Attachment A
2026 – 2031 Local Hazard Mitigation Plan

# CITY OF OAKLAND
# LOCAL HAZARD MITIGATION PLAN

2026

CITY OF OAKLAND

BLACK & VEATCH

AGENCY SUBMITTAL DRAFT

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## Definitions and Acronyms

**°F**—Degrees Fahrenheit

**0.2 percent-annual-chance flood**—The flood that has a 0.2 percent chance of being equaled or exceeded in any given year; often referred to as the 500-year flood.

**0.2 percent-annual-chance (500-year) floodplain**—The area flooded by the flood that has a 0.2 percent chance of being equaled or exceeded each year.

**1.0 percent-annual-chance flood**—The flood that has a 1 percent chance of being equaled or exceeded in any given year; often referred to as the 100-year flood.

**1 percent-annual-chance (100-year) floodplain**—The area flooded by the flood that has a 1 percent chance of being equaled or exceeded in a given year. The 1 percent-annual-chance flood is the standard used by most federal and state agencies.

**ac-ft**—Unit of acre-feet

**ADA Programs Division (ADA)**—A division in the City Administrator's Office that promotes equity for persons with disabilities by coordinating physical and programmatic access compliance in all city programs, activities, and services.

**ADA accessibility**—The requirement under the Americans with Disabilities Act (ADA) Title II and Section 504 & 508 for state and local governments to ensure that all programs, facilities, services, communications, emergency operations, and public information are accessible to people with disabilities. ADA accessibility includes removing physical, communication, transportation, and programmatic barriers and ensuring equitable access to preparedness, evacuation, sheltering, and recovery activities of emergency management.

**Access and Functional Needs (AFN)** — an individual may have an access or functional need if they have a developmental or intellectual disability, a physical disability, a chronic condition, an injury, limited English proficiency or are non-English speaking, are an older adult, are a child, are a person living in an institutionalized setting, or are low income, experiencing homelessness, or transportation disadvantaged, including, but not limited to, those who are dependent on public transit, or those who are pregnant (Government Code 8593.3). When referring to individuals, the term is used as "access or functional needs" with lowercase words and without using the acronym. When referring to the entire population, resources, considerations, or department title, the term is used as "Access and Functional Needs" and the acronym AFN may be used.

**asset**—Any man-made or natural feature that has value, including people; buildings; infrastructure, such as bridges, roads, sewers, and water systems; lifelines, such as electricity and communication resources; and environmental, cultural, or recreational features such as parks, wetlands, and landmarks.

**ASCE**—American Society of Engineers

**base flood**—The flood having a 1 percent chance of being equaled or exceeded in any given year, also known as the "100-year" or "1 percent annual chance" flood. The base flood is a statistical concept used to ensure that all properties subject to the National Flood Insurance Program (NFIP) are protected to the same degree against flooding.

**basin**—The area within which all surface water—whether from rainfall, snowmelt, springs, or other sources—flows to a single water body or watercourse. The boundary of a river basin is defined by natural topography, such as hills, mountains, and ridges. Basins are also referred to as "watersheds."

**benefit/cost analysis**—A systematic, quantitative method of comparing projected benefits to projected costs of a project or policy. It is used as a measure of cost effectiveness.

**benefit**—A net project outcome and is usually defined in monetary terms. Benefits may include direct and indirect effects. For the purposes of benefit/cost analysis of proposed mitigation measures, benefits are limited to specific, measurable, risk reduction factors, including reduction in expected property losses (buildings, contents, and functions) and protection of human life.

**CAL FIRE**—California Department of Forestry and Fire Protection

**Cal OES**—California Governor's Office of Emergency Services

**CA DWR**—California Department of Water Resources

**capability assessment**—An analysis of a community's capacity to address threats associated

with hazards. The assessment includes two components: an inventory of an agency's mission, programs, and policies, and an analysis of its capacity to carry them out.

**CDC**—Centers for Disease Control and Prevention

**CFR**—Code of Federal Regulations

**CIP**—Capital Improvement Program

**climate change**—A change in global or regional climate patterns, in particular a change apparent from the mid to late 20th century onwards and attributed largely to the increased levels of atmospheric carbon dioxide produced by the use of fossil fuels.

**Community Lifeline**—As defined by FEMA, a community lifeline enables the continuous operation of critical government and business functions and is essential to human health and safety or economic security.

**CRS**—Community Rating System

**Core Planning Team (CPT)**—Planning team comprised of key personnel from the City of Oakland and discipline leads from the City's contract consultant, Black & Veatch

**cyber-attack**—An attempt to damage, disrupt, or gain unauthorized access to a computer, computer system, or electronic communications network.

**dam failure**—An uncontrolled release of impounded water due to structural deficiencies in dam.

**dam**—Any artificial barrier or controlling mechanism that can or does impound or divert water.

**debris flow**—Dense mixtures of water-saturated debris that move down-valley, looking and behaving much like flowing concrete. They form when loose masses of unconsolidated material are saturated, become unstable, and move down slope. The source of water varies but includes rainfall, melting snow or ice, and glacial outburst floods.

**DFIRM**—Digital Flood Insurance Rate Map

**Disaster Mitigation Act (DMA; Public Law 106-390)**—The latest federal legislation enacted to encourage and promote proactive, pre-disaster planning as a condition of receiving certain federal financial assistance.

**DMA**—Disaster Mitigation Act

**DRE**—Department of Race and Equity. The Department of Race and Equity works with City departments to create a city where our diversity is maintained, racial disparities have been eliminated and racial equity has been achieved.

**drought**—The cumulative impacts of long periods of dry weather. These can include deficiencies in surface and subsurface water supplies and general impacts on health, well-being, and quality of life.

**earthquake**—The shaking of the ground caused by an abrupt shift of rock along a fracture in the earth or a contact zone between tectonic plates.

**EBMUD**—East Bay Municipal Utility District

**EBRPD**—East Bay Regional Parks District

**emergency action plan**—A formal document that identifies potential emergency conditions at a dam and specifies actions to be followed to minimize property damage and loss of life. The plan specifies actions the dam owner should take to alleviate problems at a dam. It contains procedures and information to assist the dam owner in issuing early warning and notification messages to responsible downstream emergency management authorities of the emergency situation. It also contains inundation maps to show emergency management authorities the critical areas for action in case of an emergency.

**EMSD - Emergency Management Service Division** EMSD, a division of the Oakland Fire Department, is responsible for ensuring the City of Oakland can respond to, recover from, and mitigate against any hazard that affects our city, the region, the state, and beyond. Through internal and external training and exercising, EMSD builds its capabilities, explores vulnerabilities and evaluates and reviews City plans covering the entire cycle of preparedness to ensure continuous improvement.

**epicenter**—The point on the earth's surface directly above the hypocenter of an earthquake. The location of an earthquake is commonly described by the geographic position of its epicenter and by its focal depth.

**equity**— OMC 2.29.170.2.C and AI-580 define Equity as fairness. Ensuring City departments take steps so that all people have access to opportunities, services and the fair distribution of resources to support positive outcomes in meeting their needs and take their conditions into consideration.

**Equity Priority Communities (EPC)**—As defined in this plan, communities in census tracts that align with the City 's Environmental Justice Element of the General Plan are considered priority areas for implementing mitigation initiatives. This includes individuals with Access and Functional Needs (AFN).

**exposure**—Exposure is defined as the number and dollar value of assets considered to be at risk during the occurrence of a specific hazard.

**extreme heat**—Temperatures that hover 10 °F or more above the average high temperature for a region and last for several days.

**fault**—A fracture in the earth's crust along which two blocks of the crust have slipped with respect to each other.

**federal disaster declaration**—Declarations for events that cause more damage than state and local governments and resources can handle without federal government assistance. A federal disaster declaration puts into motion long-term federal recovery programs, some of which are matched by state programs, to help disaster victims, businesses, and public entities.

**FEMA**—Federal Emergency Management Agency

**fire behavior**—Fire behavior refers to the physical characteristics of a fire and is a function of the interaction between the fuel characteristics (such as type of vegetation and structures that could burn), topography, and weather. Variables that affect fire behavior include the rate of spread, intensity, fuel consumption, and fire type (such as underbrush versus crown fire).

**FIRM**—Flood Insurance Rate Map

**flash flood**—A flood that occurs with little or no warning when water levels rise at an extremely fast rate.

**Flood Insurance Rate Map (FIRM)**—The official maps on which the Federal Emergency Management Agency delineate the Special Flood Hazard Area.

**floodplain**—The land area along the sides of a river that becomes inundated with water during a flood.

**flood**—The inundation of normally dry land resulting from the rising and overflowing of a body of water.

**floodway**—Floodways are areas within a floodplain that are reserved for the purpose of conveying flood discharge without increasing the base flood elevation more than 1 foot. Generally speaking, no development is allowed in floodways, as any structures located there would block the flow of floodwaters.

**frequency**—How often a hazard of specific magnitude, duration, and/or extent is expected to occur on average. Statistically, a hazard with a 100-year frequency is expected to occur about once every 100 years on average and has a 1 percent chance of occurring any given year. Frequency reliability varies depending on the type of hazard considered.

**g**—Gravity (%g, percent acceleration force of gravity)

**GBS**—general building stock

**geographic information system (GIS)**—A computer software application that relates data regarding physical and other features on the earth to a database for mapping and analysis.

**goal**—A general guideline that explains what is to be achieved. Goals are usually broad-based, long-term, policy-type statements and represent global visions. Goals help define the benefits that a plan is trying to achieve. The success of a hazard mitigation plan is measured by the degree to which its goals have been met (that is, by the actual benefits in terms of actual hazard mitigation).

**greenhouse gases**—Methane, nitrous oxide and other gases that trap heat and warm the Earth, as a greenhouse traps heat from the sun.

**ground shaking**—The result of rapid ground acceleration caused by seismic waves passing beneath buildings, roads, and other structures.

**gust**—A strong rush of wind

**hazard**—A source of potential danger or adverse condition that could harm people and/or cause property damage.

**Hazard Mitigation Grant Program (HMGP)**—Authorized under Section 202 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act, the HMGP is administered by FEMA and provides grants to states, tribes, and local governments to implement hazard mitigation actions after a major disaster declaration. The purpose of the program is to reduce the loss of life

and property due to disasters and to enable mitigation activities to be implemented as a community recovers from a disaster.

**hazardous material**—A substance or combination of substances (biological, chemical, radiological, and/or physical) that, because of its quantity, concentration, or physical, chemical or infectious characteristics, has the potential to cause harm to humans, animals, or the environment, either by itself or through interaction with other factors.

**HCD**—Department of Housing and Community Development

**high-hazard dam**—Dams that can cause loss of human life from the failure or improper operation of the dam.

**HMA**—Hazard Mitigation Assistance

**HMP**—Hazard Mitigation Plan

**hypocenter**—The region underground where an earthquake's energy originates.

**Individuals with Access and Functional Needs (AFN)**— People who may require additional assistance before, during, or after an emergency due to factors affecting independence, communication, transportation, supervision, or medical care. This category includes, but is not limited to, people with disabilities, older adults, children, individuals with limited English proficiency, those without access to transportation, pregnant individuals, people experiencing homeless, and others who may face functional barriers during disasters. AFN is a planning term used to guide inclusive emergency preparedness and response. It does not replace or modify civil rights protections under the ADA. See "Equity Priority Communities"

**intensity**—The measure of the effects of a hazard.

**inventory**—The assets identified in a study region. Inventories include assets that could be lost when a disaster occurs, and community resources are at risk. Assets include people, buildings, transportation, and other valued community resources.

**ITD**—Information Technology Department

**landslide**—The movement of masses of loosened rock and soil down a hillside or slope. Slope failures occur when the strength of the soils forming the slope is exceeded by the pressure, such as weight or saturation, acting upon them.

**lightning**—Lightning is an electrical discharge resulting from the buildup of positive and negative charges within a thunderstorm. When the buildup becomes strong enough, lightning appears as a "bolt," usually within or between clouds and the ground. A bolt of lightning instantaneously reaches temperatures approaching 50,000 degrees F. The rapid heating and cooling of air near lightning causes thunder. Lightning is a major threat during thunderstorms. In the United States, 75 to 100 Americans are struck and killed by lightning each year.

**liquefaction**—Loosely packed, water-logged sediments losing their strength in response to strong shaking, causing major damage during earthquakes.

**local government**—Any county, municipality, city, town, township, public authority, school district, special district, intrastate district, council of governments (regardless of whether the council of governments is incorporated as a nonprofit corporation under State law), regional or interstate government entity, or agency or instrumentality of a local government; any Indian tribe or authorized tribal organization, or Alaska Native village or organization; and any rural community, unincorporated town or village, or other public entity.

**magnitude**—The measure of the strength of an earthquake.

**mass movement**—A collective term for landslides, debris flows, and lahars.

**mitigation actions**—Specific actions to achieve goals and objectives that minimize the effects from a disaster and reduce the loss of life and property.

**mitigation**—A preventive action taken in advance of an event to reduce or eliminate risk to life or property.

**millimeter (mm)**—unit of length, equal to one thousandth of a meter

**Mw**—Moment Magnitude Scale

**NCEI**—National Centers for Environmental Information

**NFIP**—National Flood Insurance Program

**NRI**—National Risk Index

**NOAA**—National Oceanic and Atmospheric Administration

**NWS**—National Weather Service

**OakDOT**—Oakland Department of Transportation

**objective**—For the purposes of this plan, an objective is defined as a short-term aim that, when combined with other objectives, forms a strategy or course of action to meet a goal. Unlike goals, objectives are specific and measurable.

**OFD**—Oakland Fire Department

**OPD**—Oakland Police Department

**OPW**—Oakland Public Works Department

**pandemic**—An epidemic of infectious disease that has spread through human populations across a large region, multiple continents, or worldwide.

PDM—Pre-Disaster Mitigation

**peak ground acceleration (PGA)**—A measure of the highest amplitude of ground shaking that accompanies an earthquake, based on a percentage of the force of gravity.

**PGA**—Peak Ground Acceleration

**preparedness**—Actions that strengthen the capability of government, people, and communities to respond to disasters.

**presidential disaster declaration (same as federal disaster declaration)**—These declarations are typically made for events that cause more damage than state and local governments and resources can handle without federal government assistance. Generally, no specific dollar loss threshold has been established for such declarations. A presidential disaster declaration puts into motion long-term federal recovery programs, some of which are matched by state programs, designed to help disaster victims, businesses, and public entities.

**probability of occurrence**—A statistical measure or estimate of the likelihood that a hazard will occur. This probability is generally based on past hazard events in the area and a forecast of events that could occur in the future. A probability factor based on yearly values of occurrence is used to estimate probability of occurrence.

**Project Management Team (PM)**—Planning team comprised of key personnel from the City of Oakland Fire Department - Emergency Management Services Division (OFD EMSD) and discipline leads from the City's contract consultant, Black & Veatch

**RCV**—replacement cost value

**recurrence interval** —The recurrence interval (sometimes called the return period) is based on the probability that the given event will be equaled or exceeded in any given year.

**residual risk**—The risk that remains after controls are accounted for.

**return period**—The average number of years between occurrences of a hazard (equal to the inverse of the annual likelihood of occurrence).

**risk assessment**—The process of measuring potential loss of life, personal injury, economic injury, and property damage resulting from hazards. This process assesses the vulnerability of people, buildings, and infrastructure to hazards

**risk ranking**—Process to score and rank hazards based on the probability that they will occur and the impact they will have if they do.

**risk**—The estimated impact that a hazard would have on people, services, facilities, and structures in a community. Risk measures the likelihood of a hazard occurring and resulting in an adverse condition that causes injury or damage. Risk is often expressed in relative terms such as a high, moderate, or low likelihood of sustaining damage above a particular threshold due to occurrence of a specific type of hazard. Risk also can be expressed in terms of potential monetary losses associated with the intensity of the hazard.

**riverine**—Of or produced by a river. Riverine floodplains have readily identifiable channels.

**Robert T. Stafford Act**—The statutory authority for most federal disaster response activities, especially as they pertain to FEMA and its programs (Robert T. Stafford Disaster Relief and Emergency Assistance Act, Public Law 100-107). Signed into law November 23, 1988; amended by the Disaster Relief Act of 1974 (Public Law 93-288).

**SFHA**—Special Flood Hazard Area

**special flood hazard area**—The base floodplain delineated on a Flood Insurance Rate Map. The

SFHA is mapped as a Zone A in riverine situations and zone V in coastal situations. The SFHA may or may not encompass all of a community's flood problems.

**stakeholder**—Business leaders, civic groups, academia, non-profit organizations, major employers, managers of critical facilities, farmers, developers, special purpose districts, and others whose actions could impact hazard mitigation.

**steep slope**—A slope greater than 33 percent.

**Steering Committee (SC)**— Planning team comprised of CPT members, personnel from the City of Oakland, and local and areawide stakeholders.

**Sustainability**— Office of Sustainability. The Office of Sustainability is housed in the Sustainability and Resilience Division of the City Administrator's Office. This team fosters collaboration with staff across all City Departments and with community leaders and experts on equitable climate change mitigation and adaptation.

**USACE**—U.S. Army Corps of Engineers

**USDA**—U.S. Department of Agriculture

**USDM**—U.S. Drought Monitor

**USGS**—U.S. Geological Survey

**VHFHSZ**—Very High Fire Hazard Severity Zone

**vulnerability**—Assessment of how exposed or susceptible an asset is to damage. Vulnerability depends on an asset's construction, contents, and the economic value of its functions.

**watershed**—An area that drains downgradient from areas of higher land to areas of lower land to the lowest point.

**wildfire**—Fires that result in uncontrolled destruction of forests, brush, field crops, grasslands, and real and personal property in non-urban areas. Because of their distance from firefighting resources, they can be difficult to contain and can cause a great deal of destruction.

**wildland-urban interface area (WUI)**—An area susceptible to wildfires and where wildland vegetation and urban or suburban development occur together. An example would be smaller urban areas and dispersed rural housing in forested areas.

# EXECUTIVE SUMMARY

*City Of Oakland*

**To reduce risk and increase resilience equitably, the mission of the City of Oakland Local Hazard Mitigation Plan is to establish and promote a comprehensive mitigation strategy and efforts to protect the whole community and environment from identified natural and human-caused hazards.**

## HAZARD MITIGATION OVERVIEW

The City of Oakland (City) has updated its local hazard mitigation plan (LHMP) to continue its commitment to reducing risk of natural hazards for the residents, assets, environment, and community lifelines within the city.

The LHMP update forms the foundation of the City's long-term strategy to reduce disaster losses and break the cycle of disaster damage, rebuilding, and repetitive damage. This plan aligns with federal and state hazard mitigation planning regulations and requirements to ensure the City remains eligible for pre- and post-disaster mitigation funding through the Federal Emergency Management Agency (FEMA).

## PLANNING PROCESS

The City of Oakland 2026 Hazard Mitigation Plan is an update of the 2021 Hazard Mitigation Plan. The Oakland Fire Department's (OFD) Emergency Management Services Division (EMSD) managed the LHMP update and will oversee its implementation and annual updates. The planning area for the Hazard Mitigation Plan was defined as the incorporated area of the City of Oakland.

The planning process for this LHMP update, consisted of the following steps:

- **Organization of Resources** –The City organized the Project Management Team (PM), Core Planning Team (CPT), and Steering Committee (SC) (see Table 3-1). These groups met and coordinated throughout the planning process.
- **Public Engagement and Outreach** – A robust public engagement strategy was implemented.
- **Update Community Capabilities** – City departments assessed capabilities related to implementing mitigation initiatives.
- **Identify Hazards** – The Core Planning Team and Steering Committee identified and confirmed hazards to include in the plan.
- **Risk Assessment** – Using best available data and with input from the CPT and SC, the consultant team performed a risk assessment of each natural hazard of concern.
- **Mitigation Actions and Implementation Strategy** – Through a consultant-facilitated process, City departments and stakeholders assembled to develop objectives and mitigation actions.
- **Assemble and Review the Plan** –Black & Veatch (the consultant team) updated and assembled the draft plan with input from the planning groups and City staff. The draft plan was open for public comment for a two-week period.
- **Plan Approval and Adoption** – The LHMP is approved by FEMA and the California Office of Emergency Services (Cal OES). The plan is adopted by City Council and is adopted into the General Plan Safety Element. The City chose to adopt the plan pending Cal OES and FEMA approval to expedite the City Council adoption process. Additionally, the City adopted the LHMP as an appendix to the General Plan's Safety Element for plan integration. Cal OES performed a review of the draft and FEMA issued approval on Month Day, 2026.

The Project Management Team (PM) and Core Planning Team (CPT) facilitated the development of the 2026 LHMP update. The CPT consisted of staff from key departments of the City of Oakland and the consultant team. A 23-member Steering Committee (SC) of City staff and areawide stakeholders oversaw the plan development. Coordination with other local, state, and federal agencies involved in hazard mitigation occurred throughout the seven-step planning process. The SC reviewed the City's 2021 LHMP, and existing programs that may support hazard mitigation actions. The consultant team made recommendations to the City to align with the 2023 California State Hazard Mitigation Plan.

Public outreach efforts included a hazard mitigation survey, presentations to area stakeholders, five in-person public meetings, two virtual town hall meetings, a project website, the use of social media, and printed materials.

Chapter 2 (Planning Process) of this plan documents the process used to develop the 2026 City of Oakland LHMP. It includes who was a part of the process, and what data and information were utilized to create or revise the plan. Efforts were made to ensure a successful planning endeavor by engaging with community leaders, stakeholders, and the public to ensure their input and support throughout the process.

## BUILDING THE PLANNING TEAMS

The City brought together a diverse and inclusive group of individuals to participate, develop, and implement the LHMP. A Project Management (PM) team, a Core Planning Team (CPT) and Steering Committee (SC) were responsible for overseeing, coordinating, and executing the planning process:

- **Project Management Team** - The PM team was comprised of key personnel from EMSD and discipline leads from the consultant team.
- **Core Planning Team** - The CPT was comprised of key personnel from the City and discipline leads from the consultant team.
- **Hazard Mitigation Steering Committee** – Included 23-members comprised of CPT members, other city personnel, and neighboring jurisdiction stakeholders.

The PM Team and the CPT facilitated the development of this plan update, consisting of staff from several departments of the City of Oakland and a contract consultant. A 23-member SC of city staff and areawide stakeholders oversaw the plan development. (As many departments had non-voting members and/or alternates, a total of 39 individuals participated in the SC.) Coordination with other local, state, and federal agencies involved in hazard mitigation occurred throughout the seven-step planning process. The CPT and SC reviewed the City's previous hazard mitigation plan (the 2016-2021 Local Hazard Mitigation Plan), the 2023 California State Hazard Mitigation Plan, and existing programs that may support hazard mitigation actions.

A **Whole Communities Team** included City staff acting as equity subject matter experts, convening as needed to provide recommendations and promote inclusion of and benefit to Equity Priority Communities and individuals with AFN. Members of the Whole Communities Team were also participants in the CPT and SC.

## OUTREACH STRATEGY

The City implemented a multi-media public involvement strategy using a community engagement plan that was approved by the SC.

The strategy included five in-person public meetings combined with Personal Emergency Preparedness (PEP) workshops. The sessions included presentations on the hazard mitigation planning process, presentation of hazard mapping, and an opportunity for attendees to suggest potential actions by the City of Oakland. Interpretation was offered in Cantonese, Spanish and Vietnamese.

Community outreach also included a community hazard mitigation survey available in English, Spanish, Chinese and Vietnamese; a project webpage with an interactive StoryMap; and web-based updates and social media releases. Outreach methods included printed

postcards with a survey link, printed meeting flyers, and an email interest list including individuals and local community-based organizations.

Two virtual town halls were held during the public comment period. One focused on technical input from subject-matter experts, and the second town hall focused on input from the whole community.

## RISK ASSESSMENT

A risk assessment describes the risks associated with each identified hazard of concern. A general profile of the hazard as it impacts the City was updated and an assessment was performed to determine the effects and the potential damage of the hazard. For this LHMP update, total and Equity Priority Communities are considered in the risk assessment.

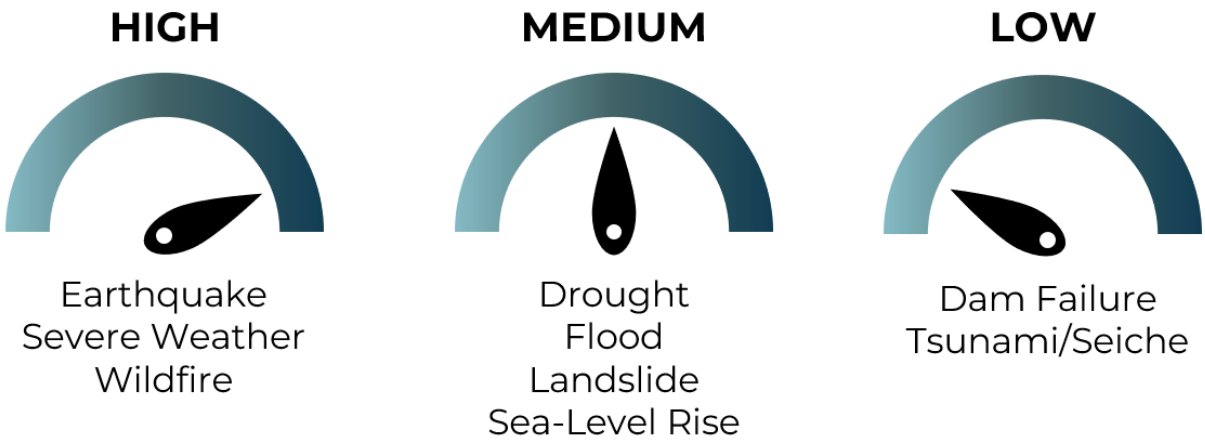
The CPT and SC reviewed available information to determine what types of hazards may affect the City, how often they can occur, their potential severity, and considered the hazard groupings in the State of California HMP for consistency with the State's approach to mitigation planning. The following hazards are included in the 2026 LHMP:

- Dam Failure
- Drought
- Earthquake
- Flood
- Landslide
- Sea-Level Rise
- Severe Weather
- Tsunami/Seiche
- Wildfire

The SC used the risk assessment to gauge the potential impacts of hazards identified as "hazards of concern" for this plan. Risk assessment models for hazards of concern in this LHMP are based on current data and technologies. The assessment of each hazard of concern includes discussion of the following:

- Hazard identification and profile.
- The exposure and potential impacts to population, property, and the environment to the hazards.
- The estimated cost of potential damage, where applicable.

