is incomplete, coarse or non-existent. Without accurate vegetation and topographic maps, there is currently no way to comprehensively analyze or monitor the impact of human decisions and natural disasters across the counties over time.

Project Description: To address these needs, the EBRPD has undertaken a project to develop a fine-scale vegetation map and topographic landscape database for Alameda and Contra Costa Counties. Having accurate and consistent countywide fine-scale maps and databases of the county's vegetation and topography will be invaluable tools for managing and monitoring each county's fire and flood hazards, critical habitats, land use change, carbon stocks and climate resiliency.

The fine scale vegetation and landscape databases will support a myriad of other applications beside fire risk and forest health. Knowledge of riparian vegetation types coupled with detailed topographic data will support management of culvert data, pollutant flow modeling, and hydrologic modeling of flooding or drought conditions. Tree mortality data will support hazardous tree removal and inform managers about pathogen pathways. Tidal wetlands mapping will support the long-term monitoring of the Bay Area estuary. Finescale grassland mapping will support conservation and management of native dominated grasslands including informing fuels management. BY mapping the native grasslands, they can be avoided and protected during fuels management work; the mapping will also help to determine what kind of fuels treatments are needed in our native grasslands such as brush thinning/removal or prescribed fire. Information on building footprints will inform emergency evacuation planning. Fine scale impervious surfaces maps will be important inputs for storm water and inundation models.

The project consists of several tasks: Collect and process ortho imagery and lidar data; Create Wildland Hazard Index & associated layers; Field sampling, analysis, and creation of Vegetation Alliance and Association Descriptions and Keys; Create Fine Scale Vegetation Map and associated layers.

Other Alternatives: No action. Continue to make local decisions based on incomplete, outdated, or large scale mapping data.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Wildfire Reduction and Resource Management Plan, Grazing Program,

Responsible Division/Partners: EBRPD Stewardship, EBRPD Fire

Cost Estimate: $3.5M

Benefits (Losses Avoided): The benefits are numerous and overall will provide a better understanding and management of natural and ecological environments. This will support more focused, targeted management tools and mitigation measures to protect the EBRPD natural systems, which will ultimately assist in reducing a myriad of impacts from future hazard events.

Potential Funding: USGS grants, Cal Fire grants, California Department of Fish and Wildlife, Alameda and Contra Costa Counties, Coastal Commission, EBMUD, SFPUC, Zone 7, CDPR, Save Mt. Diablo, and others

Timeline: Initiated in 2020, with a project completion of 2025.

Project Priority (H, M, L): High

Action 5. Enhance public education and awareness of EBRPD priority hazards including the role of effective mitigation on Park District lands

Hazards Addressed: Multi-hazard – Climate Change, Dam Failure, Drought & Water Shortage (with tree mortality), Earthquakes (and earthquake liquefaction), Flood: 1%/0.2% annual chance, Flood: Localized/Stormwater Flooding, Landslide, Mudslide, Debris Flow, Levee Failure, Pandemic, Sea Level Rise, Severe Weather: Extreme Heat, Severe Weather: Heavy Rain and Storms, Severe Weather: High Winds and Tornadoes, Tsunami, Wildfire (with smoke/ air quality)

Issue/Background: The EBRPD, and the communities it serves, have been affected by many natural hazard events in the recent past and plays a key community role in public outreach/education efforts to communicate the potential risk and vulnerability of the EBRPD to the impacts associated with future hazard events. A comprehensive multi-hazard public education program will better inform the EBRPD and surrounding communities of natural hazards of concern and actions that can be taken by the EBRPD and the public to be better informed and prepared for the next disaster event.

Project Description: A comprehensive multi-hazard outreach program will be designed to address both broad and targeted educational needs for the EBRPD and the communities it serves. The Park District will work with other agencies as appropriate to develop timely and consistent annual outreach messages in order to communicate the risk and vulnerability of natural hazards of concern. This includes measures the EBRPD and public can take to be better prepared and to mitigate and reduce the damages and other impacts from a hazard event occurring on Park District lands. The public outreach effort will leverage and build upon existing EBRPD outreach mechanisms and will consider:

- Using a variety of information outlets, including websites, news media, and local, public sponsored events;
- Creating and distributing (where applicable) brochures, leaflets, newsletters, websites, and other tools;
- Displaying public outreach information in EBRPD facilities, and other places and events;
- Developing public-private partnerships and incentives to support public education activities.

Other Alternatives: Continue public information activities currently in place, No Action

Existing Planning Mechanism(s) through which Action Will Be Implemented: Existing EBRPD outreach programs will be reviewed for effectiveness and leveraged and expanded upon to deliver the messages and to reach the target audiences.

Responsible Division/Partners: EBRPD Public Affairs, EBRPD Fire, EBRPD Stewardship

Cost Estimate: $34,000 per year

Benefits (Losses Avoided): Better informed EBRPD staff and community will help protect lives and reduce damages

Potential Funding: EBRPD Budgets, CalFire grants, WUI grants

Timeline: To be initiated within 1 year and ongoing

Project Priority (H, M, L): High

Climate Change Actions

Action 6. Implementation of "green" projects, including greenhouse gas reduction projects and implementation of Green Fleet Management Plan

Hazards Addressed: Climate Change (including extreme heat, drought, heavy rains and storms, wildfire, and other hazards affected by climate change)

Issue/Background: The EBRPD is concerned with the current and future effects of climate change on Park District lands and assets. EBRPD has always been a "green" agency. For over 85 years, their mission and vision have supported environmental protection, preservation, and public access to open space and Bay shoreline for recreation. Open space benefits the environment through absorption of carbon emissions and other pollutants in the air. Carbon emissions are believed to be a critical contributing factor of climate change. The EBRPD will continue to identify and implement "green" projects, including those intended to reduce greenhouse gas emissions to limit future impacts of climate change.

Project Description: EBRPD is seeking to lower its carbon output by implementing "green" projects including implementation of greenhouse gas reduction projects and its Green Fleet Management Plan. The Park District fleet consists of over 800 rolling stock items, including large industrial vehicles (e.g., sanitation trucks and firetrucks), smaller pickup trucks, sports utility vehicles, and smaller all-terrain vehicles (ATVs). Pickup trucks, ATVs, utility vehicles, and sedans make up nearly half of the fleet. 696 items in the fleet are motorized.

Approximately 158 vehicles are anticipated to be replaced in the next five years. Of these, 22 (14% of replacements) will have opportunities to be downsized in engine size and 35 (22%) have been identified for conversion to an alternative fuel type, and the remaining 64% will be replaced with newer models with better gas mileage and lower GHG emissions. An additional 13 electric vehicle charging stations are projected to be necessary at the various yards to accommodate the growing load of electric and hybrid vehicles. Thirty-eight locations in the Park District were assessed for panel upgrades, with 13 of these requiring PG&E meter upgrades to meet charging needs

Other Alternatives: No action. Continue to purchase traditional Internal Combustion Engine vehicles

Existing Planning Mechanism(s) through which Action Will Be Implemented: Green Fleet Management Plan and other EBRPD climate change initiatives

Responsible Division/Partners: EBRPD Maintenance and Skilled Trades (MAST)

Cost Estimate: Alternate Fuel Vehicles $17.5 million, EV Charging Stations $2 - $3 million

Benefits (Losses Avoided): Reduced risk from climate change impacts to EBRPD lands, assets, natural resources, surrounding communities, and region.

Potential Funding: FEMA HMGP and BRIC grants; Bay Area Air Quality Management District, EBRPD Budget

Timeline: Alternate Fuel Vehicles, 1-2 Years; EV Charging Stations, 1-3 Years

Project Priority (H, M, L): Medium

Climate Change, Coastal Flooding and Sea Level Rise, and Levee Failure Actions

Action 7. Implementation of Hayward shoreline projects to address climate change, coastal flooding, sea level rise

Hazards Addressed: Climate change, Coastal Flooding and Sea Level Rise, Levee Failure

Issue/Background: The California Coastal Commission Sea Level Rise Policy Guidance provides a summary of the best available science on sea level rise for California. It indicates that in the past century, global mean sea level (MSL) has increased by seven to eight inches, and that, with greater than a 95% probability, human influence has been the primary cause of the observed warming of the atmosphere and the ocean since the mid-20th century.

The Hayward Shoreline is vulnerable to inundation by coastal flooding and SLR that threatens critical infrastructure such as wastewater infrastructure, areas along the eastern approach to the San Mateo-Hayward Bridge (State Route 92), landfills, the Bay Trail, the Hayward Shoreline Interpretive Center (HSIC), business parks, residential neighborhoods, marshes, and managed ponds that provide high quality habitat for Federal and state endangered species.

The Park District has observed higher water levels, more frequent and increasingly intense storm surges and wave run-up over the past decade at Hayward Marsh causing erosion of existing water control embankments and recurring emergency repairs to preserve the San Francisco Bay Trail and Federal and state listed endangered and special status species habitats. As sea level continues to rise, shoreline embankments, built infrastructure, and marsh edges will experience further wave and wind action, resulting in accelerated erosion, and habitat and infrastructure loss. Sea level rise, combined with more frequent and intense storm surges during extreme weather events will further increase the risk and resulting damage to the Hayward Shoreline.

Project Description: Numerous plans and studies developed by the EBRPD and others identify various multi-benefit strategies for the shoreline, its existing infrastructure, and the surrounding natural habitat in order to adapt to Sea Level Rise. These plans help guide the development of future projects in coordination with state and local agencies, landowners, and the public. These plans guide the phased implementation of projects that will adapt the Hayward Regional Shoreline to sea level rise and mitigate the impacts of climate change and related hazards.

Numerous alternatives to addressing the effects of sea level rise will be evaluated, including nature based and engineered design solutions. These alternatives will be considered in determining the best mitigation alternatives to reducing risk and the damaging effects of sea level rise specific to different areas of coastline. This project covers the implementation of the preferred adaptation solutions for implementation for areas located throughout the Hayward Shoreline.

Other Alternatives: Both nature based and engineered design alternatives will be considered on a site-specific basis. Various alternatives have been vetted through robust public engagement processes and will be further considered for implementation and feasibility to determine the best mitigation actions for reducing risk and the damaging effects of sea level rise.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Hayward Regional Shoreline Adaptation Master Plan, 2021; San Francisco Bay Trail Risk Assessment & Adaptation Prioritization Plan 2021; Metropolitan Transportation Commission (MTC) and ABAG Plan Bay Area 2040, 2017; Bay Trail Design Guidelines and Toolkit, 2016. Baylands Ecosystem habitat Goals Science Update, 2015; California State Wildlife Action Plan, 2015; Adapting to Rising Tides – Hayward Resilience Study, BCDC/NOAA 2015, City of Hayward General Plan 2040, 2014; Alameda Countywide Bicycle and Pedestrian Plan, 2012; East Bay Regional Park District Master Plan, 2013; Alameda county Flood Control and Water Conservation District and Alameda County Mosquito Abatement District (Alameda County Codes); Bay Conservation and Development Commission (BCDC) Bay Plan, 2012; San Francisco Bay Trail Plan, SB 100 Lockyer, 1989;

Responsible Division/Partners: East Bay Regional Park District (EBRPD); Hayward Area Shoreline Planning Agency, (HASPA) a joint powers agency including City of Hayward, EBRPD; and Hayward Area Recreation and Park District (HARD), Alameda County Flood Control Agency

Cost Estimate: $961,000,000 for all projects combined. Each project's cost will depend on scope.

Benefits (Losses Avoided): Implementation of adaptation strategies will provide multiple benefits: Creating a resilient shoreline environment for people and ecology; enhance the shoreline environment to reduce risk to critical infrastructure and built assets; build social resilience in the community; and build capacity for future generations to adapt to climate change

Potential Funding: Grants from California Coastal Conservancy, San Francisco Bay Restoration Authority, California Natural Resources Agency, US Fish and Wildlife Service, Environmental Protection Agency, FEMA HMGP, BRIC and FMA grants

Timeline: 1-5 Years+, depending on scope of each project and available funding

Project Priority (H, M, L): Medium

Drought Actions

Action 8. Water supply/source redundancy, storage, and reliability projects

Hazards Addressed: Drought & Water Shortage

Issue/Background: Based on historical information, the occurrence of drought in California, including the Park District, is cyclical, driven by weather patterns. Drought has occurred in the past and will occur in the future. Park District ponds are drying during periods of extreme drought. Wells and springs have gone dry due to this more frequent and intense drought events. Mandatory conservation measures are typically implemented during extended droughts. Cattle, sheep, and goat grazing are used as a vegetation management tool to reduce fire fuels and maintain or improve habitat conditions for resident plants and wildlife. For this program to run effectively, water is essential for the animals.

Project Description: The District is seeking to source additional water from guaranteed water sources, where feasible. Plan and implement new livestock water systems and switch existing water systems over to municipal sources, like water meters. Drill new wells in locations known to have good ground flow. Pond restoration activities to clean and structurally repair livestock water ponds to expand the hydroperiod and support more water storage.

Other Alternatives: No action – continue to depend on springs, ponds, EBMUD and wells. Reduce grazing animals when necessary.

Existing Planning Mechanism(s) through which Action Will Be Implemented: EBRPD Grazing License, 2013 Master Plan, EBRPD Wildland Management policies and Guidelines

Responsible Division/Partners: EBRPD DECO Grazing Tenants, NRCS, Local Resource Conservation Districts

Cost Estimate: $3 million

Benefits (Losses Avoided): Additional water will be available for firefighting efforts. Additional water will be available for the animals that the Park District uses for grazing to reduce fine fuel loads. This will also reduce risk to wildfire. Improved water supply will reduce property damage.

Potential Funding: CA DWR grants, FEMA BRIC and HMGP funds.

Timeline: Within 5 years.

Project Priority (H, M, L): Medium.

Earthquake Actions

Action 9. Conduct seismic evaluation of vulnerable structures and structural retrofits of EBRPD facilities and infrastructure

Hazards Addressed: Earthquake

Issue/Background: Several faults are located within and near the Park District. Seismic hazard mapping indicates that the EBRPD has high seismic hazard potential. Additionally, the Park District is located within a delineated Alquist-Priolo Earthquake Fault Zone. One of the most important Park District facilities within Alquist-Priolo Zones is the Peralta Oaks headquarters building; although other buildings and critical facilities and structures are also within these high seismic risk areas.

Project Description: The EBRPD is seeking to conduct seismic evaluations of vulnerable structures to prioritize structural retrofits of EBRPD structures including critical facilities and infrastructure (Peralta Oaks, Public Safety Headquarters, Fire Station #1 (Tilden), Fire Station #2 (Redwood Canyon, and others.)

Other Alternatives: No action.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Capital Improvements Plan, VFA Asset Management Program, 553 Major Infrastructure Renovation & Replacement Plan

Responsible Division/Partners: EBRPD DECO

Cost Estimate: $40,000 per building, Totaling $240,000

Benefits (Losses Avoided): Reduced risk and property damage to EBRPD structures. Increased life safety for District personnel and visitors. Increased ability to respond from hardened structures when earthquakes do occur.

Potential Funding: FEMA HMGP and BRIC grants, EBRPD 553 Major Maintenance Fund

Timeline: 1-Year

Project Priority (H, M, L): Medium

Flood, Localized Flood, Heavy Rains and Storms, Landslides, and Dam Failure Actions

Action 10. Implementation of the Lake Temescal Dam Restoration Plan

Hazards Addressed: Dam Failure, Flooding, Heavy Rains and Storms, Dam Failure

Issue/Background: Lake Temescal is a 13-acre artificial lake in northeastern Oakland, initially constructed in the late 1860s to store drinking water. Lake Temescal is an Extremely High Hazard dam, which could cause loss of life should the dam fail. Further, increased runoff from the dam can cause flooding and impact downstream properties and facilities during periods of heavy rains and storms. Various reports indicate that the lake had an initial depth between 60 and 80 feet).

The lake drains 2.7 square miles of the Oakland Hills watershed, which is developed primarily with single-family residential units. Roughly one-third of the watershed is forested, while 14% is covered with impervious surfaces. In the mid-1930s, the original dam height was decreased to its current elevation and the lake was opened to the public as part of the EBRPD park system for recreational use. Lake sedimentation can be traced back to the earliest known bathymetric survey in 1907, which indicated that the lake depth had reduced by approximately 36 feet since its construction. In the 1960s and 1970s, large-scale freeway and residential development occurred within the lake's watershed. During this time, EBRPD noticed a significant impact to water quality, which began to impair recreational uses of the lake. Algae blooms increased, clarity decreased, and sedimentation was exacerbated, which was linked to the increased runoff.

Project Description: The recommended plan includes implementation of three restoration options, which would combine dredging the lake, creation of treatment wetlands at the mouths of Caldecott Creek and Temescal Creek and expanding the existing sediment basins. The installation of oxygenation and recirculation equipment would further enhance the restoration project and help sustain water quality into the future. These features would work together to maximize improvements to water quality and fish habitat while protecting the lifespan of the project. Dredging the lake to provide a 30- to 35-foot water depth with side slopes as steep as possible without risking erosion or failure will create a beneficial epilimnion to hypolimnion ratio that will decrease sediment and water column mixing while improving cold water habitat for fish, as described in Section 3. The steeper slopes will minimize habitat for undesirable aquatic vegetation. Expanding sediment basins and removing larger volumes of sediment from them each year will slow sedimentation in the lake and decrease the flux of nutrients and other pollutants into the lake. The treatment wetlands will remove additional nutrients, suspended solids, and other pollutants from flows entering the lake. Oxygenation and recirculation equipment will remove additional nutrients and pollutants from water in the main body of the lake (present from winter flows or legacy pollutants entering water column from sediment). They will also improve fish habitat and suppress nutrients, hydrogen sulfide, and methylmercury.

Other Alternatives: No action. Implement other alternatives considered: Alum Treatments (and Vegetation Harvesting), Dredging, Wetlands Treatment, Sediment Basin Expansion, Oxygenation and Recirculation.

Existing Planning Mechanism(s) through which Action Will Be Implemented: 2019 Lake Temescal Feasibility Assessment

Responsible Division/Partners: Stewardship, Design & Construction, Maintenance & Skilled Trades

Cost Estimate: Dredging, Treatment Wetlands, Sediment Basin Expansion: $19.7MM to $24.4MM

Benefits (Losses Avoided): The benefits realized from implementation of the restoration recommendations will improve the life of the dam over time. These dam improvements will help reduce the potential for a dam failure which can be a significant life safety issue and also contribute to property damage in the downstream inundation areas. Implementation of the preferred alternative will also limit the potential for excessive runoff from the dam and downstream flooding. Benefits associated with the recommended alternative include: Dredging: Adds depth and improves cold water habitat, - Removes legacy nutrients and pollutants, and Extends life of open water lake. Treatment Wetlands: Removes nutrients and pollutants from inflow, and Provides habitat. Sediment Basin Expansion: Decreases sediment, nutrients and pollutants entering the lake

Potential Funding: FEMA HHPD, BRIC, HMGP, Coastal Conservancy, Wildlife Conservation Board, California Department of Fish & Wildlife

Timeline: 1-5 years

Project Priority (H, M, L): Medium

Action 11. Flood and Storm Mitigation Inland Areas

Hazards Addressed: Flood: 1%/0.2%, Flood: Localized Flooding, Heavy Rains and Storms, Landslides, Mudslides, and Debris Flows

Issue/Background: Heavy rains and storms and associated flooding occur throughout the Park District, primarily during the rainy season from November through April. Prolonged heavy rainfall contributes to a large volume of runoff resulting in high peak flows of moderate duration. Flooding is more severe when previous rainfall has created saturated ground conditions. Storm drain culverts and drainage systems have a finite capacity. When rainfall exceeds this capacity, or the system is clogged, water accumulates in areas until it reaches a level of overland release and causes a variety of issues.

The Park District is traversed by several streams and drainage areas which cross through the area. The development that has occurred during the past forty years has accentuated existing drainage problems and has increased the potential for localized flooding and associated impacts to Park District lands. The Park District has many locations where flows in small, unnamed drainage channels and more developed areas of the Park District may exceed the capacity of culverts resulting in scour, erosion and damage to culverts, creek crossings, and trails. Severe events may result in damages and closures to trails, roads and bridges. These storm events have resulted in flooding, washouts, erosion, landslides, mudslides, debris areas, and impacts to natural systems and habitat areas and require frequent repairs to restore these areas.

Project Description: The project is to restore vulnerable areas impacted by storm and flood events and make them more resilient to the next flood event. Project activities will cover a range of mitigation solutions to include: slope protection, backfilling of areas with rock and fill, construction of retaining walls, regrading, rock slope protection, Geotech walls, new base rock and asphalt, installation of articulated fords, erosion control matting and wattle, armoring of creek embankments, bridge replacements, trail stabilization, retaining walls, culvert replacements, and other flood protection measures.

Other Alternatives: No action. Continue to repair areas as damages occur during future storm and flood events.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Trails, Creeks and Ponds Program. Regional General Permit and MOU's with Army Corps, Water Board and California Department of Fish and Wildlife and US Fish and Wildlife Service

Responsible Division/Partners: Maintenance and Skilled Trades, Stewardship

Cost Estimate: $7 - $11 Million

Benefits (Losses Avoided): The proposed improvements will minimize property and environmental damages during future storm events. Improvements will also provide protection against washouts of roads, creek crossings, and trails which impede emergency response and result in trail closures.

Potential Funding: FEMA HMGP, BRIC. FMA, Capital Improvement Budgets, Measure WW

Timeline: Initiated within 1-3 years and ongoing.

Project Priority (H, M, L): Medium

Action 12. Drainage System Improvements and Culvert Replacement Action

Hazards Addressed: Flood: 1%/0.2%, Flood: Localized Flooding, Heavy Rains and Storms, Landslides, Mudslides, and Debris Flows

Issue/Background: The EBRPD maintains approximately 2,000 culverts. The culverts range from older, non-engineered, undersized culverts to larger, modern well-engineered culverts installed more recently. Many of the older, undersized culverts are very vulnerable to damage in severe winter storm events, ranging from debris blockages in smaller events, to erosion and scour in moderate events to complete washout in major events. In a typical winter storm season, approximately 40% of the older undersized culverts require debris removal and/or repairs.

Failure of undersized culverts results not only in damages to the culverts, but also causes flooding and results in scour and erosion that damages roads and trails and also environmental damages. Damage to roads or trails may impede emergency response and results in closures of some park areas. Environmental damage from flooding, erosion, debris accumulation and deposition (land sliding) of mud and rocks affects streams and other environmentally sensitive areas downstream of failed culverts. Failure of under-road culverts also results in environmental impacts from oil, grease and other pollutants released into watersheds.

The restoration costs from such environmental damage are typically substantially higher than the replacement costs of culverts. Over 100 of the 2,000 culverts are in need of replacement

Project Description: The project is to replace older, undersized culverts with larger, fully-engineered culverts with head walls and end walls. The upsized, modern design culverts will have substantially greater conveyance capacity and a greatly reduced likelihood of blockages, scour and erosion. The project scope will generally include conducting a H&H study, excavation and removal of existing culvert, erosion control and placement of culvert, headwall and associated rock or erosion protection measures in the project area. Most culverts will require biological monitors to be on site during construction due to working in areas with endangered species or other sensitive and protected habitat.

Other Alternatives: No action. Continue to repair and/or replace with modern same-size culverts, as culverts are damaged during future storm events.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Trails, Creeks and Ponds Program. Regional General Permit and MOU's with Army Corps, Water Board and California Department of Fish and Wildlife and US Fish and Wildlife Service

Responsible Division/Partners: EBRPD Maintenance and Skilled Trades

Cost Estimate: $20k for an 18-inch culvert to $30k for a 48-inch culvert

Benefits (Losses Avoided): The proposed culverts will minimize future damages in further winter storm events, with future damages almost completely eliminated in small to medium severity winter storm events and substantially reduce damages even for larger, more severe winter storm events. Increased culvert capacity will also provide protection against washouts of roads and trails which impede emergency response and result in trail closures.

Potential Funding: FEMA HMGP, BRIC. Capital Improvement Budgets, Measure WW

Timeline: Initiated within 1-3 years and ongoing. Project duration is 36 months to include PM and environmental.

Project Priority (H, M, L): High

Wildfire, Drought and Water Shortage, Extreme Heat, Climate Change, and High Winds Actions

Action 13. Implement the vegetation management/fuel reduction projects from the Wildfire Hazard Reduction and Resource Management Plan

Hazards Addressed: Wildfire, Drought and Water Shortage, Extreme Heat, High Winds

Issue/Background: Wildfires continue to occur annually in and around EBRPD Park Lands located within Alameda and Contra Costa Counties. Much of EBRPD lands are located in areas of High and Very High Fire Hazard Severity Zones as mapped by Cal Fire. The East Bay Hills' combination of hot dry summers, wind-conducive topography, flammable vegetation, dense urban development, limited fire-fighting access, and diablo winds contribute to the extreme risk of WUI fires within the EBRPD.

EBRPD lands and assets continue to be at risk to wildfire as well as the numerous homes and other structures surrounding EBRPD lands. Much of the extreme wildfire risk and vulnerability of the Park District to Wildfire can be attributed to increased fuel loads from vegetation further stressed by drought and extreme temperatures. High winds can compound the damaging effects of wildfire; any ignition has the potential to become an out of control wildfire.

Project Description: While the EBRPD cannot control all aspects of wildfire, managing and reducing the fuels in wildfire prone areas can improve habitat and restore native vegetation while reducing wildfire hazards. The Wildfire Hazard Reduction and Resource Management Plan contains multiple strategies to manage vegetation and reduce fuels in and around the EBRPD. Vegetation Management and Fuel Reduction projects from this plan will reduce the wildfire hazard on publicly-owned lands in the East Bay's wildland-urban interface to a reduced level of risk; will preserve aesthetic landscape values for park users and neighboring communities; and will assist in maintaining optimal habitat and ecological function of Park District lands. The Vegetation Management/Fuel Reduction projects are designed to reduce or otherwise modify the type and quantities of available fuel that wildfires need to grow and spread. Strategies for modifying fuels include changing the arrangement of fuels to disrupt fuel continuity, decreasing the total volume of available fuels, reducing the amount of volatile materials in the fuel load, and decreasing the available surface area across which fire can spread.

Other Alternatives: No action, fight fires when they occur. Ignition resistant construction for new facilities and hardening of existing facilities.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Wildfire Hazard Reduction and Resource Management Plan

Responsible Division/Partners: EBRPD Fire

Cost Estimate: $10,000,000

Benefits (Losses Avoided): Reduced wildfire risk to EBRPD park lands, assets, visitors, and staff, as well as to the cities and counties surrounding ERPBD lands. Implementation of these projects will reduce the potential for loss of life and injuries and damage/destruction of structures and critical facilities and

infrastructure. These projects will also reduce impacts to the environment, habitat areas, and other sensitive natural and cultural resources.

Potential Funding: FEMA HMGP and BRIC grants, CAL FIRE grants, EBRPD Budget

Timeline: 1-5 years and ongoing. Each vegetation management/fuel reduction project has its own timeline depending on the area and project activities. FEMA NEPA document for the project required that project be completed more slowly over a 10-year period. In the NEPA documentation it is referred to as the "Unified Methodology".

Project Priority (H, M, L): High

Action 14. Continued implementation of the EBRPD Tree Die-Back and Hazardous Trees Abatement Plans and Programs

Hazards Addressed: Drought and Water Shortage, Wildfire, Climate Change, Extreme Heat, High Winds

Issue/Background: Since October 2020, the East Bay Regional Park District has been impacted by a sudden onset of tree mortality and dieback, affecting eucalyptus, conifers, and acacia. This has led to an increase in standing dead trees of various ages and sizes, and other hazardous conditions in the wildland-urban Interface of the East Bay hills. To date, the Park District has identified over 1,500 acres of tree mortality on District lands. The District recognizes this sudden tree mortality issue as an opportunity to address emergency drought and vegetation management needs in a changing climate and better understand the full extent and best approach for addressing the issue.

Mitigation of the tree mortality and dieback problem is a high priority because of increased wildfire hazard in the wildland areas and the potential for worsening conditions and expansion into other forested sites in future years. Fuel loading and fire potential are greater in affected eucalyptus, acacia, and conifer stands as compared to healthy stands due to the higher proportion of dead and dying material. Removal of dead and dying trees near structures, powerlines, and roadways is also a high priority because of the immediate falling hazard.

Project Description: Continued implementation of tree management projects to include tree thinning and removal at priority areas: Richmond, Miller Knox, Chabot, Tilden, Wildcat Canyon, and others, and use of carbonator biomass system (to lower carbon footprint).

Treatment of the heavy fuel loading in tree mortality and dieback areas will involve tree falling and logging operations, mastication/chipping of brush and down material, and basal chemical applications to eucalyptus before and after removals. Both the live and dead vegetation components should be targets of fuels management efforts. All activities must be performed in a manner that protects the site, soils, and sensitive habitat areas. Trees designated for retention, including mature eucalyptus trees and native hardwoods must be protected from damage during operations to create a healthy landscape. Ongoing maintenance options to enhance native habitats and keep fire hazard low after initial treatment include mowing, chemical treatments of brush and eucalyptus regrowth, periodic surface fuel broadcast burns, and grazing.

Approximately 100,000 tons of biomass is targeted for removal across 1,200+ acres of eucalyptus in Anthony Chabot – an undertaking that is by far larger than any previous forest management projects in the District. Traditional biomass disposal methods may need to be augmented by novel approaches to help lower disposal costs, reduce the amount of carbon released by trucking and through the process of decomposition, and minimize impacts on the road system. If all of the biomass removed from the site is trucked to facilities for waste disposal, landfill, or cogeneration, the number of truck loads leaving the park would be in the thousands.

Other Alternatives: No action – remove dead trees after they have fallen/fight fires as they occur rather than being proactive.

Existing Planning Mechanism(s) through which Action Will Be Implemented: EBRPD Tree Die Back Program and Plan; Hazardous Tree Abatement Program

Responsible Division/Partners: EBRPD Fire

Cost Estimate: Cost of hazardous fuels treatments/reduction and tree removals is $10-$30 million.

Benefits (Losses Avoided): Increased life safety for EBRPD personnel, park visitors, and those in surrounding communities. Reduced potential for structure loss. Reduced risk to natural habitats. Reduced risk to park lands and trails from wildfire.

Potential Funding: The District has acquired a $10M emergency grant from CalRecycle to treat critical fuel conditions in tree mortality and dieback areas. This is an opportunity to fund a large-scale fuel reduction effort in the expansive eucalyptus groves in both Anthony Chabot and Tilden and tie together several past fuel reduction projects. FEMA HMGP and BRIC grants, Cal Fire

Timeline: Within 1-year and ongoing

Project Priority (H, M, L): High

Action 15. Defensible space and ignition resistant construction projects

Hazards Addressed: Wildfire, Drought and Water Shortage, Extreme Heat, High Winds, Climate Change

Issue/Background: Wildfires continue to occur annually in and around EBRPD Park Lands located within Alameda and Contra Costa counties. Much of EBRPD lands are located in areas of High and Very High Fire Hazard Severity Zones as mapped by Cal Fire. The East Bay Hills' combination of hot dry summers, wind-conducive topography, flammable vegetation, dense urban development, limited fire-fighting access, and diablo winds contribute to the extreme risk of WUI fires within the EBRPD. Winds in wildfires carry huge amounts of burning embers, swirling into cracks and crevices, igniting anything that is combustible. Defensible space around structures and critical facilities and infrastructure and ignition resistant construction retrofits can limit the spread and destruction from future wildfire events.

Project Description: Defensible space and ignition resistant construction retrofits can significantly improve the chance of a building surviving a wildfire. Defensible space is the buffer created between a

building and the grass, trees, shrubs, or any wildland area that surrounds it. This space is needed to slow or stop the spread of wildfire and it helps protect buildings from catching fire—either from embers, direct flame contact or radiant heat. Proper defensible space also provides firefighters with a safe area to work in, to defend a structure. Likewise, hardening of existing structures using a variety of ignition resistant construction techniques can limit property damages. This project entails identifying and implementing defensible space and ignition resistant construction retrofits for priority structures within the Park District.

Other Alternatives: No action, fight fires when they occur. Fuels modification of wildfire prone areas

Existing Planning Mechanism(s) through which Action Will Be Implemented: Wildfire Hazard Reduction and Resource Management Plan, County Weed Abatement Notifications, Capital Improvement Program

Responsible Division/Partners: EBRPD Fire, EBRPD Operations

Cost Estimate: $3,000 to $20,000 per location, depending on the site specific activities

Benefits (Losses Avoided): Reduced wildfire risk to EBRPD park lands, assets, visitors, and staff, as well as to the cities and counties surrounding ERPBD lands. Implementation of these projects will reduce the potential for loss of life and injuries and damage/destruction of structures and critical facilities and infrastructure. These projects will also reduce impacts to the environment, habitat areas, and other sensitive natural and cultural resources

Potential Funding: FEMA HMGP and BRIC grants, CAL FIRE grants, EBRPD Budget, California Conservation Corps

Timeline: 1-5 years and ongoing. Each defensible space and ignition resistant construction project has its own timeline depending on the area and project activities. Projects will be started as soon as funding is available.

Project Priority (H, M, L): High

Action 16. Continued update and implementation of grazing program and grazing plan

Hazards Addressed: Drought and Water Shortage, Extreme Heat, Wildfire

Issue/Background: Wildfires continue to occur annually in and around EBRPD Park Lands located within Alameda and Contra Costa Counties. Much of EBRPD lands are located in areas of High and Very High Fire Hazard Severity Zones as mapped by Cal Fire. The East Bay Hills' combination of hot dry summers, wind-conducive topography, flammable vegetation, dense urban development, limited fire-fighting access, and diablo winds contribute to the extreme risk of WUI fires within the EBRPD.

EBRPD lands and assets continue to be at risk to wildfire as well as the numerous homes and other structures surrounding EBRPD lands. Much of the extreme wildfire risk and vulnerability of the Park District to Wildfire can be attributed to increased fuel loads from vegetation further stressed by drought and

extreme temperatures. Vegetation management and fuels reduction through grazing activities is a primary strategy to reduce wildfire risk in the Park District.

Project Description: EBRPD leases about 86,000 acres for grazing providing important support for local agriculture in the East Bay as well as effective land management. The Park District's roughly 86,000 acres of grazing land offers an important contribution to sustaining working landscapes in the East Bay. Grazing continues to be an important part of the Park District's land management strategy to enhance biodiversity of native flora, maintain wildlife habitat, and to reduce wildfire fuels, thereby supporting wilderness fire prevention efforts. This practice generates operating revenue for the EBRPD, sustains the local farm economy, and provides a linkage to the historic land use pattern in the region. Further, public interest in locally-grown food and grass-fed animals may create a value premium for the Park District's grazing lands and foster a connection to working lands through recreation. The goal of this mitigation action would be to increase the efficacy and possibly expand the Grazing Program.

Other Alternatives: No action – keep status quo.

Existing Planning Mechanism(s) through which Action Will Be Implemented: EBRPD Grazing Program

Responsible Division/Partners: EBRPD Stewardship

Cost Estimate: $3-$5 million

Benefits (Losses Avoided): Reduced risk from wildfire as the grazing keeps wildfire fuel levels low and manageable. This increases life safety for District personnel as well as those who use the parks and for those areas adjacent to the Park District lands in surrounding communities and counties. Property protection is also an added benefit of the grazing program.

Potential Funding: EBRPD Budget, CAL FIRE, FEMA BRIC and HMGP grants, East Contra Costa Habitat Conservancy grants

Timeline: Ongoing – more funding would increase the amount of area to be grazed.

Project Priority (H, M, L): Medium

Action 17. Planting of more native and fire tolerant vegetation and shaded fuel breaks

Hazards Addressed: Drought and Water Shortage, Extreme Heat, Wildfire

Issue/Background: Wildfires continue to occur annually in and around EBRPD Park Lands located within Alameda and Contra Costa Counties. Much of EBRPD lands are located in areas of High and Very High Fire Hazard Severity Zones as mapped by Cal Fire. The East Bay Hills' combination of hot dry summers, wind-conducive topography, flammable vegetation, dense urban development, limited fire-fighting access, and diablo winds contribute to the extreme risk of WUI fires within the EBRPD.

EBRPD lands and assets continue to be at risk to wildfire as well as the numerous homes and other structures surrounding EBRPD lands. Much of the extreme wildfire risk and vulnerability of the Park District to Wildfire can be attributed to increased fuel loads from vegetation further stressed by drought and extreme temperatures. Vegetation management is a primary strategy to reduce wildfire risk in the Park District.

Project Description: The primary fire mitigation tool the Park District uses to meet these goals is the shaded fuel break, defined as a strategically located strip on which a cover of heavy or flammable vegetation has been changed to a cover of lower fuel volume and reduced flammability. This definition is compatible with native, fire-resilient vegetation communities such as coast live oak woodlands, which have an open character with wide tree spacing and sparse understory.

The conversion of flammable tree cover to a fire-resilient, drought-resistant type, such as conversion of a eucalyptus plantation to native live oak woodland, is a central goal of the Park District's fuels management program. Oak woodlands are widespread, highly biodiverse, yet imperiled keystone ecosystems supporting over 300 species of wildlife. Other rare and important habitats that could be converted from eucalyptus plantation to fire-resilient, functional habitat include riparian woodland, coastal scrub, and maritime chaparral. As critical as the ever-increasing scale of fuels reduction work is, it is essential these activities do not degrade the ecological value of the lands on which they are performed.

Other Alternatives: No Action.

Existing Planning Mechanism(s) through which Action Will Be Implemented: Wildfire Hazard Reduction and Resource Management Plan (WHRRMP)

Responsible Division/Partners: EBRPD Stewardship, EBRPD Fire

Cost Estimate: $8 - $13 million

Benefits (Losses Avoided): Reduced wildfire risk to EBRPD park lands, assets, visitors, and staff, as well as to the cities and counties surrounding ERPBD lands. Implementation of these efforts will reduce the potential for loss of life and injuries and damage/destruction of structures and critical facilities and infrastructure from future wildfires. These efforts will also reduce impacts to the environment, habitat areas, and other sensitive natural and cultural resources.

Potential Funding: EBRPD Budget, CAL FIRE, FEMA BRIC and HMGP grants, State Assembly Member Requests

Timeline: 3 – 5 Years

Project Priority (H, M, L): Medium

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 2022 LHMP Update is to secure buy-in from the EBRPD, raise awareness of the Plan, and formalize the Plan's approval and implementation. The adoption of this LHMP Update completes Planning Step 9 of the 10-step planning process: Adopt the Plan, in accordance with the requirements of DMA 2000. The governing board for the Park District has adopted this 2022 Local Hazard Mitigation Plan by passing a resolution. A copy of the generic resolution is 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 2022 EBRPD LHMP Update 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 LHMP into existing planning mechanisms and how to address continued public involvement.

7.1 Implementation

Once adopted, this LHMP Update faces the truest test of its worth: implementation. While this LHMP contains many worthwhile actions, the EBRPD 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 LHMP 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 and operational plans, stormwater plans, Community Wildfire Protection Plans (CWPPs), Emergency Operations Plans (EOPS), Standard Operating Procedures (SOPs), and other hazard and emergency management planning efforts for the Park District. The EBRPD already implements policies and programs to reduce losses to life and property from hazards. This LHMP Update builds upon the momentum developed through previous and related planning efforts and mitigation efforts and recommends implementing actions, where possible, through these other Park District mechanisms.

Mitigation is most successful when it is incorporated into the day-to-day functions and priorities of the Park District. 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 EBRPD 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 EBRPD 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 EBRPD Division heads and staff are charged with implementation of various activities in this LHMP Update. During the annual reviews as described later in this section, an assessment of progress on each of the goals and activities in this LHMP Update should be determined and noted. At that time, recommendations can be 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 Update 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 LHMP, the EBRPD Management Services, Assistant Finance Officer (AFO) will be responsible for LHMP implementation and maintenance. The HMPC identified in Appendix A (or a similar committee) will reconvene annually each year to ensure mitigation strategies are being pursued and the Park District continues to maintain compliance with applicable mitigation programs. As such, EBRPD 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 Park District decision makers;
- Maintain a vigilant monitoring of multi-objective cost-share opportunities to help the Park District implement the Plan's recommended actions for which no current funding exists;
- Monitor and assist in the implementation and update of this LHMP Update;
- Report on Plan progress and recommended changes to the Park District's governing board; and
- Inform and solicit input from stakeholders and the public.

The primary duty of the EBRPD is to see this LHMP successfully carried out and to report to their governing board, stakeholders, 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 Park District website.

7.2 Maintenance

Plan maintenance implies an ongoing effort to monitor and evaluate Plan implementation and to update this LHMP Update as progress, roadblocks, or changing circumstances are recognized.

7.2.1. Maintenance Schedule

The EBRPD AFO is responsible for initiating LHMP reviews. In order to monitor progress and update the mitigation strategies identified in the mitigation action plan, the EBRPD and the HMPC will revisit this LHMP Update annually and following a hazard event. The HMPC will meet annually to review progress on LHMP 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 Update anticipated to be fully approved and adopted in 2023, the next LHMP Update for the EBRPD will occur in 2028.

7.2.2. Maintenance Evaluation Process

Evaluation of progress can be achieved by monitoring changes in vulnerabilities identified in this LHMP Update. 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;
- Increased vulnerability resulting from unforeseen or new circumstances.

Updates to this LHMP 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 Update to accommodate actions that have failed or are not considered feasible after a review of their consistency with established criteria, time frame, EBRPD 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 LHMP will be by written changes and submissions, as the HMPC deems appropriate and necessary, and as approved by the EBRPD 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 EBRPD governing board.

Annual Plan Review Process

For this LHMP Update review process, EBRPD AFO, as project 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 2022 LHMP Update will normally occur on an annual basis each year and will be conducted by the HMPC as follows:

- EBRPD 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 Update.
- Notices will be emailed 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.
- EBRPD officials will be notified by email and telephone or personal visit and urged to participate.
- Prior to the review, division 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 LHMP will be available for public comment on the EBRPD website.
- After the review meeting, minutes of the meeting and an annual report will be prepared by the HMPC and placed on the EBRPD website for review by stakeholders, the public and EBRPD staff. The report will also be presented to the EBRPD Board for review, and a request will be made that the Board take action to recognize and adopt any changes resulting from the review.
- A copy of the 2022 LHMP Update will be continually posted on the EBRPD'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:

- EBRPD growth or change in the past year.
- The number of substantially damaged or substantially improved structures by flood zone.
- The renovations to EBRPD infrastructure including water, sewer, drainage, roads, bridges, gas lines, and buildings.
- Natural hazard occurrences that required activation of the local 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 to the EBRPD or closure of offices or public services.
- The dates of hazard events descriptions.
- Documented damages due to the event.
- Closures of EBRPD and the number of days closed.
- Road or bridge closures and other access routes due to the hazard and the length of time closed.
- Assessment of the number of EBRPD buildings and assets damaged and whether the damage was minor, substantial, major, or if buildings and assets were totally destroyed.
- Review of any changes in federal, state, and local policies to determine the impact of these policies on the EBRPD 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 the delay in implementation.

7.2.3. Incorporation into Existing Planning Mechanisms

Another important implementation mechanism that is highly effective and low-cost is incorporation of this 2022 LHMP Update recommendations and their underlying principles into other EBRPD plans, programs, and mechanisms. Where possible, the EBRPD 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 LHMP's capability assessment, the EBRPD already implements policies and programs to reduce losses to life and property from hazards. This LHMP Update 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:

- Park District strategic and operational plans
- Park District Emergency Operations Plans and other emergency management efforts
- Park District SOPs
- Climate plans
- Fire plans
- Flood/stormwater plans
- Capital improvement plans and budgets
- Other plans and policies outlined in the capability assessment
- Other plans, regulations, and practices with a mitigation focus

EBRPD staff involved in these other planning mechanisms will be responsible for integrating the findings and recommendations of this LHMP Update 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 budget meetings for Park District program opportunities.

The successful implementation of this mitigation strategy will require constant and vigilant review of existing plans and programs and the identification of other local, state, and federal mitigation partners for coordination and multi-objective opportunities that promote a safe, sustainable community.

Examples of incorporation of the LHMP Update into existing programs and planning mechanisms include:

1. Integration of hazard mitigation goals and actions identified in this LHMP mitigation strategy into the next update of the EBRPD Wildfire Hazard Reduction and Resource Management Plan. Key staff responsible for implementing the Wildfire Hazard Reduction and Resource Management Plan participated in this LHMP Update. Future updates of both documents should work together to promote mitigation planning as a primary goal of the EBRPD.
2. Integration of this LHMP into Park District climate change, coastal flooding, and sea level rise plans. It is anticipated that this LHMP will be used to inform any updates to these types of plans, and conversely risk and vulnerability data and mitigation strategies contained in these other plans will be integrated into future updates of this LHMP for the Park District.
3. Use of the LHMP risk assessment and other information to update the hazard analysis in development and future updates of the Park District's Emergency Operations Plan, SOPs and other emergency planning efforts for the Park District.

Efforts should continuously be made to monitor the progress of mitigation actions implemented through these other programs and planning mechanisms and, where appropriate, their priority actions should be incorporated into updates of this LHMP.

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 stories from the LHMP 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 Park District 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 also 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 LHMP Update draft.

East Bay Regional Park District

Appendix A Planning Process

A.1 Lists of HMPC Invites/Stakeholders

A.1.1. Initial LHMP Invite List

East Bay Regional Park District Staff

Name	Position	Department
Jeff Rasmussen	Assistant Finance Officer	Finance and Management Services
Dave Mason	Public Information Officer	Public Affairs Division
Aileen Theile	Fire Chief	Public Safety, Fire Department
Kristen Van Dam	Fuels Ecologist	Stewardship
Matt Graul	Division Chief	Stewardship
Alma Balmes	Manager	Risk & Management
Katy Hornbeck	Manager	Grants
Eric Holmes	Administrative Analyst II	Management Services
Lisa Goorjian	Chief of Design & Construction	Acquisition, Stewardship & Development Division
David Rusting	Chief Information Officer	Finance & Management Services Division
Brian Holt	Chief	Planning, Trails & GIS
Khari Helae	Assistant Fire Chief	Public Safety, Fire Department
Devan Reiff	Principal Planner	Planning, Trails & GIS
Lt. Terrence (Joe) Cotcher	Police Lieutenant	Public Safety, Police Department
David Phulps	Police Lieutenant	Public Safety, Police Department
Glen Gilchrist	Design Manager	
Debra Auker	Assistant General Manager of Finance and Management Services/CFO	Finance and Management Services

Alameda County and Cities

Jurisdiction	Name	Department
Alameda County	Teresa Langdon	Emergency Services
Alameda County	David Rocha	Fire Department
City of Alameda	Erin Smith	Public Works
City of Alameda	Sharon Oliver	Fire Department, Disaster Preparedness Coordinator

Jurisdiction	Name	Department
City of Albany	Lance Calkins	Fire Department
City of Emeryville	Lori Elefant	Human Resources
City of Fremont	Rachel DiFranco	Sustainability Office
City of Hayward	Don Nichelson	Fire Department
City of Livermore	Ruben Torres	Fire Department
City of Pleasanton	Ruben Torres	Fire Department
City of Union City	Joan Malloy	City Manager

Contra Costa County and Cities

Jurisdiction	Name	Department
Contra Costa County	Rick Kovar	OES
Contra Costa County	Benjamin Alldritt	
Contra Costa County	Jimmy Lee	
Contra Costa County	Chris Lau	Public Works Department
Contra Costa County	Kelly Kalfsbeek	Public Works Department
Contra Costa County	Tim Jenson	
Contra Costa County	Will Nelson	Director of Community Development
City of Antioch	John Fortner	
City of Antioch	John Samuelson	
City of Brentwood	Ben Tolero	Police Lieutenant
City of Brentwood	David Schroer	
City of Clayton	Jim Warburton	
City of Concord	Kevin Marstall	
City of Concord	Nicholas Gartner	
City of Concord	Trish Beirne	Emergency and Volunteer Services Mgr.
City of El Cerrito	Alexandra Orologas	
City of Hercules	Mike Roberts	
City of Hercules	Shiva Matinpour	Community Development Specialist
City of Lafayette	Niroop K. Srivatsa	Planning & Building Director
City of Lafayette	Cathy Surges-Moscato	
City of Martinez	Tim Tucker	City Engineer
City of Martinez	Laura Austin	
City of Martinez	M Sappal	
Town of Moraga	Brian Horn	
Town of Moraga	Afshan Hamid	
Town of Moraga	Shawn Knapp	

Jurisdiction	Name	Department
City of Oakley	Dan Gomex	Police Chief
City of Oakley	Beard	
City of Orinda	Emmanuel Ursu	Planning Director
City of Orinda	Drummond Buckley	
City of Orinda	Scott Christie	
City of Pinole	N Gang	
City of Pittsburg	Kristin Pollot	Planning Manager
City of Pleasant Hill	Deirdre Castillo	
City of Richmond	Richard Mitchell	Director of Planning and Building
City of Richmond	Genevieve Pastor-Cohen	
City of Richmond	I Kwan Choi	
City of Richmond	Lina Velasco	
City of San Pablo	Ronalyn Nanato	Associate Engineer
City of San Pablo	Jessica Rivas	
City of San Pablo	Ronalyn Nonato	Associate Engineer
City of San Ramon	Steven Spedowfski	Senior Analyst
City of San Ramon	Cliff Buxton	
City of San Ramon	Robin Bartlett	
City of San Ramon	D Carlson	
City of San Ramon		
City of Walnut Creek	Steve Waymire	Planner
City of Walnut Creek	Carla Hanson	
City of Walnut Creek	Betsy Burkhart	

Fire Districts

Agency	Name	Title
Contra Costa County Fire Protection District	Chris Bachman	
Contra Costa County Fire Protection District	Aaron McAlister	
East Contra Costa Fire Protection District	Brian Helmmick	Battalion Chief
Rodeo-Hercules Fire Protection District	Bryan Craig	
Rodeo-Hercules Fire Protection District	Kimberly Corcoran	
San Ramon Valley Fire Protection District	Ron Marley	
San Ramon Valley Fire Protection District	Danielle Bell	
San Ramon Valley Fire Protection District	Roy Wendel	
San Ramon Valley Fire Protection District	Frank Drayton	

Agency	Name	Title
Moraga-Orinda Fire District	Dennis Rein	

Water and Flood Control Districts

Agency	Name	Title
Contra Costa Water District	Cristina Estrella	
Contra Costa Water District	Jill Mosley	
East Bay MUD	Scott Hill	Watershed and Recreation Manager
East Bay MUD	David Cook	Security and Emergency Preparedness Manager
East Bay MUD	John Daley	
Contra Costa County Flood Control and Water Conservation District	Paul R. Detjens	Senior Civil Engineer
Alameda County Flood Control and Water Conservation District	Daniel Woldesenbet	General Manager
Diablo Water	Wayne Weaver	
Diablo Water	N Mendoza	

Parks and Recreation Districts

Agency	Name	Title
Pleasant Hill Recreation and Park District	Michelle Lacy	General Manager
Hayward Area Recreation and Park District	Paul McCreary	General Manager

State and Federal Agencies

Agency	Name	Title
California Department of Fish and Wildlife	Scott Wilson	SF Bay Regional Manager
Regional Water Resources Control Board	Keith Lichten	Engineer, Watershed Management
State Lands Commission	Brian Bugsch	Chief, Land Management
State Lands Commission	Ken Foster	
California Department of Fish and Wildlife	Scott Wilson	Bay Delta Regional Manager
U.S. Army Corps of Engineers	Patrick O'Brien	Hydrologist

HILLS EMERGENCY FORUM

Agency	Name	Title
Hills Emergency Forum	Todd LaBerge	Fire Marshall
Hills Emergency Forum	Scott Hill	
Hills Emergency Forum	Caroll Rice	
Hills Emergency Forum	Amie Krigbaum	Fire Inspector
Hills Emergency Forum	Mike Marcucci	Deputy Chief
Hills Emergency Forum	Jake Hess	Unit Chief
Hills Emergency Forum	Devin Woolridge	Berkely Edu
Hills Emergency Forum	Kathy Leonard	
Hills Emergency Forum	Edgar Orre	Cal Fire
Hills Emergency Forum	Dori Tieu	Berkely Edu
Hills Emergency Forum	Rich Dean	Berkely Edu
Hills Emergency Forum	David Winnacker	Chief Moraga-Orinda Fire
Hills Emergency Forum	Mike Torkelson	Interim Fire Marshal

Non-governmental Organizations

Agency	Name	Title
Hills Emergency Forum	Cheryl Miller	Staff Support
EBRPD Park Advisory Committee	Yolande Barial	Secretary
Regional Parks Foundations	Carol Johnson	Executive Director
Diablo Fire Safe Council	Cheryl Miller	Executive Director
Bay Area Ridge Trail	Janet McBride	Executive Director
East Bay California Native Plant Society	Karen Whitestone	Conservation Analyst

Other Additions

Agency	Name	Title
Delta Diablo	Brian Thomas	
Delta Diablo	Mary Harvey	
Delta Diablo	Vo Thanh	
BIMID	Regina Espinoza	
Central San		
UCSF	Michelle Heckle	USSF Police/EOC

Agency	Name	Title
National Weather Service	Brian Garcia	
Cal OES	Victoria LaMar-Haas	
PG&E	E5bq	
UC Berkely	Woolridge	
Calfire	Ed Orre	Santa Clara Unit
Moraga Orinda Fire	Dave Winnacker	Fire Department
Alameda County	Pat Anekayuwat	Planning
Alameda County	Hank Ackerman	Flood Control
City of Alameda	Amy Wooldridge	Parks & Recreation

Attended Meetings, added to stakeholder lists

Agency	Name	Title
City of Union City	Ricardo Martinez	
El Cerrito Fire	Jose Castrejon	Interim Fire Chief
Livermore-Pleasanton Fire Department	Kim Colantuona	
Danville Police Department	Allan Shields	
City of Walnut Creek	Mike Vickers	
Diablo Water	Christine Belleci	
City of Fremont Fire	Alec Tune	Emergency Services Manager
El Cerrito	Chase Beckman	Fire Marshall
City of Orinda	David Biggs	City Manager
City of Concord	Bruce Davis	
	Michelle Battaglia	
City of Richmond	Jonelyn Whales	Senior Planner

A.1.2. HMPC Participant List

Agency	Name	Title
East Bay Regional Parks	Jeff Rasmussen	Assistant Finance Officer
East Bay Regional Parks	Dave Mason	Public Information Officer
East Bay Regional Parks	Aileen Theile	Fire Chief
East Bay Regional Parks	Kristen Van Dam	Fuels Ecologist
East Bay Regional Parks	Matt Graul	Division Chief
East Bay Regional Parks	Alma Balmes	Manager
East Bay Regional Parks	Katy Hornbeck	Manager

Agency	Name	Title
East Bay Regional Parks	Eric Holmes	Administrative Analyst II
East Bay Regional Parks	Lisa Goorjian	Chief of Design & Construction
East Bay Regional Parks	David Rusting	Chief Information Officer
East Bay Regional Parks	Brian Holt	Chief
East Bay Regional Parks	Khari Helae	Assistant Fire Chief
East Bay Regional Parks	Devan Reiff	Principal Planner
East Bay Regional Parks	Lt. Terrence (Joe) Cotcher	Police Lieutenant
East Bay Regional Parks	David Phulps	Police Lieutenant
East Bay Regional Parks	Glen Gilchrist	Design Manager
Debra Auker	Assistant General Manager of Finance and Management Services/CFO	Finance and Management Services
City of Alameda	Sharon Oliver	Fire Department, Disaster Preparedness Coordinator
City of Berkeley Fire	Dan Green	Assistant Fire Chief
City of Union City	Joan Malloy	City Manager
Contra Costa County	Rick Kovar	OES
Contra Costa County	Chris Lau	Public Works Department
Contra Costa County	Kelly Kalfsbeek	Public Works Department
Contra Costa County	Will Nelson	Director of Community Development
Contra Costa Fire	Aaron McAlister	Deputy Fire Chief
Contra Costa Fire	Chris Bachman	
City of Concord	Trish Beirne	Emergency and Volunteer Services Mgr.
City of Lafayette	Cathy Surges-Moscato	
Kensington Fire	Bill Hansell	
Town of Moraga	Afshan Hamid	
City of San Pablo	Ronalyn Nonato	Associate Engineer
City of Walnut Creek	Betsy Burkhart	
San Ramon Valley Fire Protection District	Ron Marley	
State Lands Commission	Ken Foster	
Hills Emergency Forum	Edgar Orre	Cal Fire
Hills Emergency Forum/ Berkeley Fire	Dori Tieu	Berkely Edu
Hills Emergency Forum	David Winnacker	Chief Moraga-Orinda Fire
UCSF	Michelle Heckle	USSF Police/EOC
City of Union City	Ricardo Martinez	
El Cerrito Fire	Jose Castrejon	Interim Fire Chief
Livermore-Pleasanton Fire Department	Kim Colantuona	

Agency	Name	Title
Danville Police Department	Allan Shields	
City of Walnut Creek	Mike Vickers	
Diablo Water	Christine Belleci	
City of Fremont Fire	Alec Tune	Emergency Services Manager
El Cerrito	Chase Beckman	Fire Marshall
City of Orinda	David Biggs	City Manager
City of Concord	Bruce Davis	
	Michelle Battaglia	
City of Richmond	Jonelyn Whales	Senior Planner

A.2 Website for Hazard Mitigation Plan

A.3 Internal Kickoff Meeting

A.3.1. Internal Kickoff Meeting Invite to Stakeholders

From: Jeff Rasmussen <JRasmussen@ebparks.org>
Sent: Wednesday, April 27, 2022 3:32 PM
To: Matthew Graul <MGraul@ebparks.org>; Brian Holt <BHolt@ebparks.org>; Michael Reeves <mreeves@ebparks.org>; Robert Kennedy <RKennedy@ebparks.org>; Steve Castile <scastile@ebparks.org>; Katy Hornbeck <KHornbeck@ebparks.org>; Eric Holmes <EHolmes@ebparks.org>; Lisa Goorjian <LGoorjian@ebparks.org>; Alma Balmes <abalmes@ebparks.org>; Lance Brede <LBrede@ebparks.org>; Aileen Theile <atheile@ebparks.org>; Eric Holmes <EHolmes@ebparks.org>; Dave Mason <DMason@ebparks.org>; David Rusting <DRusting@ebparks.org>; Dina Robertson <DRobertson@ebparks.org>; Kristen Van Dam <KVanDam@ebparks.org>
Cc: Debra Auker <DAuker@ebparks.org>; Jeanine Foster <jeanine.foster@fostermorrison.com>
Subject: Local hazard Mitigation Plan Update

In order to remain eligible for FEMA mitigation grants, we are required to update our Local Hazard Mitigation Plan every five years. The current plan was last updated in 2017, see attached. Please attend or delegate attendance to this important meeting and please forward this invitation to any other District staff you think would be helpful on this team. This process will require 5 additional meetings which will also include members of the public and other agency that assist us with emergency preparedness.

The project kickoff meeting with our consultants from Foster-Morrison will be held as follows (A separate Outook invite will also be sent out for this date):

HMPC Meeting: Virtual Meeting – Zoom Platform
Join Zoom Meeting:
https://us02web.zoom.us/j/82928464035?pwd=b2t0RGFybEVobVJiR0RsL1VOVGVWQT09
May 11, 2022 (Wednesday)
1:30 – 3:00 pm

Please accept the Outlook invite and plan on attending or delegating attendance to this important meeting.

East Bay Regional Park District
Healthy Parks Healthy People

Jeff Rasmussen
Assistant Finance Officer | Management Services
East Bay Regional Park District
2950 Peralta Oaks Court, Oakland, CA 94605
T: 510-544-2130| M: 510-326-1257
JRasmussen@ebparks.org | www.ebparks.org

A.3.2. Internal Kickoff Meeting Agenda

AGENDA

EAST BAY REGIONAL PARK DISTRICT
LOCAL HAZARD MITIGATION PLAN (LHMP) UPDATE
INTERNAL (KICKOFF) MEETING #1
MAY 11, 2022

1. Introductions
2. Hazard Mitigation & the Disaster Mitigation Act Planning Requirements
3. The Role of the Hazard Mitigation Planning Committee (HMPC)
4. Agency and Stakeholder Identification for HMPC
5. Mitigation Strategy Update
6. Schedule
7. Questions and Answers

A.3.3. Internal Kickoff Meeting Sign-in Sheet

This meeting was held via Zoom. Below is the sign in document for the meeting.

Name	Title	Department/Agency/Affiliation
Jeff Rasmussen	Assistant Finance Officer	EBRPD, Finance and Management Services
Dave Mason	Public Information Officer	EBRPD, Public Affairs Division
Aileen Theile	Fire Chief	EBRPD, Public Safety, Fire Department
Kristen Van Dam	Fuels Ecologist	EBRPD, Stewardship
Matt Graul	Division Chief	EBRPD, Stewardship
Alma Balmes	Manager	EBRPD, Risk & Management
Katy Hornbeck	Manager	EBRPD, Grants
Eric Holmes	Administrative Analyst II	EBRPD, Management Services
Lisa Goorjian	Chief of Design & Construction	Acquisition, Stewardship & Development Division
David Rusting	Chief Information Officer	Finance & Management Services Division
Brian Holt	Chief	Planning, Trails & GIS
Jeanine Foster	Project Manager	Foster Morrison Consulting
Chris Morrison	Lead Planner	Foster Morrison Consulting
Luana Dowling	Wildfire Specialist	Dowling Firewise w/Foster Morrison Consulting

Source: EBRPD, Foster Morrison Consulting

A.4 Kickoff Meeting

A.4.1. Kickoff Meeting Invite to HMPC and Stakeholders

From: Jeanine Foster <jeanine.foster@fostermorrison.com>
Sent: Tuesday, May 17, 2022 3:10 PM
To: Jeanine Foster; Jeff Rasmussen; dmason@ebparks.org; atheile@ebparks.org; kvandam@abparks.org; mgraul@abparks.org; abalmes@ebparks.org; khornbeck@ebparks.org; eholms@ebparks.org; lgoorjian@ebparks.org; drusting@ebparks.org; bholt@ebparks.org; khelae@ebparks.org; dReiff@ebayparks.org; tcothcher@ebayparks.org; Chris Morrison; 'Luana Dowling (dowlingluana@gmail.com)'
Cc: Luana Dowling; Devan Reiff; tlangdon@acgov.org; michael.cadrecha@acgov.org; David.rocha@acgov.org; esmith@alamedaca.gov; LKozisek@alamedaca.gov; soliver@alamedaca.gov; lcalkins@albanyca.org; tburroughs@cityofberkeley.info; gdong@cityofberkeley.info; roger.bradley@dublin.ca.gov; lelefant@ci.emeryville.ca.us; rdifranco@fremont.gov; laurel.james@hayward-ca.gov; don.nichelson@hayward-ca.gov; LPFDPostmaster@lpfire.org; terrence.grindall@newark.org; dreiff@oaklandnet.com; GPastor-Cohen@oaklandnet.com; bmclaren@ci.piedmont.ca.us; hderespini@sanleandro.org; jmalloy@unioncity.org; rlier@cccounty.us; srose@so.cccounty.us; ashie@so.cccounty.us; rkova@so.cccounty.us; Mgerh001@so.cccounty.us; balld@so.cccounty.us; jlee@so.cccounty.us; Chris.lau@pw.cccounty.us; Sdeutsch@pw.cccounty.us; Kelly.kalfsbeek@pw.cccounty.us; Tim.jensen@pw.cccounty.us; Will.Nelson@dcd.cccounty.us; rmarchoke@ci.antioch.ca.us; jfortner@antiochca.gov; jsamuelson@antiochca.gov; btolero@ci.brentwood.ca.us; dschroer@brentwoodca.gov; mtsubota@breanwoodca.gov; cmullen@ci.clayton.ca.us; Elise.warren@claytonpd.com; jwarburton@ci.clayton.ca.us; Victoria.walker@cityofconcord.org; Hames.nakayama@cityofconcord.org; Kevin.marstall@cityofconcord.org; Nicholas.gartner@cityofconcord.org; Trish.beirne@cityofconcord.org; ggilbert@danville.ca.gov; ggillette@danville.ca.gov; sjone@danville.ca.gov; jhebel@danville.ca.gov; mbond@ci.el-cerrito.ca.us; aorologas@ci.el-cerrito.ca.us; dgibson@co.el-cerrito.ca.us; mpigoni@ci.el-cerrito.ca.us; hsmyth@ci.hercules.ca.us; mikeroberts@ci.hercules.ca.us; rreber@ci.hercules.ca.us; planner@lovelafayette.org; csurges@ci.lafayette.ca.us; ttucker@cityofmartinez.org; laustin@cityofmartinez.org; msappal@cityofmartinez.org; jingram@moraga.ca.us; bhorn@moraga.ca.us; ahamid@moraga.ca.us; south@moraga.ca.us; sknapp@moraga.ca.us; dgomez@ci.oakley.ca.us; beard@ci.oakley.ca.us; orindaplanning@cityoforinda.org; dbuckley@cityoforinda.org; Schristie@cityoforinda.org; jchen@cityoforinda.org; jparrott@ci.pinole.ca.us; ngang@ci.pinole.ca.us; kpollot@ci.pittsburg.ca.us; lwright@ci.pittsburg.ca.us; rwui@ci.pleasant-hill.ca.us; dcastillo@ci.pleasant-hill.ca.us; mmoreno@ci.pleasant-hill.ca.us; richard_mitchell@ci.richmond.ca.us; Adrian_sheppard@ci.richmond.ca.us; Genevieve_pastor-cohen@ci.richmond.ca.us; ichoi@ci.richmond.ca.us; Lina_velasco@ci.richmond.ca.us; RonalynN@sanpabloca.gov; jessicar@sanpabloca.gov; jillm@sanpabloca.gov; spedowfski@sanramon.ca.gov; cbuxton@sanramon.ca.gov; rbartlett@sanramon.ca.gov; dcarlson@sanramon.ca.gov; waymire@walnut-creek.org; Hansen@walnut-creek.org; burkhart@walnut-creek.org; danab@abag.ca.gov; Lindy.lowe@bcdc.ca.gov; laurat@abag.ca.gov; rgrac@cccfpd.org; Chris.bachman@cccfpd.org; Aaron.mcalister@cccfpd.org; bhelmick@eccfpd.org; biagi@rhfd.org; craig@rhfd.org; corcoran@rhfd.org; mpicard@srvfire.ca.gov; rmarley@srvfire.ca.gov; dbell@srvfire.ca.gov; rwendel@srvfire.ca.gov; fdrayton@srvfire.ca.gov; shealy@mofd.org; sperkins@mofd.org; drein@mofd.org; mneher@ccwater.com; cestrella@ccwater.com; jmosley@ccwater.com; scotth@ebmud.com; George.wright@ebmud.com; Steven.frew@ebmud.com; John.daley@ebmud.com; pdetj@pw.cccounty.us; info@acpwa.org; wweaver@diablowater.org; nmendoza@diablowater.org; MLacy@pleasanthillrec.com; mblair@pleasanthillrec.us; mccp@haywardrec.org; jlawrence@larpd.org; Matt.gerhart@scc.ca.gov; askbdr@wildlife.ca.gov; Keith.Lichten@waterboards.ca.gov; Brian.Bugsch@slc.ca.gov; mike.martin@fire.ca.gov;

patrick.s.obrien@usace.army.mil; DFSCMiller@comcast.net; ybarial@ebparks.org; cjohnson@ebparks.org; info@oaklandfiresafe.org; info@ridgetrail.org; conservation@ebcnps.org; briant@deltadiablo.org; maryh@deltadiablo.org; thanhv@deltadiablo.org; Michelle.heckle@ucsf.edu; Larry.fong3@redcross.org; e5bq@pge.com; woolridg@berkeley.edu; edgar.orre@fire.ca.gov; dwinnacker@mofd.org; pat.anekayuwat@acgov.org; hank@acpwa.org; AWooldridge@alamedaca.gov; dgibson@ci.el-cerrito.ca.us; AYuen@ci.berkeley.ca.us; bblack@piedmont.ca.gov; VCrudele@oaklandca.gov; dwhite@oaklandnet.com; talaberge@lbl.gov; Carollrice@aol.com; akrigbaum@lbl.gov; mike.marcucci@fire.ca.gov; NLuby@oaklandnet.com; Jake.Hess@fire.ca.gov; kleonardnet@yahoo.com; dtieu@CityofBerkeley.info; djsmith@berkeley.edu; DCarrion@ci.el-cerrito.ca.us; richdean@berkeley.edu; Joan Malloy; Ananthan Kanagasundaram; Ricardo Martinez; simonenageon@ridgetrail.org; McLaughlin, Monique; Paul Detjens; Christine Belleci; Joel Pullen; Pinto, Chris; Cook, David; Timothy Rood; Allan Shields; Stefani, Danielle; amcal@cccfpd.org; Battaglia, Michelle@Wildlife; Grefsrud, Marcia@Wildlife
Subject: FW: East Bay Regional Park District LHMP Update: HMPC Kickoff Meeting
When: Wednesday, June 1, 2022 2:30 PM-5:00 PM (UTC-07:00) Mountain Time (US & Canada).
Where: https://us02web.zoom.us/j/89651325192?pwd=j_HyHbApQUp7zt22MRYjVV_EF8IKBL.1

Here is my last invite sent.