Based on the risk assessment, the hazards of concern are ranked as the risk they pose to the City. Results are as follows:




## COMMUNITY CAPABILITIES

The LHMP process included a robust assessment of Oakland's capabilities, based on information provided by City departments. This process was designed to identify any gaps that need to be addressed for successful implementation of the mitigation actions. The following capability types are analyzed in this LHMP:

- Plans, Programs, Ordinances and Authorities
- Administrative and Technical Capabilities
- Fiscal Capabilities
- NFIP Capabilities
- Adaptive Capacity to Climate Change Capabilities
- Public Education and Outreach

The capability assessment results indicate that the City is well-equipped to implement mitigation strategies with existing capabilities.

## MITIGATION STRATEGY

The mitigation strategy is the long-term blueprint for reducing the potential losses identified in the risk assessment. It describes how the City will accomplish the overall purpose, goals, and objectives of the planning process.

### Goals, Objectives, and Actions

The SC reviewed and udpated the mitigation goals from the prior plan to reflect the current focus of the City of Oakland, to integrate current citywide plans, and to add an equity focus where feasible. The 2026 LHMP has five goals of equal priority:

- **Goal 1.** Advance equity, reduce racial disparities, and ensure ADA accessibility for people with disabilities and individuals with access and functional needs in all phases of preparing for, responding to, and recovering from natural hazards.
- **Goal 2.** Protect life, property, the environment, and natural and cultural resources equitably.

- **Goal 3.** Advance community-driven outreach efforts to equip Oaklanders with the knowledge, resources, and support needed to prepare for, respond to, and recover from natural hazards.
- **Goal 4.** Implement strategies to enable departments of the City of Oakland to equitably respond to and mitigate hazards in accordance with the Emergency Operations Plan in an integrated manner.
- **Goal 5.** Pursue feasible, cost-effective, and environmentally appropriate hazard mitigation measures including adaptive capacity to reduce risk from a changing climate, incorporating targeted strategies to advance equitable outcomes.

The 2026 LHMP includes objectives that are more clearly paired with mitigation actions, which will support measurable progress and inclusive hazard reduction over the five-year implementation period. City departments developed objectives and actions that aligned with the five overarching goals and addressed equity considerations, including accessibility for individuals with disabilities and access and functional needs. This process included consideration of the objectives in the 2021 LHMP. The SC reviewed the objectives and actions developed for the updated LHMP and provided feedback.

Mitigation actions presented in this plan are designed to reduce or eliminate losses resulting from natural hazard events. The LHMP development process resulted in the identification of 75 mitigation actions that will be prioritized over the next five years. Table ES1 summarizes the actions, specifying the designated lead and supporting departments who will implement the action, along with their respective priorities for implementation.

Table ES-1. Mitigation Action Plan for the City of Oakland

| MITIGATION OBJECTIVE | MITIGATION ACTION | LEAD | SUPPORT |
|---|---|---|---|
| **Objective 1:** Ensure the LHMP is in alignment with the General Plan and utilizing General Plan Safety and EJ Element tools to ensure Equity Priority Communities have priority for funding, and access to City mitigation and emergency preparedness services. | 1. Prioritize hazard preparedness and mitigation funding for communities identified in the General Plan and LHMP as Equity Priority Communities with vulnerability. | OFD | ADA |
| **Objective 1** | 2. Prioritize mitigation and emergency preparedness services for communities identified in the General Plan and LHMP as Equity Priority Communities with vulnerability. | OFD | ADA |
| **Objective 2:** Individuals with AFN have priority for funding, access to City mitigation and emergency preparedness services regardless of geographic area. Services are accessible to individuals with AFN. | 1. Mitigation and preparedness services will be compliant with ADA, Section 504, Section 508 requirements, and any applicable accessibility policies & laws. | ADA | ITD, City Administrator's Office |
| **Objective 2** | 2. Advocate for the inclusion of considerations for individuals with AFN in planning efforts from other agencies in which Oakland staff participate. Connect planning efforts with city-affiliated groups. | DRE, ADA | |
| **Objective 2** | 3. Identify and build relationships with local organizations and agencies serving individuals with AFN. Build relationships with other agencies to connect with these organizations to better plan for their needs during a natural hazard event. | City Administrator's Office | OFD |
| **Objective 3:** Increase hazard awareness throughout Oakland with a focus on Equity Priority Communities and individuals with AFN. Reduce disparities in preparedness and mitigation of disaster risks. | 1. Strengthen partnerships with community-based organizations, faith-based groups, and the private sector to support mitigation outreach and implementation. | OFD | ADA, EWDD |

| MITIGATION OBJECTIVE | MITIGATION ACTION | LEAD | SUPPORT |
|---|---|---|---|
| **Objective 3** | 2. Develop multilingual hazard awareness campaign including campaign materials for populations facing higher risk, including specific content to meet the needs of individuals with AFN. Involve these communities in providing input to ensure the campaign's accessibility and cultural competency. | OFD | ADA |
| **Objective 3** | 3. Embed mitigation and preparedness messaging into programs that already serve equity priorities communities and individuals with AFN (e.g., clinics, food banks, youth programs). | OFD | ADA |
| **Objective 3** | 4. Develop an Online 'Know Your Risk' + Equity Map: Create a web tool where residents can view hazards alongside indicators of social vulnerability and find tailored mitigation resources. | OFD | ADA |
| **Objective 3** | 5. Develop community engagement campaign to expand participation in AC Alert programs, hazard mitigation planning and the identification of mitigation projects. | OFD | ADA |
| **Objective 4:** Maximize potential for City facilities to protect the community from hazards. | 1. Facilitate resilience improvements in City facilities to reliably serve as resilience hubs or places of respite during hazard events. | Sustainability | OFD, OPW, ADA |
| **Objective 4** | 2. Prioritize investment in City facilities that might be used as respite centers or emergency related support for retrofit and safety improvements. | OPW | ADA, OFD, Sustainability |
| **Objective 4** | 3. Develop public communication methods to inform about City resources available in the event of a hazard. | OFD | ADA, City Administrators Office |
| **Objective 5:** Encourage the incorporation of hazard mitigation measures into repairs, major alterations, new development, and redevelopment practices, and prioritize Equity Priority Communities and individuals with AFN that are subject to substantial hazard risk. | 1. Continue to seek funding to revive Housing Preservation Services programs supporting seismic retrofits of high-risk housing units in Equity Priority Communities. This includes two pending applications for Hazard Mitigation Grant Program (HMGP) funding from FEMA and Cal OES to re-open the Safer Housing for Oakland Program (SHOP): Soft Story Apartment Retrofit Program, providing financial assistance to property owners with buildings subject to Oakland's Mandatory Soft Story Retrofit Program. | HCD | Planning & Building, ADA |
| **Objective 5** | 2. Educate low-income homeowners seeking rehabilitation loans about the purpose and availability of publicly funded seismic retrofit assistance programs, such as the Earthquake Brace + Bolt (EBB) and Earthquake Soft-Story (ESS) programs funded by the State of California/California Earthquake Authority. | HCD | ADA |

| MITIGATION OBJECTIVE | MITIGATION ACTION | LEAD | SUPPORT |
|---|---|---|---|
| **Objective 6:** Support and strengthen or replace property, infrastructure and lifelines to minimize post disaster disruption and facilitate short-term recovery (1-5 years), with a focus on Equity Priority Communities and individuals with AFN impacted by a hazard event. | 1. Fast track / streamline permitting process with prioritization for Equity Priority Communities and individuals with AFN. | Planning & Building | HCD, ADA |
| **Objective 6** | 2. Consider adoption of a disaster reconstruction overlay zone. As part of this action, re-evaluate all development scenarios and requirements following a hazard event such as a wildfire, landslide, flood, earthquake; explore funding sources and create a low-interest construction loan program for income-qualified owners who are recovering from a disaster. | Planning & Building | ADA |
| **Objective 6** | 3. Consider an ordinance requiring installation and periodic inspection and maintenance of gas shut-off valves in existing buildings at the time of sale, transfer of title, and when upgrades are planned for gas piping to minimize the risk of post-earthquake fires due to gas pipeline ruptures. | Planning & Building | ADA |
| **Objective 7:** Use the best available and most recent hazard data to evaluate the potential threat and its impacts on Equity Priority Communities when reviewing proposed development opportunities | 1. In areas vulnerable to contaminated groundwater rise, study the compounding impacts of sea level rise in groundwater threats in areas with hazardous facilities and Equity Priority Communities. Coordinate with adjacent jurisdictions as appropriate to develop a Shallow Groundwater Rise Vulnerability assessment to establish a detailed understanding of the effects of rising shallow groundwater on people, the built environment, and water supply. | Sustainability | ADA, OPW |
| **Objective 7** | 2. Evaluate densities where slopes are at the greatest risk for landslides and consider reducing current permitted development densities and intensities by 2028. | Planning & Building | ADA |
| **Objective 8:** Develop and coordinate the City's Sea Level Rise strategy. | 1. Develop the Regional Shoreline Adaptation Plan. | Sustainability | ADA |
| **Objective 8** | 2. Sea-Level Rise Vulnerability and Assessment Improvement Plan - The Port of Oakland's Sea-Level Rise Vulnerability and Assessment Improvement Plan will assess the potential effects of sea-level rise on maritime facilities. The study will evaluate facilities Port-wide for sea-level rise vulnerability and develop an implementation plan for near-term and long-term strategies to | Port of Oakland | Planning & Building, Sustainability, City Administrator's Office |

| MITIGATION OBJECTIVE | MITIGATION ACTION | LEAD | SUPPORT |
|---|---|---|---|
| | address potential impacts. The study will analyze the need for infrastructure such as sea walls, wharf improvements, and changes in port operations. In addition, the study will help establish design standards. | | |
| **Objective 9:** Use the best available data on groundwater rise and its potential impacts on Equity Priority Communities while reviewing proposed development opportunities in areas vulnerable to contaminated groundwater rise. | 1. Study compounding impact of sea level rise on groundwater threats in areas with hazardous facilities. Coordinate with adjacent jurisdictions as appropriate to create a Shallow Groundwater Rise Vulnerability Assessment to establish a detailed understanding of the effects of rising shallow groundwater on people, the built environment, and water supply. This includes buoyancy, seepage, infiltration, liquefaction, corrosion, and contaminant mobilization hazards. The assessment should have an interactive map component that will be updated based on site-specific geotechnical and topographic data submitted by new developments. Continue to comply with performance standards pursuant to the National Pollutant Discharge Elimination System municipal stormwater permit. | Planning & Building | Sustainability, OPW, DRE, ADA |
| **Objective 10:** Reduce fire risk during natural hazard events by reducing natural gas infrastructure in Oakland. | 1. Work with PG&E to implement pilot projects under SB 1221 to identify and eliminate natural gas infrastructure through electrification of homes and businesses, prioritizing those with the potential to result in branch line decommissioning of natural gas piping. | Sustainability | ADA |
| **Objective 10** | 2. Work with public agency partners to provide safety and security information regarding the emergency use of diesel and gasoline powered generators. | Sustainability | ADA |
| **Objective 10** | 3. Promote the widespread use of carbon monoxide detectors in homes and businesses, including through the donation and giveaway programs of carbon monoxide detectors. | Sustainability | ADA |
| **Objective 11:** Safer Housing for Oakland Program (SHOP): Soft Story Apartment Retrofit Program—Under this action, the City will invest in and seek Hazard Mitigation Grant Program (HMGP) funding from FEMA and CalOES to support property owners with buildings subject to Oakland's Mandatory Soft Story Retrofit Program, which the Department of Planning & Building developed to enforce 2019 municipal ordinance No. 13516. | 1. The program will be implemented by contacting owners of the remaining subject buildings that that have not yet completed the required retrofit. This is a discrete list, but these types of buildings tend to be in lower income areas of Oakland. The initial focus will be on Opportunity Zones and other priority areas of need. | HCD | ADA |

| MITIGATION OBJECTIVE | MITIGATION ACTION | LEAD | SUPPORT |
|---|---|---|---|
| **Objective 12:** Increase public awareness of benefits of fire safety and mitigation practices. | 1. Expand on existing strategies to reach low-income, historically hard to reach and non-English speaking populations and individuals with AFN through translated materials, earned media, and strategic engagement planning. | OFD | ADA |
| **Objective 12** | 2. Introduce Firewise program to Equity Priority Communities in the WUI to reduce wildfire risk through resident-led action, education, and collaboration with local fire agencies, focusing on creating defensible space, hardening homes, and developing preparedness plans to become more resilient to wildfires criteria. | OFD | ADA |
| **Objective 12** | 3. Monitoring grant opportunities for the City of Oakland to increase fire safe and fuel mitigation efforts, and expand emergency preparedness. | OFD | ADA |
| **Objective 13:** Reduce the likelihood of catastrophic wildfires by limiting ignition potential, reducing fuel loads, and modifying fuel arrangements on City-owned lands. | 1. Full implementation of the 10 year Vegetation Management Plan to cover more than 1,400 acres of City property plus treatment areas approximately 300 miles of roadside using heavy equipment, hands crews and goats. | OFD | ADA |
| **Objective 13** | 2. Collaborate with CAL FIRE, EBRPD, Oakland Firesafe Council Friends of Joaquin Miller, Friends of Sausal Creek, Firewise Communities to align fire prevention, fuel mitigation and public awareness campaigns to strengthen preparedness, prevention and resiliency strategies. | OFD | ADA |
| **Objective 14:** Maintain 100% compliance on private and public parcels related to vegetation management. | 1. The Vegetation Management Unit of the Oakland Fire Department inspects properties in the Oakland Hills, much of which is designated as a Very High Fire Hazard Severity Zone (VHFHSZ). The VMU works under the Oakland Fire Department's Fire Prevention Bureau. The VMU is responsible for the inspections of around 25,000 parcels in the VHFHSZ. The purpose of these inspections is to identify and mitigate hazards that could contribute to the spread, growth, and intensity of wildfire. Inspections are done annually, and property owners are required to actively maintain their parcels in a fire-safe condition year-round. | OFD | ADA, OPW |
| **Objective 14** | 2. Continue to deploy one of the largest herds of goats in CA to mitigate low lying and dry vegetation on roadside and in City open space. | OFD | ADA |
| **Objective 15:** In high hazard areas, develop local programs and messaging to ensure broad awareness and specifically among Equity Priority Communities for defensible space maintenance, home | 1. Continue to provide fire safety and public education efforts related to requirements for development, property maintenance, and emergency preparedness in the VHFHSZ and prioritize the most vulnerable populations in these areas. | OFD | ADA |

| MITIGATION OBJECTIVE | MITIGATION ACTION | LEAD | SUPPORT |
|---|---|---|---|
| hardening, and training for evacuation procedures to reduce risk to people and property. | | | |
| **Objective 16:** Reduce instances of storm-related tree and branch failures that may cause road closures, property damage, and threats to life by reinstating a regular pruning/maintenance cycle on all city trees. Prioritize tree maintenance activities in frontline communities. | 1. Prune all trees in the public right of way on regular 7-year intervals, as described in the 2024 Oakland Urban Forest Plan, to address preventable whole tree and branch failures during wind and wind/rain events. | OPW | ADA |
| **Objective 16** | 2. Implement the awarded USDA Forest Service Inflation Reduction Act funding to begin routine pruning in Oakland's highest-priority census tracts per the OakDOT Geographic Equity Toolbox. | OPW | ADA |
| **Objective 16** | 3. Identify additional funding sources to regularly prune trees in the rest of Oakland, with work focusing on census tracts based on priority level identified in the Geographic Equity Toolbox. | OPW | ADA |
| **Objective 17:** Complete the City's Storm Drainage Master Plan. | 1. Identify feasible, equitable (using the CIP prioritization system), and cost-effective stormwater infrastructure projects that would increase system capacity, have been identified in the City's capital improvement program and/or Storm Drainage Master Plan, that and would be good target projects for which to pursue funding under applicable local, state, and federal grant programs. | OPW | OakDOT, ADA |
| **Objective 17** | 2. Conduct equitable outreach and engagement as we implement all CIP Storm Drainage projects. | OPW | OakDOT, ADA |
| **Objective 17** | 3. Leverage funding opportunities that may be available through government grants or projects conducted by DOT. | OPW | OakDOT, ADA |
| **Objective 17** | 4. Tree Planning. Implement the component of the City's Storm Drain Master Plan that looks to quantify the stormwater capture and pollutant removal benefit of tree planting and modeling where in the city stormwater runoff reduction could be achieved through increased tree canopy. Coordinate with Tree Services Division to make sure it corresponds to the Urban Forestry Master Plan. | OPW | OakDOT, ADA |
| **Objective 18:** Identify, integrate, and implement green infrastructure practices into | 1. The City will continue to implement its Green Stormwater Infrastructure (GSI) Plan to include GSI where required by the Municipal Regional Stormwater Permit and where feasible. Examples include bioretention areas, | OPW | OakDOT, Planning & Building, ADA |

| MITIGATION OBJECTIVE | MITIGATION ACTION | LEAD | SUPPORT |
|---|---|---|---|
| streetscape improvement, and stormwater management projects. | engineered tree well filters, green roofs, flow-through planters, and permeable pavement. | | |
| **Objective 18** | 2. Encourage developers to include green infrastructure practices. | Planning & Building | OPW, ADA |
| **Objective 19:** Minimize repetitive and potential losses due to flood by maintaining compliance with the NFIP and improving floodplain operations. | 1. Continue to maintain the City's good standing and compliance under the NFIP through:<br>• Enforce the City's flood damage prevention ordnance<br>• Update the City's flood damage prevention ordinance to ensure compliance with state and federal requirements | City Administrator's Office | Planning & Building, OPW, ADA |
| **Objective 19** | 2. Participate in floodplain and mapping updates and advocate for accuracy in updated maps based on locally documented conditions. | OPW | Planning & Building, ADA |
| **Objective 19** | 3. Build community knowledge of floodplain concerns and revised floodplain mapping in an inclusive manner. Provide public assistance/information on floodplain requirements and impacts. | OPW and Planning & Building | ADA |
| **Objective 20:** Explore resources and steps needed to participate in CRS program. | 1. Complete CRS assessment and determine City of Oakland readiness for participation. | City Administrator's Office, OPW, Planning & Building | ADA |
| **Objective 21:** Complete the City's Storm Drainage Master Plan | 1. Identify feasible, equitable (using the CIP prioritization system), and cost-effective stormwater infrastructure projects that would increase system capacity, have been identified in the City's capital improvement program and/or Storm Drainage Master Plan, that and would be good target projects for which to pursue funding under applicable local, state, and federal grant programs. | OPW | ADA |
| **Objective 21** | 2. Conduct equitable outreach and engagement as we implement all CIP Storm Drainage projects. | OPW | ADA |
| **Objective 21** | 3. Leverage funding opportunities that may be available through government grants or projects conducted by DOT and OPW. | OPW | OakDOT, ADA |
| **Objective 22:** Prevent discharge of wastewater contamination into waterways as a result of natural hazards. Enhance social equity by implementing sewer system improvement project with high | 1. Extend the service life of the City's sewer collection system. Complete 13-mile of sewer collection system rehabilitation annually to extend service life. Prioritize repairs based on risk factors and equity factors. | OPW | ADA |
| | 2. Enhance social equity by implementing sewer system improvement project with high CIP scores focusing on underserved communities. | OPW | ADA |
| | 3. Complete 50-mile sewer pipelines with root control treatment to improve sewage conveyance annually. | OPW | ADA |

| MITIGATION OBJECTIVE | MITIGATION ACTION | LEAD | SUPPORT |
|---|---|---|---|
| CIP scores focusing on underserved communities. | | | |
| **Objective 22** | 4. Partner with Alameda County Health Department for Fat/Oil/Grease (FOG) enforcement and outreach focusing on Food Service Establishments and high FOG contributors. | OPW | ADA |
| | 5. Continue to send abatement notices to property owners with private sewer lateral defects. | OPW | ADA |
| | 6. Engage communities by sending out project notices and/or flyers prior and during project implementation to households and businesses in the targeted areas. | OPW | ADA |
| **Objective 22** | 7. Faster project delivery by eliminating project barriers to expedite project implementation, including but not limited to, contractor outreach, enhanced contracting process, onsite support/enforcement. | OPW | ADA |
| | 8. Equitable access by providing guidance to property owners on sewer lateral corrections. | OPW | ADA |
| | 9. For major capital sanitary sewer subbasin projects, the City will continue to replace private lower laterals where applicable within the City right-of-way where the sewer main is replaced. | OPW | ADA |
| **Objective 23:** Monitor and measure number of miles of sewer main rehabilitation annually. Complete sanitary sewer masterplan by end of 2025. Obtain priority of work with risk and equity components. | 1. Enhance social equity by implementing sewer system improvement project with high CIP scores focusing on underserved communities. | OPW | ADA |
| **Objective 23** | 2. Engage communities by sending out project notices and/or flyers prior and during project implementation to households and businesses in the targeted areas. | OPW | ADA |
| **Objective 23** | 3. Faster project delivery by eliminating project barriers to expedite project implementation, including but not limited to, contractor outreach, enhanced contracting process, onsite support/enforcement. | OPW | ADA |
| **Objective 23** | 4. Send abatement notices to property owners with private sewer lateral defects. Provide equitable access by providing guidance to property owners on sewer lateral corrections. | OPW | ADA |
| **Objective 23** | 5. For major capital sanitary sewer subbasin projects, the City will continue to replace private lower laterals where applicable within the City right-of-way where the sewer main is replaced. | OPW | ADA |
| **Objective 24:** Integrate Integrated Preparedness Plan (IPP) priorities into departmental work plans. | 1. Develop the annual IPP Work Plan that lists priority preparedness activities, responsible departments, milestones, and supports implementation of relevant LHMP mitigation actions. | OFD | ADA |

| MITIGATION OBJECTIVE | MITIGATION ACTION | LEAD | SUPPORT |
|---|---|---|---|
| **Objective 24** | 2. Conduct an Annual Integrated Preparedness Planning Workshop (IPPW)with internal and external partners to review opportunities for capacity and capability improvements for risk reduction and update the multi-year IPP schedule. | OFD | ADA |
| **Objective 24** | 3. Maintain a Multi-Year Preparedness Calendar of trainings, exercises, plan updates, outreach events, and major projects. | OFD | ADA |
| **Objective 25:** To mitigate the effects of disruptions, ensure the city's ability to maintain internal operations and external services with a focus on the needs of Equity Priority Communities and individuals with AFN. | 1. Each City department will submit Continuity of Operations Plans (COOPs) to the Emergency Management Services Division of OFD on an annual basis. Each department will keep these plans current by submitting revisions as needed. | OFD | ADA |
| **Objective 26:** Reduce risk to critical Port of Oakland facilities and infrastructure through targeted seismic, flood, and climate resilience improvements, enhanced monitoring capabilities, and modernization of energy systems to ensure operational continuity during hazard events. | 1. Wharf Seismic and Structural Resilience Upgrade- Implement a comprehensive Wharf Repair and Upgrade Project to enhance resilience against earthquakes and severe storm conditions. The project will include:<br>• Seismic Upgrades: Strengthen wharf structures to withstand ground shaking and minimize catastrophic damage during major earthquakes.<br>• Structural Enhancements: Improve load distribution, reinforce critical connections, and repair or replace deteriorated piles to restore vertical and lateral support.<br>• Concrete Rehabilitation: Remove delaminated concrete, install corrosion-resistant reinforcement, and place new concrete to restore deck integrity and reduce maintenance needs. | Port of Oakland | |
| **Objective 26** | 2. Maritime Area Seismic Monitors - The Port of Oakland's Seaport terminals are generally constructed of pile-supported wharf structures with riprap bulkheads retaining soil at the back of the terminals. The Port proposes to implement additional seismic monitoring equipment at Berths 23–26 and Berths 57–58, as well as repair existing equipment at Berths 35–37. Port personnel have identified difficulty in assessing potential damage to terminals after a major earthquake due to limited functioning seismic monitoring equipment. The proposed installations will fill gaps in the current monitoring system by providing a more complete picture at Inner Harbor, Middle Harbor, and Outer Harbor locations. This will allow engineers to focus on inspections of areas most susceptible to damage and proceed with repairs to resume operations quickly. | Port of Oakland | |
| **Objective 26** | 3. North Field Flood Protection Study and Adaptation Plan - Building on the 2023 North Field Vulnerability Study, the Port of Oakland will lead a comprehensive analysis to:<br>• Confirm design of flood elevations and critical infrastructure vulnerabilities. | Port of Oakland | |

| MITIGATION OBJECTIVE | MITIGATION ACTION | LEAD | SUPPORT |
|---|---|---|---|
| | • Assess wetlands, culverts, and drainage systems.<br>• Identify near-term flood protection measures and phased adaptation strategies.<br>• Develop coordination protocols with Caltrans, East Bay Regional Park District, City of Alameda, and other stakeholders. | | |
| **Objective 26** | 4. Old Earhart Road Floodwall Improvement - Based on the 2023 North Field Vulnerability Study, the Port of Oakland will implement a localized flood protection project at Old Earhart Road. The project will:<br>• Raise Old Earhart Road to connect two existing high points on the north side of North Field.<br>• Construct two short floodwalls totaling approximately 530 feet to close gaps and create a continuous barrier.<br>• Reduce flood risk for critical airport infrastructure and maintain operational continuity during extreme weather and sea level rise events. | Port of Oakland | |
| **Objective 26** | 5. Modernize Port Energy Infrastructure for Resilience and Reliability - Port Public Power will strengthen energy resilience by modernizing the Port's electrical infrastructure and planning for future grid demands. This action includes:<br>• Conducting a comprehensive assessment of existing systems<br>• Identifying critical upgrades<br>• Integrating advanced technologies to support full-scale electrification<br>Over the next decade, the Port will implement renewable generation projects, battery storage systems, and smart grid solutions to:<br>• Enhance operational flexibility<br>• Reduce greenhouse gas emissions<br>• Provide uninterrupted service to critical facilities during hazard events | Port of Oakland | |
| **Objective 26** | 6. Maritime Terminal Study on Liquefaction Potential - The Port of Oakland is located in a geographic area highly prone to liquefaction and, as a result, infrastructure damage from seismic activity. To mitigate risk and prepare for imminent seismic events, the Port will conduct a comprehensive liquefaction study at its marine terminals. This study will evaluate liquefaction potential throughout the terminals and its effects on Port infrastructure. It will identify areas and facilities most at risk and outline a plan for mitigation, retrofit, and emergency response. | Port of Oakland | |

## IMPLEMENTING, ADOPTING, AND MAINTAINING THE PLAN

The LHMP action items provide a framework for activities that the City of Oakland can implement over the next 5 years. The goals objectives, and mitigation actions will be implemented through existing plans, policies, and programs.

The City of Oakland's Emergency Management Services Division (EMSD) Manager and the Planning & Building Department will have co-lead responsibility for overseeing the plan implementation and maintenance strategy. Plan implementation and evaluation will be a shared responsibility among all agencies identified as lead agencies in the mitigation action plan.

The Oakland City Council has adopted the 2026 LHMP and will hold responsibility for allocating City resources to ensure it is implemented. As part of the City's General Plan Update led by the Planning & Building Department, City Council adopted an updated Safety Element, updated Housing Element and created a new Environmental Justice Element (September 26, 2023). The updated Safety Element adopted the 2021 LHMP, and city staff will seek to adopt the 2026 LHMP as an appendix to the Safety Element as well.

Plan maintenance of the LHMP will include the following:

- Monitoring implementation of the mitigation actions.
- Progress reporting.
- A strategy for continued public involvement.
- Plan integration with other relevant plans and programs.

This LHMP is designed with an adaptive management approach that can evolve along with funding sources and state and federal mandates. The framework established by this plan will enable the City to pursue FEMA Hazard Mitigation Assistance (HMA) grant funding for feasible, eligible, and cost-effective actions. The City developed this plan with extensive opportunities for public involvement and input.

# Part 1 - Introduction & Planning Process

# 1. INTRODUCTION

## 1.1 WHY PREPARE THIS PLAN?

**Hazard mitigation reduces the loss of life, property, and environmental damage caused by natural and human-made disasters. Hazard Mitigation Plan consists of long-term and short-term policies, programs, projects, and other activities.**

**The City of Oakland prepared this Local Hazard Mitigation Plan (LHMP) to better protect the residents, property, and assets throughout the City from the effects of natural hazards, and to establish eligibility for pre- and post-disaster FEMA grants.**

Hazard mitigation plays a crucial role in emergency management by working to reduce the impacts of disasters on individuals, communities, and important assets. By implementing mitigation measures, we can help prevent the same areas from being repeatedly impacted by disasters. Mitigation is part of the emergency management cycle, which is divided into four phases:

- **Preparedness** is when we develop or update activities, programs and systems before an event happens. These activities are often tested (or exercised) in non-emergency situations to determine their effectiveness. Emergency managers also assess potential risks, hazards, and vulnerabilities in this phase.
- **Response** focuses on the immediate and short-term effects of a disaster. It is usually focused on life safety and preventing immediate damage.
- **Recovery** is a long-term phase that looks to return a community to normal, or to a more resilient state, after a disaster.
- **Mitigation** focuses on building (or rebuilding) in ways that reduce the risk more permanently. It is an activity that can occur at any point in the emergency management cycle. For example, communities can undertake mitigation actions before a disaster (the preparedness phase) or while rebuilding after a disaster (the recovery phase) (FEMA 2023).

### 1.1.1 Federal and State Eligibility

#### Federal Eligibility

**Hazard mitigation** is any sustained action taken to reduce or eliminate long-term risk to life and property from hazards.

FEMA defines a **Hazard Mitigation Plan** as a community-driven process to help state, local, tribal, and territorial governments plan for hazard risk. By planning for risk and setting a strategy for action, governments can reduce the

In an effort to reduce the Nation's mounting natural disaster losses, the US Congress passed the Disaster Mitigation Act of 2000 (DMA 2000), which amended the Robert T. Stafford Disaster Relief and Emergency Assistance Act. Section 322 of DMA 2000 emphasizes the need for state and local government entities to closely coordinate on mitigation planning activities and requires a LHMP for any local government applying for federal mitigation grant funds. These funds primary fall under FEMA HMA program. Grant programs under HMA include the following:

- Fire Management Assistance Grant.
- Flood Mitigation Assistance.
- Hazard Mitigation Grant Program.
- Rehabilitation of High Hazard Potential Dams (HHPD).
- Public Assistance – Categories C through G.

Entities with an adopted and federally-approved LHMP are pre-positioned to receive available mitigation funds before and after the next disaster strikes. The plan was developed to make Oakland eligible for pre- and post-disaster FEMA grants.

#### State Eligibility

Assembly Bill Number 2140 (AB 2140) allows counties and cities in California to be considered for additional state cost-share on eligible Public Assistance projects by adopting their current, FEMA-approved local hazard mitigation plans into the Safety Element of their General Plan. This adoption, along with other requirements, makes the county or city eligible to be considered for part or all of its local-share costs on eligible Public Assistance projects to be provided by the state through the California Disaster Assistance Act (CDAA) (Cal OES 2024).

Once the mitigation plan is approved by Cal OES and FEMA, the local jurisdiction must then adopt the mitigation plan into the Safety Element of their General Plan following the requirements outlined by Cal OES.

## 1.2 PURPOSES FOR PLANNING

The City of Oakland prepared, formally approved and adopted this DMA 2000-compliant hazard mitigation plan. The plan was approved by Cal OES and FEMA. The plan identifies resources, information, and strategies for reducing risk from natural hazards. Elements and strategies in the plan meet program requirements and the intent of the City and its residents to mitigate hazards. The plan will help guide mitigation activities throughout the planning area. It was developed to meet the following needs:

- Meet or exceed program requirements specified under the DMA.

- Enable the City of Oakland to apply for federal grant funding to reduce hazard risk through mitigation.
- Fulfill state and federal requirements for hazard mitigation planning.
- Create a risk assessment that focuses on the hazards of concern in Oakland.
- Coordinate existing plans and programs so that high-priority projects to mitigate potential disaster impacts are funded and implemented.
- Serve as an implementation tool for the Safety Element of the City's General Plan.
- Develop hazard and risk information utilizing Equity Priority Community data developed by the City's General Plan Environmental Justice Element.

## 1.3 WHO WILL BENEFIT FROM THIS PLAN?

All residents, businesses, and employees in the City of Oakland are the beneficiaries of this hazard mitigation plan. The plan reduces risk for those who live in, work in, and visit the City. It provides a viable planning framework for all foreseeable natural hazards. Participation in development of the plan by key stakeholders helped to ensure that the outcomes will be mutually beneficial. The plan's goals and recommendations lay the groundwork for the development and implementation of equitable local mitigation activities and partnerships.

## 1.4 FOCUS ON EQUITY

### 1.4.1 City of Oakland's Equity History and Goals

Social equity is critical in promoting healthy and inclusive communities. Oakland has a long history of activism around issues of racial equity and social justice. The City takes a systemic approach to eliminating disparities and barriers to accessing City resources and services with the goal of increasing the well-being of all Oakland residents.

In 2016, the City changed its Municipal Code to define equity and the conditions needed to implement it in its departments, The City of Oakland Municipal Code defines equity as fairness. It means that identity—such as race, ethnicity, gender, age, disability, sexual orientation, or expression—has no detrimental effect on the distribution of resources, opportunities, and outcomes for the City's residents. The Department of Race and Equity (DRE) was then created to provide support and the design of a citywide framework, tools and infrastructure. In 2017, Oakland was chosen to be among the first cohort of five cities to develop local equity indicator tools in partnership with the City University of New York's Institute for State and Local Governance, with funding from the Rockefeller Foundation. The project began as a joint effort between the Resilient Oakland Office and the DRE. It resulted in a baseline report of racial disparities in Oakland. The 2018 Equity Indicators Reports started to be used by City departments to identify disparities that could be addressed through their lines of business, In 2024, The National Civic League recognized Oakland as one of the best ten Cities in the areas or Equity and Inclusive Engagement noting that most of its major policy and planning efforts had adopted the equity process and framework developed by DRE in collaborations with City Departments. Oakland City Departments strive to advance equity by using this process to identify strategies determined through an intentional focus on racial and ethnic disparities and their root causes, informed by community input and City staff expertise.

Oakland's General Plan Environmental Justice and Safety Element provides a quantitative framework used by City staff and community members to better understand the impacts of race, measure disparities, and track changes in policy to eliminate negative impacts of past policies for different groups over time. This framework informs policies that address these disparities and is built upon the data provided in the Equity Indicators Report.

### 1.4.2 Addressing Equity in Hazard Mitigation

There are many examples of what happens in a disaster when vulnerable communities are not taken into consideration in the planning process. Tragedies like Hurricane Katrina, and most recently fires in California where non-English speakers, especially Asian Americans and Spanish speaking population struggled to receive notifications, information and resources, highlight the need to take a more holistic approach to Hazard Mitigation Planning.

The planning process for this hazard mitigation plan was designed to stimulate better, more effective, sustainable and vital connections between stakeholders, toward the common objective of mitigating hazard risks to the community. The plan emphasizes equity to empower the City's most vulnerable people to play a role in building resilience. This focus on equity aligns with the City's approach to evaluate burdens, benefits, and outcomes on underserved communities. The equity process was applied throughout the public outreach process, in the evaluation of risk, and in the development of mitigation actions.

The Local Hazard Mitigation Plan utilizes the Environmental Justice Communities identified in the Environmental Justice Element of the City's General Plan as Equity Priority Communities. These Equity Priority Communities are analyzed to determine exposure to and risk from natural hazards.

For this LHMP update, the composite score of each census tract was divided into three categories (91-100, 81-90, and ≤80). Populations in these categories are recognized as priority communities that are most affected by the hazard.

As part of the General Plan Environmental Justice Element, the City developed a screening analysis to identify EJC that consists of a composite set of indicators (quantitative metrics of EJ issues). Each indicator is scored and then combined to identify the topmost cumulatively burdened communities (City of Oakland 2023). Refer to the Environmental Justice Element of the General Plan for further details on the how the City identified the EJC. Refer to Figure 1-1 that shows the distribution of the EJCs.

Through this broad engagement and focus on equity, the City seeks to reduce vulnerability to natural hazards for all communities so that the benefits of hazard mitigation, such as the following, can be shared by all:

- A faster recovery and return to normal life for neighborhoods after a hazard event
- Reduced stress on emergency responders and social services
- A faster return to work for workers after a hazard event, resulting in less economic disruption and fewer businesses closing
- Maintenance of the culture, diversity, and distinct neighborhoods of the City

The planning process sought to identify specific needs for targeted mitigation actions that can overcome traditional barriers and challenges to equity. Such actions should achieve the following objectives:

- Minimize the impacts of hazard events.
- Provide a better quality of life for all groups and members of the community.
- Build trust and networks that can be relied upon for other developmental activities.
- Promote overall sustainability and resilience.

The risk assessments and the action plan in this hazard mitigation plan aimed for equity by considering the diversity of communities in the City and each community's access to resources (including information, knowledge, and technology), social networks and connections, beliefs and customs, age, gender, race, health, and physical ability. The City will continue to apply an equity lens to address hazard mitigation that aligns with its equity priorities.

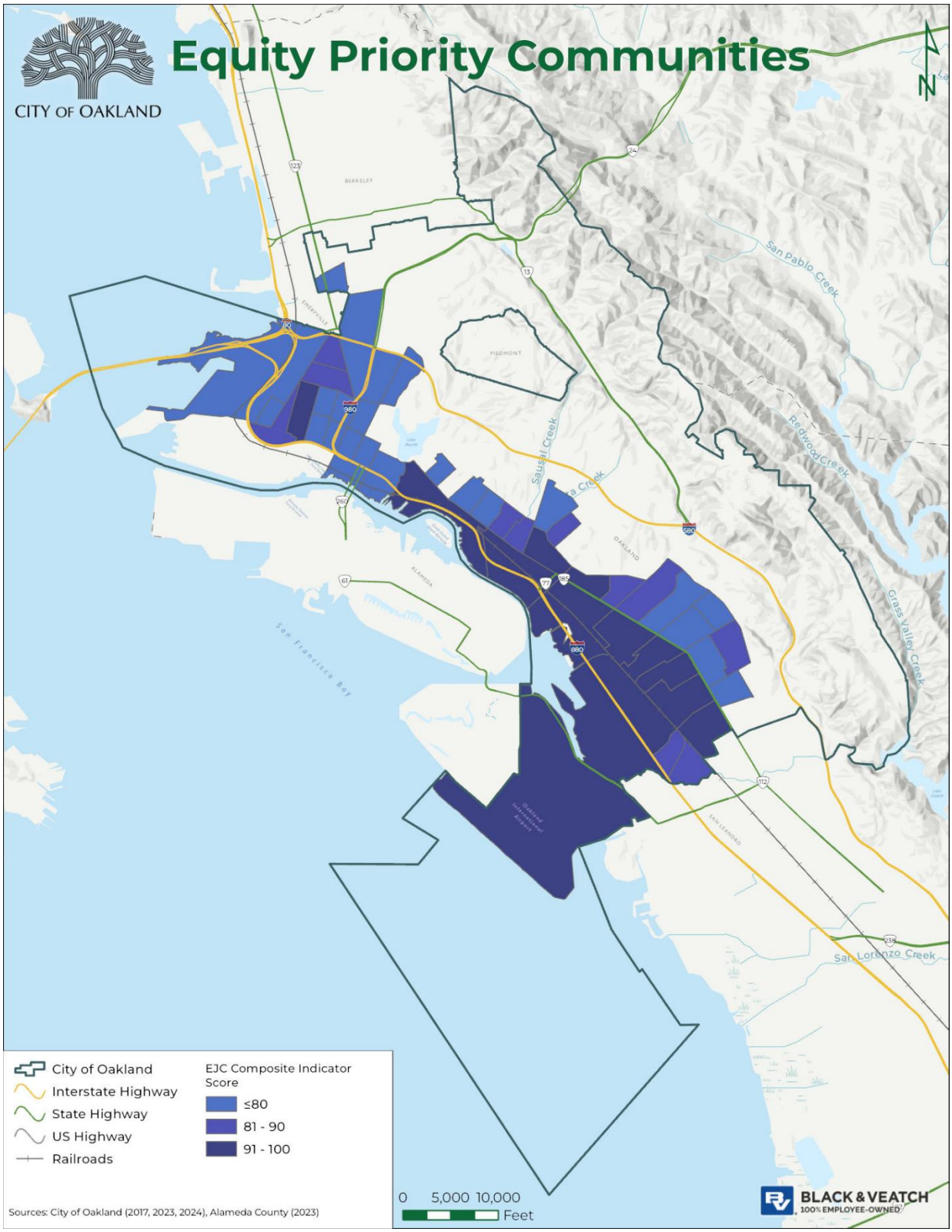



Figure 1-1. Environmental Justice Communities in the City of Oakland

## 1.5 NAVIGATING THE LOCAL HAZARD MITIGATION PLAN

The 2026 City of Oakland LHMP was prepared to align with FEMA's Local Mitigation Planning Policy Guide (April 2025), FEMA's Local Mitigation Planning Handbook (June 2025), and the State of California planning requirements.

Throughout this plan, FEMA's local hazard mitigation planning requirements and state-specific compliance are identified using the icons below. These provide a pathway to show where the LHMP meets each requirement.

**FEMA Mitigation Plan Requirement – 44 CFR Part 201.6**

***Used to identify the requirements met for a local hazard mitigation plan.***

**California Senate Bill Compliance**

***Used to identify where the plan complies with California Senate Bills related to hazard mitigation planning.***

# 2. PLAN UPDATE – WHAT HAS CHANGED

Preparation of the *2026 City of Oakland Local Hazard Mitigation Plan* continues the hazard mitigation planning process that has been in place in the City of Oakland since the early 1970s, with the adoption of the first Seismic and Safety Elements to the City's General Plan. The City of Oakland is a leader in the regional discussion of hazards, hazards mitigation, and disaster recovery. The City was designated one of the first Disaster Resistant Communities in the United States, as well as one of the first "100 Resilient Cities."

This is the fourth update to the City of Oakland's initial 2006 hazard mitigation plan (previously updated in 2011, 2016, and 2021). Prior plan updates reconciled changes or enhancements made to the plan as required by FEMA for local hazard mitigation plan updates. This section reconciles changes and enhancements to the 2021 update.

## 2.1 THE 2021 PLAN

Oakland's 2021 hazard mitigation plan established a 22-member Steering Committee of City staff and area stakeholders to oversee all phases of the planning process. The mission of the 2021 LHMP was:

> *To equitably reduce risk and increase resilience, the mission of the City of Oakland local hazard mitigation plan is to establish and promote a comprehensive mitigation strategy and efforts to protect the whole community and environment from identified natural and manmade hazards.*

The following goals and objectives were determined in alignment with the City's mission statement.

### 2.1.1 2021 Hazard Mitigation Plan Goals

1. Protect life, property, the environment, and natural and cultural resources.
2. Increase public awareness of and the prevention and preparedness for risks.
3. Coordinate with other programs that can support or enhance hazard mitigation.
4. Increase the effectiveness of emergency services provided to the City.
5. Pursue feasible, cost-effective, and environmentally sound hazard mitigation measures.
6. Increase adaptive capacity to reduce risk from hazard impacts based on a changing climate.
7. Reduce racial disparities in how communities prepare for, respond to, and recover from local hazards.

### 2.1.2 2021 Hazard Mitigation Plan Objectives

1. Reduce repetitive losses due to flood, fire, and earthquake by informing land use, design, and construction policies.
2. Identify natural and manmade hazards that threaten life and property in the City.
3. Use best available hazard data while reviewing proposed development opportunities.

4. Encourage the incorporation of hazard mitigation measures into repairs, major alterations, new development, and redevelopment practices, especially in areas subject to substantial hazard risk.
5. Encourage and support leadership within the private sector, non-profit agencies, and community-based organizations to promote and implement local hazard mitigation activities.
6. Incorporate risk reduction considerations in new and updated infrastructure and development plans to reduce the impacts of hazards.
7. Continue providing City emergency services staff with training and equipment to address all identified hazards.
8. Develop and provide updated information about threats, hazards, vulnerabilities, and mitigation strategies to state, regional, and local agencies, as well as private sector and nonprofit groups.
9. Establish and maintain partnerships among all levels of government, private sector, community groups, and institutions of higher learning that improve and implement methods to protect life and property.
10. Create financial and regulatory incentives to motivate stakeholders such as homeowners, private sector businesses, and nonprofit community organizations to mitigate hazards and risk.
11. Continue developing and strengthening inter-jurisdictional coordination and cooperation in the area of emergency services.
12. Support the protection of vital records, and strengthen or replace buildings, infrastructure, and lifelines to minimize post-disaster disruption and facilitate short-term and long-term recovery.
13. Coordinate state and local efforts to reduce greenhouse gas emissions and implement climate action strategies through hazard mitigation plans and actions.
14. Implement hazard mitigation programs and projects that protect life, property, and the environment.
15. Promote and implement hazard mitigation plans and projects that are consistent with state, regional and local climate adaptation goals, policies, and programs.
16. Advance community resilience through preparation, adoption, and implementation of state, regional, and local multi-hazard mitigation plans and projects.
17. Prioritize vulnerable populations in policy responses, including but not limited to, low-income individuals and families; people of color; the young; the elderly; people with disabilities; people with existing health issues; and people with limited English proficiency.

During the 2021 LHMP planning process, City staff engaged Oakland residents at six community meetings and through an online survey, to hear their concerns and priorities for reducing risks from known hazards. Due to COVID-19 considerations, all public events were held as virtual town halls, using the City's Zoom account and were widely accessible to any interested community members and/or stakeholders.

The City convened a group of internal City staff in various departments, as well as outside agencies and districts, to update hazard risk profiles and prioritize equitable mitigation measures. To address the impacts from the nine hazards that were assessed, the plan identified and prioritized 21 mitigation strategies with assigned implementation and funding priority.

## 2.2 WHY UPDATE?

### 2.2.1 Federal Eligibility

In response to the requirements of the DMA 2000, which requires local governmental agencies to develop and update its LHMP every 5 years, this plan serves as the 2026 update to the 2021 Local Hazard Mitigation Plan. The City of Oakland LHMP update is in alignment with FEMA's Local Mitigation Planning Policy Guide (April 2025), FEMA's Local Mitigation Planning Handbook (June 2025), and the State of California planning requirements.

Title 44 of the Code of Federal Regulations (44 CFR) stipulates that hazard mitigation plans must present a schedule for monitoring, evaluating, and updating the plan (see Section 20.4). This provides an opportunity to reevaluate recommendations, monitor the impacts of actions that have been accomplished, and determine if there is a need to change the focus of mitigation strategies. The Robert T. Stafford Act requires that jurisdictions have current hazard mitigation plans to pursue and receive certain federal grant funding.

### 2.2.2 Changes in Development

**Local Plan Requirement E1—44 CFR Part 201.6(d)(3)**

***A local jurisdiction must review and revise its plan to reflect changes in development.***

Tracking previous and future growth in potential hazard areas provides an overview of increased exposure to hazards within a community. This requirement ensures that the mitigation strategy continues to address the risk and vulnerability of existing and potential development and takes into consideration possible future conditions that could impact vulnerability.

As of January 1, 2025, the reported population estimate for the City of Oakland was 426,457, representing a decrease of 1.07% from the 2021 reported population (California Department of Finance 2025). The total number of 191,411 housing units was reported, a 6.23 percent increase, and the average number of persons per household was 2.31, a decrease of 6.97 percent, for the same time frame. The change in demographics for household types over the performance period was as follows:

- Single Detached: +0.49 percent
- Single Attached: +2.32 percent
- 2 to 4 Units: +0.73 percent
- Five or More Units: +16.35 percent
- Mobile Homes: no change

The City has adopted a general plan that governs land-use decisions and policymaking, as well as a building code and specialty ordinances based on state and federal mandates. The updated LHMP assumes that some new development triggered by the increase in population occurred in hazard areas. All such new development would have been regulated pursuant to local programs and codes. Therefore, it is assumed that hazard vulnerability did not measurably increase even if exposure did. Any new development would have accounted

for potential hazard impacts under codes and standards such as the International Building Code and flood damage prevention requirements of the National Flood Insurance Program (NFIP).

A comprehensive review of permitting since completion of the previous plan can help to identify recent development trends and anticipated future development. Table 2-1 summarizes development trends in the performance period since the preparation of the previous hazard mitigation plan, as well as expected future development trends.