-----Original Appointment-----
From: Jeanine Foster
Sent: Wednesday, May 18, 2022 11:09 AM
To: tcotcher@ebparks.org
Subject: FW: East Bay Regional Park District LHMP Update: HMPC Kickoff Meeting
When: Wednesday, June 1, 2022 2:30 PM-5:00 PM (UTC-07:00) Mountain Time (US & Canada).
Where: https://us02web.zoom.us/j/89651325192?pwd=j_HyHbApQUp7zt22MRYjVV_EF8IKBL.1

All,

You are being invited to an East Bay Regional Park District Meeting to kick off the EBRPD 2022 Local Hazard Mitigation Plan (LHMP) Update project. Zoom meeting information is provided below. See attached invite for more details.

Topic: East Bay Regional Park District LHMP Update: Hazard Mitigation Planning Committee (HMPC) Kickoff Meeting
Time: June 1, 2022 01:30 – 4:00 pm Pacific Time (US and Canada

Join Zoom Meeting Join Zoom Meeting
https://us02web.zoom.us/j/89651325192?pwd=j_HyHbApQUp7zt22MRYjVV_EF8IKBL.1

Meeting ID: 896 5132 5192
Passcode: 765101
One tap mobile
+12532158782,,89651325192#,,,,*765101# US (Tacoma)
+13462487799,,89651325192#,,,,*765101# US (Houston)

Dial by your location
+1 253 215 8782 US (Tacoma)

+1 346 248 7799 US (Houston)
+1 669 900 6833 US (San Jose)
+1 301 715 8592 US (Washington DC)
+1 312 626 6799 US (Chicago)
+1 929 205 6099 US (New York)

Meeting ID: 896 5132 5192
Passcode: 765101
Find your local number: https://us02web.zoom.us/u/kbY4PlnAPE

Hope to see everyone!

Thanks,

Jeanine Foster
Foster Morrison Consulting
(303) 717-7171

A.4.2. Kickoff Meeting Agenda

EAST BAY REGIONAL PARKS DISTRICT
LOCAL HAZARD MITIGATION PLAN (LHMP)
HMPC MEETING #1
June 1, 2022

1. Introductions
2. Hazard Mitigation & the Disaster Mitigation Act Planning Requirements
3. The Role of the Hazard Mitigation Planning Committee (HMPC)
4. Hazard Identification
5. Schedule
6. Data Needs
7. Questions and Answers

A.4.3. Kickoff Meeting Sign-in Sheet

Name	Title	Department/Agency/Affiliation
Jeff Rasmussen	Assistant Finance Officer	EBRPD, Finance and Management Services
Kristen Van Dam	Fuels Ecologist	EBRPD, Stewardship
Alma Balmes	Risk and Safety Manager	EBRPD, Risk & Management
Katy Hornbeck	Grants Manager	EBRPD, Grants
Lisa Goorjian	Chief of Design & Construction	Acquisition, Stewardship & Development Division
David Rusting	Chief Information Officer	Finance & Management Services Division
Devon Reiff		EBRPD Planning/ dreiff@ebparks.org
Jeanine Foster	Project Manager	Foster Morrison Consulting
Chris Morrison	Lead Planner	Foster Morrison Consulting
Luana Dowling	Wildfire Specialist	Dowling Firewise w/Foster Morrison Consulting
Chris Lau		CCC Public Works Department/ clau@pw.cccounty.us
Ricardo Martinez		City of Union City/ ricardom@unioncity.org
Jose Castrejon	Interim Fire Chief	El Cerrito Fire/ jcastrejon@ci.el-cerrito.ca.us
Kim Colantuona		Livermore-Pleasanton Fire Department/ kcolantuono@lpfire.org
Ed Orre		Cal Fire edgar.orre@fire.ca.gov
Rick Kovar		Contra Costa OES/ rkova@so.cccounty.us
Allan Shields		Danville Police Department/ ashields@danville.ca.gov
Dave Winnacker		Moraga-Orinda Fire District/ dwinnacker@mofd.org
Joan Malloy	City Manager	Union City
Ronalyn Nonato	Associate Engineer	City of San Pablo/
Mike Vickers		City of Walnut Creek/ 925-256-3538/ vickers@walnut-creek.org
Kelly Kalfsbeek		CCC Public Works Department/ kkalfsbe@pw.cccounty.us
Afshan Hamid		Town of Moraga/
Will Nelson	DCD	CCC Planning Department/ will.nelson@dcd.cccounty.us
Sharon Oliver	Disaster Preparedness Coordinator	Alameda Fire Department
Dori Tieu		
Christine Belleci		Cbelleci@diablowater.org

A.5 Risk Assessment Meeting

A.5.1. Emailed Invite to Risk Assessment Meeting

From: Jeanine Foster <jeanine.foster@fostermorrison.com>
Sent: Friday, June 10, 2022 11:39 AM
To: Jeanine Foster; Jrasmussen@ebparks.org; Dmason@ebparks.org; Atheile@ebparks.org; Kvandam@ebparks.org; Mgraul@ebparks.org; Abalmes@ebparks.org; Khornbeck@ebparks.org; Eholmes@ebparks.org; Lgoorjian@ebparks.org; Drusting@ebparks.org; Bholt@ebparks.org; Khelae@ebparks.org; DReiff@ebparks.org; tcotcher@ebparks.org; tlangdon@acgov.org; David.rocha@acgov.org; esmith@alamedaca.gov; soliver@alamedaca.gov; lcalkins@albanyca.org; lelefant@ci.emeryville.ca.us; rdifranco@fremont.gov; don.nichelson@hayward-ca.gov; LPFDPostmaster@lpfire.org; jmalloy@unioncity.org; rkova@so.cccounty.us; balld@so.cccounty.us; jlee@so.cccounty.us; Chris.lau@pw.cccounty.us; Kelly.kalfsbeek@pw.cccounty.us; Tim.jensen@pw.cccounty.us; Will.Nelson@dcd.cccounty.us; jfortner@antiochca.gov; jsamuelson@antiochca.gov; btolero@ci.brentwood.ca.us; dschroer@brentwoodca.gov; jwarburton@ci.clayton.ca.us; Kevin.marstall@cityofconcord.org; Nicholas.gartner@cityofconcord.org; Trish.beirne@cityofconcord.org; aorologas@ci.el-cerrito.ca.us; mikeroberts@ci.hercules.ca.us; rreber@ci.hercules.ca.us; planner@lovelafayette.org; csurges@ci.lafayette.ca.us; ttucker@cityofmartinez.org; laustin@cityofmartinez.org; msappal@cityofmartinez.org; bhorn@moraga.ca.us; ahamid@moraga.ca.us; sknapp@moraga.ca.us; dgomez@ci.oakley.ca.us; beard@ci.oakley.ca.us; orindaplanning@cityoforinda.org; dbuckley@cityoforinda.org; Schristie@cityoforinda.org; ngang@ci.pinole.ca.us; kpollot@ci.pittsburg.ca.us; dcastillo@ci.pleasant-hill.ca.us; richard_mitchell@ci.richmond.ca.us; Genevieve_pastor-cohen@ci.richmond.ca.us; ichoi@ci.richmond.ca.us; Lina_velasco@ci.richmond.ca.us; RonalynN@sanpabloca.gov; jessicar@sanpabloca.gov; spedowfski@sanramon.ca.gov; cbuxton@sanramon.ca.gov; rbartlett@sanramon.ca.gov; dcarlson@sanramon.ca.gov; waymire@walnut-creek.org; Hansen@walnut-creek.org; burkhart@walnut-creek.org; Chris.bachman@cccfpd.org; Aaron.mcalister@cccfpd.org; bhelmick@eccfpd.org; craig@rhfd.org; corcoran@rhfd.org; rmarley@srvfire.ca.gov; dbell@srvfire.ca.gov; rwendel@srvfire.ca.gov; fdrayton@srvfire.ca.gov; drein@mofd.org; cestrella@ccwater.com; jmosley@ccwater.com; scotth@ebmud.com; Steven.frew@ebmud.com; John.daley@ebmud.com; pdetj@pw.cccounty.us; info@acpwa.org; wweaver@diablowater.org; nmendoza@diablowater.org; MLacy@pleasanthillrec.com; mccp@haywardrec.org; askbdr@wildlife.ca.gov; Keith.Lichten@waterboards.ca.gov; Brian.Bugsch@slc.ca.gov; patrick.s.obrien@usace.army.mil; DFSCMiller@comcast.net; ybarial@ebparks.org; cjohnson@ebparks.org; info@ridgetrail.org; conservation@ebcnps.org; briant@deltadiablo.org; maryh@deltadiablo.org; thanhv@deltadiablo.org; Michelle.heckle@ucsf.edu; Larry.fong3@redcross.org; e5bq@pge.com; woolridg@berkeley.edu; edgar.orre@fire.ca.gov; dwinnacker@mofd.org; pat.anekayuwat@acgov.org; hank@acpwa.org; AWooldridge@alamedaca.gov; talaberge@lbl.gov; Carollrice@aol.com; akrigbaum@lbl.gov; mike.marcucci@fire.ca.gov; Jake.Hess@fire.ca.gov; kleonardnet@yahoo.com; dtieu@CityofBerkeley.info; DCarrion@ci.el-cerrito.ca.us; richdean@berkeley.edu; ricardom@unioncity.org; jcastrejon@ci.el-cerrito.ca.us; kcolantuono@lpfire.org; ashields@danville.ca.gov; vickers@walnut-creek.org; cbelleci@diablowater.org; smatinpour@ci.hercules.ca.us; MGerh001@so.cccounty.us; atune@freemont.gov; Chris Morrison; 'Luana Dowling (dowlingluana@gmail.com)'; Brenna Howell; mjtorkelson@lbl.gov
Cc: Caldwell, Vicki@SLC; Alec Tune; Jordan Davis; Paul Detjens; McLaughlin, Monique; Battaglia, Michelle@Wildlife; Lisa Maxwell; Danielle Mieler; amcal@cccfpd.org; Hill, Scott; Foster, Kenneth@SLC
Subject: East Bay Regional Park District LHMP Update: HMPC #2 - Risk Assessment Meeting
When: Wednesday, July 13, 2022 2:30 PM-5:00 PM (UTC-07:00) Mountain Time (US & Canada).
Where: https://us02web.zoom.us/j/89202893338?pwd=YlYxQmlTamI3aEJyaisrLys4bWI4UT09

All,

You are being invited to the East Bay Regional Park District Hazard Mitigation Planning Committee (HMPC) Meeting #2 on the Risk Assessment for the Local Hazard Mitigation Plan (LHMP) Update.

Zoom meeting information is provided below.

Topic: East Bay Regional Park District LHMP Update: Hazard Mitigation Planning Committee (HMPC) Risk Assessment Meeting
Time: July 13, 2022 01:30 – 4:00 pm Pacific Time (US and Canada)

Join Zoom Meeting
https://us02web.zoom.us/j/89202893338?pwd=YlYxQmlTamI3aEJyaisrLys4bWI4UT09

Meeting ID: 892 0289 3338
Passcode: 376053
One tap mobile
+16699006833,,89202893338#,,,,*376053# US (San Jose)
+12532158782,,89202893338#,,,,*376053# US (Tacoma)

Dial by your location
+1 669 900 6833 US (San Jose)
+1 253 215 8782 US (Tacoma)
+1 346 248 7799 US (Houston)
+1 929 205 6099 US (New York)
+1 301 715 8592 US (Washington DC)
+1 312 626 6799 US (Chicago)
Meeting ID: 892 0289 3338
Passcode: 376053
Find your local number: https://us02web.zoom.us/u/kiG6q8K7r

A.5.2. Risk Assessment Meeting Agenda

East Bay Regional Parks District
Local Hazard Mitigation Plan (LHMP) Update
Risk Assessment Meeting
July 13, 2022

1. Introductions
2. Status of the DMA Planning Process
3. Review (and discussions/input) of the Risk Assessment
4. Open Discussion and Input on the Risk Assessment (Handout)
5. Review of Data Needs
6. Next Steps

A.5.3. Risk Assessment Meeting Sign in Sheet

Name	Title	Department/Agency/Affiliation
Jeff Rasmussen	Assistant Finance Officer	EBRPD, Finance and Management Services
Betsy Burkhart		City of Walnut Creek
Glen Gilchrist		EBRPD
Bruce Davis		City of Concord
Ken Foster		State Lands Commission; Kenneth.foster@slc.ca.gov
Matt Graul		EBRPD
Ailene Theile		EBRPD Fire Chief
Ron Marley		San Ramon Valley Fire Protection District; rmarley@srvfire.ca.gov
Michelle Battaglia		
Cathy Surges-Moscato		Lafayette Police Department; csurgis@ci.lafayette.ca.us
Kristen Van Dam	Fuels Ecologist	EBRPD, Stewardship
Alma Balmes	Manager	EBRPD, Risk & Management
David Rusting	Chief Information Officer	Finance & Management Services Division
Jeanine Foster	Project Manager	Foster Morrison Consulting
Chris Morrison	Lead Planner	Foster Morrison Consulting
Luana Dowling	Wildfire Specialist	Dowling Firewise w/Foster Morrison Consulting
Kim Colantuona		Livermore-Pleasanton Fire Department/ kcolantuono@lpfire.org

A.6 Mitigation Strategy Meetings

A.6.1. Email Invites to Mitigation Strategy Meetings (August 3)

From: Jeanine Foster <jeanine.foster@fostermorrison.com>
Sent: Tuesday, June 14, 2022 1:33 PM
To: Jeanine Foster; Jrasmussen@ebparks.org; Dmason@ebparks.org; Atheile@ebparks.org; Kvandam@ebparks.org; Mgraul@ebparks.org; Abalmes@ebparks.org; Khornbeck@ebparks.org; Eholmes@ebparks.org; Lgoorjian@ebparks.org; Drusting@ebparks.org; Bholt@ebparks.org; Khelae@ebparks.org; DReiff@ebparks.org; tcotcher@ebparks.org; tlangdon@acgov.org; David.rocha@acgov.org; esmith@alamedaca.gov; soliver@alamedaca.gov; lcalkins@albanyca.org; lelefant@ci.emeryville.ca.us; rdifranco@fremont.gov; don.nichelson@hayward-ca.gov; LPFDPostmaster@lpfire.org; jmalloy@unioncity.org; rkova@so.cccounty.us; balld@so.cccounty.us; jlee@so.cccounty.us; Chris.lau@pw.cccounty.us; Kelly.kalfsbeek@pw.cccounty.us; Tim.jensen@pw.cccounty.us; Will.Nelson@dcd.cccounty.us; jfortner@antiochca.gov; jsamuelson@antiochca.gov; btolero@ci.brentwood.ca.us; dschroer@brentwoodca.gov; jwarburton@ci.clayton.ca.us; Kevin.marstall@cityofconcord.org; Nicholas.gartner@cityofconcord.org; Trish.beirne@cityofconcord.org; aorologas@ci.el-cerrito.ca.us; mikeroberts@ci.hercules.ca.us; rreber@ci.hercules.ca.us; planner@lovelafayette.org; csurges@ci.lafayette.ca.us; ttucker@cityofmartinez.org; laustin@cityofmartinez.org; msappal@cityofmartinez.org; bhorn@moraga.ca.us; ahamid@moraga.ca.us; sknapp@moraga.ca.us; dgomez@ci.oakley.ca.us; beard@ci.oakley.ca.us; orindaplanning@cityoforinda.org; dbuckley@cityoforinda.org; Schristie@cityoforinda.org; ngang@ci.pinole.ca.us; kpollot@ci.pittsburg.ca.us; dcastillo@ci.pleasant-hill.ca.us; richard_mitchell@ci.richmond.ca.us; Genevieve_pastor-cohen@ci.richmond.ca.us; ichoi@ci.richmond.ca.us; Lina_velasco@ci.richmond.ca.us; RonalynN@sanpabloca.gov; jessicar@sanpabloca.gov; spedowfski@sanramon.ca.gov; cbuxton@sanramon.ca.gov; rbartlett@sanramon.ca.gov; dcarlson@sanramon.ca.gov; waymire@walnut-creek.org; Hansen@walnut-creek.org; burkhart@walnut-creek.org; Chris.bachman@cccfpd.org; Aaron.mcalister@cccfpd.org; bhelmick@eccfpd.org; craig@rhfd.org; corcoran@rhfd.org; rmarley@srvfire.ca.gov; dbell@srvfire.ca.gov; rwendel@srvfire.ca.gov; fdrayton@srvfire.ca.gov; drein@mofd.org; cestrella@ccwater.com; jmosley@ccwater.com; scotth@ebmud.com; Steven.frew@ebmud.com; John.daley@ebmud.com; pdetj@pw.cccounty.us; info@acpwa.org; wweaver@diablowater.org; nmendoza@diablowater.org; MLacy@pleasanthillrec.com; mccp@haywardrec.org; askbdr@wildlife.ca.gov; Keith.Lichten@waterboards.ca.gov; Brian.Bugsch@slc.ca.gov; patrick.s.obrien@usace.army.mil; DFSCMiller@comcast.net; ybarial@ebparks.org; cjohnson@ebparks.org; info@ridgetrail.org; conservation@ebcnps.org; briant@deltadiablo.org; maryh@deltadiablo.org; thanhv@deltadiablo.org; Michelle.heckle@ucsf.edu; Larry.fong3@redcross.org; e5bq@pge.com; woolridg@berkeley.edu; edgar.orre@fire.ca.gov; dwinnacker@mofd.org; pat.anekayuwat@acgov.org; hank@acpwa.org; AWooldridge@alamedaca.gov; talaberge@lbl.gov; Carollrice@aol.com; akrigbaum@lbl.gov; mike.marcucci@fire.ca.gov; Jake.Hess@fire.ca.gov; kleonardnet@yahoo.com; dtieu@CityofBerkeley.info; DCarrion@ci.el-cerrito.ca.us; richdean@berkeley.edu; ricardom@unioncity.org; jcastrejon@ci.el-cerrito.ca.us; kcolantuono@lpfire.org; ashields@danville.ca.gov; vickers@walnut-creek.org; cbelleci@diablowater.org; smatinpour@ci.hercules.ca.us; atune@fremont.gov
Cc: Chris Morrison; 'Luana Dowling (dowlingluana@gmail.com)'; Brenna Howell; Jordan Davis; McLaughlin, Monique; Hill, Scott; amcal@cccfpd.org; Jonelyn Whales
Subject: East Bay Regional Park District LHMP Update: HMPC #3 - Mitigation Strategy Meeting - Goals
When: Wednesday, August 3, 2022 2:30 PM-5:00 PM (UTC-07:00) Mountain Time (US & Canada).
Where: https://us02web.zoom.us/j/82512971921?pwd=REcrMnZiajFSeGpPTUVIbnFDSG1LQT09

All,

On behalf of the East Bay Regional Park District (EBRPD), you are being invited to the Hazard Mitigation Planning Committee (HMPC) Meeting #3 for the EBRPD 2022 Local Hazard Mitigation Plan (LHMP) Update project. HMPC Meeting #3 is the first of two meetings to develop the updated Mitigation Strategy. Meeting #3 will address the development of updated Goals for the 2022 LHMP.

Zoom meeting information is provided below.

Topic: East Bay Regional Park District LHMP Update: HMPC Meeting #3 – Mitigation Strategy Goals Development
Time: August 3, 2022 01:30 – 4:00 pm Pacific Time (US and Canada)

Join Zoom Meeting
https://us02web.zoom.us/j/82512971921?pwd=REcrMnZiajFSeGpPTUVIbnFDSG1LQT09

Meeting ID: 825 1297 1921
Passcode: 329301
One tap mobile
+13462487799,,82512971921#,,,,*329301# US (Houston)
+16699006833,,82512971921#,,,,*329301# US (San Jose)

Dial by your location
+1 346 248 7799 US (Houston)
+1 669 900 6833 US (San Jose)
+1 253 215 8782 US (Tacoma)
+1 312 626 6799 US (Chicago)
+1 929 205 6099 US (New York)
+1 301 715 8592 US (Washington DC)
Meeting ID: 825 1297 1921
Passcode: 329301
Find your local number: https://us02web.zoom.us/u/kdkiI5N2Vi

A.6.2. Email Invites to Mitigation Strategy Meetings (August 4)

From: Jeanine Foster <jeanine.foster@fostermorrison.com>
Sent: Tuesday, June 14, 2022 2:40 PM
To: Jeanine Foster; Jrasmussen@ebparks.org; Dmason@ebparks.org; Atheile@ebparks.org; Kvandam@ebparks.org; Mgraul@ebparks.org; Abalmes@ebparks.org; Khornbeck@ebparks.org; Eholmes@ebparks.org; Lgoorjian@ebparks.org; Drusting@ebparks.org; Bholt@ebparks.org; Khelae@ebparks.org; DReiff@ebparks.org; tcotcher@ebparks.org; tlangdon@acgov.org; David.rocha@acgov.org; esmith@alamedaca.gov; soliver@alamedaca.gov; lcalkins@albanyca.org; lelefant@ci.emeryville.ca.us; rdifranco@fremont.gov; don.nichelson@hayward-ca.gov; LPFDPostmaster@lpfire.org; jmalloy@unioncity.org; rkova@so.cccounty.us; balld@so.cccounty.us; jlee@so.cccounty.us; Chris.lau@pw.cccounty.us; Kelly.kalfsbeek@pw.cccounty.us; Tim.jensen@pw.cccounty.us; Will.Nelson@dcd.cccounty.us; jfortner@antiochca.gov; jsamuelson@antiochca.gov; btolero@ci.brentwood.ca.us; dschroer@brentwoodca.gov; jwarburton@ci.clayton.ca.us; Kevin.marstall@cityofconcord.org; Nicholas.gartner@cityofconcord.org; Trish.beirne@cityofconcord.org; aorologas@ci.el-cerrito.ca.us; mikeroberts@ci.hercules.ca.us; rreber@ci.hercules.ca.us; planner@lovelafayette.org; csurges@ci.lafayette.ca.us; ttucker@cityofmartinez.org; laustin@cityofmartinez.org; msappal@cityofmartinez.org; bhorn@moraga.ca.us; ahamid@moraga.ca.us; sknapp@moraga.ca.us; dgomez@ci.oakley.ca.us; beard@ci.oakley.ca.us; orindaplanning@cityoforinda.org; dbuckley@cityoforinda.org; Schristie@cityoforinda.org; ngang@ci.pinole.ca.us; kpollot@ci.pittsburg.ca.us; dcastillo@ci.pleasant-hill.ca.us; richard_mitchell@ci.richmond.ca.us; Genevieve_pastor-cohen@ci.richmond.ca.us; ichoi@ci.richmond.ca.us; Lina_velasco@ci.richmond.ca.us; RonalynN@sanpabloca.gov; jessicar@sanpabloca.gov; spedowfski@sanramon.ca.gov; cbuxton@sanramon.ca.gov; rbartlett@sanramon.ca.gov; dcarlson@sanramon.ca.gov; waymire@walnut-creek.org; Hansen@walnut-creek.org; burkhart@walnut-creek.org; Chris.bachman@cccfpd.org; Aaron.mcalister@cccfpd.org; bhelmick@eccfpd.org; craig@rhfd.org; corcoran@rhfd.org; rmarley@srvfire.ca.gov; dbell@srvfire.ca.gov; rwendel@srvfire.ca.gov; fdrayton@srvfire.ca.gov; drein@mofd.org; cestrella@ccwater.com; jmosley@ccwater.com; scotth@ebmud.com; Steven.frew@ebmud.com; John.daley@ebmud.com; pdetj@pw.cccounty.us; info@acpwa.org; wweaver@diablowater.org; nmendoza@diablowater.org; MLacy@pleasanthillrec.com; mccp@haywardrec.org; askbdr@wildlife.ca.gov; Keith.Lichten@waterboards.ca.gov; Brian.Bugsch@slc.ca.gov; patrick.s.obrien@usace.army.mil; DFSCMiller@comcast.net; ybarial@ebparks.org; cjohnson@ebparks.org; info@ridgetrail.org; conservation@ebcnps.org; briant@deltadiablo.org; maryh@deltadiablo.org; thanhv@deltadiablo.org; Michelle.heckle@ucsf.edu; Larry.fong3@redcross.org; e5bq@pge.com; woolridg@berkeley.edu; edgar.orre@fire.ca.gov; dwinnacker@mofd.org; pat.anekayuwat@acgov.org; hank@acpwa.org; AWooldridge@alamedaca.gov; talaberge@lbl.gov; Carollrice@aol.com; akrigbaum@lbl.gov; mike.marcucci@fire.ca.gov; Jake.Hess@fire.ca.gov; kleonardnet@yahoo.com; dtieu@CityofBerkeley.info; DCarrion@ci.el-cerrito.ca.us; richdean@berkeley.edu; ricardom@unioncity.org; jcastrejon@ci.el-cerrito.ca.us; kcolantuono@lpfire.org; ashields@danville.ca.gov; vickers@walnut-creek.org; cbelleci@diablowater.org; smatinpour@ci.hercules.ca.us; atune@fremont.gov
Cc: Chris Morrison; 'Luana Dowling (dowlingluana@gmail.com)'; Brenna Howell; Jordan Davis; McLaughlin, Monique; Hill, Scott; amcal@cccfpd.org; Jonelyn Whales; Green, Dan; Robert Kennedy
Subject: East Bay Regional Park District LHMP Update: HMPC #4 - Mitigation Strategy Meeting - Mitigation Action Development
When: Thursday, August 4, 2022 10:00 AM-12:30 PM (UTC-07:00) Mountain Time (US & Canada).
Where: https://us02web.zoom.us/j/87369588768?pwd=OFMxK0cyMjJyeVFYWmY2cGhjeHZUUT09

All,

On behalf of the East Bay Regional Park District (EBRPD), you are being invited to the Hazard Mitigation Planning Committee (HMPC) Meeting #4 for the EBRPD 2022 Local Hazard Mitigation Plan (LHMP) Update project. HMPC Meeting #4 is the second of two meetings to develop the updated Mitigation Strategy. Meeting #4 will address the development of updated Mitigation Actions and Projects for the 2022 LHMP.

Zoom meeting information is provided below.

Topic: East Bay Regional Park District LHMP Update: HMPC Meeting #4 – Mitigation Strategy – Actions and Projects Development
Time: August 4, 2022 09:00 – 11:30 am Pacific Time (US and Canada)

Join Zoom Meeting
https://us02web.zoom.us/j/87369588768?pwd=OFMxK0cyMjJyeVFYWmY2cGhjeHZUUT09

Meeting ID: 873 6958 8768
Passcode: 879071
One tap mobile
+12532158782,,87369588768#,,,,*879071# US (Tacoma)
+13462487799,,87369588768#,,,,*879071# US (Houston)

Dial by your location
+1 253 215 8782 US (Tacoma)
+1 346 248 7799 US (Houston)
+1 669 900 6833 US (San Jose)
+1 301 715 8592 US (Washington DC)
+1 312 626 6799 US (Chicago)
+1 929 205 6099 US (New York)
Meeting ID: 873 6958 8768
Passcode: 879071
Find your local number: https://us02web.zoom.us/u/kd5HIOKxk

A.6.3. Mitigation Strategy Meeting Agenda

East Bay Regional Park District
Local Hazard Mitigation Plan (LHMP) Update
Mitigation Strategy Meetings
August 3 and 4. 2022

HMPC Meeting #3:

1. Introductions
2. LHMP Project Status and Next Steps/Timeline
3. Priority Hazards Review
4. Develop Plan Goals and Objectives
5. Introduction to HMPC Meeting #4: Mitigation Alternatives/Actions/Projects

HMPC Meeting #4:

1. Introductions
2. Review Mitigation Categories and Selection Criteria
3. Brainstorming of Mitigation Alternatives/Actions/Projects by Hazard
4. Review of Voting Process for Prioritization of Mitigation Actions/Projects
5. Questions

A.6.4. Mitigation Strategy Meeting Sign in Sheets

August 3, 2022

Name	Title	Department/Agency/Affiliation
Jeff Rasmussen	Assistant Finance Officer	EBRPD, Finance and Management Services
Ricardo Martinez		City of Union City
Jose Castrejon	Interim Fire Chief	El Cerrito Fire
Trish Beirne	Emergency & Volunteer Services Manager	City of Concord
Afshan Hamid	Planning Director	Town of Moraga
Aaron McAlister	Deputy Fire Chief	Contra Costa Fire
Chris Lau	Assistant Public Works Director	Contra Costa County Public Works Department
Dori Tieu	Deputy Fire Marshal	City of Berkely Fire
Alec Tune	Emergency Services Manager	Fremont Fire Department OES
Matt Graul	Chief of Stewardship	EBRPD
Katy Hornbeck	Grants Manager	EBRPD
David Rusting	Chief Information Officer	Finance & Management Services Division
Jeanine Foster	Project Manager	Foster Morrison Consulting
Chris Morrison	Lead Planner	Foster Morrison Consulting
Luana Dowling	Wildfire Specialist	Dowling Firewise w/Foster Morrison Consulting

August 4, 2022

Name	Title	Department/Agency/Affiliation
Jeff Rasmussen	Assistant Finance Officer	EBRPD, Finance and Management Services
Jose Castrejon	Interim Fire Chief	El Cerrito Fire
Trish Beirne	Emergency & Volunteer Services Manager	City of Concord
Alma Balmes	Manager	EBRPD, Risk & Management
Eric Holmes	Administrative Analyst II	EBRPD
David Biggs	City Manager	City of Orinda
David Phulps	Police Lieutenant	EBRPD
Ron Marley		San Ramon Fire Protection District
MD Heckle		USSF Police/ EOC
Jonelyn Whales	Sr. Planner	City of Richmond
Matt Graul	Chief of Stewardship	EBRPD
Katy Hornbeck	Grants Manager	EBRPD
David Rusting	Chief Information Officer	Finance & Management Services Division

Name	Title	Department/Agency/Affiliation
Jeanine Foster	Project Manager	Foster Morrison Consulting
Chris Morrison	Lead Planner	Foster Morrison Consulting
Luana Dowling	Wildfire Specialist	Dowling Firewise w/Foster Morrison Consulting

A.7 Final HMPC Meeting

A.7.1. Final HMPC Meeting Invite

-----Original Appointment-----
From: Jeanine Foster <jeanine.foster@fostermorrison.com>
Sent: Wednesday, October 19, 2022 5:24 PM
To: Jeanine Foster; Jrasmussen@ebparks.org; Dmason@ebparks.org; Atheile@ebparks.org; Kvandam@ebparks.org; Mgraul@ebparks.org; Abalmes@ebparks.org; Khornbeck@ebparks.org; Eholmes@ebparks.org; Lgoorjian@ebparks.org; Drusting@ebparks.org; Bholt@ebparks.org; Khelae@ebparks.org; DReiff@ebparks.org; tcotcher@ebparks.org; dphulps@ebparks.org; tlangdon@acgov.org; David.rocha@acgov.org; esmith@alamedaca.gov; soliver@alamedaca.gov; lcalkins@albanyca.org; lelefant@ci.emeryville.ca.us; rdifranco@fremont.gov; don.nichelson@hayward-ca.gov; LPFDPostmaster@lpfire.org; jmalloy@unioncity.org; rkova@so.cccounty.us; balld@so.cccounty.us; jlee@so.cccounty.us; Chris.lau@pw.cccounty.us; Kelly.kalfsbeek@pw.cccounty.us; Tim.jensen@pw.cccounty.us; Will.Nelson@dcd.cccounty.us; jfortner@antiochca.gov; jsamuelson@antiochca.gov; btolero@ci.brentwood.ca.us; dschroer@brentwoodca.gov; jwarburton@ci.clayton.ca.us; Kevin.marstall@cityofconcord.org; Nicholas.gartner@cityofconcord.org; Trish.beirne@cityofconcord.org; aorologas@ci.el-cerrito.ca.us; mikeroberts@ci.hercules.ca.us; rreber@ci.hercules.ca.us; planner@lovelafayette.org; csurges@ci.lafayette.ca.us; ttucker@cityofmartinez.org; laustin@cityofmartinez.org; msappal@cityofmartinez.org; bhorn@moraga.ca.us; ahamid@moraga.ca.us; sknapp@moraga.ca.us; dgomez@ci.oakley.ca.us; beard@ci.oakley.ca.us; dbuckley@cityoforinda.org; Schristie@cityoforinda.org; ngang@ci.pinole.ca.us; kpollot@ci.pittsburg.ca.us; dcastillo@ci.pleasant-hill.ca.us; richard_mitchell@ci.richmond.ca.us; Genevieve_pastor-cohen@ci.richmond.ca.us; ichoi@ci.richmond.ca.us; Lina_velasco@ci.richmond.ca.us; RonalynN@sanpabloca.gov; jessicar@sanpabloca.gov; spedowfski@sanramon.ca.gov; cbuxton@sanramon.ca.gov; rbartlett@sanramon.ca.gov; dcarlson@sanramon.ca.gov; waymire@walnut-creek.org; Hansen@walnut-creek.org; burkhart@walnut-creek.org; Chris.bachman@cccfpd.org; Aaron.mcalister@cccfpd.org; bhelmick@eccfpd.org; craig@rhfd.org; corcoran@rhfd.org; rmarley@srvfire.ca.gov; dbell@srvfire.ca.gov; rwendel@srvfire.ca.gov; fdrayton@srvfire.ca.gov; drein@mofd.org; cestrella@ccwater.com; jmosley@ccwater.com; scotth@ebmud.com; Steven.frew@ebmud.com; John.daley@ebmud.com; pdetj@pw.cccounty.us; info@acpwa.org; wweaver@diablowater.org; nmendoza@diablowater.org; MLacy@pleasanthillrec.com; mccp@haywardrec.org; askbdr@wildlife.ca.gov; Keith.Lichten@waterboards.ca.gov; Brian.Bugsch@slc.ca.gov; patrick.s.obrien@usace.army.mil; DFSCMiller@comcast.net; ybarial@ebparks.org; cjohnson@ebparks.org; info@ridgetrail.org; conservation@ebcnps.org; briant@deltadiablo.org; maryh@deltadiablo.org; thanhv@deltadiablo.org; Michelle.heckle@ucsf.edu; Larry.fong3@redcross.org; e5bq@pge.com; woolridg@berkeley.edu; edgar.orre@fire.ca.gov; dwinnacker@mofd.org; pat.anekayuwat@acgov.org; hank@acpwa.org; AWooldridge@alamedaca.gov; talaberge@lbl.gov; Carollrice@aol.com; akrigbaum@lbl.gov; mike.marcucci@fire.ca.gov; Jake.Hess@fire.ca.gov; kleonardnet@yahoo.com; dtieu@CityofBerkeley.info; richdean@berkeley.edu; ricardom@unioncity.org; jcastrejon@ci.el-cerrito.ca.us; kcolantuono@lpfire.org; ashields@danville.ca.gov; vickers@walnut-creek.org; cbelleci@diablowater.org; smatinpour@ci.hercules.ca.us; atune@fremont.gov; mjtorkelson@lbl.gov; cbeckman@ci.el-cerrito.ca.us; Kenneth.foster@slc.ca.gov; DBiggs@cityoforinda.org; Jonelyn_whales@ci.richmond.ca.us
Cc: Chris Morrison; Green, Dan; Feil, Jessica; amcal@cccfpd.org; Jordan Davis; bhansell@kensingtonfire.org; glain@cccfpd.org; Maggie Dutton
Subject: EBRPD LHMP Update: Final HMPC Meeting on the Draft Plan
When: Thursday, November 17, 2022 10:00 AM-12:00 PM (UTC-07:00) Mountain Time (US & Canada).
Where: https://us02web.zoom.us/j/88214133860?pwd=bEovck9KS1JxK2xLVTNtUDNLNTFIUT09

All,
The EBRPD 2022 Local Hazard Mitigation Plan (LHMP) Update – Public Review Draft is available at the following Dropbox link: https://www.dropbox.com/t/75nyv1NHzlka9X0q

Ready for Download from the Public Review Draft Folder:

1. EBRPD LHMP Update Complete (PDF) – contains the entire LHMP
2. EBRPD LHMP Update Chapters Only (PDF) – contains just the Base Plan Chapters in one document
3. EBRPD LHMP Update Appendices Only (PDF) – contains just the Appendices in one document

See below for details and next steps.

Final HMPC Meeting. Our final planning team meeting is scheduled for Thursday, November 17 from 9:00 to 11:00 am, via Zoom (***this is the invite***). It is important that everyone attend this final meeting to address any public comments received and to finalize all input to the LHMP.

Final LHMP Input. All final planning team input to the Draft LHMP needs to be provided no later than December 2 (Friday), in order to meet our Cal OES/FEMA submittal by December 16, 2022. Please take time to download and review the document.

Final Public Meeting. The final public meeting on the Draft Plan will be held Wednesday, November 16 from 6:00 to 7:30 pm. The zoom meeting invite information will be available on the EBRPD webpage along with the Public Review Draft by Wednesday, October 26, 2022. See: https://www.ebparks.org/projects/fema-local-hazard-mitigation-plan.

If you have questions, please contact Jeanine Foster at Jeanine.foster@fostermorrison.com or 303.717.7171.

Thank you for your continued engagement in the process. See below for the Zoom Invite Info.

Topic: EBRPD 2022 LHMP Update – Final HMPC Meeting on the Draft Plan
Time: Thursday, November 17, 2022, 9:00 – 11:00am Pacific Time

Join Zoom Meeting
https://us02web.zoom.us/j/88214133860?pwd=bEovck9KS1JxK2xLVTNtUDNLNTFIUT09

Meeting ID: 882 1413 3860
Passcode: 801530
One tap mobile
+17193594580,,88214133860#,,,,*801530# US
+12532158782,,88214133860#,,,,*801530# US (Tacoma)

Dial by your location
+1 719 359 4580 US
+1 253 215 8782 US (Tacoma)
+1 346 248 7799 US (Houston)
+1 669 444 9171 US

+1 309 205 3325 US
+1 312 626 6799 US (Chicago)
+1 386 347 5053 US
+1 564 217 2000 US
+1 646 931 3860 US
+1 929 205 6099 US (New York)
+1 301 715 8592 US (Washington DC)
Meeting ID: 882 1413 3860
Passcode: 801530
Find your local number: https://us02web.zoom.us/u/kdkfILCjkm

A.7.2. Final HMPC Meeting Agenda

AGENDA
East Bay Regional Park District
Local Hazard Mitigation Plan Update
Final HMPC Meeting
November 17, 2022

1. Introductions
2. Status of the LHMP Update Process
3. Addressing Public Comments
4. Final HMPC Input: Outstanding Items
5. Summary of Changes in EBRPD Planning Area Vulnerabilities/ Mitigation Priorities
6. Final Steps

A.8 Public Involvement

A.8.1. Kickoff Meeting Press Release

East Bay Regional Park District

East Bay Regional Park District
2022 Local Hazard Mitigation Plan Update
Public Meeting #1 - Press Release

Get Involved!

HELP YOUR COMMUNITY BE HAZARD-READY!

East Bay Regional Park District, CA: The East Bay Regional Park District (EBRPD) is updating their 2017 Local Hazard Mitigation Plan (LHMP). Wildfire, drought, earthquakes, floods, and severe weather are just a few of the hazards of concern to the Park District. While natural hazards such as these cannot be prevented, an LHMP forms the foundation for the Park District's long-term strategy to reduce disaster losses by breaking the repeated cycle of disaster damage and reconstruction. Communities with a FEMA-approved LHMP are eligible to apply for both pre- and post-disaster mitigation grant funding.

The people most aware of potential hazards are the people that live and work in the affected communities. In addition to plan participation by local, state and federal agencies, the EBRPD is seeking members of the public to participate in our LHMP Update process.

You are invited! An initial public information meeting will be held as follows:

EBRPD 2022 LHMP Update - Public Information Kickoff Meeting
June 1, 2022
6:00 – 7:30 pm
Virtual Meeting – Zoom Platform

To obtain the Zoom link for the upcoming public meeting and for additional information on this project, go to the EBRPD LHMP webpage at https://www.ebparks.org/projects/resource-management. Look for the Local Hazard Mitigation Plan (LHMP) link.

For more information contact Jeff Rasmussen at jrassmussen@ebparks.org or (510) 544-2130.

###

A.8.2. Kickoff Meeting Public Meeting Invite– EBRPD Website

Thursday, May 26, 2022

2022 Local Hazard Mitigation Plan Update Public Meeting #1

Thursday, May 26, 2022 (Oakland, CA) – The Park District is updating its 2017 Local Hazard Mitigation Plan (LHMP). Wildfire, drought, earthquakes, floods, and severe weather are just a few of the hazards of concern to the Park District. While natural hazards such as these cannot be prevented, a LHMP forms a strategy to reduce and minimize disaster losses by breaking the repeated cycle of disaster damage and reconstruction. Communities with a FEMA-approved LHMP are eligible to apply for both pre- and post-disaster mitigation grant funding.

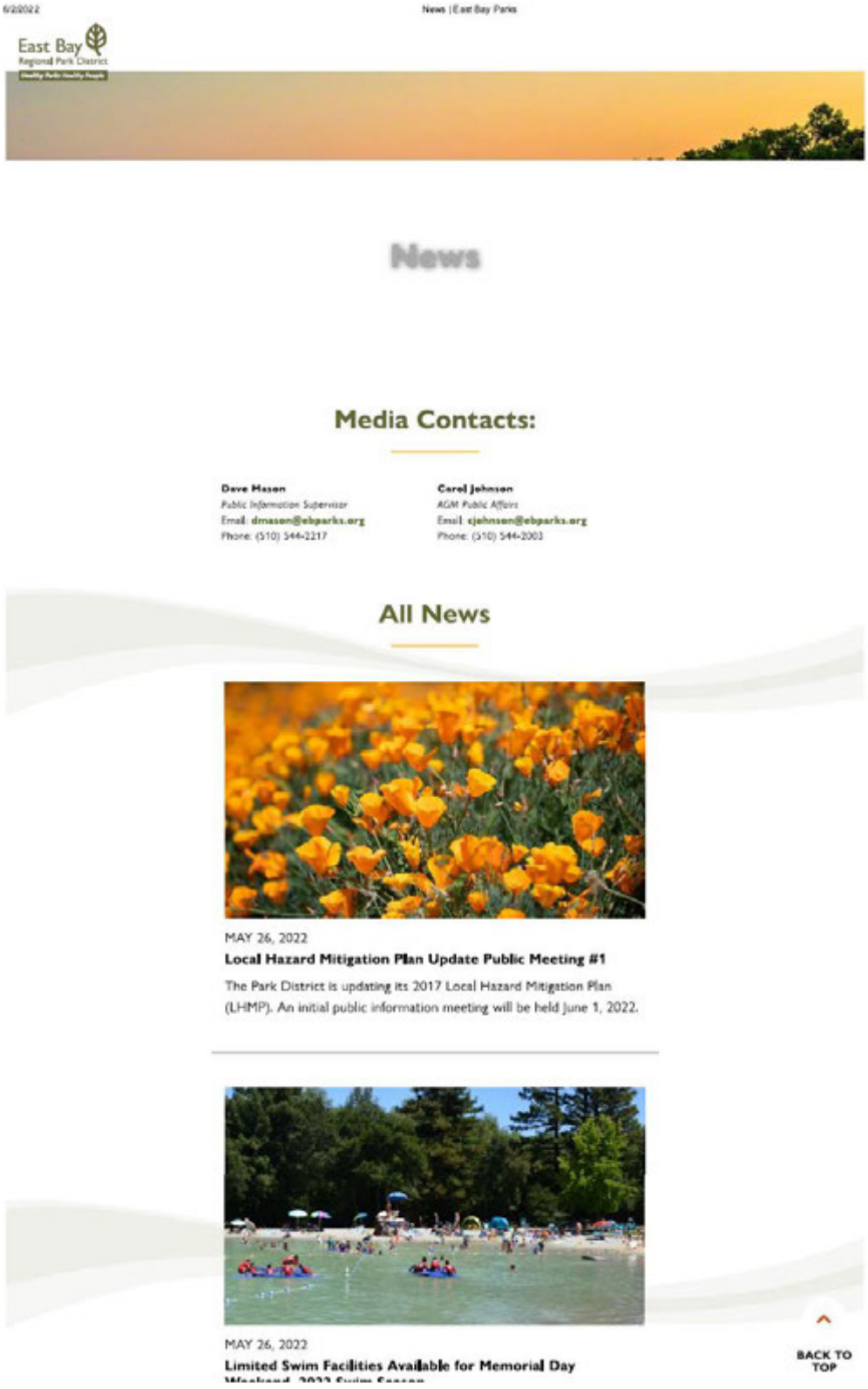
The people most aware of potential hazards are the people that live and work in the affected communities. In addition to input and participation of local, state and federal agencies, the Park District is seeking input and participation from the public.

An initial public information meeting will be held as follow:

2022 LHMP Update Public Information Kickoff Virtual Meeting - Zoom
June 1, 2022
6:00 – 7:30 pm
www.ebparks.org/projects/fema-local-hazard-mitigation-plan

For more information, contact Jeff Rasmussen at **jrassmussen@ebparks.org** or (510) 544-2130.

A.8.3. Kickoff Meeting Public Invite – on East Bay Park News



6/2/2022 News | East Bay Parks

East Bay Regional Park District

News

Media Contacts:

Dave Mason
Public Information Supervisor
Email: dmason@ebparks.org
Phone: (510) 544-2217

Carol Johnson
AGM Public Affairs
Email: cjohnson@ebparks.org
Phone: (510) 544-2003

All News

MAY 26, 2022

Local Hazard Mitigation Plan Update Public Meeting #1

The Park District is updating its 2017 Local Hazard Mitigation Plan (LHMP). An initial public information meeting will be held June 1, 2022.

MAY 26, 2022

Limited Swim Facilities Available for Memorial Day

BACK TO TOP

A.8.4. Kickoff Meeting – Public Agenda

EAST BAY REGIONAL PARKS DISTRICT
LOCAL HAZARD MITIGATION PLAN (LHMP)
PUBLIC MEETING #1
JUNE 1, 2022

1. Introductions
2. Hazard Mitigation & the Disaster Mitigation Act Planning Requirements
3. Hazard Identification and Profiles
4. Schedule
5. Questions and Answers

A.8.5. Kickoff Meeting – Public Sign in Sheet

Name	Title	Department/Agency/Affiliation
Jeff Rasmussen	Assistant Finance Officer	EBRPD, Finance and Management Services
Devan Reiff	Principal Planner	EBRPD, Planning, Trails & GIS
Jeanine Foster	Project Manager	Foster Morrison Consulting
Chris Morrison	Lead Planner	Foster Morrison Consulting

A.8.6. Press Release for Final Public Meeting

NEWS RELEASE

EAST BAY REGIONAL PARK DISTRICT: PUBLIC AFFAIRS DIVISION

East Bay Regional Park District
www.ebparks.org

For Immediate Release
Contact: Public Information Specialist Jen Vanya
(510) 544-2207

Public Input Requested:
Join Nov. 16 Zoom Meeting on Updated Local Hazard Mitigation Plan

Tuesday, November 8, 2022 (Oakland, CA) – The East Bay Regional Park District is updating its 2017 Local Hazard Mitigation Plan (LHMP) in accordance with the Disaster Mitigation Act of 2000. While natural hazards such as wildfire, drought, earthquakes, floods, and severe weather cannot be entirely prevented in the East Bay, the Park District's LHMP development process helps reduce the impacts of natural hazards to Regional Parks and surrounding communities. Communities with approved Federal Emergency Management Agency (FEMA) local hazard mitigation plans are eligible to apply for both pre- and post-disaster mitigation grant funding.

In May 2022, the Park District held its first public meeting, and as public comments were received, the District began updating the 2017 LHMP to create a new draft. The 2022 draft update of the LHMP is scheduled to be finalized and submitted to the California Governor's Office of Emergency Services and FEMA in December 2022.

The public is invited to attend the second and final public meeting on November 16, 2022, via zoom and to provide comments on the draft LHMP before its submittal.

Public Zoom Meeting
Wednesday, November 16, 2022
6:00 – 7:30 pm
Zoom Meeting Link

2950 Peralta Oaks Court, Oakland, California 94605
1-888-EBPARKS (1-888-327-2757) • www.ebparks.org

2022 Local Hazard Mitigation Plan Public Review Draft
PDF format: www.ebparks.org/projects/fema-local-hazard-mitigation-plan
Printed copies are available at Park District headquarters: 2950 Peralta Oaks Ct., Oakland, CA 94605

Comments and input on the Public Review Draft are due by Friday, December 2, 2022:

- Email comments to jeanine.foster@fostermorrison.com or jrasmussen@ebparks.org.
- Drop off written comments or send by mail to: East Bay Regional Park District Attn. Jeff Rasmussen, 2950 Peralta Oaks Ct., Oakland CA 94605.

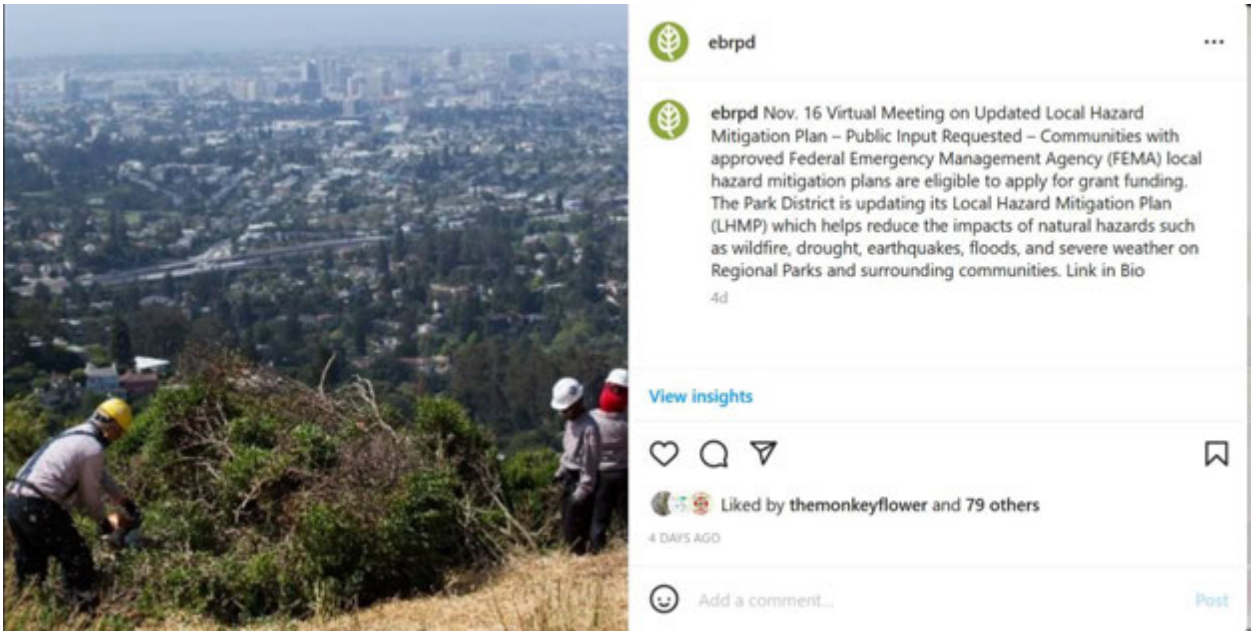
Project information: www.ebparks.org/projects/fema-local-hazard-mitigation-plan For more information, contact Jeff Rasmussen at jrasmussen@ebparks.org or (510) 544-2130.

The East Bay Regional Park District is the largest regional park system in the nation, comprising 73 parks, 55 miles of shoreline, and over 1,300 miles of trails for hiking, biking, horseback riding, and environmental education. The Park District receives more than 25 million visits annually throughout Alameda and Contra Costa counties in the San Francisco Bay Area.

A.8.7. Invite to Final Public Meeting for Review of Draft Plan on Facebook

Source: EBRPD

A.8.8. Invite to Final Public Meeting for Review of Draft Plan on Instagram

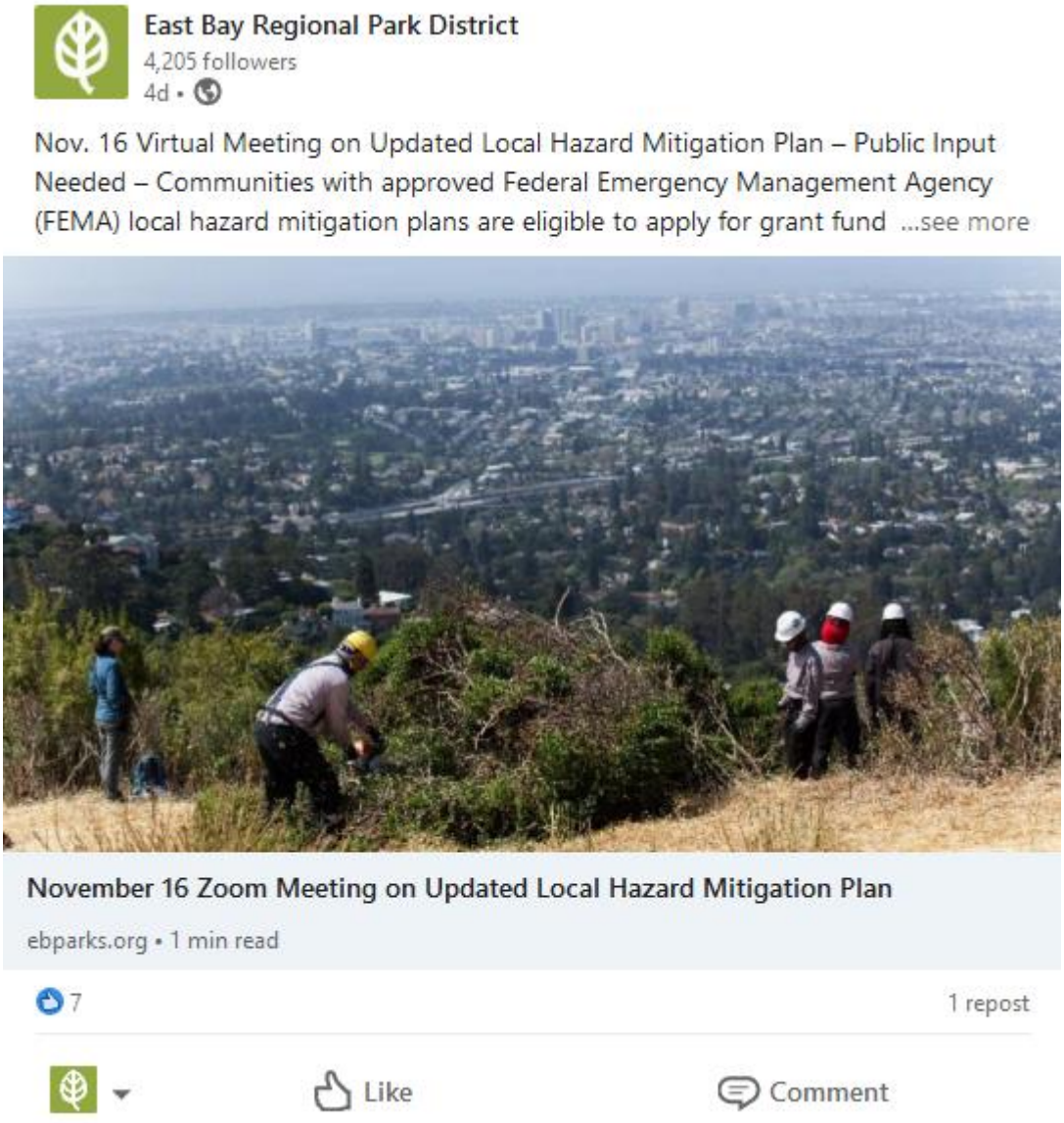


Source: EBRPD

A.8.9. Invite to Final Public Meeting for Review of Draft Plan on Twitter

Source: EBRPD

A.8.10. Invite to Final Public Meeting for Review of Draft Plan on LinkedIn



Source: EBRPD

A.8.11. Final Public Meeting Agenda

EAST BAY REGIONAL PARK DISTRICT
LOCAL HAZARD MITIGATION PLAN (LHMP) UPDATE
FINAL PUBLIC MEETING
NOVEMBER 16, 2022

1. Introductions
2. Overview of the LHMP Update Process
3. Overview of the EBRPD 2022 LHMP Update
4. Public Comments/Input
5. Next Steps

A.8.12. Final Public Meeting Sign in Sheet

Name	Title	Department/Agency/Affiliation
Jeff Rasmussen	Assistant Finance Officer	EBRPD, Finance and Management Services
Debra Auker	Chief Financial Officer	EBRPD, Finance and Management Services
Jeanine Foster	Project Manager	Foster Morrison Consulting
Chris Morrison	Lead Planner	Foster Morrison Consulting

A.8.13. Public Comments

No public comments were received during the 2022 LHMP Update development process.

A.9 Meeting Handouts

Below are the handouts for each meeting. Handouts specific to the Risk Assessment Meeting can be found in Appendix C.

A.9.1. Internal Kickoff Meeting Handouts

2017 LHMP Mitigation Strategy

East Bay Regional Park District LHMP Update: 2017 Mitigation Goals

Goal 1: Reduce Threats to Life Safety for Visitors, Staff and Residents Adjacent to the Park District's Parks

Objectives

- Enhance life safety by retrofitting existing facilities, replacing them with new current-code facilities or relocating them out of high hazard areas.
- Locate new facilities outside of high hazard areas whenever possible and design them to minimize life safety risk from future disaster events.
- Continue and enhance the Park District's ongoing fuel management programs.
- Develop robust disaster response and evacuation plans and conduct frequent practice drills.
- Enhance life safety by improving public awareness of wildland/urban interface fires, earthquakes and other natural hazards that pose substantial life safety risk to the Park District's facilities and people.

Goal 2: Reduce Damage to the Park District's Lands and Facilities and Adjacent Areas in Future Natural Hazard Events

Objectives:

- Retrofit, replace or relocate existing facilities with a high vulnerability to one or more natural hazards to reduce damage, economic loss and disruption in future disaster events.
- Ensure that new facilities are adequately designed for hazard events and located outside of mapped high hazard zones to minimize damage and loss of function in future disaster events, to the extent practicable.
- Continue and enhance the Park District's ongoing fuel management programs.

Goal 3: Protect Environmentally Important Lands and Facilities and Sites with Historical/Cultural Significance

Objectives:

- Manage, maintain and restore park lands so that they retain their important scenic, natural and cultural values.
- Maintain, acquire and preserve significant biologic, geologic, scenic and historic resources within Alameda and Contra Costa counties.
- Minimize threats to important lands, facilities and sites from future natural hazard events, to the extent practicable.

Goal 4: Enhance Emergency Planning, Disaster Response and Post-Disaster Recovery

Objectives:

- Enhance collaboration and coordination between the Park District, local governments, utilities, businesses and citizens to prepare for and recover from future natural disaster events.
- Enhance emergency planning to facilitate effective response and rapid recovery from future natural disaster events.

Goal 5: Increase Awareness and Understanding of Natural Hazards and Mitigation

Objectives:

- Implement education and outreach efforts to increase awareness of natural hazards throughout the Park District, including staff, visitors and the entire communities served by the Park District.
- Create, maintain and publicize a natural hazards page on the Park District's website with links to more information about natural hazards and mitigation activities to reduce risks from natural hazards.

East Bay Regional Park District LHMP Update: 2017 Mitigation Action Status

Mitigation Action	Complete	Ongoing	Not Started	Project in Plan Update
Multi-Hazard Mitigation Actions				
Long Term				
Integrate the findings and action items in the mitigation plan into ongoing programs and practices for the Park District.				
Review and enhance emergency and evacuation planning, including the adequacy of back-up generators, using hazard and risk information in the mitigation plan				
Consider natural hazards and site new facilities outside of high hazard areas whenever possible.				
Ensure that new facilities are adequately designed to minimize risk from natural hazards.				
Systematically track natural hazard events that result in damage to Park District facilities to help target mitigation actions.				
Pursue mitigation grants from FEMA's pre- and post-disaster programs and from other sources.				
Pursue FEMA Public Assistance grants if Park District facilities suffer damage in a FEMA declared disaster and include mitigation measures in addition to repairs.				
Enhance and complete the Park District's inventory of facilities to more accurately evaluate risks from natural hazards				
Increase awareness and understanding of natural hazards by creating a natural hazards page on the Park District's website with links to more information.				

Mitigation Action	Complete	Ongoing	Not Started	Project in Plan Update
Keep the Park District's mitigation plan on the website and encourage comments from stakeholders for the periodic review and update of the mitigation plan.				
Earthquake Actions				
Short Term				
Retrofit or replace the Park District's Peralta Oaks headquarters building, as funding becomes available.				
Develop a Park District policy for the desired level of seismic performance for critical and important facilities.				
Complete seismic evaluations of important buildings including Tilden, Sunol and Crab Cove Visitor Centers, Temescal Beach House, Tilden Carousel, and Brazil Room.				
Complete evaluations of critical infrastructure include the Del Valle sewage ponds and the District owned dams.				
Evaluate nonstructural seismic vulnerabilities in Park District facilities and mitigate components that pose significant life safety or loss of function risks.				
Complete and update the Park District's inventory of facilities, including data necessary to evaluate seismic risk.				
Long Term				
Replace the Public Safety Office, Service Yard Office and Fire Station #1 with new current-code buildings, as funding becomes available.				
Retrofit or replace critical and important facilities with significant seismic deficiencies, as identified by the evaluations in Short Term #2, as funding becomes available.				
Enhance emergency planning for earthquakes including duck, cover and hold drills and evacuation drills.				
Locate new facilities outside of high earthquake hazard areas including sites subject to liquefaction, surface rupture, earthquake-induced landslides, or in close proximity to faults, whenever possible.				
Wildfire Actions				
Short Term				
Complete the remaining fuel reduction projects identified in the Fuels Plan, and expand to other areas as funding becomes available.				
Continue to refine the Park District's fuels reduction strategies to maximize the reduction in fire risk, while minimizing possible impacts on the natural environment.				
Review and refine emergency response and evacuation planning for locations with high risk for wildland and/or wildland/urban interface fires.				

Mitigation Action	Complete	Ongoing	Not Started	Project in Plan Update
Continue outreach and education programs through the Hills Emergency Forum, the Fire Wise Program, Local Fire Safe Councils and other organizations.				
Long Term				
Pursue additional grants for fuels management and other fire risk reduction projects from FEMA and other agencies including Calfire, US Forest Service and California Fire Safe Council.				
Evaluate and implement mitigation measures to reduce fire risk, including enhancing defensible space around buildings, fuel reduction measures near important facilities and upgrading building elements with materials designed to be fire-resistant, as funding becomes available.				
Continue and expand the Park District's hazardous tree abatement programs as funding becomes available.				
Locate new facilities outside of areas with significant wildland/urban interface fire risk, whenever possible.				
Drought Actions				
Short Term				
Continue and enhance the Park District's water conservation measures, including xeriscaping.				
Evaluate possible increases in water storage, including cisterns to provide emergency water for fire suppression and implement if feasible, as funding becomes available.				
Flood Mitigation Actions				
Short Term				
Evaluate the adequacy of existing levees for floods, including storm surge, tsunamis and sea level rise and develop prioritized mitigation actions.				
Compile and maintain an inventory of sites with a history of overbank flooding or localized stormwater drainage flooding and develop prioritized mitigation actions.				
Enhance emergency planning, including flood response actions including flood fighting via temporary barriers, for sites with significant flood risk.				
Long Term				
Implement flood risk reduction measures for shoreline facilities or sites with high flood risk, including levees at Hayward Shoreline, shoreline protection along the Bay and recreational facilities at Lake Del Valle, as funding becomes available.				
Implement flood risk reduction measures for facilities or sites with high flood risk from overbank or stormwater drainage flooding, as funding becomes available.				
Locate new facilities outside of areas with significant flood risk, whenever possible.				

Mitigation Action	Complete	Ongoing	Not Started	Project in Plan Update
Landslide Actions				
Short-Term				
Develop a Park District policy for closure of sites with high landslide risk during periods of heavy rainfall.				
Consult with an engineering geologist or geotechnical engineer regarding landslide risk for sites with important facilities with a history of landslides and/or apparent high risk.				
Compile and maintain an inventory of sites with a history of landslides and develop prioritized mitigation actions.				
Long Term				
Implement landslide mitigation measures at high landslide hazard sites with important facilities including Wildcat Canyon, Lake Chabot and the other parks listed in this chapter, as funding becomes available.				
Locate new facilities outside of areas with significant landslide risk, whenever possible.				
Other Natural Hazard Actions				
Short-Term				
Review and update the Park District's emergency operations plan to include high wind events, snow or ice storms, and extreme temperatures.				
Continue and enhance the Park District's hazardous tree mitigation programs, as funding becomes available.				
Evaluate infrastructure and buildings possibly vulnerable to high winds, including communications towers.				
Long term				
Implement tie downs or other measures to mitigate infrastructure and buildings vulnerable to high winds, as funding becomes available.				

Multi-Hazard Mitigation Actions

Long Term

Integrate the findings and action items in the mitigation plan into ongoing programs and practices for the Park District.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Review and enhance emergency and evacuation planning, including the adequacy of back-up generators, using hazard and risk information in the mitigation plan

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Consider natural hazards and site new facilities outside of high hazard areas whenever possible.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Ensure that new facilities are adequately designed to minimize risk from natural hazards.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Systematically track natural hazard events that result in damage to Park District facilities to help target mitigation actions.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Pursue mitigation grants from FEMA's pre- and post-disaster programs and from other sources.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Pursue FEMA Public Assistance grants if Park District facilities suffer damage in a FEMA declared disaster and include mitigation measures in addition to repairs.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Earthquake Mitigation Actions

Short term

Retrofit or replace the Park District's Peralta Oaks headquarters building, as funding becomes available.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Develop a Park District policy for the desired level of seismic performance for critical and important facilities.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Complete seismic evaluations of important buildings including Tilden, Sunol and Crab Cove Visitor Centers, Temescal Beach House, Tilden Carousel, and Brazil Room.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Complete evaluations of critical infrastructure include the Del Valle sewage ponds and the District owned dams.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Evaluate nonstructural seismic vulnerabilities in Park District facilities and mitigate components that pose significant life safety or loss of function risks.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Complete and update the Park District's inventory of facilities, including data necessary to evaluate seismic risk.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Long Term

Replace the Public Safety Office, Service Yard Office and Fire Station #1 with new current-code buildings, as funding becomes available.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Retrofit or replace critical and important facilities with significant seismic deficiencies, as identified by the evaluations in Short Term #2, as funding becomes available.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Enhance emergency planning for earthquakes including duck, cover and hold drills and evacuation drills.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Locate new facilities outside of high earthquake hazard areas including sites subject to liquefaction, surface rupture, earthquake-induced landslides, or in close proximity to faults, whenever possible.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Wildfire Mitigation Actions

Short term

Complete the remaining fuel reduction projects identified in the Fuels Plan, and expand to other areas as funding becomes available.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Continue to refine the Park District's fuels reduction strategies to maximize the reduction in fire risk, while minimizing possible impacts on the natural environment.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Review and refine emergency response and evacuation planning for locations with high risk for wildland and/or wildland/urban interface fires.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Continue outreach and education programs through the Hills Emergency Forum, the Fire Wise Program, Local Fire Safe Councils and other organizations.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Long Term

Pursue additional grants for fuels management and other fire risk reduction projects from FEMA and other agencies including Calfire, US Forest Service and California Fire Safe Council.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Evaluate and implement mitigation measures to reduce fire risk, including enhancing defensible space around buildings, fuel reduction measures near important facilities and upgrading building elements with materials designed to be fire-resistant, as funding becomes available.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Continue and expand the Park District's hazardous tree abatement programs as funding becomes available.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Locate new facilities outside of areas with significant wildland/urban interface fire risk, whenever possible.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Drought Mitigation Actions

Short term

Continue and enhance the Park District's water conservation measures, including xeriscaping.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Evaluate possible increases in water storage, including cisterns to provide emergency water for fire suppression and implement if feasible, as funding becomes available.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Flood Mitigation Actions

Short term

Evaluate the adequacy of existing levees for floods, including storm surge, tsunamis and sea level rise and develop prioritized mitigation actions.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Compile and maintain an inventory of sites with a history of overbank flooding or localized stormwater drainage flooding and develop prioritized mitigation actions.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Enhance emergency planning, including flood response actions including flood fighting via temporary barriers, for sites with significant flood risk.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Long Term

Implement flood risk reduction measures for shoreline facilities or sites with high flood risk, including levees at Hayward Shoreline, shoreline protection along the Bay and recreational facilities at Lake Del Valle, as funding becomes available.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Implement flood risk reduction measures for facilities or sites with high flood risk from overbank or stormwater drainage flooding, as funding becomes available.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Locate new facilities outside of areas with significant flood risk, whenever possible.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Landslide Mitigation Actions

Short-Term

Develop a Park District policy for closure of sites with high landslide risk during periods of heavy rainfall.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Consult with an engineering geologist or geotechnical engineer regarding landslide risk for sites with important facilities with a history of landslides and/or apparent high risk.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Compile and maintain an inventory of sites with a history of landslides and develop prioritized mitigation actions.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Long Term

Implement landslide mitigation measures at high landslide hazard sites with important facilities including Wildcat Canyon, Lake Chabot and the other parks listed in this chapter, as funding becomes available.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Locate new facilities outside of areas with significant landslide risk, whenever possible.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Other Natural Hazards Mitigation Actions

Short-Term

Review and update the Park District's emergency operations plan to include high wind events, snow or ice storms, and extreme temperatures.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Continue and enhance the Park District's hazardous tree mitigation programs, as funding becomes available.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Evaluate infrastructure and buildings possibly vulnerable to high winds, including communications towers.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

Long term

Implement tie downs or other measures to mitigate infrastructure and buildings vulnerable to high winds, as funding becomes available.

Progress to Date (Consider: Was the project implemented – why or why not? Did the project reduce risks? Can you provide evidence of loss avoidance?):

East Bay Regional Parks District 2017 LHMP

Planning Committee

Name	Title	Division
Paul Ferrario	Acting Risk Manager	Legal
Alan Love	Police Lieutenant	Public Safety
Kelly Barrington	Chief of Maintenance and Skilled Trades	Operations
Mark Ragatz	Chief of Operations	Operations
Matt Graul	Chief of Stewardship	Acquisition, Stewardship and Development
Tiffany Margulici	Grants Manager	Finance and Management Service
Aileen Theile	Fire Captain	Public Safety

Name	Title	Division
Ed Liu	Civil Engineer	Acquisition, Stewardship and Development
Sandra Hamlat	Senior Planner	Acquisition, Stewardship and Development
Jeff Rasmussen	Assistant Finance Manager	Finance and Management Service
Alternates		
Jessica Lau	Administrative Analyst II	Finance and Management Services
James Grabowski	Police Officer	Public Safety
Anna Fong	Administrative Analyst II	Legal
Dania Stoneham	Unit Manager	Operations

Stakeholder Identification

FEMA requirement Element A2: *The planning process shall include 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 non-profit interests to be involved in the planning process.*

Alameda County and Cities

Jurisdiction	Name	Department
Alameda County	Teresa Langdon	Emergency Services
Alameda County	Michael Cadrecha	GSA
Alameda County	David Rocha	Fire Department
City of Alameda	Erin Smith	Public Works
City of Alameda	Laurie Kozisek	Public Works
City of Alameda	Sharon Oliver	Fire Department
City of Albany	Lance Calkins	Fire Department
City of Berkeley	Timothy Burroughs	Resilience
City of Berkeley	Gil Dong	Fire Department
City of Dublin	Roger Bradley	Assistant to the City Manager
City of Emeryville	Lori Elefant	Human Resources
City of Fremont	Rachel DiFranco	Sustainability Office
City of Hayward	Laurel James	City Manager's Office
City of Hayward	Don Nichelson	Fire Department
City of Livermore	Ruben Torres	Fire Department
City of Newark	Terrance Grindall	City Manager's Office
City of Oakland	Devan Reiff	Planning Department
City of Oakland	Genevieve Pastor-Cohen	Emergency Services
Town of Piedmont	Warren (Bud) McLaren	Fire Department
City of Pleasanton	Ruben Torres	Fire Department
City of San Leandro	Heidi DeRespini	Emergency Services
City of Union City	Joan Malloy	ECD Director

Contra Costa County and Cities

Jurisdiction	Name	Department
Contra Costa County	Rich Lierly	Floodplain/Watershed
Contra Costa County	Susan Roseberry	Emergency Services
City of Antioch	Rick Marchoke	Police Lieutenant
City of Brentwood	Ben Tolero	Police Lieutenant
City of Clayton	Charlie Mullen	Community Development Director
City of Concord	Victoria Walker	Comm. Econ. Dev. Dir
Town of Danville	Greg Gilbert	Emergency Services Manager
City of El Cerrito	Michael Bond	Battalion Chief/Fire Marshall
City of Hercules	Holly Myth	Planning Director
City of Lafayette	Niroop K. Srivatsa	Planning & Building Director
City of Martinez	Tim Tucker	City Engineer
Town of Moraga	Jay Ingram	Parks and Recreation Director
City of Oakley	Dan Gomex	Police Chief
Town of Orinda	Emmanuel Ursu	Planning Director
City of Pinole	Jim Parrott	Fire Chief
City of Pittsburg	Kristin Pollot	Planning Manager
City of Pleasant Hill	Roderick Wui	Planner
City of Richmond	Richard Mitchell	Director of Planning and Building
City of San Pablo	Ronalyn Nanato	Assistant Engineer
City of San Ramon	Steven Spedowfski	Senior Analyst
City of Walnut Creek	Steve Waymire	Planner

Regional Agencies

Agency	Name	Title
Association of Bay Area Governments	Dana Brechwald	Resilience Planner
Bay Conservation and Development Commission	Lindy Lowe	Planning Director
Bay Trail	Laura Thompson	Program Manager
SF Bay Restoration Authority	Amy	

Fire Districts

Agency	Name	Title
Contra Costa County Fire Protection District	Rich Grace	Assistant Fire Chief

East Contra Costa Fire Protection District	Brian Helmmick	Battalion Chief
Kensington Fire Protection District	Michael Bond	Fire Marshall
Rodeo-Hercules Fire Protection District	Alan Biagi	Battalion Chief
San Ramon Valley Fire Protection District	Mike Piccard	Battalion Chief
Moraga-Orinda Fire District	Stephen Healy	Fire Chief

Water and Flood Control Districts

Agency	Name	Title
Contra Costa Water District	Jerry Brown	General Manager
East Bay MUD	Scott Hill	Watershed and Recreation Manager
Contra Costa County Flood Control and Water Conservation District	Paul R. Detjens	Senior Civil Engineer
Alameda County Flood Control and Water Conservation District	Daniel Woldesenbet	General Manager

Parks and Recreation Districts

Agency	Name	Title
Pleasant Hill Recreation and Park District	Michelle Lacy	General Manager
Hayward Area Recreation and Park District	Paul McCreary	General Manager
Livermore Area Recreation and Parks District	John Lawrence	General Manager

State and Federal Agencies

Agency	Name	Title
California Coastal Conservancy	Matt Gerhart	SF Bay Regional Manager
California Department of Fish and Wildlife	Scott Wilson	SF Bay Regional Manager

Regional Water Resources Control Board	Keith Lichten	Engineer, Watershed Management
State Lands Commission	Brian Bugsch	Chief, Land Management
California Department of Fish and Wildlife	Scott Wilson	Bay Delta Regional Manager
Cal Fire – Sunol	Mike Martin	Battalion Chief
U.S. Army Corps of Engineers	Patrick O'Brien	Hydrologist

Non-governmental Organizations

Agency	Name	Title
Hills Emergency Forum	Cheryl Miller	Staff Support
EBRPD Park Advisory Committee	Yolande Barial	Secretary
Regional Parks Foundations	Carol Johnson	Executive Director
Diablo Fire Safe Council	Cheryl Miller	Executive Director
Oakland Fire Safe Council		
Bay Area Ridge Trail	Janet McBride	Executive Director
East Bay California Native Plant Society	Karen Whitestone	Conservation Analyst

Sources: Alameda County LHMP; Contra Costa County LHMP; ABAG LHMP workshop attendees; *Preserving Shoreline Parks in the Face of Climate Change*, Adapting to Rising Tides, 2015; EBRPD website; EBRPD Municipal Service Review, Alameda County LAFCO

Other Possible Additions

Agency	**Name**	**Title**
National Weather Service	Brian Garcia ?	
Cal OES	Victoria LaMar-Haas	Program Manager Local Mitigation Planning Unit
FEMA Region IX	Xing Liu	Sr. Mitigation Planner
Cal DWR		
Red Cross		
PG&E		

A.9.2. Kickoff Meeting Handouts for Public and HMPC Meetings

EBRPD Hazard Identification and Profiles – 2022
Disaster Declarations and National Weather Service Research

Alameda County Disaster History

Alameda County – Disaster Declarations 1950-2022

Year	Disaster Name	Disaster Type	Disaster Cause	Disaster #	State Declaration #	Federal Declaration #
2020	Covid-19	Pandemic	Pandemic	DR-4482	3/4/2020	1/20/2020
2020	Covid-19	Pandemic	Pandemic	EM-3428	3/4/2020	3/13/2020
2017	California Severe Winter Storms, Flooding, Mudslides	Flood	Storms	DR-4308	3/7/2017	4/1/2017
2017	California Severe Winter Storms, Flooding, Mudslides	Flood	Storms	DR-4305	2/10/2017	3/16/2017
2017	California Severe Winter Storms, Flooding, Mudslides	Flood	Storms	DR-4301	–	2/14/2017
2014	California Drought	Drought	Drought	GP 2014-13	1/17/2014	–
2008	2008 January Storms	Flood	Flood	GP-2008-01	12/21/2007	–
2007	Bay Area Oils Spill	Other	Accident	GP-2007-15	11/9/2007	–
2006	California Severe Winter Storms, Flooding, Landslides, Mud Flows	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	Road Damage	Flood	Storms	GP 2003	1/1/2003	–
2001	Energy Emergency	Economic	Greed	GP 2001	1/1/2001	–
1998	1998 El Nino Floods	Flood	Flood	DR-1203	Proclaimed	2/19/1998
1997	1997 January Floods	Flood	Storms	DR-1155	1/2/97-1/31/97	1/4/1997

Year	Disaster Name	Disaster Type	Disaster Cause	Disaster #	State Declaration #	Federal Declaration #
1995	California Severe Winter Storms, Flooding, Landslides, Mud Flows	Flood	Storms	DR-1046	Proclaimed	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	Wildfire	Wildfire	DR-919	–	10/22/1991
1990	Freeze	Freeze	Freeze	DR-894	12/19/1990-1/18/1991	2/11/1991
1989	Loma Prieta Earthquake	Earthquake	Earthquake	DR-845	–	9/18/1989
1986	1986 Storms	Flood	Storms	DR-758	2/18-86-3/12/86	2/18/1986
1983	Bradford Levee Failure	Flood	Storms	GP 83-05	12/9/1983 1/18/1984	–
1983	1982-1983 Winter Storms	Flood	Storms	DR-677	12/8/1982-3/21/1983	2/9/1983
1982	California Severe Storms, Flood, Mudslides, High Tide	Flood	Storms	DR-651	1/5/1982	1/7/1982
1981	Mediterranean Fruit Fly Infestation	Agricultural	Insect Pests	GP-1980 Medfly	12/1/1980	–
1979	Gasoline Shortage	Economic	OPEC	–	5/8/1979	–
1977	1976 Drought	Drought	Drought	EM-3023	2/9/1976, 2/13/1976, 2/24/1976, 3/26/1976, 7/6/1976	1/20/1977
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	9/24/1970 9/28/1970 10/1/1970 10/2/1970 10/20/1970 11/14/1970	8/29/1970
1970	1970 Northern California Flooding	Flood	Flood	DR 283	1/27/1970 - 3/2/1970	2/16/1970
1963	1963 Floods	Flood	Storms	–	2/14/1964	–

Year	Disaster Name	Disaster Type	Disaster Cause	Disaster #	State Declaration #	Federal Declaration #
1962	Flood and Rainstorm	Flood	Storms	–	10/17/1962, 10/25/1962, 10/30/1962, 11/4/1962	10/24/1962
1962	Floods and Rains	Floods	Storms	–	10/17/1962 10/25/1962 10/30/1962 11/4/1962	10/24/1962
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	–
1957	Unseasonal and Heavy Rainfall	Flood	Severe Storm, Economic	–	5/20/1957 (Cherry-producing)	–
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: FEMA, Cal OES, May 2022

Alameda County Disaster Declaration Summary Table by Hazard Type 1950-2022

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Agricultural	1	1981	0	–
Drought	2	1976, 2014	1	1976
Earthquake	0	–	1	1989
Economic	3	1974, 1979, 2001	0	–
Freeze	2	1973, 1990	2	1973, 1990
Flood (including heavy rains and storms)	19	1950, 1955, 1957, 1958 (twice), 1962, 1963, 1970, 1982, 1983 (twice), 1986, 1995 (twice), 1997, 1998, 2008, 2017 (twice)	17	1955, 1958, 1962 (twice), 1970, 1982, 1983, 1986, 1995 (twice), 1997, 1998, 2005, 2006, 2017 (three)
Hurricane	0	–	1	2005
Other	1	2007	0	–
Pandemic	2	2020	2	2020
Road Damage	1	2003	0	–
Wildfire	1	1970	2	1970, 1991
Totals	**32**	–	**26**	**–**

Source: FEMA, Cal OES, May 2022

Alameda County Disasters since 2017 Plan

- 2017 Flood (three federal and two state)
- 2020 Pandemic (state and federal)

Contra Costa County Disaster Declarations

Contra Costa County – Disaster Declarations 1950-2022

Year	Disaster Name	Disaster Type	Disaster Cause	Disaster #	State Declaration #	Federal Declaration #
2020	Covid-19	Pandemic	Pandemic	DR-4482	3/4/2020	1/20/2020
2020	Covid-19	Pandemic	Pandemic	EM-3428	3/4/2020	3/13/2020
2017	California Severe Winter Storms, Flooding, Mudslides	Flood	Storms	DR-4308	3/7/2017	4/1/2017
2017	California Severe Winter Storms, Flooding, Mudslides	Flood	Storms	DR-4305	2/10/2017	3/16/2017
2017	California Severe Winter Storms, Flooding, Mudslides	Flood	Storms	DR-4301	–	2/14/2017
2014	California Drought	Drought	Drought	GP 2014-13	1/17/2014	–
2010	Richmond Sinkhole	Other	Storms	GP-2010-15	–	–
2008	2008 January Storms	Flood	Flood	GP-2008-01	12/21/2007	–
2007	Bay Area Oils Spill	Other	Accident	GP-2007-15	11/9/2007	–
2006	California Severe Winter Storms, Flooding, Landslides, Mud Flows	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	Road Damage	Flood	Storms	GP 2003	1/1/2003	–
2001	Energy Emergency	Economic	Greed	GP 2001	1/1/2001	–
1998	1998 El Nino Floods	Flood	Flood	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	Proclaimed	3/12/1995

Year	Disaster Name	Disaster Type	Disaster Cause	Disaster #	State Declaration #	Federal Declaration #
1995	1995 Severe Winter Storms	Flood	Storms	DR-1044	1/6/95-3/14/95	1/13/1995
1982	Late Winter Storms	Flood	Storms	DR-979	1/7/1993	1/15/1993
1989	Loma Prieta Earthquake	Earthquake	Earthquake	DR-845	–	9/18/1989
1986	1986 Storms	Flood	Storms	DR-758	2/18-86-3/12/86	2/18/1986
1984	High Tides/Storms	Flood	Storms	GP-83-03	1/1/1984	–
1983	Bradford Levee Failure	Flood	Storms	GP 83-05	12/9/1983 1/18/1984	–
1983	1982-1983 Winter Storms	Flood	Storms	DR-677	12/8/1982-3/21/1983	2/9/1983
1982	High Tides and Flooding	Flood	Storms	–	12/8/1982	–
1982	California Severe Storms, Flood, Mudslides, High Tide	Flood	Storms	DR-651	1/5/1982	1/7/1982
1981	Mediterranean Fruit Fly Infestation	Agricultural	Insect Pests	GP-1980 Medfly	12/1/1980	–
1980	California Torrential Rain, High Tide & Winds	Storms	Floods	EM-3078	1/23/1980	2/1/1980
1979	Gasoline Shortage	Economic	OPEC	–	5/8/1979	–
1977	1976 Drought	Drought	Drought	EM-3023	2/9/1976, 2/13/1976, 2/24/1976, 3/26/1976, 7/6/1976	1/20/1977
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	Storms and Floods	Flood	Storms	–	4/10/1970	–
1969	Severe Storms and Flooding	Flood	Storms	DR-253		1/26/1969
1963	1963 Floods	Flood	Storms	–	2/14/1964	–
1962	Flood and Rainstorm	Flood	Storms	–	10/17/1962, 10/25/1962, 10/30/1962, 11/4/1962	10/24/1962

Year	Disaster Name	Disaster Type	Disaster Cause	Disaster #	State Declaration #	Federal Declaration #
1962	Floods and Rains	Floods	Storms	–	10/17/1962 10/25/1962 10/30/1962 11/4/1962	10/24/1962
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	–
1957	Unseasonal and Heavy Rainfall	Flood	Severe Storm, Economic	–	5/20/1957 (Cherry-producing)	–
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: FEMA, Cal OES

Contra Costa County Disaster Declaration Summary Table by Hazard Type 1950-2022

Disaster Type	State Declarations		Federal Declarations	
	Count	Years	Count	Years
Agricultural	1	1981	0	–
Drought	2	1976, 2014	1	1976
Earthquake	0	–	1	1989
Economic	3	1974, 1979, 2001	0	–
Freeze	1	1973	1	1973
Flood (including heavy rains and storms)	24	1950, 1955, 1957, 1958 (twice), 1962, 1963, 1969, 1970, 1980, 1982 (twice), 1983 (twice), 1984, 1986, 1992, 1995 (twice), 1997, 1998, 2008, 2017 (twice)	20	1955, 1958, 1962 (twice), 1969, 1970, 1980, 1982, 1983, 1986, 1992, 1995 (twice), 1997, 1998, 2005, 2006, 2017 (three)
Hurricane	0	–	1	2005
Other	2	2007, 2010	0	–
Pandemic	2	2020	2	2020
Road Damage	1	2003	0	–
Totals	**36**	–	**26**	**–**

Source: FEMA, Cal OES

Contra Costa County Disasters since 2017 Plan

- 2017 Flood (three federal and two state)
- 2020 Pandemic (state and federal)

Severe Weather Events

NCDC Severe Weather Events for Alameda County 1950-1/31/2022*

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Coastal Flood	3	0	0	0	0	$0	$0
Debris Flow	16	0	0	0	0	$12,874,000	$0
Dense Fog	19	0	0	0	0	$0	$0
Dense Smoke	8	0	0	0	0	$0	$0
Excessive Heat	6	0	0	0	0	$0	$0
Flash Flood	12	0	0	0	0	$100,000	$0
Flood	43	0	0	0	0	$44,325,500	$0
Frost/Freeze	4	0	0	0	0	$20,000	$400,000
Hail	14	0	0	0	0	$0	$0
Heat	14	1	1	13	0	$30,000	$0
Heavy Rain	5	0	2	0	1	$60,000	$30,000
High Surf	1	0	0	0	0	$0	$0
Heavy Snow	1	0	0	0	0	$0	$0
High Wind	88	1	0	1	0	$3,210,000	$0
Strong Wind	258	4	0	8	0	$3,753,800	$0
Thunderstorm Wind	2	0	0	0	0	$50,000	$0
Tornado	5	0	0	0	0	$275,000	$0
Tsunami	1	0	0	0	0	$50,000	$0
Wildfire	17	0	0	6	1	$10,000	$0
Winter Storm	6	0	0	0	0	$0	$0
Total	**523**	**6**	**3**	**28**	**2**	**$64,758,300**	**$430,000**

Source: NCDC

*Note: Losses reflect totals for all impacted areas

**Due to the regional nature of reporting certain hazard events, these hazards are included in the NCDC database for Alameda County

NCDC Severe Weather Events for Contra Costa County 1950-1/31/2022*

Event Type	Number of Events	Deaths	Deaths (indirect)	Injuries	Injuries (indirect)	Property Damage	Crop Damage
Coastal Flood	2	0	0	0	0	$0	$0
Debris Flow	21	0	0	0	0	$12,875,000	$0
Dense Fog	19	0	0	0	0	$0	$0
Dense Smoke	8	0	0	0	0	$0	$0
Excessive Heat	6	0	0	0	0	$0	$0

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	99	0	0	0	0	$17,647,500	$0
Frost/Freeze	4	0	0	0	0	$20,000	$400,000
Hail	19	0	0	0	0	$5,000,010	$10
Heat	14	1	1	13	0	$0	$0
Heavy Rain	9	1	1	0	5	$2,075,000	$0
Heavy Snow	1	0	0	0	0	$0	$0
High Surf	1	0	0	0	0	$0	$0
High Wind	88	1	0	1	0	$3,210,000	$0
Lightning	2	0	0	0	0	$3,000	$0
Strong Wind	258	4	1	8	4	$3,753,800	$0
Thunderstorm Wind	6	0	0	0	0	$10,000	$0
Tornado	6	0	0	0	0	$72,500	$0
Tsunami	1	0	0	0	0	$50,000	$0
Wildfire	17	0	0	6	1	$10,000	$0
Winter Storm	6	0	0	0	0	$0	$0
Total	**613**	**7**	**3**	**28**	**10**	**$45,427,810**	**$400,010**

Source: NCDC

*Note: Losses reflect totals for all impacted areas

**Due to the regional nature of reporting certain hazard events, these hazards are included in the NCDC database for Contra Costa County

EBRPD Hazards Comparison Summary

2017 EBRPD Plan	2021 Draft Alameda County Plan	2018 Contra Costa County Plan	2018 State of California Plan Applicable Hazards	Proposed EBRPD 2022 Hazards*
Climate Change (as part of profile and other hazards)	Climate Change	Climate Change	Climate Change and Related Hazards	Climate Change (as a stand alone and as it exacerbates other hazards)
Dam Failure (as part of earthquake and flood)	Dam Failure	Dam Failure	Dam Failure	Dam Failure
Drought	Drought	Drought	Droughts and Water Shortage	Drought & Water Shortage (with tree mortality)
Earthquakes (and Liquefaction with other earthquake induced hazards)	Earthquake	Earthquake	Earthquake	Earthquake (and earthquake liquefaction)
Floods	Flood	Flood	Flood	Flood: 1%/0.2% annual chance
Floods (flooding outside of FEMA mapped floodplains)	Flood	Flood	Flood	Flood: Localized/Stormwater Flooding
Landslide	Landslide	Landslide	Landslide	Landslide, Mudslide, Debris Flow
Levee Failure (as part of Flood)			Levee Failure and Safety	Levee Failure
–	Infectious Disease	–	Pandemic	–
Sea Level Rise (as part of flood)	–	–	Sea Level Rise	Sea Level Rise
Extreme Temperatures	–	–	Severe Weather and Storms	Severe Weather: Extreme Heat
–	–	–	Severe Weather and Storms	Severe Weather: Heavy Rain and Storms
High Winds (and Tornadoes)	–	–	Severe Weather and Storms	Severe Weather: High Winds and Tornadoes
Snow and Ice Storms	–	–	Severe Weather and Storms	–
Tsunami (part of earthquake/flood)	Tsunami	Tsunami	Tsunami	Tsunami
Volcano	–	–	Volcanic Eruption	–
Wildland-Urban Interface Fires	Wildfire	Wildfire	Wildfire	Wildfire (with smoke/ air quality)

*PSPS – handle as part of severe wind?/or as a vulnerability?

EBRPD Hazard Identification 2022

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Climate Change	Extensive	Likely	Limited	High	–
Dam Failure	Limited	Occasional	Critical	High	Medium
Drought & Water Shortage (with tree mortality)	Extensive	Likely	Limited	Medium	High
Earthquakes (and earthquake liquefaction)	Extensive	Occasional	Catastrophic	Medium	Low
Flood: 1%/0.2% annual chance	Limited	Occasional/ Unlikely	Limited	Medium	High
Flood: Localized/Stormwater Flooding	Significant	Highly Likely	Limited	Medium	Medium
Landslide, Mudslide, Debris Flow	Limited	Occasional	Limited	Medium	Medium
Levee Failure	Limited	Occasional	Limited	Medium	Medium
Pandemic	Extensive	Occasional	Critical	Medium	Low
Sea Level Rise	Limited	Likely	Limited	Medium	High
Severe Weather: Extreme Heat	Extensive	Highly Likely	Limited	Medium	High
Severe Weather: Heavy Rain and Storms	Extensive	Highly Likely	Limited	Medium	High
Severe Weather: High Winds and Tornadoes	Extensive	Highly Likely	Limited	High	High
Tsunami	Limited	Occasional	Limited	Medium	Medium
Wildfire (with smoke/ air quality)	Significant	Likely	Critical	High	High

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

Climate Change Influence

Low: Minimal potential impact

Medium: Moderate potential impact

High: Widespread potential impact

A.9.3. Risk Assessment Meeting Handouts for HMPC Meeting

AGENDA
East Bay Regional Park District
Local Hazard Mitigation Plan (LHMP) Update
HMPC Meeting #2 - Risk Assessment
July 13, 2022

1. Introductions
2. Status of the DMA Planning Process
3. Review of Risk Assessment (PowerPoint)
4. Open Discussion and Input on the Risk Assessment (Handout)
5. Schedule/Next Steps

Contact Info:

Jeanine Foster (jeanine.foster@fostermorrison.com)
(303.717.7171)
Foster Morrison Consulting, Ltd.

2022 East Bay Regional Park District
LHMP Update Project/Next Steps - Schedule

LHMP Update Project Schedule/Key Dates

2022 LHMP Update Meetings

- ~~**May 11** (Wednesday) Internal Kickoff meeting (1:30 – 3:00)~~
- ~~**June 1** (Wednesday) HMPC Kickoff Meeting #1 Public Meeting #1 (1:30 – 4:00, 6:00-7:30)~~
- ~~**July 13** (Wednesday) HMPC Meeting #2 (Risk Assessment) (1:30 – 4:00)~~
- **August 3** (Wednesday) HMPC Meeting #3 (Mitigation Strategy – Goals) (1:30-4:00)
- **August 4** (Thursday) HMPC Meeting #4 (Mitigation Strategy – Actions and Projects) (9-11:30)
- **November 16** (Wednesday) Public Meeting #2 (6:00-7:30)
- **November 17** (Thursday) HMPC Meeting #5 (9-11:30)

HMPC #3 & #4: Mitigation Strategy Meetings - Follow up

- **August 11 (**Thursday**)** Mitigation Strategy Actions and Projects processed and voting site launched
- **August 19** (Friday) Voting ends
- **August 24** (Wednesday) Foster Morrison to send Mitigation Action prioritization follow up to EBRPD
- **September 16 (**Friday) EBRPD Mitigation Action (Project) Worksheets due to Foster Morrison

LHMP Document Drafts

- **September 23** (Friday) HMPC (First) Draft LHMP to EBRPD/HMPC
- **October 14** (Friday) EBRPD/HMPC comments due on Draft Plan
- **October 26** (Wednesday) Comments incorporated into Public Review (Second) Draft to EBRPD/HMPC
- **November 2** (Wednesday): Public Review Draft on EBRPD website
- **December 2** (Friday**)** all EBRPD, HMPC and Public input to Foster Morrison
- **December 9 – 16:** Final EBRPD, HMPC, and Public comments incorporated and LHMP submittal to Cal OES – December 2022

Table 1 EBRPD Hazard Identification Table

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Climate Change	Extensive	Likely	Limited	High	–
Dam Failure	Significant	Occasional	Critical	High	Medium
Drought & Water Shortage (with tree mortality)	Extensive	Likely	Critical	Medium	High
Earthquakes (and earthquake liquefaction)	Extensive	Occasional	Catastrophic	Medium	Low
Flood: 1%/0.2% annual chance	Limited	Occasional/ Unlikely	Limited	Medium	High
Flood: Localized/Stormwater Flooding	Significant	Highly Likely	Limited	Medium	Medium
Landslide, Mudslide, Debris Flow	Significant	Likely	Limited	Medium	Medium
Levee Failure	Limited	Occasional	Limited	Medium	Medium
Pandemic	Extensive	Occasional	Critical	Medium	Low
Sea Level Rise	Limited	Likely	Limited	Medium	High
Severe Weather: Extreme Heat	Extensive	Highly Likely	Limited	Medium	High
Severe Weather: Heavy Rain and Storms	Extensive	Highly Likely	Limited	Medium	High
Severe Weather: High Winds and Tornadoes	Extensive	Highly Likely	Limited	High	High
Tsunami	Limited	Occasional	Limited	Medium	Medium
Wildfire (with smoke/ air quality)	Extensive	Highly Likely	Catastrophic	High	High

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

Climate Change Influence

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 jurisdiction 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: East Bay Regional Park District

Climate Change

- The 2018 State of California Multi-Hazard Mitigation Plan noted 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. Climate Change has the potential to alter the nature and frequency of most hazards.
- EBRPD indicated smoke events have increased, especially from northern California fires. Drought seems to be deeper, longer, and more difficult in nature.
- DOES ANYONE HAVE ANY OTHER CLIMATE CHANGE CONCERNS/ISSUES/IMPACTS TO NOTE SPECIFIC TO THE EBRPD?
- Likelihood of Future Occurrence: Likely
- Vulnerability: Medium
- Priority Hazard

Coastal Flooding and Sea Level Rise (SLR)

- No state or federal disaster declarations. The NCDC reported 4 events of coastal flooding and high tides for Alameda County and 3 for Contra Costa County.
- The frequency and severity of coastal flooding is expected to gradually increase as sea level gradually rises.
- The 2020 San Francisco Bay Trail Risk Assessment & Adaptation Prioritization Plan (RAAPP) conducted by EBRPD utilizes sea-level rise scenarios based on projections issued by the State of California (CoSMoS data). The LHMP utilizes the same data looking at zero (0) (existing conditions), three (3), and six (6) feet of sea level rise to depict mid-century and end-of-century planning scenarios.
- 6 scenarios were utilized in evaluating impacts to the Park District: 0, 3, and 6 feet – with and without 100-year storm surge.
- East Bay Park lands include approximately 55 miles of shoreline, which encompass EBRPD parks and segments of the San Francisco Bay Trail. Coastal Flooding and SLR primarily affects EBRPD coastal park lands and assets, to the north and west.
- ANY INPUT ON COASTAL FLOODING AND SEA LEVEL RISE IN THE PARK DISTRICT? PAST OCCURENCES? OTHER ISSUES/CONCERNS/IMPACTS?
- Likelihood of Future Occurrence: Likely
- Vulnerability: Medium?
- Priority Hazard

Dam Failure

- There are 23 dams in Alameda County and 25 dams in Contra Costa County that were constructed for flood control, storage, treatment impoundments, electrical generation, and recreational purposes. Of the 23 dams in Alameda County, 11 were rated as Extremely High Hazard, 7 are rated as High Hazard, 3 as Significant Hazard, 2 as Low Hazard. Of the 25 dams in Contra Costa County, 12 were rated as Extremely High Hazard, 11 are rated as High Hazard, 0 as Significant Hazard, 2 as Low Hazard. Outside of EBRPD boundaries, 4 EH Hazard dams also intersect with Park Lands and Assets.

- Of these, 19 Extremely High Hazard and 6 High Hazard dams have the potential to impact EBRPD lands and assets.
- 2 of the Extremely High Hazard dams, C.L. Tilden and Lake Temescal are owned by EBRPD.
- EBRPD indicated past events occurred during 2017 storms: San Leandro Reservoir caused flooding at golf course. Del Valle Dam flooded/had issues. During storm events, Alameda Creek flows too fast - can't release from Del Valle Dam if creek flowing above 5,000 CFS, then park floods from Del Valle Dam. OTHER INCIDENTS/ISSUES TO NOTE?
- WHICH DAM(S) ARE THE PARK DISTRICT MOST CONCERNED WITH?
- ANY SPECIFIC DAM VULNERABILITIES/ISSUES/CONCERNS TO NOTE – BOTH FOR ALL DAMS AND SPECIFIC TO EBRPD OWNED DAMS?
- Likelihood of Future Occurrence: Occasional?
- Vulnerability: High
- Priority Hazard

Drought and Water Shortage

- Historical drought data for the EBRPD Planning Area and region indicate there have been 5 significant multi-year droughts in the last 84 years.
- 2 state disaster declarations in 1976 and 2014; 1 federal disaster declaration in 1976
- EBMUD provides municipal water, mostly surface water. The Park District also owns some wells (Briones Park and a few other areas). Some wells have gone dry or close: Round Valley Park and Pleasonton Ridge areas. Storage tanks are being added to address this. Grazing also puts pressure on water during times of drought. Some Turf has been abandoned and others reduced. Ponds are also drying. Also seeing Pond failures related to drought and storm events.
- WHAT HAS BEEN IMPACTED THE MOST? HOW HAS WATER SUPPLY BEEN AFFECTED IN THE EBRPD FROM THIS MOST RECENT DROUGHT? WHAT ARE THE MOST SIGNIFICANT CONCERNS MOVING FORWARD?
- Likelihood of Future Occurrence: Likely
- Vulnerability: High?
- Priority Hazard

Earthquake

- Geological data indicates that the Bay Area is located within an area of relatively high seismic activity and is traversed by multiple faults associated with the Pacific and North American plates.
- Level of earthquake hazard varies substantially by location and is primarily determined by several factors: earthquake magnitude, earthquake epicenter, earthquake depth, and soil and rock conditions.
- Since 1836, eight earthquakes of magnitude 6.0 or greater have occurred in the region. These include: 1906 M7.8 San Francisco; 1984 M6.4 Morgan Hill; 1989 M7.1 Loma Prieta; 2014 M6.0 Napa.
- Since 1950, there has been 1 disaster declaration in both Alameda and Contra Costa Counties for the 1989 Loma Prieta Earthquake.
- For the EBRPD, the most damaging earthquakes would be those nearest to the Park District's lands (especially the Hayward Fault and the Calaveras Fault, but also the Concord and Greenville Faults.) Large earthquakes on the San Andreas fault could also affect the Park District, but to a significantly lesser degree because of the greater distance between the fault and the Park District's facilities.
- The most likely major earthquake to affect the Park District is an approximately M7.0 earthquake on the Hayward Fault that has an estimated 33 percent change of occurring in the next 30 years and is closest to areas with high concentrations of the Park District's lands and facilities.

- Damages from earthquakes may include those from ground shaking and surface rupture and also include secondary impacts from earthquake induced landslides, dam, reservoir and levee failures, and fires.
- Based on analysis of the Alquist-Priolo fault zones (where surface rupture could occur) 17 different Park Lands fall within the AP zones and could potentially be affected. The EBRPD Peralta Oaks headquarters building is within the area where surface rupture is possible.
- The expected consequences of major earthquake on the Park District include not only building damages but also casualties (injuries and deaths) and loss of important functions. The buildings at most risk are older buildings, designed to lower seismic performance standards than current or recent code buildings, especially buildings that are non-ductile such as masonry buildings. These include the lightly reinforced masonry buildings in the two corporation yards and historically important buildings including the Tilden, Sunol and Crab Cove Visitor Centers, Temescal Beach House, Tilden Carousel and Brazil Room.
- The Park District infrastructure of most concern includes the Del Valle sewage ponds because failure would contaminate a major drinking water supply, the Del Valle potable water system and several dams including: Lake Anza Dam, Temescal Dam, Jewel Lake Dam and Sunol Dam. Well lines and storage tanks also vulnerable.
- The impacts of earthquake damage to the Park District's infrastructure would include not only repair costs, but also loss of function and life safety risk. Life safety risk would be substantial for park visitors or staff in locations where earthquake-induced landslides occur or for people on bridges that fail.
- OTHER SIGNIFICANT ISSUES/IMPACTS/CONCERNS RELATED TO EARTHQUAKE?
- Likelihood of Future Occurrence: Likely
- Vulnerability: Extremely High?
- Priority Hazard

Earthquake Liquefaction

- Liquefaction is a process where loose, wet sediments lose bearing strength during an earthquake and behave similar to a liquid. Settling or lateral spreading can cause major damage to buildings and to infrastructure such as roads, underground utilities, and levees.
- Based on the CGS Seismic Hazard Zone (liquefaction) Maps, the Park District has a number of shoreline parks and facilities that are likely to be impacted by liquefaction in the event of an earthquake.
- Likelihood of Future Occurrence: Likely?
- Vulnerability: High
- Priority Hazard

Flood Hazards

FEMA Mapped Floodplains - 1%/0.5%

- Historically, flooding associated with severe winter storms has been among the most common disasters in the Bay Area. The Park District has frequently suffered significant damage in past severe winter storms from floods as well as from high winds, landslides, debris flows and erosion.
- 19 state and 17 federal disaster declarations related to heavy rains and flooding in Alameda County; 24 state and 20 federal declarations in Contra Costa County.
- 60 NCDC flood/heavy rain events since 1993 for Alameda County;125 for Contra Costa County.
- The Park District generally has several winter storm events every year, with damages in these events ranging from minor cleanup to millions of dollars. 4 severe storm events occurred in 1986, 1998 and 2005-2006, and 2016. Since the last plan, 3 federal and 2 state declarations for severe storms and

flooding occurred in 2017. EBRPD declared for 2 of the 3 events. According to files provided by ERBPD, there were multiple areas (78 sites) with damage, especially along creek banks and trails.

- The most common damage from winter rains and storms and associated flooding have been to infrastructure, including: washouts of culverts and trails; landslides or debris slides affecting roads, trails and bridges; erosion of channels and adjacent areas; and tree falls.
- ANY OTHER ISSUES/IMPACTS/CONCERNS TO NOTE?
- Likelihood of Future Occurrence: 1%-Occasional; 0.5%-Unlikely;
- Vulnerability: High
- Priority Hazard

Localized/Stormwater flooding

- Flood hazard areas for the EBRPD are not limited to areas within FEMA-mapped floodplains; Many flood-prone locations within the Park District are not FEMA-mapped because there is not enough development to warrant FEMA mapping.
- From previous heavy rain and storm events, the Park District has experienced significant damages due to flooding, landslides, debris flows and erosion; 1992 – nearly $1.2M in damages to 34 sites; 2005-2006, over $6M in damages to 52 sites.
- Since the last plan, 3 federal and 2 state declarations for heavy rain and storms, flooding, and other damages occurred. Again, EBRPD declared for 2 of the 3 events, with numerous damages at multiple sites.
- ARE THERE ANY SPECIFIC EBRPD LOCALIZED FLOODING PROBLEM AREAS TO NOTE?
- ANY OTHER ISSUES/IMPACTS/CONCERNS TO NOTE?
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: Medium
- Priority Hazard

Landslide, Mudslide, Debris Flow

- Historically, the Park District has experienced significant damages from various slope failures associated with heavy rains and winter storm events. Significant damages from past events have occurred in Del Valle, Wildcat Canyon, Richmond and Claremont Canyon. Other identified areas of concern include: Lake Chabot, Mission Peak, Bishop Ranch, Las Trampas, Briones, Alhambra Valley, Shadow Cliffs, and Lafayette-Moraga Trail. These and other locations suffered landsliding in 2017.
- OTHER HISTORIC PROBLEM AREAS WITHIN THE PARK DISTRICT – THOSE WITH HISTORIC SLOPE FAILURE ISSUES? HAVE ANY BEEN MITIGATED?
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: Medium - High?
- Priority Hazard

Levee Failure

- Levee failures can occur during high water events and under normal non-flood conditions. There are numerous causes for such failures, including scour, foundation failures, under-seepage, through-seepage, animal burrows, and others. Levees can also fail as a result of earthquakes.
- The probability of levee failure is increasing over time due to sea level rise, increased flooding potential from global climate range resulting in early winter snow melts, and the likelihood of an earthquake.
- There are 200 levee segments in EBRPD boundaries; 133 segments in Alameda County side and 67 segments in Contra Costa side.

- Based on the DFIRMS, there are no 0.2%, X-protected by levee flood zones that protect EBRPD lands or assets. (Note: This is based on levees that are certified as providing 100-year level of protection). However, other non-certified levee segments may impact the Park District.
- No disaster declarations for levee failure have occurred in either county since 1950.
- HAS THE PARK DISTRICT EVER BEEN AFFECTED BY A LEVEE FAILURE ISSUE?
- ARE THERE ANY SPECIFIC LEVEES/PARKS THAT ARE A CONCERN TO THE PARK DISTRICT? DOES THE PARK DISTRICT OWN ANY LEVEES?
- Likelihood of Future Occurrence: Occasional
- Vulnerability: Medium
- Priority Hazard

Pandemic

- The 20th Century had 3 Pandemics (WHO): 1918-1919 Influenza Pandemic (H1N1),1957-1958 Influenza Pandemic (H2N2), and the 1968 Influenza Pandemic (H3N2). The 21st Century had 2 Pandemics (WHO): 2009 Swine Flu (H1N1) and 2020 Covid-19.
- Two 2020 state and federal declarations for Covid-19; the NCDC does not track pandemics.
- As of mid-July 2022, there had been over 319,569 cases of Covid-19 reported for Alameda County and around 1,932 deaths. In Contra Costa County, there were 229,926 cases and 1,355 deaths.
- Since 2020, amidst the pandemic and changing local health orders, EBRPD had steadfastly kept most of the Regional Parks and trails open.
- WHAT ARE THE PARK DISTRICT'S BIGGEST COVID-19 IMPACTS/RESPONSE EFFORTS/PRIMARY ISSUES/CONCERNS?
- Likelihood of Future Occurrence: Likely
- Vulnerability: High
- Priority Hazard

Severe Weather

Extreme Heat

- Annual occurrences – it gets hot every summer. In EBRPD/Alameda County, monthly average maximum temperatures in the warmest months (June through September) range from the upper-60s to the low 70s. The highest recorded daily extreme was 107°F on June 2, 1960. In a typical year, maximum temperatures exceed 90°F on 3.5 days.
- In EBRPD/Contra Costa County, monthly average maximum temperatures in the warmest months (June through September) range from the upper-80s to the low 90s. The highest recorded daily extreme was 117°F on June 17, 1961. In a typical year, maximum temperatures exceed 90°F on 61.3 days.
- The NCDC data shows 20 extreme heat incidents for both Alameda Contra Costa Counties since 1996.
- ANY SPECIFIC INSTANCES OF HEAT THAT CAUSED DAMAGES OR ISSUES FOR THE PARK DISTRICT? ESPECIALLY THOSE SINCE 2017?
- BIGGEST HEAT RELATED ISSUES/CONCERNS/IMPACTS?
- Climate change will affect this hazard in the future.
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: Medium
- Priority Hazard

Heavy Rains and Storms (Thunderstorms, Hail, Lightning)

- Significant EBRPD history: annual occurrences. Average annual precipitation in Alameda County side of the Park District is 18.03 inches per year. The highest recorded annual precipitation is 29.37 inches in 1973; the highest recorded precipitation for a 24-hour period is 4.53 inches on October 13, 1962. The lowest recorded annual precipitation was 8.64 inches in 1976.
- Average annual precipitation in Contra Costa County side of the Park District is 13.22 inches per year. The highest recorded annual precipitation is 27.75 inches in 1983; the highest recorded precipitation for a 24-hour period is 3.03 inches on October 13, 1962. The lowest recorded annual precipitation was 5.87 inches in 1976.
- 19 state and 17 federal disaster declarations related to heavy rains and flooding in Alameda County; 24 state and 20 federal declarations in Contra Costa County.
- 19 NCDC heavy rain and storm events since 1993 in Alameda County; 30 in Contra Costa County
- Severe storms/heavy rains are the primary cause of most major flooding. It also contributes to landslides, debris flows, and erosion in the Park District.
- The Park District generally has several winter heavy rain and storm events every year, with damages in these events ranging from minor cleanup to millions of dollars. 4 severe events were in 1986, 1998 and 2005-2006, and 2016. Since the last plan, 3 federal and 2 state declarations for flooding occurred. EBRPD declared for 2 of the 3 events with damages at multiple sites.
- The most common damage from winter rains and storms and associated flooding have been to infrastructure, including: washouts of culverts and trails; landslides or debris slides affecting roads, trails and bridges; erosion of channels and adjacent areas; and tree falls.
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: Medium
- Priority Hazard

High Winds and Tornadoes

- Annual occurrences of high wind events
- No state or federal disaster declarations. The NCDC data recorded 353 and 360 high wind incidents for Alameda and Contra Costa County, respectively, since 1955. This includes 5 tornado events in Alameda and 6 in Contra Costa Counties.
- ANY NOTABLE HIGH WINDS OR TORNADO EVENTS SINCE 2017?
- WHAT ARE THE PARK DISTRICTS BIGGEST CONCERNS/ISSUES/IMPACTS WITH HIGH WINDS? ANY TREE BLOW DOWN EVENTS?
- HOW MANY PSPS EVENTS HAS THE PARK DISTRICT EXPERIENCED?
- WHAT OTHER TYPES OF POWER OUTAGE EVENTS HAS THE PARK DISTRICT EXPERIENCED?
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: Medium
- Priority Hazard

Tsunami

- There has been no state or federal disaster declarations due to tsunami. The NCDC identifies 1 Tsunami event for both Alameda and Contra Costa Counties, the same event - March 11, 2011 - At the Berkeley Marina the tsunami (generated from an earthquake in Japan) damaged six boat slips, three docks, and snapped a wooden piling.

- EBRPD indicates biggest tsunami impacts to natural resources (wetlands, endangered species, and species habitat). trails will also be impacted.
- OTHER ISSUES/CONCERNS TO EBRPD?
- Likelihood of Future Occurrence: Unlikely – Occasional
- Vulnerability: Medium
- Non-Priority Hazard?

Wildfire

- Wildfires occur on an annual basis in the Park District
- Any ignition has the potential to become an out of control wildfire.
- 1 state (1970) and 2 federal (1970 and 1991(tunnel fire)) disaster declarations since 1950.
- Under normal conditions, most fires that start in the East Bay Hills are efficiently controlled by firefighters with no loss of life or structures. A phenomenon known as "Diablo winds" turns can affect the severity of a wildfire. Red Flag days occur during conditions of low humidity, high temperatures, and hot, dry Diablo winds blowing in from the east and usually occur in the fall months. In recent years, these events are occurring more often.
- During the 75-year period between 1923 and 1998, 11 Diablo wind-driven fires in the Berkeley/Oakland hills burned a total of 9,840 acres, destroyed more than 4,000 homes, took 26 lives, and resulted in over $2 billion in financial losses. The most significant fire in this period was the October 20, 1991 Tunnel Fire in the Oakland-Berkeley hills. The fire resulted in 25 deaths, 150 injuries, and the displacement of over 10,000 persons. With destruction and damage to over 3,400 residential units, losses were in excess of $1.5 Billion in 1991 dollars.
- Four Park District parks were impacted by the Tunnel Fire: Temescal Regional Recreation Area, Sibley Volcanic Regional Preserve, Claremont Canyon Regional Preserve, and Huckleberry Botanical Regional Preserve. Most of the damage was in the Temescal Regional Recreation Area.
- The threat of catastrophic wildfires under Diablo wind conditions presents significant risks to public health and safety, homes, and property along the wildland-urban interface. This risk increases with an increase in development along the wildland-urban interface.
- The ongoing serious drought has exacerbated and continues to exacerbate the risk of major wildland/urban interface fires in or near the Park District's lands.
- The EBRPD has 75 park lands that are entirely or partially designated as High or Very High fire severity zones.
- DOES THE EBRPD TRACK RED FLAG DAYS?
- EBRPD IS WORKING ON GETTING US A FIRE LOG SINCE 2016 FROM THE EBRPD FIRE DEPARTMENT?
- Likelihood of Future Occurrence: Highly Likely
- Vulnerability: Extremely High
- Priority Hazard

A.9.4. Mitigation Strategy Meeting Handouts

These can be found in Appendix C of this Plan.

A.9.5. Final Meeting Handouts for HMPC

The final handout for the HMPC meeting is shown in Section 2.2 of the base Plan Update.

A.9.6. Final Meeting Handouts for Public

EAST BAY REGIONAL PARK DISTRICT
2022 LHMP UPDATE
FINAL PUBLIC MEETING
NOVEMBER 16, 2022

Hazards List

- Climate Change
- Coastal Flooding and Sea Level Rise
- Dam Failure
- Drought and Water Shortage
- Earthquake (and Earthquake Liquefaction)
- Flood: (1%/0.2% annual chance)
- Flood: Localized/Stormwater
- Landslide, Mudslide, and Debris Flow
- Levee Failure
- Pandemic
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rains and Storms (Hail, Lightning)
- Severe Weather: High Winds and Tornado
- Tsunami
- Wildfire (w/smoke and air quality)

Mitigation Strategy: EBRPD LHMP Mission Statement and Goals

Mission Statement:

> ***This Local Hazard Mitigation Plan assesses natural hazards of concern to the EBRPD, including consideration of climate change effects on hazards; evaluates risk to life safety, public health, property, and the environment; and evaluates mitigation measures to reduce risks and vulnerabilities, minimize losses, and increase EBRPD resilience and sustainability.***

Goal 1: Reduce Threats to Life Safety for Visitors, Staff and Residents Adjacent to the Park District's Parks

Goal 2: Reduce Damage to the Park District's Lands and Facilities, Critical Infrastructure, and Adjacent Areas from Future Natural Hazard Events

Goal 3: Protect Environmentally Important Lands and Facilities and Sites with Historical/Cultural Significance and to Ensure the Long-Term Viability of Important Natural Resources

Goal 4: Enhance Emergency Planning, Disaster Response and Post-Disaster Recovery Efforts to Increase Park District Capabilities and Leverage Interagency and Public-Private Coordination and Resources to be Prepared for, Respond to, and Recover from Future Natural Hazard Events

Goal 5: Increase Education, Awareness and Understanding of Natural Hazards and Mitigation

Mitigation Strategy: EBRPD Mitigation Actions

Action Title	New Action/ 2017 Action	Address Current Development	Address Future Development	Mitigation Category
Multi-Hazard Actions				
Action 1. Ingress/egress improvements	New Action	X	X	Property Protection Emergency Services
Action 2. Upgrade and replace the Channel 3 (Fire and Park Operations) base station radio receivers and/or transmitters.	New Action	X	X	Emergency Services
Action 3. Backup power supply for critical facilities and infrastructure: Generator/solar/battery projects	New Action	X	X	Property Protection Emergency Services
Action 4. Park District wide Vegetation Map and Landscape Database project - conduct mapping of all areas and implement resulting projects	New Action	X	X	Prevention Natural Resource Protection
Action 5. Enhance public education and awareness of EBRPD priority hazards including the role of effective mitigation on Park District lands	2017 Action	X	X	Public Information
Climate Change Actions				
Action 6. Implementation of "green" projects, including greenhouse gas reduction projects and implementation of Green Fleet Management Plan	New Action	X	X	Prevention Property Protection
Climate Change, Coastal Flooding and Sea Level Rise, and Levee Failure Actions				
Action 7. Implementation of Hayward shoreline projects to address climate change, coastal flooding, sea level rise	New Action	X	X	Prevention Property Protection Structural Projects Natural Resource Protection
Drought and Water Shortage Actions				
Action 8. Water supply/source redundancy, storage, and reliability projects	New Action	X	X	Prevention Property Protection Natural Resource Protection
Earthquake Actions				
Action 9. Conduct seismic evaluation of vulnerable structures and structural retrofits of EBRPD facilities and infrastructure	2017 Action	X	X	Property Protection Structural Projects

Action Title	New Action/ 2017 Action	Address Current Development	Address Future Development	Mitigation Category
Flood, Localized Flood, Heavy Rains and Storms, Landslides, and Dam Failure Actions				
Action 10. Implementation of the Lake Temescal Dam Restoration Plan	New Action	X	X	Property Protection Structural Projects Natural Resource Protection
Action 11. Flood and Storm Mitigation Inland Areas	2017 Action	X	X	Property Protection Structural Projects Natural Resource Protection
Action 12. Drainage System Improvements and Culvert Replacement Action	2017 Action	X	X	Property Protection Structural Projects Natural Resource Protection
Wildfire, Drought and Water Shortage, Extreme Heat, Climate Change, and High Winds Actions				
Action 13. Implement the vegetation management/fuel reduction projects from the Wildfire Hazard Reduction and Resource Management Plan	2017 Action	X	X	Prevention Property Protection Natural Resource Protection
Action 14. Continued implementation of the EBRPD Tree Die-Back and Hazardous Trees Abatement Plans and Programs	2017 Action	X	X	Prevention Property Protection Natural Resource Protection
Action 15. Defensible space and ignition resistant construction projects	2017 Action	X	X	Prevention Property Protection Natural Resource Protection
Action 16. Continued update and implementation of grazing program and grazing plan	New Action	X	X	Prevention Property Protection Natural Resource Protection
Action 17. Planting of more native and fire tolerant vegetation and shaded fuel breaks	New Action	X	X	Prevention Property Protection Natural Resource Protection

Appendix B References

2013 East Bay Regional Park District Master Plan

2017 EBRPD Local Hazard Mitigation Plan

2017 Economic Analysis Impact Report

2018 Contra Costa County Local Hazard Mitigation Plan

2018 State of California Hazard Mitigation Plan

2021 Alameda County Local Hazard Mitigation Plan Public Draft

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.

Bureau of Land Management

CA DWR Best Available Maps

Cal Adapt – Extended Drought Scenarios

CAL FIRE GIS datasets

Cal OES

Cal-Adapt

Cal-Adapt – Annual Average of Acres Burned

Cal-Adapt – Number of Extreme Heat Days by Year

Cal-Adapt – Precipitation: Decadal Averages Map

CalAtlas

California Adaptation Planning Guide

California Climate Adaptation Strategy (CAS) – 2021

California Department of Finance

California Department of Fish and Wildlife

California Department of Parks and Recreation Office of Historic Preservation

California Department of Water Resources

California Department of Water Resources (CA DWR) Division of Safety of Dams

California Department of Water Resources Best Available Maps

California Department of Water Resources Division of Safety of Dams

California Division of Mines and Geology

California Geological Survey

California Natural Diversity Database

California Office of Emergency Services – Dam Inundation Data

California's Drought of 2007-2009, An Overview. State of California Natural Resources Agency, California Department of Water Resources.

Climate Change and Health Profile Report – Alameda and Contra Costa County

East Bay Regional Park District GIS

East Bay Regional Park District GIS

East Bay Regional Park District staff

Existing plans and studies

FEMA

FEMA Disaster Declaration Database

FEMA: Building Performance Assessment: Oklahoma and Kansas Tornadoes

FEMA's HAZUS-MH 4.2 GIS-based inventory data

Hazus MH 4.2

HMPC input

Integrated Regional Water Management Plan

IPCC Fifth Assessment Synthesis Report (2014)

Kenward, Alyson PhD, Adams-Smith, Dennis, and Raja, Urooj. Wildfires and Air Pollution – The Hidden Health Hazards of Climate Change. Climate Central. 2013.

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.

Liu, J.C., Mickley, L.J., Sulprizio, M.P. et al. Climatic Change. 138: 655. doi:10.1007/s10584-016-1762-6. 2016.

Multi-Hazard Identification and Risk Assessment, FEMA 1997

National Drought Mitigation Center

National Drought Mitigation Center – Drought Impact Reporter

National Integrated Drought Information System

National Levee Database

National Oceanic and Atmospheric Administration (NOAA) National Climatic Data Center (NCDC) Storm Events Database

National Institute of Building Science Multi-Hazard Mitigation Council 2019 Interim Report

National Oceanic and Atmospheric Administration's National Climatic Data Center

National Weather Service

Natural Resource and Conservation Service

NOAA Storm Prediction Center

Pacific Gas and Electric Company

Personal interviews with planning team members and staff from the County

Proceedings of the National Academy of Sciences

Public Health Alliance of Southern California

Public Policy Institute of California

Science Magazine

State of California Department of Conservation

Statewide GIS datasets from other agencies such as Cal OES, FEMA, USGS, CGS, Cal Atlas, and others

U.S. Census Bureau 2010 Household Population Estimates

U.S. Fish and Wildlife Service

U.S. Fish and Wildlife Service's National Wetlands Inventory maps

U.S. Forest Service GIS datasets

U.S. Geological Survey

U.S. Occupational Safety and Health Administration

United States Geological Survey Open File Report 2015-3009

University of California

US Army Corps of Engineers

US Census Bureau

US Department of Agriculture

US Farm Service Agency

US Fish and Wildlife Service

USDA Forest Service Region 5

USGS Bulletin 1847

USGS National Earthquake Information Center

USGS Publication 2014-3120

Vaisala National Lightning Detection Network

Western Regional Climate Center

World Health Organization

Written descriptions of inventory and risks provided by East Bay Regional Park District staff

Appendix C Mitigation Strategy

East Bay Regional Park District
Local Hazard Mitigation Plan Update
HMPC Meetings #3 & 4 - Mitigation Strategy Meetings
August 3 & 4, 2022

Table of Contents:

Jeanine Foster (jeanine.foster@fostermorrison.com)
Foster Morrison Consulting, Ltd.
(303) 717-7171

AGENDA

East Bay Regional Park District
Local Hazard Mitigation Plan (LHMP) Update
HMPC Meetings #3 & #4 - Mitigation Strategy Meetings
August 3 & 4, 2022

HMPC Meeting #3:

1. Introductions
2. LHMP Project Status and Next Steps/Timeline
3. Priority Hazards Review
4. Develop Plan Goals and Objectives
5. Introduction to HMPC Meeting #4: Mitigation Alternatives/Actions/Projects

HMPC Meeting #4:

1. Introductions
2. Review Mitigation Categories and Selection Criteria
3. Brainstorming of Mitigation Alternatives/Actions/Projects by Hazard
4. Review of Voting Process for Prioritization of Mitigation Actions/Projects
5. Questions

Mitigation Strategy Meetings
August 3 & 4, 2022
Day 1

Status of the 2022 EBRPD LHMP Update Project/Next Steps

FEMA's 4-Phase-10 Step DMA/CRS Planning Process

Phase I: Organize Resources

1) Get organized

2) Plan for public involvement

3) Coordinate with other departments and agencies

Phase II: Risk Assessment

4) Identify the hazard(s)

5) Assess the risks

Capability Assessment

Phase III: Mitigation Strategy

6) Set planning goals

7) Review mitigation alternatives

8) Draft and action plan

Phase IV: Adoption and Implementation

9) Adopt the plan

10) Implement the plan, evaluate its worth, and revise as needed

LHMP Update Project Schedule/Key Dates

2022 LHMP Update Meetings

- **August 3** (Wednesday) HMPC Meeting #3 (Mitigation Strategy – Goals) (1:30-4:00)
- **August 4** (Thursday) HMPC Meeting #4 (Mitigation Strategy – Actions and Projects) (9-11:30)
- **November 16** (Wednesday) Public Meeting #2 (6:00-7:30)
- **November 17** (Thursday) HMPC Meeting #5 (9-11:30)

HMPC #3 & #4: Mitigation Strategy Meetings - Follow up

- **August 10 (**Wednesday**)** Mitigation Strategy Actions and Projects processed and voting site launched
- **August 18** (Thursday) Voting ends/Input on goals due
- **August 24** (Wednesday) Foster Morrison to send Mitigation Action prioritization follow up to EBRPD
- **September 16 (**Friday) EBRPD Mitigation Action (Project) Worksheets due to Foster Morrison

LHMP Document Drafts

- **September 23** (Friday) HMPC (First) Draft LHMP to EBRPD/HMPC
- **October 14** (Friday) EBRPD/HMPC comments due on Draft Plan
- **October 26** (Wednesday) Comments incorporated into Public Review (Second) Draft to EBRPD
- **November 2** (Wednesday): Public Review Draft on EBRPD website
- **December 2** (Friday**)** all EBRPD, HMPC and Public input due to Foster Morrison
- **December 9 – 16:** Final EBRPD, HMPC, and Public comments incorporated and LHMP Update submittal to Cal OES – December 2022

East Bay Regional Park District Hazard Identification & Profiles

Hazard	Geographic Extent	Likelihood of Future Occurrences	Magnitude/ Severity	Significance	Climate Change Influence
Climate Change	Extensive	Likely	Limited	High	–
Dam Failure	Significant	Occasional	Critical	High	Medium
Drought & Water Shortage (with tree mortality)	Extensive	Likely	Critical	High	High
Earthquakes (and earthquake liquefaction)	Extensive	Occasional	Catastrophic	Medium	Low
Flood: 1%/0.2% annual chance	Limited	Occasional/ Unlikely	Limited	Medium	High
Flood: Localized/Stormwater Flooding	Significant	Highly Likely	Limited	Medium	Medium
Landslide, Mudslide, Debris Flow	Significant	Likely	Limited	Medium	Medium
Levee Failure	Limited	Occasional	Limited	Medium	Medium
Pandemic	Extensive	Occasional	Critical	Medium	Low
Sea Level Rise	Limited	Likely	Limited	Medium	High
Severe Weather: Extreme Heat	Extensive	Highly Likely	Limited	Medium	High
Severe Weather: Heavy Rain and Storms	Extensive	Highly Likely	Limited	Medium	High
Severe Weather: High Winds and Tornadoes	Extensive	Highly Likely	Limited	Medium	High
Tsunami	Limited	Occasional	Limited	➢ Low	Medium
Wildfire (with smoke/ air quality)	Extensive	Highly Likely	Catastrophic	High	High

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

Climate Change Influence

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.

EBRPD Priority Hazards*

- Climate Change
- Coastal Flooding and Sea Level Rise
- Dam Failure
- Drought & Water Shortage
- Earthquake (w/ Earthquake Liquefaction)
- Flood: 1%/0.2% annual chance
- Flood: Localized/Stormwater
- Landslide, Mudslide, Debris Flow
- Levee Failure
- Pandemic
- Severe Weather: Extreme Heat
- Severe Weather: Heavy Rains and Storms (hail, lightning)
- Severe Weather: High Winds and Tornadoes
- Wildfire (w/ smoke and air quality)

Non-Priority Hazards:

- Tsunami

*Note: Any hazard ranked medium or high significance in the Hazard ID table (on page 5) is considered to be a priority hazard for purposes of mitigation planning.

Mitigation Strategy: Goals

The most important element of the LHMP is the resulting mitigation strategy which serves as the long-term blueprint for reducing potential losses identified in the risk assessment. The mitigation strategy is comprised of three components:

1. Mitigation Goals
2. Mitigation Action Alternatives
3. Mitigation Action (Implementation) Plan

Mitigation Goals

Up to now, the HMPC has been involved in collecting and providing data for the EBRPD Local Hazard Mitigation Plan Update. From this information, a Risk Assessment has been developed that describes the risk and vulnerability of the EBRPD 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 to incorporating these improvements into the Mitigation Strategy portion of the LHMP. Our planning goals should provide direction for what loss reduction activities can be undertaken to reduce losses and make the EBRPD 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.***

  - ***Goal statements may form the basis for objectives. They can 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.***

  - ***Consider other planning area goals from other regional/district/county programs, plans and priorities.***

Types/Sources of other area mitigation plans/ programs include:

- General Plans
- Stormwater Program and Plans
- Flood/Watershed Management Plans and Studies
- Drought Plans, Urban/Integrated Regional Water Management Plans
- Community Wildfire Protection Plans
- Strategic Fire Plans
- Dam Emergency Action Plans
- Emergency Operations Plans
- Climate Adaptation Plans
- Others?

Goals From Other Relevant Plans

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.

2021 Alameda County Local Hazard Mitigation Plan

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

2018 Contra Costa County Local Hazard Mitigation Plan

Guiding Principal: To reduce the vulnerability from hazards within the planning area in a cost-effective manner, within the capabilities of the partnership.

Goals:

- Save (or protect) lives and reduce injury.
- Increase resilience of infrastructure and critical facilities.
- Avoid (minimize or reduce) damage to property.
- Encourage the development and implementation of long-term, cost-effective and environmentally sound mitigation projects.
- Build and support capacity to enable local government and the public to prepare for, respond to and recover from the impact of natural hazards.