Table 2-1 Recent and Expected Future Development Trends

<table>
<tr><th>Criterion</th><th>Response</th></tr>
<tr><td>Land annexed since last hazard mitigation plan</td><td>None.</td></tr>
<tr><td>Land targeted for annexation in next five years</td><td>None.</td></tr>
<tr><td>Areas targeted for development or major redevelopment in the next five years, and whether any of the areas interface with known hazard risk areas.</td><td>The City has an extensive list of development and redevelopment proposals throughout the City. These developments are highly likely to interface with one or more of the hazards assessed by this plan. The City's General Plan and Building Code provide the capacity to address the risk to these developments when they interface with a known hazard area.</td></tr>
<tr><td>Number of permits for new construction issued in the City since the preparation of the previous hazard mitigation plan</td><td>
<table>
<tr><td></td><td>2020</td><td>2021</td><td>2022</td><td>2023</td><td>2024</td></tr>
<tr><td>Single Family</td><td>215</td><td>323</td><td>346</td><td>235</td><td>243</td></tr>
<tr><td>Multi-Family</td><td>892</td><td>1,344</td><td>1,563</td><td>560</td><td>785</td></tr>
<tr><td>Other (commercial, mixed use, etc.)</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td><td>N/A</td></tr>
<tr><td>Total</td><td>3127</td><td>3,688</td><td>3,931</td><td>2818</td><td>3052</td></tr>
</table>
Notes:<br>Other (commercial, mixed-use, etc.) building permit types typically fall under the multifamily category.<br>Single-family permits include detached single-family, townhomes, condos, and accessory dwelling units.<br>Multi-family permits are for structures with 2+ units</td></tr>
<tr><td>Number of new construction permits for each hazard area (or qualitative description of where development has occurred).</td><td>The City currently does not track permit activity by known hazard areas, with the exception of new development proposals that occur within the FEMA-designated special flood hazard area, pursuant to the minimum requirements of the National Flood Insurance Program.</td></tr>
<tr><td>Level of buildout in the City, based on a buildable lands inventory.</td><td>Oakland does not have a buildable lands inventory.</td></tr>
</table>

### 2.2.3 Changes in Risk

As will be shown in Chapter 4, Section 4.5.2 of this LHMP, the general building stock (GBS) in the City has a 2025 assessed valuation of $128.97 billion, an increase of 8.8% of the assessed value for the general building stock in 2020. It is important to note that while the value of general building stock in the City increased, the footprint of the City through annexation or expansion did not. The permit activity noted in Table 2-1 is primarily associated with

redevelopment. As noted above, all development or redevelopment within the City would have been regulated according to the City's General Plan and adopted building codes. Redevelopment with oversight from a General Plan and building code applications is considered to lower the risk as it strengthens or replaces sub-standard building stock. While the 2026 LHMP may show an increase in exposure and/or loss estimations, these increases are viewed as directly attributable to the increase in property value within the City. Examples of changes in risk identified from the 2021 LHMP and this update are shown in Table 2-2.

Table 2-2. Recent and Expected Future Development Trends

| Hazard | 2021 LHMP GBS Value Exposed | 2026 LHMP GBS Value Exposed | % Change |
|---|---|---|---|
| Dam Failure[1] | $20,239,748,722 | $17,213,821,280 | -17.6% |
| Earthquake[2] | $117,570,761,434 | $128,971,332,346 | 8.8% |
| 100-Year Flood | $1,108,508,129 | $1,671,521,003 | 33.7% |
| Landslide (Very High) | $1,132,210,919 | $3,114,145,788 | 63.6% |
| SLR-2050 | 1,622,061,045 | $11,802,105,142 | 86.3% |
| SLR-2100 | 17,639,582,766 | $23,054,285,189 | 23.5% |
| Tsunami | $16,162,563,441 | $16,965,465,804 | 4.7% |
| Wildfire (Very High FHSZ) | $9,551,318,096 | $19,255,494,290 | 50.4% |
| Severe Weather[2] | $117,570,761,434 | $128,971,332,346 | 8.8% |

*(1) Number decreased due to mapping*
*(2) GBS value for the entire City since the hazard impacts all areas of the City.*

## 2.3 THE UPDATED PLAN – WHAT IS DIFFERENT?

**Local Plan Requirement E2—44 CFR Part 201.6(d)(3)**

***A local jurisdiction must review and revise its plan to reflect changes in community priorities.***

The 2026 LHMP has been improved and revised in response to changes in community priorities, planning requirements and overall improvements. Key changes are outlined as follows:

- **Mission Statement** – The mission statement of the LHMP was revised to include equity, an overarching priority of all planning efforts in the City reinforced by the adoption of the General Plan Environmental Justice Element in 2023.
- **Plan Integration** – Goals have been updated to align with equity considerations, current initiatives, programs, as well as to meet identified state priorities.
- **Goals and Objectives** – City departments recognized that many the goals and objectives in the prior plan lacked a measureable component. To more closely align with current City priorities for accountability, this update focuses on measurable objectives for each mitigation action.
- **Equity Priority Communities** – The updated plan defines Equity Priority Communities in alignment with the City 's Environmental Justice Element of the General Plan and includes enhancements to increase its focus on Equity Priority Communities and serving individuals with access and functional needs. This includes

expansion in community engagement efforts, incorporation of hazard zone overlay mapping in the equity analysis, and a process to develop mitigation objectives and actions that incorporated equity and services for individuals with access and functional needs.

- **Climate Change Impacts** – The updated plan integrates a dedicated a subsection for each hazard of concern to the issue of climate change and its potential effects on climate-related hazards.
- **Risk Ranking** – Hazard risk ranking methodology was revised to align with input from the extensive community outreach efforts at the beginning of the planning process. The revised methodology accounts for resident displacement, economic impacts, environmental impacts, and transportation impacts.
- **Community Outreach** – The City's priorities for inclusive community outreach have changed significantly since the 2021 LHMP, when all engagement was held virtually to align with priorities for social distancing due to the COVID-19 pandemic. Community outreach priorities for the 2026 update focused on reaching people at in-person events in their own communities.

The following table indicates the changes between the 2021 LHMP and this 2026 update as they related to 44 CFR requirements.

Table 2-3 Plan Changes Crosswalk

| 44 CFR Requirement (April 2025) | 2021 LHMP | 2026 LHMP Update |
|---|---|---|
| **Element A: Planning Process** | | |
| Does the plan document the planning process, including how it was prepared and who was involved in the process for each jurisdiction? (44 CFR § 201.6(c)(1)) | The 2021 LHMP documented the planning process in Chapter 3 (Plan Development Approach). | The 2026 LHMP update documents the planning process in Section 3 (Planning Process). |
| Does the plan document 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? (44 CFR § 201.6(b)(2)) | The 2021 LHMP process identified key stakeholders and coordinated with them throughout the process. | The 2026 LHMP update provided multiple opportunities for neighboring communities and stakeholders to be involved in the planning process. This is described in Section 3.5 (Stakeholder Outreach Involvement). |
| Does the plan document how the public was involved in the planning process during the drafting stage and prior to plan approval? (44 CFR § 201.6(b)(1)) | Two groups played significant roles in the planning process for the 2021 plan update:<br>• A core planning team, made up of discipline leads from the City and technical consultants, made all milestone decisions on plan process and content.<br>• Those milestone decisions were vetted and validated through an oversite Steering Committee made up of City staff and outside stakeholders.<br>Both committees reviewed existing plans and programs that could support or enhance the outcomes from this plan and identified and participated in a robust public engagement strategy including a community member survey, public forums, and a public comment period. | The 2026 LHMP update provided multiple opportunities for the public to be involved in the planning process. This is described in Section 3.6 (Public Participation and Involvement). |
| Does the plan describe the review and incorporation of existing plans, studies, reports, and technical information? (44 CFR § 201.6(b)(3)) | A comprehensive review of relevant plants and programs was performed by the planning team. | A comprehensive review of relevant plans and programs was performed by the planning team, as discussed in Section 3.8 (Review and Incorporation of Existing Programs) and Section 18 (Capability Assessment). |
| **Element B: Risk Assessment** | | |

| 44 CFR Requirement (April 2025) | 2021 LHMP | 2026 LHMP Update |
|---|---|---|
| Does the plan include a description of the type, location, and extent of all natural hazards that can affect the jurisdiction? Does the plan also include information on previous occurrences of hazard events and on the probability of future hazard events? (44 CFR § 201.6(c)(2)(i)) | Comprehensive risk assessments of each hazard of concern are presented in Chapters 7 through 15. Each chapter includes the following:<br>• Hazard profile, including maps of extent and location, historical occurrences, frequency, severity, and warning time<br>• Secondary hazards<br>• Exposure of people, property, critical facilities, and the environment<br>• Vulnerability of people, property, critical facilities, and the environment<br>• Future trends in development<br>• Scenarios<br>• Issues<br>• The hazards are compared to each other via a risk ranking methodology described in Chapter 17. | Comprehensive risk assessments of each hazard of concern are presented in Chapters 7 through 15. Each chapter includes the following:<br>• Description of the hazard<br>• Location<br>• Extent including intensity, warning time, and worst-case scenarios<br>• Previous occurrences<br>• Future conditions including probability, climate change, and potential future impacts<br>• Vulnerability of the hazards on the population, general building stock, community lifelines, economy, historic and cultural resources, ecosystems and natural resources, and land use and development trends.<br>• Mitigation opportunities for each hazard.<br>The hazards are compared to each other via a risk ranking methodology described in Chapter 17. |
| Does the plan include a summary of the jurisdiction's vulnerability and the impacts on the community from the identified hazards? Does this summary also address NFIP-insured structures that have been repetitively damaged by floods? (44 CFR § 201.6(c)(2)(ii)) | Vulnerability was assessed for all hazards of concern. The Hazus computer model was used for the dam failure, earthquake, flood, and tsunami hazards. These were Level-2 (user-defined) analyses using coordinating agency and local data. Critical facilities and assets were defined and inventoried using the Hazus Comprehensive Data Management System and other available datasets. Outputs were generated for other hazards by applying an estimated damage function to affected assets when available. The asset inventory was extracted from the Hazus model. Best available data were used for all analysis.<br><br>The description of the National Flood Insurance Program and repetitive loss discussion was enhanced to meet new DMA and CRS planning requirements. The update includes a | Sections 7 through 15 include vulnerability assessments for each hazard of concern. For dam failure, earthquake, flood, and tsunami, Hazus was used to conduct a Level-2 analysis to determine the number of people and structures exposed to the hazards, along with the estimated impacts on the economy, debris, and people seeking shelter. For all other hazards, a more qualitative assessment was performed to understand the persons and assets at risk to hazards.<br><br>Updated NFIP statistics, including repetitively damaged structures, are included in the 2026 plan. |

| 44 CFR Requirement (April 2025) | 2021 LHMP | 2026 LHMP Update |
|---|---|---|
| | comprehensive analysis of repetitive loss properties. For these properties, the type of structure was determined and causes of flooding were cited, and the information was reflected on maps. National Flood Insurance Program capability is also assessed. | |
| **Element C: Mitigation Strategy** | | |
| Does the plan document each participant's existing authorities, policies, programs and resources and its ability to expand on and improve these existing policies and programs? (44 CFR § 201.6(c)(3)) | An action plan was developed (Chapter 21) via a facilitated process that included:<br>• Risk ranking<br>• Capability assessment<br>• Action alternative review<br>• Action selection<br>• Action prioritization<br>• Action category analysis. | A mitigation action plan was developed (Chapter 19) that identifies and prioritizes mitigation actions for the 2026 LHMP. Through a facilitated process that incorporated equity priorities, risk ranking, capability assessment, and the plan's goals and objectives, the SC evaluated existing capabilities to determine mitigation actions to improve existing policies and programs. |
| Does the plan address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements, as appropriate? (44 CFR § 201.6(c)(3)(ii)) | Section 5.3.7 includes an assessment of capabilities related to NFIP requirements. The action plan in Chapter 21 includes actions supporting continued compliance and good standing under the program. | Section 10.2.5 (Impact on the Economy) includes a discussion on the National Flood Insurance Program (NFIP) and the City's assessment of the NFIP. In addition, the City identified actions in Chapter 19 (Mitigation Strategy) related to the NFIP. |
| Does the plan include goals to reduce/avoid long-term vulnerabilities to the identified hazards? (44 CFR § 201.6(c)(3)(i)) | Chapter 19 identifies a mission statement, seven goals and 17 objectives. Objectives were selected to meet multiple goals, and actions were selected and prioritized based on meeting multiple objectives. All of these planning components were new for this plan update. | The 2026 LHMP updated goals and objectives and includes the following goals to reduce long-term vulnerabilities to hazards:<br>• Goal 1: Advance equity, reduce racial disparities, and ensure ADA accessibility for people with disabilities and individuals with access and functional needs in all phases of preparing for, responding to, and recovering from natural hazards.<br>• Goal 2: Protect life, property, the environment, and natural and cultural resources equitably.<br>• Goal 5: Pursue feasible, cost-effective, and environmentally appropriate hazard mitigation measures including adaptive capacity to reduce risk from a changing climate, incorporating targeted strategies to advance equitable outcomes. |

| 44 CFR Requirement (April 2025) | 2021 LHMP | 2026 LHMP Update |
|---|---|---|
| Does the plan identify and analyze a comprehensive range of specific mitigation actions and projects for each jurisdiction being considered to reduce the effects of hazards, with emphasis on new and existing buildings and infrastructure? (44 CFR § 201.6(c)(3)(ii)) | A hazard mitigation catalog was developed from which recommended actions were selected. A table in the action plan section analyzes each action by mitigation type to illustrate the range of actions selected. | A comprehensive range of mitigation actions was identified for the plan update and the City identified at least one mitigation action that addresses each hazard of concern. |
| Does the plan contain an action plan that describes how the actions identified will be prioritized (including a cost-benefit review), implemented, and administered by each jurisdiction? (44 CFR § 201.6(c)(3)(iv)); (§201.6(c)(3)(iii)) | Each of the recommended actions is prioritized using a qualitative methodology that looked at the objectives the project will meet, the timeline for completion, how the project will be funded, the impact of the project, the benefits of the project and the costs of the project. This prioritization scheme is detailed in Section 21.3. | Section 19.5 describes the prioritization process used for each mitigation strategy identified for the LHMP. Estimated costs and benefits are included in the detailed discussion of each proposed mitigation action. |
| **Element D: Plan Maintenance** | | |
| Is there discussion of how each community will continue public participation in the plan maintenance process? (44 CFR § 201.6(c)(4)(iii)) | Chapter 22 details a comprehensive strategy for continuing public involvement | Section 20.7 discusses ongoing public participation following plan approval. |
| Is there a description of the method and schedule for keeping the plan current (monitoring, evaluating and updating the mitigation plan within a five-year cycle)? (44 CFR § 201.6(c)(4)(i)) | Chapter 22 includes a detailed plan maintenance strategy centered on an annual progress report by the City over the 5-year performance period of the plan. This is an entirely new strategy from the 2016-2021 plan. | Section 20.4 discusses the procedures for monitoring the plan, including tracking of the progress/status of actions. Section 20.8 discusses the procedures for updating the plan. |
| Does the plan describe a process by which each community will integrate the requirements of the mitigation plan into other planning mechanisms, such as comprehensive or capital improvement plans, when appropriate? (44 CFR § 201.6(c)(4)(ii)) | Chapter 22 includes a detailed plan maintenance strategy centered on an annual progress report by the City over the 5-year performance period of the plan. This is an entirely new strategy from the 2016-2021 plan. | Section 20.2 and 20.3 documents how the SC will integrate the LHMP into relevant decision-making processes, plans, or mechanisms, where feasible. |
| **Element E: Plan Update** | | |
| Was the plan revised to reflect changes in development? (44 CFR § 201.6(d)(3)) | There is a discussion on future development trends as they pertain to each hazard of concern. This discussion looks predominantly at the existing land use and the current regulatory environment that dictates this land use. | Section 2.2.2 discusses how changes in development and population are incorporated into the plan. |
| Was the plan revised to reflect changes in priorities and progress in local mitigation efforts? (44 CFR § 201.6(d)(3)) | An action plan was developed (Chapter 21) via a facilitated process that included:<br>• Risk ranking<br>• Capability assessment<br>• Action alternative review<br>• Action selection | Goals and objectives have been updated to reflect current priorities and focus areas within the City. The mitigation strategy was updated to reflect progress made with the previous actions and identify new local priorities with an equity focus. |

| 44 CFR Requirement (April 2025) | 2021 LHMP | 2026 LHMP Update |
|---|---|---|
| | • Action prioritization<br>• Action category analysis. | |
| **Element F: Plan Adoption** | | |
| For single-jurisdictional plans, has the governing body of the jurisdiction formally adopted the plan to be eligible for certain FEMA assistance? (44 CFR § 201.6(c)(5)) | Appendix G includes formal adoption documentation. | The 2026 LHMP achieved DMA compliance for the City of Oakland. Adoption resolution is included in Appendix E. |

# 3. PLANNING PROCESS

**Local Plan Requirement A1 – 44 CFR Part 201.6(c)(1)**

***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.***

## 3.1 INTRODUCTION

The following section describes the overall process of developing the LHMP, including how it was prepared, who was involved, and how stakeholders and the public participated. To adhere to the requirements of the DMA 2000 and ensure that the planning process received wide and robust support from regional and local stakeholders and the public, the approach to the planning process and plan documentation included the following:

- The 2026 City of Oakland LHMP is a single jurisdictional plan and considers all natural hazards that pose a threat to the City. This satisfies the natural hazards requirements specified in DMA 2000 and Element B of FEMA's *Local Mitigation Planning Policy Guide* (April 2025).
- The City selected a contract consultant, Black & Veatch Corporation (the consultant team), to assist with the development and implementation of the plan.
- This LHMP was developed following the process outlined by DMA 2000, FEMA's *Local Mitigation Planning Policy Guide* (April 2025), and the State of California requirements for mitigation planning. Following these processes ensures that all requirements have been met and supports state and federal reviews of the LHMP.

The planning process for this LHMP update, consisted of the following steps:

1. **Organization of Resources** –City staff defined and organized the Project Management Team (PM), Core Planning Team (CPT), and Steering Committee (SC) (see Table 3-1). These groups met and coordinated throughout the planning process.
2. **Public Engagement and Outreach** – A robust public engagement strategy was implemented, focused on reaching diverse groups of community members.

3. **Update Community Capabilities** – City departments assessed capabilities related to implementing mitigation initiatives.
4. **Identify Hazards** – The Core Planning Team and Steering Committee identified and confirmed hazards to include in the plan.
5. **Risk Assessment** – Using best available data and with input from the CPT and SC, the consultant team performed a risk assessment of each natural hazard of concern.
6. **Mitigation Actions and Implementation Strategy** – Through a consultant-facilitated process, City departments and stakeholders assembled to develop measurable objectives and feasible mitigation actions.
7. **Assemble and Review the Plan** – The consultant team updated and assembled the draft plan in stages to allow input from the City on 50%, 75%, and 100% drafts. Members of the public were encouraged to comment on the draft prior to agency submittal.
8. **Plan Approval and Adoption** – The City chose to adopt the plan prior to agency submittal to expedite the City Council adoption process. Additionally, the City adopted the LHMP into the General Plan Safety Element for plan integration. Cal OES performed a review of the draft and FEMA issued approval on Month Day, 2026.

## 3.2 DEFINING THE PLANNING AREA

The planning area consists of the incorporated limits for the City of Oakland. Relevant Planning Area characteristics are described in Chapter 4 (City of Oakland Profile). Throughout this plan, quantitative risk assessment results are presented by sub-area, where it is feasible to do so, and shown on Figure 3-1 and listed below:

- Central East Oakland
- Coliseum/Airport
- Downtown
- East Oakland Hills
- Eastlake/Fruitvale
- Glenview/ Redwood Heights
- North Oakland Hills
- North Oakland/Adams Point
- West Oakland

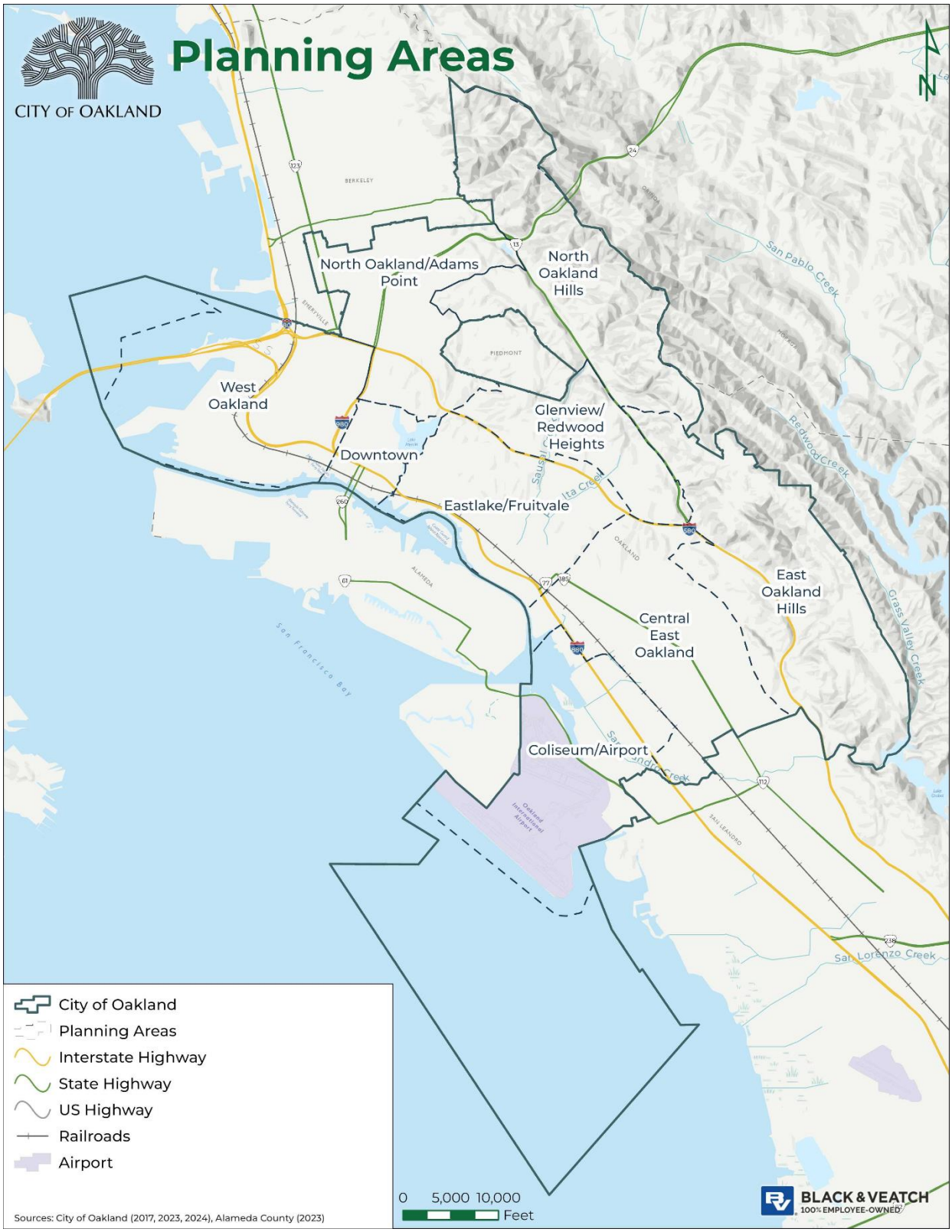



Figure 3-1 City of Oakland Hazard Mitigation Planning Area

## 3.3 FUNDING

City general funds, Cal OES funding, and an HMGP grant covered 100 percent of the cost of developing this hazard mitigation plan update. The Oakland Fire Department's (OFD) Emergency Management Services Division (EMSD) administered the development of the plan.

### 3.3.1 Contract Consultant

Black & Veatch was selected as a contract consultant to guide and assist the City throughout the expedited planning process.

## 3.4 FORMATION OF THE PLANNING TEAMS

The LHMP planning teams included a Project Management (PM) team, a Core Planning Team (CPT), and a Steering Committee (SC). Some members of the CPT and SC also participated in a Whole Communities Team, a subset of the planning teams, to advise on issues related to equity. Members of the planning teams are listed in Table 3-1.

- **Project Management Team** (PM) included key personnel from EMSD, and discipline leads from the consultant team. They guided the overall planning process for the planning teams.
- **Core Planning Team** (CPT) includes key personnel from the City and discipline leads from the consultant team. They were responsible for monitoring plan progress milestones and working closely with the plan development.
- **Steering Committee** (SC) consisted of 23 members made up of the CPT, additional City staff, and stakeholders from other jurisdictions. Throughout the process they were responsible for reviewing and approving information, providing input, informing the risk assessment and risk ranking, approving key milestones (with City Council having final approval authority) and approving mitigation strategies.