EBRPD Wildfire Hazard Reduction and Resource Management Plan

- Reduce fire hazards on District-owned lands in the East Bay's wildland-urban interface (WUI) to an acceptable level.
- Maintain and enhance ecological values for plant and wildlife habitat consistent with fire reduction goals.
- Preserve aesthetic landscape values for park users and neighboring communities.
- Provide a vegetation management plan which is cost-effective and both financially and environmentally sustainable to EBRPD on an on-going basis.

EBRPD 2017 LHMP Update (This is what we are updating)

GOAL 1: Reduce Threats to Life Safety for Visitors, Staff and Residents Adjacent to the Park District's Parks

- Enhance life safety by retrofitting existing facilities, replacing them with new current-code facilities or relocating them out of high hazard areas.
- Locate new facilities outside of high hazard areas whenever possible and design them to minimize life safety risk from future disaster events.
- Continue and enhance the Park District's ongoing fuel management programs.
- Develop robust disaster response and evacuation plans and conduct frequent practice drills.
- Enhance life safety by improving public awareness of wildland/urban interface fires, earthquakes and other natural hazards that pose substantial life safety risk to the Park District's facilities and people.

GOAL 2: Reduce Damage to the Park District's Lands and Facilities and Adjacent Areas in Future Natural Hazard Events

- Retrofit, replace or relocate existing facilities with a high vulnerability to one or more natural hazards to reduce damage, economic loss and disruption in future disaster events.
- Ensure that new facilities are adequately designed for hazard events and located outside of mapped high hazard zones to minimize damage and loss of function in future disaster events, to the extent practicable.
- Continue and enhance the Park District's ongoing fuel management programs.

GOAL 3: Protect Environmentally Important Lands and Facilities and Sites with Historical/Cultural Significance

- Manage, maintain and restore park lands so that they retain their important scenic, natural and cultural values.
- Maintain, acquire and preserve significant biologic, geologic, scenic and historic resources within Alameda and Contra Costa counties.
- Minimize threats to important lands, facilities and sites from future natural hazard events, to the extent practicable.

GOAL 4: Enhance Emergency Planning, Disaster Response and Post-Disaster Recovery

- Enhance collaboration and coordination between the Park District, local governments, utilities, businesses and citizens to prepare for and recover from future natural disaster events.
- Enhance emergency planning to facilitate effective response and rapid recovery from future natural disaster events.

GOAL 5: Increase Awareness and Understanding of Natural Hazards and Mitigation

- Implement education and outreach efforts to increase awareness of natural hazards throughout the Park District, including staff, visitors and the entire communities served by the Park District.
- Create, maintain, and publicize a natural hazards page on the Park District's website with links to more information about natural hazards and mitigation activities to reduce risks from natural hazards.

Other Example Goal Statements

- 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

General Recommendations for Categories of Goals

- Reduce Losses/Protection of Life, Property, Public Health, and the Environment from all Hazards
- Reduce Losses/Protection of Critical Facilities and Infrastructure from all Hazards
- Public Education
- Increase Park District Capabilities to all Hazards
- Any Hazard-specific goals

Goals Development

The purpose of goal's development is to reach a consensus on updated goals for the EBRPD 2022 LHMP Update. Provided above are example goals for this LHMP and goals from the previous 2017 EBRPD LHMP. ***You may reword those above or develop your own updated goals.***

Each person should provide either via chat (on this zoom call) or email to Jeanine.foster@fostermorrison.com: Three (3) goals they would like to see included for this 2022 EBRPD LHMP Update. (Please submit by Thursday, August 18)

When collated, we will combine and rework them into 4-6 goals for this LHMP Update and send them out to the HMPC for further review and refinement.

Mitigation Strategy Meetings
August 3 & 4, 2022
Day 2

Mitigation Strategy Action Development: Ground Rules

Rule 1: The EBRPD MUST have a Mitigation Action/Project to address each of their Priority Hazards (those rated as a high or medium significance in their Hazard Identification table).

Rule 2: Every Mitigation Action/Project MUST be supported by Risk Assessment Data contained within Chap 4 of the Base Plan. Note: this might necessitate backfilling the hazard risk assessment data.

Rule 3: The Mitigation Actions/Projects for this 2022 LHMP Update should reflect the EBRPD's WISH LIST for mitigation, regardless of funding source.

Rule 4: Any Mitigation Action/Project that might be considered for FEMA mitigation grant funding over the next 5-years covered by this LHMP MUST be included in this 2022 LHMP Update.

Rule 5: While the updated Mitigation Strategy should include all potential Mitigation Actions/Projects for the EBRPD (regardless of funding source), keep in mind that the Park District is NOT obligated to implement ANY of the identified Mitigation Actions/Projects – all are always subject to funding and changing priorities.

Rule 6: Each Mitigation Action/Project to be included in this LHMP Update MUST have a Mitigation Action Worksheet completed by the responsible (owning) EBRPD Division. This applies to Mitigation Actions/Projects being carried forward from the 2017 LHMP.

Rule 7: The EBRPD CAN later include Mitigation Actions/Projects that might not get identified during this Mitigation Action/Project Prioritization process – the key is to complete a Mitigation Action Worksheet for any project to be included in the updated LHMP prior to submittal to Cal OES/FEMA.

REMEMBER: Having a FEMA approved LHMP for your Jurisdiction is a prerequisite for being eligible to apply for FEMA pre and post mitigation funding.

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 Actions

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
  - ✓ Backup power supply/generators
  - ✓ 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:

1. Avoidance: setting construction projects back from the stream.
2. Reduction: Preventing runoff that conveys sediment and other water-borne pollutants, such as planting proper vegetation and conservation tillage.
3. 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 Actions from 2017 ERBPD LHMP (This is what we are updating)

Mitigation Action	Complete	Ongoing	Not Started	Project in Plan Update
Multi-Hazard Mitigation Actions				
Long Term				
Integrate the findings and action items in the mitigation plan into ongoing programs and practices for the Park District.				
Review and enhance emergency and evacuation planning, including the adequacy of back-up generators, using hazard and risk information in the mitigation plan				
Consider natural hazards and site new facilities outside of high hazard areas whenever possible.				
Ensure that new facilities are adequately designed to minimize risk from natural hazards.				
Systematically track natural hazard events that result in damage to Park District facilities to help target mitigation actions.				
Pursue mitigation grants from FEMA's pre- and post-disaster programs and from other sources.				
Pursue FEMA Public Assistance grants if Park District facilities suffer damage in a FEMA declared disaster and include mitigation measures in addition to repairs.				
Enhance and complete the Park District's inventory of facilities to more accurately evaluate risks from natural hazards				
Increase awareness and understanding of natural hazards by creating a natural hazards page on the Park District's website with links to more information.				
Keep the Park District's mitigation plan on the website and encourage comments from stakeholders for the periodic review and update of the mitigation plan.				
Earthquake Actions				
Short Term				
Retrofit or replace the Park District's Peralta Oaks headquarters building, as funding becomes available.				
Develop a Park District policy for the desired level of seismic performance for critical and important facilities.				
Complete seismic evaluations of important buildings including Tilden, Sunol and Crab Cove Visitor Centers, Temescal Beach House, Tilden Carousel, and Brazil Room.				
Complete evaluations of critical infrastructure include the Del Valle sewage ponds and the District owned dams.				
Evaluate nonstructural seismic vulnerabilities in Park District facilities and mitigate components that pose significant life safety or loss of function risks.				
Complete and update the Park District's inventory of facilities, including data necessary to evaluate seismic risk.				
Long Term				

Mitigation Action	Complete	Ongoing	Not Started	Project in Plan Update
Replace the Public Safety Office, Service Yard Office and Fire Station #1 with new current-code buildings, as funding becomes available.				
Retrofit or replace critical and important facilities with significant seismic deficiencies, as identified by the evaluations in Short Term #2, as funding becomes available.				
Enhance emergency planning for earthquakes including duck, cover and hold drills and evacuation drills.				
Locate new facilities outside of high earthquake hazard areas including sites subject to liquefaction, surface rupture, earthquake-induced landslides, or in close proximity to faults, whenever possible.				
Wildfire Actions				
Short Term				
Complete the remaining fuel reduction projects identified in the Fuels Plan, and expand to other areas as funding becomes available.				
Continue to refine the Park District's fuels reduction strategies to maximize the reduction in fire risk, while minimizing possible impacts on the natural environment.				
Review and refine emergency response and evacuation planning for locations with high risk for wildland and/or wildland/urban interface fires.				
Continue outreach and education programs through the Hills Emergency Forum, the Fire Wise Program, Local Fire Safe Councils and other organizations.				
Long Term				
Pursue additional grants for fuels management and other fire risk reduction projects from FEMA and other agencies including Calfire, US Forest Service and California Fire Safe Council.				
Evaluate and implement mitigation measures to reduce fire risk, including enhancing defensible space around buildings, fuel reduction measures near important facilities and upgrading building elements with materials designed to be fire-resistant, as funding becomes available.				
Continue and expand the Park District's hazardous tree abatement programs as funding becomes available.				
Locate new facilities outside of areas with significant wildland/urban interface fire risk, whenever possible.				
Drought Actions				
Short Term				
Continue and enhance the Park District's water conservation measures, including xeriscaping.				
Evaluate possible increases in water storage, including cisterns to provide emergency water for fire suppression and implement if feasible, as funding becomes available.				
Flood Mitigation Actions				
Short Term				

Mitigation Action	Complete	Ongoing	Not Started	Project in Plan Update
Evaluate the adequacy of existing levees for floods, including storm surge, tsunamis and sea level rise and develop prioritized mitigation actions.				
Compile and maintain an inventory of sites with a history of overbank flooding or localized stormwater drainage flooding and develop prioritized mitigation actions.				
Enhance emergency planning, including flood response actions including flood fighting via temporary barriers, for sites with significant flood risk.				
Long Term				
Implement flood risk reduction measures for shoreline facilities or sites with high flood risk, including levees at Hayward Shoreline, shoreline protection along the Bay and recreational facilities at Lake Del Valle, as funding becomes available.				
Implement flood risk reduction measures for facilities or sites with high flood risk from overbank or stormwater drainage flooding, as funding becomes available.				
Locate new facilities outside of areas with significant flood risk, whenever possible.				
Landslide Actions				
Short-Term				
Develop a Park District policy for closure of sites with high landslide risk during periods of heavy rainfall.				
Consult with an engineering geologist or geotechnical engineer regarding landslide risk for sites with important facilities with a history of landslides and/or apparent high risk.				
Compile and maintain an inventory of sites with a history of landslides and develop prioritized mitigation actions.				
Long Term				
Implement landslide mitigation measures at high landslide hazard sites with important facilities including Wildcat Canyon, Lake Chabot and the other parks listed in this chapter, as funding becomes available.				
Locate new facilities outside of areas with significant landslide risk, whenever possible.				
Other Natural Hazard Actions				
Short-Term				
Review and update the Park District's emergency operations plan to include high wind events, snow or ice storms, and extreme temperatures.				
Continue and enhance the Park District's hazardous tree mitigation programs, as funding becomes available.				
Evaluate infrastructure and buildings possibly vulnerable to high winds, including communications towers.				
Long term				
Implement tie downs or other measures to mitigate infrastructure and buildings vulnerable to high winds, as funding becomes available.				

Mitigation Strategy: Action (Implementation) 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. The EBRPD must have a mitigation action(s) and an action implementation plan (worksheet) specific to each priority hazard.

Mitigation Criteria

For use in selecting and prioritizing Proposed Mitigation Measures

1. STAPLEE

Social: Does the measure treat people fairly? (different groups, vulnerable and underserved populations)

- Community Acceptance
- Effect on Segment of Population
- Social Benefits/Disruptions

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, Regulations, Permits
- 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

East Bay Regional Park District

Mitigation Action Prioritization (Voting) Instructions

The mitigation actions and projects will be further collated by hazard and will be presented back to the HMPC for prioritization. **An email link to the voting site will be launched Wednesday, August 10; voting will close COB Thursday, August 18**. The voting website location is https://fostermorrison.aweeba.com/.

Each person will have 9 votes total to vote for their preferred mitigation actions/projects:

- ***3 high priority votes (5 points each)***
- ***3 medium priority votes (3 points each)***
- ***3 low priority votes (1 point each)***

Your votes will indicate the consensus of the team.

Use the list of mitigation selection criteria (above) to help you make your determinations.

After the votes are tabulated, we will send out an email detailing mitigation action prioritization results and next steps.

East Bay Regional Park District
Mitigation Action Worksheet

Mitigation Action/Project Title:	
Hazards Addressed:	
Issue/Background:	
Project Description:	
Other Alternatives:	
Existing Planning Mechanism(s) through which Action Will Be Implemented:	
Responsible Division/Partners:	
Cost Estimate:	
Benefits (Losses Avoided):	
Potential Funding:	
Timeline:	
Project Priority (H, M, L):	

Worksheet completed by:	
Name and Title:	
Phone:	

EBRPD 2022 LHMP Update

Mitigation Strategy Meetings – Action Prioritization

21 Voting Members

Actions sorted by Vote Totals

Agency/ Department	Mitigation Action Title	Hazards Addressed	Points/ Worksheet Status
	Implement the fuels management/reduction projects from the Wildfire Hazard Reduction and Resource Management Plan	Wildfire	44
	Ingress/egress improvements	Wildfire	31
	Implementation of greenhouse gas reduction projects	Climate Change	27
	Continued update and implementation of the EBRPD Tree Die-Back Plan/Continued implementation of tree management projects to include tree thinning and removal at priority areas: Richmond, Miller Knox, Chabot, Tilden, Wildcat Canyon, Others. and use of carbonator biomass system (to lower carbon footprint)	Drought and Water Shortage, Wildfire	25
	Upgrade and replace the Channel 3 (Fire and Park Operations) base station radio receivers and/or transmitters. Several base stations have reached their end of life and need to be replaced with upgraded equipment to maintain the Low Band radio system utilized by all Park Staff for communication from the parks to the Communications Center.	Multi-Hazard	20
	Implementation of shoreline projects to support shoreline resiliency	Climate Change, Coastal Flooding, Levee Failure, and Sea Level Rise	17
	Implement projects from Fuels Management Work Detail, 2022	Wildfire	16
	Evacuation planning for Park District staff and visitors, including alternatives for sheltering in place	Multi-Hazard	16
	Implementation of shoreline habitat restoration projects	Climate Change, Coastal Flooding, Levee Failure, and Sea Level Rise	15
	Water source redundancy, storage, and reliability projects	Drought & Water Shortage	15
	Defensible space projects	Wildfire	15
	Fuel break projects	Wildfire	15
	Dam improvement/rehabilitation projects for EBRPD dams	Dam Failure	14
	Add additional RAWs to provide Park District wide coverage including in all areas of Very High Fire Severity	Multi-Hazard	14

Agency/ Department	Mitigation Action Title	Hazards Addressed	Points/ Worksheet Status
	Conduct seismic evaluation of vulnerable structures and structural retrofits of EBRPD structures including critical facilities and infrastructure (Peralta Oaks, Public Safety Headquarters, Fire Station #1 (Tilden), Fire Station #2 (Redwood Canyon), others	Earthquake	13
	Creek restoration projects	Flood, Heavy Rains and Storms	13
	Enhance and add new wetland areas to reduce nutrient loading which contributes to toxic blue green algae blooms and while also mitigating against flood impacts	Climate Change, Drought, Extreme Heat, Flood	12
	Continued update and implementation of grazing program and grazing plan	Drought and Water Shortage, Wildfire	12
	Backup power supply for critical facilities and infrastructure: Generator/solar/battery projects	Multi-Hazard	12
	Implementation of Green Fleet Management Plan	Climate Change	11
	Complete Ecological Health Assessment Report for publicly owned lands in East Bay and implement recommendations	Climate Change	11
	District wide Vegetation Map and Landscape Database project – conduct mapping of all areas and implement resulting projects	Wildfire	11
	Enhance public education and awareness of EBRPD priority hazards including the role of effective mitigation on Park District lands	Multi-Hazard	11
	Release and publicize updated wildfire EOP to include data/information on the changing wildfire risk in recent years and criteria/triggers for level 2 restrictions during high risk days (high heat, red flag days, etc.)	Wildfire	10
	Implementation of projects from the Hayward Shoreline Master Plan	Climate Change, Coastal Flooding, Levee Failure, and Sea Level Rise	9
	Planting of more native and fire tolerant vegetation and shaded fuel breaks	Drought and Water Shortage, Wildfire	9
	Improve water systems for suppression, water flows, and resiliency against wildfires	Wildfire	9
	Upgrade and replace the Channel 3 (Fire and Park Operations) base station radio receivers and/or transmitters	Multi-Hazard	9
	Water Resources, Regional - Resiliency - watershed protection and preservation of shorelines, marshes, riparian areas, lakes and urban creeks. Adaptation to sea level rise and climate related changes (Measure FF)	Climate Change, Coastal Flooding, Levee Failure, and Sea Level Rise	8
	Ignition resistance/hardening projects for structures and critical facilities and infrastructure located in High and Very High Fire Hazard Severity Zones	Wildfire	8
	Dredging of reservoirs to reduce toxic blue green algae blooms	Climate Change, Drought, Extreme Heat, Flood	7

Agency/ Department	Mitigation Action Title	Hazards Addressed	Points/ Worksheet Status
	Upgrade district radio stations to include software and equipment at all 9 existing radio tower sites (project # 159500)	Multi-Hazard	7
	Implementation of Strategic Energy Plan	Climate Change	6
	PV and energy efficient projects	Climate Change	6
	Erosion repair/protection projects	Climate Change, Coastal Flooding, Levee Failure, and Sea Level Rise	6
	Temescal - Improve sediment basin to establish wetland buffer, which will improve water quality. Dredging of lake. Restore erosion on west shoreline trail (Measure FF)	Dam Failure	6
	Establishing new wells	Drought & Water Shortage	6
	Water Resources, Regional - Recycle / Reuse / Capture water infrastructure / Water Bottle Refill (Measure FF)	Drought & Water Shortage	6
	Decommissioning of gas lines on Park District lands	Earthquake	6
	Reestablish ponds and pond replacement projects	Drought and Water Shortage, Wildfire	6
	Air filtration system enhancements/ filter replacements	Pandemic, Wildfire	6
	Develop extreme heat SOP to include restrictions, closures during extreme heat days	Severe Weather: Extreme Heat	6
	Marsh protection projects	Climate Change, Coastal Flooding, Levee Failure, and Sea Level Rise	5
	Rain catchment systems	Drought & Water Shortage	5
	Safe Healthy Forests - Stewardship / Restore and Reestablish - Plant fire tolerant vegetation, Wildfire Management Efforts, Redwood Forest Management Plan (Measure FF)	Flood, Heavy Rains and Storms	5
	Bridge improvement/replacement projects	Climate Change, Coastal Flooding, Levee Failure, and Sea Level Rise	4
	Implement projects from 2022 Adopted Projects and Program Budget Five-year Expenditure Plan	Multi-Hazard	4
	Undergrounding of Utilities	Multi-Hazard	4
	Implementation of East Bay restoration projects to address wetlands, SLR, water quality, environmental justice	Climate Change, Coastal Flooding, Levee Failure, and Sea Level Rise	3

Agency/ Department	Mitigation Action Title	Hazards Addressed	Points/ Worksheet Status
	Restore Encinal Beach at Alameda Point Regional Shoreline (project #518300)	Climate Change, Coastal Flooding, Levee Failure, and Sea Level Rise	3
	Restore and stabilize Point Isabel Regional Shoreline at North Point (project #518200)	Climate Change, Coastal Flooding, Levee Failure, and Sea Level Rise	3
	Erosion control/rip rap at Water Trail at Point Isabel (project # 553700)	Climate Change, Coastal Flooding, Levee Failure, and Sea Level Rise	3
	At Alameda Point, study wetland impact / design for shoreline resiliency and enhance and manage dune habitat at Encinal/Breakwater Beach - to account for sea level rise. (Measure FF)	Climate Change, Coastal Flooding, Levee Failure, and Sea Level Rise	3
	Irrigation projects	Drought & Water Shortage	3
	Culvert and creek crossing maintenance projects	Flood, Heavy Rains and Storms	3
	Erosion repair/protection projects	Flood, Heavy Rains and Storms	3
	Bridge replacement projects	Flood, Heavy Rains and Storms	3
	Redwood tank replacement projects: 3 at Tilden Park, 2 at Anthony Chabot, 1 at Lake Chabot, 1 at Dry Creek Pioneer and 1 at Camp Arroyo	Drought and Water Shortage, Wildfire	3
	Trail maintenance/fire break projects	Wildfire	3
	Mass shelter projects across Park District to establish buildings/areas as shelter, safe havens/cooling centers for extreme heat days	Severe Weather: Extreme Heat	3
	Make improvements to water supply system and other infrastructure to provide and store water at Shadow Cliffs Regional Recreation Area (project #133400)	Drought & Water Shortage	2
	Culvert replacement projects (Twin Culverts, Alvarado, Redwood Creek, Wildcat Creek, others)	Flood, Heavy Rains and Storms	2
	Critical facilities and infrastructure – flood protection projects	Flood, Heavy Rains and Storms	2
	Capital projects to retrofit sewer lines	Earthquake	1
	Dredge Honker Bay at Lake Chabot Regional Park to minimize the runoff onto Redwood Canyon Golf Course (project #531700)	Flood, Heavy Rains and Storms	1
	At Kennedy Grove, Repair streambank erosion - improve water quality into San Pablo Creek (Measure FF)	Flood, Heavy Rains and Storms	1

Agency/ Department	Mitigation Action Title	Hazards Addressed	Points/ Worksheet Status
	At Leona Canyon, Pyrite Trail - control erosion and prevent sediment build up in the creek by improving the trail grading, contouring and shape (Measure FF)	Flood, Heavy Rains and Storms	1
	Wildcat Canyon - Drainage installation for watershed health and safety upgrades - Mezue Trail to Belgium Trail/Wildcat Creek Trail to Rifle Range Trail/Havey Creek Trail drainage improvements (Measure FF)	Flood, Heavy Rains and Storms	1
	HVAC projects Park District wide	Pandemic, Wildfire	1
	Implement requirements of new fire code	Wildfire	1
	Develop strategy/SOP for wildfire smoke events for EBRPD staff and visitors	Wildfire	1
	Smoke and air quality projects	Wildfire	1
	Implementation of projects from the Bay Trail Risk Assessment & Adaptation Prioritization Plan (RAAPP)	Climate Change, Coastal Flooding, Levee Failure, and Sea Level Rise	0
	Complete permitting and design for the Coyote Hills Public Access and Habitat Restoration Project	Climate Change, Coastal Flooding, Levee Failure, and Sea Level Rise	0
	Restore Hayward Marsh to include marsh restoration, protection of shoreline, and SLR resiliency (project #160500)	Climate Change, Coastal Flooding, Levee Failure, and Sea Level Rise	0
	Restore Albany Beach at McLaughlin Eastshore State Park (project # 571500)	Climate Change, Coastal Flooding, Levee Failure, and Sea Level Rise	0
	McLaughlin Eastshore State Park - Increase resiliency of shorelines, such as North Basin Strip (Measure FF)	Climate Change, Coastal Flooding, Levee Failure, and Sea Level Rise	0
	At Gateway, enhance tidal and intertidal habitat - restoration/resiliency. "Living shoreline" - designed to anticipate sea level rise (Measure FF)	Climate Change, Coastal Flooding, Levee Failure, and Sea Level Rise	0
	Miller/Knox - Shoreline upgrades to adapt to rising sea levels (Measure FF)	Climate Change, Coastal Flooding, Levee Failure, and Sea Level Rise	0
	MLK Jr. Shoreline - Increase resiliency of shoreline to anticipate sea level rise (Measure FF)	Climate Change, Coastal Flooding, Levee Failure, and Sea Level Rise	0

Agency/ Department	Mitigation Action Title	Hazards Addressed	Points/ Worksheet Status
	Point Isabel - Stabilize and enhance banks of Hoffman Channel to improve bay water quality, protect against sea level rise and improve public access. Preservation of habitat for endangered Ridgway's rail. Environmental maintenance (Measure FF)	Climate Change, Coastal Flooding, Levee Failure, and Sea Level Rise	0
	Outfall improvement projects	Climate Change, Coastal Flooding, Levee Failure, and Sea Level Rise	0
	Water Resources, Regional - Healthy habitat - Blue-green algae management (Measure FF)	Climate Change, Drought, Extreme Heat, Flood	0
	Sediment removal projects	Dam Failure	0
	At Temescal Regional Recreation Area, water quality and erosion control improvements (project #534900)	Dam Failure	0
	Conduct seismic study for EBRPD owned dams	Dam Failure	0
	Dam infiltration system improvements for wildfire ash and other particulates	Dam Failure	0
	Replace well at Coyote Hills Regional Park (project #15800)	Drought & Water Shortage	0
	At Sibley Volcanic Preserve restore McCosker Creek and habitat areas, road/bridge improvements, and add water line, water tank and water treatment system (project #150800)	Drought & Water Shortage	0
	Miller/Knox - Increase drought tolerant landscaping (Measure FF)	Drought & Water Shortage	0
	Continued implementation of turf maximization program/turf drought recovery project	Drought & Water Shortage	0
	Identify and conduct non-structural retrofits	Earthquake	0
	At Tilden Regional Park remove crossing and replace with free span bridges, restore stream (project #158400)	Flood, Heavy Rains and Storms	0
	At Tilden Regional Park conduct Jewel Lake Study to prevent lake from filling with sediment to include creating wildcat creek bypass and dredging lake (project #527800)	Flood, Heavy Rains and Storms	0
	Tilden Regional Park - Park-wide erosion control and watershed management for long-term sustainability of habitat and nature trails (Measure FF)	Flood, Heavy Rains and Storms	0
	At Anthony Chabot, Creek protection project - Reduce erosion, increase access and improve safety by installing a ped bridge on Columbine Trail over Grass Valley Creek (Measure FF)	Flood, Heavy Rains and Storms	0
	Green Transportation and Regional Trails - Regional parkland trail expansion and maintenance, including erosion control for protection of sensitive habitat (Measure FF)	Flood, Heavy Rains and Storms	0
	Redwood - Creek Restoration - Erosion control and stabilization of Tres Sandas Trail (Measure FF)	Flood, Heavy Rains and Storms	0

Agency/ Department	Mitigation Action Title	Hazards Addressed	Points/ Worksheet Status
	Sibley/Huckleberry/Claremont - Bay Area Ridge Trail - erosion control project (Measure FF)	Flood, Heavy Rains and Storms	0
	Landslide repair and protection projects at key areas: Wildcat Canyon, Richmond, Lake Chabot, District Ranch, Others	Landslides, Mudslides and Debris Flow	0
	Levee improvement plan and projects	Levee Failure	0
	Levee maintenance projects	Levee Failure	0
	Build an inlet setback levee in Hayward	Levee Failure	0
	Garin Regional Park improvements to include trail grading, brush removal, bridge installation, and installation of water meters and water lines to support Grazing Program (project #156200)	Drought and Water Shortage, Wildfire	0
	Point Pinole - Habitat Restoration - Remove Eucalyptus tree and invasive bristly ox tongue near grasslands. Maintain marshlands and manage native grasses (Measure FF)	Drought and Water Shortage, Wildfire	0
	Other water infrastructure improvement projects for storage, spring boxes, develop additional municipal sources	Drought and Water Shortage, Wildfire	0
	Network improvement projects (Anthony Chabot building)	Severe Weather: Extreme Heat	0
	Water Resources, Regional - Healthy habitat - Blue-green algae management (Measure FF)	Climate Change, Drought, Extreme Heat, Flood	0

N/A – not part of voting process

Appendix D Adoption Resolution

Note to Reviewers: When this plan has been reviewed and approved pending adoption by FEMA Region IX, the adoption resolutions will be signed by the EBRPD and added to this appendix. A model resolution is provided below

Resolution # _____

Sample Resolution: East Bay Regional Park District

Resolution # _____

Adopting the East Bay Regional Park District (EBRPD) Local Hazard Mitigation Plan

Whereas, EBRPD recognizes the threat that natural hazards pose to people and property within the Park District; 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 made available hazard mitigation grants to state and local governments;

Whereas, an adopted Local Hazard Mitigation Plan is required as a condition of future funding for mitigation projects under multiple FEMA pre- and post-disaster mitigation grant programs; and

Whereas, EBRPD fully participated in the FEMA-prescribed mitigation planning process to prepare this local hazard mitigation plan; and

Whereas, the California Office of Emergency Services and Federal Emergency Management Agency, Region IX officials have reviewed the EBRPD Local Hazard Mitigation Plan Update and approved it contingent upon this official adoption of the participating governing body;

Whereas, the EBRPD desires to comply with the requirements of the Disaster Mitigation Act and to augment its emergency planning efforts by formally adopting the EBRPD Local Hazard Mitigation Plan;

Whereas, adoption by the governing body for the EBRPD, demonstrates the jurisdiction's commitment to fulfilling the mitigation goals and objectives outlined in this Local Hazard Mitigation Plan.

Whereas, adoption of this legitimizes the plan and authorizes responsible agencies to carry out their responsibilities under the plan.

Now, therefore, be it resolved, that the EBRPD adopts the Local Hazard Mitigation Plan as an official plan; and

Be it further resolved, EBRPD will submit this adoption resolution to the California Office of Emergency Services and FEMA Region IX officials to enable the plan's final approval in accordance with the requirements of the Disaster Mitigation Act of 2000.

Passed:_____
(date)

_____
Certifying Official

East Bay Regional Park District

Appendix E Threatened and Endangered Species

Table E–1 Special Status Species in EBRPD Areas of Alameda County

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	CA Rare Plant Rank
Animals – Amphibians					
Ambystoma californiense pop. 1	California tiger salamander – central California DPS	Threatened	Threatened	WL	–
Rana boylii	foothill yellow–legged frog	None	Endangered	SSC	–
Rana draytonii	California red–legged frog	Threatened	None	SSC	–
Animals – Birds					
Accipiter cooperii	Cooper's hawk	None	None	WL	–
Accipiter striatus	sharp–shinned hawk	None	None	WL	–
Aquila chrysaetos	golden eagle	None	None	FP WL	–
Buteo regalis	ferruginous hawk	None	None	WL	–
Buteo swainsoni	Swainson's hawk	None	Threatened	–	–
Circus hudsonius	northern harrier	None	None	SSC	–
Elanus leucurus	white–tailed kite	None	None	FP	–
Haliaeetus leucocephalus	bald eagle	Delisted	Endangered	FP	–
Eremophila alpestris actia	California horned lark	None	None	WL	–
Anser albifrons elgasi	tule greater white–fronted goose	None	None	SSC	–
Branta hutchinsii leucopareia	cackling (=Aleutian Canada) goose	Delisted	None	WL	–
Bucephala islandica	Barrow's goldeneye	None	None	SSC	–
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 montanus	mountain plover	None	None	SSC	–
Charadrius nivosus nivosus	western snowy plover	Threatened	None	SSC	–
Falco columbarius	merlin	None	None	WL	–
Falco mexicanus	prairie falcon	None	None	WL	–
Falco peregrinus anatum	American peregrine falcon	Delisted	Delisted	FP	–
Spinus lawrencei	Lawrence's goldfinch	None	None	–	–
Antigone canadensis tabida	greater sandhill crane	None	Threatened	FP	–

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	CA Rare Plant Rank
Progne subis	purple martin	None	None	SSC	–
Agelaius tricolor	tricolored blackbird	None	Threatened	SSC	–
Xanthocephalus xanthocephalus	yellow–headed blackbird	None	None	SSC	–
Icteria virens	yellow–breasted chat	None	None	SSC	–
Lanius ludovicianus	loggerhead shrike	None	None	SSC	–
Hydroprogne caspia	Caspian tern	None	None	–	–
Sternula antillarum browni	California least tern	Endangered	Endangered	FP	–
Pandion haliaetus	osprey	None	None	WL	–
Geothlypis trichas sinuosa	saltmarsh common yellowthroat	None	None	SSC	–
Setophaga petechia	yellow warbler	None	None	SSC	–
Ammodramus savannarum	grasshopper sparrow	None	None	SSC	–
Artemisiospiza belli belli	Bell's sage sparrow	None	None	WL	–
Melospiza melodia maxillaris	Suisun song sparrow	None	None	SSC	–
Melospiza melodia pop. 1	song sparrow (–inModesto–in population)	None	None	SSC	–
Melospiza melodia pusillula	Alameda song sparrow	None	None	SSC	–
Melospiza melodia samuelis	San Pablo song sparrow	None	None	SSC	–
Passerculus sandwichensis alaudinus	Bryant's savannah sparrow	None	None	SSC	–
Pelecanus erythrorhynchos	American white pelican	None	None	SSC	–
Nannopterum auritum	double–crested cormorant	None	None	WL	–
Melanerpes lewis	Lewis' woodpecker	None	None	–	–
Sphyrapicus ruber	red–breasted sapsucker	None	None	–	–
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	–
Numenius americanus	long–billed curlew	None	None	WL	–
Asio flammeus	short–eared owl	None	None	SSC	–
Asio otus	long–eared owl	None	None	SSC	–
Athene cunicularia	burrowing owl	None	None	SSC	–
Selasphorus rufus	rufous hummingbird	None	None	–	–
Empidonax traillii	willow flycatcher	None	Endangered	–	–
Animals – Crustaceans					
Branchinecta conservatio	Conservancy fairy shrimp	Endangered	None	–	–
Branchinecta longiantenna	longhorn fairy shrimp	Endangered	None	–	–
Branchinecta lynchi	vernal pool fairy shrimp	Threatened	None	–	–

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	CA Rare Plant Rank
Branchinecta mesovallensis	midvalley fairy shrimp	None	None	–	–
Linderiella occidentalis	California linderiella	None	None	–	–
Lepidurus packardi	vernal pool tadpole shrimp	Endangered	None	–	–
Animals – Fish					
Acipenser medirostris pop. 1	green sturgeon – southern DPS	Threatened	None	–	–
Acipenser transmontanus	white sturgeon	None	None	SSC	–
Archoplites interruptus	Sacramento perch	None	None	SSC	–
Lavinia exilicauda exilicauda	Sacramento hitch	None	None	SSC	–
Mylopharodon conocephalus	hardhead	None	None	SSC	
Pogonichthys macrolepidotus	Sacramento splittail	None	None	SSC	
Hysterocarpus traskii traskii	Sacramento–San Joaquin tule perch	None	None	–	
Hypomesus transpacificus	Delta smelt	Threatened	Endangered	–	
Spirinchus thaleichthys	longfin smelt	Candidate	Threatened	–	
Thaleichthys pacificus	eulachon	Threatened	None	–	
Entosphenus tridentatus	Pacific lamprey	None	None	SSC	–
Lampetra ayresii	western river lamprey	None	None	SSC	–
Oncorhynchus kisutch pop. 4	coho salmon – central California coast ESU	Endangered	Endangered	–	–
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. 11	chinook salmon – Central Valley spring–run ESU	Threatened	Threatened	–	–
Oncorhynchus tshawytscha pop. 13	chinook salmon – Central Valley fall / late fall–run ESU	None	None	SSC	–
Oncorhynchus tshawytscha pop. 7	chinook salmon – Sacramento River winter–run ESU	Endangered	Endangered	–	–
Animals – Insects					
Andrena blennospermatis	Blennosperma vernal pool andrenid bee	None	None	–	–
Perdita scitula antiochensis	Antioch andrenid bee	None	None	–	–
Anthicus antiochensis	Antioch Dunes anthicid beetle	None	None	–	–
Bombus caliginosus	obscure bumble bee	None	None	–	–
Bombus crotchii	Crotch bumble bee	None	None	–	–
Bombus occidentalis	western bumble bee	None	None	–	–
Efferia antiochi	Antioch efferian robberfly	None	None	–	–

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	CA Rare Plant Rank
Metapogon hurdi	Hurd's metapogon robberfly	None	None	–	–
Hygrotus curvipes	curved–foot hygrotus diving beetle	None	None	–	–
Sphecodogastra antiochensis	Antioch Dunes halcitid bee	None	None	–	–
Lytta molesta	molestan blister beetle	None	None	–	–
Myrmosula pacifica	Antioch multilid wasp	None	None	–	–
Rhaphiomidas trochilus	Valley mydas fly	None	None	–	–
Danaus plexippus pop. 1	monarch – California overwintering population	Candidate	None	–	–
Euphydryas editha bayensis	Bay checkerspot butterfly	Threatened	None	–	–
Speyeria callippe callippe	callippe silverspot butterfly	Endangered	None	–	–
Apodemia mormo langei	Lange's metalmark butterfly	Endangered	None	–	–
Eucerceris ruficeps	redheaded sphecid wasp	None	None	–	–
Philanthus nasalis	Antioch specid wasp	None	None	0	–
Coelus gracilis	San Joaquin dune beetle	None	None	–	–
Idiostatus middlekauffi	Middlekauff's shieldback katydid	None	None	–	–
Animals – Mammals					
Vulpes macrotis mutica	San Joaquin kit fox	Endangered	Threatened	–	–
Microtus californicus sanpabloensis	San Pablo vole	None	None	SSC	–
Neotoma fuscipes annectens	San Francisco dusky–footed woodrat	None	None	SSC	–
Reithrodontomys raviventris	salt–marsh harvest mouse	Endangered	Endangered	FP	–
Dipodomys heermanni berkeleyensis	Berkeley kangaroo rat	None	None	–	–
Perognathus inornatus	San Joaquin pocket mouse	None	None	–	–
Nyctinomops macrotis	big free–tailed bat	None	None	SSC	–
Enhydra lutris nereis	southern sea otter	Threatened	None	FP	–
Taxidea taxus	American badger	None	None	SSC	–
Sorex vagrans halicoetes	salt–marsh wandering shrew	None	None	SSC	–
Antrozous pallidus	pallid bat	None	None	SSC	–
Corynorhinus townsendii	Townsend's big–eared bat	None	None	SSC	–
Lasionycteris noctivagans	silver–haired bat	None	None	–	–
Lasiurus blossevillii	western red bat	None	None	SSC	–
Lasiurus cinereus	hoary bat	None	None	–	–
Myotis ciliolabrum	western small–footed myotis	None	None	–	–
Myotis yumanensis	Yuma myotis	None	None	–	–

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	CA Rare Plant Rank
Animals – Mollusks					
Helminthoglypta nickliniana bridgesi	Bridges' coast range shoulderband	None	None	–	–
Pomatiopsis californica	Pacific walker	None	None	–	–
Gonidea angulata	western ridged mussel	None	None	–	–
Animals – Reptiles					
Anniella pulchra	Northern California legless lizard	None	None	SSC	–
Arizona elegans occidentalis	California glossy snake	None	None	SSC	–
Masticophis flagellum ruddocki	San Joaquin coachwhip	None	None	SSC	–
Masticophis lateralis euryxanthus	Alameda whipsnake	Threatened	Threatened	–	–
Emys marmorata	western pond turtle	None	None	SSC	–
Thamnophis gigas	giant gartersnake	Threatened	Threatened		–
Phrynosoma blainvillii	coast horned lizard	None	None	SSC	–
Community – Terrestrial					
Alkali Meadow	Alkali Meadow	None	None	–	–
Alkali Seep	Alkali Seep	None	None	–	–
Cismontane Alkali Marsh	Cismontane Alkali Marsh	None	None	–	–
Coastal and Valley Freshwater Marsh	Coastal and Valley Freshwater Marsh	None	None	–	–
Coastal Brackish Marsh	Coastal Brackish Marsh	None	None	–	–
Northern Claypan Vernal Pool	Northern Claypan Vernal Pool	None	None	–	–
Northern Coastal Salt Marsh	Northern Coastal Salt Marsh	None	None	–	–
Northern Maritime Chaparral	Northern Maritime Chaparral	None	None	–	–
Serpentine Bunchgrass	Serpentine Bunchgrass	None	None	–	–
Stabilized Interior Dunes	Stabilized Interior Dunes	None	None	–	–
Valley Needlegrass Grassland	Valley Needlegrass Grassland	None	None	–	–
Valley Sink Scrub	Valley Sink Scrub	None	None	–	–
Plants – Brophytes					
Anomobryum julaceum	slender silver moss	None	None	–	4.2
Grimmia torenii	Toren's grimmia	None	None	–	1B.3
Triquetrella californica	coastal triquetrella	None	None	–	1B.2
Plants – Vascular					
Cicuta maculata var. bolanderi	Bolander's water–hemlock	None	None	–	2B.1
Eryngium jepsonii	Jepson's coyote–thistle	None	None	–	1B.2

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	CA Rare Plant Rank
Eryngium racemosum	Delta button–celery	None	Endangered	–	1B.1
Eryngium spinosepalum	spiny–sepaled button–celery	None	None	–	1B.2
Lilaeopsis masonii	Mason's lilaeopsis	None	Rare	–	1B.1
Sanicula saxatilis	rock sanicle	None	Rare	–	1B.2
Blepharizonia plumosa	big tarplant	None	None	–	1B.1
Centromadia parryi ssp. congdonii	Congdon's tarplant	None	None	–	1B.1
Cirsium andrewsii	Franciscan thistle	None	None	–	1B.2
Eriophyllum jepsonii	Jepson's woolly sunflower	None	None	–	4.3
Helianthella castanea	Diablo helianthella	None	None	–	1B.2
Hesperevax caulescens	hogwallow starfish	None	None	–	4.2
Holocarpha macradenia	Santa Cruz tarplant	Threatened	Endangered	–	1B.1
Isocoma arguta	Carquinez goldenbush	None	None	–	1B.1
Lasthenia conjugens	Contra Costa goldfields	Endangered	None	–	1B.1
Lasthenia ferrisiae	Ferris' goldfields	None	None	–	4.2
Madia radiata	showy golden madia	None	None	–	1B.1
Microseris sylvatica	sylvan microseris	None	None	–	4.2
Monolopia gracilens	woodland woollythreads	None	None	–	1B.2
Senecio aphanactis	chaparral ragwort	None	None	–	2B.2
Symphyotrichum lentum	Suisun Marsh aster	None	None	–	1B.2
Amsinckia grandiflora	large–flowered fiddleneck	Endangered	Endangered	–	1B.1
Amsinckia lunaris	bent–flowered fiddleneck	None	None	–	1B.2
Cryptantha hooveri	Hoover's cryptantha	None	None	–	1A
Arabis blepharophylla	coast rockcress	None	None	–	4.3
Erysimum capitatum var. angustatum	Contra Costa wallflower	Endangered	Endangered	–	1B.1
Streptanthus albidus ssp. peramoenus	most beautiful jewelflower	None	None	–	1B.2
Streptanthus hispidus	Mt. Diablo jewelflower	None	None	–	1B.3
Tropidocarpum capparideum	caper–fruited tropidocarpum	None	None	–	1B.1
Campanula exigua	chaparral harebell	None	None	–	1B.2
Viburnum ellipticum	oval–leaved viburnum	None	None	–	2B.3
Spergularia macrotheca var. longistyla	long–styled sand–spurrey	None	None	–	1B.2
Atriplex cordulata var. cordulata	heartscale	None	None	–	1B.2
Atriplex coronata var. coronata	crownscale	None	None	–	4.2
Atriplex depressa	brittlescale	None	None	–	1B.2
Extriplex joaquinana	San Joaquin spearscale	None	None	–	1B.2

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	CA Rare Plant Rank
Suaeda californica	California seablite	Endangered	None	–	1B.1
Calystegia purpurata ssp. saxicola	coastal bluff morning–glory	None	None	–	1B.2
Convolvulus simulans	small–flowered morning–glory	None	None	–	4.2
Carex comosa	bristly sedge	None	None	–	2B.1
Eleocharis parvula	small spikerush	None	None	–	4.3
Arctostaphylos auriculata	Mt. Diablo manzanita	None	None	–	1B.3
Arctostaphylos manzanita ssp. laevigata	Contra Costa manzanita	None	None	–	1B.2
Arctostaphylos pallida	pallid manzanita	Threatened	Endangered	–	1B.1
Astragalus tener var. tener	alkali milk–vetch	None	None	–	1B.2
Hoita strobilina	Loma Prieta hoita	None	None	–	1B.1
Lathyrus jepsonii var. jepsonii	Delta tule pea	None	None	–	1B.2
Lupinus albifrons var. abramsii	Abrams' lupine	None	None	–	3.2
Trifolium hydrophilum	saline clover	None	None	–	1B.2
Phacelia phacelioides	Mt. Diablo phacelia	None	None	–	1B.2
Iris longipetala	coast iris	None	None	–	4.2
Juglans californica	southern California black walnut	None	None	–	4.2
Monardella antonina ssp. antonina	San Antonio Hills monardella	None	None	–	3
Scutellaria galericulata	marsh skullcap	None	None	–	2B.2
Calochortus pulchellus	Mt. Diablo fairy–lantern	None	None	–	1B.2
Calochortus umbellatus	Oakland star–tulip	None	None	–	4.2
Fritillaria agrestis	stinkbells	None	None	–	4.2
Fritillaria liliacea	fragrant fritillary	None	None	–	1B.2
Lilium rubescens	redwood lily	None	None	–	4.2
Hesperolinon breweri	Brewer's western flax	None	None	–	1B.2
Hibiscus lasiocarpos var. occidentalis	woolly rose–mallow	None	None	–	1B.2
Malacothamnus hallii	Hall's bush–mallow	None	None	–	1B.2
Calandrinia breweri	Brewer's calandrinia	None	None	–	4.2
Oenothera deltoides ssp. howellii	Antioch Dunes evening–primrose	Endangered	Endangered	–	1B.1
Piperia michaelii	Michael's rein orchid	None	None	–	4.2
Castilleja ambigua var. ambigua	johnny–nip	None	None	–	4.2
Chloropyron molle ssp. molle	soft salty bird's–beak	Endangered	Rare	–	1B.2
Cordylanthus nidularius	Mt. Diablo bird's–beak	None	Rare	–	1B.1

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	CA Rare Plant Rank
Eschscholzia rhombipetala	diamond–petaled California poppy	None	None	–	1B.1
Meconella oregana	Oregon meconella	None	None	–	1B.1
Puccinellia simplex	California alkali grass	None	None	–	1B.2
Collomia diversifolia	serpentine collomia	None	None	–	4.3
Eriastrum ertterae	Lime Ridge eriastrum	None	Candidate Endangered	–	1B.1
Gilia millefoliata	dark–eyed gilia	None	None	–	1B.2
Leptosiphon ambiguus	serpentine leptosiphon	None	None	–	4.2
Leptosiphon grandiflorus	large–flowered leptosiphon	None	None	–	4.2
Navarretia gowenii	Lime Ridge navarretia	None	None	–	1B.1
Navarretia heterandra	Tehama navarretia	None	None	–	4.3
Navarretia nigelliformis ssp. radians	shining navarretia	None	None	–	1B.2
Eriogonum nudum var. psychicola	Antioch Dunes buckwheat	None	None	–	1B.1
Eriogonum truncatum	Mt. Diablo buckwheat	None	None	–	1B.1
Eriogonum umbellatum var. bahiiforme	bay buckwheat	None	None	–	4.2
Polygonum marinense	Marin knotweed	None	None	–	3.1
Potamogeton zosteriformis	eel–grass pondweed	None	None	–	2B.2
Stuckenia filiformis ssp. alpina	northern slender pondweed	None	None	–	2B.2
Androsace elongata ssp. acuta	California androsace	None	None	–	4.2
Delphinium californicum ssp. interius	Hospital Canyon larkspur	None	None	–	1B.2
Delphinium recurvatum	recurved larkspur	None	None	–	1B.2
Myosurus minimus ssp. apus	little mousetail	None	None	–	3.1
Ranunculus lobbii	Lobb's aquatic buttercup	None	None	–	4.2
Galium andrewsii ssp. gatense	phlox–leaf serpentine bedstraw	None	None	–	4.2
Limosella australis	Delta mudwort	None	None	–	2B.1
Dirca occidentalis	western leatherwood	None	None	–	1B.2

Sources: California Natural Diversity Database BIOS Viewer Tool

Federal Status

Endangered: The classification provided to an animal or plant in danger of extinction within the foreseeable future throughout all or a significant portion of its range.

Threatened: The classification provided to an animal or plant which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Proposed Endangered: The classification provided to an animal or plant that is proposed for federal listing as Endangered in the Federal Register under Section 4 of the Endangered Species Act.

Proposed Threatened: The classification provided to an animal or plant that is proposed for federal listing as Threatened in the Federal Register under Section 4 of the Endangered Species Act.

Candidate: The classification provided to an animal or plant that has been studied by the United States Fish and Wildlife Service, and the Service has concluded that it should be proposed for addition to the Federal Endangered and Threatened species list.
None: The plant or animal has no federal status.
Delisted: The plant or animal was previously listed as Endangered or Threatened, but is no longer listed on the Federal Endangered and Threatened species list.

CDFW Status

FP: Fully Protected: This classification was the State of California's initial effort to identify and provide additional protection to those animals that were rare or faced possible extinction.
SSC: Species of Special Concern: To this end, the Department has designated certain vertebrate species as "Species of Special Concern" because declining population levels, limited ranges, and/or continuing threats have made them vulnerable to extinction. The goal of designating species as "Species of Special Concern" is to halt or reverse their decline by calling attention to their plight and addressing the issues of concern early enough to secure their long–term viability.
WL: Watch List: Species that were previously designated as "Species of Special Concern" but no longer merit that status, or which do not yet meet SSC criteria, but for which there is concern and a need for additional information to clarify status.

CA Rare Plant 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

Table E–2 Special Status Species in EBRPD Areas of Contra Costa County

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	CA Rare Plant Rank
Animals – Amphibians					
Ambystoma californiense pop. 1	California tiger salamander – central California DPS	Threatened	Threatened	WL	–
Rana boylii	foothill yellow–legged frog	None	Endangered	SSC	–
Rana draytonii	California red–legged frog	Threatened	None	SSC	–
Spea hammondii	western spadefoot	None	None	SSC	–
Animals – Arachnids					
Microcina leei	Lee's micro–blind harvestman	None	None	–	–
Microcina lumi	Lum's micro–blind harvestman	None	None	–	–
Animals – Birds					
Accipiter cooperii	Cooper's hawk	None	None	WL	–
Accipiter striatus	sharp–shinned hawk	None	None	WL	–
Aquila chrysaetos	golden eagle	None	None	FP WL	–
Buteo regalis	ferruginous hawk	None	None	WL	–
Buteo swainsoni	Swainson's hawk	None	Threatened	–	–
Circus hudsonius	northern harrier	None	None	SSC	–
Elanus leucurus	white–tailed kite	None	None	FP	–
Haliaeetus leucocephalus	bald eagle	Delisted	Endangered	FP	–
Eremophila alpestris actia	California horned lark	None	None	WL	–
Chaetura vauxi	Vaux's swift	None	None	SSC	–
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	–	–
Cardinalis cardinalis	northern cardinal	None	None	WL	–
Charadrius nivosus nivosus	western snowy plover	Threatened	None	SSC	–
Pica nuttalli	yellow–billed magpie	None	None	–	–
Falco columbarius	merlin	None	None	WL	–
Falco mexicanus	prairie falcon	None	None	WL	–
Falco peregrinus anatum	American peregrine falcon	Delisted	Delisted	FP	–
Spinus lawrencei	Lawrence's goldfinch	None	None	–	–
Riparia riparia	bank swallow	None	Threatened	–	–
Agelaius tricolor	tricolored blackbird	None	Threatened	SSC	–

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	CA Rare Plant Rank
Icteria virens	yellow–breasted chat	None	None	SSC	–
Lanius ludovicianus	loggerhead shrike	None	None	SSC	–
Hydroprogne caspia	Caspian tern	None	None	–	–
Larus californicus	California gull	None	None	WL	–
Rynchops niger	black skimmer	None	None	SSC	–
Sternula antillarum browni	California least tern	Endangered	Endangered	FP	–
Thalasseus elegans	elegant tern	None	None	WL	–
Geothlypis trichas sinuosa	saltmarsh common yellowthroat	None	None	SSC	–
Setophaga petechia	yellow warbler	None	None	SSC	–
Aimophila ruficeps canescens	southern California rufous–crowned sparrow	None	None	WL	–
Ammodramus savannarum	grasshopper sparrow	None	None	SSC	–
Artemisiospiza belli belli	Bell's sage sparrow	None	None	WL	–
Melospiza melodia pusillula	Alameda song sparrow	None	None	SSC	–
Melospiza melodia samuelis	San Pablo song sparrow	None	None	SSC	–
Passerculus sandwichensis alaudinus	Bryant's savannah sparrow	None	None	SSC	–
Pooecetes gramineus affinis	Oregon vesper sparrow	None	None	SSC	–
Pelecanus occidentalis californicus	California brown pelican	Delisted	Delisted	FP	–
Nannopterum auritum	double–crested cormorant	None	None	WL	–
Melanerpes lewis	Lewis' woodpecker	None	None	–	–
Sphyrapicus ruber	red–breasted sapsucker	None	None	–	–
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	–
Numenius americanus	long–billed curlew	None	None	WL	–
Asio flammeus	short–eared owl	None	None	SSC	–
Asio otus	long–eared owl	None	None	SSC	–
Athene cunicularia	burrowing owl	None	None	SSC	–
Plegadis chihi	white–faced ibis	None	None	WL	–
Selasphorus rufus	rufous hummingbird	None	None	–	–
Animals – Crustaceans					
Calasellus californicus	An isopod	None	None	–	–
Branchinecta conservatio	Conservancy fairy shrimp	Endangered	None	–	–
Branchinecta longiantenna	longhorn fairy shrimp	Endangered	None	–	–

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	CA Rare Plant Rank
Branchinecta lynchi	vernal pool fairy shrimp	Threatened	None	–	–
Linderiella occidentalis	California linderiella	None	None	–	–
Lepidurus packardi	vernal pool tadpole shrimp	Endangered	None	–	–
Animals – Fish					
Acipenser medirostris pop. 1	green sturgeon – southern DPS	Threatened	None	–	–
Acipenser transmontanus	white sturgeon	None	None	SSC	–
Archoplites interruptus	Sacramento perch	None	None	SSC	–
Hesperoleucus venustus subditus	southern coastal roach	None	None	SSC	–
Lavinia exilicauda exilicauda	Sacramento hitch	None	None	SSC	–
Mylopharodon conocephalus	hardhead	None	None	SSC	–
Pogonichthys macrolepidotus	Sacramento splittail	None	None	SSC	–
Hysterocarpus traskii traskii	Sacramento–San Joaquin tule perch	None	None	–	–
Gasterosteus aculeatus microcephalus	resident threespine stickleback	None	None	–	–
Eucyclogobius newberryi	tidewater goby	Endangered	None	–	–
Hypomesus transpacificus	Delta smelt	Threatened	Endangered	–	–
Spirinchus thaleichthys	longfin smelt	Candidate	Threatened	–	–
Entosphenus tridentatus	Pacific lamprey	None	None	SSC	–
Oncorhynchus kisutch pop. 4	coho salmon – central California coast ESU	Endangered	Endangered	–	–
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. 11	chinook salmon – Central Valley spring–run ESU	Threatened	Threatened	–	–
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 crotchii	Crotch bumble bee	None	None	–	–
Bombus occidentalis	western bumble bee	None	None	–	–
Ischnura gemina	San Francisco forktail damselfly	None	None	–	–
Hygrotus curvipes	curved–foot hygrotus diving beetle	None	None	–	–
Icaricia icarioides missionensis	Mission blue butterfly	Endangered	None	–	–

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	CA Rare Plant Rank
Danaus plexippus pop. 1	monarch – California overwintering population	Candidate	None	–	–
Euphydryas editha bayensis	Bay checkerspot butterfly	Threatened	None	–	–
Speyeria callippe callippe	callippe silverspot butterfly	Endangered	None	–	–
Animals – Mammals					
Vulpes macrotis mutica	San Joaquin kit fox	Endangered	Threatened	–	–
Neotoma fuscipes annectens	San Francisco dusky–footed woodrat	None	None	SSC	–
Reithrodontomys raviventris	salt–marsh harvest mouse	Endangered	Endangered	FP	–
Dipodomys heermanni berkeleyensis	Berkeley kangaroo rat	None	None	–	–
Perognathus inornatus	San Joaquin pocket mouse	None	None	–	–
Eumops perotis californicus	western mastiff bat	None	None	SSC	–
Nyctinomops macrotis	big free–tailed bat	None	None	SSC	–
Enhydra lutris nereis	southern sea otter	Threatened	None	FP	–
Taxidea taxus	American badger	None	None	SSC	–
Sorex vagrans halicoetes	salt–marsh wandering shrew	None	None	SSC	–
Sorex vagrans paludivagus	Monterey vagrant shrew	None	None	–	–
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	–
Lasionycteris noctivagans	silver–haired bat	None	None	–	–
Lasiurus blossevillii	western red bat	None	None	–	–
Lasiurus cinereus	hoary bat	None	None	–	–
Myotis yumanensis	Yuma myotis	None	None	–	–
Vulpes macrotis mutica	San Joaquin kit fox	Endangered	Threatened	–	–
Animals – Mollusks					
Helminthoglypta nickliniana bridgesi	Bridges' coast range shoulderband	None	None	–	–
Tryonia imitator	mimic tryonia (=California brackishwater snail)	None	None	–	–
Pomatiopsis californica	Pacific walker	None	None	–	–
Anodonta californiensis	California floater	None	None	–	–
Gonidea angulata	western ridged mussel	None	None	–	–
Animals – Reptiles					
Anniella pulchra	Northern California legless lizard	None	None	SSC	–
Arizona elegans occidentalis	California glossy snake	None	None	SSC	–

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	CA Rare Plant Rank
Masticophis flagellum ruddocki	San Joaquin coachwhip	None	None	SSC	–
Masticophis lateralis euryxanthus	Alameda whipsnake	Threatened	Threatened	–	–
Emys marmorata	western pond turtle	None	None	SSC	–
Phrynosoma blainvillii	coast horned lizard	None	None	SSC	–
Community – Terrestrial					
–	Northern Claypan Vernal Pool	None	None	–	–
–	Northern Coastal Salt Marsh	None	None	–	–
–	Northern Maritime Chaparral	None	None	–	–
–	Serpentine Bunchgrass	None	None	–	–
–	Sycamore Alluvial Woodland	None	None	–	–
–	Valley Needlegrass Grassland	None	None	–	–
–	Valley Sink Scrub	None	None	–	–
Plants – Brophytes					
Fissidens pauperculus	minute pocket moss	None	None	–	1B.2
Plants – Vascular					
Chlorogalum pomeridianum var. minus	dwarf soaproot	None	None	–	1B.2
Allium sharsmithiae	Sharsmith's onion	None	None	–	1B.3
Eryngium aristulatum var. hooveri	Hoover's button–celery	None	None	–	1B.1
Eryngium jepsonii	Jepson's coyote–thistle	None	None	–	1B.2
Lilaeopsis masonii	Mason's lilaeopsis	None	Rare	–	1B.1
Sanicula maritima	adobe sanicle	None	Rare	–	1B.1
Balsamorhiza macrolepis	big–scale balsamroot	None	None	–	1B.2
Blepharizonia plumosa	big tarplant	None	None	–	1B.1
Centromadia parryi ssp. congdonii	Congdon's tarplant	None	None	–	1B.1
Cirsium fontinale var. campylon	Mt. Hamilton thistle	None	None	–	1B.2
Deinandra bacigalupii	Livermore tarplant	None	Endangered	–	1B.1
Eriophyllum jepsonii	Jepson's woolly sunflower	None	None	–	4.3
Helianthella castanea	Diablo helianthella	None	None	–	1B.2
Hesperevax caulescens	hogwallow starfish	None	None	–	4.2
Holocarpha macradenia	Santa Cruz tarplant	Threatened	Endangered	–	1B.1
Lasthenia conjugens	Contra Costa goldfields	Endangered	None	–	1B.1
Lasthenia ferrisiae	Ferris' goldfields	None	None	–	4.2
Leptosyne hamiltonii	Mt. Hamilton coreopsis	None	None	–	1B.2
Lessingia hololeuca	woolly–headed lessingia	None	None	–	3

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	CA Rare Plant Rank
Lessingia tenuis	spring lessingia	None	None	–	4.3
Microseris sylvatica	sylvan microseris	None	None	–	4.2
Monolopia gracilens	woodland woollythreads	None	None	–	1B.2
Senecio aphanactis	chaparral ragwort	None	None	–	2B.2
Amsinckia grandiflora	large–flowered fiddleneck	Endangered	Endangered	–	1B.1
Amsinckia lunaris	bent–flowered fiddleneck	None	None	–	1B.2
Plagiobothrys chorisianus var. chorisianus	Choris' popcornflower	None	None	–	1B.2
Plagiobothrys diffusus	San Francisco popcornflower	None	Endangered	–	1B.1
Plagiobothrys glaber	hairless popcornflower	None	None	–	1A
Caulanthus lemmonii	Lemmon's jewelflower	None	None	–	1B.2
Streptanthus albidus ssp. peramoenus	most beautiful jewelflower	None	None	–	1B.2
Tropidocarpum capparideum	caper–fruited tropidocarpum	None	None	–	1B.1
Campanula exigua	chaparral harebell	None	None	–	1B.2
Legenere limosa	legenere	None	None	–	1B.1
Viburnum ellipticum	oval–leaved viburnum	None	None	–	2B.3
Spergularia macrotheca var. longistyla	long–styled sand–spurrey	None	None	–	1B.2
Atriplex cordulata var. cordulata	heartscale	None	None	–	1B.2
Atriplex coronata var. coronata	crownscale	None	None	–	4.2
Atriplex depressa	brittlescale	None	None	–	1B.2
Atriplex minuscula	lesser saltscale	None	None	–	1B.1
Extriplex joaquinana	San Joaquin spearscale	None	None	–	1B.2
Suaeda californica	California seablite	Endangered	None	–	1B.1
Convolvulus simulans	small–flowered morning–glory	None	None	–	4.2
Eleocharis parvula	small spikerush	None	None	–	4.3
Arctostaphylos pallida	pallid manzanita	Threatened	Endangered	–	1B.1
Astragalus tener var. tener	alkali milk–vetch	None	None	–	1B.2
Hoita strobilina	Loma Prieta hoita	None	None	–	1B.1
Trifolium hydrophilum	saline clover	None	None	–	1B.2
Iris longipetala	coast iris	None	None	–	4.2
Juglans californica	southern California black walnut	None	None	–	4.2
Acanthomintha lanceolata	Santa Clara thorn–mint	None	None	–	4.2
Calochortus pulchellus	Mt. Diablo fairy–lantern	None	None	–	1B.2
Calochortus umbellatus	Oakland star–tulip	None	None	–	4.2
Fritillaria agrestis	stinkbells	None	None	–	4.2

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	CA Rare Plant Rank
Fritillaria falcata	talus fritillary	None	None	–	1B.2
Fritillaria liliacea	fragrant fritillary	None	None	–	1B.2
Hesperolinon breweri	Brewer's western flax	None	None	–	1B.2
Clarkia breweri	Brewer's clarkia	None	None	–	4.2
Clarkia concinna ssp. automixa	Santa Clara red ribbons	None	None	–	4.3
Clarkia franciscana	Presidio clarkia	Endangered	Endangered	–	1B.1
Piperia michaelii	Michael's rein orchid	None	None	–	4.2
Castilleja ambigua var. ambigua	johnny–nip	None	None	–	4.2
Chloropyron maritimum ssp. palustre	Point Reyes salty bird's–beak	None	None	–	1B.2
Chloropyron molle ssp. hispidum	hispid salty bird's–beak	None	None	–	1B.1
Chloropyron palmatum	palmate–bracted bird's–beak	Endangered	Endangered	–	1B.1
Eschscholzia rhombipetala	diamond–petaled California poppy	None	None	–	1B.1
Erythranthe laciniata	cut–leaved monkeyflower	None	None	–	4.3
Puccinellia simplex	California alkali grass	None	None	–	1B.2
Gilia millefoliata	dark–eyed gilia	None	None	–	1B.2
Leptosiphon acicularis	bristly leptosiphon	None	None	–	4.2
Leptosiphon ambiguus	serpentine leptosiphon	None	None	–	4.2
Leptosiphon grandiflorus	large–flowered leptosiphon	None	None	–	4.2
Navarretia nigelliformis ssp. radians	shining navarretia	None	None	–	1B.2
Navarretia prostrata	prostrate vernal pool navarretia	None	None	–	1B.2
Polemonium carneum	Oregon polemonium	None	None	–	2B.2
Chorizanthe cuspidata var. cuspidata	San Francisco Bay spineflower	None	None	–	1B.2
Chorizanthe robusta var. robusta	robust spineflower	Endangered	None	–	1B.1
Eriogonum luteolum var. caninum	Tiburon buckwheat	None	None	–	1B.2
Eriogonum umbellatum var. bahiiforme	bay buckwheat	None	None	–	4.2
Polygonum marinense	Marin knotweed	None	None	–	3.1
Stuckenia filiformis ssp. alpina	northern slender pondweed	None	None	–	2B.2
Androsace elongata ssp. acuta	California androsace	None	None	–	4.2
Aspidotis carlotta–halliae	Carlotta Hall's lace fern	None	None	–	4.2
Delphinium californicum ssp. interius	Hospital Canyon larkspur	None	None	–	1B.2
Delphinium recurvatum	recurved larkspur	None	None	–	1B.2

Scientific Name	Common Name	Federal Status	State Status	CDFW Status	CA Rare Plant Rank
Ranunculus lobbii	Lobb's aquatic buttercup	None	None	–	4.2
Horkelia cuneata var. sericea	Kellogg's horkelia	None	None	–	1B.1
Galium andrewsii ssp. gatense	phlox–leaf serpentine bedstraw	None	None	–	4.2
Dirca occidentalis	western leatherwood	None	None	–	1B.2

Sources: California Natural Diversity Database BIOS Viewer Tool

Federal Status

Endangered: The classification provided to an animal or plant in danger of extinction within the foreseeable future throughout all or a significant portion of its range.

Threatened: The classification provided to an animal or plant which is likely to become an endangered species within the foreseeable future throughout all or a significant portion of its range.

Proposed Endangered: The classification provided to an animal or plant that is proposed for federal listing as Endangered in the Federal Register under Section 4 of the Endangered Species Act.

Proposed Threatened: The classification provided to an animal or plant that is proposed for federal listing as Threatened in the Federal Register under Section 4 of the Endangered Species Act.

Candidate: The classification provided to an animal or plant that has been studied by the United States Fish and Wildlife Service, and the Service has concluded that it should be proposed for addition to the Federal Endangered and Threatened species list.

None: The plant or animal has no federal status.

Delisted: The plant or animal was previously listed as Endangered or Threatened, but is no longer listed on the Federal Endangered and Threatened species list.

CDFW Status

FP: Fully Protected: This classification was the State of California's initial effort to identify and provide additional protection to those animals that were rare or faced possible extinction.

SSC: Species of Special Concern: To this end, the Department has designated certain vertebrate species as "Species of Special Concern" because declining population levels, limited ranges, and/or continuing threats have made them vulnerable to extinction. The goal of designating species as "Species of Special Concern" is to halt or reverse their decline by calling attention to their plight and addressing the issues of concern early enough to secure their long–term viability.