Table 3-1. City of Oakland Planning Teams

| Organization / Department | Name | Title | Project Management Team Member | Core Planning Team Member | SC Member | SC Member (Alternate) |
|---|---|---|---|---|---|---|
| **City of Oakland** | | | | | | |
| City Administrator's Office - ADA Programs | Anh Nguyen | ADA Programs Manager | | | X | |
| City Administrator's Office - ADA Programs | Mark Romoser | ADA Programs Program Analyst | | | | X |
| City Administrator's Office – Public Information Officer | Sean Maher | Citywide Communications and Engagement Director | | | X | |
| City Administrator's Office - Sustainability | Daniel Hamilton | Sustainability Manager | | X | X | |

| Organization / Department | Name | Title | Project Management Team Member | Core Planning Team Member | SC Member | SC Member (Alternate) |
|---|---|---|---|---|---|---|
| City Administrator's Office & Animal Services | Joe DeVries | Director of Animal Services | | | X | |
| City Attorney's Office | Michael Branson | Deputy City Attorney | | X | X | |
| Department of Transportation | Jason Patton | Senior Transportation Planner | | | X | |
| Human Resources Management | Greg Elliot | Human Resources Manager | | | X | |
| Human Services | Melissa Francisco | Executive Assistant to the Director | | | X | |
| Information Technology | Eduardo Alvarez | Spatial Analyst | | | X | |
| Information Technology | Julian Ware | Spatial Data Administrator | | | | X |
| Fire Department | Matthew Nichelini | Deputy Chief | | | X | |
| Fire Department-Fire Prevention | Javan Smith | Fire Marshall Assistant | | | X | |
| Fire Department Emergency Management Services Division | Olga Crowe | Assistant Emergency Services Manager | X | X | X | |
| Fire Department Emergency Management Services Division | Jessica Feil | EMSD Manager | | X | | X |
| Fire Department Emergency Management Services Division | Veronika Cole | Emergency Planning Coordinator | X | X | | X |
| Fire Department-Public Information Officer | Michael Hunt | Chief of Staff | | | X | |
| Parks, Recreation & Youth Development | Alethia Walker | Recreation Supervisor | | | X | |
| Parks, Recreation & Youth Development | Jessica Bustos | Recreation Supervisor | | | | X |
| Parks, Recreation & Youth Development | Carlos Vargas | Recreation Supervisor | | | | X |
| Public Works Capital Improvement Program | Tess Kavanagh | CIP Coordinator | | | X | |
| Planning & Building | Daniel Findley | Planner | | X | X | |
| Planning & Building | Laura Kiminski | Planning & Building Strategic Planning Manage | | X | | X |
| Planning & Building | Ed Manasse | Planning & Building Deputy Director | | X | | X |
| Public Works | Terri Fashing | Watershed Program Manager | | X | X | |
| Race and Equity | Jacque Larrainzar | Race and Equity Analyst | | X | X | |

| Organization / Department | Name | Title | Project Management Team Member | Core Planning Team Member | SC Member | SC Member (Alternate) |
|---|---|---|---|---|---|---|
| Race and Equity | Darlene Flynn | Department of Race and Equity Director | | | | X |
| **Alameda County** | | | | | | |
| Office of Emergency Services | Brentt Blaser | Emergency Manager | | | X | |
| Office of Emergency Services | Francesca Ciresi | Emergency Services Coordinator | | | | X |
| Office of Emergency Services | Shauna D. Polk | Senior Emergency Services Coordinator | | | | X |
| Office of Emergency Services | Samia Stanley | Senior Emergency Services Coordinator | | | | X |
| **City of Piedmont** | | | | | | |
| Fire Department | Dave Brannigan | Fire Chief | | | X | |
| Planning Department | Lamis Chabbani | Assistant Planner | | | | X |
| **East Bay Municipal Utility District (EBMUD)** | | | | | | |
| EBMUD | Heidi Benenson | Emergency Preparedness and Business Continuity Administrator | | | X | |
| EBMUD | Shelly Dean | Associate Engineer | | | | X |
| **East Bary Regional Park District (EBRPD)** | | | | | | |
| EBRPD | Justin Porter | Health and Safety Officer | | | X | |
| **Port of Oakland** | | | | | | |
| Port of Oakland | Desmond DeMoss | Safety and Business Continuity Officer | | | X | |
| Port of Oakland | Sarah Corso | Environmental Health & Safety Specialist | | | | X |
| **Black & Veatch** | | | | | | |
| Black & Veatch | Rob Flaner | Project Manager | X | X | | |
| Black & Veatch | Megan Brotherton | Lead Planner | X | X | | |
| Black & Veatch | Carol Baumann | Risk Assessment Lead | X | X | | |
| Black & Veatch | Heather Apgar | Mitigation Strategy Lead | X | | | |
| Black & Veatch | Erin Schanen | Planner | X | X | | |

## 3.5 PLANNING ACTIVITIES

Table 3-2 summarizes the planning process activities, efforts, and key milestones conducted to prepare the LHMP. Meeting documentation (e.g., presentations, meeting summaries) is located in Appendix B (Meeting Documentation). Table 3-2 only identifies milestone meetings and activities held during the plan update; it does not reflect all planning activities conducted throughout the planning process.

Table 3-2. Plan Development Milestones

| Date | FEMA Local Mitigation Planning Policy Requirement* | Activity | Description | Attendance |
|---|---|---|---|---|
| April 24, 2025 | A1, A2, A3, B1 | CPT Kickoff | • LHMP Overview<br>• Planning Groups<br>• Community engagement<br>• Hazard Identification<br>• Update on Contractor Selection<br>• Future meeting times | 10 |
| May 13, 2025 | A1, B1, C1, C3 | SC Kickoff Meeting | • Overview of the LHMP with Cal OES Presentation<br>• Introduction to Hazard Identification<br>• Mission, Goals, Objectives, and Mitigation Statement<br>• Steering Committee Guidelines | 29 (Included six CalOES staff presenters) |
| May 29, 2025 | A2, A4, B1, B2, C3 | SC #2 | • Floodplain Concern<br>• Approval of Identified Hazards<br>• Goals and Objectives<br>• Community Engagement | 18 |
| July 14, 2025 | A2, A3 | SC #3 | • Introduction and Overview<br>• 2025 LHMP Annual Progress Report<br>• Community Engagement Plan | 24 |
| August 28, 2025 | A2, A3 | CPT#2 | • Update on contracting<br>• Community Engagement | 8 |
| ***Planning Process Supported by Contract Consultant*** | | | | |
| September 23, 2025 | A2, A4, B1, B2, C3 | PM Project Kickoff Meeting | • Introductions<br>• Scope & schedule<br>• Planning teams & committees<br>• Risk assessment<br>• City department responsibilities<br>• Communication protocols | 8 |
| October 9, 2025 | A2, A4, B1, B2, C3 | CPT #3 | • Select and confirm hazard scenarios for GIS analysis<br>• Overview and assignments for the capabilities assessment<br>• Summary of community outreach | 10 |
| October 14, 2025 | A1, A2, A3 | PM #1 | • Public Townhall Meetings<br>• CPT Scheduling and Meeting Content<br>• Data Sources | 3 |
| October 28, 2025 | A1, C1 | PM #2 | • Schedule and Milestone Timeline<br>• Work Plan for Each Working Group (SC and CPT)<br>• New Data Sources for Integration | 4 |
| November 3, 2025 | A1, A2, A3, B2 | PM #3 | • Schedule and Milestone Timeline<br>• Mitigation Actions<br>• Risk Assessment | 4 |

| Date | FEMA Local Mitigation Planning Policy Requirement* | Activity | Description | Attendance |
|---|---|---|---|---|
| | | | • SC Coordination<br>• CPT Coordination<br>• Public Town Halls | |
| November 5, 2025 | A1, C4, C5, D2 | SC #4 | • Introductions<br>• Approve Prior Meeting Minutes<br>• Schedule and Milestones<br>• Previous Mitigation Actions<br>• Goals & Objectives<br>• Plan Maintenance Strategy | 19 |
| November 10, 2025 | A2, A3, C3, C4 | PM #4 | • Public Survey<br>• Equity Approach<br>• LHMP Development<br>• SMARTE Objectives Overview | 4 |
| November 13, 2025 | B2, C3, C4 | CPT #4 | • LHMP Process (Equity, Goals, Objectives and Action Items)<br>• Equity Analysis and Earthquake Mapping<br>• Introduction to the Mitigation Catalogue | 9 |
| November 17, 2025 | B2, C3, C4 | SC #5 | • Introductions<br>• Approve Prior Meeting Minutes<br>• Schedule and Milestones<br>• Approve Updated Mitigation Goals<br>• Hazard Profiles - Risk Assessment<br>Risk Ranking<br>• Objectives and Mitigation Actions | 18 |
| November 24, 2025 | A2, A3, B2 | CPT #5 | • Risk Assessment Follow-Ups from 11.17.25 Steering Committee Meeting<br>• Equity Analysis<br>• Community Engagement to Inform LHMP Facilities/ Community Lifelines | 10 |
| November 24, 2025 | A2, A3, B2, C3 | PM #5 | • Public Survey<br>• Schedule and Milestone Timeline<br>• CPT Coordination<br>• Risk Assessment<br>• Equity Priority Communities<br>• Goals and Objectives<br>• Stakeholder Engagement | 4 |
| November 25, 2025 | B2 | CPT #6 | • Mapping Discussion<br>• EJ Community/Gradient Discussion<br>• Oakland History Profile Discussion | 10 |

| Date | FEMA Local Mitigation Planning Policy Requirement* | Activity | Description | Attendance |
|---|---|---|---|---|
| December 1, 2025 | A2, A3, C2, C3 | PM #6 | • Public Survey<br>• Schedule and Milestones<br>• StoryMap Access and Updates<br>• Repetitive Loss Data<br>• Information Packet for Objectives and Action Items<br>• CPT Coordination | 5 |
| December 3, 2025 | A2, C1, C2, C3, C4, C5 | Mitigation Objectives and Action Items Workshop Kickoff | • Overview of Mitigation Objective and Action Plan Development | 20 |
| December 8, 2025 | A2, A3 | PM #7 | • Public Survey<br>• Update from the LHMP Equity<br>• Review Meeting<br>• Schedule and Milestones<br>• LHMP Development - 50% Draft<br>• Public Meetings | 5 |
| December 9, 2025 | A2, C1, C2, C3, C4, C5 | Mitigation Objectives and Action Items Workshop – NFIP Session | • Develop Mitigation Objectives<br>• Develop Mitigation Actions as Measurable Components of the Objectives | 7 |
| December 9, 2025 | A2, C1, C2, C3, C4, C5 | Mitigation Objectives and Action Items Workshop – Infrastructure Working Group | • Develop Mitigation Objectives<br>• Develop Mitigation Actions as Measurable Components of the Objectives | 19 |
| December 10, 2025 | A2, C1, C2, C3, C4, C5 | Mitigation Objectives and Action Items Workshop – Whole Communities Team | • Develop Mitigation Objectives<br>• Develop Mitigation Actions as Measurable Components of the Objectives | 11 |
| December 10, 2025 | A2, C1, C2, C3, C4, C5 | Mitigation Objectives and Action Items Workshop – HCD and Planning Working Group | • Develop Mitigation Objectives<br>• Develop Mitigation Actions as Measurable Components of the Objectives | 10 |
| December 11, 2025 | A2, C1, C2, C3, C4, C5 | Mitigation Objectives and Action Items Workshop – OFD Working Group | • Develop Mitigation Objectives<br>• Develop Mitigation Actions as Measurable Components of the Objectives | 13 |

| Date | FEMA Local Mitigation Planning Policy Requirement* | Activity | Description | Attendance |
|---|---|---|---|---|
| December 12, 2025 | A2, C1, C2, C3, C4, C5 | Mitigation Objectives and Action Items Workshop – Office of Sustainability Working Group | • Develop Mitigation Objectives<br>• Develop Mitigation Actions as Measurable Components of the Objectives | 7 |
| December 12, 2025 | A2, C1, C2, C3, C4, C5 | Mitigation Objectives and Action Items Workshop – Whole Communities Team | • Review and Provide Input on Objective and Action Item Development Process with Equity Focus<br>• Define Access and Functional Needs Populations | 10 |
| December 17, 2025 | A2, A4, B1, B2, C2 | SC #6 | • LHMP Updates<br>• Approval of the Risk Assessment and Risk Ranking Methodology<br>• Mitigation Strategy - Approval of Mitigation Objectives and Actions for Public Comment Draft<br>• Update on LHMP Public Comment Draft | 20 |
| January 12, 2026 | B2 | CPT #7 | • Approval of Objectives and Actions | 10 |
| January 9 – February 2, 2026 | A2, A3 | Public Comment Period | • Three and a half weeks open public comment period on the draft plan | N/A |
| January 20, 2026 | A2, A3 | Technical Forum | • Presentation of the draft plan for comment | 2 |
| January 27, 2026 | A2, A3 | Community Town Hall | • Presentation of the draft plan for comment | 22 |
| March 12, 2026 | - | Draft Plan Submittal to Cal OES | • Submittal of draft plan and Plan Review Tool to Cal OES for review and approval | N/A |
| March 25, 2026 | A2, A4, B1, B2, C2 | SC #7 | • Discuss public comment packet<br>• Collect topics for 2027 annual update | N/A |
| May 1, 2026 | - | Draft Plan Submittal to FEMA Region 9 | • Submittal of draft plan to FEMA Region 9 by Cal OES | N/A |
| Month Day, 2026 | - | Approval Pending Adoption | • Approval Pending Adoption letter provided by FEMA Region 9 | N/A |
| Month Day, 2026 | F1 | Adoption | • Oakland City Council adoption of draft plan | N/A |
| Month Day, 2026 | F1 | Approval | • Proof of adoption documentation submitted to FEMA Region 9 and Cal OES | N/A |

| Date | FEMA Local Mitigation Planning Policy Requirement* | Activity | Description | Attendance |
|---|---|---|---|---|
| Month Day, 2026 | F1 | Approval | • Final approval of the plan by FEMA Region 9 | N/A |

**Identifies specific FEMA Local Mitigation Planning Policy requirements:*

*A1 – Planning Process – Documentation*
*A2 – Planning Process – Stakeholder Input*
*A3 – Planning Process – Public Involvement*
*A4 – Planning Process – Existing Plans Incorporation*
*B1 – Risk Assessment – Identify Hazards*
*B2 – Risk Assessment – Hazard Vulnerabilities*
*C1 – Mitigation Strategy – Existing Capabilities*
*C2 – Mitigation Strategy – NFIP Participation*
*C3 – Mitigation Strategy – Mitigation Goals*
*C4 – Mitigation Strategy – Identify Mitigation Actions*
*C5 – Mitigation Strategy – Develop Action Plan*
*D1 – Plan Maintenance – Continued Public Participation*
*D2 – Plan Maintenance – Keeping Plan Current*
*D3 – Plan Maintenance – Plan Integration*
*E1 – Plan Update – Changes in Development*
*E2 – Plan Update – Changes in Priorities*
*F1 – Plan Adoption*

## 3.6 STAKEHOLDER OUTREACH AND INVOLVEMENT

**Local Plan Requirement A2 – 44 CFR Part 201.6(b)(2)**

***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 non-profit interests to be involved in the planning process.***

Outreach to stakeholders began within the first month of the planning process and was maintained throughout the planning process. The LHMP incorporates relevant feedback and information from stakeholders as described in this section. This section outlines the stakeholders who were involved in the creation of this LHMP and outlines their participation.

### 3.6.1 Types of Stakeholders

Stakeholders consist of individuals and groups that mitigate actions or policies affect. For this LHMP, private organizations, public entities, and neighboring er were identified and invited to participate. The City made conscientious efforts to ensure diverse regional, county, and local representation in the planning process. Refer to Table 3-4 for the list of stakeholders.

### 3.6.2 Stakeholder and Neighboring Community Participation

Stakeholders were invited to participate via presentations and/or email notifications informing them of the planning effort and giving them an opportunity to get involved. Stakeholders were invited to participate in the following activities:

- Participate as a member of the SC.
- Participate in public outreach events
- Host a public outreach event.
- Share information on public outreach within their organization.
- Comment on the draft plan.

Below is a summary of the stakeholders' involvement in the planning process, demonstrating the extensive outreach efforts made by the City. Key elements of stakeholder outreach include the following:

- Four stakeholders agreed to serve as members of the SC.
- One stakeholder hosted a public outreach event.
- The web link to the draft plan was emailed to all 287 stakeholders and neighboring communities, inviting them to view the website to learn more, join community engagement events or comment on the draft plan. Comments were received from the identified stakeholders via email and in meetings held during the public comment period.

## Incorporation of Stakeholder and Neighboring Community Input

Comments on the draft plan were reviewed, and applicable feedback was incorporated into this LHMP, including the following:

- ADA compliance is needed across all emergency planning efforts.
- Use a community-based approach to support residents during disaster events.

## Federal and State Agencies

The following section lists the government agencies that were involved during the planning process. Note that Alameda County agencies are included in the Local Stakeholders and Neighboring section.

Table 3-3 describes how federal and state agencies participated in the 2026 City of Oakland LHMP. Those listed in the table below were directly or indirectly involved in the process and provided crucial information to develop the LHMP.

Table 3-3. Federal and State Agencies

| Agency | Federal | State | Participation |
|---|---|---|---|
| FEMA Region 9 | X | | FEMA provided updated planning guidance; provided summary and detailed NFIP data for the City; and conducted a plan review. |
| FEMA National Risk Index (NRI) | X | | FEMA's NRI was used to confirm the natural hazard selection for this LHMP. |
| National Centers for Environmental Information (NCEI) | X | | NCEI's online tools were accessed to obtain information regarding hazard identification, hazard details, and risk assessments to incorporate into this LHMP. |
| NOAA Storm Prediction Center (SPC) | X | | Information accessed to support risk assessment |
| US Army Corps of Engineers | X | | Information accessed to support risk assessment |
| U.S. Census Bureau | X | | Information accessed to support city profile and risk assessment |
| U.S. Geological Survey | X | | Information accessed to support the risk assessment |
| Cal OES – Mitigation Planning Division | | X | Oversaw the planning process, presented at the kickoff SC meeting, and provided technical support. |
| CAL FIRE | | X | Fire Hazard Severity Zone maps were consulted for the risk assessment; however, the City's adopted fire risk maps were used for analysis. |

## Local Stakeholders and Neighboring Communities

A broad group of stakeholders and neighboring communities were invited to participate in the LHMP update process and are listed in Table 3-4.

The following City stakeholders were invited via email to participate in the plan development process from the beginning and/or were kept apprised of plan development milestones and invited to comment on the draft plan:

- City of Oakland ADA Programs
- Oakland City Attorney's Office
- City of Oakland City Administrator's Office
- City of Oakland Communications Division
- City of Oakland Department of Housing and Community Development
- City of Oakland Department of Race and Equity
- City of Oakland Department of Transportation
- City of Oakland Economic and Workforce Development Department
- City of Oakland Fire Department
- City of Oakland Human Services Department
- City of Oakland Parks, Recreation & Youth Development
- City of Oakland Planning & Building Department
- City of Oakland Public Libraries
- City of Oakland Public Works Department
- City of Oakland Senior Centers
- Mayor's Commission on Persons with Disabilities
- Port of Oakland

The stakeholders and neighboring communities listed below were contacted via email with public meeting announcements, town hall invitations, and/or invitations to comment on the draft plan.

Table 3-4. Local Stakeholders and Neighboring Communities Involved in the Planning Process

| Stakeholder Category | Agency or Organization Name |
|---|---|
| Agencies Involved in Hazard Mitigation Activities | Alameda County Flood Control District |
| | California Department of Water Resources (CA DWR) |
| | Cal OES |
| | Firesafe Council |
| | Claremont Canyon Conservancy |
| Community-Based Organizations/Non-Profits | Acts Full Gospel |
| | Allen Temple |
| | Asian Pacific Environmental Network |
| | Center for Independent Living |
| | Collective Resilience Now |
| | Communities for a Better Environment |
| | Confederated Villages of Lijan |
| | CURYJ |
| | East Oakland Collective |
| | East Bay Asian Local Development Corporation |
| | El Timpano |

| Stakeholder Category | Agency or Organization Name |
|---|---|
| | Family Bridges |
| | Friends of Lincoln Square Park |
| | Friendship House |
| | Mayor's Commission on Persons with Disabilities |
| | Mujeres Unidas y Activas |
| | Oak Center Neighborhood Association |
| | Oakland Climate Action Coalition |
| | Oakland Housing Authority |
| | Oakland Neighborhood Councils |
| | Oakland Public Libraries |
| | Oakland Senior Centers |
| | Resilient Communities |
| | Roots Community Health |
| | Sogorea Te Land Trust |
| | Tzu Chi |
| | Unity Council |
| | United Policy Holders |
| | Urban Habitat |
| | Urban Releaf |
| | Wa Sung Community Service Club |
| | West Oakland Environmental Indicators Project |
| | West Oakland Cultural Action Network |
| Emergency Services | American Red Cross (Bay Area Chapter) |
| | Alameda County OES Sherrif's Office |
| Local Businesses and Academia | Oakland Unified School District |
| | University of California |
| Natural Resource Protection | East Bay Regional Park District |
| | Save the Bay |
| | Sierra Club |
| Neighboring Communities | City of Alameda |
| | City of Berkeley |
| | City of Emeryville |
| | City of San Leandro |
| Planning and Zoning | Oakland Department of Planning and Building |
| Transportation | Oakland DOT |
| Utilities | East Bay Municipal Utility District (EBMUD) |

### 3.6.3 Stakeholder Draft Plan Review

All the entities listed above were provided an opportunity to review and comment on the draft plan during the public comment period. Each entity was sent an email informing them that the draft plan was available for comment and including a link to the webpage and online comment tool. Additional invitations to review the draft plan were released through social media posts and on a banner on the City's website.

The stakeholder and public draft review period extended from January 16-29, 2026. Stakeholders submitted written comments on the draft plan and provided verbal input

during a Technical Forum and a presentation to the Firesafe Council. Applicable comments are incorporated in the draft plan.

Upon completion of a public comment period, the complete draft plan was sent to Cal OES and FEMA Region 9 for a review to ensure program compliance.

## 3.7 PUBLIC PARTICIPATION AND INVOLVEMENT

**Local Plan Requirement A3 – 44 CFR Part 201.6(b)(1)**

***The planning process shall include an opportunity for the public to comment on the plan during the drafting stage and prior to plan approval.***

An important component of the mitigation planning process involved public participation. Public involvement during the development of the City of Oakland LHMP was sought using six methods:

- Hazard Mitigation Plan Webpage and StoryMap
- Social media
- Postcards
- Public meetings and presentations to groups
- Public survey
- Email to LHMP Interest List

During the first phase of outreach in the Fall of 2025, emails in English, Cantonese, and Spanish were sent to 319 community members and stakeholder organizations informing them of opportunities to be involved in the planning process. In January 2026, a second phase of outreach was similarly conducted via 287 emails to encourage participation in the public comment period. Comments received from community members throughout the planning process are incorporated in the draft plan as listed in Table 3-6.

### 3.7.1 Hazard Mitigation Plan Webpage and StoryMap

The City maintains a Local Hazard Mitigation Plan webpage to provide information about the overall process, including upcoming meetings, ways to get involved, a hazard mapper (StoryMap) where the public can learn about hazards impacting any address in Oakland, and general information about hazard mitigation. The webpage was used to keep the public informed about public participation opportunities.

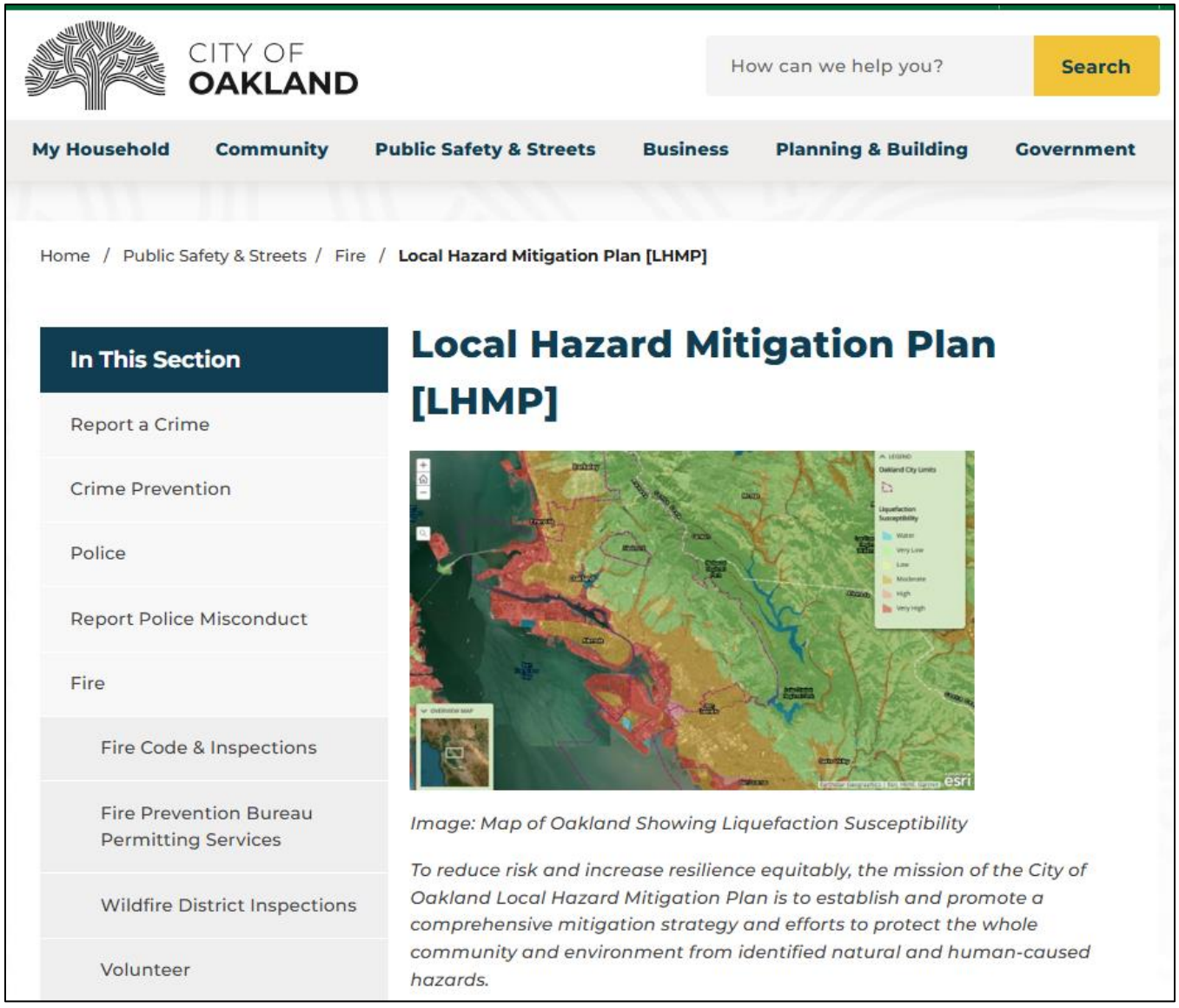



Figure 3-2 City of Oakland Hazard Mitigation Webpage

### 3.7.2 Social Media

The City used social media platforms (Facebook, X, and Instagram) to promote the planning effort, including links to the mitigation webpage, invitation to complete the public survey, and notifications of upcoming meetings. Posts were shared in multiple languages (English, Spanish, and Chinese).

Figure 3-3 Multilingual Instagram Posts Promoting Public Meetings and the Public Survey

### 3.7.3 Print and Digital Postcard

The City used printed and digital postcards and flyers, in multiple languages, to promote the public survey. Postcards were provided at the public window for Building and Planning as well as to attendees of meetings and workshops.

Figure 3-4 Postcards Promoting the Public Survey in English, Cantonese, and Spanish

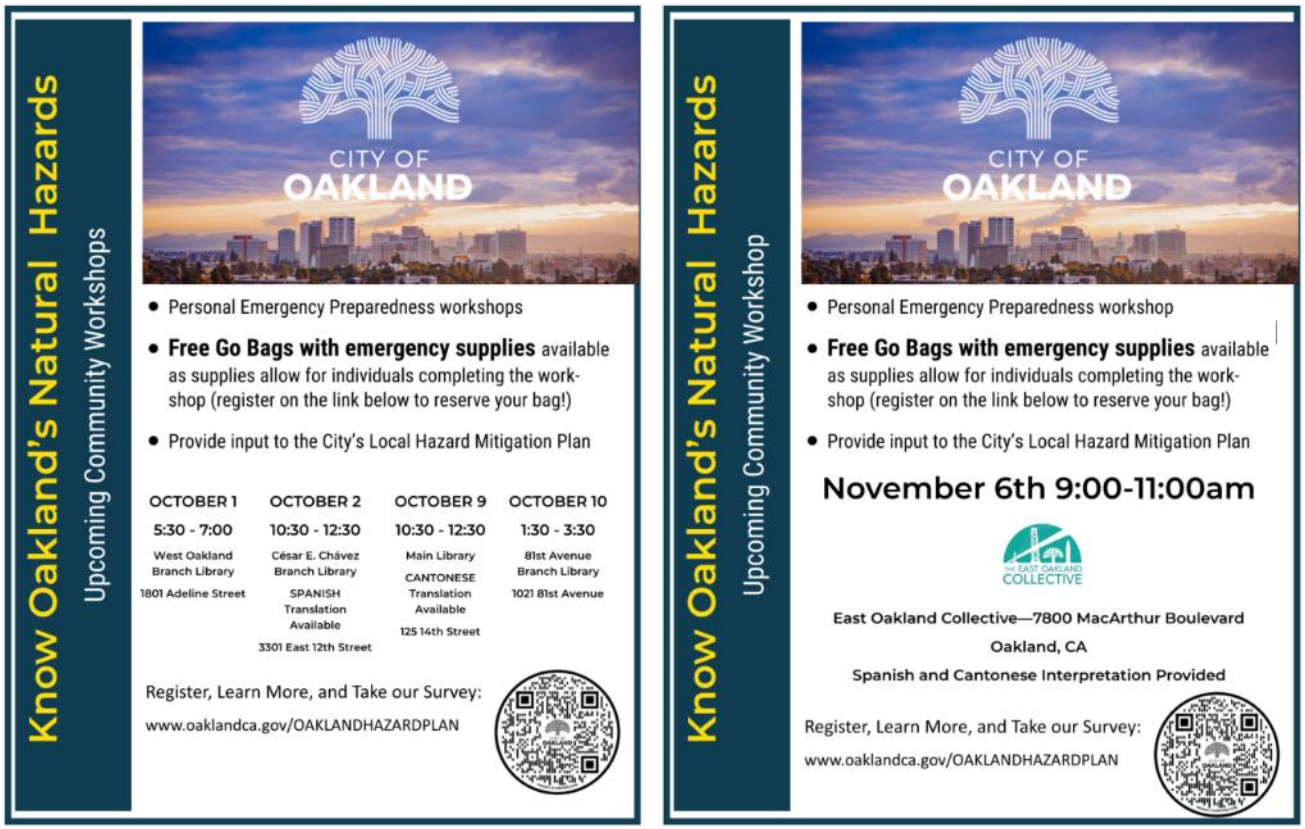



Figure 3-5. Flyers Promoting the Community Workshops (English example depicted. Also made available in Cantonese and Spanish, not pictured here.)

### 3.7.4 Public Meetings

Five in-person public workshops were held throughout the City, focusing on locations that provided convenient access to Equity Priority Communities. Meetings were held in English with translation services in Spanish, Chinese, and Vietnamese. Two virtual meetings were held during the public comment period. In addition, City staff made presentations with opportunities for public comment to the Mayor's Commission on Persons with Disabilities, the North Hills Community Association and two presentations to the Oakland Firesafe Council.

Table 3-5 summarizes each public meeting throughout the planning process along with key takeaways from public comment provided.

Table 3-5. Public Meetings

| Date | Event and Location | Number Present | Key Takeaways |
|---|---|---|---|
| June 25, 2025 | North Hills Community Association<br><br>Montclair Presbyterian Church<br>5701 Thornhill Drive<br>Oakland, CA | 32 | • Need for enhanced parking restrictions in fire hazard areas<br>• Need to study and coordinate traffic response in an emergency, community understanding of who coordinates traffic response<br>• One respondent commented that sirens are not audible |
| September 15, 2025 | Presentation to the Mayor's Commission on Persons with Disabilities) (Online and In-Person)<br><br>City Hall, Hearing Room 1, First Floor, One Frank H. Ogawa Plaza, Oakland, CA, 94612 | 17 | • Concern about safe evacuations for persons with disabilities |
| September 18, 2025 | Oakland Firesafe Council<br><br>Virtual via Zoom | 26 | • Evacuation route concerns<br>• Vegetation management needed on side streets<br>• Fire hydrants need to be checked to ensure pumps work properly |
| October 1, 2025 | Personal Emergency Preparedness & Hazard Mitigation Plan Workshop<br><br>West Oakland Branch Library<br>1801 Adeline Street | 47 | • Tree trimming for low-income community members<br>• More multi-lingual outreach needed<br>• Remove trash/abandoned vehicles that can clog storm drains or hinder evacuation access<br>• Summarize hazard maps for easy understanding |
| October 2, 2025 | Personal Emergency Preparedness & Hazard Mitigation Plan Workshop<br><br>3301 East 12th Street Library (Fruitvale Branch) | 7 | • Clear storm drains<br>• Remove/trim trees on Cleveland that can damage utility lines<br>• Improve communication with those who don't have email or social media access |

| Date | Event and Location | Number Present | Key Takeaways |
|---|---|---|---|
| | | | • Engage trusted neighborhood partners for better outreach to Spanish-speaking community members |
| October 9, 2025 | Personal Emergency Preparedness & Hazard Mitigation Plan Workshop<br><br>Main Library<br>125 14th Street | 29 | • Coordinate with landlords of large apartment buildings to provide emergency preparedness information<br>• Protect the unhoused from hazards<br>• Train the trainers to focus on supporting local resiliency in the local neighborhoods<br>• Increase awareness and understanding of the “Know Your Zone” program |
| October 10, 2025 | Personal Emergency Preparedness & Hazard Mitigation Plan Workshop<br><br>81st Avenue Library<br>1021 81st Avenue | 24 | • Add more siren locations to better cover the community<br>• Support creek management in low-income areas to remove invasive plants<br>• Remove fire-prone eucalyptus in the hills<br>• Fund resilience hubs in trusted community locations<br>• Remediate illegal dumping that blocks storm drains |
| November 6, 2025 | Personal Emergency Preparedness & Hazard Mitigation Plan Workshop<br><br>East Oakland Collective<br>7800 MacArthur Boulevard | 47 | • Educate community members on hazardous household materials that could present extra dangers during a wildfire<br>• Trim trees or promote community member activities to trim trees on private property to reduce damage during high-wind events<br>• Clean the trash from the streets that clogs storm drains |
| January 20, 2026 | Technical Forum<br><br>Virtual via Zoom | 2 | • Concerns about the urban heat island effect in vulnerable communities |
| January 21, 2026 | Presentation to Oakland Firesafe Council<br><br>Virtual via Zoom | 43 | • Wildfire can impact equity priority communities away from the VHFHSZ, safe spaces with air filtration is needed.<br>• Increase accessibility for neighborhood groups to perform vegetation management work on City Property with less steps needed to get permission. (Expedited permitting)<br>• Raise awareness of where the highest hazards are. |

| Date | Event and Location | Number Present | Key Takeaways |
|---|---|---|---|
| | | | • Improve wildfire detection in parks through sensors.<br>• Consider impact to cell phones in a public safety power shutoff. |
| January 27, 2026 | Community Town Hall<br><br>Virtual via Zoom | 22 | • Accessibility and ADA compliance across communications, evacuations, and facilities.<br>• Desire for decentralized community driven resilience strategies.<br>• Improved evacuation planning for mobility impaired residents and non-vehicle travel.<br>• Environmental equity in parks, tree canopy, and heat mitigation.<br>• Better access to hazard maps and more digestible plan summaries. |

### 3.7.5 Public Survey

A local hazard mitigation plan community survey captured data and information from members of the public, focusing on those that live or have connections to the City (such as through work or school). The survey was posted from September 2025 through December 2025 and was offered in English, Spanish, Chinese, and Vietnamese. The City posted the survey on multiple social media platforms, and a link was provided on the City's mitigation plan webpage. Print copies of the survey postcard were posted and available for the public at the Building and Planning helpdesk. A link to the electronic public survey was shared with SC members, other City staff, and the LHMP interest list.

#### Public Survey Results

Between September 2025 and December 2025, over 120 members of the public completed the public survey. The complete survey and detailed results are included in Appendix A (Public Survey). The following summarizes highlights from the survey:

- Earthquake readiness and wildfire smoke/wildfire risk are the clearest priorities—both in lived experience and perceived importance.
- Resilience hubs, continuity of City operations, and community training are widely supported, indicating interest in accessible, neighborhood-level supports and skills-building.
- Awareness gaps remain (e.g., AC Alerts), and more than half lack a specific evacuation route, highlighting opportunities for targeted outreach and route planning.
- Email is the most effective channel for engagement; consider pairing with in-person events to reach older adults and communities less active online.

#### Incorporation of the Public Input into the Hazard Mitigation Plan

Survey participants, meeting attendees, and members of the public who commented on the draft plan, including those from Equity Priority Communities, suggested actions the City should continue to do or should start doing to reduce or eliminate risk of future hazard events. All mitigation-related suggestions are included in the mitigation action plan, or are

existing core capabilities that the City will continue to carry out. Refer to Table 3-6 for examples of the suggestions and how they were incorporated in the Plan.

Table 3-6. Public Comment Examples and LHMP Incorporation

| Public Input | 2026 LHMP Incorporation |
|---|---|
| Provide more multi-lingual outreach for hazard information and preparedness | Mitigation action 3-2 |
| Resilience hubs needed in more neighborhoods to increase community resilience | Mitigation action 4-1 |
| More tree trimming to reduce the amount of damage during windstorms | Mitigation action 16-1 |

### 3.7.6 Public Comment Period

Members of the public were provided an opportunity to comment on the draft plan from January 16-29, 2026. The City's website included a link to the draft plan and an online tool that allowed community members to submit comments. In addition to the website, the public comment period was promoted on Oakland's social media channels, with the Oakland Firesafe Council during their regular meeting and during the two virtual meetings listed in Table 3-5. In addition, 185 community members who joined the LHMP interest list were emailed with an invitation to comment on the draft plan.

## 3.8 IDENTIFICATION AND OUTREACH TO EQUITY PRIORITY COMMUNITIES

Equity Priority Communities are identified to align with the City's General Plan Environmental Justice Element as shown in Figure 3-6. Defined in the General Plan (Environmental Justice Communities) and in this LHMP (Equity Priority Communities), the communities are low-income areas that are disproportionately impacted by environmental pollution and other hazards that can lead to adverse health effects. These communities are eligible for special funding considerations, as well as targeted environmental justice efforts and investments to be recognized and uplifted in order to equitably allocate opportunities and resources (City of Oakland 2023).

Outreach was conducted via multi-lingual email blasts, social media posts, and through in-person meetings held in five locations throughout the identified Equity Priority Community neighborhoods. The meeting materials were translated into Spanish and Chinese, and meetings were held with interpretation in these languages along with Vietnamese. Additionally, the LHMP was presented and feedback sought at the Mayor's Commission on Persons with Disabilities.

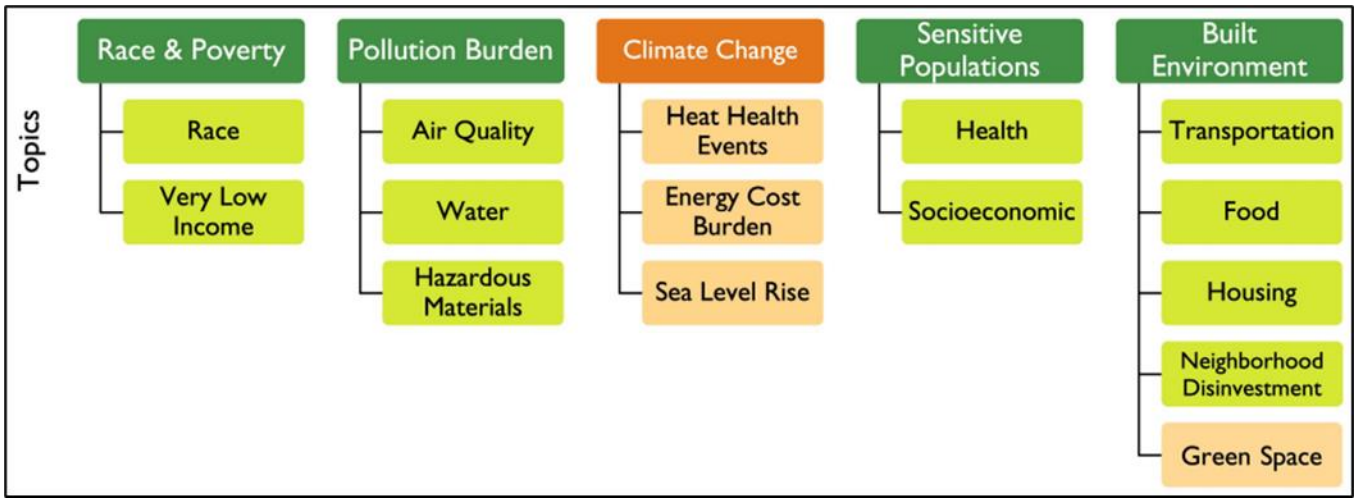



Figure 3-6. General Plan Environmental Justice Element Community Screening Factors

## 3.9 REVIEW AND INCORPORATION OF EXISTING PROGRAMS

**Local Plan Requirement A4 – 44 CFR Part 201.6(b)(3)**

***Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.***

The City utilized the most current technical information, plans, studies, and reports during the planning process to assist in hazard profiling, risk and vulnerability assessment, reviewing mitigation capabilities, and identifying, developing, and prioritizing mitigation strategies at local levels. The following provides examples of sources reviewed for the development of this plan.

- **Overall Planning Process** – The 2025 FEMA Local Mitigation Planning Policy Guide and Handbook were reviewed and used to develop the LHMP for the City. The 2023 California State HMP was reviewed for alignment with mitigation goals, identified hazards, risk assessments, and mitigation actions. In addition, neighboring jurisdiction mitigation plans were reviewed for alignment with identified hazards and mitigation actions.
- **Risk Assessment** – Asset and inventory data collected was used to complete the risk assessment of the LHMP. This included local, state, and federal hazard technical information (e.g., US Geological Survey [USGS] earthquake data, FEMA disaster declarations). Details of the data used, along with how the data was used, is presented in Chapter 6 and throughout the natural hazard profiles (Chapters 7 through 14).
- **Capability Assessment** – Numerous plans, reports, regulations, codes, and technical information were reviewed for the LHMP. Details are provided in Chapter 18. The following programs and plans can affect mitigation within the planning area:
  - 2021 City of Oakland Local Hazard Mitigation Plan
  - City of Oakland Emergency Operations Plan
  - 2025-2028 City of Oakland Strategic Plan
  - Oakland Municipal Code
  - Oakland Planning Code

  - City of Oakland Capital Improvement Program
  - City of Oakland General Plan including:
    - Environmental Justice Element
    - Land Use and Transportation Element
    - Estuary Policy Plan
    - Safety Element
    - Open Space, Conservation, and Recreation (OSCAR) Element
    - Historic Preservation Element
    - Housing Element
  - Regional Shoreline Adaptation Plan
  - Oakland 2030 Equitable Climate Action Plan
  - Oakland Preliminary Sea-level rise Road Map
  - Resilient Oakland Playbook
  - California Fire Code
  - 2019 California Building Code
  - California Clean Air Act
  - California State Hazard Mitigation Forum
  - Disabled Access Code
  - Title 24 California Energy Code 2019 Edition
  - Vegetation Management Plan

- **Mitigation Strategy** – The City developed 75 mitigation actions to address the results of the risk assessment and input received from the public and local stakeholders. These actions considered the current capabilities of City departments to implement each strategy.

# 4. CITY OF OAKLAND PROFILE

This chapter provides general information about the City of Oakland, including its historical information, physical setting, general building stock, land use, population, demographics, population trends, and community lifelines. Analyzing this information leads to an understanding of the study area, including economic, structural, and population assets at risk, and of concerns that could be related to hazards analyzed in this plan (e.g., low-lying areas prone to flooding, high percentage of vulnerable persons in an area).

## 4.1 OVERVIEW

### 4.1.1 Geographic Overview

The City of Oakland is a municipality in Alameda County, California, on the eastern shore of the San Francisco Bay opposite San Francisco. The City has a total area of 78 square miles and is bordered by 19 miles of coastline to the west and hills to the east, with views of both the San Francisco Bay and the Pacific Ocean. Cities adjacent to Oakland include Berkeley to the north; San Leandro to the south; Alameda across the Oakland Estuary; Piedmont, a small city surrounded by Oakland; and Emeryville, a city along the bay between Oakland and Berkeley. Oakland is the only city in the United States with a natural saltwater lake, 115-acre Lake Merritt, wholly contained within its border.

### 4.1.2 Historical Overview

Oakland has a rich and complex history shaped by geography, industry, migration, and infrastructure development. These historical factors have deeply influenced the city's vulnerability to natural and human-caused hazards.

Oakland was founded on unceded land of the Chochenyo-speaking Ohlone indigenous group, the Lisjan, who are the original stewards of this land. After the arrival of Spanish missionaries in the 1760s, many Lisjan people were forced into labor camps at missions and baptized into the Catholic faith. By the late 1840s, many other Ohlone were forced into remote reservations or killed. The Lisjan continue to revitalize their cultural practices and uphold their responsibilities to protect and care for their ancestral homeland.

Between the 1770s and 1849, Spanish settlers and later Mexican ranchers established large land grants (ranchos) in the area.

Oakland's incorporation in 1852 coincided with California's Gold Rush economy. Its proximity to San Francisco and access to deep-water ports made it a hub for shipping and manufacturing. The arrival of the Transcontinental Railroad in 1869 transformed Oakland into a major transportation center, spurring rapid industrialization.

Industries such as shipbuilding, canneries, and manufacturing clustered along the waterfront. While these industries fueled economic growth, they introduced environmental hazards: toxic waste and soil contamination from industrial operations created long-term remediation challenges; fire risk increased due to wooden structures and lack of modern fire codes in early industrial districts; flooding was exacerbated by the filling of wetlands and creeks to create industrial land, reducing natural drainage.

Oakland's population surged in the early 20th century, driven by migration from the Midwest and South, as well as waves of immigrants from Asia and Europe. African Americans migrated during the Great Migration, seeking jobs in shipyards and factories. These communities often settled in low-lying, industrial areas where housing was affordable but hazard exposure was high.

Urban growth led to dense housing in flatlands, increasing vulnerability to earthquakes and fires; infrastructure strain, as water and sewer systems lagged behind population growth, heightening public health risks during floods or disasters; and transportation expansion, including streetcars and early highways, which improved mobility but also fragmented neighborhoods and created evacuation challenges.

World War II brought massive shipbuilding operations to Oakland's waterfront. Oakland became a defense industry powerhouse, attracting tens of thousands of workers. This boom intensified hazard risks: industrial accidents and fires became more common in shipyards and factories; air and water pollution worsened, creating long-term environmental health hazards; housing shortages led to hastily built structures, often lacking seismic resilience.

After the war, the construction of Interstate 880 and other freeways reshaped Oakland. While highways improved regional connectivity, they introduced new vulnerabilities: earthquake risk for elevated freeway structures (tragically realized during the 1989 Loma Prieta earthquake when the Cypress Freeway collapsed); flooding and drainage issues due to paved surfaces and altered watershed patterns; and community displacement, concentrating low-income residents in hazard-prone areas.

By the 1970s, Oakland faced economic decline as manufacturing jobs disappeared. Abandoned industrial sites became environmental hazards, with contaminated soils and derelict buildings posing fire and health risks. Social vulnerability increased as unemployment rose and public investment lagged.

Hazard mitigation during this era focused on earthquake preparedness, spurred by growing awareness of the Hayward Fault's proximity; flood control projects, including improvements to stormwater systems; and fire prevention, particularly in the wildland-urban interface of the Oakland Hills.

The 1989 Loma Prieta earthquake was a turning point for Oakland. The collapse of the Cypress Freeway killed 42 people and highlighted the fragility of aging infrastructure. Liquefaction in the flatlands caused structural damage, and emergency response was hampered by transportation disruptions.

Post-disaster reforms included seismic retrofitting of bridges, freeways, and public buildings; updated building codes to improve earthquake resilience; and hazard mapping and land-use planning to identify vulnerable zones.

Two years later, the 1991 Oakland Hills Firestorm destroyed over 3,000 homes and killed 25 people. This disaster underscored the risks of development in fire-prone areas and the need for vegetation management, emergency communication systems, and community evacuation planning.

Mitigation measures included strict fire codes for hillside construction; vegetation clearance programs and defensible space requirements; and mutual aid agreements for firefighting resources.

Today, Oakland faces a complex hazard landscape shaped by its history: seismic risk remains high due to the Hayward Fault; flooding and sea-level rise threaten low-lying neighborhoods and former wetlands filled for industrial use; wildfire risk persists in the hills, exacerbated by climate change; and social vulnerability continues in historically marginalized communities concentrated in hazard-prone areas.

Recent mitigation efforts include green infrastructure projects to manage stormwater and reduce flood risk; climate adaptation planning, focusing on sea-level rise and heat resilience; and community-based preparedness programs, addressing equity in disaster response.

Oakland's history reveals a recurring theme: economic and infrastructural decisions have long-term consequences for hazard vulnerability. Industrial development, transportation networks, and housing patterns created exposure to earthquakes, floods, fires, and environmental hazards. Migration and social inequities compounded these risks, making hazard mitigation not just a technical challenge but a social imperative.

Today's resilience strategies—seismic retrofits, fire prevention, and climate adaptation—are informed by these historical lessons. Oakland's future depends on integrating hazard mitigation with equitable development, ensuring that all communities can withstand and recover from the hazards shaped by the City's past.

### 4.1.3 Government

The City of Oakland has a Mayor-Council form of government, where the mayor, one councilmember at-large and seven district based councilmembers are elected to serve four-year terms. Through the Mayor and the Mayor-appointed City Administrator, the City Council establishes policy and directs City departments. The Administrator's office enforces policies, makes recommendations to the Council, and coordinates projects and initiatives assigned by the Council. The City Council is responsible for adopting this local hazard mitigation plan, while the City Administrator is responsible for overseeing its implementation.