WL: Watch List: Species that were previously designated as "Species of Special Concern" but no longer merit that status, or which do not yet meet SSC criteria, but for which there is concern and a need for additional information to clarify status.

CA Rare Plant 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

Appendix F Detailed Hazard Tables

Dam Tables

EBRPD – Extremely High Hazard Dam Inundation Areas and Affected Park District Lands and Acres Details

EBRPD/ Park Lands	Dam Classification / Dam Inundation Area	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
EBRPD – Alameda County				
Alameda Creek Trail	**Extremely High**			
	James H Turner	8	1	10.67%
	Alameda Creek Trail Total	**8**	**1**	**10.67%**
Anthony Chabot	**Extremely High**			
	New Upper San Leandro	3,349	6	0.19%
	Anthony Chabot Total	**3,349**	**6**	**0.19%**
Ardenwood Historic Farm	**Extremely High**			
	James H Turner	410	157	38.35%
	New Calaveras	410	204	49.72%
	Ardenwood Historic Farm Total	**820**	**361**	**44.03%**
Camp Arroyo	**Extremely High**			
	Del Valle	144	72	50.34%
	Camp Arroyo Total	**144**	**72**	**50.34%**
Coyote Hills	**Extremely High**			
	Del Valle	3,716	366	9.86%
	James H Turner	6,194	862	13.92%
	New Calaveras	8,380	885	10.57%
	Coyote Hills Total	**18,289**	**2,114**	**11.56%**
Del Valle	**Extremely High**			
	Del Valle	4,949	39	0.78%
	Del Valle Total	**4,949**	**39**	**0.78%**
Del Valle to Shadow Cliffs Trail	**Extremely High**			
	Del Valle	1	1	100.00%

EBRPD/ Park Lands	Dam Classification / Dam Inundation Area	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
	Del Valle to Shadow Cliffs Trail Total	**1**	**1**	**100.00%**
Hayward Shoreline	**Extremely High**			
	James H Turner	2,129	194	9.10%
	New Calaveras	2,129	124	5.83%
	Hayward Shoreline Total	**4,257**	**318**	**7.46%**
Lake Chabot	**Extremely High**			
	Chabot	1,649	1	0.06%
	New Upper San Leandro	3,299	558	16.90%
	Lake Chabot Total	**4,948**	**559**	**11.29%**
Martin Luther King Jr. Shoreline	**Extremely High**			
	Chabot	1,531	118	7.74%
	New Upper San Leandro	1,565	218	13.91%
	Martin Luther King Jr. Shoreline Total	**3,096**	**336**	**10.86%**
McLaughlin Eastshore	**Extremely High**			
	Lake Temescal	1,830	69	3.76%
	McLaughlin Eastshore Total	**1,830**	**69**	**3.76%**
Niles Canyon Trail	**Extremely High**			
	Del Valle	17	4	21.33%
	James H Turner	51	5	10.65%
	New Calaveras	51	6	11.95%
	Niles Canyon Trail Total	**120**	**15**	**12.73%**
Oyster Bay Shoreline	**Extremely High**			
	Chabot	390	3	0.87%
	New Upper San Leandro	390	7	1.70%
	Oyster Bay Shoreline Total	**779**	**10**	**1.29%**
Pleasanton Ridge	**Extremely High**			
	Del Valle	4,414	2	0.04%
	James H Turner	13,433	6	0.04%
	New Calaveras	17,847	6	0.03%

EBRPD/ Park Lands	Dam Classification / Dam Inundation Area	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
	Pleasanton Ridge Total	**35,694**	**13**	**0.04%**
Quarry Lakes	**Extremely High**			
	Del Valle	1,847	402	21.78%
	James H Turner	2,789	462	16.58%
	New Calaveras	2,789	466	16.71%
	Quarry Lakes Total	**7,425**	**1,331**	**17.92%**
SF Bay Trail (MLK to MESP)	Extremely High			
	New Upper San Leandro	44	0	0.00%
	SF Bay Trail (MLK to MESP) Total	**44**	**0**	**0.00%**
Shadow Cliffs	**Extremely High**			
	Del Valle	259	248	95.63%
	Shadow Cliffs Total	**259**	**248**	**95.63%**
Sunol	**Extremely High**			
	New Calaveras	6,825	290	4.25%
	Sunol Total	**6,825**	**290**	**4.25%**
Vargas Plateau	**Extremely High**			
	Del Valle	265	0	0.08%
	James H Turner	796	1	0.09%
	New Calaveras	796	1	0.11%
	Vargas Plateau Total	**1,857**	**2**	**0.10%**
EBRPD – Alameda County Total		**188,425**	**11,581**	**6.14%**
EBRPD - Contra Costa County				
Antioch/Oakley Shoreline	**Extremely High**			
	Mammoth Pool*	9	0	4.35%
	Shaver Lake*	26	0	1.74%
	Vermilion Valley*	26	0	1.91%
	Antioch/Oakley Shoreline Total	**60**	**1**	**2.19%**
Big Break Shoreline	**Extremely High**			
	Huntington Lake 1*	26,517	1,314	4.96%
	Mammoth Pool*	26,517	1,328	5.01%
	Marsh Creek	26,517	7	0.03%
	Shaver Lake*	26,517	1,330	5.02%

EBRPD/ Park Lands	Dam Classification / Dam Inundation Area	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
	Vermilion Valley*	26,517	1,365	5.15%
	Big Break Shoreline Total	**132,586**	**5,345**	**4.03%**
Briones to Las Trampas Trail	**Extremely High**			
	Lafayette	37	1	2.24%
	Briones to Las Trampas Trail Total	**37**	**1**	**2.24%**
Contra Loma	**Extremely High**			
	Antioch Res	681	0	0.02%
	Contra Loma Total	**681**	**0**	**0.02%**
Delta Access	**Extremely High**			
	Huntington Lake 1	6,951	8	0.11%
	Los Vaqueros	14,895	552	3.71%
	Mammoth Pool	7,944	8	0.10%
	Shaver Lake	6,951	8	0.11%
	Vermilion Valley	7,944	8	0.10%
	Delta Access Total	**44,684**	**583**	**1.31%**
Iron Horse Trail	**Extremely High**			
	Lafayette	0	0	3.04%
	Iron Horse Trail Total	**0**	**0**	**3.04%**
Kennedy Grove	**Extremely High**			
	Briones	436	38	8.78%
	San Pablo	218	30	13.63%
	Kennedy Grove Total	**654**	**68**	**10.39%**
Lafayette to Moraga Trail	**Extremely High**			
	Lafayette	19	10	52.24%
	Lafayette to Moraga Trail Total	**19**	**10**	**52.24%**
North Richmond Shoreline	**Extremely High**			
	Briones	66	20	30.94%
	San Pablo	66	20	30.72%
	North Richmond Shoreline Total	**131**	**40**	**30.83%**
Point Pinole Shoreline	**Extremely High**			
	Briones	6,608	159	2.40%
	North	2,203	5	0.22%

EBRPD/ Park Lands	Dam Classification / Dam Inundation Area	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
	San Pablo	6,608	146	2.20%
	Point Pinole Shoreline Total	**15,419**	**309**	**2.01%**
San Pablo Bay Shoreline	**Extremely High**			
	Maloney	230	0	0.00%
	San Pablo Bay Shoreline Total	**230**	**0**	**0.00%**
Sobrante Ridge	**Extremely High**			
	Briones	272	3	1.17%
	Sobrante Ridge Total	**272**	**3**	**1.17%**
Tilden	**Extremely High**			
	C L Tilden Park	1,468	30	2.07%
	Tilden Total	**1,468**	**30**	**2.07%**
Tilden (Nature Area)	**Extremely High**			
	C L Tilden Park	1,419	33	2.32%
	Tilden (Nature Area) Total	**1,419**	**33**	**2.32%**
Vasco Hills	**Extremely High**			
	Los Vaqueros	3,411	9	0.27%
	Vasco Hills Total	**3,411**	**9**	**0.27%**
Waterbird	**Extremely High**			
	Lafayette	8	0	0.48%
	Waterbird Total	**8**	**0**	**0.48%**
Wildcat Canyon	**Extremely High**			
	Briones	718	10	1.36%
	C L Tilden Park	4,760	55	1.15%
	San Pablo	359	2	0.61%
	Wildcat Canyon Total	**5,837**	**67**	**1.15%**
Wildcat Creek Trail	**Extremely High**			
	Briones	19	6	33.33%
	C L Tilden Park	6	1	8.80%
	San Pablo	12	5	39.02%
	Wildcat Creek Trail Total	**37**	**12**	**31.14%**
EBRPD – Contra Costa County Total		**207,904**	**6,533**	**3.14%**

EBRPD/ Park Lands	Dam Classification / Dam Inundation Area	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
EBRPD – Grand Total		**396,329**	**18,114**	**4.57%**

Source: CA DWR/DOD, EBRPD GIS

*indicates dam located outside Alameda or Contra Costa County which could affect EBRPD assets

EBRPD – Extremely High Hazard Dam Inundation Areas and Affected Park District Assets and Replacement Values Details

EBRPD / Park Lands	Dam Inundation Area	Asset Count	Replacement Value
EBRPD – Alameda County			
Alameda County Trails	Del Valle	1	$0
	James H Turner	3	$616,364
	New Calaveras	1	$70,770
Ardenwood	James H Turner	10	$1,601,506
	New Calaveras	39	$3,675,136
Camp Arroyo	Del Valle	12	$582,629
Coyote Hills	Del Valle	3	$259,214
	James H Turner	12	$790,813
	New Calaveras	20	$1,655,176
Lake Chabot	New Upper San Leandro	58	$10,535,188
Martin Luther King, Jr.	Chabot	1	$186,477
	New Upper San Leandro	14	$6,392,718
Pleasanton Ridge	James H Turner	2	$0
	New Calaveras	1	$0
Quarry Lakes	Del Valle	1	$0
	James H Turner	4	$520,987
	New Calaveras	5	$433,643
Shadow Cliffs	Del Valle	41	$5,441,732
Sunol / Ohlone Wilderness	New Calaveras	15	$2,827,723
Temescal	Del Valle	2	$273,961
EBRPD – Contra Costa County			
Contra Costa Trails	Lafayette	10	$5,962,914
Delta Access	Los Vaqueros	3	$165,599
East County Trails	Marsh Creek	4	$1,612,317
Kennedy Grove	Briones	9	$836,117
	San Pablo	9	$836,117
Point Pinole	Briones	6	$8,144,181
	San Pablo	4	$4,771.271

EBRPD / Park Lands	Dam Inundation Area	Asset Count	Replacement Value
Tilden	C L Tilden Park	12	$5,033,143

Source: CA DWR/DOD, EBRPD GIS

EBRPD – High Hazard Dam Inundation Areas and Affected Park District Lands and Acres Details

EBRPD/ Park Lands	Dam Classification / Dam Inundation Area	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
EBRPD – Alameda County				
Brushy Peak	**High**			
	Dyer	163	0	0.00%
	Brushy Peak Total	**163**	**0**	**0.00%**
Don Castro	**High**			
	Cull Creek	95	2	2.56%
	San Lorenzo Creek	189	5	2.73%
	Don Castro Total	**284**	**8**	**2.68%**
EBRPD – Alameda County Total		**188,425**	**11,581**	**6.14%**
EBRPD - Contra Costa County				
Castle Rock	**High**			
	Pine Creek	39	14	35.26%
	Castle Rock Total	**39**	**14**	**35.26%**
Contra Costa Canal Trail	**High**			
	Pine Creek Detention	0	0	11.23%
	Contra Costa Canal Trail Total	**0**	**0**	**11.23%**
Diablo Foothills	**High**			
	Pine Creek	910	6	0.69%
	Diablo Foothills Total	**910**	**6**	**0.69%**
EBRPD – Contra Costa County Total		**207,904**	**6,533**	**3.14%**
EBRPD – Grand Total				

Source: CA DWR/DOD, EBRPD GIS

EBRPD – High Hazard Dam Inundation Areas and Affected Park District Assets and Replacement Values Details

EBRPD / Park Lands	Dam Inundation Area	Asset Count	Replacement Value
EBRPD – Contra Costa County			
Diablo Foothills / Castle Rock	Pine Creek	11	$1,754,993
Contra Costa Trails	Pine Creek Detention	2	$443,305
East County Trails	Dry Creek	1	$875,664

Source: CA DWR/DOD, EBRPD GIS

Earthquake Tables

EBRPD – Earthquake Liquefaction Susceptibility Zones and Affected Park District Lands and Acres Details

EBRPD / Park Lands	Liquefaction Susceptibility Zone	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
EBRPD – Alameda County				
Alameda Creek Trail	High	8	8	100.00%
	Alameda Creek Trail Total	**8**	**8**	**100.00%**
Anthony Chabot	Very High	6,698	2	0.03%
	Moderate	16,746	70	0.42%
	Very Low	3,352	3,280	97.86%
	Anthony Chabot Total	**26,796**	**3,352**	**12.51%**
Ardenwood Historic Farm	High	205	205	100.00%
	Ardenwood Historic Farm Total	**205**	**205**	**100.00%**
Brushy Peak	High	2,257	32	1.41%
	Moderate	7,564	131	1.73%
	Low	325	66	20.28%
	Very Low	2,257	1,692	74.99%
	Water	163	10	6.34%
	Brushy Peak Total	**12,565**	**1,932**	**15.37%**
Camp Arroyo	Very High	575	32	5.48%
	High	288	7	2.58%
	Moderate	288	4	1.45%
	Low	575	29	5.11%
	Very Low	431	71	16.53%
	Camp Arroyo Total	**2,157**	**144**	**6.67%**
Coyote Hills	High	1,239	45	3.65%
	Moderate	4,372	810	18.52%
	Very Low	947	378	39.86%
	Water	947	6	0.66%
	Coyote Hills Total	**7,505**	**1,239**	**16.51%**
Del Valle	Very High	24,746	29	0.12%
	High	24,746	30	0.12%
	Moderate	4,949	0	0.00%
	Low	54,442	137	0.25%

EBRPD / Park Lands	Liquefaction Susceptibility Zone	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
	Very Low	9,981	3,819	38.27%
	Water	4,949	1,017	20.55%
	Del Valle Total	**123,814**	**5,032**	**4.06%**
Del Valle to Shadow Cliffs Trail	High	1	1	100.00%
	Del Valle to Shadow Cliffs Trail Total	**1**	**1**	**100.00%**
Don Castro	Very High	189	6	3.11%
	Moderate	284	2	0.82%
	Low	95	1	1.35%
	Very Low	378	69	18.14%
	Water	189	16	8.69%
	Don Castro Total	**1,135**	**95**	**8.33%**
. Hayward Shoreline	Very High	5,107	11	0.22%
	Moderate	5,610	737	13.13%
	Water	4,835	77	1.60%
	Hayward Shoreline Total	**15,552**	**825**	**5.30%**
Lake Chabot	Very High	1,649	24	1.47%
	Moderate	14,844	109	0.73%
	Low	4,948	0	0.01%
	Very Low	4,951	1,240	25.04%
	Water	3,299	278	8.44%
	Lake Chabot Total	**29,690**	**1,652**	**5.56%**
Martin Luther King Jr. Shoreline	Very High	3,836	177	4.61%
	Moderate	757	56	7.40%
	Water	21,988	73	0.33%
	Martin Luther King Jr. Shoreline Total	**26,581**	**306**	**1.15%**
McLaughlin Eastshore	Very High	12,813	269	2.10%
	Moderate	1,830	0	0.00%
	Very Low	3,661	2	0.05%
	Water	93,353	34	0.04%
	McLaughlin Eastshore Total	**111,658**	**305**	**0.27%**
Niles Canyon Trail	Very High	17	1	7.44%
	High	17	1	8.72%
	Very Low	17	14	83.84%

EBRPD / Park Lands	Liquefaction Susceptibility Zone	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
	Niles Canyon Trail Total	**51**	**17**	**33.33%**
Oyster Bay Shoreline	Very High	195	183	94.04%
	Water	584	2	0.40%
	Oyster Bay Shoreline Total	**779**	**186**	**23.81%**
Pleasanton Ridge	Moderate	53,542	110	0.21%
	Very Low	13,433	8,814	65.61%
	Pleasanton Ridge Total	**66,974**	**8,924**	**13.32%**
Quarry Lakes	Very High	2,309	49	2.14%
	High	1,403	186	13.28%
	Moderate	480	6	1.25%
	Low	462	0	0.03%
	Water	7,887	238	3.02%
	Quarry Lakes Total	**12,540**	**480**	**3.82%**
SF Bay Trail (MLK to MESP)	Very High	218	2	0.76%
	Moderate	44	1	1.47%
	Water	437	3	0.66%
	SF Bay Trail (MLK to MESP) Total	**699**	**5**	**0.74%**
Shadow Cliffs	Very High	1,814	10	0.58%
	High	1,037	30	2.92%
	Moderate	777	98	12.59%
	Very Low	259	12	4.76%
	Water	1,814	108	5.96%
	Shadow Cliffs Total	**5,701**	**259**	**4.55%**
Sunol	Very High	6,825	101	1.48%
	Moderate	86,905	163	0.19%
	Low	29,803	41	0.14%
	Very Low	21,339	6,520	30.55%
	Sunol Total	**144,872**	**6,825**	**4.71%**
Vargas Plateau	Very High	265	0	0.08%
	Moderate	2,224	1	0.06%
	Very Low	3,468	1,243	35.84%
	Vargas Plateau Total	**5,957**	**1,244**	**20.89%**

EBRPD / Park Lands	Liquefaction Susceptibility Zone	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
EBRPD – Alameda County Total	**698,373**	**55,882**	**8.00%**	**EBRPD – Alameda County Total**
EBRPD – Contra Costa County				
Alameda Point Shoreline Trail	Very High	3	3	99.94%
	Water	3	0	0.06%
	Alameda Point Shoreline Trail Total	**7**	**3**	**50.00%**
Bay Area Ridge Trail (GD to LC)	Very Low	57	57	100.00%
	Bay Area Ridge Trail (GD to LC) Total	**57**	**57**	**100.00%**
Claremont Canyon ·	Very Low	218	218	100.00%
	Claremont Canyon Total	**218**	**218**	**100.00%**
Creative Design Group Building	Moderate	0	0	
	Creative Design Group Building Total	**0**	**0**	
Crown Beach	Very High	184	93	50.75%
	Moderate	180	0	0.13%
	Water	3,426	4	0.10%
	Crown Beach Total	**3,791**	**97**	**2.57%**
Cull Canyon	Very High	362	18	4.96%
	Moderate	2,531	17	0.67%
	Low	362	0	0.12%
	Very Low	362	312	86.19%
	Water	723	15	2.04%
	Cull Canyon Total	**4,338**	**362**	**8.33%**
Doolan Canyon	High	774	29	3.78%
	Moderate	774	52	6.72%
	Very Low	2,323	693	29.83%
	Doolan Canyon Total	**3,871**	**774**	**20.00%**
Dry Creek Pioneer	Very High	1,675	1	0.04%
	Moderate	6,700	36	0.54%
	Low	3,350	5	0.16%
	Very Low	1,675	1,633	97.47%
	Dry Creek Pioneer Total	**13,401**	**1,675**	**12.50%**

EBRPD / Park Lands	Liquefaction Susceptibility Zone	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
Dublin Hills	Very Low	642	642	100.00%
	Dublin Hills Total	**642**	**642**	**100.00%**
Five Canyons	Very Low	226	226	100.00%
	Five Canyons Total	**226**	**226**	**100.00%**
Garin	Moderate	7,056	23	0.33%
	Low	2,607	1	0.03%
	Very Low	8,899	4,421	49.68%
	Water	2,607	5	0.18%
	Garin Total	**21,169**	**4,449**	**21.02%**
Helicopter Unit	Moderate	1	1	100.00%
	Helicopter Unit Total	**1**	**1**	**100.00%**
. Judge John Sutter Shoreline	Very High	33	24	74.15%
	Water	115	1	1.07%
	Judge John Sutter Shoreline Total	**148**	**25**	**17.20%**
Leona Canyon	Moderate	297	1	0.30%
	Very Low	297	296	99.70%
	Leona Canyon Total	**595**	**297**	**50.00%**
Mission Peak	Very High	3,015	1	0.04%
	Moderate	3,015	1	0.02%
	Very Low	3,015	3,013	99.95%
	Mission Peak Total	**9,044**	**3,015**	**33.33%**
Ohlone	Moderate	10,883	42	0.39%
	Very Low	23,537	9,004	38.26%
	Water	3,606	1	0.04%
	Ohlone Total	**38,026**	**9,048**	**23.79%**
Peralta Oaks Headquarters	Very Low	7	7	100.00%
	Peralta Oaks Headquarters Total	**7**	**7**	**100.00%**
Reinhardt Redwood	Very High	1,779	1	0.06%
	Moderate	3,559	30	0.83%
	Very Low	1,783	1,752	98.29%
	Reinhardt Redwood Total	**7,121**	**1,783**	**25.04%**
Roberts	Very Low	121	121	100.00%
	Roberts Total	**121**	**121**	**100.00%**

EBRPD / Park Lands	Liquefaction Susceptibility Zone	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
Skyline National Trail	Very Low	0	0	100.00%
	Skyline National Trail Total	**0**	**0**	**100.00%**
Tassajara Creek Trail	Very High	4	2	33.63%
	Moderate	9	3	33.19%
	Tassajara Creek Trail Total	**13**	**4**	**33.33%**
Temescal	Moderate	125	12	9.96%
	Low	83	3	3.04%
	Very Low	42	17	40.31%
	Water	83	10	11.87%
	Temescal Total	**333**	**42**	**12.50%**
EBRPD – Contra Costa County Total		**1,012,176**	**61,637**	**6.09%**
Grand Total		**1,710,549**	**117,519**	**6.87%**

Source: USGS/CGS, EBRPD GIS

EBRPD – Earthquake Liquefaction Susceptibility Zones and Affected Park District Assets and Replacement Values Details

EBRPD / Park Lands	Liquefaction Susceptibility Zone	Asset Count	Replacement Value
EBRPD – Alameda County			
Alameda County Trails	Very High	4	$860,417
	High	1	$627,669
	Moderate	3	$760,457
	Alameda County Trails Total	**8**	**$2,248,543**
Anthony Chabot	Moderate	2	
	Very Low	63	$14,846,086
	Anthony Chabot Total	**65**	**$14,846,086**
Ardenwood	High	45	$6,229,584
	Ardenwood Total	**45**	**$6,229,584**
Brushy Peak	Moderate	7	$0
	Very Low	5	$202,430
	Brushy Peak Total	**12**	**$202,430**
Camp Arroyo	Low	13	$2,043,985
	Very Low	21	$9,760,648
	Camp Arroyo Total	**34**	**$11,804,633**

EBRPD / Park Lands	Liquefaction Susceptibility Zone	Asset Count	Replacement Value
Claremont Canyon	Very Low	2	$0
	Claremont Canyon Total	**2**	**$0**
Coyote Hills	Moderate	17	$1,451,822
	Very Low	15	$2,169,778
	Water	1	$34,853
	Coyote Hills Total	**33**	**$3,656,453**
Crown Beach	Very High	25	$11,274,573
	Water	4	$1,658,771
	Crown Beach Total	**29**	**$12,933,344**
Cull Canyon	Moderate	2	$659,067
	Very Low	11	$2,122,151
	Water	2	$328,374
	Cull Canyon Total	**15**	**$3,109,592**
Del Valle	High	1	$239,584
	Low	19	$3,458,774
	Very Low	13	$4,175,689
	Water	40	$15,744,092
	Del Valle Total	**73**	**$23,618,139**
Don Castro	Very Low	12	$3,025,921
	Water	3	$110,363
	Don Castro Total	**15**	**$3,136,284**
Dublin Hills	Very Low	1	$204,384
	Dublin Hills Total	**1**	**$204,384**
Garin/Dry Creek Pioneer	Moderate	23	$4,585,780
	Low	2	$182,129
	Very Low	17	$1,247,193
	Water	1	$164,187
	Garin/Dry Creek Pioneer Total	**43**	**$6,179,289**
Hayward Shoreline	Moderate	13	$2,082,349
	Water	4	$1,045,881
	Hayward Shoreline Total	**17**	**$3,128,230**
Judge John Sutter	Very High	8	$8,677,540
	Water	1	$9,229,449
	Judge John Sutter Total	**9**	**$17,906,989**
Lake Chabot	Very High	12	$932,920
	Moderate	7	$6,142,359

EBRPD / Park Lands	Liquefaction Susceptibility Zone	Asset Count	Replacement Value
	Very Low	58	$12,400,528
	Water	12	$548,279
	Lake Chabot Total	**89**	**$20,024,086**
Martin Luther King, Jr.	Very High	23	$9,898,642
	Moderate	3	$869,459
	Water	3	$1,559,996
	Martin Luther King, Jr. Total	**29**	**$12,328,097**
McLaughlin Eastshore	Very High	3	$4,909,320
	Very Low	1	$0
	McLaughlin Eastshore Total	**4**	**$4,909,320**
Mission Peak	Very Low	9	$1,752,489
	Mission Peak Total	**9**	**$1,752,489**
Peralta Oaks	Very Low	2	$11,713,395
	Peralta Oaks Total	**2**	**$11,713,395**
Peralta Oaks North	Very Low	1	$0
	Peralta Oaks North Total	**1**	**$0**
Pleasanton Ridge	Moderate	3	$77,375
	Very Low	13	$3,377,072
	Pleasanton Ridge Total	**16**	**$3,454,447**
Quarry Lakes	Very High	11	$2,217,699
	High	10	$1,119,931
	Water	1	$778,793
	Quarry Lakes Total	**22**	**$4,116,423**
Reinhardt Redwood	Very High	2	$395,506
	Moderate	9	$558,089
	Very Low	23	$6,923,427
	Reinhardt Redwood Total	**34**	**$7,877,022**
Roberts	Very Low	22	$3,210,116
	Roberts Total	**22**	**$3,210,116**
Shadow Cliffs	Moderate	36	$4,612,065
	Water	5	$829,667
	Shadow Cliffs Total	**41**	**$5,441,732**
Sunol / Ohlone Wilderness	Very High	1	$492,647
	Moderate	19	$1,903,333
	Very Low	22	$1,233,425
	Sunol / Ohlone Wilderness Total	**42**	**$3,629,405**

EBRPD / Park Lands	Liquefaction Susceptibility Zone	Asset Count	Replacement Value
Temescal	Moderate	14	$1,381,620
	Low	2	
	Very Low	11	$2,814,912
	Water	3	$346,384
	Temescal Total	**30**	**$4,542,916**
Vargas Plateau	Very Low	4	$689,836
	Vargas Plateau Total	**4**	**$689,836**
EBRPD – Alameda County Total		**746**	**$192,893,264**
EBRPD – Contra Costa County			
Antioch/Oakley	Very High	6	$201,585
	Water	1	$1,027,411
	Antioch/Oakley Total	**7**	**$1,228,996**
Bay Point	Moderate	2	$547,945
	Low	4	$155,882
	Bay Point Total	**6**	**$703,827**
Big Break	High	2	$13,381
	Moderate	9	$2,672,026
	Water	1	$864,730
	Big Break Total	**12**	**$3,550,137**
Black Diamond Mines	Very High	8	$0
	Moderate	47	$1,285,185
	Low	1	$0
	Very Low	22	$3,784,306
	Black Diamond Mines Total	**78**	**$5,069,491**
Briones	Moderate	2	$410,468
	Very Low	19	$1,310,176
	Briones Total	**21**	**$1,720,644**
Brooks Island	Water	5	$771,617
	Brooks Island Total	**5**	**$771,617**
Byron Vernal Pools	Low	2	$0
	Very Low	2	$0
	Byron Vernal Pools Total	**4**	**$0**
Carquinez Strait	Moderate	2	$917,015
	Very Low	8	$1,411,602
	Water	1	$1,199,799
	Carquinez Strait Total	**11**	**$3,528,416**

EBRPD / Park Lands	Liquefaction Susceptibility Zone	Asset Count	Replacement Value
Clayton Ranch	Low	1	$0
	Very Low	2	$29,075
	Clayton Ranch Total	**3**	**$29,075**
Contra Costa Trails	Very High	10	$2,633,602
	Moderate	18	$11,441,052
	Low	6	$914,522
	Very Low	10	$1,908,596
	Contra Costa Trails Total	**44**	**$16,897,772**
Contra Loma	Very Low	22	$8,198,819
	Water	6	$463,665
	Contra Loma Total	**28**	**$8,662,484**
Crockett Hills	Moderate	3	$0
	Very Low	4	$361,370
	Crockett Hills Total	**7**	**$361,370**
Deer Valley	Very High	3	$0
	Low	13	$475,361
	Very Low	2	$145,704
	Deer Valley Total	**18**	**$621,065**
Delta Access	High	5	$319,237
	Water	1	$17,993
	Delta Access Total	**6**	**$337,230**
Diablo Foothills / Castle Rock	Very High	4	$325,195
	Low	9	$1,657,420
	Very Low	1	$295,537
	Diablo Foothills / Castle Rock Total	**14**	**$2,278,152**
East County Trails	Very High	3	$2,211,052
	Moderate	6	$1,886,328
	Low	7	$3,119,007
	East County Trails Total	**16**	**$7,216,387**
Huckleberry	Very Low	1	$0
	Huckleberry Total	**1**	**$0**
Kennedy Grove	Moderate	3	$260,068
	Low	4	$551,837
	Very Low	2	$24,212
	Kennedy Grove Total	**9**	**$836,117**
Las Trampas	Moderate	24	$4,791,482

EBRPD / Park Lands	Liquefaction Susceptibility Zone	Asset Count	Replacement Value
	Low	1	$1,272,092
	Very Low	15	$3,123,216
	Las Trampas Total	**40**	**$9,186,790**
McLaughlin Eastshore	Very High	2	$0
	Water	1	$0
	McLaughlin Eastshore Total	**3**	**$0**
Miller/Knox	Very High	8	$2,742,364
	Moderate	5	$442,863
	Very Low	7	$1,232,917
	Water	2	$1,563,241
	Miller/Knox Total	**22**	**$5,981,385**
Morgan Territory	Very Low	16	$401,128
	Morgan Territory Total	**16**	**$401,128**
Point Isabel	Very High	5	$718,293
	Water	1	$0
	Point Isabel Total	**6**	**$718,293**
Point Pinole	Very High	6	$6,119,149
	Moderate	5	$6,764,037
	Low	16	$2,651,384
	Very Low	1	$1,313,496
	Water	1	$4,886,086
	Point Pinole Total	**29**	**$21,734,152**
Radke Martinez	Very High	11	$1,326,045
	Moderate	3	$1,603,560
	Water	2	$1,264,240
	Radke Martinez Total	**16**	**$4,193,845**
Reinhardt Redwood	Very Low	8	$554,428
	Reinhardt Redwood Total	**8**	**$554,428**
Roberts	Very Low	6	$1,180,080
	Roberts Total	**6**	**$1,180,080**
Round Valley	Very High	1	$985,122
	High	15	$1,436,055
	Low	1	$0
	Very Low	1	$0
	Round Valley Total	**18**	**$2,421,177**
Sibley	Very Low	8	$2,414,572

EBRPD / Park Lands	Liquefaction Susceptibility Zone	Asset Count	Replacement Value
	Sibley Total	**8**	**$2,414,572**
Sycamore Valley	Very High	1	$0
	Very Low	1	$191,007
	Sycamore Valley Total	**2**	**$191,007**
Thurgood Marshall, Home of the Port Chicago 50	Low	1	$0
	Very Low	1	$0
	Thurgood Marshall, Home of the Port Chicago 50 Total	**2**	**$0**
Tilden	Very High	1	$143,255
	Moderate	13	$3,596,085
	Low	3	$162,322
	Very Low	125	$21,121,354
	Tilden Total	**142**	**$25,023,016**
Vasco Caves	Very Low	6	$92,991
	Vasco Caves Total	**6**	**$92,991**
Vasco Hills	High	4	$0
	Low	21	$5,411,015
	Very Low	2	$0
	Vasco Hills Total	**27**	**$5,411,015**
Waterbird	Very Low	2	$89,303
	Waterbird Total	**2**	**$89,303**
Wildcat Canyon	Very Low	12	$4,243,890
	Wildcat Canyon Total	**12**	**$4,243,890**
EBRPD – Contra Costa County Total		**655**	**$137,649,852**
EBRPD – Grand Total		**1,401**	**$330,543,116**

Source: USGS/CGS, EBRPD GIS

Flood Tables

EBRPD – DFIRM Flood Zones and Affected Park District Lands and Acres Details

EBRPD / Park Lands	Flood Zone	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
EBRPD – Alameda County				
Alameda Creek Trail	**1% Annual Chance Flood Hazard**			
	Zone A	7.87	3.01	38.19%
	Zone AE	7.87	2.33	29.63%
	Alameda Creek Trail Total	**15.74**	**5.34**	**33.91%**
Brushy Peak	**0.2% Annual Chance Flood Hazard**			
	Zone X (shaded)	162.64	0.27	0.17%
	Brushy Peak Total	**162.64**	**0.27**	**0.17%**
Camp Arroyo	**1% Annual Chance Flood Hazard**			
	Zone AE	4,027.05	2.87	0.07%
	Zone AE Floodway	287.65	21.18	7.36%
	Total 1%	**4,314.7**	**24.05**	**7.43%**
	0.2% Annual Chance Flood Hazard			
	Zone X (shaded)	5,177.63	2.37	0.05%
	0.2% Total	**5,177.63**	**2.37**	**0.05%**
	Camp Arroyo Total	**9,492.33**	**26.42**	**0.28%**
Coyote Hills	**1% Annual Chance Flood Hazard**			
	Zone A	2,185.85	2.57	0.12%
	Zone AE	4,663.32	124.36	2.67%
	Coyote Hills Total	**6,849.17**	**126.93**	**1.85%**
Del Valle	**1% Annual Chance Flood Hazard**			
	Zone AE	24,746.17	1.91	0.01%
	Zone AE Floodway	4,949.23	1.51	0.03%
	1% Total	**29,695.4**	**3.42**	**0.04%**
	0.2% Annual Chance Flood Hazard			
	Zone X (shaded)	54,441.58	0.39	0.00%
	0.2% Total	**54,441.58**	**0.39**	**0.00%**
	Del Valle Total	**84,136.98**	**3.81**	**0.00%**
Don Castro	**1% Annual Chance Flood Hazard**			
	Zone A	94.60	1.58	1.67%
	Zone AE	94.60	19.09	20.18%
	Don Castro Total	**189.19**	**20.67**	**10.93%**

EBRPD / Park Lands	Flood Zone	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
Hayward Shoreline	**1% Annual Chance Flood Hazard**			
	Zone AE	9,578.82	813.27	8.49%
	Zone VE	3,102.29	203.23	6.55%
	1% Total	**12,681.11**	**1016.5**	**15.04%**
	0.2% Annual Chance Flood Hazard			
	Zone X (shaded)	3,391.03	0.95	0.03%
	0.2% Total	**3,391.03**	**0.95**	**0.03%**
	Hayward Shoreline Total	**16,072.13**	**1,017.45**	**6.33%**
Martin Luther King Jr. Shoreline	**1% Annual Chance Flood Hazard**			
	Zone AE	1,547.93	670.81	43.34%
	1% Total	**1,547.93**	**670.81**	**43.34%**
	0.2% Annual Chance Flood Hazard			
	Zone X (shaded)	9,892.45	82.90	0.84%
	0.2% Total	**9,892.45**	**82.90**	**0.84%**
	Martin Luther King Jr. Shoreline Total	**11,440.38**	**753.71**	**6.59%**
McLaughlin Eastshore	**1% Annual Chance Flood Hazard**			
	Zone AE	25,626.42	414.93	1.62%
	Zone VE	16,474.13	389.46	2.36%
	1% Total	**16,474.13**	**389.46**	**2.36%**
	0.2% Annual Chance Flood Hazard			
	Zone X (shaded)	27,456.88	48.51	0.18%
	0.2% Total	**27,456.88**	**48.51**	**0.18%**
	McLaughlin Eastshore Total	**69,557.44**	**852.90**	**1.23%**
Niles Canyon Trail	**1% Annual Chance Flood Hazard**			
	Zone A	17.16	0.83	4.82%
	Niles Canyon Trail Total	**17.16**	**0.83**	**4.82%**
Oyster Bay Shoreline	**1% Annual Chance Flood Hazard**			
	Zone AE	389.52	2.65	0.68%
	Zone VE	584.28	8.14	1.39%
	1% Total	**584.28**	**8.14**	**1.39%**
	0.2% Annual Chance Flood Hazard			
	Zone X (shaded)	194.76	0.02	0.01%
	0.2% Total	**194.76**	**0.02**	**0.01%**
	Oyster Bay Shoreline Total	**1,168.57**	**10.81**	**0.92%**

EBRPD / Park Lands	Flood Zone	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
Pleasanton Ridge	**0.2% Annual Chance Flood Hazard**			
	Zone X (shaded)	8,828.58	9.17	0.10%
	Pleasanton Ridge Total	**8,828.58**	**9.17**	**0.10%**
Quarry Lakes	**1% Annual Chance Flood Hazard**			
	Zone A	461.83	0.08	0.02%
	Quarry Lakes Total	**461.83**	**0.08**	**0.02%**
SF Bay Trail (MLK to MESP)	**1% Annual Chance Flood Hazard**			
	Zone AE	131.09	42.00	32.04%
	1% Total	**131.09**	**42.00**	**32.04%**
	0.2% Annual Chance Flood Hazard			
	Zone X (shaded)	218.48	0.60	0.28%
	0.2% Total	**218.48**	**0.60**	**0.28%**
	SF Bay Trail (MLK to MESP) Total	**349.57**	**42.60**	**12.19%**
Shadow Cliffs	**1% Annual Chance Flood Hazard**			
	Zone A	1,554.95	129.21	8.31%
	Zone AE Floodway	259.16	0.21	0.08%
	Shadow Cliffs Total	**1,814.11**	**129.42**	**7.13%**
Vargas Plateau	**0.2% Annual Chance Flood Hazard**			
	Zone X (shaded)	979.15	0.09	0.01%
	Vargas Plateau Total	**979.15**	**0.09**	**0.01%**
Alameda Point Shoreline Trail	**1% Annual Chance Flood Hazard**			
	Zone VE	3.27	0.51	15.48%
	1% Total	**3.27**	**0.51**	**15.48%**
	0.2% Annual Chance Flood Hazard			
	Zone X (shaded)	3.27	0.13	4.07%
	0.2% Total	**3.27**	**0.13**	**4.07%**
	Alameda Point Shoreline Trail Total	**6.53**	**0.64**	**9.78%**
Crown Beach	**1% Annual Chance Flood Hazard**			
	Zone AE	1,622.90	69.38	4.27%
	Zone VE	180.32	52.87	29.32%
	1% Total	**1,803.22**	**122.25**	**33.59%**
	0.2% Annual Chance Flood Hazard			
	Zone X (shaded)	1,266.12	19.56	1.54%
	0.2% Total	**1,266.12**	**19.56**	**1.54%**
	Crown Beach Total	**3,069.34**	**141.81**	**4.62%**

EBRPD / Park Lands	Flood Zone	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
Dry Creek Pioneer	**1% Annual Chance Flood Hazard**			
	Zone AE	1,675.11	0.00	0.00%
	Dry Creek Pioneer Total	**1,675.11**	**0.00**	**0.00%**
Judge John Sutter Shoreline	**1% Annual Chance Flood Hazard**			
	Zone AE	65.23	15.88	24.35%
	Zone VE	20.63	8.73	42.30%
	1% Total	**85.86**	**24.61**	**66.65%**
	0.2% Annual Chance Flood Hazard			
	Zone X (shaded)	85.86	5.32	6.20%
	0.2% Total	**85.86**	**5.32**	**6.20%**
	Judge John Sutter Shoreline Total	**171.73**	**29.94**	**17.43%**
SF Bay Trail	**1% Annual Chance Flood Hazard**			
	Zone AE	1.02	0.03	2.48%
	SF Bay Trail Total	**1.02**	**0.03**	**2.48%**
Tassajara Creek Trail	**1% Annual Chance Flood Hazard**			
	Zone AE Floodway	4.50	0.90	19.97%
	Tassajara Creek Trail Total	**4.50**	**0.90**	**19.97%**
Temescal	**1% Annual Chance Flood Hazard**			
	Zone AE	41.64	20.14	48.37%
	Temescal Total	**41.64**	**20.14**	**48.37%**
EBRPD 1% Alameda County Total		**508,404**	**3,024**	**0.59%**
EBRPD 0.2% Alameda County Total		**508,404**	**170**	**0.03%**
EBRPD – Contra Costa County				
Antioch/Oakley Shoreline	**1% Annual Chance Flood Hazard**			
	Zone AE	25.68	3.29	12.80%
	Antioch/Oakley Shoreline Total	**25.68**	**3.29**	**12.80%**
Big Break Shoreline	**1% Annual Chance Flood Hazard**			
	Zone AE	4,971.98	1,648.67	33.16%
	Zone AE Floodway	1,657.33	1.30	0.08%
	Big Break Shoreline Total	**6,629.31**	**1,649.97**	**24.89%**
Briones to Las Trampas Trail	**1% Annual Chance Flood Hazard**			
	Zone AE	37.46	0.00	0.00%
	Zone AE Floodway	37.46	0.60	1.61%
	0.2% Total	**74.92**	**0.6**	**1.61%**

EBRPD / Park Lands	Flood Zone	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
	0.2% Annual Chance Flood Hazard			
	Zone X (shaded)	37.46	0.16	0.43%
	1% Total	**37.46**	**0.16**	**0.43%**
	Briones to Las Trampas Trail Total	**112.38**	**0.76**	**0.68%**
Castle Rock	**1% Annual Chance Flood Hazard**			
	Zone A	39.34	9.65	24.53%
	Castle Rock Total	**39.34**	**9.65**	**24.53%**
Delta Access	**1% Annual Chance Flood Hazard**			
	Zone AE	2,978.92	842.88	28.29%
	Delta Access Total	**2,978.92**	**842.88**	**28.29%**
Diablo Foothills	**1% Annual Chance Flood Hazard**			
	Zone A	1,867.34	18.29	0.98%
	Diablo Foothills Total	**1,867.34**	**18.29**	**0.98%**
Kennedy Grove	**1% Annual Chance Flood Hazard**			
	Zone A	436.18	3.41	0.78%
	Kennedy Grove Total	**436.18**	**3.41**	**0.78%**
Lafayette to Moraga Trail	**1% Annual Chance Flood Hazard**			
	Zone AE Floodway	57.72	1.84	3.18%
	1% Total	**57.72**	**1.84**	**3.18%**
	0.2% Annual Chance Flood Hazard			
	Zone X (shaded)	57.72	0.09	0.16%
	0.2% Total	**57.72**	**0.09**	**0.16%**
	Lafayette to Moraga Trail Total	**115.44**	**1.93**	**1.67%**
McLaughlin Eastshore	**1% Annual Chance Flood Hazard**			
	Zone AE	3,660.92	19.20	0.52%
	Zone VE	3,660.92	28.08	0.77%
	1% Total	**7,321.84**	**47.28**	**1.29%**
	0.2% Annual Chance Flood Hazard			
	Zone X (shaded)	7,321.84	2.78	0.04%
	0.2% Total	**7,321.84**	**2.78**	**0.04%**
	McLaughlin Eastshore Total	**14,643.67**	**50.06**	**0.34%**
North Richmond Shoreline	**1% Annual Chance Flood Hazard**			
	Zone AE	32.80	32.80	100.00%
	North Richmond Shoreline Total	**32.80**	**32.80**	**100.00%**

EBRPD / Park Lands	Flood Zone	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
Point Pinole Shoreline	**1% Annual Chance Flood Hazard**			
	Zone AE	35,244.44	510.69	1.45%
	Zone AH	2,202.78	2.22	0.10%
	Zone VE	13,216.67	460.78	3.49%
	1% Total	**50,663.89**	**973.69**	**5.04%**
	0.2% Annual Chance Flood Hazard			
	Zone X (shaded)	114,544.43	67.17	0.06%
	0.2% Total	**114,544.43**	**67.17**	**0.06%**
	Point Pinole Shoreline Total	**165,208.32**	**1,040.86**	**0.63%**
San Pablo Bay Shoreline	**1% Annual Chance Flood Hazard**			
	Zone AE	1,196.92	119.97	10.02%
	Zone AE Floodway	229.55	0.47	0.20%
	Zone AO	229.55	0.38	0.16%
	Zone VE	1,295.21	106.39	8.21%
	1% Total	**2,951.23**	**227.21**	**18.59%**
	0.2% Annual Chance Flood Hazard			
	Zone X (shaded)	1,606.88	1.96	0.12%
	0.2% Total	**1,606.88**	**1.96**	**0.12%**
	San Pablo Bay Shoreline Total	**4,558.11**	**229.17**	**5.03%**
Tilden (Nature Area)	**1% Annual Chance Flood Hazard**			
	Zone A	1,419.14	14.72	1.04%
	Tilden (Nature Area) Total	**1,419.14**	**14.72**	**1.04%**
Vasco Hills	**1% Annual Chance Flood Hazard**			
	Zone A	3,411.12	31.08	0.91%
	Vasco Hills Total	**3,411.12**	**31.08**	**0.91%**
Waterbird	**1% Annual Chance Flood Hazard**			
	Zone A	7.63	0.51	6.75%
	Zone AE	205.80	72.16	35.06%
	Waterbird Total	**213.44**	**72.67**	**34.05%**
Wildcat Canyon	**1% Annual Chance Flood Hazard**			
	Zone A	9,519.17	32.66	0.34%
	Wildcat Canyon Total	**9,519.17**	**32.66**	**0.34%**
Wildcat Creek Trail	**1% Annual Chance Flood Hazard**			
	Zone A	6.21	2.66	42.90%

EBRPD / Park Lands	Flood Zone	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
	1% Total	**6.21**	**2.66**	**42.90%**
	0.2% Annual Chance Flood Hazard			
	Zone X (shaded)	12.42	3.55	28.55%
	0.2% Total	**12.42**	**3.55**	**28.55%**
	Wildcat Creek Trail Total	**18.63**	**6.21**	**33.33%**
Bay Point Shoreline	**1% Annual Chance Flood Hazard**			
	Zone AE	1,103.28	127.88	11.59%
	Bay Point Shoreline Total	**1,103.28**	**127.88**	**11.59%**
Big Break Delta Shoreline Trail	**1% Annual Chance Flood Hazard**			
	Zone AE	8.88	0.79	8.87%
	Big Break Delta Shoreline Trail Total	**8.88**	**0.79**	**8.87%**
Black Diamond Mines	**1% Annual Chance Flood Hazard**			
	Zone A	10,756.64	37.27	0.35%
	Black Diamond Mines Total	**10,756.64**	**37.27**	**0.35%**
Briones	**1% Annual Chance Flood Hazard**			
	Zone A	5,964.04	14.70	0.25%
	Zone AE	5,964.04	0.74	0.01%
	Briones Total	**11,928.09**	**15.43**	**0.13%**
Briones to Mt Diablo Trail	**0.2% Annual Chance Flood Hazard**			
	Zone X (shaded)	6.06	0.04	0.60%
	Briones to Mt Diablo Trail Total	**6.06**	**0.04**	**0.60%**
Browns Island	**1% Annual Chance Flood Hazard**			
	Zone AE	600.48	600.42	99.99%
	Browns Island Total	**600.48**	**600.42**	**99.99%**
Byron Vernal Pools	**1% Annual Chance Flood Hazard**			
	Zone A	1,959.03	33.09	1.69%
	Zone AE	1,959.03	0.28	0.01%
	Byron Vernal Pools Total	**3,918.06**	**33.37**	**0.85%**
CA State Riding & Hiking Trail	**1% Annual Chance Flood Hazard**			
	Zone AE Floodway	50.46	0.32	0.62%
	CA State Riding & Hiking Trail Total	**50.46**	**0.32**	**0.62%**
Carquinez Strait Shoreline	**1% Annual Chance Flood Hazard**			
	Zone A	1,349.77	0.03	0.00%
	Zone AE	3,027.29	18.60	0.61%

EBRPD / Park Lands	Flood Zone	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
	Zone VE	163.87	1.33	0.81%
	Carquinez Strait Shoreline Total	**4,540.94**	**19.96**	**0.44%**
Contra Costa Trails	**1% Annual Chance Flood Hazard**			
	Zone A	2.04	1.40	68.42%
	Contra Costa Trails Total	**2.04**	**1.40**	**68.42%**
Deer Valley	**1% Annual Chance Flood Hazard**			
	Zone A	10,834.42	152.23	1.41%
	Deer Valley Total	**10,834.42**	**152.23**	**1.41%**
Delta de Anza Trail	**1% Annual Chance Flood Hazard**			
	Zone A	5.45	0.21	3.83%
	Zone AE	5.45	5.02	92.26%
	Zone AO	5.45	0.00	0.06%
	Delta de Anza Trail Total	**16.34**	**5.24**	**32.05%**
Huckleberry	**1% Annual Chance Flood Hazard**			
	Zone A	238.29	5.42	2.28%
	Huckleberry Total	**238.29**	**5.42**	**2.28%**
Las Trampas	**1% Annual Chance Flood Hazard**			
	Zone A	13,486.83	43.41	0.32%
	Las Trampas Total	**13,486.83**	**43.41**	**0.32%**
Little Hills	**1% Annual Chance Flood Hazard**			
	Zone A	36.49	12.20	33.44%
	Little Hills Total	**36.49**	**12.20**	**33.44%**
Miller/Knox Shoreline	**1% Annual Chance Flood Hazard**			
	Zone AE	954.23	7.39	0.77%
	Zone VE	954.23	93.78	9.83%
	Miller/Knox Shoreline Total	**1,908.45**	**101.17**	**5.30%**
Morgan Territory	**1% Annual Chance Flood Hazard**			
	Zone A	1,386.22	29.42	2.12%
	Morgan Territory Total	**1,386.22**	**29.42**	**2.12%**
Point Isabel Shoreline	**1% Annual Chance Flood Hazard**			
	Zone AE	190.04	8.09	4.26%
	Zone VE	38.01	0.41	1.07%
	1% Total	**228.05**	**8.5**	**5.33%**
	0.2% Annual Chance Flood Hazard			
	Zone X (shaded)	38.01	0.07	0.17%

EBRPD / Park Lands	Flood Zone	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
	0.2% Total	**38.01**	**0.07**	**0.17%**
	Point Isabel Shoreline Total	**266.06**	**8.56**	**3.22%**
Radke Martinez Shoreline	**1% Annual Chance Flood Hazard**			
	Zone AE	2,000.21	264.76	13.24%
	1% Total	**2,000.21**	**264.76**	**13.24%**
	0.2% Annual Chance Flood Hazard			
	Zone X (shaded)	2,001.68	50.74	2.53%
	0.2% Total	**2,001.68**	**50.74**	**2.53%**
	Radke Martinez Shoreline Total	**4,001.89**	**315.50**	**7.88%**
Round Valley	**1% Annual Chance Flood Hazard**			
	Zone A	5,708.17	158.85	2.78%
	Round Valley Total	**5,708.17**	**158.85**	**2.78%**
SF Bay Trail	**0.2% Annual Chance Flood Hazard**			
	Zone X (shaded)	1.02	0.36	35.22%
	SF Bay Trail Total	**1.02**	**0.36**	**35.22%**
Thurgood Marshall	**1% Annual Chance Flood Hazard**			
	Zone AE	2,543.85	0.33	0.01%
	Thurgood Marshall Total	**2,543.85**	**0.33**	**0.01%**
Vasco Caves	**1% Annual Chance Flood Hazard**			
	Zone A	719.84	7.27	1.01%
	Vasco Caves Total	**719.84**	**7.27**	**1.01%**
Brooks Island	**1% Annual Chance Flood Hazard**			
	Zone AE	756.56	0.14	0.02%
	Zone VE	756.56	172.35	22.78%
	1% Total	**1513.12**	**172.49**	**22.80%**
	0.2% Annual Chance Flood Hazard			
	Zone X (shaded)	756.56	0.46	0.06%
	0.2% Total	**756.56**	**0.46**	**0.06%**
	Brooks Island Total	**2,269.67**	**172.96**	**7.62%**
EBRPD 1% Contra Costa County Total		**57**	**38**	**66.7%**
EBRPD 0.2% Contra Costa County Total		**530,785**	**127**	**0.02%**

Source: FEMA Alameda County DFIRM 12/21/2018, Contra Costa County DFIRM 3/21/2017, EBRPD GIS

EBRPD – DFIRM Flood Zones and Affected Park District Assets and Replacement Values Details

EBRPD / Park Lands	Flood Zone	Asset Count	Replacement Value
EBRPD – Alameda County			
Alameda County Trails	1% Annual Chance Flood Hazard	4	$1,408,066
	0.2% Annual Chance Flood Hazard	1	$224,113
	Other Areas	3	$616,364
	Alameda County Trails Total	**8**	**$2,248,543**
Anthony Chabot	Other Areas	65	$14,846,086
	Anthony Chabot Total	**65**	**$14,846,086**
Ardenwood	Other Areas	45	$6,229,584
	Ardenwood Total	**45**	**$6,229,584**
Brushy Peak	Other Areas	12	$202,430
	Brushy Peak Total	**12**	**$202,430**
Camp Arroyo	Other Areas	34	$11,804,633
	Camp Arroyo Total	**34**	**$11,804,633**
Claremont Canyon	Other Areas	2	$0
	Claremont Canyon Total	**2**	**$0**
Coyote Hills	1% Annual Chance Flood Hazard	1	$69,680
	Other Areas	32	$3,586,773
	Coyote Hills Total	**33**	**$3,656,453**
Crown Beach	1% Annual Chance Flood Hazard	10	$3,247,634
	0.2% Annual Chance Flood Hazard	5	$1,425,550
	Other Areas	14	$8,260,160
	Crown Beach Total	**29**	**$12,933,344**
Cull Canyon	Other Areas	15	$3,109,592
	Cull Canyon Total	**15**	**$3,109,592**
Del Valle	Other Areas	73	$23,618,139
	Del Valle Total	**73**	**$23,618,139**
Don Castro	1% Annual Chance Flood Hazard	1	$110,363
	Other Areas	14	$3,025,921
	Don Castro Total	**15**	**$3,136,284**
Dublin Hills	Other Areas	1	$204,384
	Dublin Hills Total	**1**	**$204,384**
Garin/Dry Creek Pioneer	Other Areas	43	$6,179,289
	Garin/Dry Creek Pioneer Total	**43**	**$6,179,289**
Hayward Shoreline	1% Annual Chance Flood Hazard	16	$2,617,694

EBRPD / Park Lands	Flood Zone	Asset Count	Replacement Value
	Other Areas	1	$510,536
	Hayward Shoreline Total	**17**	**$3,128,230**
Judge John Sutter	1% Annual Chance Flood Hazard	6	$9,497,710
	0.2% Annual Chance Flood Hazard	2	$8,409,279
	Other Areas	1	$0
	Judge John Sutter Total	**9**	**$17,906,989**
Lake Chabot	Other Areas	89	$20,024,086
	Lake Chabot Total	**89**	**$20,024,086**
Martin Luther King, Jr.	1% Annual Chance Flood Hazard	9	$3,949,942
	0.2% Annual Chance Flood Hazard	11	$5,326,966
	Other Areas	9	$3,051,189
	Martin Luther King, Jr. Total	**29**	**$12,328,097**
McLaughlin Eastshore	Other Areas	4	$4,909,320
	McLaughlin Eastshore Total	**4**	**$4,909,320**
Mission Peak	Other Areas	9	$1,752,489
	Mission Peak Total	**9**	**$1,752,489**
Peralta Oaks	Other Areas	2	$11,713,395
	Peralta Oaks Total	**2**	**$11,713,395**
Peralta Oaks North	Other Areas	1	$0
	Peralta Oaks North Total	**1**	**$0**
Pleasanton Ridge	Other Areas	16	$3,454,447
	Pleasanton Ridge Total	**16**	**$3,454,447**
Quarry Lakes	Other Areas	22	$4,116,423
	Quarry Lakes Total	**22**	**$4,116,423**
Reinhardt Redwood	Other Areas	34	$7,877,022
	Reinhardt Redwood Total	**34**	**$7,877,022**
Roberts	Other Areas	22	$3,210,116
	Roberts Total	**22**	**$3,210,116**
Shadow Cliffs	1% Annual Chance Flood Hazard	28	$4,522,249
	Other Areas	13	$919,483
	Shadow Cliffs Total	**41**	**$5,441,732**
Sunol / Ohlone Wilderness	Other Areas	42	$3,629,405
	Sunol / Ohlone Wilderness Total	**42**	**$3,629,405**
Temescal	1% Annual Chance Flood Hazard	11	$1,450,982
	Other Areas	19	$3,091,934
	Temescal Total	**30**	**$4,542,916**

EBRPD / Park Lands	Flood Zone	Asset Count	Replacement Value
Vargas Plateau	Other Areas	4	$689,836
	Vargas Plateau Total	**4**	**$689,836**
EBRPD – Alameda County Total		**746**	**$192,893,264**
EBRPD – Contra Costa County			
Antioch/Oakley	1% Annual Chance Flood Hazard	5	$1,071,715
	Other Areas	2	$157,281
	Antioch/Oakley Total	**7**	**$1,228,996**
Bay Point	1% Annual Chance Flood Hazard	2	$547,945
	Other Areas	4	$155,882
	Bay Point Total	**6**	**$703,827**
Big Break	1% Annual Chance Flood Hazard	12	$3,550,137
	Big Break Total	**12**	**$3,550,137**
Black Diamond Mines	1% Annual Chance Flood Hazard	6	
	Other Areas	72	$5,069,491
	Black Diamond Mines Total	**78**	**$5,069,491**
Briones	1% Annual Chance Flood Hazard	1	$410,468
	Other Areas	20	$1,310,176
	Briones Total	**21**	**$1,720,644**
Brooks Island	1% Annual Chance Flood Hazard	3	$120,554
	Other Areas	2	$651,063
	Brooks Island Total	**5**	**$771,617**
Byron Vernal Pools	Other Areas	4	$0
	Byron Vernal Pools Total	**4**	**$0**
Carquinez Strait	1% Annual Chance Flood Hazard	1	$1,199,799
	Other Areas	10	$2,328,617
	Carquinez Strait Total	**11**	**$3,528,416**
Clayton Ranch	Other Areas	3	$29,075
	Clayton Ranch Total	**3**	**$29,075**
Contra Costa Trails	1% Annual Chance Flood Hazard	17	$13,057,856
	Other Areas	27	$3,839,916
	Contra Costa Trails Total	**44**	**$16,897,772**
Contra Loma	Other Areas	28	$8,662,484
	Contra Loma Total	**28**	**$8,662,484**
Crockett Hills	Other Areas	7	$361,370
	Crockett Hills Total	**7**	**$361,370**
Deer Valley	1% Annual Chance Flood Hazard	4	$145,704

EBRPD / Park Lands	Flood Zone	Asset Count	Replacement Value
	Other Areas	14	$475,361
	Deer Valley Total	**18**	**$621,065**
Delta Access	1% Annual Chance Flood Hazard	4	$337,230
	Other Areas	2	$0
	Delta Access Total	**6**	**$337,230**
Diablo Foothills / Castle Rock	1% Annual Chance Flood Hazard	9	$1,488,293
	Other Areas	5	$789,859
	Diablo Foothills / Castle Rock Total	**14**	**$2,278,152**
East County Trails	1% Annual Chance Flood Hazard	7	$3,385,537
	Other Areas	9	$3,830,850
	East County Trails Total	**16**	**$7,216,387**
Huckleberry	Other Areas	1	$0
	Huckleberry Total	**1**	**$0**
Kennedy Grove	Other Areas	9	$836,117
	Kennedy Grove Total	**9**	**$836,117**
Las Trampas	1% Annual Chance Flood Hazard	20	$4,017,056
	Other Areas	20	$5,169,734
	Las Trampas Total	**40**	**$9,186,790**
McLaughlin Eastshore	1% Annual Chance Flood Hazard	1	$0
	Other Areas	2	$0
	McLaughlin Eastshore Total	**3**	**$0**
Miller/Knox	1% Annual Chance Flood Hazard	2	$1,563,241
	Other Areas	20	$4,418,144
	Miller/Knox Total	**22**	**$5,981,385**
Morgan Territory	Other Areas	16	$401,128
	Morgan Territory Total	**16**	**$401,128**
Point Isabel	1% Annual Chance Flood Hazard	1	
	Other Areas	5	$718,293
	Point Isabel Total	**6**	**$718,293**
Point Pinole	1% Annual Chance Flood Hazard	5	$11,627,601
	0.2% Annual Chance Flood Hazard	2	$1,402,666
	Other Areas	22	$8,703,885
	Point Pinole Total	**29**	**$21,734,152**
Radke Martinez	1% Annual Chance Flood Hazard	11	$4,193,845
	0.2% Annual Chance Flood Hazard	5	$0
	Radke Martinez Total	**16**	**$4,193,845**

EBRPD / Park Lands	Flood Zone	Asset Count	Replacement Value
Reinhardt Redwood	Other Areas	8	$554,428
	Reinhardt Redwood Total	**8**	**$554,428**
Roberts	Other Areas	6	$1,180,080
	Roberts Total	**6**	**$1,180,080**
Round Valley	1% Annual Chance Flood Hazard	13	$1,214,616
	Other Areas	5	$1,206,561
	Round Valley Total	**18**	**$2,421,177**
Sibley	Other Areas	8	$2,414,572
	Sibley Total	**8**	**$2,414,572**
Sycamore Valley	1% Annual Chance Flood Hazard	1	
	Other Areas	1	$191,007
	Sycamore Valley Total	**2**	**$191,007**
Thurgood Marshall, Home of the Port Chicago 50	Other Areas	2	$0
	Thurgood Marshall, Home of the Port Chicago 50 Total	**2**	**$0**
Tilden	Other Areas	142	$25,023,016
	Tilden Total	**142**	**$25,023,016**
Vasco Caves	Other Areas	6	$92,991
	Vasco Caves Total	**6**	**$92,991**
Vasco Hills	Other Areas	27	$5,411,015
	Vasco Hills Total	**27**	**$5,411,015**
Waterbird	Other Areas	2	$89,303
	Waterbird Total	**2**	**$89,303**
Wildcat Canyon	1% Annual Chance Flood Hazard	1	$3,546,439
	Other Areas	11	$697,451
	Wildcat Canyon Total	**12**	**$4,243,890**
EBRPD – Contra Costa County Total		**655**	**$137,649,852**
EBRPD Grand Total		**1,401**	**$330,543,116**

Source: FEMA Alameda County DFIRM 12/21/2018, Contra Costa County DFIRM 3/21/2017, EBRPD GIS

Landslide Tables

EBRPD – Landslide Incidence and Susceptibility Areas and Affected Park District Lands and Acres Details

EBRPD / Park Lands	Landslide Susceptibility and Incidence Area	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
EBRPD – Alameda County				
Alameda Creek Trail	Low	8	8	100.0%
	Alameda Creek Trail Total	**8**	**8**	**100.0%**
Anthony Chabot	High	3,349	74	2.2%
	Moderate	3,349	3,133	93.6%
	Low	3,352	145	4.3%
	Anthony Chabot Total	**10,050**	**3,352**	**33.3%**
Ardenwood Historic Farm	Low	205	205	100.0%
	Ardenwood Historic Farm Total	**205**	**205**	**100.0%**
Brushy Peak	High	1,932	1,891	97.9%
	Moderate	1,769	41	2.3%
	Brushy Peak Total	**3,701**	**1,932**	**52.2%**
Camp Arroyo	High	144	144	100.0%
	Camp Arroyo Total	**144**	**144**	**100.0%**
Coyote Hills	Low	2,477	1,239	50.0%
	Coyote Hills Total	**2,477**	**1,239**	**50.0%**
Del Valle	High	5,032	5,032	100.0%
	Del Valle Total	**5,032**	**5,032**	**100.0%**
Del Valle to Shadow Cliffs Trail	Low	1	1	100.0%
	Del Valle to Shadow Cliffs Trail Total	**1**	**1**	**100.0%**
Don Castro	Moderate	95	95	100.0%
	Don Castro Total	**95**	**95**	**100.0%**
Hayward Shoreline	Low	1,064	1,006	94.5%
	Hayward Shoreline Total	**1,064**	**1,006**	**94.5%**
Lake Chabot	Moderate	1,652	1,576	95.4%
	Low	1,649	76	4.6%
	Lake Chabot Total	**3,301**	**1,652**	**50.0%**
Martin Luther King Jr. Shoreline	Low	1,548	417	27.0%
	Martin Luther King Jr. Shoreline Total	**1,548**	**417**	**27.0%**
McLaughlin Eastshore	Low	1,830	1,043	57.0%
	McLaughlin Eastshore Total	**1,830**	**1,043**	**57.0%**

EBRPD / Park Lands	Landslide Susceptibility and Incidence Area	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
Niles Canyon Trail	Moderate	17	17	100.0%
	Niles Canyon Trail Total	**17**	**17**	**100.0%**
Oyster Bay Shoreline	Low	195	192	98.8%
	Oyster Bay Shoreline Total	**195**	**192**	**98.8%**
Pleasanton Ridge	High	4,509	38	0.8%
	Moderate	8,924	8,886	99.6%
	Pleasanton Ridge Total	**13,433**	**8,924**	**66.4%**
Quarry Lakes	Low	480	480	100.0%
	Quarry Lakes Total	**480**	**480**	**100.0%**
SF Bay Trail (MLK to MESP)	Low	131	41	31.4%
	SF Bay Trail (MLK to MESP) Total	**131**	**41**	**31.4%**
Shadow Cliffs	Low	259	259	100.0%
	Shadow Cliffs Total	**259**	**259**	**100.0%**
Sunol	High	6,825	5,403	79.2%
	Moderate	5,961	1,210	20.3%
	Low	5,961	212	3.6%
	Sunol Total	**18,746**	**6,825**	**36.4%**
Vargas Plateau	Moderate	1,244	21	1.7%
	Low	1,244	1,223	98.3%
	Vargas Plateau Total	**2,489**	**1,244**	**50.0%**
Alameda Point Shoreline Trail	Low	3	3	94.9%
	Alameda Point Shoreline Trail Total	**3**	**3**	**94.9%**
Bay Area Ridge Trail (GD to LC)	Moderate	57	57	100.0%
	Bay Area Ridge Trail (GD to LC) Total	57	57	100.0%
Claremont Canyon	High	218	218	100.0%
	Claremont Canyon Total	**218**	**218**	**100.0%**
Creative Design Group Building	High	0	0	100.0%
	Creative Design Group Building Total	**0**	**0**	**100.0%**
Crown Beach	Low	184	173	94.2%
	Crown Beach Total	**184**	**173**	**94.2%**
Cull Canyon	Moderate	362	362	100.0%
	Cull Canyon Total	**362**	**362**	**100.0%**
Doolan Canyon	High	774	774	100.0%
	Doolan Canyon Total	**774**	**774**	**100.0%**
Dry Creek Pioneer	Moderate	1,675	338	20.2%
	Low	1,675	1,337	79.8%