#### Sub-Areas

In 2019, the City of Oakland adopted a new plan for paving City streets that divided Oakland into nine areas for project planning. These areas, larger than City-defined neighborhoods but smaller than city council districts, were drawn based on considerations including street condition, population density, and equity factors. For this hazard mitigation plan, City staff determined that these areas are suitable for use as sub-areas in assessing the risk presented by natural hazards. Throughout this plan, quantitative risk assessment results are presented by sub-area where it is feasible to do so. The sub-areas are as follows (see Figure 4-1):

- Central East Oakland
- Coliseum/Airport
- Downtown
- East Oakland Hills
- Eastlake/Fruitvale
- Glenview/Redwood Heights
- North Oakland Hills
- North Oakland/Adams Point
- West Oakland

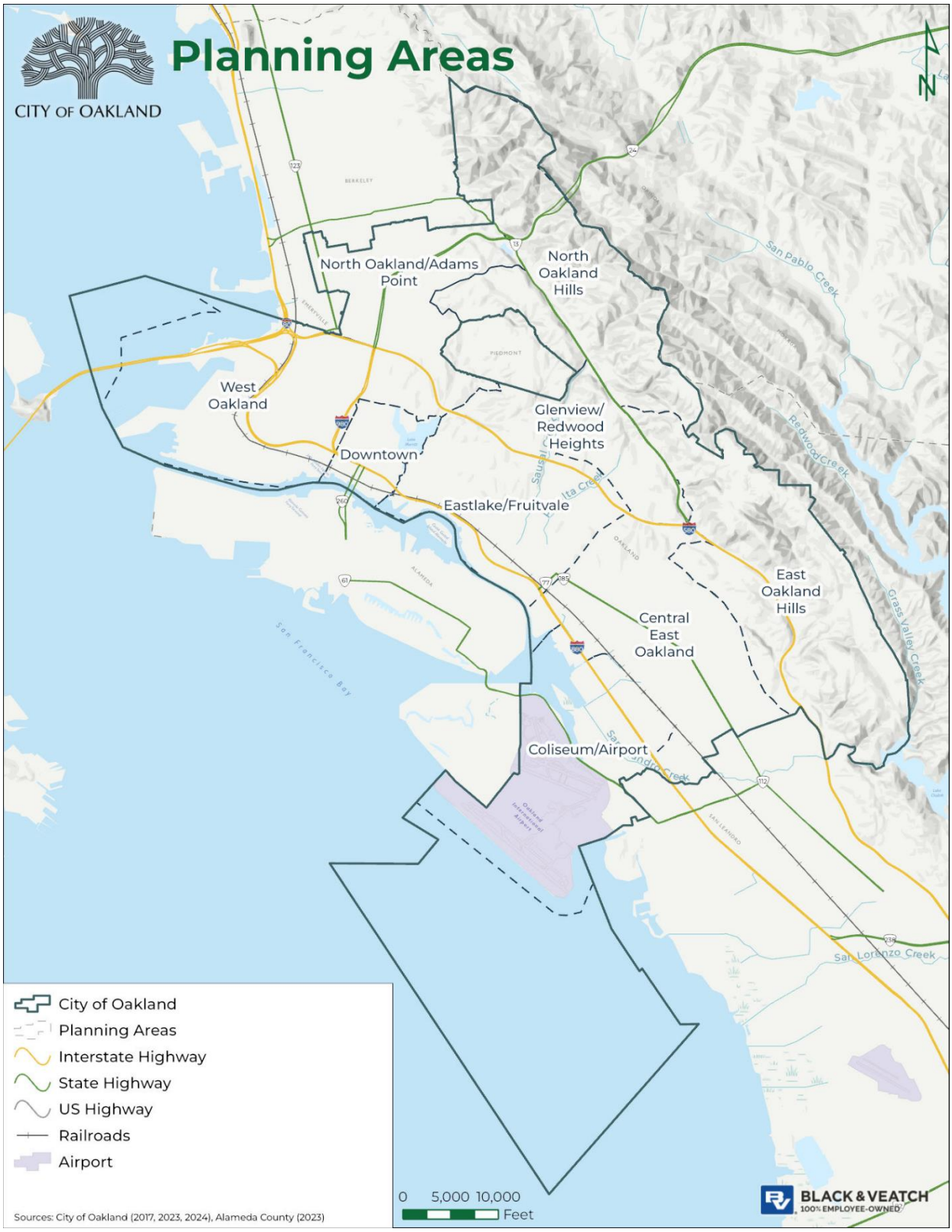



Figure 4-1. Sub-Areas Used in Hazard Risk Assessments

### 4.1.4 Major Past Hazard Events

The City of Oakland was the site of the Oakland Hills Fire in 1991, which resulted in 25 deaths, 150 injuries, and over $1.5 billion in fire losses. The City also has been included in many Alameda County disaster proclamations. Since 1969, federal disaster declarations have been issued for 24 disasters affecting Alameda County, as listed in Table 4-1. While many of these events may not have directly impacted the City of Oakland, they are a testament to the frequency and types of hazard events typical of the region. Review of these events helps identify targets for risk reduction and methods to increase a community's capability to avoid large-scale events in the future.

Federal disaster declarations are typically issued for hazard events that cause more damage than state and local governments can handle without assistance from the federal government, although no specific dollar loss threshold has been established for these declarations. A presidential disaster declaration puts federal recovery programs into motion to help disaster victims, businesses, and public entities. Some of the programs are matched by state programs. There are two types of disaster declarations provided for in the Stafford Act: Emergency Declarations and Major Disaster Declarations. Both declaration types authorize the President to provide supplemental federal disaster assistance (FEMA 2011).

- **Emergency Declaration:** An Emergency Declaration can be declared for any occasion or instance when the President determines federal assistance is needed. Emergency Declarations supplement State and local efforts in providing emergency services, such as the protection of lives, property, public health, and safety, or to lessen or avert the threat of a catastrophe in any part of the United States.
- **Major Declaration:** The President can declare a Major Disaster Declaration for any natural event, including any hurricane, tornado, storm, high water, wind-driven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, or drought, or, regardless of cause, fire, flood, or explosion, that the President believes has caused damage of such severity that it is beyond the combined capabilities of state and local governments to respond. A major disaster declaration provides a wide range of federal assistance programs for individuals and public infrastructure, including funds for both emergency and permanent work.

Review of presidential disaster declarations helps establish the probability of reoccurrence for each hazard and identify targets for risk reduction. Table 4-1 summarizes the federal disaster declarations that included Alameda County since 1970.

Table 4-1. Federal Disaster Declaration History in Alameda County

| Disaster Number | Event Date(s) | Declaration Date | Incident Type | Title |
|---|---|---|---|---|
| DR-283-CA | February 16, 1970 | February 16, 1970 | Flood | Severe Storms & Flooding |
| DR-295-CA | September 29, 1970 | September 29, 1970 | Fire | Forest & Brush Fires |
| EM-3023-CA | January 20, 1977 | January 20, 1977 | Drought | Drought |

| Disaster Number | Event Date(s) | Declaration Date | Incident Type | Title |
|---|---|---|---|---|
| DR-651-CA | December 19, 1981-January 8, 1982 | January 7, 1982 | Flood | Severe Storms, Flood, Mudslides & High Tide |
| DR-677-CA | January 21, 1983-March 30, 1983 | February 9, 1983 | Coastal Storm | Coastal Storms, Floods, Slides & Tornadoes |
| DR-758-CA | February 12, 1986-March 10, 1986 | February 21, 1986 | Flood | Severe Storms & Flooding |
| DR-845-CA | October 17, 1989-December 18, 1989 | October 18, 1989 | Earthquake | Loma Prieta Earthquake |
| DR-894-CA | December 19, 1990-January 3, 1991 | February 11, 1991 | Freezing | Severe Freeze |
| DR-919-CA | October 20-29, 1991 | October 22, 1991 | Fire | Oakland Hills Fire |
| DR-1046-CA | February 13-April 19, 1995 | March 12, 1995 | Severe Storm | Severe Winter Storms, Flooding Landslides, Mud Flow |
| DR-1044-CA | January 3-February 10, 1995 | January 10, 1995 | Severe Storm | Severe Winter Storms, Flooding, Landslides, Mud Flows |
| DR-1155-CA | December 28, 1996-April 1, 1997 | January 4, 1997 | Severe Storm | Severe Storms, Flooding, Mud And Landslides |
| DR-1203-CA | February 2-April 30, 1998 | February 9, 1998 | Severe Storm | Severe Winter Storms And Flooding |
| EM-3248-CA | August 29-October 1, 2005 | September 13, 2005 | Hurricane | Hurricane Katrina Evacuation |
| DR-1646-CA | March 29-April 16, 2006 | June 5, 2006 | Severe Storm | Severe Storms, Flooding, Landslides, And Mudslides |
| DR-1628-CA | December 17, 2005-January 3, 2006 | February 3, 2006 | Severe Storm | Severe Storms, Flooding, Mudslides, And Landslides |
| DR-4308-CA | February 01-February 23, 2017 | April 1, 2017 | Flood | Severe Winter Storms, Flooding, And Mudslides |
| DR-4305-CA | January 18-23, 2017 | March 16, 2017 | Flood | Severe Winter Storms, Flooding, And Mudslides |
| DR-4301-CA | January 3-12, 2017 | February 14, 2017 | Severe Storm | Severe Winter Storms, Flooding, And Mudslides |
| DR-4482-CA | January 20, 2020-May 11, 2023 | March 22, 2020 | Biological | Covid-19 Pandemic |
| EM-3428-CA | January 20, 2020-May 11, 2023 | March 13, 2020 | Biological | Covid-19 |
| DR-4699-CA | February 21-July 10, 2023 | April 3, 2023 | Severe Storm | Severe Winter Storms, Straight-Line Winds, Flooding, Landslides, And Mudslides |
| DR-4683-CA | December 27, 2022-January 31, 2023 | January 14, 2023 | Flood | Severe Winter Storms, Flooding, Landslides, And Mudslides |
| EM-3591-CA | January 8-31, 2023 | January 9, 2023 | Flood | Severe Winter Storms, Flooding, And Mudslides |

*Source: (FEMA 2025)*

## 4.2 PHYSICAL SETTING

This section describes the location, geography, topography, watersheds, and climate of the City of Oakland.

### 4.2.1 Location

The City of Oakland is located on the east side of the San Francisco Bay in the County of Alameda. It is bordered to the west by 19 miles of coastline and to the east by rolling hills that offer views of the Bay and the Pacific Ocean. The City features more than 100 parks, covering over 2,500 acres, along with several recreational areas along its perimeter. Lake Merritt is located adjacent to the downtown area (City of Oakland 2011).

### 4.2.2 Climate

Oakland has a warm-summer Mediterranean climate, with warm, dry summers and mild, wet winters. Table 4-2 lists the historical monthly averages for Oakland for low temperature, high temperature, mean temperature, and average precipitation (NWS NOAA NOWData n.d.) The warmest month of the year is September, and the coldest month of the year is January. The wettest month is January, with an average rainfall of 4.78 inches, and the driest is July, with an average of 0.07 inches.

Table 4-2. Oakland Historic Weather Averages and Records

| Month | Average High | Average Low | Average Mean | Precipitation |
|---|---|---|---|---|
| January | 57.0° | 50.9° | 53.8° | 0.10” |
| February | 60.1° | 50.8° | 55.0° | 0.10” |
| March | 61.8° | 51.8° | 56.4° | 0.11” |
| April | 61.9° | 56.2° | 58.7° | 0.04” |
| May | 64.0° | 58.2° | 60.6° | 0.02” |
| June | 65.5° | 60.7° | 63.4° | 0.01” |
| July | 67.2° | 61.7° | 64.1° | 0.00” |
| August | 69.3° | 62.5° | 66.0° | 0.00” |
| September | 69.4° | 62.5° | 66.8° | 0.00” |
| October | 68.1° | 62.2° | 64.9° | 0.04” |
| November | 60.7° | 54.9° | 58.0° | 0.07” |
| December | 57.3° | 50.7° | 53.2° | 0.16” |

*Source: NWS NOWData*

### 4.2.3 Topography

About two-thirds of Oakland lies in the flat plain of the East Bay, with one-third rising into the foothills and hills of the East Bay range. Oaklanders refer to their city’s terrain as “the flatlands” and “the hills”. Oakland’s highest point is near Grizzly Peak Boulevard, east of Berkeley, just over 1,760 feet above sea level.

### 4.2.4 Watersheds and Surface Waters

A watershed is a geographical area that directs precipitation and snowmelt toward creeks, streams, rivers, and ultimately outflow locations such as reservoirs, bays, and the ocean. Watersheds vary in size and configuration, encompassing anything from a small body of water or county to vast regions covering thousands of square miles with numerous waterways (National Ocean Service 2024). Figure 4-2 depicts the general makeup of a watershed.

The City of Oakland dominantly resides in the San Fransico Bay watershed with the northern planning area contributing to the San Pablo Bay watershed (California DWR 2025); (USGS 2022). Several local watersheds reside within the Planning Area and are depicted in Figure 4-3.

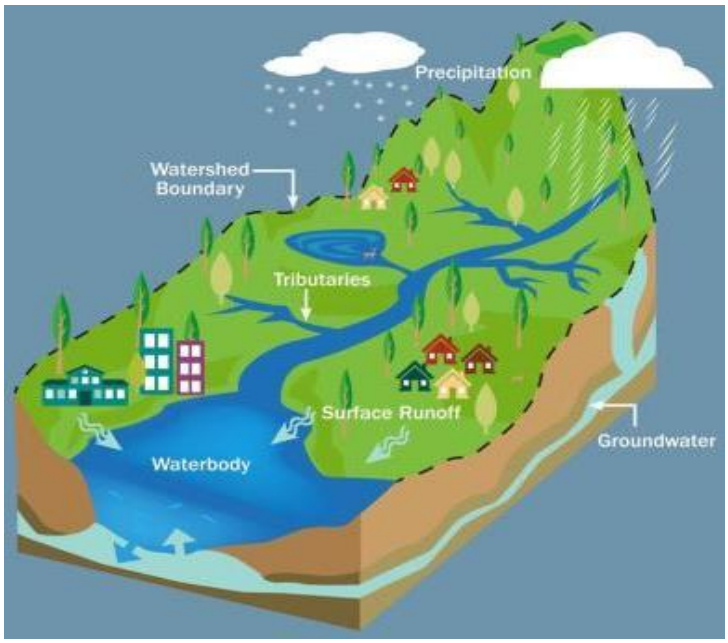



Figure 4-2 Watershed Diagram

*Source: NOAA Fisheries, 2022*

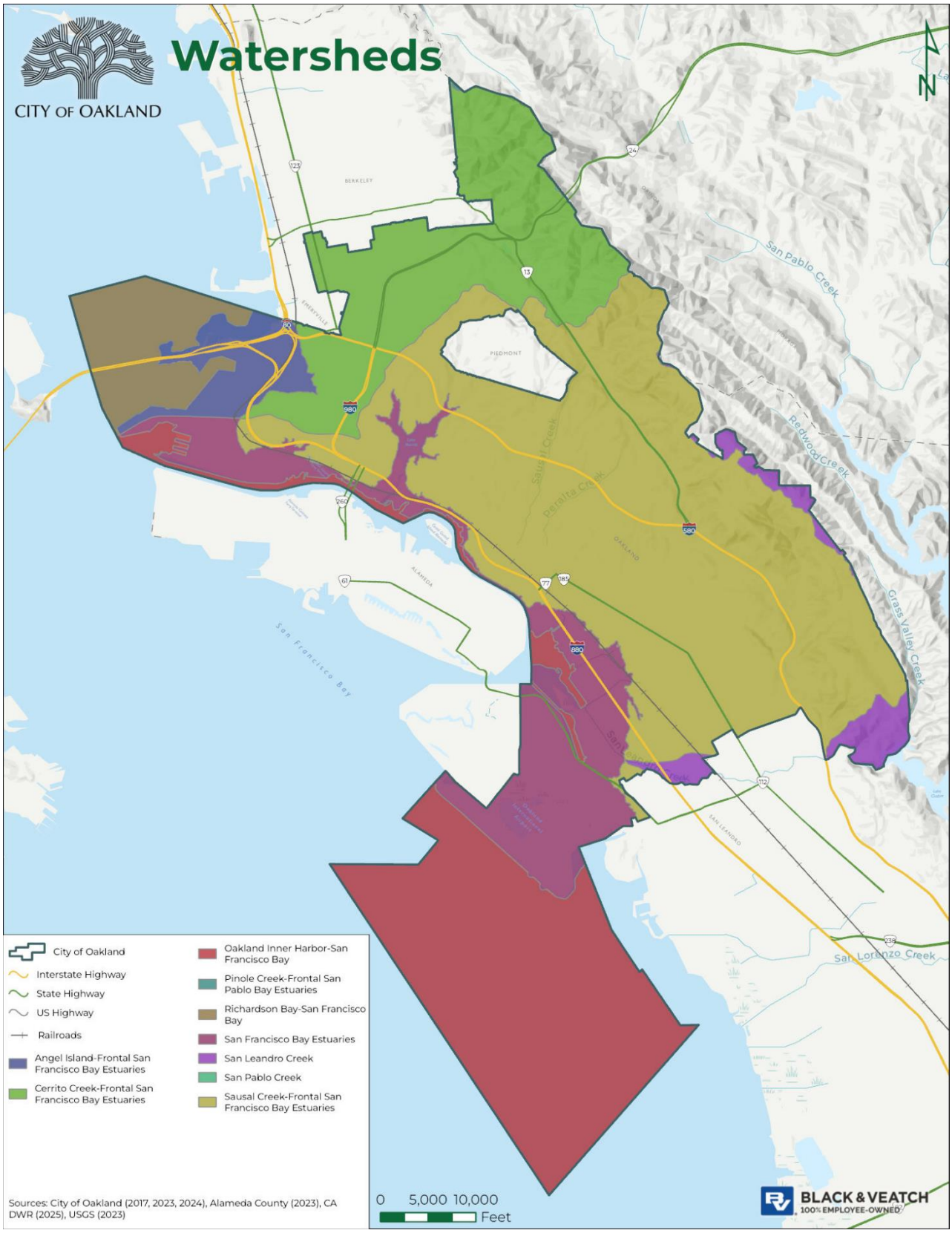



Figure 4-3 USGS Watershed for the City of Oakland

### 4.2.5 Soils

Several soil types can be found in the city, varying in drainage and slope. The 1975 *Soil Survey of Alameda County* identifies seven general soil types in the area (including the City of Oakland), as summarized in Table 4-3.

Table 4-3 Identified Soil Types in Alameda County

| Soil Type | Soil Description | % of Total Survey Area |
|---|---|---|
| Reyes-Urban land | Nearly level, very poorly drained clays on tidal flats, and urban land | 23.0 |
| Clear Lake-Omni-Urban land | Nearly level to moderately sloping, poorly drained clays and silty clay loams, and urban land; on the basin rim | 17.0 |
| Xeropsamments-Urban land-Baywood | Nearly level to moderately sloping, somewhat excessively drained sands and loamy sands, and urban land; on the coastal plain | 8.0 |
| Xerorthents-Maymen-Millsholm | Steep to very steep, well drained and somewhat excessively drained soils that have various textures; on foothills | 17.0 |
| Danville-Botella | Nearly level to moderately sloping, well drained loams and silty clay loams; on low terraces and alluvial fans | 16.0 |
| Tierra-Urban Land | Nearly level to moderately steep, moderately well drained loams, and urban land; on upland terraces | 7.0 |
| Sycamore-Yolo | Nearly level, well drained and poorly drained silt loams, on flood plains and alluvial fans | 12.0 |

*Source: U.S. Department of Agriculture, 1975*

### 4.2.6 Geology

The planning area lies within the geologic region of California referred to as the Coast Ranges geomorphic province. The natural region of the Coast Ranges is between the Pacific Ocean and the Great Valley, extending from the Oregon border to the Santa Ynez River near Santa Barbara. Discontinuous northwest-trending mountain ranges, ridges, and intervening valleys characterize this province. Much of the Coast Range province is composed of marine sedimentary and volcanic rocks that form the Franciscan Assemblage. The Franciscan Assemblage in this region represents some of the oldest rocks in the region and consists primarily of greenstone (altered volcanic rocks), basalt, chert (ancient silica-rich ocean deposits), and sandstone that originated as ancient sea floor sediments.

The San Francisco Bay is in a broad depression in the Franciscan bedrock resulting from an east-west expansion between the San Andreas and the Hayward fault systems. The bedrock surface can be found at elevations of 200 to 2,000 feet below mean sea level across the Bay Area. Sedimentary deposits overlie the Franciscan bedrock that originated from millions of years of erosion, deposition, and changes in sea level. Geologists categorize these sedimentary deposits into geologic formations based on the period of deposition and material type:

- The **Alameda Formation** is the deepest and oldest of these sedimentary deposits and consists of a mixture of clay, silt, sand, gravel, and some shells with predominantly silt and clay sediments surrounding discontinuous layers of sand and gravel.

- Overlying the Alameda Formation is the **San Antonio Formation**, which consists of sandy clays, gravelly clays, clayey sands, and gravels with interbedded silty clay deposits.
- Younger alluvial deposits once referred to as the **Temescal Formation** are deposited on top of the San Antonio and consist of sandy clays, clayey sands, sands, and gravels. The source material for these alluvial deposits comes from the Berkeley Hills.

Ruptures along the nearby San Andreas Fault caused severe earth movement in the San Francisco Bay Area in 1906 and 1989. San Andreas quakes induce creep (movement occurring on earthquake faults) in the Hayward fault, which runs directly through Oakland, Berkeley, San Jose, and other Bay Area cities.

## 4.3 SENSITIVE RESOURCES

### 4.3.1 Historical and Cultural Resources

Oakland's wealth of historic buildings and neighborhoods is matched by few other California cities. These artifacts reflect the City's rich multicultural history, from earliest times to the present. The materials and workmanship used are impossible or costly to obtain today. In 1994 the City of Oakland adopted a Historic Preservation Element as part of its General Plan. The Historic Preservation Element is based on two broad goals:

- Use historic preservation to foster economic vitality and quality of life.
- Prevent unnecessary destruction of properties of special historical, cultural, and aesthetic value.

The Element spells out these goals through policies and actions that govern how the City treats "Designated Historic Properties" (landmarks, districts, and heritage properties) and "Potential Designated Historic Properties." Potential Designated Historic Property is the broadest definition of "historic" under the Preservation Element. It is a description, not a designation. It is a category based on Planning Department survey ratings. The ratings report what the survey has found throughout Oakland, on a scale of A ("highest importance") through E ("of no particular interest"). The City considers any property that has at least a potential rating of C ("secondary importance") or that could contribute to a potential primary or secondary district to warrant consideration for possible preservation. To recognize the importance of neighborhood character and highlight restoration opportunities, this is a very inclusive category. About a fifth to a quarter of Oakland's buildings are considered to have at least some minimal historic value. Figure 4-4 shows the distribution of the different cultural assets across the City.

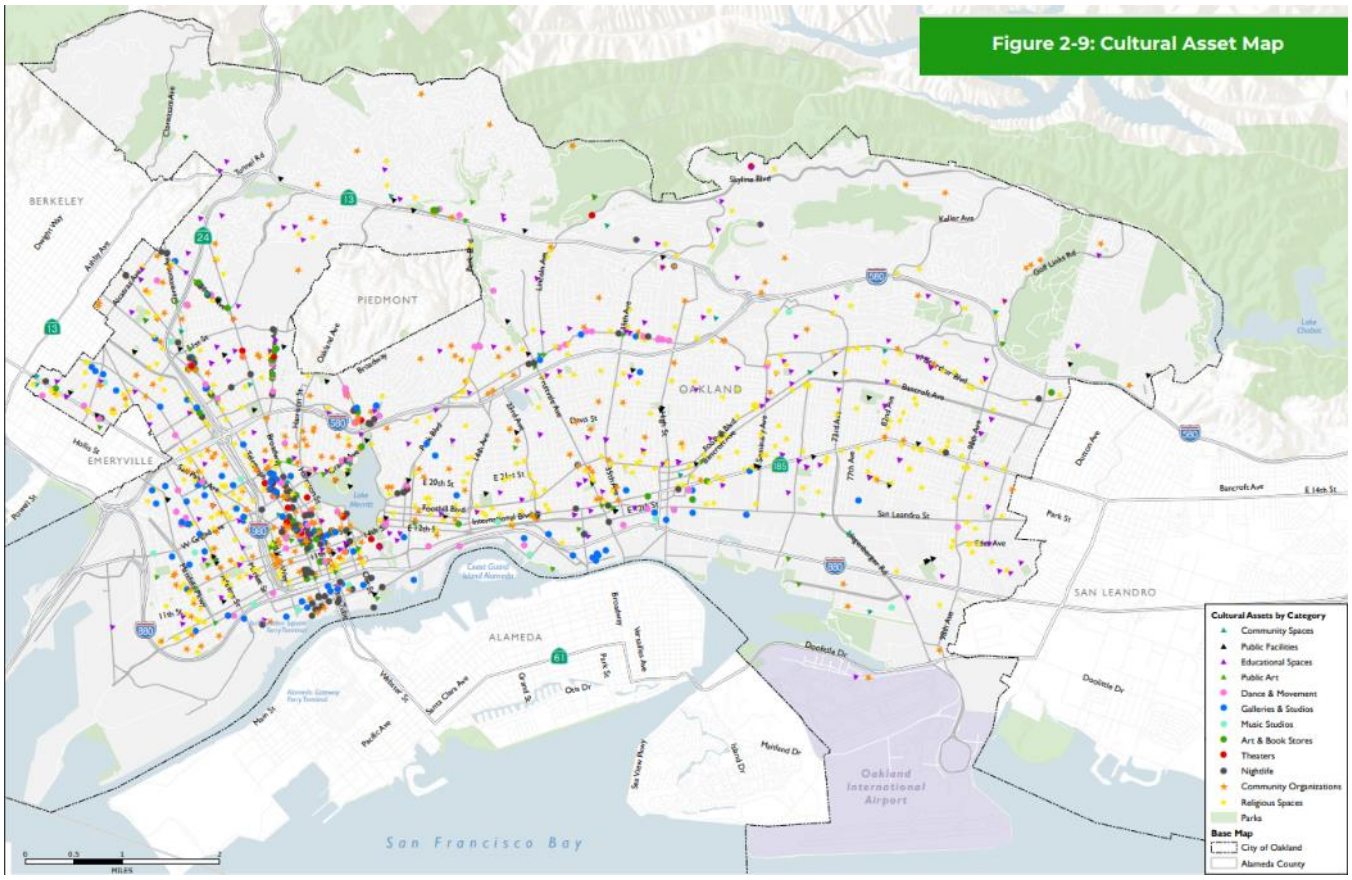



Figure 4-4. Cultural Asset Map from the General Plan

*Source: (City of Oakland 2022)*

Landmarks in the city may be designated for historical, cultural, educational, architectural, aesthetic, or environmental value. They are nominated by their owners, the City, or the public and are designated after public hearings by the Landmarks Board, Planning Commission, and City Council. About 150 landmarks and preservation districts have been designated, out of nearly 100,000 buildings in Oakland. These buildings, sites, and features range from City Hall to the home of blues musician Brownie McGhee, to the Old Survivor Redwood Tree, to the Grand Lake Theater and Roof Sign.