EBRPD / Park Lands	Landslide Susceptibility and Incidence Area	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
	Dry Creek Pioneer Total	**3,350**	**1,675**	**50.0%**
Dublin Hills	High	642	642	100.0%
	Dublin Hills Total	**642**	**642**	**100.0%**
Five Canyons	Moderate	226	226	100.0%
	Five Canyons Total	**226**	**226**	**100.0%**
Garin	Moderate	8,899	3,822	42.9%
	Low	2,607	628	24.1%
	Garin Total	**11,506**	**4,449**	**38.7%**
Helicopter Unit	Low	1	1	100.0%
	Helicopter Unit Total	**1**	**1**	**100.0%**
Judge John Sutter Shoreline	Low	33	29	90.1%
	Judge John Sutter Shoreline Total	**33**	**29**	**90.1%**
Leona Canyon	Moderate	297	75	25.1%
	Low	297	223	74.9%
	Leona Canyon Total	**595**	**297**	**50.0%**
Mission Peak	Low	3,015	3,015	100.0%
	Mission Peak Total	**3,015**	**3,015**	**100.0%**
Ohlone	High	9,048	7,947	87.8%
	Moderate	9,048	1,100	12.2%
	Ohlone Total	**18,095**	**9,048**	**50.0%**
Peralta Oaks Headquarters	Low	7	7	100.0%
	Peralta Oaks Headquarters Total	**7**	**7**	**100.0%**
Reinhardt Redwood	High	1,779	1,540	86.6%
	Moderate	1,779	119	6.7%
	Low	1,783	123	6.9%
	Reinhardt Redwood Total	**5,342**	**1,783**	**33.4%**
Roberts	High	121	57	47.2%
	Low	121	64	52.8%
	Roberts Total	**241**	**121**	**50.0%**
Skyline National Trail	High	0	0	100.0%
	Skyline National Trail Total	**0**	**0**	**100.0%**
Tassajara Creek Trail	High	4	4	100.0%
	Tassajara Creek Trail Total	**4**	**4**	**100.0%**
Temescal	High	42	42	100.0%
	Temescal Total	**42**	**42**	**100.0%**
EBRPD – Alameda County Total		**109,905**	**57,036**	**51.9%**

EBRPD / Park Lands	Landslide Susceptibility and Incidence Area	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
EBRPD – Contra Costa County				
Antioch/Oakley Shoreline	Moderate	9	7	78.9%
	Antioch/Oakley Shoreline Total	**9**	**7**	**78.9%**
Big Break Shoreline	Moderate	1,657	2	0.1%
	Low	1,657	224	13.5%
	Big Break Shoreline Total	**3,315**	**226**	**6.8%**
Briones to Las Trampas Trail	High	37	37	100.0%
	Briones to Las Trampas Trail Total	37	37	100.0%
Castle Rock	High	39	39	100.0%
	Castle Rock Total	**39**	**39**	**100.0%**
Contra Costa Canal Trail	Low	0	0	100.0%
	Contra Costa Canal Trail Total	**0**	**0**	**100.0%**
Contra Loma	Moderate	681	681	100.0%
	Contra Loma Total	**681**	**681**	**100.0%**
Delta Access	Low	993	993	100.0%
	Delta Access Total	**993**	**993**	**100.0%**
Diablo Foothills	High	957	924	96.5%
	Moderate	910	5	0.6%
	Low	46	28	60.9%
	Diablo Foothills Total	**1,914**	**957**	**50.0%**
Iron Horse Trail	High	0	0	100.0%
	Iron Horse Trail Total	**0**	**0**	**100.0%**
Kennedy Grove	High	218	218	100.0%
	Kennedy Grove Total	**218**	**218**	**100.0%**
Lafayette to Moraga Trail	High	19	19	100.0%
	Lafayette to Moraga Trail Total	**19**	**19**	**100.0%**
North Richmond Shoreline	Low	33	28	85.9%
	North Richmond Shoreline Total	**33**	**28**	**85.9%**
Point Pinole Shoreline	High	2,203	17	0.8%
	Low	2,203	862	39.1%
	Point Pinole Shoreline Total	**4,406**	**878**	**19.9%**
San Pablo Bay Shoreline	High	279	205	73.7%
	San Pablo Bay Shoreline Total	**279**	**205**	**73.7%**
Sobrante Ridge	High	272	272	100.0%
	Sobrante Ridge Total	**272**	**272**	**100.0%**
Tilden	High	1,468	1,468	100.0%

EBRPD / Park Lands	Landslide Susceptibility and Incidence Area	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
	Tilden Total	**1,468**	**1,468**	**100.0%**
Tilden (Nature Area)	High	1,419	710	50.0%
	Tilden (Nature Area) Total	**1,419**	**710**	**50.0%**
Vasco Hills	Moderate	6,822	3,411	50.0%
	Vasco Hills Total	**6,822**	**3,411**	**50.0%**
Waterbird	Moderate	198	66	33.2%
	Low	198	132	66.8%
	Waterbird Total	**396**	**198**	**50.0%**
Wildcat Canyon	High	5,119	1,894	37.0%
	Low	2,380	845	35.5%
	Wildcat Canyon Total	**7,498**	**2,739**	**36.5%**
Wildcat Creek Trail	Low	6	6	100.0%
	Wildcat Creek Trail Total	**6**	**6**	**100.0%**
Bay Area Ridge Trail (KG to SO)	High	166	166	100.0%
	Bay Area Ridge Trail (KG to SO) Total	**166**	**166**	**100.0%**
Bay Point Shoreline	Moderate	138	127	92.3%
	Bay Point Shoreline Total	**138**	**127**	**92.3%**
Big Break Delta Shoreline Trail	Low	9	9	100.0%
	Big Break Delta Shoreline Trail Total	**9**	**9**	**100.0%**
Bishop Ranch	High	983	983	100.0%
	Bishop Ranch Total	**983**	**983**	**100.0%**
Black Diamond Mines	Moderate	6,130	6,130	100.0%
	Black Diamond Mines Total	**6,130**	**6,130**	**100.0%**
Briones	High	6,224	6,224	100.0%
	Briones Total	**6,224**	**6,224**	**100.0%**
Briones to Martinez Trail	High	0	0	100.0%
	Briones to Martinez Trail Total	**0**	**0**	**100.0%**
Briones to Mt Diablo Trail	High	6	6	100.0%
	Briones to Mt Diablo Trail Total	**6**	**6**	**100.0%**
Browns Island	(blank)	600	574	95.5%
	Browns Island Total	**600**	**574**	**95.5%**
Byron Vernal Pools	Moderate	1,959	1,959	100.0%
	Byron Vernal Pools Total	**1,959**	**1,959**	**100.0%**
CA State Riding & Hiking Trail	Moderate	151	49	32.2%
	Low	50	2	3.4%
	CA State Riding & Hiking Trail Total	**202**	**50**	**25.0%**

EBRPD / Park Lands	Landslide Susceptibility and Incidence Area	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
Calaveras Ridge Trail (LT to PR)	High	43	43	100.0%
	Calaveras Ridge Trail (LT to PR) Total	**43**	**43**	**100.0%**
Carquinez Strait Shoreline	High	1,514	128	8.5%
	Moderate	2,863	1,333	46.6%
	Carquinez Strait Shoreline Total	**4,377**	**1,462**	**33.4%**
Clayton Ranch	High	4,078	474	11.6%
	Moderate	4,078	3,603	88.4%
	Clayton Ranch Total	**8,155**	**4,078**	**50.0%**
Contra Costa Trails	Low	2	2	100.0%
	Contra Costa Trails Total	**2**	**2**	**100.0%**
Crockett Hills	High	4,229	2,115	50.0%
	Crockett Hills Total	**4,229**	**2,115**	**50.0%**
Deer Valley	Moderate	3,611	3,611	100.0%
	Deer Valley Total	**3,611**	**3,611**	**100.0%**
Delta de Anza Trail	Low	5	5	100.0%
	Delta de Anza Trail Total	**5**	**5**	**100.0%**
Huckleberry	High	238	238	100.0%
	Huckleberry Total	**238**	**238**	**100.0%**
Las Trampas	High	11,701	5,851	50.0%
	Las Trampas Total	**11,701**	**5,851**	**50.0%**
Las Trampas to Mt Diablo Trail	High	191	191	100.0%
	Las Trampas to Mt Diablo Trail Total	**191**	**191**	**100.0%**
Little Hills	High	36	36	100.0%
	Little Hills Total	**36**	**36**	**100.0%**
Miller/Knox Shoreline	Low	318	216	67.9%
	Miller/Knox Shoreline Total	**318**	**216**	**67.9%**
Morgan Territory	High	10,965	2,600	23.7%
	Moderate	5,482	2,882	52.6%
	Morgan Territory Total	**16,447**	**5,482**	**33.3%**
Point Isabel Shoreline	Low	38	31	81.1%
	Point Isabel Shoreline Total	**38**	**31**	**81.1%**
Radke Martinez Shoreline	Moderate	335	175	52.2%
	Radke Martinez Shoreline Total	**335**	**175**	**52.2%**
Rancho Pinole	High	556	556	100.0%
	Rancho Pinole Total	**556**	**556**	**100.0%**
Round Valley	Moderate	3,812	1,906	50.0%

EBRPD / Park Lands	Landslide Susceptibility and Incidence Area	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
	Round Valley Total	**3,812**	**1,906**	**50.0%**
SF Bay Trail	Moderate	1	1	67.2%
	Low	1	0	32.8%
	SF Bay Trail Total	**2**	**1**	**50.0%**
SF Bay Trail (PP to CS)	Low	0	0	100.0%
	SF Bay Trail (PP to CS) Total	**0**	**0**	**100.0%**
Sibley	High	928	928	100.0%
	Sibley Total	**928**	**928**	**100.0%**
Sycamore Valley	High	692	692	100.0%
	Sycamore Valley Total	**692**	**692**	**100.0%**
Thurgood Marshall	Moderate	2,544	1,321	51.9%
	Low	2,544	1,223	48.1%
	Thurgood Marshall Total	**5,088**	**2,544**	**50.0%**
Tilden (Botanic Garden)	High	9	9	100.0%
	Tilden (Botanic Garden) Total	**9**	**9**	**100.0%**
Vasco Caves	Moderate	1,440	720	50.0%
	Vasco Caves Total	**1,440**	**720**	**50.0%**
EBRPD – Contra Costa County Total		**108,497**	**60,215**	**55.5%**
EBRPD – Grand Total		**218,402**	**117,251**	**53.7%**

Source: USGS Landslide Data, EBRPD GIS

EBRPD – Landslide Incidence and Susceptibility Areas and Affected Park District Assets and Replacement Values Details

Park Lands	Landslide Susceptibility and Incidence Area	Asset Count	Replacement Value
EBRPD – Alameda County			
Alameda County Trails	High	4	$1,004,510
	Low	4	$1,244,033
	Alameda County Trails Total	**8**	**$2,248,543**
Anthony Chabot	High	1	$95,503
	Moderate	54	$9,981,845
	Low	10	$4,768,738
	Anthony Chabot Total	**65**	**$14,846,086**
Ardenwood	Low	45	$6,229,584
	Ardenwood Total	**45**	**$6,229,584**

Park Lands	Landslide Susceptibility and Incidence Area	Asset Count	Replacement Value
Brushy Peak	High	12	$202,430
	Brushy Peak Total	**12**	**$202,430**
Camp Arroyo	High	34	$11,804,633
	Camp Arroyo Total	**34**	**$11,804,633**
Claremont Canyon	High	2	$0
	Claremont Canyon Total	**2**	**$0**
Coyote Hills	Low	33	$3,656,453
	Coyote Hills Total	**33**	**$3,656,453**
Crown Beach	Low	29	$12,933,344
	Crown Beach Total	**29**	**$12,933,344**
Cull Canyon	Moderate	15	$3,109,592
	Cull Canyon Total	**15**	**$3,109,592**
Del Valle	High	73	$23,618,139
	Del Valle Total	**73**	**$23,618,139**
Don Castro	Moderate	15	$3,136,284
	Don Castro Total	**15**	**$3,136,284**
Dublin Hills	High	1	$204,384
	Dublin Hills Total	**1**	**$204,384**
Garin/Dry Creek Pioneer	Moderate	7	$318,085
	Low	36	$5,861,204
	Garin/Dry Creek Pioneer Total	**43**	**$6,179,289**
Hayward Shoreline	Low	17	$3,128,230
	Hayward Shoreline Total	**17**	**$3,128,230**
Judge John Sutter	Low	9	$17,906,989
	Judge John Sutter Total	**9**	**$17,906,989**
Lake Chabot	Moderate	88	$20,024,086
	Low	1	$0
	Lake Chabot Total	**89**	**$20,024,086**
Martin Luther King, Jr.	Low	29	$12,328,097
	Martin Luther King, Jr. Total	**29**	**$12,328,097**
McLaughlin Eastshore	Low	4	$4,909,320
	McLaughlin Eastshore Total	**4**	**$4,909,320**
Mission Peak	Low	9	$1,752,489
	Mission Peak Total	9	$1,752,489
Peralta Oaks	Low	2	$11,713,395
	Peralta Oaks Total	**2**	**$11,713,395**

Park Lands	Landslide Susceptibility and Incidence Area	Asset Count	Replacement Value
Peralta Oaks North	Low	1	$0
	Peralta Oaks North Total	**1**	**$0**
Pleasanton Ridge	Moderate	16	$3,454,447
	Pleasanton Ridge Total	**16**	**$3,454,447**
Quarry Lakes	Low	22	$4,116,423
	Quarry Lakes Total	**22**	**$4,116,423**
Reinhardt Redwood	High	19	$2,201,887
	Moderate	5	$825,098
	Low	10	$4,850,037
	Reinhardt Redwood Total	**34**	**$7,877,022**
Roberts	Low	22	$3,210,116
	Roberts Total	**22**	**$3,210,116**
Shadow Cliffs	Low	41	$5,441,732
	Shadow Cliffs Total	**41**	**$5,441,732**
Sunol / Ohlone Wilderness	High	42	$3,629,405
	Sunol / Ohlone Wilderness Total	**42**	**$3,629,405**
Temescal	High	28	$4,268,955
	Low	2	$273,961
	Temescal Total	**30**	**$4,542,916**
Vargas Plateau	Low	4	$689,836
	Vargas Plateau Total	**4**	**$689,836**
Alameda County Total		**746**	**$192,893,264**
Contra Costa County			
Antioch/Oakley	Moderate	7	$1,228,996
	Antioch/Oakley Total	**7**	**$1,228,996**
Bay Point	Moderate	6	$703,827
	Bay Point Total	**6**	**$703,827**
Big Break	Low	12	$3,550,137
	Big Break Total	**12**	**$3,550,137**
Black Diamond Mines	Moderate	78	$5,069,491
	Black Diamond Mines Total	**78**	**$5,069,491**
Briones	High	21	$1,720,644
	Briones Total	**21**	**$1,720,644**
Brooks Island	Low	5	$771,617
	Brooks Island Total	**5**	**$771,617**
Byron Vernal Pools	Moderate	4	$0

Park Lands	Landslide Susceptibility and Incidence Area	Asset Count	Replacement Value
	Byron Vernal Pools Total	**4**	**$0**
Carquinez Strait	High	5	$1,374,687
	Moderate	6	$2,153,729
	Carquinez Strait Total	**11**	**$3,528,416**
Clayton Ranch	High	1	$0
	Moderate	2	$29,075
	Clayton Ranch Total	**3**	**$29,075**
Contra Costa Trails	High	34	$7,405,117
	Moderate	2	$246,281
	Low	8	$9,246,374
	Contra Costa Trails Total	**44**	**$16,897,772**
Contra Loma	Moderate	28	$8,662,484
	Contra Loma Total	**28**	**$8,662,484**
Crockett Hills	High	7	$361,370
	Crockett Hills Total	**7**	**$361,370**
Deer Valley	Moderate	18	$621,065
	Deer Valley Total	**18**	**$621,065**
Delta Access	Low	6	$337,230
	Delta Access Total	**6**	**$337,230**
Diablo Foothills / Castle Rock	High	14	$2,278,152
	Diablo Foothills / Castle Rock Total	**14**	**$2,278,152**
East County Trails	Moderate	10	$5,346,477
	Low	6	$1,869,910
	East County Trails Total	**16**	**$7,216,387**
Huckleberry	High	1	$0
	Huckleberry Total	**1**	**$0**
Kennedy Grove	High	9	$836,117
	Kennedy Grove Total	9	$836,117
Las Trampas	High	40	$9,186,790
	Las Trampas Total	**40**	**$9,186,790**
McLaughlin Eastshore	Low	3	$0
	McLaughlin Eastshore Total	**3**	**$0**
Miller/Knox	Low	22	$5,981,385
	Miller/Knox Total	**22**	**$5,981,385**
Morgan Territory	High	13	$216,016
	Moderate	3	$185,112

Park Lands	Landslide Susceptibility and Incidence Area	Asset Count	Replacement Value
	Morgan Territory Total	**16**	**$401,128**
Point Isabel	Low	6	$718,293
	Point Isabel Total	**6**	**$718,293**
Point Pinole	High	3	$6,020,190
	Low	26	$15,713,962
	Point Pinole Total	**29**	**$21,734,152**
Radke Martinez	Moderate	16	$4,193,845
	Radke Martinez Total	**16**	**$4,193,845**
Reinhardt Redwood	High	8	$554,428
	Reinhardt Redwood Total	**8**	**$554,428**
Roberts	High	6	$1,180,080
	Roberts Total	**6**	**$1,180,080**
Round Valley	Moderate	18	$2,421,177
	Round Valley Total	**18**	**$2,421,177**
Sibley	High	8	$2,414,572
	Sibley Total	**8**	**$2,414,572**
Sycamore Valley	High	2	$191,007
	Sycamore Valley Total	**2**	**$191,007**
Thurgood Marshall, Home of the Port Chicago 50	Moderate	1	$0
	Low	1	$0
	Thurgood Marshall, Home of the Port Chicago 50 Total	**2**	**$0**
Tilden	High	142	$25,023,016
	Tilden Total	**142**	**$25,023,016**
Vasco Caves	Moderate	6	$92,991
	Vasco Caves Total	**6**	**$92,991**
Vasco Hills	Moderate	27	$5,411,015
	Vasco Hills Total	**27**	**$5,411,015**
Waterbird	Moderate	2	$89,303
	Waterbird Total	**2**	**$89,303**
Wildcat Canyon	Low	12	$4,243,890
	Wildcat Canyon Total	**12**	**$4,243,890**
EBRPD – Contra Costa County Total		**655**	**$137,649,852**
EBRPD Grand Total		**1,401**	**$330,543,116**

Source: USGS Landslide Data, EBRPD GIS

Sea Level Rise Tables

EBRPD – Sea Level Rise Scenarios and Affected Park District Lands and Acres Details

EBRPD / Park Lands	Sea Level Rise Scenario	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
EBRPD – Alameda County				
Alameda Creek Trail	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	8	5.2	66.5%
	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario	8	6.9	87.8%
	Alameda Creek Trail Total	**16**	**12.1**	**77.1%**
Coyote Hills	Existing Condition: 100-year (storm) scenario	947	0.0	0.0%
	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	947	0.0	0.0%
	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	947	0.1	0.0%
	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2,477	845.3	34.1%
	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario	2,477	855.3	34.5%
	Coyote Hills Total	**7,796**	**1,700.7**	**21.8%**
Hayward Shoreline	Existing Condition: 0-year (tidal) scenario	1,064	638.4	60.0%
	Existing Condition: 100-year (storm) scenario	1,353	871.9	64.4%
	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1,064	1,022.5	96.1%
	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	1,064	1,053.7	99.0%
	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	1,064	1,061.4	99.7%
	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario	1,064	1,063.6	99.9%
	Hayward Shoreline Total	**6,675**	**5,711.5**	**85.6%**
Martin Luther King Jr. Shoreline	Existing Condition: 0-year (tidal) scenario	1,548	598.0	38.6%
	Existing Condition: 100-year (storm) scenario	4,576	606.6	13.3%
	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1,548	633.0	40.9%
	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	1,548	678.3	43.8%
	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	1,548	707.4	45.7%
	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario	1,548	771.8	49.9%

EBRPD / Park Lands	Sea Level Rise Scenario	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
	Martin Luther King Jr. Shoreline Total	**12,316**	**3,995.0**	**32.4%**
McLaughlin Eastshore	Existing Condition: 0-year (tidal) scenario	1,830	1,554.5	84.9%
	Existing Condition: 100-year (storm) scenario	3,661	1,568.1	42.8%
	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1,830	1,581.9	86.4%
	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	1,830	1,634.4	89.3%
	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	1,830	1,681.7	91.9%
	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario	1,830	1,730.9	94.6%
	McLaughlin Eastshore Total	**12,813**	**9,751.5**	**76.1%**
Oyster Bay Shoreline	Existing Condition: 0-year (tidal) scenario	195	8.0	4.1%
	Existing Condition: 100-year (storm) scenario	195	7.9	4.0%
	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	195	9.0	4.6%
	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	195	8.7	4.5%
	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	195	9.8	5.0%
	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario	195	14.2	7.3%
	Oyster Bay Shoreline Total	**1,169**	**57.5**	**4.9%**
SF Bay Trail (MLK to MESP)	Existing Condition: 0-year (tidal) scenario	131	40.5	30.9%
	Existing Condition: 100-year (storm) scenario	131	40.5	30.9%
	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	131	41.4	31.6%
	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	131	40.6	31.0%
	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	131	43.3	33.0%
	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario	131	43.4	33.1%
	SF Bay Trail (MLK to MESP) Total	**787**	**249.6**	**31.7%**
Alameda Point Shoreline Trail	Existing Condition: 0-year (tidal) scenario	3	0.1	2.4%
	Existing Condition: 100-year (storm) scenario	3	0.1	3.4%
	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	3	0.8	25.1%
	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	3	0.7	21.2%

EBRPD / Park Lands	Sea Level Rise Scenario	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	3	3.1	93.7%
	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario	3	3.1	94.7%
	Alameda Point Shoreline Trail Total	**20**	**7.9**	**40.1%**
Crown Beach	Existing Condition: 0-year (tidal) scenario	180	84.8	47.0%
	Existing Condition: 100-year (storm) scenario	361	90.0	25.0%
	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	180	95.5	53.0%
	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	184	136.9	74.3%
	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	184	121.1	65.8%
	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario	184	182.5	99.1%
	Crown Beach Total	**1,274**	**710.9**	**55.8%**
Judge John Sutter Shoreline	Existing Condition: 0-year (tidal) scenario	33	7.5	23.1%
	Existing Condition: 100-year (storm) scenario	33	8.8	27.0%
	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	33	13.3	40.9%
	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	33	25.7	78.7%
	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	33	30.7	94.2%
	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario	33	32.6	99.9%
	Judge John Sutter Shoreline Total	**196**	**118.6**	**60.6%**
EBRPD – Alameda County Total		**43,060**	**22,315.4**	**51.8%**
Contra Costa County				
North Richmond Shoreline	Existing Condition: 0-year (tidal) scenario	33	26.4	80.4%
	Existing Condition: 100-year (storm) scenario	33	26.4	80.6%
	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	33	31.2	95.1%
	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	33	31.9	97.2%
	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	33	32.7	99.6%
	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario	33	32.8	100.0%
	North Richmond Shoreline Total	**197**	**181.4**	**92.1%**

EBRPD / Park Lands	Sea Level Rise Scenario	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
Point Pinole Shoreline	Existing Condition: 0-year (tidal) scenario	2,203	1,475.1	67.0%
	Existing Condition: 100-year (storm) scenario	4,406	1,517.0	34.4%
	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	2,203	1,586.4	72.0%
	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2,203	1,610.2	73.1%
	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2,203	1,645.3	74.7%
	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario	2,203	1,690.7	76.8%
	Point Pinole Shoreline Total	**15,419**	**9,524.7**	**61.8%**
San Pablo Bay Shoreline	Existing Condition: 0-year (tidal) scenario	279	203.2	72.9%
	Existing Condition: 100-year (storm) scenario	967	204.4	21.1%
	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	279	211.2	75.8%
	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	279	212.8	76.4%
	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	279	218.6	78.4%
	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario	279	224.3	80.5%
	San Pablo Bay Shoreline Total	**2,361**	**1,274.6**	**54.0%**
Waterbird	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	198	54.3	27.4%
	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	198	53.9	27.2%
	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	198	60.9	30.7%
	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario	198	60.6	30.6%
	Waterbird Total	**793**	**229.7**	**29.0%**
Wildcat Creek Trail	Existing Condition: 0-year (tidal) scenario	6	0.1	1.0%
	Existing Condition: 100-year (storm) scenario	12	0.1	0.5%
	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	6	0.1	1.0%
	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	6	0.1	1.0%
	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	6	1.7	27.6%
	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario	6	1.9	31.3%

EBRPD / Park Lands	Sea Level Rise Scenario	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
	Wildcat Creek Trail Total	**43**	**3.9**	**9.0%**
Bay Point Shoreline	Existing Condition: 0-year (tidal) scenario	138	17.7	12.9%
	Existing Condition: 100-year (storm) scenario	276	18.3	6.6%
	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	138	115.1	83.5%
	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	138	113.5	82.3%
	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	138	126.7	91.9%
	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario	138	125.5	91.0%
	Bay Point Shoreline Total	**965**	**516.8**	**53.5%**
Brooks Island	Existing Condition: 0-year (tidal) scenario	378	311.6	82.4%
	Existing Condition: 100-year (storm) scenario	378	322.6	85.3%
	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	378	325.6	86.1%
	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	378	327.4	86.6%
	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	378	329.4	87.1%
	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario	378	330.9	87.5%
	Brooks Island Total	**2,270**	**1,947.5**	**85.8%**
Browns Island	Existing Condition: 0-year (tidal) scenario	600	0.9	0.2%
	Existing Condition: 100-year (storm) scenario	600	1.0	0.2%
	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	600	5.5	0.9%
	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	600	5.5	0.9%
	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	600	5.5	0.9%
	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario	600	5.5	0.9%
	Browns Island Total	**3,603**	**23.8**	**0.7%**
Carquinez Strait Shoreline	Existing Condition: 0-year (tidal) scenario	1,514	18.7	1.2%
	Existing Condition: 100-year (storm) scenario	1,514	18.8	1.2%
	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1,514	18.7	1.2%
	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	1,514	19.3	1.3%

EBRPD / Park Lands	Sea Level Rise Scenario	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	1,514	19.2	1.3%
	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario	1,514	19.9	1.3%
	Carquinez Strait Shoreline Total	**9,082**	**114.6**	**1.3%**
Miller/Knox Shoreline	Existing Condition: 0-year (tidal) scenario	318	111.1	34.9%
	Existing Condition: 100-year (storm) scenario	318	111.6	35.1%
	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	318	112.0	35.2%
	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	318	112.4	35.3%
	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	318	120.4	37.8%
	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario	318	147.0	46.2%
	Miller/Knox Shoreline Total	**1,908**	**714.4**	**37.4%**
Point Isabel Shoreline	Existing Condition: 0-year (tidal) scenario	38	1.3	3.5%
	Existing Condition: 100-year (storm) scenario	38	2.2	5.9%
	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	38	5.1	13.3%
	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	38	9.5	24.9%
	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	38	12.2	32.1%
	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario	38	19.3	50.8%
	Point Isabel Shoreline Total	**228**	**49.6**	**21.8%**
Radke Martinez Shoreline	Existing Condition: 0-year (tidal) scenario	333	197.3	59.2%
	Existing Condition: 100-year (storm) scenario	667	213.9	32.1%
	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	333	275.2	82.5%
	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	333	275.6	82.7%
	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	335	300.8	89.8%
	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario	335	299.2	89.4%
	Radke Martinez Shoreline Total	**2,337**	**1,562.0**	**66.9%**
SF Bay Trail	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	1	0.2	23.8%

EBRPD / Park Lands	Sea Level Rise Scenario	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	1	0.8	74.0%
	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario	1	0.8	80.2%
	SF Bay Trail Total	**3**	**1.8**	**59.3%**
EBRPD – Contra Costa County Total		**39,209**	**16,144.7**	**41.2%**
EBRPD Grand Total		**82,269**	**38,460.1**	**46.7%**

Source: Cosmos, EBRPD GIS

EBRPD – Sea Level Rise Scenarios and Affected Park District Assets and Replacement Values Details

Scenario/Park Land	Asset Count	Replacement Value
Existing Condition: 0-year		
EBRPD – Alameda County		
Crown Beach	3	$1,220,939
Hayward Shoreline	5	$555,581
Judge John Sutter	1	$9,229,449
Martin Luther King, Jr.	3	$2,268,079
EBRPD – Contra Costa County		
Brooks Island	3	$120,554
Carquinez Strait	1	$1,199,799
Miller/Knox	2	$1,563,241
Point Pinole	1	$4,886,086
Existing Condition: 100-year		
EBRPD – Alameda County		
Crown Beach	3	$1,220,939
Hayward Shoreline	5	$555,581
Judge John Sutter	1	$9,229,449
Martin Luther King, Jr.	4	$2,363,786
EBRPD – Contra Costa County		
Bay Point	1	$164,842
Brooks Island	3	$120,554
Carquinez Strait	1	$1,199,799
Miller/Knox	2	$1,563,241
Point Pinole	1	$4,886,086

Scenario/Park Land	Asset Count	Replacement Value
1 Meter of Sea-level Rise: 0-year (tidal) scenario		
EBRPD – Alameda County		
Crown Beach	3	$1,220,939
Hayward Shoreline	13	$1,507,292
Judge John Sutter	1	$9,229,449
Martin Luther King, Jr.	4	$2,456,665
EBRPD – Contra Costa County		
Bay Point	2	$547,945
Brooks Island	3	$120,554
Carquinez Strait	1	$1,199,799
Miller/Knox	2	$1,563,241
Point Pinole	2	$4,978,027
Radke Martinez	9	$3,976,744
1 Meter of Sea-level Rise: 100-year (storm) scenario		
EBRPD – Alameda County		
Crown Beach	17	$7,887,804
Hayward Shoreline	16	$2,617,694
Judge John Sutter	7	$10,623,395
Martin Luther King, Jr.	10	$6,117,016
EBRPD – Contra Costa County		
Bay Point	1	$164,842
Brooks Island	3	$120,554
Carquinez Strait	1	$1,199,799
McLaughlin Eastshore	2	$0
Miller/Knox	2	$1,563,241
Point Pinole	1	$4,886,086
Radke Martinez	9	$3,976,744
2 Meter of Sea-level Rise: 0-year (tidal) scenario		
EBRPD – Alameda County		
Coyote Hills	13	$958,715
Crown Beach	12	$3,290,574
Hayward Shoreline	16	$2,617,694
Judge John Sutter	9	$17,906,989
Martin Luther King, Jr.	15	$7,374,146
EBRPD – Contra Costa County		
Bay Point	2	$547,945
Brooks Island	3	$120,554

Scenario/Park Land	Asset Count	Replacement Value
Carquinez Strait	1	$1,199,799
McLaughlin Eastshore	2	$0
Miller/Knox	2	$1,563,241
Point Pinole	4	$8,343,861
Radke Martinez	16	$4,193,845
2 Meter of Sea-level Rise: 100-year (storm) scenario		
EBRPD – Alameda County		
Coyote Hills	16	$1,486,675
Crown Beach	29	$12,933,344
Hayward Shoreline	17	$3,128,230
Judge John Sutter	9	$17,906,989
Martin Luther King, Jr.	27	$12,328,097
McLaughlin Eastshore	1	$0
EBRPD – Contra Costa County		
Bay Point	2	$547,945
Brooks Island	3	$120,554
Carquinez Strait	1	$1,199,799
McLaughlin Eastshore	3	$0
Miller/Knox	6	$1,881,191
Point Pinole	5	$9,657,357
Radke Martinez	16	$4,193,845

Source: Cosmos, EBRPD GIS

Tsunami Tables

EBRPD – Tsunami Hazard Area Coastal Evacuation Zones and Affected Park District Lands and Acres Details

EBRPD / Park Lands	Tsunami Hazard Area Coastal Evacuation Zone	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
EBRPD – Alameda County				
Alameda Creek Trail	Tsunami Coastal Evacuation Zone	8	7	88.01%
Coyote Hills	Tsunami Coastal Evacuation Zone	2,477	1,235	49.85%
Hayward Shoreline	Tsunami Coastal Evacuation Zone	1,064	1,064	100.00%
Martin Luther King Jr. Shoreline	Tsunami Coastal Evacuation Zone	1,548	774	50.00%
McLaughlin Eastshore	Tsunami Coastal Evacuation Zone	1,830	1,830	100.00%
Oyster Bay Shoreline	Tsunami Coastal Evacuation Zone	195	195	100.00%
SF Bay Trail (MLK to MESP)	Tsunami Coastal Evacuation Zone	131	44	33.33%
Alameda Point Shoreline Trail	Tsunami Coastal Evacuation Zone	3	3	100.00%
Crown Beach	Tsunami Coastal Evacuation Zone	184	183	99.53%
Judge John Sutter Shoreline	Tsunami Coastal Evacuation Zone	33	33	100.00%
EBRPD – Alameda County Total		**7,474**	**5,368**	**71.83%**
EBRPD – Contra Costa County				
North Richmond Shoreline	Tsunami Coastal Evacuation Zone	33	33	100.00%
Point Pinole Shoreline	Tsunami Coastal Evacuation Zone	4,406	1,730	39.26%
San Pablo Bay Shoreline	Tsunami Coastal Evacuation Zone	279	228	81.83%
Wildcat Creek Trail	Tsunami Coastal Evacuation Zone	6	3	47.49%
Carquinez Strait Shoreline	Tsunami Coastal Evacuation Zone	1,514	20	1.33%
Miller/Knox Shoreline	Tsunami Coastal Evacuation Zone	318	187	58.68%
Point Isabel Shoreline	Tsunami Coastal Evacuation Zone	38	38	100.00%

EBRPD / Park Lands	Tsunami Hazard Area Coastal Evacuation Zone	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
Radke Martinez Shoreline	Tsunami Coastal Evacuation Zone	333	272	81.48%
SF Bay Trail	Tsunami Coastal Evacuation Zone	1	0	4.86%
Brooks Island	Tsunami Coastal Evacuation Zone	378	378	100.00%
EBRPD – Contra Costa County Total		**7,306**	**2,888**	**39.54%**
EBRPD – Grand Total		**14,780**	**8,257**	**55.86%**

Source: CGS Tsunami Inundation Areas, EBRPD GIS

EBRPD – Tsunami Hazard Area Coastal Evacuation Zones and Affected Park District Assets and Replacement Values Details

Park Lands	Tsunami Hazard Area Coastal Evacuation Zone	Asset Count	Replacement Value
EBRPD – Alameda County			
Coyote Hills	Tsunami Coastal Evacuation Zone	29	$2,951,666
Crown Beach	Tsunami Coastal Evacuation Zone	29	$12,933,344
Hayward Shoreline	Tsunami Coastal Evacuation Zone	17	$3,128,230
Judge John Sutter	Tsunami Coastal Evacuation Zone	9	$17,906,989
Martin Luther King, Jr.	Tsunami Coastal Evacuation Zone	29	$12,328,097
McLaughlin Eastshore	Tsunami Coastal Evacuation Zone	4	$4,909,320
EBRPD –Alameda County Total		**117**	**$54,157,646.00**
EBRPD – Contra Costa County			
Brooks Island	Tsunami Coastal Evacuation Zone	5	$771,617
Carquinez Strait	Tsunami Coastal Evacuation Zone	1	$1,199,799
McLaughlin Eastshore	Tsunami Coastal Evacuation Zone	3	
Miller/Knox	Tsunami Coastal Evacuation Zone	19	$5,160,371
Point Isabel	Tsunami Coastal Evacuation Zone	6	$718,293
Point Pinole	Tsunami Coastal Evacuation Zone	6	$12,941,097
Radke Martinez	Tsunami Coastal Evacuation Zone	6	$3,792,720
EBRPD – Contra Costa County Total		**46**	**$22,612,481.00**

Source: CGS Tsunami Inundation Areas, EBRPD GIS

Wildfire Tables

EBRPD – Fire Responsibility Areas and Affected Park District Lands and Acres Details

EBRPD / Park Lands	Fire Responsibility Area	Total Park Lands (in Acres)	Park Lands in Fire Responsibility Areas (in Acres)	Percent Park Lands in Fire Responsibility Areas
EBRPD – Alameda County				
Alameda Creek Trail	LRA	8	8	100.00%
	Alameda Creek Trail Total	**8**	**8**	**100.00%**
Anthony Chabot	SRA	3,352	3,317	98.97%
	LRA	3,349	34	1.03%
	Anthony Chabot Total	**6,701**	**3,352**	**50.02%**
Ardenwood Historic Farm	LRA	205	205	100.00%
	Ardenwood Historic Farm Total	**205**	**205**	**100.00%**
Brushy Peak	SRA	1,932	1,866	96.63%
	LRA	1,932	65	3.37%
	Brushy Peak Total	**3,863**	**1,932**	**50.00%**
Camp Arroyo	SRA	144	144	100.00%
	Camp Arroyo Total	**144**	**144**	**100.00%**
Coyote Hills	LRA	2,477	1,239	50.00%
	Coyote Hills Total	**2,477**	**1,239**	**50.00%**
Del Valle	SRA	5,032	5,032	100.00%
	Del Valle Total	**5,032**	**5,032**	**100.00%**
Del Valle to Shadow Cliffs Trail	LRA	1	1	100.00%
	Del Valle to Shadow Cliffs Trail Total	**1**	**1**	**100.00%**
Don Castro	LRA	95	95	100.00%
	Don Castro Total	95	95	100.00%
Hayward Shoreline	LRA	1,064	1,064	100.00%
	Hayward Shoreline Total	**1,064**	**1,064**	**100.00%**
Lake Chabot	SRA	1,652	1,452	87.92%
	LRA	1,649	200	12.10%
	Lake Chabot Total	**3,301**	**1,652**	**50.04%**
Martin Luther King Jr. Shoreline	LRA	1,548	774	50.00%
	Martin Luther King Jr. Shoreline Total	**1,548**	**774**	**50.00%**
McLaughlin Eastshore	LRA	1,830	1,830	100.00%
	McLaughlin Eastshore Total	**1,830**	**1,830**	**100.00%**

EBRPD / Park Lands	Fire Responsibility Area	Total Park Lands (in Acres)	Park Lands in Fire Responsibility Areas (in Acres)	Percent Park Lands in Fire Responsibility Areas
Niles Canyon Trail	SRA	17	1	8.72%
	LRA	17	16	91.28%
	Niles Canyon Trail Total	**34**	**17**	**50.00%**
Oyster Bay Shoreline	LRA	195	195	100.00%
	Oyster Bay Shoreline Total	**195**	**195**	**100.00%**
Pleasanton Ridge	SRA	22,261	6,677	29.99%
	LRA	8,924	2,246	25.17%
	Pleasanton Ridge Total	**31,185**	**8,924**	**28.61%**
Quarry Lakes	LRA	480	480	100.00%
	Quarry Lakes Total	**480**	**480**	**100.00%**
SF Bay Trail (MLK to MESP)	LRA	131	44	33.33%
	SF Bay Trail (MLK to MESP) Total	**131**	**44**	**33.33%**
Shadow Cliffs	LRA	259	259	100.00%
	Shadow Cliffs Total	**259**	**259**	**100.00%**
Sunol	SRA	6,825	6,825	100.00%
	Sunol Total	**6,825**	**6,825**	**100.00%**
Vargas Plateau	SRA	979	6	0.66%
	LRA	1,244	1,238	99.48%
	Vargas Plateau Total	**2,224**	**1,244**	**55.97%**
Alameda Point Shoreline Trail	LRA	3	3	100.00%
	Alameda Point Shoreline Trail Total	**3**	**3**	**100.00%**
Bay Area Ridge Trail (GD to LC)	SRA	57	57	100.00%
	Bay Area Ridge Trail (GD to LC) Total	**57**	**57**	**100.00%**
Claremont Canyon	SRA	218	0	0.09%
	LRA	218	218	99.91%
	Claremont Canyon Total	**437**	**218**	**50.03%**
Creative Design Group Building	LRA	0	0	100.00%
	Creative Design Group Building Total	**0**	**0**	**100.00%**
Crown Beach	LRA	184	184	100.00%
	Crown Beach Total	**184**	**184**	**100.00%**
Cull Canyon	SRA	362	304	83.98%
	LRA	362	58	16.02%

EBRPD / Park Lands	Fire Responsibility Area	Total Park Lands (in Acres)	Park Lands in Fire Responsibility Areas (in Acres)	Percent Park Lands in Fire Responsibility Areas
	Cull Canyon Total	**723**	**362**	**50.00%**
Doolan Canyon	SRA	774	774	100.00%
	Doolan Canyon Total	**774**	**774**	**100.00%**
Dry Creek Pioneer	SRA	1,675	8	0.47%
	LRA	1,675	1,667	99.53%
	Dry Creek Pioneer Total	**3,350**	**1,675**	**50.00%**
Dublin Hills	SRA	642	460	71.60%
	LRA	502	182	36.36%
	Dublin Hills Total	**1,144**	**642**	**56.15%**
Five Canyons	SRA	226	171	75.47%
	LRA	226	55	24.53%
	Five Canyons Total	**452**	**226**	**50.00%**
Garin	SRA	13,348	1,471	11.02%
	LRA	8,899	2,979	33.47%
	Garin Total	**22,247**	**4,449**	**20.00%**
Helicopter Unit	LRA	1	1	100.00%
	Helicopter Unit Total	**1**	**1**	**100.00%**
Judge John Sutter Shoreline	LRA	33	33	100.00%
	Judge John Sutter Shoreline Total	**33**	**33**	**100.00%**
Leona Canyon	LRA	297	297	100.00%
	Leona Canyon Total	**297**	**297**	**100.00%**
Mission Peak	SRA	3,015	934	30.97%
	LRA	3,015	2,081	69.03%
	Mission Peak Total	**6,029**	**3,015**	**50.00%**
Ohlone	SRA	9,048	9,048	100.00%
	Ohlone Total	**9,048**	**9,048**	**100.00%**
Peralta Oaks Headquarters	LRA	7	7	100.00%
	Peralta Oaks Headquarters Total	**7**	**7**	**100.00%**
Reinhardt Redwood	SRA	1,783	1,773	99.43%
	LRA	1,779	10	0.57%
	Reinhardt Redwood Total	**3,563**	**1,783**	**50.05%**
Roberts	SRA	121	112	92.84%
	LRA	121	9	7.16%
	Roberts Total	**241**	**121**	**50.00%**

EBRPD / Park Lands	Fire Responsibility Area	Total Park Lands (in Acres)	Park Lands in Fire Responsibility Areas (in Acres)	Percent Park Lands in Fire Responsibility Areas
Skyline National Trail	LRA	0	0	100.00%
	Skyline National Trail Total	**0**	**0**	**100.00%**
Tassajara Creek Trail	LRA	4	4	100.00%
	Tassajara Creek Trail Total	**4**	**4**	**100.00%**
Temescal	LRA	42	42	100.00%
	Temescal Total	**42**	**42**	**100.00%**
EBRPD – Alameda County Total		**116,240**	**58,257**	**50.12%**
Contra Costa County				
Antioch/Oakley Shoreline	LRA	9	9	100.00%
	Antioch/Oakley Shoreline Total	**9**	**9**	**100.00%**
Big Break Shoreline	LRA	1,657	1,657	100.00%
	Big Break Shoreline Total	**1,657**	**1,657**	**100.00%**
Briones to Las Trampas Trail	LRA	37	37	100.00%
	Briones to Las Trampas Trail Total	**37**	**37**	**100.00%**
Castle Rock	SRA	39	39	100.00%
	Castle Rock Total	**39**	**39**	**100.00%**
Contra Costa Canal Trail	LRA	0	0	100.00%
	Contra Costa Canal Trail Total	**0**	**0**	**100.00%**
Contra Loma	FRA	681	681	100.00%
	SRA	681	0	0.00%
	Contra Loma Total	**1,362**	**681**	**50.00%**
Delta Access	LRA	993	993	100.00%
	Delta Access Total	**993**	**993**	**100.00%**
Diablo Foothills	SRA	957	956	99.90%
	LRA	910	1	0.10%
	Diablo Foothills Total	**1,867**	**957**	**51.24%**
Iron Horse Trail	LRA	0	0	100.00%
	Iron Horse Trail Total	**0**	**0**	**100.00%**
Kennedy Grove	SRA	218	215	98.42%
	LRA	218	3	1.58%
	Kennedy Grove Total	**436**	**218**	**50.00%**
Lafayette to Moraga Trail	LRA	19	19	100.00%
	Lafayette to Moraga Trail Total	**19**	**19**	**100.00%**
North Richmond Shoreline	LRA	33	33	100.00%

EBRPD / Park Lands	Fire Responsibility Area	Total Park Lands (in Acres)	Park Lands in Fire Responsibility Areas (in Acres)	Percent Park Lands in Fire Responsibility Areas
	North Richmond Shoreline Total	**33**	**33**	**100.00%**
Point Pinole Shoreline	LRA	2,203	2,203	100.00%
	Point Pinole Shoreline Total	**2,203**	**2,203**	**100.00%**
San Pablo Bay Shoreline	LRA	279	279	100.00%
	San Pablo Bay Shoreline Total	**279**	**279**	**100.00%**
Sobrante Ridge	SRA	272	0	0.00%
	LRA	272	272	100.00%
	Sobrante Ridge Total	**545**	**272**	**50.00%**
Tilden	SRA	1,468	1,448	98.67%
	LRA	1,468	20	1.33%
	Tilden Total	**2,935**	**1,468**	**50.00%**
Tilden (Nature Area)	SRA	1,419	632	44.54%
	LRA	1,419	77	5.46%
	Tilden (Nature Area) Total	**2,838**	**710**	**25.00%**
Vasco Hills	SRA	6,822	3,411	50.00%
	Vasco Hills Total	**6,822**	**3,411**	**50.00%**
Waterbird	LRA	198	198	100.00%
	Waterbird Total	**198**	**198**	**100.00%**
Wildcat Canyon	SRA	4,760	0	0.00%
	LRA	5,119	2,739	53.51%
	Wildcat Canyon Total	**9,878**	**2,739**	**27.73%**
Wildcat Creek Trail	LRA	6	6	100.00%
	Wildcat Creek Trail Total	**6**	**6**	**100.00%**
Bay Area Ridge Trail (KG to SO)	SRA	166	166	100.00%
	LRA	166	0	0.00%
	Bay Area Ridge Trail (KG to SO) Total	**332**	**166**	**50.00%**
Bay Point Shoreline	LRA	138	138	100.00%
	Bay Point Shoreline Total	**138**	**138**	**100.00%**
Big Break Delta Shoreline Trail	LRA	9	9	100.00%
	Big Break Delta Shoreline Trail Total	**9**	**9**	**100.00%**
Bishop Ranch	SRA	983	983	100.00%
	LRA	613	0	0.00%
	Bishop Ranch Total	**1,596**	**983**	**61.58%**
Black Diamond Mines	FRA	4,627	0	0.00%

EBRPD / Park Lands	Fire Responsibility Area	Total Park Lands (in Acres)	Park Lands in Fire Responsibility Areas (in Acres)	Percent Park Lands in Fire Responsibility Areas
	SRA	6,130	5,682	92.68%
	LRA	6,130	449	7.32%
	Black Diamond Mines Total	**16,887**	**6,130**	**36.30%**
Briones	SRA	6,224	5,716	91.84%
	LRA	6,224	508	8.16%
	Briones Total	**12,447**	**6,224**	**50.00%**
Briones to Martinez Trail	LRA	0	0	100.00%
	Briones to Martinez Trail Total	**0**	**0**	**100.00%**
Briones to Mt Diablo Trail	LRA	6	6	100.00%
	Briones to Mt Diablo Trail Total	**6**	**6**	**100.00%**
Browns Island	LRA	600	600	100.00%
	Browns Island Total	**600**	**600**	**100.00%**
Byron Vernal Pools	SRA	1,959	1,959	100.00%
	Byron Vernal Pools Total	**1,959**	**1,959**	**100.00%**
CA State Riding & Hiking Trail	SRA	50	0	0.00%
	LRA	101	50	50.00%
	CA State Riding & Hiking Trail Total	**151**	**50**	**33.33%**
Calaveras Ridge Trail (LT to PR)	LRA	43	43	100.00%
	Calaveras Ridge Trail (LT to PR) Total	**43**	**43**	**100.00%**
Carquinez Strait Shoreline	FRA	1,514	1	0.09%
	SRA	1,514	1,241	81.96%
	LRA	2,863	272	9.49%
	Carquinez Strait Shoreline Total	**5,891**	**1,514**	**25.70%**
Clayton Ranch	SRA	4,078	4,077	100.00%
	LRA	4,078	0	0.00%
	Clayton Ranch Total	**8,155**	**4,078**	**50.00%**
Contra Costa Trails	LRA	2	2	100.00%
	Contra Costa Trails Total	**2**	**2**	**100.00%**
Crockett Hills	SRA	4,229	2,115	50.00%
	Crockett Hills Total	**4,229**	**2,115**	**50.00%**
Deer Valley	SRA	3,611	2,731	75.61%
	LRA	3,611	881	24.39%
	Deer Valley Total	**7,223**	**3,611**	**50.00%**
Delta de Anza Trail	LRA	5	5	100.00%

EBRPD / Park Lands	Fire Responsibility Area	Total Park Lands (in Acres)	Park Lands in Fire Responsibility Areas (in Acres)	Percent Park Lands in Fire Responsibility Areas
	Delta de Anza Trail Total	**5**	**5**	**100.00%**
Huckleberry	SRA	238	237	99.62%
	LRA	238	1	0.38%
	Huckleberry Total	**477**	**238**	**50.00%**
Las Trampas	FRA	4,065	0	0.00%
	SRA	11,701	5,517	47.15%
	LRA	5,851	334	5.71%
	Las Trampas Total	**21,617**	**5,851**	**27.07%**
Las Trampas to Mt Diablo Trail	SRA	191	174	91.26%
	LRA	191	17	8.74%
	Las Trampas to Mt Diablo Trail Total	**382**	**191**	**50.00%**
Little Hills	SRA	36	36	100.00%
	Little Hills Total	**36**	**36**	**100.00%**
Miller/Knox Shoreline	LRA	318	318	100.00%
	Miller/Knox Shoreline Total	**318**	**318**	**100.00%**
Morgan Territory	SRA	10,965	5,482	50.00%
	Morgan Territory Total	**10,965**	**5,482**	**50.00%**
Point Isabel Shoreline	LRA	38	38	100.00%
	Point Isabel Shoreline Total	**38**	**38**	**100.00%**
Radke Martinez Shoreline	LRA	335	335	100.00%
	Radke Martinez Shoreline Total	**335**	**335**	**100.00%**
Rancho Pinole	SRA	556	556	100.00%
	Rancho Pinole Total	**556**	**556**	**100.00%**
Round Valley	SRA	3,812	1,906	50.00%
	Round Valley Total	**3,812**	**1,906**	**50.00%**
SF Bay Trail	LRA	1	1	100.00%
	SF Bay Trail Total	**1**	**1**	**100.00%**
SF Bay Trail (PP to CS)	LRA	0	0	100.00%
	SF Bay Trail (PP to CS) Total	**0**	**0**	**100.00%**
Sibley	SRA	928	867	93.50%
	LRA	928	60	6.50%
	Sibley Total	**1,856**	**928**	**50.00%**
Sycamore Valley	LRA	692	692	100.00%
	Sycamore Valley Total	**692**	**692**	**100.00%**

EBRPD / Park Lands	Fire Responsibility Area	Total Park Lands (in Acres)	Park Lands in Fire Responsibility Areas (in Acres)	Percent Park Lands in Fire Responsibility Areas
Thurgood Marshall	FRA	2,544	2,541	99.87%
	SRA	5,088	2	0.04%
	LRA	5,088	1	0.02%
	Thurgood Marshall Total	**12,719**	**2,544**	**20.00%**
Tilden (Botanic Garden)	SRA	9	9	100.00%
	Tilden (Botanic Garden) Total	**9**	**9**	**100.00%**
Vasco Caves	SRA	1,440	720	50.00%
	Vasco Caves Total	**1,440**	**720**	**50.00%**
Brooks Island	LRA	378	378	100.00%
	Brooks Island Total	**378**	**378**	**100.00%**
EBRPD – Contra Costa County Total		**147,464**	**63,787**	**43.26%**
EBRPD Grand Total		**263,704**	**122,044**	**46.28%**

Source: CAL FIRE, EBRPD GIS

EBRPD – Fire Hazard Severity Zones and Affected Park District Lands and Acres Details

EBRPD / Park Lands	Fire Hazard Severity Zone	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
EBRPD – Alameda County				
Alameda Creek Trail	Moderate	8	0	0.00%
	Non-Wildland/Non-Urban	8	0	0.01%
	Urban Unzoned	8	8	99.99%
	Alameda Creek Trail Total	**24**	**8**	**33.33%**
Anthony Chabot	Very High	6,703	2,455	36.63%
	High	3,349	896	26.75%
	Moderate	3,349	0	0.00%
	Anthony Chabot Total	**13,401**	**3,352**	**25.01%**
Ardenwood Historic Farm	High	205	48	23.43%
	Moderate	205	3	1.25%
	Non-Wildland/Non-Urban	205	72	34.99%
	Urban Unzoned	205	83	40.33%
	Ardenwood Historic Farm Total	**820**	**205**	**25.00%**

EBRPD / Park Lands	Fire Hazard Severity Zone	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
Brushy Peak	High	3,538	0	0.01%
	Moderate	2,094	1,931	92.21%
	Brushy Peak Total	**5,632**	**1,932**	**34.30%**
Camp Arroyo	High	144	81	56.26%
	Moderate	144	63	43.74%
	Camp Arroyo Total	**288**	**144**	**50.00%**
Coyote Hills	High	2,186	421	19.26%
	Non-Wildland/Non-Urban	14,790	817	5.53%
	Urban Unzoned	1,239	0	0.03%
	Coyote Hills Total	**18,215**	**1,239**	**6.80%**
Del Valle	High	5,032	3,961	78.72%
	Moderate	9,898	1,071	10.82%
	Del Valle Total	**14,931**	**5,032**	**33.70%**
Del Valle to Shadow Cliffs Trail	Moderate	3	0	0.03%
	Urban Unzoned	2	1	49.96%
	Del Valle to Shadow Cliffs Trail Total	**5**	**1**	**20.00%**
Don Castro	High	95	95	100.00%
	Don Castro Total	**95**	**95**	**100.00%**
Hayward Shoreline	High	5,520	79	1.43%
	Moderate	5,033	19	0.38%
	Non-Wildland/Non-Urban	9,488	834	8.79%
	Urban Unzoned	3,969	132	3.32%
	Hayward Shoreline Total	**24,009**	**1,064**	**4.43%**
Lake Chabot	Very High	13,197	993	7.52%
	High	13,194	344	2.61%
	Moderate	3,299	290	8.80%
	Non-Wildland/Non-Urban	3,299	25	0.76%
	Lake Chabot Total	**32,988**	**1,652**	**5.01%**
Martin Luther King Jr. Shoreline	High	17,463	127	0.73%
	Moderate	8,345	22	0.26%
	Non-Wildland/Non-Urban	25,824	522	2.02%
	Urban Unzoned	11,373	104	0.91%

EBRPD / Park Lands	Fire Hazard Severity Zone	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
	Martin Luther King Jr. Shoreline Total	**63,005**	**774**	**1.23%**
McLaughlin Eastshore	High	9,152	108	1.18%
	Moderate	10,983	20	0.18%
	Non-Wildland/Non-Urban	31,118	1,505	4.84%
	Urban Unzoned	40,270	123	0.30%
	McLaughlin Eastshore Total	**91,523**	**1,756**	**1.92%**
Niles Canyon Trail	Very High	17	1	2.94%
	High	17	17	97.06%
	Niles Canyon Trail Total	**34**	**17**	**50.00%**
Oyster Bay Shoreline	High	584	193	32.95%
	Moderate	584	2	0.32%
	Non-Wildland/Non-Urban	195	0	0.18%
	Urban Unzoned	195	0	0.01%
	Oyster Bay Shoreline Total	**1,558**	**195**	**12.50%**
Pleasanton Ridge	Very High	17,752	5,712	32.17%
	High	62,275	3,192	5.13%
	Moderate	8,829	19	0.22%
	Pleasanton Ridge Total	**88,856**	**8,924**	**10.04%**
Quarry Lakes	High	924	43	4.70%
	Moderate	462	21	4.45%
	Non-Wildland/Non-Urban	924	292	31.58%
	Urban Unzoned	480	124	25.84%
	Quarry Lakes Total	**2,789**	**480**	**17.20%**
SF Bay Trail (MLK to MESP)	Non-Wildland/Non-Urban	306	14	4.56%
	Urban Unzoned	175	30	17.02%
	SF Bay Trail (MLK to MESP) Total	**481**	**44**	**9.09%**
Shadow Cliffs	High	259	35	13.54%
	Moderate	1,037	86	8.28%
	Non-Wildland/Non-Urban	777	79	10.17%

EBRPD / Park Lands	Fire Hazard Severity Zone	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
	Urban Unzoned	1,037	59	5.70%
	Shadow Cliffs Total	**3,110**	**259**	**8.33%**
Sunol	High	6,825	6,797	99.59%
	Moderate	6,825	28	0.41%
	Sunol Total	**13,650**	**6,825**	**50.00%**
Tilden	Very High	13,209	31	0.23%
	Tilden Total	**13,209**	**31**	**0.23%**
Vargas Plateau	High	1,244	1,026	82.42%
	Moderate	3,203	219	6.83%
	Vargas Plateau Total	**4,447**	**1,244**	**27.98%**
Alameda Point Shoreline Trail	Urban Unzoned	7	3	50.00%
	Alameda Point Shoreline Trail Total	**7**	**3**	**50.00%**
Bay Area Ridge Trail (GD to LC)	High	57	57	100.00%
	Bay Area Ridge Trail (GD to LC) Total	**57**	**57**	**100.00%**
Bishop Ranch	High	613	0	0.02%
	Bishop Ranch Total	**613**	**0**	**0.02%**
Calaveras Ridge Trail (LT to PR)	High	87	1	0.68%
	Calaveras Ridge Trail (LT to PR) Total	**87**	**1**	**0.68%**
Claremont Canyon	Very High	437	218	49.95%
	Claremont Canyon Total	**437**	**218**	**49.95%**
Creative Design Group Building	Urban Unzoned	0	0	100.00%
	Creative Design Group Building Total	**0**	**0**	**100.00%**
Crown Beach	Non-Wildland/Non-Urban	1,623	67	4.12%
	Urban Unzoned	2,168	117	5.41%
	Crown Beach Total	**3,791**	**184**	**4.86%**
Cull Canyon	High	723	362	50.00%
	Cull Canyon Total	**723**	**362**	**50.00%**
Doolan Canyon	High	774	284	36.66%
	Moderate	774	211	27.20%

EBRPD / Park Lands	Fire Hazard Severity Zone	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
	Doolan Canyon Total	**1,548**	**494**	**31.93%**
Dry Creek Pioneer	High	3,350	1,670	49.86%
	Non-Wildland/Non-Urban	1,675	5	0.28%
	Dry Creek Pioneer Total	**5,025**	**1,675**	**33.33%**
Dublin Hills	High	1,144	641	56.05%
	Dublin Hills Total	**1,144**	**641**	**56.05%**
Five Canyons	High	452	206	45.54%
	Moderate	226	20	8.91%
	Five Canyons Total	**679**	**226**	**33.33%**
Garin	Very High	8,899	76	0.85%
	High	20,405	4,374	21.44%
	Garin Total	**29,303**	**4,449**	**15.18%**
Helicopter Unit	Urban Unzoned	1	1	100.00%
	Helicopter Unit Total	**1**	**1**	**100.00%**
Huckleberry	Very High	477	2	0.37%
	Huckleberry Total	**477**	**2**	**0.37%**
Judge John Sutter Shoreline	Non-Wildland/Non-Urban	148	8	5.12%
	Urban Unzoned	136	25	18.45%
	Judge John Sutter Shoreline Total	**284**	**33**	**11.50%**
Las Trampas	High	5,851	473	8.09%
	Las Trampas Total	**5,851**	**473**	**8.09%**
Leona Canyon	Very High	297	23	7.71%
	High	297	274	92.29%
	Leona Canyon Total	**595**	**297**	**50.00%**
Mission Peak	Very High	6,029	2	0.03%
	High	12,059	2,666	22.11%
	Moderate	9,044	343	3.79%
	Mission Peak Total	**27,132**	**3,010**	**11.09%**
Ohlone	High	9,048	8,401	92.86%
	Moderate	18,095	635	3.51%
	Ohlone Total	**27,143**	**9,036**	**33.29%**
	Very High	7	7	100.00%

EBRPD / Park Lands	Fire Hazard Severity Zone	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
Peralta Oaks Headquarters	**Peralta Oaks Headquarters Total**	**7**	**7**	**100.00%**
Reinhardt Redwood	Very High	5,342	1,011	18.93%
	Reinhardt Redwood Total	**5,342**	**1,011**	**18.93%**
Roberts	Very High	362	88	24.19%
	Roberts Total	**362**	**88**	**24.19%**
SF Bay Trail	High	1	0	0.02%
	Urban Unzoned	1	0	32.82%
	SF Bay Trail Total	**2**	**0**	**16.42%**
Sibley	Very High	4,639	59	1.28%
	Sibley Total	**4,639**	**59**	**1.28%**
Skyline National Trail	Very High	0	0	100.00%
	Skyline National Trail Total	**0**	**0**	**100.00%**
Tassajara Creek Trail	Moderate	4	4	100.00%
	Tassajara Creek Trail Total	**4**	**4**	**100.00%**
Temescal	Very High	42	41	98.44%
	High	42	1	1.56%
	Temescal Total	**83**	**42**	**50.00%**
EBRPD – Alameda County Total		**508,404**	**57,647**	**11.34%**
EBRPD – Contra Costa County!				
Antioch/Oakley Shoreline	Non-Wildland/Non-Urban	9	0	3.79%
	Urban Unzoned	17	8	48.11%
	Antioch/Oakley Shoreline Total	**26**	**9**	**33.33%**
Big Break Shoreline	Moderate	1,657	37	2.25%
	Non-Wildland/Non-Urban	6,629	1,618	24.41%
	Urban Unzoned	3,315	2	0.05%
	Big Break Shoreline Total	**11,601**	**1,657**	**14.29%**
Briones to Las Trampas Trail	High	300	2	0.63%
	Moderate	112	35	30.98%
	Urban Unzoned	37	1	2.04%
	Briones to Las Trampas Trail Total	**450**	**37**	**8.33%**

EBRPD / Park Lands	Fire Hazard Severity Zone	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
Castle Rock	High	39	39	100.00%
	Castle Rock Total	**39**	**39**	**100.00%**
Contra Costa Canal Trail	Urban Unzoned	0	0	100.00%
	Contra Costa Canal Trail Total	**0**	**0**	**100.00%**
Contra Loma	High	1,362	608	44.67%
	Non-Wildland/Non-Urban	681	73	10.66%
	Contra Loma Total	**2,043**	**681**	**33.33%**
Delta Access	Moderate	1,986	3	0.14%
	Non-Wildland/Non-Urban	993	990	99.70%
	Urban Unzoned	993	0	0.02%
	Delta Access Total	**3,972**	**993**	**25.00%**
Diablo Foothills	High	2,778	833	29.99%
	Moderate	1,821	124	6.80%
	Diablo Foothills Total	**4,599**	**957**	**20.81%**
Iron Horse Trail	Urban Unzoned	0	0	100.00%
	Iron Horse Trail Total	**0**	**0**	**100.00%**
Kennedy Grove	Very High	218	1	0.36%
	High	872	217	24.91%
	Kennedy Grove Total	**1,090**	**218**	**20.00%**
Lafayette to Moraga Trail	High	19	1	3.80%
	Moderate	19	11	58.14%
	Urban Unzoned	38	7	19.03%
	Lafayette to Moraga Trail Total	**77**	**19**	**25.00%**
McLaughlin Eastshore	Non-Wildland/Non-Urban	3,661	1	0.02%
	Urban Unzoned	5,491	74	1.35%
	McLaughlin Eastshore Total	**9,152**	**75**	**0.82%**
North Richmond Shoreline	Moderate	33	0	0.02%
	Non-Wildland/Non-Urban	66	30	45.18%
	Urban Unzoned	66	3	4.81%

EBRPD / Park Lands	Fire Hazard Severity Zone	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
	North Richmond Shoreline Total	**164**	**33**	**20.00%**
Point Pinole Shoreline	Very High	19,825	1	0.00%
	High	15,419	137	0.89%
	Moderate	4,406	498	11.31%
	Non-Wildland/Non-Urban	55,069	1,567	2.84%
	Urban Unzoned	2,203	0	0.01%
	Point Pinole Shoreline Total	**96,922**	**2,203**	**2.27%**
San Pablo Bay Shoreline	Moderate	230	0	0.06%
	Non-Wildland/Non-Urban	1,984	197	9.95%
	Urban Unzoned	2,033	81	3.99%
	San Pablo Bay Shoreline Total	**4,246**	**279**	**6.56%**
Sobrante Ridge	High	272	271	99.58%
	Moderate	1,362	1	0.08%
	Sobrante Ridge Total	**1,634**	**272**	**16.67%**
Tilden	Very High	14,677	1,437	9.79%
	Tilden Total	**14,677**	**1,437**	**9.79%**
Tilden (Nature Area)	Very High	4,967	707	14.24%
	High	9,934	2	0.03%
	Tilden (Nature Area) Total	**14,901**	**710**	**4.76%**
Vasco Hills	High	10,233	557	5.44%
	Moderate	6,822	2,854	41.83%
	Vasco Hills Total	**17,056**	**3,411**	**20.00%**
Waterbird	High	198	149	75.23%
	Moderate	191	2	0.92%
	Non-Wildland/Non-Urban	198	47	23.81%
	Urban Unzoned	191	0	0.08%
	Waterbird Total	**777**	**198**	**25.49%**
Wildcat Canyon	Very High	29,276	2,644	9.03%
	High	55,002	95	0.17%
	Wildcat Canyon Total	**84,277**	**2,739**	**3.25%**

EBRPD / Park Lands	Fire Hazard Severity Zone	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
Wildcat Creek Trail	High	12	5	39.48%
	Moderate	12	1	10.52%
	Wildcat Creek Trail Total	**25**	**6**	**25.00%**
Bay Area Ridge Trail (KG to SO)	High	332	166	50.00%
	Bay Area Ridge Trail (KG to SO) Total	**332**	**166**	**50.00%**
Bay Point Shoreline	Non-Wildland/Non-Urban	276	86	31.36%
	Urban Unzoned	138	51	37.28%
	Bay Point Shoreline Total	**414**	**138**	**33.33%**
Big Break Delta Shoreline Trail	Moderate	9	5	53.37%
	Non-Wildland/Non-Urban	9	0	0.01%
	Urban Unzoned	9	4	46.62%
	Big Break Delta Shoreline Trail Total	**27**	**9**	**33.33%**
Bishop Ranch	High	1,353	983	72.66%
	Bishop Ranch Total	**1,353**	**983**	**72.66%**
Black Diamond Mines	High	27,643	5,816	21.04%
	Moderate	12,260	314	2.56%
	Black Diamond Mines Total	**39,904**	**6,130**	**15.36%**
Briones	Very High	11,928	2	0.02%
	High	18,411	6,221	33.79%
	Moderate	5,964	0	0.00%
	Briones Total	**36,303**	**6,224**	**17.14%**
Briones to Martinez Trail	High	0	0	100.00%
	Briones to Martinez Trail Total	**0**	**0**	**100.00%**
Briones to Mt Diablo Trail	High	18	0	1.21%
	Moderate	12	2	19.59%
	Urban Unzoned	12	3	28.60%
	Briones to Mt Diablo Trail Total	**42**	**6**	**14.29%**
Browns Island	Non-Wildland/Non-Urban	1,201	600	50.00%

EBRPD / Park Lands	Fire Hazard Severity Zone	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
	Browns Island Total	**1,201**	**600**	**50.00%**
Byron Vernal Pools	High	1,959	588	30.02%
	Moderate	3,918	1,371	34.99%
	Byron Vernal Pools Total	**5,877**	**1,959**	**33.33%**
CA State Riding & Hiking Trail	Very High	50	2	3.30%
	High	151	39	25.98%
	Moderate	202	1	0.34%
	Urban Unzoned	50	9	17.37%
	CA State Riding & Hiking Trail Total	**454**	**50**	**11.11%**
Calaveras Ridge Trail (LT to PR)	High	87	43	49.32%
	Calaveras Ridge Trail (LT to PR) Total	**87**	**43**	**49.32%**
Carquinez Strait Shoreline	Very High	2,700	3	0.11%
	High	14,481	1,500	10.36%
	Moderate	1,350	0	0.01%
	Non-Wildland/Non-Urban	1,514	11	0.71%
	Carquinez Strait Shoreline Total	**20,044**	**1,514**	**7.55%**
Claremont Canyon	Very High	218	0	0.16%
	Claremont Canyon Total	**218**	**0**	**0.16%**
Clayton Ranch	Very High	4,078	187	4.59%
	High	8,155	3,888	47.67%
	Moderate	4,078	2	0.06%
	Clayton Ranch Total	**16,310**	**4,078**	**25.00%**
Contra Costa Trails	Urban Unzoned	2	2	100.00%
	Contra Costa Trails Total	**2**	**2**	**100.00%**
Crockett Hills	High	4,229	2,114	50.00%
	Moderate	842	0	0.02%
	Crockett Hills Total	**5,071**	**2,115**	**41.70%**
Deer Valley	High	7,223	2,033	28.15%
	Moderate	7,223	1,578	21.85%
	Deer Valley Total	**14,446**	**3,611**	**25.00%**

EBRPD / Park Lands	Fire Hazard Severity Zone	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
Delta de Anza Trail	Urban Unzoned	5	5	100.00%
	Delta de Anza Trail Total	**5**	**5**	**100.00%**
Doolan Canyon	High	1,548	180	11.61%
	Moderate	774	100	12.92%
	Doolan Canyon Total	**2,323**	**280**	**12.05%**
Dublin Hills	High	141	1	0.75%
	Dublin Hills Total	**141**	**1**	**0.75%**
Huckleberry	Very High	715	237	33.09%
	Huckleberry Total	**715**	**237**	**33.09%**
Las Trampas	Very High	9,915	776	7.83%
	High	31,532	4,585	14.54%
	Urban Unzoned	1,786	17	0.93%
	Las Trampas Total	**43,233**	**5,377**	**12.44%**
Las Trampas to Mt Diablo Trail	Very High	191	0	0.03%
	High	573	190	33.12%
	Moderate	764	1	0.15%
	Las Trampas to Mt Diablo Trail Total	**1,527**	**191**	**12.50%**
Little Hills	Very High	36	21	58.04%
	High	36	15	41.96%
	Little Hills Total	**73**	**36**	**50.00%**
Miller/Knox Shoreline	Moderate	318	120	37.71%
	Non-Wildland/Non-Urban	4,771	107	2.24%
	Urban Unzoned	3,499	91	2.60%
	Miller/Knox Shoreline Total	**8,588**	**318**	**3.70%**
Morgan Territory	Very High	5,482	164	2.98%
	High	10,965	5,319	48.51%
	Morgan Territory Total	**16,447**	**5,482**	**33.33%**
Point Isabel Shoreline	Non-Wildland/Non-Urban	380	1	0.21%
	Urban Unzoned	228	37	16.32%
	Point Isabel Shoreline Total	**608**	**38**	**6.25%**
	High	2,334	33	1.39%

EBRPD / Park Lands	Fire Hazard Severity Zone	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
Radke Martinez Shoreline	Moderate	1,333	57	4.30%
	Non-Wildland/Non-Urban	2,667	177	6.63%
	Urban Unzoned	668	68	10.23%
	Radke Martinez Shoreline Total	**7,002**	**335**	**4.78%**
Rancho Pinole	High	556	556	100.00%
	Rancho Pinole Total	**556**	**556**	**100.00%**
Reinhardt Redwood	Very High	5,338	772	14.46%
	Reinhardt Redwood Total	**5,338**	**772**	**14.46%**
Roberts	Very High	362	33	9.13%
	Roberts Total	**362**	**33**	**9.13%**
Round Valley	High	1,897	1,833	96.66%
	Moderate	3,812	72	1.90%
	Round Valley Total	**5,708**	**1,906**	**33.39%**
SF Bay Trail	High	1	1	54.06%
	Moderate	1	0	13.10%
	SF Bay Trail Total	**2**	**1**	**33.58%**
SF Bay Trail (PP to CS)	Moderate	0	0	100.00%
	SF Bay Trail (PP to CS) Total	**0**	**0**	**100.00%**
Sibley	Very High	4,639	843	18.17%
	High	928	26	2.75%
	Sibley Total	**5,567**	**868**	**15.60%**
Sycamore Valley	Very High	692	0	0.01%
	High	692	324	46.78%
	Moderate	1,384	368	26.60%
	Sycamore Valley Total	**2,768**	**692**	**25.00%**
Thurgood Marshall	High	15,263	2,544	16.67%
	Thurgood Marshall Total	**15,263**	**2,544**	**16.67%**
Tilden (Botanic Garden)	Very High	9	9	100.00%
	Tilden (Botanic Garden) Total	**9**	**9**	**100.00%**
Vasco Caves	High	1,440	529	36.72%
	Moderate	2,160	191	8.85%

EBRPD / Park Lands	Fire Hazard Severity Zone	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
	Vasco Caves Total	**3,599**	**720**	**20.00%**
Brooks Island	High	378	42	11.17%
	Non-Wildland/Non-Urban	378	323	85.26%
	Urban Unzoned	378	14	3.58%
	Brooks Island Total	**1,135**	**378**	**33.33%**
EBRPD – Contra Costa County Total		**530,785**	**64,382**	**12.13%**
EBRPD – Grand Total		**1,039,189**	**122,029**	**11.74%**

Source: CAL FIRE, EBRPD GIS

EBRPD – Fire Hazard Severity Zones and Affected Park District Assets and Replacement Values Details

Park Lands	Fire Hazard Severity Zone	Asset Count	Replacement Value
EBRPD – Alameda County			
Alameda County Trails	High	3	$616,364
	Moderate	1	$244,053
	Urban Unzoned	4	$1,388,126
	Alameda County Trails Total	**8**	**$2,248,543**
Anthony Chabot	Very High	45	$13,035,288
	High	20	$1,810,798
	Anthony Chabot Total	**65**	**$14,846,086**
Ardenwood	High	41	$5,285,931
	Non-Wildland/Non-Urban	1	$509,516
	Urban Unzoned	3	$434,137
	Ardenwood Total	**45**	**$6,229,584**
Brushy Peak	Moderate	12	$202,430
	Brushy Peak Total	**12**	**$202,430**
Camp Arroyo	High	21	$9,760,648
	Moderate	13	$2,043,985
	Camp Arroyo Total	**34**	**$11,804,633**
Claremont Canyon	Very High	2	$0
	Claremont Canyon Total	**2**	**$0**
Coyote Hills	High	21	$2,874,565
	Non-Wildland/Non-Urban	12	$781,888

Park Lands	Fire Hazard Severity Zone	Asset Count	Replacement Value
	Coyote Hills Total	**33**	**$3,656,453**
Crown Beach	High	1	$1,220,939
	Non-Wildland/Non-Urban	1	
	Urban Unzoned	27	$11,712,405
	Crown Beach Total	**29**	**$12,933,344**
Cull Canyon	High	15	$3,109,592
	Cull Canyon Total	15	$3,109,592
Del Valle	High	31	$7,759,751
	Moderate	42	$15,858,388
	Del Valle Total	**73**	**$23,618,139**
Don Castro	High	15	$3,136,284
	Don Castro Total	**15**	**$3,136,284**
Dublin Hills	High	1	$204,384
	Dublin Hills Total	**1**	**$204,384**
Garin/Dry Creek Pioneer	High	41	$6,148,275
	Non-Wildland/Non-Urban	2	$31,014
	Garin/Dry Creek Pioneer Total	**43**	**$6,179,289**
Hayward Shoreline	High	3	$951,711
	Non-Wildland/Non-Urban	7	$1,509,898
	Urban Unzoned	7	$666,621
	Hayward Shoreline Total	**17**	**$3,128,230**
Judge John Sutter	Non-Wildland/Non-Urban	1	$9,229,449
	Urban Unzoned	8	$8,677,540
	Judge John Sutter Total	**9**	**$17,906,989**
Lake Chabot	Very High	79	$19,332,094
	High	1	$44,464
	Moderate	8	$647,528
	Urban Unzoned	1	
	Lake Chabot Total	**89**	**$20,024,086**
Martin Luther King, Jr.	High	8	$2,444,220
	Moderate	1	$781,294
	Non-Wildland/Non-Urban	6	$4,409,049
	Urban Unzoned	14	$4,693,534
	Martin Luther King, Jr. Total	**29**	**$12,328,097**
McLaughlin Eastshore	High	2	$585,354

Park Lands	Fire Hazard Severity Zone	Asset Count	Replacement Value
	Urban Unzoned	2	$4,323,966
	McLaughlin Eastshore Total	**4**	**$4,909,320**
Mission Peak	High	9	$1,752,489
	Mission Peak Total	**9**	**$1,752,489**
Peralta Oaks	Very High	2	$11,713,395
	Peralta Oaks Total	**2**	**$11,713,395**
Peralta Oaks North	Very High	1	$0
	Peralta Oaks North Total	**1**	**$0**
Pleasanton Ridge	Very High	5	$289,101
	High	10	$3,087,971
	Moderate	1	$77,375
	Pleasanton Ridge Total	**16**	**$3,454,447**
Quarry Lakes	High	7	$806,953
	Moderate	4	$1,111,346
	Non-Wildland/Non-Urban	11	$2,198,124
	Quarry Lakes Total	**22**	**$4,116,423**
Reinhardt Redwood	Very High	34	$7,877,022
	Reinhardt Redwood Total	**34**	**$7,877,022**
Roberts	Very High	22	$3,210,116
	Roberts Total	**22**	**$3,210,116**
Shadow Cliffs	High	3	$323,739
	Moderate	7	$491,604
	Non-Wildland/Non-Urban	4	$712,805
	Urban Unzoned	27	$3,913,584
	Shadow Cliffs Total	**41**	**$5,441,732**
Sunol / Ohlone Wilderness	High	42	$3,629,405
	Sunol / Ohlone Wilderness Total	**42**	**$3,629,405**
Temescal	Very High	26	$4,257,836
	High	2	$11,119
	Urban Unzoned	2	$273,961
	Temescal Total	**30**	**$4,542,916**
Vargas Plateau	Moderate	4	$689,836
	Vargas Plateau Total	**4**	**$689,836**
EBRPD – Alameda County Total		**746**	**$192,893,264**

Park Lands	Fire Hazard Severity Zone	Asset Count	Replacement Value
EBRPD – Contra Costa County			
Antioch/Oakley	Non-Wildland/Non-Urban	1	$1,027,411
	Urban Unzoned	6	$201,585
	Antioch/Oakley Total	**7**	**$1,228,996**
Bay Point	Urban Unzoned	6	$703,827
	Bay Point Total	**6**	**$703,827**
Big Break	Moderate	11	$2,685,407
	Non-Wildland/Non-Urban	1	$864,730
	Big Break Total	**12**	**$3,550,137**
Black Diamond Mines	High	77	$5,069,491
	Moderate	1	
	Black Diamond Mines Total	**78**	**$5,069,491**
Briones	High	21	$1,720,644
	Briones Total	**21**	**$1,720,644**
Brooks Island	High	4	$771,617
	Non-Wildland/Non-Urban	1	
	Brooks Island Total	**5**	**$771,617**
Byron Vernal Pools	Moderate	4	
	Byron Vernal Pools Total	**4**	
Carquinez Strait	High	10	$2,328,617
	Non-Wildland/Non-Urban	1	$1,199,799
	Carquinez Strait Total	**11**	**$3,528,416**
Clayton Ranch	High	3	$29,075
	Clayton Ranch Total	**3**	**$29,075**
Contra Costa Trails	Very High	2	$190,418
	High	8	$702,173
	Moderate	9	$2,474,568
	Urban Unzoned	25	$13,530,613
	Contra Costa Trails Total	**44**	**$16,897,772**
Contra Loma	High	20	$7,883,494
	Non-Wildland/Non-Urban	8	$778,990
	Contra Loma Total	**28**	**$8,662,484**
Crockett Hills	High	7	$361,370
	Crockett Hills Total	**7**	**$361,370**
Deer Valley	High	1	
	Moderate	17	$621,065

Park Lands	Fire Hazard Severity Zone	Asset Count	Replacement Value
	Deer Valley Total	**18**	**$621,065**
Delta Access	Non-Wildland/Non-Urban	6	$337,230
	Delta Access Total	**6**	**$337,230**
Diablo Foothills / Castle Rock	High	14	$2,278,152
	Diablo Foothills / Castle Rock Total	**14**	**$2,278,152**
East County Trails	High	1	$113,836
	Moderate	4	$1,404,713
	Non-Wildland/Non-Urban	2	$465,197
	Urban Unzoned	9	$5,232,641
	East County Trails Total	**16**	**$7,216,387**
Huckleberry	Very High	1	
	Huckleberry Total	**1**	
Kennedy Grove	High	9	$836,117
	Kennedy Grove Total	**9**	**$836,117**
Las Trampas	Very High	17	$4,525,023
	High	23	$4,661,767
	Las Trampas Total	**40**	**$9,186,790**
McLaughlin Eastshore	Urban Unzoned	3	
	McLaughlin Eastshore Total	**3**	
Miller/Knox	Moderate	1	$160,423
	Non-Wildland/Non-Urban	2	$1,563,241
	Urban Unzoned	19	$4,257,721
	Miller/Knox Total	**22**	**$5,981,385**
Morgan Territory	High	16	$401,128
	Morgan Territory Total	**16**	**$401,128**
Point Isabel	Urban Unzoned	6	$718,293
	Point Isabel Total	**6**	**$718,293**
Point Pinole	High	2	$1,402,666
	Moderate	18	$2,661,173
	Non-Wildland/Non-Urban	6	$11,650,123
	Urban Unzoned	3	$6,020,190
	Point Pinole Total	**29**	**$21,734,152**
Radke Martinez	High	8	$1,826,167
	Moderate	3	$1,920,955
	Non-Wildland/Non-Urban	3	$446,723

Park Lands	Fire Hazard Severity Zone	Asset Count	Replacement Value
	Urban Unzoned	2	
	Radke Martinez Total	**16**	**$4,193,845**
Reinhardt Redwood	Very High	8	$554,428
	Reinhardt Redwood Total	**8**	**$554,428**
Roberts	Very High	6	$1,180,080
	Roberts Total	**6**	**$1,180,080**
Round Valley	High	2	
	Moderate	16	$2,421,177
	Round Valley Total	**18**	**$2,421,177**
Sibley	Very High	8	$2,414,572
	Sibley Total	**8**	**$2,414,572**
Sycamore Valley	High	1	
	Moderate	1	$191,007
	Sycamore Valley Total	**2**	**$191,007**
Thurgood Marshall, Home of the Port Chicago 50	High	2	
	Thurgood Marshall, Home of the Port Chicago 50 Total	**2**	
Tilden	Very High	142	$25,023,016
	Tilden Total	**142**	**$25,023,016**
Vasco Caves	Moderate	6	$92,991
	Vasco Caves Total	**6**	**$92,991**
Vasco Hills	Moderate	27	$5,411,015
	Vasco Hills Total	**27**	**$5,411,015**
Waterbird	High	2	$89,303
	Waterbird Total	**2**	**$89,303**
Wildcat Canyon	High	12	$4,243,890
	Wildcat Canyon Total	**12**	**$4,243,890**
EBRPD – Contra Costa County Total		**655**	**$137,649,852**
EBRPD Grand Total		**1,401**	**$330,543,116**

Source: CAL FIRE, EBRPD GIS

EBRPD – Very High Fire Hazard Severity Zones and Affected Park District Lands and Acres Details

County / Park Lands	Very High Fire Hazard Severity Zone	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
Alameda County				
Anthony Chabot	Very High	3,352	45	1.35%
Lake Chabot	Very High	3,299	141	4.28%
Pleasanton Ridge	Very High	8,829	264	2.98%
Tilden	Very High	1,468	24	1.63%
Claremont Canyon	Very High	218	218	99.63%
Huckleberry	Very High	238	1	0.48%
Leona Canyon	Very High	297	11	3.75%
Peralta Oaks Headquarters	Very High	7	7	100.00%
Reinhardt Redwood	Very High	1,779	12	0.70%
Roberts	Very High	121	8	6.95%
Sibley	Very High	928	58	6.25%
Skyline National Trail	Very High	0	0	100.00%
Temescal	Very High	42	41	98.87%
Alameda County Total		**20,578**	**832**	**4.04%**
Contra Costa County				
Briones to Las Trampas Trail	Very High	37	0	0.11%
Kennedy Grove	Very High	654	122	18.68%
Sobrante Ridge	Very High	272	272	100.00%
Tilden	Very High	2,935	0	0.00%
Tilden (Nature Area)	Very High	2,129	77	3.64%
Wildcat Canyon	Very High	9,878	2,726	27.60%
Briones	Very High	6,224	367	5.89%
Briones to Mt Diablo Trail	Very High	6	0	3.01%
CA State Riding & Hiking Trail	Very High	50	0	0.00%
Carquinez Strait Shoreline	Very High	2,700	112	4.15%
Las Trampas	Very High	4,065	32	0.78%
Las Trampas to Mt Diablo Trail	Very High	191	0	0.03%
SF Bay Trail	Very High	1	0	0.01%

County / Park Lands	Very High Fire Hazard Severity Zone	Total Park Lands (in Acres)	Affected Park Lands (in Acres)	Percent Park Lands Area Affected
Sibley	Very High	928	0	0.00%
Sycamore Valley	Very High	692	0	0.00%
Contra Costa County Total		**30,763**	**3,709**	**12.06%**
Grand Total		**51,340**	**4,540**	**8.84%**

Source: CAL FIRE, EBRPD GIS

EBRPD – Very High Fire Hazard Severity Zones and Affected Park District Assets and Replacement Values Details

EBRPD /Very High Fire Hazard Severity Zone	Fire Hazard Severity Zone	Asset Count	Replacement Value
EBRPD – Alameda County			
Peralta Oaks	Very High	2	$11,713,395
Peralta Oaks North	Very High	1	$0
Roberts	Very High	3	$619,390
Temescal	Very High	26	$4,257,836
EBRPD – Alameda County Total		**746**	**$192,893,264**
EBRPD – Contra Costa County			
Carquinez Strait	Very High	2	$180,000
Contra Costa Trails	Very High	3	$212,310
Wildcat Canyon	Very High	11	$3,775,888
EBRPD – Contra Costa County Total		**655**	**$137,649,852**
EBRPD Grand Total		**1,401**	**$330,543,116**

Source: CAL FIRE, EBRPD GIS

Appendix G Critical Facilities Inventory

Table G–1 EBRPD Critical Facilities by Park Land Area and with Hazards

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Alameda County Trails	Bridge - Amador Valley Boulevard (South), Dublin	Zone A	Urban Unzoned	Moderate				High							
Alameda County Trails	Bridge - Dublin Boulevard (North), Dublin	Zone X (shaded)	Urban Unzoned	Moderate				High							
Alameda County Trails	Bridge - Sequoia Bridge, Fremont	Zone A	Urban Unzoned	High		X	X	Low							
Alameda County Trails	Bridge - Tassajara Creek Crossing / Tassajara Road (West), Dublin	Zone AE Floodway	Moderate	Very High				High							
Alameda County Trails	Bridge - West Las Positas Boulevard (North) / Creekside Park / Pleasanton	Zone AE Floodway	Urban Unzoned	Moderate		X		High							
Alameda County Trails	Park Office - Alameda County Trails	Zone X (unshaded)	High	Very High		Extremely High Dam Inundation Area		Low							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Alameda County Trails	Service Yard - Shop - Alameda County Trails	Zone X (unshaded)	High	Very High		Extremely High Dam Inundation Area		Low							
Alameda County Trails	Service Yard - Tool Shed - Alameda County Trails	Zone X (unshaded)	High	Very High		Extremely High Dam Inundation Area		Low							
Anthony Chabot	3-Bay Storage - Service Yard	Zone X (unshaded)	High	Very Low				Moderate							
Anthony Chabot	Bridge - Buckeye Trail East	Zone X (unshaded)	Very High	Very Low				Moderate							
Anthony Chabot	Bridge - Buckeye Trail West	Zone X (unshaded)	Very High	Very Low				Moderate							
Anthony Chabot	Bridge - MacDonald Staging Area	Zone X (unshaded)	Very High	Very Low				High							
Anthony Chabot	Bridge - Stone Bridge	Zone X (unshaded)	Very High	Very Low				Moderate							
Anthony Chabot	Kiosk - Campground	Zone X (unshaded)	High	Very Low				Moderate							
Anthony Chabot	Office & Restroom - Marksmanship Range [Demolished]	Zone X (unshaded)	Very High	Very Low				Moderate							
Anthony Chabot	Park Office - Service Yard	Zone X (unshaded)	High	Very Low				Moderate							
Anthony Chabot	Range 8B Pit - Marksmanship Range	Zone X (unshaded)	Very High	Very Low				Moderate							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Anthony Chabot	Trap Building - Marksmanship Range [Demolished]	Zone X (unshaded)	Very High	Very Low				Moderate							
Anthony Chabot	Wastewater - Lift Station - Puma Point	Zone X (unshaded)	High	Very Low				Moderate							
Anthony Chabot	Wastewater - Lift Station - Service Yard	Zone X (unshaded)	High	Very Low				Moderate							
Anthony Chabot	Wastewater - RV Sewage Disposal Station - Campground	Zone X (unshaded)	High	Very Low				Moderate							
Anthony Chabot	Wastewater - Sewage Grinder - Huck's Trail	Zone X (unshaded)	High	Very Low				Moderate							
Anthony Chabot	Water - Booster Pump - Brandon Trail	Zone X (unshaded)	Very High	Very Low				Moderate							
Anthony Chabot	Water - Tank - Big Bear	Zone X (unshaded)	Very High	Very Low				Low							
Anthony Chabot	Water - Tank - Campground Main In-Ground Tank	Zone X (unshaded)	High	Very Low				Moderate							
Anthony Chabot	Water - Tank - Gruenfeldt	Zone X (unshaded)	Very High	Very Low				Low							
Anthony Chabot	Water - Tank - Marksmanship Range Redwood Tank	Zone X (unshaded)	Very High	Very Low				Moderate							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Antioch/Oakley	Wastewater - Wastewater Ejection - Antioch/Oakley	Zone X (unshaded)	Urban Unzoned	Very High				Moderate							
Ardenwood	Blacksmith Shop	Zone X (unshaded)	High	High		X		Low							
Ardenwood	Granary	Zone X (unshaded)	High	High		X		Low							
Ardenwood	Park Office - Ardenwood	Zone X (unshaded)	High	High				Low							
Ardenwood	Shop - Ardenwood Operations	Zone X (unshaded)	High	High		X		Low							
Ardenwood	SPCRR Wissel Car Barn	Zone X (unshaded)	Urban Unzoned	High		X		Low							
Ardenwood	Walnut Huller	Zone X (unshaded)	High	High		X		Low							
Bay Point	Bridge - Harrier Trail	Zone AE	Urban Unzoned	Moderate				Moderate				X		X	X
Bay Point	Water - Well - Bay Point	Zone X (unshaded)	Urban Unzoned	Low				Moderate							
Big Break	Visitor Center - Big Break Visitor Center at the Delta	Zone AE	Moderate	Moderate				Low							
Black Diamond Mines	Arata - Building 02 - Garage	Zone X (unshaded)	High	Moderate				Moderate							
Black Diamond Mines	Arata - Building 08 - Cistern/Washhouse	Zone X (unshaded)	High	Moderate				Moderate							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Black Diamond Mines	Arata - Building 11 - Trailer	Zone A	High	Very High				Moderate							
Black Diamond Mines	Arata - Building 13 - Feed Room	Zone X (unshaded)	High	Moderate				Moderate							
Black Diamond Mines	Arata - Building 16 - Powder Room	Zone X (unshaded)	High	Very High				Moderate							
Black Diamond Mines	Arata - Building 17 - Sheepherder's House	Zone X (unshaded)	High	Very High				Moderate							
Black Diamond Mines	Arata - Building 19 - Outhouse	Zone X (unshaded)	High	Moderate				Moderate							
Black Diamond Mines	Arata - Building 20 - Outhouse	Zone X (unshaded)	High	Moderate				Moderate							
Black Diamond Mines	Arata - Building 21 - Outhouse	Zone X (unshaded)	High	Moderate				Moderate							
Black Diamond Mines	Arata - Building 23 - Mine Office	Zone X (unshaded)	High	Moderate				Moderate							
Black Diamond Mines	Arata - Building 24 - Miner's Cabin	Zone X (unshaded)	High	Moderate				Moderate							
Black Diamond Mines	Arata - Building 26 - Garden House	Zone X (unshaded)	High	Moderate				Moderate							
Black Diamond Mines	Arata - Building 27 - Playhouse	Zone X (unshaded)	High	Moderate				Moderate							
Black Diamond Mines	Arata - Building 29 - Windmill	Zone X (unshaded)	High	Moderate				Moderate							
Black Diamond Mines	Arata - Building 30 - Feed Tank	Zone X (unshaded)	High	Moderate				Moderate							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Black Diamond Mines	Arata - Building 31 - Scale	Zone X (unshaded)	High	Moderate				Moderate							
Black Diamond Mines	Eureka Slope Portal	Zone X (unshaded)	High	Very Low				Moderate							
Black Diamond Mines	Fan House	Zone X (unshaded)	High	Very Low				Moderate							
Black Diamond Mines	Lougher Ranch - Building S11 - Outbuilding 2	Zone X (unshaded)	High	Moderate				Moderate							
Black Diamond Mines	Lougher Ranch - Building S16 - Garage	Zone X (unshaded)	High	Moderate				Moderate							
Black Diamond Mines	Lougher Ranch - Building S17 - Shed	Zone X (unshaded)	High	Moderate				Moderate							
Black Diamond Mines	Lougher Ranch - Building S18 - Blacksmith Shop	Zone X (unshaded)	High	Moderate				Moderate							
Black Diamond Mines	Lougher Ranch - Building S19 - Water Tower	Zone X (unshaded)	High	Moderate				Moderate							
Black Diamond Mines	Lougher Ranch - Building S20 - Windmill	Zone X (unshaded)	High	Moderate				Moderate							
Black Diamond Mines	Sidney Flat - Building S01 - Visitor Center	Zone X (unshaded)	High	Moderate				Moderate							
Black Diamond Mines	Sidney Flat - Building S02 - Mining Office	Zone X (unshaded)	High	Moderate				Moderate							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Black Diamond Mines	Sidney Flat - Building S03 - Interpretive Headquarters	Zone X (unshaded)	High	Moderate				Moderate							
Black Diamond Mines	Sidney Flat - Building S04 - Park Office	Zone X (unshaded)	High	Moderate				Moderate							
Black Diamond Mines	Sidney Flat Annex - Building S06 - Jones House	Zone X (unshaded)	High	Very Low				Moderate							
Black Diamond Mines	Sidney Flat Annex - Building S07 - Workshop - Williams House	Zone X (unshaded)	High	Very Low				Moderate							
Black Diamond Mines	Sidney Flat Annex - Building S08 - The Red Shed	Zone X (unshaded)	High	Very Low				Moderate							
Black Diamond Mines	Sidney Flat Annex - Mower Shed	Zone X (unshaded)	High	Very Low				Moderate							
Black Diamond Mines	Visitor Center - Greathouse	Zone X (unshaded)	High	Very Low				Moderate							
Black Diamond Mines	Water - Booster Pump - Hazel Atlas Portal	Zone X (unshaded)	High	Very Low				Moderate							
Black Diamond Mines	Water - Booster Pump - Service Yard	Zone X (unshaded)	High	Very Low				Moderate							
Black Diamond Mines	Water - Tank/Upper Pump - Affinito	Zone X (unshaded)	High	Very Low				Moderate							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Black Diamond Mines	Water - Well - Arada	Zone X (unshaded)	Moderate	Low				Moderate							
Briones	Bridge - Service Yard Entrance Road	Zone A	High	Moderate				High							
Briones	Park Office	Zone X (unshaded)	High	Very Low				High							
Briones	Potable Water System	Zone X (unshaded)	High	Very Low				High							
Briones	Power House - Generator Room	Zone X (unshaded)	High	Very Low				High							
Briones	Shop	Zone X (unshaded)	High	Very Low				High							
Briones	Water - Domestic Booster Pump	Zone X (unshaded)	High	Very Low				High							
Briones	Water - Well #1 - Bear Creek North Parking Lot	Zone X (unshaded)	High	Very Low				High							
Briones	Water - Well #2 - Bear Creek South Newt Hollow	Zone X (unshaded)	High	Very Low				High							
Brooks Island	Conveyer Tunnel	Zone VE	Non-Wildland/Non-Urban	Water				Low	X	X	X	X	X	X	X
Brooks Island	Water - System - for Residence	Zone X (unshaded)	High	Water				Low	X						
Byron Vernal Pools	Water - Well - Souza 2	Zone X (unshaded)	Moderate	Low				Moderate							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Camp Arroyo	Amphitheater - Camp Arroyo	Zone X (unshaded)	High	Very Low				High							
Camp Arroyo	Cabin - Alder & Walnut	Zone X (unshaded)	High	Very Low				High							
Camp Arroyo	Cabin - Blue Oak & Bay Laurel	Zone X (unshaded)	High	Very Low				High							
Camp Arroyo	Cabin - Maple & Buckeye	Zone X (unshaded)	High	Very Low				High							
Camp Arroyo	Cabin - Pine & Willow	Zone X (unshaded)	High	Very Low				High							
Camp Arroyo	Cabin - Redbud & Madrone	Zone X (unshaded)	High	Very Low				High							
Camp Arroyo	Cabin - Sycamore & Cottonwood	Zone X (unshaded)	High	Very Low				High							
Camp Arroyo	Dining Hall	Zone X (unshaded)	High	Very Low				High							
Camp Arroyo	Infirmary	Zone X (unshaded)	High	Very Low				High							
Camp Arroyo	Park Office & Shop	Zone X (unshaded)	Moderate	Low		X		High							
Camp Arroyo	Residence - Camp Arroyo Director - Camp Entrance	Zone X (unshaded)	Moderate	Low		X		High							
Camp Arroyo	Residence - Camp Arroyo Staff - Ropes Course	Zone X (unshaded)	High	Very Low				High							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Camp Arroyo	Restroom - Camp Arroyo Entrance - Vault	Zone X (unshaded)	Moderate	Low		X		High							
Camp Arroyo	Restroom - Meadow - Vault	Zone X (unshaded)	Moderate	Low		X		High							
Camp Arroyo	Swim Complex - Camp Arroyo Restrooms & Changing Rooms	Zone X (unshaded)	High	Very Low				High							
Camp Arroyo	Taylor Family Foundation - Office	Zone X (unshaded)	Moderate	Low		X		High							
Camp Arroyo	Taylor Family Foundation - West Wing	Zone X (unshaded)	Moderate	Low		X		High							
Camp Arroyo	Wastewater - Wastewater Pumping Station	Zone X (unshaded)	High	Very Low				High							
Camp Arroyo	Water - Booster Pump Station	Zone X (unshaded)	Moderate	Low		X		High							
Camp Arroyo	Water - Tanks	Zone X (unshaded)	High	Very Low				High							
Camp Arroyo	YMCA Program Office	Zone X (unshaded)	High	Very Low				High							
Camp Arroyo	Yurt - Amphitheater	Zone X (unshaded)	High	Very Low				High							
Camp Arroyo	Yurt - Residence	Zone X (unshaded)	High	Very Low				High							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Carquinez Strait	Bridge - Carquinez Scenic Drive to Berrellesa Street	Zone X (unshaded)	High	Very Low				Moderate							
Carquinez Strait	Caretaker Facility - Port Costa Brickyard	Zone X (unshaded)	High	Moderate				Moderate							
Carquinez Strait	Park Office - Ozol	Zone X (unshaded)	High	Very Low				Moderate							
Claremont Canyon	Garage - Gelston	Zone X (unshaded)	Very High	Very Low				High							
Claremont Canyon	Office - Gelston	Zone X (unshaded)	Very High	Very Low				High							
Clayton Ranch	Bridge - Ang Bridge	Zone X (unshaded)	High	Very Low				Moderate							
Contra Costa Trails	Pacheco Corporation Yard Building	Zone A	Urban Unzoned	Moderate				Low							
Contra Loma	Park Office - Swim Complex	Zone X (unshaded)	High	Very Low				Moderate							
Contra Loma	Police Substation - Former Residence	Zone X (unshaded)	High	Very Low				Moderate							
Contra Loma	Wastewater - Wastewater Ejection - Service Yard	Zone X (unshaded)	High	Very Low				Moderate							
Contra Loma	Water - Submersible Pump #1, Irrigation - Main Entry	Zone X (unshaded)	Non-Wildland/Non-Urban	Water				Moderate							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Contra Loma	Water - Submersible Pump #2, Irrigation - Main Lawn	Zone X (unshaded)	Non-Wildland/Non-Urban	Water				Moderate							
Contra Loma	Water - Submersible Pump #3, Irrigation - Island Area	Zone X (unshaded)	Non-Wildland/Non-Urban	Water				Moderate							
Contra Loma	Water - Submersible Pump #4, Irrigation - Boat Ramp	Zone X (unshaded)	Non-Wildland/Non-Urban	Water				Moderate							
Coyote Hills	Arden Dairy Milk House - Patterson Ranch	Zone X (unshaded)	High	Moderate		Extremely High Dam Inundation Area		Low							X
Coyote Hills	Office - Supervisor's Office	Zone D	High	Very Low				Low	X						
Coyote Hills	Park Office & Shop	Zone D	High	Very Low				Low	X						
Coyote Hills	Showers - Building B4	Zone X (unshaded)	High	Very Low				Low	X						
Coyote Hills	Small Barn - Patterson Ranch	Zone X (unshaded)	High	Moderate		X		Low							
Coyote Hills	Visitor Center & Naturalist Office - Coyote Hills	Zone D	High	Very Low				Low	X						
Coyote Hills	Wastewater - Lift Station - Crandall Creek	Zone X (unshaded)	Non-Wildland/Non-Urban	Moderate		X		Low	X					X	X

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Coyote Hills	Wastewater - Lift Station - Visitor Center	Zone D	Non-Wildland/Non-Urban	Moderate		X		Low	X						X
Coyote Hills	Wastewater - Wastewater Pumping Station	Zone X (unshaded)	Non-Wildland/Non-Urban	Moderate		X		Low	X					X	X
Coyote Hills	Water - Field Irrigations Pump - Patterson Drive	Zone X (unshaded)	Non-Wildland/Non-Urban	Moderate		X		Low	X					X	X
Coyote Hills	Water - Irrigation Pump - Nectar Garden	Zone D	Non-Wildland/Non-Urban	Moderate		X		Low	X					X	X
Coyote Hills	Water - Well Pump - Patterson Drive	Zone X (unshaded)	Non-Wildland/Non-Urban	Moderate		X		Low	X					X	X
Crown Beach	Bridge - Veterans Court, under Bay Farm Island Bridge	Zone AE	High	Water				Low	X	X	X	X	X	X	X
Crown Beach	Glory of the Seas Offices & Shop	Zone X (unshaded)	Urban Unzoned	Very High				Low	X				X		X
Crown Beach	GSA Building #3A (Demolished)	Zone X (unshaded)	Urban Unzoned	Very High				Low	X						X
Crown Beach	GSA Building #3B (Demolished)	Zone X (unshaded)	Urban Unzoned	Very High				Low	X				X		X
Crown Beach	GSA Building #7	Zone X (unshaded)	Urban Unzoned	Very High				Low	X						X

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Crown Beach	Surf Rental	Zone X (unshaded)	Urban Unzoned	Very High				Low	X						X
Crown Beach	Visitor Center & Residence - Crab Cove	Zone X (unshaded)	Urban Unzoned	Very High				Low	X				X		X
Crown Beach	Wastewater - Lift Station - Visitor Center Parking	Zone X (unshaded)	Urban Unzoned	Very High				Low	X						X
Cull Canyon	Bridge - Main Entrance north of Parking Lot	Zone X (unshaded)	High	Water				Moderate							
Cull Canyon	Lagoon Equipment Room	Zone X (unshaded)	High	Very Low				Moderate							
Cull Canyon	Park Office & Shop	Zone X (unshaded)	High	Moderate				Moderate							
Cull Canyon	Shade Structure - Cabanas	Zone X (unshaded)	High	Very Low				Moderate							
Cull Canyon	Shade Structure - Entrance	Zone X (unshaded)	High	Very Low				Moderate							
Cull Canyon	Swim Complex - Cull Canyon	Zone X (unshaded)	High	Very Low				Moderate							
Cull Canyon	Wastewater - Lift Station - Lagoon	Zone X (unshaded)	High	Very Low				Moderate							
Deer Valley	Water - Pump & Pressure Tanks - Deer Valley	Zone X (unshaded)	Moderate	Low				Moderate							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Deer Valley	Water - Tank - Deer Valley	Zone X (unshaded)	Moderate	Low				Moderate							
Deer Valley	Water - Well - Deer Valley	Zone X (unshaded)	Moderate	Low				Moderate							
Del Valle	Bridge - Eagles View Bridge	Zone D	High	Low				High							
Del Valle	Concession Service Yard - Mechanic Shop Building	Zone D	High	Very Low				High							
Del Valle	Fuel Tank - Concession Service Yard	Zone D	High	Very Low				High							
Del Valle	Fuel Tank - Maintenance Yard	Zone X (unshaded)	High	Low				High							
Del Valle	Park Office	Zone X (unshaded)	High	Low				High							
Del Valle	Propane Tank - Maintenance Yard	Zone X (unshaded)	High	Low				High							
Del Valle	Service Yard - Maintenance Paint and Flammable Liquid Storage	Zone X (unshaded)	High	Low				High							
Del Valle	Service Yard - Maintenance Shop	Zone X (unshaded)	High	Low				High							
Del Valle	Visitor Center - West Side - Rocky Ridge	Zone X (unshaded)	Moderate	Water				High							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Del Valle	Wastewater - Dump Station - Campground	Zone X (unshaded)	High	Low				High							
Del Valle	Wastewater - Sanitary Treatment Ponds	Zone X (unshaded)	High	Very Low				High							
Del Valle	Wastewater - Wastewater Pumping Station #1 @ Main Entry	Zone D	High	Very Low				High							
Del Valle	Wastewater - Wastewater Pumping Station #2 @ Eagle View	Zone D	High	Very Low				High							
Del Valle	Wastewater - Wastewater Pumping Station #3 @ Oak Point	Zone D	Moderate	Water				High							
Del Valle	Wastewater - Wastewater Pumping Station #4 @ Del Valle Road	Zone X (unshaded)	High	Very Low				High							
Del Valle	Wastewater - Wastewater Pumping Station #5 @ Campground	Zone X (unshaded)	Moderate	Water				High							
Del Valle	Wastewater - Wastewater Pumping Station #6 @ West Beach	Zone X (unshaded)	Moderate	Water				High							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Del Valle	Water - Raw Water Pump Station	Zone D	Moderate	Very Low				High							
Del Valle	Water - Water Treatment Backwash Filtration Ponds	Zone D	High	Very Low				High							
Del Valle	Water - Water Treatment Plant	Zone D	High	Very Low				High							
Del Valle	Water - Water Treatment Storage Tank - East	Zone D	High	Very Low				High							
Del Valle	Water - Water Treatment Storage Tank - West	Zone X (unshaded)	High	Very Low				High							
Del Valle	Water Treatment Office - Storage	Zone D	High	Very Low				High							
Diablo Foothills / Castle Rock	Barn / Shop	Zone X (unshaded)	High	Low				High							
Diablo Foothills / Castle Rock	Bridge - Northgate	Zone A	High	Very Low	X			High							
Diablo Foothills / Castle Rock	Bridge - Pine Creek / Eddy Brook	Zone A	High	Very High	X			High							
Diablo Foothills / Castle Rock	Bridge - Shady Glen / Back Forty	Zone A	High	Low	X			High							
Diablo Foothills / Castle Rock	Lifeguard Building	Zone X (unshaded)	High	Low	X			High							
Diablo Foothills / Castle Rock	Park Office	Zone X (unshaded)	High	Low				High							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Diablo Foothills / Castle Rock	Pool Area - Pump House	Zone A	High	Very High	X			High							
Diablo Foothills / Castle Rock	Pool Area - Wooden Deck	Zone A	High	Very High	X			High							
Diablo Foothills / Castle Rock	Restroom - Changing Rooms - Pool / Basketball Court	Zone X (unshaded)	High	Low				High							
Diablo Foothills / Castle Rock	Water - Booster Pump, Irrigation - Lower Restroom	Zone A	High	Low	X			High							
Don Castro	Former Soda Ash Building	Zone X (unshaded)	High	Very Low				Moderate							
Don Castro	Kiosk - Parking	Zone X (unshaded)	High	Very Low				Moderate							
Don Castro	Wastewater - Wastewater Pumping Station - Siesta Picnic	Zone X (unshaded)	High	Very Low				Moderate							
Don Castro	Wastewater - Wastewater Pumping Station - Ursa Way Residence	Zone X (unshaded)	High	Very Low				Moderate							
East County Trails	Bridge - Ambrose Park, Pittsburg	Zone X (unshaded)	Urban Unzoned	Low				Moderate							
East County Trails	Bridge - Big Break Trail / Marsh Creek Trail, Oakley	Zone AE Floodway	Non-Wildland/Non-Urban	Low		X		Low							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
East County Trails	Bridge - Creekside Park North, Brentwood	Zone AE	Urban Unzoned	Very High	X	X		Moderate							
East County Trails	Bridge - Creekside Park South, Brentwood	Zone X (unshaded)	Urban Unzoned	Moderate		X		Moderate							
East County Trails	Bridge - Empire Avenue, Oakley	Zone X (unshaded)	Urban Unzoned	Low				Moderate							
East County Trails	Bridge - Gentrytown Drive (East), Antioch	Zone X (unshaded)	Urban Unzoned	Low				Moderate							
East County Trails	Bridge - Kirker Creek, Pittsburg	Zone AE Floodway	Urban Unzoned	Very High				Moderate							
East County Trails	Bridge - Loveridge Road, Pittsburg	Zone X (unshaded)	Urban Unzoned	Low				Moderate							
East County Trails	Bridge - Piper Lane (West), Oakley	Zone AE	Moderate	Moderate				Low							
East County Trails	Bridge - Sunset Road (North) / Homecoming Park, Brentwood	Zone AE Floodway	Urban Unzoned	Low		X		Moderate							
East County Trails	Bridge - Sunset Road (South) / Brentwood Boulevard (West), Brentwood	Zone AE Floodway	Urban Unzoned	Very High		X		Moderate							
East County Trails	Bridge - Worth Shaw Community Park, Antioch	Zone X (unshaded)	High	Low				Moderate							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
East County Trails	Park Office - East County Trails	Zone X (unshaded)	Moderate	Moderate				Low							
East County Trails	Shop - East County Trails	Zone X (unshaded)	Moderate	Moderate				Low							
East County Trails	Wastewater - Wastewater Ejection - East County Trails Service Yard	Zone X (unshaded)	Moderate	Moderate				Low							
Garin/Dry Creek Pioneer	Bridge - 1 Dry Creek Trail	Zone X (unshaded)	High	Moderate				Low							
Garin/Dry Creek Pioneer	Bridge - 1 Meyer's Ranch Trail	Zone X (unshaded)	High	Moderate				Low							
Garin/Dry Creek Pioneer	Bridge - 2 Dry Creek Trail	Zone X (unshaded)	High	Moderate				Low							
Garin/Dry Creek Pioneer	Bridge - 2 Meyer's Ranch Trail	Zone X (unshaded)	High	Moderate				Low							
Garin/Dry Creek Pioneer	Bridge - 3 Dry Creek Trail	Zone X (unshaded)	High	Very Low				Low							
Garin/Dry Creek Pioneer	Bridge - 3 Meyer's Ranch Trail	Zone X (unshaded)	High	Moderate				Low							
Garin/Dry Creek Pioneer	Bridge - 4 Meyer's Ranch Trail	Zone X (unshaded)	High	Moderate				Low							
Garin/Dry Creek Pioneer	Bridge - 5 Meyer's Ranch Trail	Zone X (unshaded)	High	Moderate				Low							
Garin/Dry Creek Pioneer	Bridge - Garin Staging Area	Zone X (unshaded)	High	Moderate				Low							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Garin/Dry Creek Pioneer	Bridge - Main Vehicle Bridge - Dry Creek Garden	Zone X (unshaded)	High	Moderate				Low							
Garin/Dry Creek Pioneer	Bridge - May Trail Entry	Zone X (unshaded)	High	Moderate				Low							
Garin/Dry Creek Pioneer	Bridge - Middle Garden Bridge - Dry Creek Garden	Zone X (unshaded)	High	Very Low				Low							
Garin/Dry Creek Pioneer	Bridge - North of Jordan Pond	Zone X (unshaded)	High	Moderate				Low							
Garin/Dry Creek Pioneer	Bridge - Pool House Bridge - Dry Creek Garden	Zone X (unshaded)	High	Very Low				Low							
Garin/Dry Creek Pioneer	Bridge - South Fork Trail Bridge	Zone X (unshaded)	High	Very Low				Low							
Garin/Dry Creek Pioneer	Office - Pool House - Dry Creek Garden	Zone X (unshaded)	High	Moderate				Low							
Garin/Dry Creek Pioneer	Park Office, Shop, and Fire Station #7 - Garin	Zone X (unshaded)	High	Very Low				Low							
Garin/Dry Creek Pioneer	Shop - Dry Creek Garden	Zone X (unshaded)	High	Moderate				Low							
Garin/Dry Creek Pioneer	Visitor Center - Garin Barn	Zone X (unshaded)	High	Moderate				Low							
Garin/Dry Creek Pioneer	Wastewater - Lift Station - Garin	Zone X (unshaded)	High	Moderate				Low							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Garin/Dry Creek Pioneer	Water - Meincke Water System	Zone X (unshaded)	High	Very Low				Moderate							
Garin/Dry Creek Pioneer	Water - Pump House - Garin Staging Area	Zone X (unshaded)	High	Moderate				Low							
Garin/Dry Creek Pioneer	Water - Tank - Black Fiberglass - Dry Creek Pioneer	Zone X (unshaded)	High	Low				Low							
Garin/Dry Creek Pioneer	Water - Tank - Wood - Dry Creek Pioneer	Zone X (unshaded)	High	Low				Low							
Hayward Shoreline	Bridge - Bockman Channel	Zone AE	Urban Unzoned	Water				Low	X	X	X	X	X	X	X
Hayward Shoreline	Bridge - Cogswell Marsh - Long	Zone AE	Non-Wildland/Non-Urban	Water				Low	X				X	X	X
Hayward Shoreline	Bridge - Cogswell Marsh - Short	Zone AE	Non-Wildland/Non-Urban	Moderate				Low	X				X	X	X
Hayward Shoreline	Bridge - Oro Loma Marsh	Zone AE	Non-Wildland/Non-Urban	Moderate				Low	X	X	X	X	X	X	X
Hayward Shoreline	Bridge - San Lorenzo Creek	Zone X (unshaded)	Urban Unzoned	Moderate				Low	X						X
Hayward Shoreline	Bridge - Sulphur Creek	Zone AE	Non-Wildland/Non-Urban	Water				Low	X	X	X	X	X	X	X
Hayward Shoreline	Gate - Hayward Marsh 3A - 3B Inlet	Zone AE	Urban Unzoned	Moderate				Low	X			X	X	X	X

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Hayward Shoreline	Gate - Hayward Marsh 3A Inlet	Zone AE	Urban Unzoned	Moderate				Low	X			X	X	X	X
Hayward Shoreline	Gate - Hayward Marsh 3B Inlet	Zone AE	Urban Unzoned	Moderate				Low	X			X	X	X	X
Hayward Shoreline	Gate - Hayward Marsh Inlet	Zone AE	Non-Wildland/Non-Urban	Moderate				Low	X	X	X	X	X	X	X
Hayward Shoreline	Gate - Hayward Marsh Tide	Zone AE	Urban Unzoned	Moderate				Low	X			X	X	X	X
Hayward Shoreline	Gate - Pond 1 Discharge	Zone AE	Non-Wildland/Non-Urban	Moderate				Low	X			X	X	X	X
Hayward Shoreline	Gate - Pond 1 Emergency Discharge	Zone AE	Non-Wildland/Non-Urban	Water				Low	X	X	X	X	X	X	X
Hayward Shoreline	Gate - Salt Water Inlet - Mouse Preserve	Zone AE	Urban Unzoned	Moderate				Low	X			X	X	X	X
Judge John Sutter	Bridge Yard Building	Zone X (shaded)	Urban Unzoned	Very High				Low	X					X	X
Judge John Sutter	Shop Building	Zone AE	Urban Unzoned	Very High				Low	X				X	X	X
Judge John Sutter	Stormwater - Lift Station	Zone AE	Urban Unzoned	Very High				Low	X				X	X	X
Kennedy Grove	Park Office	Zone X (unshaded)	High	Moderate		X		High							
Lake Chabot	ADA, Plumber, & Painter	Zone X (unshaded)	Very High	Very Low				Moderate							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Lake Chabot	Bridge - Main Picnic Area	Zone X (unshaded)	Very High	Very Low		X		Moderate							
Lake Chabot	Bridge - Sewer Bridge / San Leandro Creek Bridge	Zone X (unshaded)	Moderate	Very High		X		Moderate							
Lake Chabot	Bridge 1/9 - C	Zone X (unshaded)	Very High	Very Low		X		Moderate							
Lake Chabot	Bridge 1/9 A	Zone X (unshaded)	Very High	Very Low		X		Moderate							
Lake Chabot	Bridge 1/9 B	Zone X (unshaded)	Very High	Very High		X		Moderate							
Lake Chabot	Bridge 10 - Gazebo	Zone X (unshaded)	Very High	Very High		X		Moderate							
Lake Chabot	Bridge 10 - Tee	Zone X (unshaded)	Very High	Very Low		X		Moderate							
Lake Chabot	Bridge 11 - Tee	Zone X (unshaded)	Very High	Very Low		X		Moderate							
Lake Chabot	Bridge 11/16	Zone X (unshaded)	Very High	Very Low		X		Moderate							
Lake Chabot	Bridge 13	Zone X (unshaded)	Very High	Very Low		X		Moderate							
Lake Chabot	Bridge 15 - Tee Footbridge	Zone X (unshaded)	Very High	Very Low		X		Moderate							
Lake Chabot	Bridge 16 - Tee	Zone X (unshaded)	Very High	Very Low		X		Moderate							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Lake Chabot	Bridge 17 - Equipment	Zone X (unshaded)	Very High	Very High		X		Moderate							
Lake Chabot	Bridge 2 - Fairway	Zone X (unshaded)	Very High	Very High		X		Moderate							
Lake Chabot	Bridge 2 Tee	Zone X (unshaded)	Very High	Very Low		X		Moderate							
Lake Chabot	Bridge 2/8	Zone X (unshaded)	Very High	Very High		X		Moderate							
Lake Chabot	Bridge 3 - Green	Zone X (unshaded)	High	Very High		X		Moderate							
Lake Chabot	Bridge 3 - Tee	Zone X (unshaded)	Very High	Very High		X		Moderate							
Lake Chabot	Bridge 3/7 - Footbridge	Zone X (unshaded)	Very High	Very High		X		Moderate							
Lake Chabot	Bridge 4/6 Equipment	Zone X (unshaded)	Very High	Very High		X		Moderate							
Lake Chabot	Bridge 5 - Green	Zone X (unshaded)	Very High	Very High		X		Moderate							
Lake Chabot	Bridge 5 - Tee	Zone X (unshaded)	Very High	Very Low		X		Moderate							
Lake Chabot	Bridge 6 - Tee	Zone X (unshaded)	Very High	Very Low		X		Moderate							
Lake Chabot	Bridge 7 - Green	Zone X (unshaded)	Very High	Very High		X		Moderate							
Lake Chabot	Carpenter's Office and Restroom	Zone X (unshaded)	Very High	Very Low				Moderate							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Lake Chabot	Carpenter's Workshop	Zone X (unshaded)	Very High	Very Low				Moderate							
Lake Chabot	Equipment Shop	Zone X (unshaded)	Very High	Very Low				Moderate							
Lake Chabot	MAST Managers Office	Zone X (unshaded)	Very High	Very Low				Moderate							
Lake Chabot	Park Office & Shop - Lake Chabot	Zone X (unshaded)	Very High	Very Low				Moderate							
Lake Chabot	Public Safety - Headquarters	Zone X (unshaded)	Very High	Very Low				Moderate							
Lake Chabot	Public Safety - Lifeguard Office	Zone X (unshaded)	Very High	Very Low				Moderate							
Lake Chabot	Public Safety - Mess Hall	Zone X (unshaded)	Very High	Very Low				Moderate							
Lake Chabot	Public Safety - Office - Investigations	Zone X (unshaded)	Very High	Very Low				Moderate							
Lake Chabot	Public Safety - Office - Professional Standards Unit	Zone X (unshaded)	Very High	Very Low				Moderate							
Lake Chabot	Public Safety - Office - Special Enforcement Unit	Zone X (unshaded)	Very High	Very Low				Moderate							
Lake Chabot	Redwood Canyon Golf Course - Caf ├⌐ / Restroom / Residence	Zone X (unshaded)	Very High	Moderate		X		Moderate							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Lake Chabot	Redwood Canyon Golf Course - Cart Maintenance Shop	Zone X (unshaded)	Very High	Very Low		X		Moderate							
Lake Chabot	Redwood Canyon Golf Course - Equipment Building - Maintenance	Zone X (unshaded)	Very High	Moderate		X		Moderate							
Lake Chabot	Redwood Canyon Golf Course - Office - Maintenance	Zone X (unshaded)	Very High	Moderate		X		Moderate							
Lake Chabot	Redwood Canyon Golf Course - Pro Shop / Restaurant / Event Center	Zone X (unshaded)	Very High	Moderate		X		Moderate							
Lake Chabot	Redwood Canyon Golf Course - Shed - Generator	Zone X (unshaded)	Very High	Very Low		X		Moderate							
Lake Chabot	Sanitation Office	Zone X (unshaded)	Very High	Very Low				Moderate							
Lake Chabot	Steam Wash & Wash Rack	Zone X (unshaded)	Very High	Very Low				Moderate							
Lake Chabot	Wastewater - Lift Station - by Cove Picnic Area	Zone X (unshaded)	Very High	Very Low		X		Moderate							
Lake Chabot	Wastewater - Lift Station - Redwood Canyon Golf Course	Zone X (unshaded)	Very High	Very Low		X		Moderate							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Lake Chabot	Water - Irrigation Pump - Redwood Canyon Golf Course	Zone X (unshaded)	Very High	Very Low		X		Moderate							
Lake Chabot	Water - Pump House - Service Yard	Zone X (unshaded)	Very High	Very Low				Moderate							
Lake Chabot	Water - Tank - Service Yard	Zone X (unshaded)	Very High	Very Low				Moderate							
Lake Chabot	Water Utility Office	Zone X (unshaded)	Very High	Very Low				Moderate							
Lake Chabot	Water Utility Shop	Zone X (unshaded)	Very High	Very Low				Moderate							
Las Trampas	Bridge - Fishing Bridge & Dam	Zone A	High	Moderate				High							
Las Trampas	Concession and Main Office	Zone A	High	Moderate				High							
Las Trampas	Maintenance Office	Zone A	High	Moderate				High							
Las Trampas	Office & Club Room - Las Trampas Stables	Zone A	Very High	Moderate				High							
Las Trampas	Park Office - Garage & Shop	Zone X (unshaded)	Very High	Very Low				High							
Las Trampas	Pool House (Chlorine Building)	Zone A	High	Moderate				High							
Las Trampas	Wastewater - Wastewater Ejection - Stables behind Club House	Zone X (unshaded)	Very High	Moderate				High							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Las Trampas	Water - Pump - Holly Court Residence	Zone X (unshaded)	Very High	Very Low				High							
Las Trampas	Water - Pump House - Remington Loop (lower)	Zone X (unshaded)	High	Very Low				High							
Las Trampas	Water - Tank - Holly Court	Zone X (unshaded)	Very High	Very Low				High							
Las Trampas	Water - Tank - Little Hills	Zone X (unshaded)	High	Very Low				High							
Las Trampas	Water - Tank - Madrone Trail / Kuss Road	Zone X (unshaded)	High	Very Low				High							
Las Trampas	Water - Tank - on Hill	Zone X (unshaded)	Very High	Very Low				High							
Las Trampas	Water - Tank - Service Yard	Zone X (unshaded)	Very High	Very Low				High							
Las Trampas	Water - to Main Facility - Las Trampas Stables	Zone X (unshaded)	Very High	Moderate				High							
Martin Luther King, Jr.	Boardwalk - Arrowhead Marsh Boardwalk	Zone AE	High	Moderate		X		Low	X	X	X	X	X	X	X
Martin Luther King, Jr.	Bridge - Arrowhead Marsh	Zone AE	Non-Wildland/Non-Urban	Moderate		X		Low	X				X	X	X

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Martin Luther King, Jr.	Bridge - Damon Slough Trestle	Zone X (shaded)	Urban Unzoned	Very High		X		Low	X						X
Martin Luther King, Jr.	Bridge - East Creek	Zone X (unshaded)	High	Water				Low	X						X
Martin Luther King, Jr.	Bridge - East Creek Trestle	Zone X (unshaded)	Moderate	Very High		X		Low	X						X
Martin Luther King, Jr.	Bridge - Elmhurst Creek	Zone X (shaded)	Urban Unzoned	Very High		X		Low	X						X
Martin Luther King, Jr.	Bridge - San Leandro Creek	Zone AE	Non-Wildland/Non-Urban	Moderate		X		Low	X				X	X	X
Martin Luther King, Jr.	Dock - Doolittle Boat Launch and Dock	Zone AE	Urban Unzoned	Very High		X		Low	X			X		X	X
Martin Luther King, Jr.	Dock - Doolittle Dock - by Shoreline Center	Zone AE	Urban Unzoned	Very High				Low	X		X		X	X	X
Martin Luther King, Jr.	Dock - Tidewater	Zone AE	Non-Wildland/Non-Urban	Water				Low	X	X	X	X	X	X	X
Martin Luther King, Jr.	Park Office - Garretson Point	Zone X (shaded)	Urban Unzoned	Very High		X		Low	X						X
Martin Luther King, Jr.	Pier - Arrowhead Marsh Pier	Zone AE	Non-Wildland/Non-Urban	Water		X		Low	X				X	X	X
Martin Luther King, Jr.	Pier - Doolittle Drive Pier	Zone AE	High	Very High				Low	X	X	X	X	X	X	X

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Martin Luther King, Jr.	Shoreline Center	Zone X (shaded)	Urban Unzoned	Very High				Low	X					X	X
Martin Luther King, Jr.	Tidewater - Oakland Strokes	Zone X (unshaded)	Urban Unzoned	Very High				Low	X						X
Martin Luther King, Jr.	Tidewater - Recreation Office & Residence	Zone X (shaded)	Non-Wildland/Non-Urban	Very High		X		Low	X				X	X	X
McLaughlin Eastshore	Bridge - Albany Beach / Golden Gate Fields	Zone X (unshaded)	Urban Unzoned	Very Low				Low	X						
McLaughlin Eastshore	Bridge - Meeker Marsh	Zone AE	Urban Unzoned	Water				Low	X		X	X	X	X	X
McLaughlin Eastshore	Bridge - South 51st Street	Zone X (unshaded)	Urban Unzoned	Very High				Low	X				X	X	X
McLaughlin Eastshore	Bridge - Stege Marsh	Zone X (unshaded)	Urban Unzoned	Very High				Low	X						X
Miller/Knox	Park Office & Model Railroad Museum	Zone X (unshaded)	Urban Unzoned	Very High				Low	X						
Miller/Knox	Wastewater - Lift Station - Model Railroad Museum	Zone X (unshaded)	Urban Unzoned	Very High				Low	X						
Miller/Knox	Wastewater - Lift Station - Residence Pumping Station - Dornan Drive	Zone X (unshaded)	Urban Unzoned	Very Low				Low							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Miller/Knox	Wastewater - Wastewater Pumping Station - Parking Lot	Zone X (unshaded)	Urban Unzoned	Very High				Low	X						
Miller/Knox	Water - Lagoon Transfer Pump	Zone X (unshaded)	Urban Unzoned	Moderate				Low	X						X
Mission Peak	Water - System - Mill Creek	Zone X (unshaded)	High	Very Low				Low							
Morgan Territory	Pumphouse - Staging Area	Zone X (unshaded)	High	Very Low				High							
Peralta Oaks	Administration Building	Zone X (unshaded)	Very High	Very Low				Low							
Peralta Oaks North	~ Peralta Oaks North	Zone X (unshaded)	Very High	Very Low				Low							
Pleasanton Ridge	Park Office & Shop	Zone X (unshaded)	High	Very Low				Moderate							
Pleasanton Ridge	Residence - Garms - River Rock Hill Road over Park Office	Zone X (unshaded)	High	Very Low				Moderate							
Pleasanton Ridge	Residence - Glenn Main House - Tehan Canyon	Zone X (unshaded)	High	Very Low				Moderate							
Pleasanton Ridge	Residence - Glenn Small House - Tehan Canyon	Zone X (unshaded)	High	Very Low				Moderate							
Pleasanton Ridge	Residence - Nipper - Foothill Boulevard, Sunol	Zone X (unshaded)	Very High	Very Low				Moderate							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Pleasanton Ridge	Residence - Poole - Dublin Canyon Road	Zone X (unshaded)	High	Very Low				Moderate							
Pleasanton Ridge	Residence Garage - Glenn - Tehan Canyon	Zone X (unshaded)	High	Very Low				Moderate							
Point Isabel	Bridge - Hoffman Channel	Zone AE	Urban Unzoned	Water				Low	X						X
Point Isabel	Concession - Dog Wash & Caf ├⌐	Zone X (unshaded)	Urban Unzoned	Very High				Low	X						
Point Pinole	Boardwalk - Dotson Family Marsh Central	Zone AE	Non-Wildland/Non-Urban	Moderate		X		Low	X					X	X
Point Pinole	Boardwalk - Dotson Family Marsh North	Zone AE	Non-Wildland/Non-Urban	Moderate		X		Low	X						
Point Pinole	Boardwalk - Dotson Family Marsh South	Zone X (shaded)	High	Very Low		X		Low	X						X
Point Pinole	Bridge - Atlas Road	Zone X (unshaded)	Moderate	Low				Low							
Point Pinole	Bridge - Badger Bridge	Zone X (unshaded)	Moderate	Low				Low							
Point Pinole	Bridge - Pinole Shores-Bayfront Park	Zone X (unshaded)	Urban Unzoned	Very High				High							
Point Pinole	Bridge - Rheem Creek	Zone AH	Non-Wildland/Non-Urban	Moderate		X		Low	X					X	X

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Point Pinole	Generator Shed	Zone X (unshaded)	Moderate	Low				Low							
Point Pinole	Kiosk - Atlas Road	Zone X (unshaded)	Moderate	Low				Low							
Point Pinole	Kiosk - Giant Staging Area	Zone X (unshaded)	Moderate	Low				Low							
Point Pinole	Park Office	Zone X (unshaded)	Moderate	Low				Low							
Point Pinole	Shop	Zone X (unshaded)	Moderate	Low				Low							
Point Pinole	Wastewater - Lift Station - Atlas Road	Zone X (unshaded)	Moderate	Low				Low							
Quarry Lakes	Kiosk - Parking Entrance	Zone X (unshaded)	Moderate	High		Extremely High Dam Inundation Area		Low							
Quarry Lakes	Park Office	Zone X (unshaded)	Non-Wildland/Non-Urban	Very High				Low							
Quarry Lakes	Service Yard - Shop	Zone X (unshaded)	Non-Wildland/Non-Urban	Very High				Low							
Quarry Lakes	Water - Irrigation Pump - Isherwood	Zone X (unshaded)	High	High				Low							
Radke Martinez	Bridge - Duck Pond Bridge 1	Zone AE	Non-Wildland/Non-Urban	Moderate				Moderate	X			X	X	X	X

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Radke Martinez	Bridge - Duck Pond Bridge 2	Zone AE	Non-Wildland/Non-Urban	Moderate				Moderate	X			X	X	X	X
Radke Martinez	Bridge - Grangers Wharf Bridge	Zone AE	Moderate	Water				Moderate	X			X	X	X	X
Radke Martinez	Bridge - Marsh Bridge #1	Zone AE	Moderate	Very High				Moderate	X			X	X	X	X
Radke Martinez	Bridge - Marsh Bridge #2	Zone AE	High	Moderate				Moderate	X			X	X	X	X
Radke Martinez	Bridge - The Arch Bridge	Zone AE	High	Water				Moderate	X			X	X	X	X
Radke Martinez	Embarcadero - Old Park Office	Zone AE	Non-Wildland/Non-Urban	Very High				Moderate				X	X	X	X
Reinhardt Redwood	Bridge - Across from Big Bear Staging Area	Zone X (unshaded)	Very High	Very Low				High							
Reinhardt Redwood	Bridge - Entrance of Redwood Gate	Zone X (unshaded)	Very High	Moderate				Moderate							
Reinhardt Redwood	Bridge - Fire Station Schoolhouse	Zone X (unshaded)	Very High	Very High				Moderate							
Reinhardt Redwood	Bridge - Fishway Crossing - Fish Ladder	Zone X (unshaded)	Very High	Moderate				High							
Reinhardt Redwood	Bridge - Main Entrance - Piedmont Stables	Zone X (unshaded)	Very High	Very Low				Low							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Reinhardt Redwood	Bridge - Moteiro Trail	Zone X (unshaded)	Very High	Very Low				Low							
Reinhardt Redwood	Bridge - Muehller Property	Zone X (unshaded)	Very High	Very Low				Low							
Reinhardt Redwood	Bridge - Stream Trail at Mill Trail	Zone X (unshaded)	Very High	Very Low				High							
Reinhardt Redwood	Bridge - Stream Trail at Fern Dell	Zone X (unshaded)	Very High	Moderate				High							
Reinhardt Redwood	Bridge - Stream Trail North of Prince Trail	Zone X (unshaded)	Very High	Very Low				High							
Reinhardt Redwood	Bridge - Stream Trail South of Tres Sendas Trail	Zone X (unshaded)	Very High	Very Low				High							
Reinhardt Redwood	Fire Station #2 - Redwood Schoolhouse	Zone X (unshaded)	Very High	Very High				Moderate							
Reinhardt Redwood	Kiosk - Redwood Road Parking Entrance	Zone X (unshaded)	Very High	Moderate				Moderate							
Reinhardt Redwood	Office - Redwood Schoolhouse	Zone X (unshaded)	Very High	Very Low				Moderate							
Reinhardt Redwood	Park Office - Reinhardt Redwood	Zone X (unshaded)	Very High	Very Low				High							
Reinhardt Redwood	Service Yard - AWP Office / Shaw Building	Zone X (unshaded)	Very High	Very Low				High							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Reinhardt Redwood	Service Yard - Garage in upper yard	Zone X (unshaded)	Very High	Very Low				High							
Reinhardt Redwood	Service Yard - Workshop	Zone X (unshaded)	Very High	Very Low				High							
Reinhardt Redwood	Shavings Barn - Piedmont Stables	Zone X (unshaded)	Very High	Very Low				Low							
Reinhardt Redwood	Trudeau Training Center	Zone X (unshaded)	Very High	Very Low				Low							
Reinhardt Redwood	Water - Spring box, waterline, water tank (system) - Piedmont Stables	Zone X (unshaded)	Very High	Very Low				High							
Reinhardt Redwood	Water - Water Line (3 mile long)	Zone X (unshaded)	Very High	Moderate				High							
Roberts	Kiosk - Roberts Parking Lot	Zone X (unshaded)	Very High	Very Low				Low							
Roberts	Kiosk - Roberts Swim Area	Zone X (unshaded)	Very High	Very Low				Low							
Roberts	Park Office & Workshop	Zone X (unshaded)	Very High	Very Low				Low							
Roberts	Pool Treatment Room - Roberts	Zone X (unshaded)	Very High	Very Low				Low							
Roberts	Water - Pump - Pump House in front of Residence	Zone X (unshaded)	Very High	Very Low				Low							
Round Valley	Bridge - Miwok Trail	Zone A	Moderate	Very High				Moderate							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Round Valley	Bridge - Murphy Meadow Trail	Zone A	High	Low				Moderate							
Round Valley	Water - Water System and Building	Zone A	Moderate	High				Moderate							
Round Valley	Water - Well - Drilled Well 2	Zone A	Moderate	High				Moderate							
Round Valley	Water - Well - Drilled Well and Tank	Zone A	Moderate	High				Moderate							
Shadow Cliffs	Bridge - North Beach	Zone A	Urban Unzoned	Moderate		X		Low							
Shadow Cliffs	Kiosk - Parking Entrance	Zone A	Urban Unzoned	Moderate		X		Low							
Shadow Cliffs	Park Office	Zone A	Urban Unzoned	Moderate		X		Low							
Shadow Cliffs	Southeast Sector Naturalist Offices [Office 2]	Zone A	Urban Unzoned	Moderate		X		Low							
Shadow Cliffs	Water - Primary Irrigation Pump	Zone A	Non-Wildland/Non-Urban	Water		X		Low							
Shadow Cliffs	Water - Submersible Well Pump - North Beach/Lawn	Zone A	Urban Unzoned	Moderate		X		Low							
Shadow Cliffs	Water - System - Service Yard	Zone X (unshaded)	Urban Unzoned	Moderate		X		Low							
Shadow Cliffs	Workshop/Storage	Zone A	Urban Unzoned	Moderate		X		Low							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Sibley	Pump House - McCosker	Zone X (unshaded)	Very High	Very Low				High							
Sibley	Water - Tank - McCosker	Zone X (unshaded)	Very High	Very Low				High							
Sunol / Ohlone Wilderness	Artifact Shed (former Museum)	Zone X (unshaded)	High	Moderate		X		High							
Sunol / Ohlone Wilderness	Bridge - near Visitor Center	Zone X (unshaded)	High	Very High		X		High							
Sunol / Ohlone Wilderness	Interpretive Headquarters - Geary Cabin	Zone X (unshaded)	High	Moderate		X		High							
Sunol / Ohlone Wilderness	Visitor Center - Sunol Green Barn	Zone X (unshaded)	High	Moderate		X		High							
Sunol / Ohlone Wilderness	Water - System - High Valley	Zone X (unshaded)	High	Very Low				High							
Sunol / Ohlone Wilderness	Water - System - Water Tanks above Residence	Zone X (unshaded)	High	Very Low				High							
Sunol / Ohlone Wilderness	Water - Water System & Tank - Camp Bertha	Zone X (unshaded)	High	Very Low				High							
Sunol / Ohlone Wilderness	Water - Water System & Tank - Camp Ohlone	Zone X (unshaded)	High	Moderate				High							
Sunol / Ohlone Wilderness	Windmill - High Valley - JB Ranch	Zone X (unshaded)	High	Very Low				High							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Sycamore Valley	Bridge - Haymaker Trail	Zone A	High	Very High				High							
Sycamore Valley	Bridge - Shady Slope Trail	Zone X (unshaded)	Moderate	Very Low				High							
Temescal	Bridge - Detention Pond	Zone X (unshaded)	Urban Unzoned	Moderate		X		Low							
Temescal	Bridge - South Creek	Zone X (unshaded)	Urban Unzoned	Moderate		X		Low							
Temescal	Flood Control - Caldecott Pump Station	Zone AE	Very High	Very Low				High							
Temescal	Kiosk - Beach	Zone X (unshaded)	Very High	Very Low				High							
Temescal	Kiosk - North Parking Entrance	Zone X (unshaded)	Very High	Moderate				High							
Temescal	Kiosk - South Parking Entrance	Zone X (unshaded)	High	Moderate				High							
Temescal	Kiwanis Building - Park Office & Restrooms	Zone AE	Very High	Moderate				High							
Temescal	Spillway - Lake Temescal	Zone AE	Very High	Low				High							
Temescal	Trailer Annex - former Park Office	Zone X (unshaded)	Very High	Very Low				High							
Temescal	Tunnel - Broadway Terrace	Zone X (unshaded)	High	Moderate				High							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Temescal	Wastewater - Wastewater Pumping Station - Maintenance Building	Zone X (unshaded)	Very High	Very Low				High							
Temescal	Wastewater - Wastewater Pumping Station - North	Zone X (unshaded)	Very High	Very Low				High							
Temescal	Wastewater - Wastewater Pumping Station - South	Zone AE	Very High	Moderate				High							
Temescal	Water - Pumphouse - Waterfall	Zone X (unshaded)	Very High	Moderate				High							
Tilden	Ball Wash Shed - Tilden Golf Course	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Barn Hay - Little Farm	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Brazilian Room / Brazil Building	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Bridge - GGLS Entrance Bridge	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Bridge - Hole 11	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Bridge - Hole 4	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Bridge - Hole 5	Zone X (unshaded)	Very High	Very Low				High							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Tilden	Bridge - Hole 6	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Bridge - Jewel Lake Dam	Zone X (unshaded)	Very High	Low		X		High							
Tilden	Bridge - Jewel Lake Trail at Laurel Creek	Zone X (unshaded)	Very High	Moderate		X		High							
Tilden	Bridge - Lake Anza Spillway	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Bridge - Lake Anza Trail at Wildcat Gorge Trail	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Bridge - Memory Trail South of Ca ├▒on Drive	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Bridge - Orchard to Acacia	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Bridge - Tilden Nature Area Entrance	Zone X (unshaded)	Very High	Very High		X		High							
Tilden	Bridge - Wildcat Gorge Trail at Lone Oak	Zone X (unshaded)	Very High	Very Low		X		High							
Tilden	Bridge - Wildcat Gorge Trail Puncheon	Zone X (unshaded)	Very High	Very Low				High							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Tilden	Bridge - Wildcat Gorge Trail to Selby Trail	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Bunker: Park Office, Trades, & Central Stores	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Cart Storage - Tilden Golf Course	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Central Stores Main Building	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Cow Barn - Little Farm	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Equipment Shed - Tilden Golf Course	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Equipment Shop	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Fire Station #1	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Former Pumphouse at Dam	Zone X (unshaded)	Very High	Low				High							
Tilden	GGLS Shop	Zone X (unshaded)	Very High	Very Low				High							
Tilden	GGLS Station Shade Structure	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Greenhouse - Little Farm	Zone X (unshaded)	Very High	Very Low				High							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Tilden	Junior Ranger Nature Lodge	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Lake Anza Dam Tunnel and Valve	Zone X (unshaded)	Very High	Low				High							
Tilden	Maintenance Building - Tilden Golf Course	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Nature Area Office & Shop	Zone X (unshaded)	Very High	Moderate				High							
Tilden	Potting Lodge	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Red Barn - Little Farm	Zone X (unshaded)	Very High	Very Low				High							
Tilden	RVRy Compressor Shed	Zone X (unshaded)	Very High	Very Low				High							
Tilden	RVRy Depot - Ticket Office	Zone X (unshaded)	Very High	Very Low				High							
Tilden	RVRy Gift Shop	Zone X (unshaded)	Very High	Very Low				High							
Tilden	RVRy Shop	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Sequoia Building	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Shed Classroom - Little Farm	Zone X (unshaded)	Very High	Very Low				High							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Tilden	Spillway - Lake Anza	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Trestle - GGLS Long Trestle	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Trestle - RVRy Trestle #1 Southgate High Line	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Trestle - RVRy Trestle #2 Army Camp	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Trestle - RVRy Trestle Southgate Lead Low Line	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Tunnel - GGLS 2008	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Tunnel - RVRy Tunnel #1 South Park Drive	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Tunnel - RVRy Tunnel #2 Corporation Yard Road	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Visitor Center - Environmental Education Center	Zone X (unshaded)	Very High	Very Low		X		High							
Tilden	Wastewater - Holding Tank - Steam Trains	Zone X (unshaded)	Very High	Very Low				High							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Tilden	Wastewater - Lift Station - Environmental Education Center	Zone X (unshaded)	Very High	Moderate		X		High							
Tilden	Wastewater - Lift Station - GGLS Clubhouse	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Wastewater - Lift Station - Lake Anza	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Wastewater - Lift Station - Merry-Go-Round	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Water - Booster Pump - Laurel	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Water - Booster Pump - Willows - City Line Pumping Plant	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Water - Corporation Yard Tank North	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Water - Corporation Yard Tank South	Zone X (unshaded)	Very High	Very Low				High							
Tilden	Water - RVRy Water Tower #2	Zone X (unshaded)	Very High	Very Low				High							
Vargas Plateau	Water - System - Residence	Zone X (unshaded)	Moderate	Very Low				Low							

Park	Asset	Flood Zone	Fire Hazard Severity Zone	Liquefaction	High Hazard Dam Inundation	Extremely High Hazard Dam Inundation	Significant Hazard Dam Inundation	Landslide	Tsunami Coastal Evacuation Zone	Existing Condition: 0-year (tidal) scenario	Existing Condition: 100-year (storm) scenario	1 Meter (3.1 feet) of Sea-level Rise: 0-year (tidal) scenario	1 Meter (3.1 feet) of Sea-level Rise: 100-year (storm) scenario	2 Meter (6.2 feet) of Sea-level Rise: 0-year (tidal) scenario	2 Meter (6.2 feet) of Sea-level Rise: 100-year (storm) scenario
Vasco Caves	Pumphouse - Vasco Caves	Zone X (unshaded)	Moderate	Very Low				Moderate							
Vasco Hills	Park Office	Zone X (unshaded)	Moderate	Low				Moderate							
Vasco Hills	Shop - Vasco Hills Workshop (Demolished)	Zone X (unshaded)	Moderate	Low				Moderate							
Vasco Hills	Water - Grazing Well	Zone X (unshaded)	Moderate	Low				Moderate							
Vasco Hills	Water - Pump House	Zone X (unshaded)	Moderate	Low				Moderate							
Vasco Hills	Water - Rain Catchment System	Zone X (unshaded)	Moderate	Low				Moderate							
Vasco Hills	Water - Service Yard Well	Zone X (unshaded)	Moderate	Low				Moderate							
Vasco Hills	Water - Water Tanks	Zone X (unshaded)	Moderate	Very Low				Moderate							
Wildcat Canyon	Bridge - Alvarado	Zone A	High	Very Low				Low							
Wildcat Canyon	Park Office & Fire Station #9	Zone X (unshaded)	High	Very Low				Low							
Wildcat Canyon	Wastewater - Lift Station - Alvarado	Zone X (unshaded)	High	Very Low				Low							

Source: EBRPD GIS

East Bay Regional Park District

Appendix H Detailed Critical Facilities by Hazard

Critical Facilities in Extremely High Hazard Dam Inundation Areas

Extremely High Hazard Dam Area/ EBRPD Park Lands	Asset Type	Asset Use	Asset Count
Briones Dam Inundation Area			
Kennedy Grove	Building	Office	1
	Kennedy Grove Total		**1**
Point Pinole	Roadways: Vehicular Bridges		4
	Point Pinole Total		**4**
Briones Total			**5**
CL Tilden Dam Inundation Area			
Tilden	Building	Multipurpose Use	1
	Pedestrian Paving: Pedestrian Bridges		4
	Sanitary Sewer: Lift Stations		1
	Tilden Total		**6**
CL Tilden Total			**6**
Chabot Dam Inundation Area			
Martin Luther King Jr.	Pier and Docks		1
	Martin Luther King Jr. Total		**1**
Chabot Total			**1**
Del Valle Dam Inundation Area			
Alameda County Trails	Pedestrian Paving: Pedestrian Bridges		1
	Alameda County Trails Total		**1**
Camp Arroyo	Building	Housing - Cabins	1
		Maintenance Shops	1
		Office	2
		Restrooms	2
	Water Supply: Potable Water Distribution & Storage		1
	Camp Arroyo Total		**7**
Shadow Cliffs	Building	Guard house / Guard Station	1
		Maintenance Shops	1
		Office	2
	Pedestrian Paving: Pedestrian Bridges		1

Extremely High Hazard Dam Area/ EBRPD Park Lands	Asset Type	Asset Use	Asset Count
	Water Supply: Potable Water Distribution & Storage		1
	Water Supply: Pumping Station		1
	Water Supply: Well Systems		1
	Shadow Cliffs Total		**8**
Temescal	Pedestrian Paving: Pedestrian Bridges		2
	Temescal Total		**2**
Del Valle Total			**18**

Source: CAL DSOD, EBRPD GIS

Critical Facilities in High Hazard Dam Inundation Areas

High Hazard Dam Area/ EBRPD Park Lands	Asset Type	Asset Use	Asset Count
Pine Creek Inundation Area			
Diablo Foothills / Castle Rock	Building	Maintenance Shops	1
		Recreation	1
		Site Utility	1
	Pedestrian Paving: Pedestrian Bridges		3
	Water Supply: Non Potable Water Distribution & Storage		1
	Diablo Foothills / Castle Rock Total		**7**
Pine Creek Total			**7**
Dry Creek Inundation Area			
East County Trails	**Pedestrian Paving: Pedestrian Bridges**		**1**
			1
Dry Creek Total			**1**

Source: CAL DSOD, EBRPD GIS

Critical Facilities in Moderate or Higher Earthquake Liquefaction Susceptibility Zones

County/Park Lands	Liquefaction Susceptibility / Asset Type	Asset Use	Asset Count
Alameda County			
Alameda County Trails	**Very High**		
	Building	Office	1
		Utility Plant	2
	Pedestrian Paving: Pedestrian Bridges		1
	High		
	Pedestrian Paving: Pedestrian Bridges		1
	Moderate		
	Pedestrian Paving: Pedestrian Bridges		3
	Alameda County Trails Total		**8**
Ardenwood	**High**		
	Building	Maintenance Shops	3
		Office	1
		Specialty Cultural (Museum, Library)	2
	Ardenwood Total		**6**
Coyote Hills	**Moderate**		
	Building	Office	1
		Utility Plant	1
	Sanitary Sewer: Lift Stations		2
	Water Supply: Non Potable Water Distribution & Storage		2
	Water Supply: Pumping Station		1
	Water Supply: Well Systems		1
	Coyote Hills Total		**7**
Crown Beach	**Very High**		
	Building	Office	1
		Retail	4
		Specialty Cultural (Museum, Library)	1
	Sanitary Sewer: Lift Stations		1
	Water		1
	Pedestrian Paving: Pedestrian Bridges		1
	Crown Beach Total		**8**
Cull Canyon	**Moderate**		

County/Park Lands	Liquefaction Susceptibility / Asset Type	Asset Use	Asset Count
	Building	Office	1
	Cull Canyon Total		**1**
Garin/Dry Creek Pioneer	**Moderate**		
	Building	Office	1
		Utility Plant	2
	Pedestrian Paving: Pedestrian Bridges		11
	Sanitary Sewer: Lift Stations		1
	Water Supply: Pumping Station		1
	Garin/Dry Creek Pioneer Total		**16**
Hayward Shoreline	**Moderate**		
	Pedestrian Paving: Pedestrian Bridges		3
	Storm Sewer		7
	Water		4
	Pedestrian Paving: Pedestrian Bridges		3
	Storm Sewer		1
	Hayward Shoreline Total		**18**
Judge John Sutter	**Very High**		
	Building	Maintenance Shops	1
		Multipurpose Use	1
		Site Utility	1
	Judge John Sutter Total		**3**
Lake Chabot	**Very High**		
	Pedestrian Paving: Pedestrian Bridges		12
	Moderate		
	Building	Maintenance Shops	1
		Multipurpose Use	2
		Office	1
	Lake Chabot Total		**16**
Martin Luther King, Jr.	**Very High**		
	Building	Office	2
		Recreation	2
	Pedestrian Paving: Pedestrian Bridges		3
	Piers & Docks		3
	Pedestrian Paving: Pedestrian Bridges		2
	Piers & Docks		1
	Water		3

County/Park Lands	Liquefaction Susceptibility / Asset Type	Asset Use	Asset Count
	Pedestrian Paving: Pedestrian Bridges		1
	Piers & Docks		2
	Martin Luther King, Jr. Total		**16**
Quarry Lakes	**Very High**		
	Building	Maintenance Shops	1
		Office	1
	High		
	Building	Guard house / Guard Station	1
	Water Supply: Non Potable Water Distribution & Storage		1
	Quarry Lakes Total		**4**
Reinhardt Redwood	**Very High**		
	Building	Fire/Police Station	1
	Pedestrian Paving: Pedestrian Bridges		1
	Moderate		
	Building	Guard house / Guard Station	1
	Pedestrian Paving: Pedestrian Bridges		3
	Water Supply: Potable Water Distribution & Storage		1
	Reinhardt Redwood Total		**7**
Shadow Cliffs	**Moderate**		
	Building	Guard house / Guard Station	1
		Maintenance Shops	1
		Office	2
	Pedestrian Paving: Pedestrian Bridges		1
	Water Supply: Potable Water Distribution & Storage		1
	Water Supply: Well Systems		1
	Water		1
	Water Supply: Pumping Station		1
	Shadow Cliffs Total		**8**
Sunol / Ohlone Wilderness	**Very High**		
	Pedestrian Paving: Pedestrian Bridges		1
	Moderate		
	Building	Office	3

County/Park Lands	Liquefaction Susceptibility / Asset Type	Asset Use	Asset Count
		Specialty Cultural (Museum, Library)	1
	Water Supply		1
	Sunol / Ohlone Wilderness Total		**10**
Temescal	**Moderate**		
	Building	Guard house / Guard Station	2
		Office	1
	Pedestrian Paving: Pedestrian Bridges		2
	Sanitary Sewer: Lift Stations		1
	Service & Pedestrian Tunnel		1
	Water Supply: Pumping Station		1
	Temescal Total		**8**
Contra Costa County			
Antioch/Oakley	**Very High**		
	Sanitary Sewer: Lift Stations		1
	Antioch/Oakley Total		**1**
Bay Point	**Moderate**		
	Pedestrian Paving: Pedestrian Bridges		1
	Bay Point Total		**2**
Big Break	**Moderate**		**1**
	Building	Recreation	1
	Big Break Total		**1**
Black Diamond Mines	**Very High**		
	Building	Recreation	2
		Storage - Fuel and Haz. Materials	1
	Moderate		
	Building	Maintenance Shops	4
		Office	3
		Recreation	14
		Site Utility	1
	Water Supply: Storage Tanks		1
	Black Diamond Mines Total		**37**
Briones	**Moderate**		
	Roadways: Vehicular Bridges		1
	Briones Total		**1**

County/Park Lands	Liquefaction Susceptibility / Asset Type	Asset Use	Asset Count
Carquinez Strait	**Moderate**		
	Building	Office	1
	Carquinez Strait Total		**3**
Contra Costa Trails	**Moderate**		
	Building	Maintenance Shops	1
	Contra Costa Trails Total		**1**
Diablo Foothills / Castle Rock	**Very High**		
	Building	Recreation	1
		Site Utility	1
	Pedestrian Paving: Pedestrian Bridges		1
	Diablo Foothills / Castle Rock Total		**3**
East County Trails	**Very High**		
	Pedestrian Paving: Pedestrian Bridges	(blank)	3
	Moderate		
	Building	Maintenance Shops	1
		Office	1
	Pedestrian Paving: Pedestrian Bridges	(blank)	2
	Sanitary Sewer: Lift Stations	(blank)	1
	East County Trails Total		**15**
Kennedy Grove	**Moderate**		
	Building	Office	1
	Kennedy Grove Total		**1**
Las Trampas	**Moderate**		
	Building	Office	3
		Site Utility	1
	Pedestrian Paving: Pedestrian Bridges		1
	Sanitary Sewer: Lift Stations		1
	Water Supply: Potable Water Distribution & Storage		1
	Las Trampas Total		**7**
McLaughlin Eastshore	**Very High**		
	Pedestrian Paving: Pedestrian Bridges		2
	Water		1
	Pedestrian Paving: Pedestrian Bridges		1
	McLaughlin Eastshore Total		**3**
Miller/Knox	**Very High**		

County/Park Lands	Liquefaction Susceptibility / Asset Type	Asset Use	Asset Count
	Building		1
	Sanitary Sewer: Lift Stations		2
	Moderate		
	Water Supply: Pumping Station		1
	Miller/Knox Total		**4**
Point Isabel	**Very High**		
	Building	Office	1
	Water		1
	Pedestrian Paving: Pedestrian Bridges		1
	Point Isabel Total		**4**
Point Pinole	**Very High**		
	Pedestrian Paving: Pedestrian Bridges	(blank)	1
	Moderate		
	Roadways: Vehicular Bridges		3
	Point Pinole Total		**4**
Radke Martinez	**Very High**		
	Building	Office	1
	Pedestrian Paving: Pedestrian Bridges		1
	Moderate		
	Pedestrian Paving: Pedestrian Bridges		3
	Water		2
	Pedestrian Paving: Pedestrian Bridges		2
	Radke Martinez Total		**9**
Round Valley	**Very High**		
	Pedestrian Paving: Pedestrian Bridges	(blank)	1
	High		
	Building	Utility Plant	1
	Water Supply: Well Systems		2
	Round Valley Total		**4**
Sycamore Valley	**Very High**		
	Pedestrian Paving: Pedestrian Bridges		1
	Sycamore Valley Total		**1**
Tilden	**Very High**		
	Pedestrian Paving: Pedestrian Bridges		1
	Moderate		
	Building	Maintenance Shops	1

County/Park Lands	Liquefaction Susceptibility / Asset Type	Asset Use	Asset Count
	Pedestrian Paving: Pedestrian Bridges		1
	Sanitary Sewer: Lift Stations		1
	Tilden Total		60

Source: CGS/USGS, EBRPD

Critical Facilities in 1% and 0.2% Annual Chance Detailed DFIRM Flood Zones

Park Lands	Flood Zone / Asset Type	Asset Use	Asset Count
Alameda County			
Alameda County Trails	**1% Annual Chance Flood Hazard**		
	Zone A		
	Pedestrian Paving: Pedestrian Bridges		2
	Zone A Total		***2***
	Zone AE Floodway		
	Pedestrian Paving: Pedestrian Bridges		2
	Zone AE Floodway Total		***2***
	1% Annual Chance Flood Hazard Total		**4**
	0.2% Annual Chance Flood Hazard		
	Zone X (shaded)		
	Pedestrian Paving: Pedestrian Bridges		1
	Zone X (shaded) Total		***1***
	0.2% Annual Chance Flood Hazard Total		**1**
	Alameda County Trails Total		**5**
Crown Beach	**1% Annual Chance Flood Hazard**		
	Zone AE		
	Pedestrian Paving: Pedestrian Bridges		1
	Zone AE Total		***1***
	1% Annual Chance Flood Hazard Total		**1**
	Crown Beach Total		**1**
Hayward Shoreline	**1% Annual Chance Flood Hazard**		
	Zone AE		
	Pedestrian Paving: Pedestrian Bridges		5
	Storm Sewer		8
	Zone AE Total		***13***
	1% Annual Chance Flood Hazard Total		**13**
	Hayward Shoreline Total		**13**
Judge John Sutter	**1% Annual Chance Flood Hazard**		
	Zone AE		
	Building	Maintenance Shops	1
		Site Utility	1
	Zone AE Total		***2***
	1% Annual Chance Flood Hazard Total		**2**
	0.2% Annual Chance Flood Hazard		

Park Lands	Flood Zone / Asset Type	Asset Use	Asset Count
	Zone X (shaded)		
	Building	Multipurpose Use	1
	Zone X (shaded) Total		***1***
	0.2% Annual Chance Flood Hazard Total		**1**
	Judge John Sutter Total		**3**
Martin Luther King, Jr.	**1% Annual Chance Flood Hazard**		
	Zone AE		
	Pedestrian Paving: Pedestrian Bridges		2
	Piers & Docks		6
	Zone AE Total		***8***
	1% Annual Chance Flood Hazard Total		**8**
	0.2% Annual Chance Flood Hazard		
	Zone X (shaded)		
	Building	Office	2
		Recreation	1
	Pedestrian Paving: Pedestrian Bridges		2
	Zone X (shaded) Total		***5***
	0.2% Annual Chance Flood Hazard Total		**5**
	Martin Luther King, Jr. Total		**13**
Shadow Cliffs	**1% Annual Chance Flood Hazard**		
	Zone A		
	Building	Guard house / Guard Station	1
		Maintenance Shops	1
		Office	2
	Pedestrian Paving: Pedestrian Bridges		1
	Water Supply: Pumping Station		1
	Water Supply: Well Systems		1
	Zone A Total		***7***
	1% Annual Chance Flood Hazard Total		**7**
	Shadow Cliffs Total		**7**
Temescal	**1% Annual Chance Flood Hazard**		
	Zone AE		
	Building	Office	1
		Pump Station	1
	Sanitary Sewer: Lift Stations		1
	Storm Sewer		1

Park Lands	Flood Zone / Asset Type	Asset Use	Asset Count
	Zone AE Total		***4***
	1% Annual Chance Flood Hazard Total		**4**
Contra Costa County			
Bay Point	**1% Annual Chance Flood Hazard**		
	Zone AE		
	Pedestrian Paving: Pedestrian Bridges		1
	Zone AE Total		***1***
	1% Annual Chance Flood Hazard Total		**1**
	Bay Point Total		**1**
Big Break	**1% Annual Chance Flood Hazard**		
	Zone AE		
	Building	Recreation	1
	Zone AE Total		***1***
	1% Annual Chance Flood Hazard Total		**1**
	Big Break Total		**1**
Black Diamond Mines	**1% Annual Chance Flood Hazard**		
	Zone A		
	Building	Recreation	1
	Zone A Total		***1***
	1% Annual Chance Flood Hazard Total		**1**
	Black Diamond Mines Total		**1**
Briones	**1% Annual Chance Flood Hazard**		
	Zone A		
	Roadways: Vehicular Bridges		1
	Zone A Total		***1***
	1% Annual Chance Flood Hazard Total		**1**
	Briones Total		**1**
Brooks Island	**1% Annual Chance Flood Hazard**		
	Zone VE		
	Service & Pedestrian Tunnel	(blank)	1
	Zone VE Total		***1***
	1% Annual Chance Flood Hazard Total		**1**
	Brooks Island Total		**2**
Contra Costa Trails	**1% Annual Chance Flood Hazard**		
	Zone A		
	Building	Maintenance Shops	1

Park Lands	Flood Zone / Asset Type	Asset Use	Asset Count
	Zone A Total		***1***
	1% Annual Chance Flood Hazard Total		**1**
	Contra Costa Trails Total		**1**
Diablo Foothills / Castle Rock	**1% Annual Chance Flood Hazard**		
	Zone A		
	Building	Recreation	1
		Site Utility	1
	Pedestrian Paving: Pedestrian Bridges	(blank)	3
	Water Supply: Non Potable Water Distribution & Storage		1
	Zone A Total		***6***
	1% Annual Chance Flood Hazard Total		**6**
	Diablo Foothills / Castle Rock Total		**10**
East County Trails	1% Annual Chance Flood Hazard		
	Zone AE Floodway		
	Pedestrian Paving: Pedestrian Bridges	(blank)	4
	Zone AE Floodway Total		***4***
	Zone AE		
	Pedestrian Paving: Pedestrian Bridges	(blank)	2
	Zone AE Total		***2***
	1% Annual Chance Flood Hazard Total		**6**
	East County Trails Total		**15**
Las Trampas	**1% Annual Chance Flood Hazard**		
	Zone A		
	Building	Office	3
		Site Utility	1
	Pedestrian Paving: Pedestrian Bridges	(blank)	1
	Zone A Total		**5**
	1% Annual Chance Flood Hazard Total		**5**
	Las Trampas Total		**15**
McLaughlin Eastshore	**1% Annual Chance Flood Hazard**		
	Zone AE		
	Pedestrian Paving: Pedestrian Bridges	(blank)	1
	Zone AE Total		***1***
	1% Annual Chance Flood Hazard Total		**1**
	McLaughlin Eastshore Total		**3**
Point Isabel	**1% Annual Chance Flood Hazard**		

Park Lands	Flood Zone / Asset Type	Asset Use	Asset Count
	Zone AE		
	Pedestrian Paving: Pedestrian Bridges	(blank)	1
	Zone AE Total		***1***
	1% Annual Chance Flood Hazard Total		**1**
	Point Isabel Total		**2**
Point Pinole	**1% Annual Chance Flood Hazard**		
	Zone AE		
	Roadways: Vehicular Bridges		2
	Zone AE Total		***2***
	Zone AH		
	Roadways: Vehicular Bridges		1
	Zone AH Total		***1***
	1% Annual Chance Flood Hazard Total		**3**
	0.2% Annual Chance Flood Hazard		
	Zone X (shaded)		
	Roadways: Vehicular Bridges		1
	Zone X (shaded) Total		***1***
	0.2% Annual Chance Flood Hazard Total		**1**
	Point Pinole Total		**13**
Radke Martinez	**1% Annual Chance Flood Hazard**		
	Zone AE		
	Building	Office	1
	Pedestrian Paving: Pedestrian Bridges		6
	Zone AE Total		***7***
	1% Annual Chance Flood Hazard Total		**7**
	Radke Martinez Total		**7**
Round Valley	**1% Annual Chance Flood Hazard**		
	Zone A		
	Building	Utility Plant	1
	Pedestrian Paving: Pedestrian Bridges	(blank)	2
	Water Supply: Well Systems	(blank)	2
	Zone A Total		***5***
	1% Annual Chance Flood Hazard Total		**5**
	Round Valley Total		**5**
Sycamore Valley	**1% Annual Chance Flood Hazard**		
	Zone A		

Park Lands	Flood Zone / Asset Type	Asset Use	Asset Count
	Pedestrian Paving: Pedestrian Bridges	(blank)	1
	Zone A Total		***1***
	1% Annual Chance Flood Hazard Total		**1**
	Sycamore Valley Total		**2**
Wildcat Canyon	**1% Annual Chance Flood Hazard**		
	Zone A		
	Roadways: Vehicular Bridges	(blank)	1
	Zone A Total		***1***
	1% Annual Chance Flood Hazard Total		**1**
	Wildcat Canyon Total		**3**

Source: FEMA Alameda County DFIRM 12/21/2018, Contra Costa County DFIRM 3/21/2017, EBRPD GIS

Critical Facilities in Moderate or Higher Landslide Incidence and Susceptibility Areas

County/ EBRPD Park Lands	Landslide Susceptibility and Incidence Area / Asset Type	Asset Use	Asset Count
Alameda County			
Alameda County Trails	**High**		
	Pedestrian Paving: Pedestrian Bridges		4
	High Total		4
	Alameda County Trails Total		**8**
Anthony Chabot	**High**		
	Pedestrian Paving: Pedestrian Bridges		1
	High Total		**1**
	Moderate		
	Building	Guard house/ Guard Station	1
		Maintenance Shops	1
		Office	3
		Site Utility	1
	Pedestrian Paving: Pedestrian Bridges		3
	Sanitary Sewer		1
	Sanitary Sewer: Lift Stations		2
	Sanitary Sewer: Septic Disposal Systems		1
	Water Supply: Pumping Station		1
	Water Supply: Storage Tanks		2
	Moderate Total		**16**
	Anthony Chabot Total		**17**
Camp Arroyo	**High**		
	Building	Dining / Cafeteria (with Kitchen)	1
		Housing - Cabins	9
		Maintenance Shops	1
		Medical - Clinic	1
		Office	3
		Recreation	3
		Restrooms	2
	Sanitary Sewer: Lift Stations		1
	Water Supply: Potable Water Distribution & Storage		1
	Water Supply: Storage Tanks		1
	High Total		**23**

County/ EBRPD Park Lands	Landslide Susceptibility and Incidence Area / Asset Type	Asset Use	Asset Count
	Camp Arroyo Total		**23**
Claremont Canyon	**High**		
	Building	Maintenance Shops	1
		Office	1
	High Total		**2**
	Claremont Canyon Total		**2**
Cull Canyon	**Moderate**		
	Building	Aquatic Facility	2
		Office	1
		Site Utility	2
	Pedestrian Paving: Pedestrian Bridges		1
	Sanitary Sewer: Lift Stations		1
	Moderate Total		**7**
	Cull Canyon Total		**7**
Del Valle	**High**		
	Building	Maintenance Shops	2
		Office	1
		Specialty Cultural (Museum, Library)	1
		Storage - Fuel and Haz. Materials	1
		Utility Plant	2
	Pedestrian Paving: Pedestrian Bridges		1
	Sanitary Sewer: Drain Fields		1
	Sanitary Sewer: Lift Stations		6
	Sanitary Sewer: Septic Disposal Systems		1
	Tank		5
	Water Supply: Non Potable Water Distribution & Storage		1
	Water Supply: Pumping Station		1
	High Total		**23**
	Del Valle Total		**23**
Don Castro	**Moderate**		
	Building	Guard house / Guard Station	1
		Maintenance Shops	1
	Sanitary Sewer: Lift Stations		2
	Moderate Total		**4**

County/ EBRPD Park Lands	Landslide Susceptibility and Incidence Area / Asset Type	Asset Use	Asset Count
	Don Castro Total		4
Garin/Dry Creek Pioneer	**Moderate**		
	Water Supply		1
	Moderate Total		**1**
	Garin/Dry Creek Pioneer Total		**5**
Lake Chabot	**Moderate**		
	Building	Maintenance Shops	12
		Multipurpose Use	2
		Office	8
	Pedestrian Paving: Pedestrian Bridges	(blank)	24
	Sanitary Sewer: Lift Stations	(blank)	2
	Water Supply: Pumping Station	(blank)	2
	Water Supply: Storage Tanks	(blank)	1
	Moderate Total		**51**
	Lake Chabot Total		**51**
Pleasanton Ridge	**Moderate**		
	Building	Office	1
	Moderate Total		**7**
	Pleasanton Ridge Total		**7**
Reinhardt Redwood	**High**		
	Building	Maintenance Shops	1
		Office	2
		Site Utility	1
	Pedestrian Paving: Pedestrian Bridges		3
	Water Supply		1
	Water Supply: Potable Water Distribution & Storage		1
	High Total		**9**
	Moderate		
	Building	Fire/Police Station	1
		Guard house / Guard Station	1
		Office	1
	Pedestrian Paving: Pedestrian Bridges		2
	Moderate Total		**5**
	Reinhardt Redwood Total		**19**
Sunol / Ohlone Wilderness	**High**		

County/ EBRPD Park Lands	Landslide Susceptibility and Incidence Area / Asset Type	Asset Use	Asset Count
	Building	Office	3
		Specialty Cultural (Museum, Library)	1
	Pedestrian Paving: Pedestrian Bridges		1
	Water Supply		2
	Water Supply: Potable Water Distribution & Storage		1
	Water Supply: Storage Tanks		1
	Windmill		1
	High Total		**10**
	Sunol / Ohlone Wilderness Total		**10**
Temescal	**High**		
	Building	Guard house / Guard Station	3
		Office	2
		Pump Station	1
	Sanitary Sewer: Lift Stations		3
	Service & Pedestrian Tunnel		1
	Storm Sewer		1
	Water Supply: Pumping Station		1
	High Total		**12**
	Temescal Total		**12**
Contra Costa County			
Antioch/Oakley	**Moderate**		
	Sanitary Sewer: Lift Stations		1
	Moderate Total		**1**
	Antioch/Oakley Total		**1**
Bay Point	Moderate		
	Pedestrian Paving: Pedestrian Bridges		1
	Water Supply: Well Systems		1
	Moderate Total		**2**
	Bay Point Total		**2**
Black Diamond Mines	**Moderate**		
	Building	Maintenance Shops	7
		Office	4
		Pump Station	1

County/ EBRPD Park Lands	Landslide Susceptibility and Incidence Area / Asset Type	Asset Use	Asset Count
		Recreation	18
		Site Utility	1
		Storage - Fuel and Haz. Materials	1
	Water Supply: Potable Water Distribution & Storage		2
	Water Supply: Storage Tanks		2
	Water Supply: Well Systems		1
	Moderate Total		**37**
	Black Diamond Mines Total		**37**
Briones	**High**		
	Building	Maintenance Shops	1
		Office	1
		Site Utility	1
	Roadways: Vehicular Bridges		1
	Water Supply: Potable Water Distribution & Storage		2
	Water Supply: Well Systems		2
	High Total		**8**
	Briones Total		**8**
Byron Vernal Pools	**Moderate**		
	Water Supply: Well Systems		1
	Moderate Total		**1**
	Byron Vernal Pools Total		**1**
Carquinez Strait	**Moderate**		
	Building	Office	2
	Pedestrian Paving: Pedestrian Bridges		1
	Moderate Total		**3**
	Carquinez Strait Total		**3**
Clayton Ranch	**Moderate**		
	Pedestrian Paving: Pedestrian Bridges		1
	Moderate Total		**1**
	Clayton Ranch Total		**1**
Contra Loma	**Moderate**		
	Building	Office	2
	Sanitary Sewer: Lift Stations		1
	Water Supply: Non Potable Water Distribution & Storage		4

County/ EBRPD Park Lands	Landslide Susceptibility and Incidence Area / Asset Type	Asset Use	Asset Count
	Moderate Total		**7**
	Contra Loma Total		**7**
Deer Valley	**Moderate**		
	Water Supply: Potable Water Distribution & Storage		2
	Water Supply: Well Systems		1
	Moderate Total		**3**
	Deer Valley Total		**3**
Diablo Foothills / Castle Rock	**High**		
	Building	Bathhouse	1
		Maintenance Shops	2
		Office	1
		Recreation	1
		Site Utility	1
	Water Supply: Non Potable Water Distribution & Storage		1
	High Total		**7**
	Diablo Foothills / Castle Rock Total		**7**
East County Trails	**Moderate**		
	Pedestrian Paving: Pedestrian Bridges		10
	Moderate Total		**10**
	East County Trails Total		**10**
Kennedy Grove	**High**		
	Building	Office	1
	High Total		**1**
	Kennedy Grove Total		**1**
Las Trampas	**High**		
	Building	Maintenance Shops	1
		Office	3
		Site Utility	1
	Pedestrian Paving: Pedestrian Bridges		1
	Sanitary Sewer: Lift Stations		1
	Water Supply: Potable Water Distribution & Storage		1
	Water Supply: Pumping Station		2
	Water Supply: Storage Tanks		5
	High Total		**15**

County/ EBRPD Park Lands	Landslide Susceptibility and Incidence Area / Asset Type	Asset Use	Asset Count
	Las Trampas Total		**15**
Morgan Territory	**High**		
	Building	Maintenance Shops	1
	High Total		**1**
	Morgan Territory Total		**1**
Point Pinole	High		
	Pedestrian Paving: Pedestrian Bridges		1
	High Total		**1**
	Point Pinole Total		**13**
Radke Martinez	**Moderate**		
	Building	Office	1
	Pedestrian Paving: Pedestrian Bridges		6
	Moderate Total		**7**
	Radke Martinez Total		**7**
Reinhardt Redwood	**High**		
	Pedestrian Paving: Pedestrian Bridges		3
	High Total		**3**
	Reinhardt Redwood Total		**3**
Round Valley	**Moderate**		
	Building	Utility Plant	1
	Pedestrian Paving: Pedestrian Bridges		2
	Water Supply: Well Systems		2
	Moderate Total		**5**
	Round Valley Total		**5**
Sibley	**High**		
	Building	Pump Station	1
	Water Supply: Storage Tanks		1
	High Total		**2**
	Sibley Total		**2**
Sycamore Valley	**High**		
	Pedestrian Paving: Pedestrian Bridges		2
	High Total		**2**
	Sycamore Valley Total		**2**
Tilden	High		
	Building	Animal Facility	3
		Fire/Police Station	1

County/ EBRPD Park Lands	Landslide Susceptibility and Incidence Area / Asset Type	Asset Use	Asset Count
		Maintenance Shops	10
		Multipurpose Use	5
		Pump Station	1
		Recreation	5
		Utility Plant	1
	Pedestrian Paving: Pedestrian Bridges		19
	Sanitary Sewer		1
	Sanitary Sewer: Lift Stations		4
	Service & Pedestrian Tunnel		3
	Storm Sewer		2
	Water Supply: Pumping Station		2
	Water Supply: Storage Tanks		3
	High Total		**60**
	Tilden Total		**60**
Vasco Caves	**Moderate**		
	Building	Pump Station	1
	Moderate Total		**1**
	Vasco Caves Total		**1**
Vasco Hills	**Moderate**		
	Building	Maintenance Shops	1
		Office	1
		Pump Station	1
	Tank		2
	Water Supply: Well Systems		2
	Moderate Total		**7**
	Vasco Hills Total		**7**

Source: USGS Landslide Data, EBRPD GIS

Critical Facilities by Sea Level Rise Scenario

Park Lands	Asset Type	Asset Use	Asset Count
Existing Conditions of Sea-level Rise: 0-year (tidal) scenario			
Alameda County			
Crown Beach	Pedestrian Paving: Pedestrian Bridges		1
	Crown Beach Total		**1**
Hayward Shoreline	Pedestrian Paving: Pedestrian Bridges		3
	Storm Sewer		2
	Hayward Shoreline Total		**5**
Martin Luther King, Jr.	Piers & Docks		**3**
	Martin Luther King, Jr. Total		**3**
Contra Costa County			**9**
Brooks Island	Service & Pedestrian Tunnel		1
	Brooks Island Total		**1**
Contra Costa County Total			**1**
Grand Total			**10**
Existing Conditions of Sea-level Rise: 100-year (storm) scenario			
Crown Beach	Pedestrian Paving: Pedestrian Bridges		1
	Crown Beach Total		**1**
Hayward Shoreline	Pedestrian Paving: Pedestrian Bridges		3
	Storm Sewer		2
	Hayward Shoreline Total		**5**
Martin Luther King, Jr.	Piers & Docks		4
	Martin Luther King, Jr. Total		**4**
Alameda County Total			**10**
Contra Costa County			
Brooks Island	Service & Pedestrian Tunnel		1
	Brooks Island Total		**1**
McLaughlin Eastshore	Pedestrian Paving: Pedestrian Bridges		1
	McLaughlin Eastshore Total		**1**
Contra Costa County Total			**2**
Grand Total			**12**
1 Meter of Sea-level Rise: 0-year (tidal) scenario			
Alameda County			
Crown Beach	Pedestrian Paving: Pedestrian Bridges		1
	Crown Beach Total		**1**
Hayward Shoreline	Pedestrian Paving: Pedestrian Bridges		3

Park Lands	Asset Type	Asset Use	Asset Count
	Storm Sewer		8
	Hayward Shoreline Total		**11**
Martin Luther King, Jr.	Piers & Docks		4
	Martin Luther King, Jr. Total		**4**
Alameda County Total			**16**
Contra Costa County			
Bay Point	Pedestrian Paving: Pedestrian Bridges		1
	Bay Point Total		**1**
Brooks Island	Service & Pedestrian Tunnel		1
	Brooks Island Total		
McLaughlin Eastshore	Pedestrian Paving: Pedestrian Bridges		1
	McLaughlin Eastshore Total		**1**
Radke Martinez	Building	Office	1
	Pedestrian Paving: Pedestrian Bridges		6
	Radke Martinez Total		**7**
Contra Costa County Total			**10**
Grand Total			**26**
1 Meter of Sea-level Rise: 100-year (storm) scenario			
Alameda County			
Crown Beach	Building	Office	1
		Retail	1
		Specialty Cultural (Museum, Library)	1
	Pedestrian Paving: Pedestrian Bridges		1
	Crown Beach Total		**4**
Hayward Shoreline	Pedestrian Paving: Pedestrian Bridges		5
	Storm Sewer		8
	Hayward Shoreline Total		**13**
Judge John Sutter	Building	Maintenance Shops	1
		Site Utility	1
	Judge John Sutter Total		**2**
Martin Luther King, Jr.	Building	Recreation	1
	Pedestrian Paving: Pedestrian Bridges		2
	Piers & Docks		5
	Martin Luther King, Jr. Total		**8**
Alameda County Total			**27**

Park Lands	Asset Type	Asset Use	Asset Count
Contra Costa County			
Brooks Island	Service & Pedestrian Tunnel		1
	Brooks Island Total		**1**
McLaughlin Eastshore	Pedestrian Paving: Pedestrian Bridges		2
	McLaughlin Eastshore Total		**2**
Radke Martinez	Building	Office	1
	Pedestrian Paving: Pedestrian Bridges		6
	Radke Martinez Total		**7**
Contra Costa County Total			**10**
Grand Total			**37**
2 Meter of Sea-level Rise: 0-year (tidal) scenario			
Alameda County			
Coyote Hills	Building	Utility Plant	1
	Sanitary Sewer: Lift Stations		1
	Water Supply: Non Potable Water Distribution & Storage		2
	Water Supply: Pumping Station		1
	Water Supply: Well Systems		1
	Coyote Hills Total		**6**
Crown Beach	Pedestrian Paving: Pedestrian Bridges		1
	Crown Beach Total		**1**
Hayward Shoreline	Pedestrian Paving: Pedestrian Bridges		5
	Storm Sewer		8
	Hayward Shoreline Total		**13**
Judge John Sutter	Building	Maintenance Shops	1
		Multipurpose Use	1
		Site Utility	1
	Judge John Sutter Total		**3**
Martin Luther King, Jr.	Building	Office	1
		Recreation	1
	Pedestrian Paving: Pedestrian Bridges		2
	Piers & Docks		6
	Martin Luther King, Jr. Total		**10**
Alameda County Total			**33**
Contra Costa County			
Bay Point	Pedestrian Paving: Pedestrian Bridges		1

Park Lands	Asset Type	Asset Use	Asset Count
	Bay Point Total		**1**
Brooks Island	Service & Pedestrian Tunnel		1
	Brooks Island Total		**1**
McLaughlin Eastshore	Pedestrian Paving: Pedestrian Bridges		2
	McLaughlin Eastshore Total		**2**
Point Pinole	Roadways: Vehicular Bridges		2
	Point Pinole Total		**2**
Radke Martinez	Building	Office	1
	Pedestrian Paving: Pedestrian Bridges		6
	Radke Martinez Total		**7**
Contra Costa County Total			**13**
Grand Total			**46**
2 Meter of Sea-level Rise: 100-year (storm) scenario			
Alameda County			
Coyote Hills	Building	Office	1
		Utility Plant	1
	Sanitary Sewer: Lift Stations		2
	Water Supply: Non Potable Water Distribution & Storage		2
	Water Supply: Pumping Station		1
	Water Supply: Well Systems		1
	Coyote Hills Total		**8**
Crown Beach	Building	Office	1
		Retail	4
		Specialty Cultural (Museum, Library)	1
	Pedestrian Paving: Pedestrian Bridges		1
	Sanitary Sewer: Lift Stations		1
	Crown Beach Total		**8**
Hayward Shoreline	Pedestrian Paving: Pedestrian Bridges		6
	Storm Sewer		8
	Hayward Shoreline Total		**14**
Judge John Sutter	Building	Maintenance Shops	1
		Multipurpose Use	1
		Site Utility	1
	Judge John Sutter Total		**3**

Park Lands	Asset Type	Asset Use	Asset Count
Martin Luther King, Jr.	Building	Office	2
		Recreation	2
	Pedestrian Paving: Pedestrian Bridges		6
	Piers & Docks		6
	Martin Luther King, Jr. Total		**16**
Alameda County Total			**49**
Contra Costa County			
Bay Point	Pedestrian Paving: Pedestrian Bridges		1
	Bay Point Total		**1**
Brooks Island	Service & Pedestrian Tunnel		1
	Brooks Island Total		**1**
McLaughlin Eastshore	Pedestrian Paving: Pedestrian Bridges		3
	McLaughlin Eastshore Total		**3**
Miller/Knox	Water Supply: Pumping Station		1
	Miller/Knox Total		**1**
Point Isabel	Pedestrian Paving: Pedestrian Bridges		1
	Point Isabel Total		**1**
Point Pinole	Roadways: Vehicular Bridges		3
	Point Pinole Total		**3**
Radke Martinez	Building	Office	1
	Pedestrian Paving: Pedestrian Bridges		6
	Radke Martinez Total		**7**
Contra Costa County Total			**17**
Grand Total			**66**

Source: Cosmos, EBRPD GIS

Critical Facilities Inside Tsunami Coastal Evacuation Areas

Park Lands	Tsunami Hazard Area Coastal Evacuation Zone / Asset Type	Asset Use	Asset Count
Alameda County			
Coyote Hills	Building	Bathhouse	1
		Office	3
	Sanitary Sewer: Lift Stations		2
	Water Supply: Non Potable Water Distribution & Storage		2
	Water Supply: Pumping Station		1
	Water Supply: Well Systems		1
	Coyote Hills Total		**10**
Crown Beach	Building	Office	1
		Retail	4
		Specialty Cultural (Museum, Library)	1
	Pedestrian Paving: Pedestrian Bridges		1
	Sanitary Sewer: Lift Stations		1
	Crown Beach Total		**8**
Hayward Shoreline	Pedestrian Paving: Pedestrian Bridges		6
	Storm Sewer		8
	Hayward Shoreline Total		**14**
Judge John Sutter	Building	Maintenance Shops	1
		Multipurpose Use	1
		Site Utility	1
	Judge John Sutter Total		**3**
Martin Luther King, Jr.	Building	Office	2
		Recreation	2
	Pedestrian Paving: Pedestrian Bridges		6
	Piers & Docks		6
	Martin Luther King, Jr. Total		**16**
McLaughlin Eastshore	Pedestrian Paving: Pedestrian Bridges		1
	McLaughlin Eastshore Total		**1**
Alameda County Total			**52**
Contra Costa County			
Brooks Island	Service & Pedestrian Tunnel		1
	Water Supply: Potable Water Distribution & Storage		1
	Brooks Island Total		**2**

Park Lands	Tsunami Hazard Area Coastal Evacuation Zone / Asset Type	Asset Use	Asset Count
McLaughlin Eastshore	Pedestrian Paving: Pedestrian Bridges		3
	McLaughlin Eastshore Total		**3**
Miller/Knox	Building	Office	1
	Sanitary Sewer: Lift Stations		2
	Water Supply: Pumping Station		1
	Miller/Knox Total		**4**
Point Isabel	Building	Office	1
	Pedestrian Paving: Pedestrian Bridges		1
	Point Isabel Total		2
Point Pinole	Roadways: Vehicular Bridges		4
	Point Pinole Total		**4**
Radke Martinez	Pedestrian Paving: Pedestrian Bridges		6
	Radke Martinez Total		**6**
Contra Costa County Total			**21**
Grand Total			**73**

Source: CGS Tsunami Inundation Areas, EBRPD GIS

Critical Facilities Inside Moderate or Higher FHSZs

Park Lands	Fire Hazard Severity Zone / Asset Type	Asset Use	Asset Count
Alameda County			
Alameda County Trails	**High**		
	Building	Office	1
		Utility Plant	2
	Moderate		
	Pedestrian Paving: Pedestrian Bridges		1
	Alameda County Trails Total		**8**
Anthony Chabot	**Very High**		
	Building	Office	2
		Site Utility	1
	Pedestrian Paving: Pedestrian Bridges		4
	Water Supply: Pumping Station		1
	Water Supply: Storage Tanks		3
	Very High Total		**8**
	High		
	Building	Guard house / Guard Station	1
		Maintenance Shops	1
		Office	1
	Sanitary Sewer		1
	Sanitary Sewer: Lift Stations		2
	Sanitary Sewer: Septic Disposal Systems		1
	Water Supply: Storage Tanks		1
	High Total		**8**
	Anthony Chabot Total		**19**
Ardenwood	**High**		
	Building	Maintenance Shops	2
		Office	1
		Specialty Cultural (Museum, Library)	2
	High Total		**5**
	Ardenwood Total		**6**
Camp Arroyo	**High**		
	Building	Dining / Cafeteria (with Kitchen)	1
		Housing - Cabins	8

Park Lands	Fire Hazard Severity Zone / Asset Type	Asset Use	Asset Count
		Medical - Clinic	1
		Office	1
		Recreation	3
	Sanitary Sewer: Lift Stations		1
	Water Supply: Storage Tanks		1
	High Total		**16**
	Moderate		
	Building	Housing - Cabins	1
		Maintenance Shops	1
		Office	2
		Restrooms	2
	Water Supply: Potable Water Distribution & Storage		1
	Moderate Total		**7**
	Camp Arroyo Total		**23**
Claremont Canyon	**Very High**		
	Building	Maintenance Shops	1
		Office	1
	Very High Total		**2**
	Claremont Canyon Total		**2**
Coyote Hills	**High**		
	Building	Bathhouse	1
		Office	4
		Utility Plant	1
	High Total		**6**
	Coyote Hills Total		**6**
Crown Beach	**High**		
	Pedestrian Paving: Pedestrian Bridges		1
	High Total		**1**
	Crown Beach Total		**1**
Cull Canyon	**High**		
	Building	Aquatic Facility	2
		Office	1
		Site Utility	2
	Pedestrian Paving: Pedestrian Bridges		1
	Sanitary Sewer: Lift Stations		1
	High Total		**7**

Park Lands	Fire Hazard Severity Zone / Asset Type	Asset Use	Asset Count
	Cull Canyon Total		**7**
Del Valle	**High**		
	Building	Maintenance Shops	2
		Office	1
		Storage - Fuel and Haz. Materials	1
		Utility Plant	2
	Pedestrian Paving: Pedestrian Bridges		1
	Sanitary Sewer: Drain Fields		1
	Sanitary Sewer: Lift Stations		3
	Sanitary Sewer: Septic Disposal Systems		1
	Tank		5
	Water Supply: Non Potable Water Distribution & Storage		1
	High Total		**18**
	Moderate		
	Building	Specialty Cultural (Museum, Library)	1
	Sanitary Sewer: Lift Stations		3
	Water Supply: Pumping Station		1
	Moderate Total		**5**
	Del Valle Total		**23**
Don Castro	**High**		
	Building	Guard house / Guard Station	1
		Maintenance Shops	1
	Sanitary Sewer: Lift Stations		2
	High Total		**4**
	Don Castro Total		**4**
Garin/Dry Creek Pioneer	**High**		
	Building	Maintenance Shops	1
		Office	1
		Utility Plant	2
	Pedestrian Paving: Pedestrian Bridges		15
	Sanitary Sewer: Lift Stations		1
	Water Supply		1
	Water Supply: Pumping Station		1
	Water Supply: Storage Tanks		2

Park Lands	Fire Hazard Severity Zone / Asset Type	Asset Use	Asset Count
	High Total		**24**
	Garin/Dry Creek Pioneer Total		**24**
Lake Chabot	**Very High**		
	Building	Maintenance Shops	12
		Multipurpose Use	2
		Office	8
	Pedestrian Paving: Pedestrian Bridges		22
	Sanitary Sewer: Lift Stations		2
	Water Supply: Pumping Station		2
	Very High Total		**49**
	High		
	Pedestrian Paving: Pedestrian Bridges		1
	High Total		**1**
	Moderate		
	Pedestrian Paving: Pedestrian Bridges		1
	Moderate Total		**1**
	Lake Chabot Total		**51**
Martin Luther King, Jr.	**High**		
	Pedestrian Paving: Pedestrian Bridges	(blank)	1
	Piers & Docks	(blank)	2
	High Total		**3**
	Moderate		
	Pedestrian Paving: Pedestrian Bridges		1
	Moderate Total		**1**
	Martin Luther King, Jr. Total		**16**
Mission Peak	**High**		
	Water Supply: Potable Water Distribution & Storage		1
	High Total		**1**
	Mission Peak Total		**1**
Peralta Oaks	**Very High**		
	Building	Office	1
	Very High Total		**1**
	Peralta Oaks Total		**1**
Peralta Oaks North	**Very High**		
	Building	Office	1
	Very High Total		**1**

Park Lands	Fire Hazard Severity Zone / Asset Type	Asset Use	Asset Count
	Peralta Oaks North Total		**1**
Pleasanton Ridge	**Very High**		
	Building	Housing - Single Family	1
	Very High Total		**1**
	High		
	Building	Housing - Single Family	5
		Office	1
	High Total		**6**
	Pleasanton Ridge Total		**7**
Quarry Lakes	**High**		
	Water Supply: Non Potable Water Distribution & Storage		1
	High Total		**1**
	Moderate		
	Building	Guard house / Guard Station	1
	Moderate Total		**1**
	Quarry Lakes Total		**4**
Reinhardt Redwood	**Very High**		
	Building	Assembly (Auditorium, Theater)	1
		Fire/Police Station	1
		Guard house / Guard Station	1
		Maintenance Shops	1
		Office	3
		Site Utility	1
		Utility Plant	1
	Pedestrian Paving: Pedestrian Bridges		8
	Water Supply		1
	Water Supply: Potable Water Distribution & Storage		1
	Very High Total		**19**
	Reinhardt Redwood Total		**19**
Roberts	**Very High**		
	Building	Guard house / Guard Station	2
		Maintenance Shops	1
		Office	1
	Water Supply: Potable Water Distribution & Storage		1

Park Lands	Fire Hazard Severity Zone / Asset Type	Asset Use	Asset Count
	Very High Total		**5**
	Roberts Total		**5**
Sunol / Ohlone Wilderness	**High**		
	Building	Office	3
		Specialty Cultural (Museum, Library)	1
	Pedestrian Paving: Pedestrian Bridges		1
	Water Supply		2
	Water Supply: Potable Water Distribution & Storage		1
	Water Supply: Storage Tanks		1
	Windmill		1
	High Total		**10**
	Sunol / Ohlone Wilderness Total		**10**
Temescal	**Very High**		
	Building	Guard house / Guard Station	2
		Office	2
		Pump Station	1
	Sanitary Sewer: Lift Stations		3
	Storm Sewer		1
	Water Supply: Pumping Station		1
	Very High Total		**10**
	High		
	Building	Guard house / Guard Station	1
	Service & Pedestrian Tunnel		1
	High Total		**2**
	Temescal Total		**14**
Vargas Plateau	**Moderate**		
	Water Supply: Potable Water Distribution & Storage		1
	Moderate Total		**1**
	Vargas Plateau Total		**1**
Contra Costa County			
Big Break	**Moderate**		
	Building	Recreation	1
	Moderate Total		**1**
	Big Break Total		**1**

Park Lands	Fire Hazard Severity Zone / Asset Type	Asset Use	Asset Count
Black Diamond Mines	**High**		
	Building	Maintenance Shops	7
		Office	4
		Pump Station	1
		Recreation	18
		Site Utility	1
		Storage - Fuel and Haz. Materials	1
	Water Supply: Potable Water Distribution & Storage	(blank)	2
	Water Supply: Storage Tanks	(blank)	2
	High Total		**36**
	Moderate		
	Water Supply: Well Systems	(blank)	1
	Moderate Total		**1**
	Black Diamond Mines Total		**37**
Briones	**High**		
	Building	Maintenance Shops	1
		Office	1
		Site Utility	1
	Roadways: Vehicular Bridges		1
	Water Supply: Potable Water Distribution & Storage		2
	Water Supply: Well Systems		2
	High Total		8
	Briones Total		**8**
Brooks Island	**High**		
	Water Supply: Potable Water Distribution & Storage	(blank)	1
	High Total		**1**
	Brooks Island Total		**1**
Byron Vernal Pools	**Moderate**		
	Water Supply: Well Systems	(blank)	1
	Moderate Total		**1**
	Byron Vernal Pools Total		**1**
Carquinez Strait	**High**		
	Building	Office	2
	Pedestrian Paving: Pedestrian Bridges	(blank)	1

Park Lands	Fire Hazard Severity Zone / Asset Type	Asset Use	Asset Count
	High Total		**3**
	Carquinez Strait Total		**3**
Clayton Ranch	**High**		
	Pedestrian Paving: Pedestrian Bridges		1
	High Total		**1**
	Clayton Ranch Total		**1**
Contra Loma	**High**		
	Building	Office	2
	Sanitary Sewer: Lift Stations		1
	High Total		**3**
	Contra Loma Total		**3**
Deer Valley	**Moderate**		
	Water Supply: Potable Water Distribution & Storage		2
	Water Supply: Well Systems		1
	Moderate Total		**3**
	Deer Valley Total		**3**
Diablo Foothills / Castle Rock	**High**		
	Building	Bathhouse	1
		Maintenance Shops	2
		Office	1
		Recreation	1
		Site Utility	1
	Pedestrian Paving: Pedestrian Bridges		3
	Water Supply: Non Potable Water Distribution & Storage		1
	High Total		**10**
	Diablo Foothills / Castle Rock Total		**10**
East County Trails	**High**		
	Pedestrian Paving: Pedestrian Bridges		1
	High Total		**1**
	Moderate		
	Building	Maintenance Shops	1
		Office	1
	Pedestrian Paving: Pedestrian Bridges		1
	Sanitary Sewer: Lift Stations		1
	High Total		**4**

Park Lands	Fire Hazard Severity Zone / Asset Type	Asset Use	Asset Count
	East County Trails Total		**5**
Kennedy Grove	**High**		
	Building	Office	1
	High Total		**1**
	Kennedy Grove Total		**1**
Las Trampas	**Very High**		
	Building	Maintenance Shops	1
		Office	1
	Sanitary Sewer: Lift Stations		1
	Water Supply: Potable Water Distribution & Storage		1
	Water Supply: Pumping Station		1
	Water Supply: Storage Tanks		3
	Very High Total		**8**
	High		
	Building	Office	2
		Site Utility	1
	Pedestrian Paving: Pedestrian Bridges	(blank)	1
	Water Supply: Pumping Station	(blank)	1
	Water Supply: Storage Tanks	(blank)	2
	High Total		**7**
	Las Trampas Total		**15**
Morgan Territory	**High**		
	Building	Maintenance Shops	1
	High Total		**1**
	Morgan Territory Total		**1**
Point Pinole	**High**		
	Roadways: Vehicular Bridges	(blank)	1
	High Total		**1**
	Moderate		
	Building	Guard house / Guard Station	2
		Maintenance Shops	2
		Office	1
	Roadways: Vehicular Bridges		2
	Sanitary Sewer: Lift Stations		1
	Moderate Total		**8**
	Point Pinole Total		**9**

Park Lands	Fire Hazard Severity Zone / Asset Type	Asset Use	Asset Count
Radke Martinez	**High**		
	Pedestrian Paving: Pedestrian Bridges	(blank)	2
	High Total		**2**
	Moderate		**2**
	Pedestrian Paving: Pedestrian Bridges	(blank)	2
	Moderate Total		2
	Radke Martinez Total		**4**
Reinhardt Redwood	**Very High**		
	Pedestrian Paving: Pedestrian Bridges		3
	Very High Total		**3**
	Reinhardt Redwood Total		**3**
Round Valley	**High**		
	Pedestrian Paving: Pedestrian Bridges		1
	High Total		1
	Moderate		
	Building	Utility Plant	1
	Pedestrian Paving: Pedestrian Bridges	(blank)	1
	Water Supply: Well Systems	(blank)	2
	Moderate Total		**4**
	Round Valley Total		**5**
Sibley	**Very High**		
	Building	Pump Station	1
	Water Supply: Storage Tanks		1
	Very High Total		**2**
	Sibley Total		**2**
Sycamore Valley	**High**		
	Pedestrian Paving: Pedestrian Bridges		1
	High Total		**1**
	Moderate		
	Pedestrian Paving: Pedestrian Bridges		1
	Moderate Total		**1**
	Sycamore Valley Total		**2**
Tilden	**Very High**		
	Building	Animal Facility	3
		Fire/Police Station	1
		Maintenance Shops	10

Park Lands	Fire Hazard Severity Zone / Asset Type	Asset Use	Asset Count
		Multipurpose Use	5
		Pump Station	1
		Recreation	5
		Utility Plant	1
	Pedestrian Paving: Pedestrian Bridges		19
	Sanitary Sewer		1
	Sanitary Sewer: Lift Stations		4
	Service & Pedestrian Tunnel		3
	Storm Sewer		2
	Water Supply: Pumping Station		2
	Water Supply: Storage Tanks		3
	Very High Total		**60**
	Tilden Total		**60**
Vasco Caves	**Moderate**		
	Building	Pump Station	1
	Moderate Total		**1**
	Vasco Caves Total		**1**
Vasco Hills	**Moderate**		
	Building	Maintenance Shops	1
		Office	1
		Pump Station	1
	Tank	(blank)	2
	Water Supply: Well Systems	(blank)	2
	Moderate Total		**7**
	Vasco Hills Total		**7**
Wildcat Canyon	**High**		
	Building	Multipurpose Use	1
	Roadways: Vehicular Bridges	(blank)	1
	Sanitary Sewer: Lift Stations	(blank)	1
	High Total		**3**
	Wildcat Canyon Total		**3**

Source: CAL FIRE, EBRPD GIS