Officially designated Preservation Districts are also called S-7 and S-20 Zones. They are areas or neighborhoods that are recognized for the same values as individual landmarks, and they are nominated and designated in the same way, usually with active neighborhood participation. There are currently nine designated districts containing about 1,500 buildings. They include Preservation Park, Old Oakland-Victorian Row, the Bellevue-Staten Apartment District along Lake Merritt in Adams Point, Sheffield Village, Oak Center Historic District, and 7th Street Commercial District in West Oakland.

As the cultural center of the East Bay, Oakland is home to a symphony recognized regionally and nationally for its convergence of artistic excellence and community service, an award-winning zoo with more than 400 animals, the restored Art Deco Paramount Theater movie palace, and the renovated Fox Theater. The Oakland Museum of California has the largest

collection of California art, culture and history. Oakland also has a strong musical history with many artists originating from Oakland. Oakland's diverse population is reflected in the variety of attractions including Chinatown, the Latino-dominant Fruitvale area and the African American Museum and Library at Oakland.

### 4.3.2 Scenic Resources

Oakland boasts one of the highest percentages of parks and open space per capita in the nation. The waterfront city features green hills, forests, creeks, an estuary and two lakes. Oakland is at the heart of the East Bay Regional Park District, a system of 73 parks and 31 regional hiking trails covering more than 120,000 acres in Alameda and Contra Costa Counties. In the hills overlooking the San Francisco Bay, the parks offer an extraordinary variety of recreational activities, including fishing, swimming, hiking, mountain biking, picnicking, or relaxing in a natural setting. Oakland also has an extensive collection of municipal parks, recreation centers, aquatic and water activity sites, and sports fields.

The Scenic Highways Element of the City's General Plan addresses the preservation and enhancement of attractive roadways and major thoroughfares traversing the City of Oakland. This element creates policies to address the character of specific roads, including MacArthur Freeway, Skyline Boulevard/Grizzly Peak Boulevard/Tunnel Road, the Grove-Shafter Freeway, the Warren Freeway, Park Boulevard, Joaquin Miller Road, Golf Links Road, the Embarcadero, and Oak Street.

### 4.3.3 Natural Resources

Oakland's urban forest is made up of over 500 different tree species, and includes 56,000 street trees 12,000 trees in landscaped parks, and a vast yet unknown number of trees on private property and in open space areas (City of Oakland 2024). The 2024 City of Oakland Urban Forest Plan estimates the City of Oakland has 7,819 acres of tree canopy cover, which is 21.5% of the land area for the City. Over 70% of this tree canopy is on private property. Oakland has more tree canopy than other cities in the region, primarily due to the forested Oakland Hills. This puts Oakland in about the mid-range of cities in the Bay Area for the size of its urban forest. Oakland has held the status of a Tree City USA for 38 years. This designation is made by the National Arbor Day Foundation to communities that meet core standards for urban forestry management.

The East Bay Regional Park District comprises 73 parks and a system of interpark trails spanning over 125,000 acres in Alameda and Contra Costa Counties. These parklands preserve the natural beauty that makes the Bay Area such a desirable place to live. They provide habitat for wildlife, including many rare and endangered species. They also enhance the region's quality of life, resulting in tangible economic benefits as well as aesthetic values (East Bay Regional Park District 2025).

Lake Merritt in Oakland, a tidal estuary with a 3-mile shoreline, is home to the United States' oldest designated wildlife refuge, established by state law on March 18, 1870. Lake Merritt is a tidal estuary that formed about 10,000 to 15,000 years ago when the last ice age ended. It has been extensively modified by people in the last 150 years. It is flushed twice daily by the six-hour cycle of high and low tidal flows and receives water from 62 storm drain outfalls around the lake. With water coming from the storm drains and the estuary, the lake has

brackish water (a mixture of fresh and salt water) but strongly tends toward a marine (salt water) environment.

## 4.4 POPULATION AND DEMOGRAPHICS

Those that live in the City are one of the most important assets and this LHMP will assess risk to people and identify mitigation strategies to protect them, including equity priority populations.

### 4.4.1 General Population

Oakland is the third most populous City in the San Francisco Bay Area Metropolitan Area. The City stands out as a vibrant mosaic of diverse cultures and ethnicities, where no single group comprises a majority of the population.

#### Current and Historical Population

The State of California Department of Finance reported the population of Oakland to be 426,457 as of January 1, 2025 (E-1 Population Estimates for Cities, Counties, and the State). Table 4-4 shows the population in the City of Oakland from 2000 to 2025.

Table 4-4. Annual Population Data

| Year | Population | Year | Population | Year | Population |
|---|---|---|---|---|---|
| 2000 | 399,566 | 2009 | 389,913 | 2018 | 429,145 |
| 2001 | 399,262 | 2010 | 391,475 | 2019 | 430,753 |
| 2002 | 399,296 | 2011 | 390,724 | 2020 | 433,697 |
| 2003 | 397,440 | 2012 | 394,694 | 2021 | 431,073 |
| 2004 | 394,917 | 2013 | 399,927 | 2022 | 420,963 |
| 2005 | 389,937 | 2014 | 414,091 | 2023 | 424,172 |
| 2006 | 386,350 | 2015 | 419,571 | 2024 | 424,235 |
| 2007 | 385,882 | 2016 | 425,115 | 2025 | 426,457 |
| 2008 | 387,554 | 2017 | 428,165 | - | - |

*Source: California Department of Finance E-4 Population Estimates, 2001-2010, 2011-2020, & 2021-2025*

Between 2000 and 2025, California's population grew by 16.7 percent while the City of Oakland's population increased by 6.7 percent. Figure 4-5 shows the planning area's annual population growth rates from 1970 to 2025 compared to those of the state. The State experienced peak population growth in 2000, while the Oakland area is currently seeing a declining growth rate. The State and the City both experienced a general slowing of the annual growth rate between 2000 to 2010. However, the City of Oakland's population grew by 11 percent between 2010 and 2020, while the California population only grew by 7 percent during the same period. Both the City and state have seen a decrease in growth from 2020 to 2025.

#### Future Population Projections

According to population projections by the California Department of Finance, Alameda County's population is expected to increase to 1.84 million by 2050. This represents an 11.5 percent increase from the 2025 population of 1.65 million (California Department of Finance 2025).

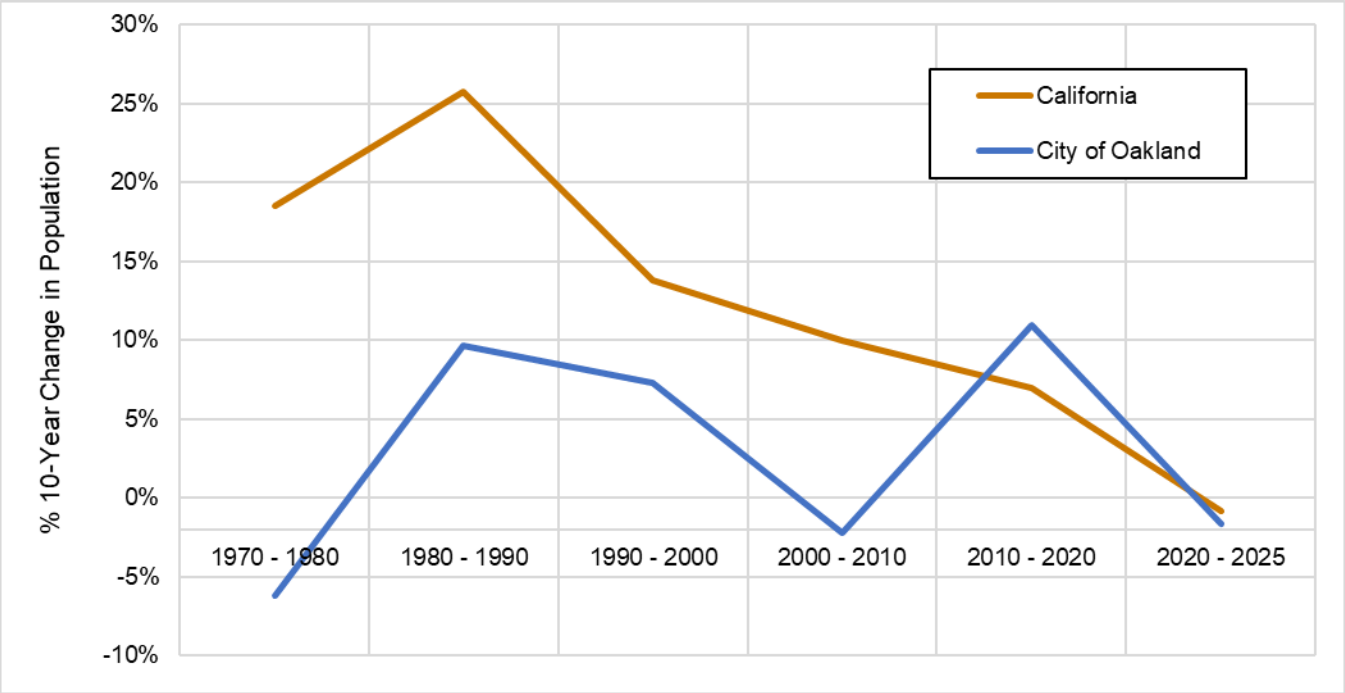



Figure 4-5 State of California and City of Oakland Population Growth by Decade

### 4.4.2 Equity Priority Communities

Equity Priority Communities are populations sharing a particular characteristic, as well as geographic communities, which have been systematically denied a full opportunity to participate in aspects of economic, social, and civic life. Equity Priority Communities represent areas where there is the potential for loss within an individual or social group. The term recognizes that some traits influence an individual's or group's resilience. This is their ability to prepare, respond, cope or recover from an event (FEMA 2023).

These communities may be more at-risk during hazard events due to a variety of factors, such as their physical and financial capacity to react or respond effectively, as well as the location and quality of their housing. Those with greater vulnerability may experience more severe impacts during emergencies or disasters. It is essential for public officials to consider the distinct needs of vulnerable populations in order to ensure their safety.

Note that throughout this LHMP, hazard mapping depicts Equity Priority Communities with an "EJC composite indicator score" based on the General Plan definition described below.

#### Environmental Justice Communities

The City of Oakland used the identified Environmental Justice Communities (EJC) from the City's General Plan Environmental Justice Element to determine the Equity Priority Communities exposed to and at risk from natural hazards. As part of the General Plan Environmental Justice Element, the City developed a screening analysis to identify EJC that consists of a composite set of indicators (quantitative metrics of EJ issues). Each indicator is scored and then combined to identify the topmost cumulatively burdened communities (City of Oakland 2023). Refer to the Environmental Justice Element of the General Plan for further details on the how the City identified the EJC. Figure 4-6 shows the screening

indicators by category, to define these communities for the City's General Plan. This definition was approved by the Steering Committee to define Equity Priority Communities in this LHMP.

For this LHMP update, the composite score of each census tract was divided into three categories (91-100, 81-90, and ≤80). Populations in these categories are recognized as priority communities that are most affected by the hazard.

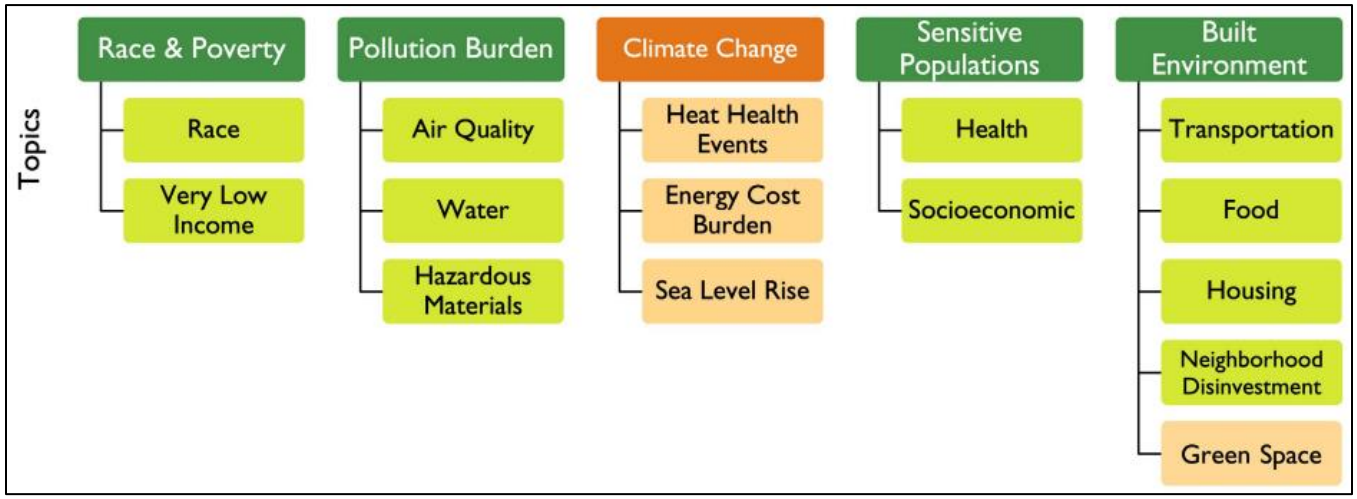



Figure 4-6. Equity Priority Community Factors Defined by the General Plan Environmental Justice Element

The distribution of Equity Priority Community members among planning sub-areas is shown in Table 4-5.

Table 4-5. Estimated Number of Equity Priority Community Members

| Sub-Areas | Equity Priority Community Thresholds[1] | EPC Population[2] |
|---|---|---|
| Central East Oakland | 91-100 | 34,939 |
| | 81-90 | 23,907 |
| | ≤80 | 25,659 |
| Coliseum/Airport | 91-100 | 4,879 |
| | 81-90 | 0 |
| | ≤80 | 0 |
| Downtown | 91-100 | 0 |
| | 81-90 | 0 |
| | ≤80 | 15,144 |
| East Oakland Hills | 91-100 | 0 |
| | 81-90 | 0 |
| | ≤80 | 0 |
| Eastlake/Fruitvale | 91-100 | 17,933 |
| | 81-90 | 13,346 |
| | ≤80 | 17,531 |
| Glenview/ Redwood Heights | 91-100 | 0 |
| | 81-90 | 0 |
| | ≤80 | 0 |

| Sub-Areas | Equity Priority Community Thresholds[1] | EPC Population[2] |
|---|---|---|
| North Oakland Hills | 91-100 | 0 |
| | 81-90 | 0 |
| | ≤80 | 0 |
| North Oakland/Adams Point | 91-100 | 0 |
| | 81-90 | 0 |
| | ≤80 | 20,378 |
| West Oakland | 91-100 | 2,553 |
| | 81-90 | 8,882 |
| | ≤80 | 20,979 |
| **Totals** | **91-100** | **60,304** |
| | **81-90** | **46,135** |
| | **≤80** | **99,691** |

*Source: (City of Oakland 2023)*

*Notes: (1) These thresholds are determined by the City of Oakland to be the most burdened communities in the City.*

*(2) Population, by census tract, within the EPC threshold*

## 4.5 DEVELOPMENT PROFILE

**Local Plan Requirement B2 - 44 CFR Part 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.***

**Local Plan Requirement E1 - 44 CFR Part 201.6(d)(3)**

***A local jurisdiction must review and revise its plan to reflect changes in development.***

### 4.5.1 Land Use

Land use describes the human use of land. It represents the economic and cultural activities (e.g., agricultural, residential, industrial, mining, and recreational uses) that are practiced at a given place. Public and private lands frequently represent very different uses (U.S. EPA 2024).

Land cover describes how much of an area is covered by forests, wetlands, impervious surfaces, agriculture, and other land and water types. Water types include wetlands or open water (National Ocean Service 2024).

Land use varies from land cover in that certain uses may not always be immediately apparent (e.g., land utilized for timber production without harvest for an extended period and wooded areas designated as wilderness may both appear as forested areas but serve different purposes) (U.S. EPA 2024).

The City of Oakland is highly urbanized. Of the total land, over 95 percent is developed. Residential neighborhoods are spread throughout the city. Table 4-6 summarizes the area and Figure 4-7 illustrates the location of current land uses in the City of Oakland.

Table 4-6. General Plan Land Use Classifications in Oakland

| Land Use Category | General Plan Data (2024) | |
|---|---|---|
| | Acreage | Percent of City |
| Business Mix | 1,344.9 | 3.74% |
| Central Business District | 721.4 | 2.01% |
| Community Commercial | 771.5 | 2.14% |
| Detached Unit Residential | 5,812.5 | 16.16% |
| EPP General Commercial 1 | 52.3 | 0.15% |
| EPP Heavy Industry | 28.5 | 0.08% |
| EPP Light Industry | 131.0 | 0.36% |
| EPP Mixed Use District | 94.2 | 0.26% |
| EPP Parks | 76.3 | 0.21% |
| EPP Planned Waterfront Development | 108.2 | 0.30% |
| EPP Produce Market | 6.8 | 0.02% |
| EPP Residential Mixed Use | 129.7 | 0.36% |
| EPP Retail Dining Entertainment | 44.5 | 0.12% |
| EPP Waterfront Commercial Recreation | 39.4 | 0.11% |
| EPP Waterfront Mixed Use | 9.5 | 0.03% |
| EPP Waterfront Warehouse District | 14.5 | 0.04% |
| General Industry and Transportation | 4,767.8 | 13.25% |
| Hillside Residential | 5,949.0 | 16.54% |
| Housing and Business Mix | 378.0 | 1.05% |
| Institutional | 1,051.9 | 2.92% |
| Mixed Housing Type Residential | 6,021.6 | 16.74% |
| Neighborhood Center Mixed Use | 764.5 | 2.13% |
| Regional Commercial | 646.4 | 1.80% |
| Resource Conservation | 3,414.2 | 9.49% |
| Urban Park and Open Space | 2,404.2 | 6.68% |
| Urban Residential | 1,194.9 | 3.32% |
| **Total** | **35,977.6** | **100.00%** |

*Source: General Plan GIS Data provided by City of Oakland 2024*

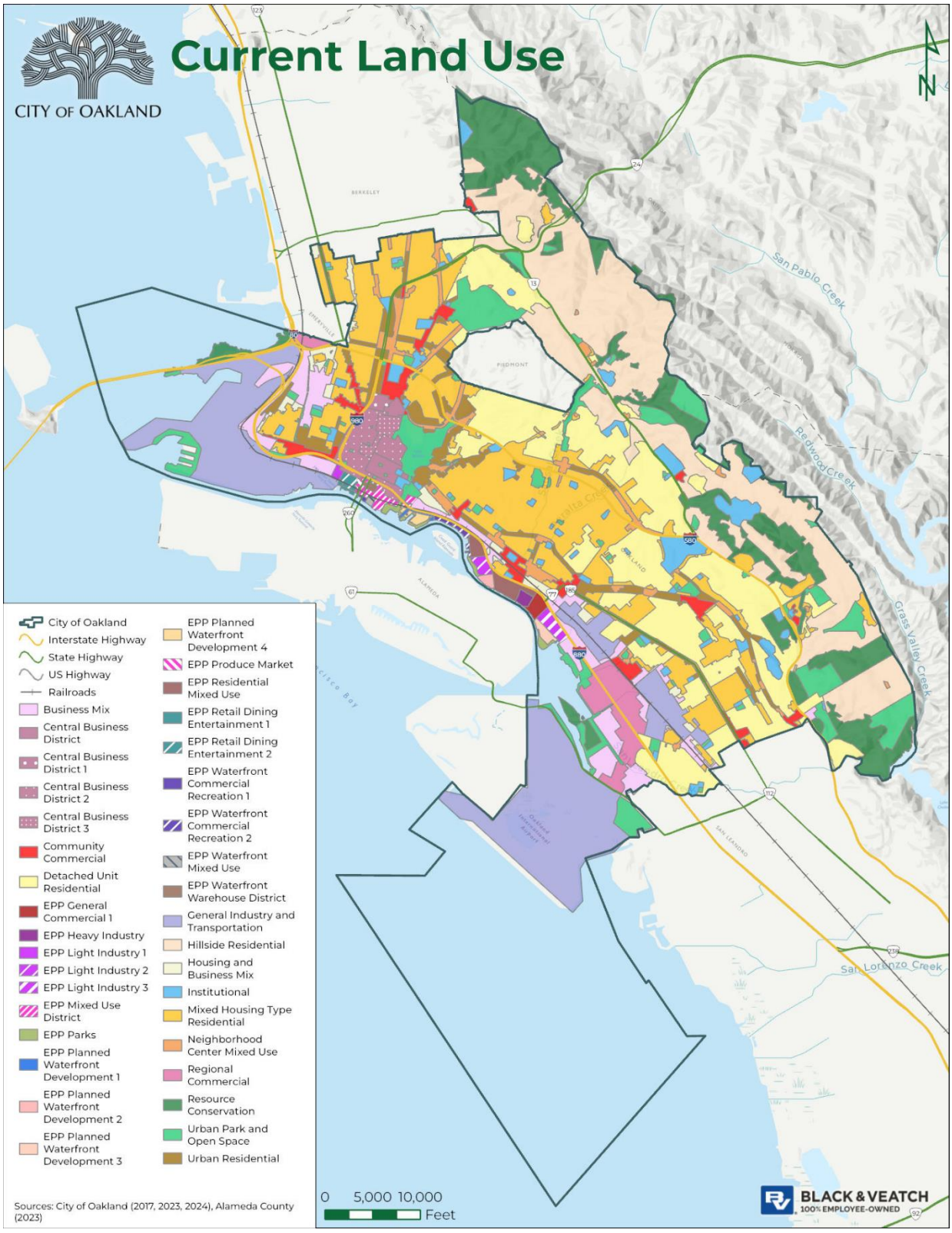



Figure 4-7. Land Use in the City of Oakland

## 4.5.2 General Building Stock

### Current Building Stock

Based on assessor records, Table 4-7 and Table 4-8 show the breakdown of planning area building stock (number and estimated replacement value) by sub-area and by type of use, respectively.

Table 4-7. Distribution of Buildings in the Planning Area by Sub-Area

| Sub-Area | Total # of Buildings | Total Building Value—Structure and Contents |
|---|---|---|
| Central East Oakland | 22,271 | $17,986,229,601 |
| Coliseum/Airport | 1,229 | $5,646,390,094 |
| Downtown | 5,087 | $21,475,904,408 |
| East Oakland Hills | 10,993 | $8,434,796,515 |
| Eastlake/Fruitvale | 17,046 | $20,713,824,637 |
| Glenview/ Redwood Heights | 11,192 | $7,699,736,380 |
| North Oakland Hills | 10,125 | $9,022,389,851 |
| North Oakland/Adams Point | 21,103 | $26,981,073,354 |
| West Oakland | 6,497 | $11,010,987,509 |
| **Total** | **105,543** | **$128,971,332,346** |

*Sources: (City of Oakland 2025); (City of Oakland 2025); (City of Oakland 2015)*

Table 4-8. Distribution of Buildings in the Planning Area by Use Type

| Use Type | Total # of Buildings | Total Building Value—Structure and Contents |
|---|---|---|
| Residential | 98,069 | $73,172,798,249 |
| Commercial | 5,347 | $35,757,270,070 |
| Industrial | 743 | $5,844,984,605 |
| Agriculture | 4 | $7,152,700 |
| Religion | 416 | $2,044,975,108 |
| Government | 717 | $6,434,885,259 |
| Education | 247 | $5,709,266,356 |
| Total | **105,543** | **$128,971,332,346** |

*Sources: (City of Oakland 2025); (City of Oakland 2025); (City of Oakland 2015)*

## 4.5.3 Development Trends

### Future Trends

The City of Oakland's General Plan governs land use decision and policymaking. This hazard mitigation plan will work together with the General Plan to support wise land use in the future by providing vital information on the risk associated with hazards within the city. The City will incorporate by reference the hazard mitigation plan in the General Plan's Safety Element. This will ensure that all future trends in development can be established with the benefits of information on risk and vulnerability to hazards identified in this plan. The City is presently undertaking a comprehensive update to its General Plan, and completed Phase 11 with the adoption of the updated Safety Element, updated Housing Element, and a new Environmental Justice Element in September 2023. This hazard mitigation plan builds upon

and implements those policy documents as well as updates to policies on land use, transportation, open space, infrastructure and capital facilities, and noise.

### Planning Framework

The Land Use Element of the City's General Plan supports "growth in industry and commerce, providing the flexibility needed to accommodate evolving trends in retailing, entertainment, manufacturing processes, and distribution techniques while also resolving long-standing problems relating to conflicts among different land uses." As of the date of this LHMP update, the City has adopted the following specific plans: Broadway Valdez District Specific Plan, Central Estuary Area Plan, Coliseum Area Specific Plan, Downtown Oakland Specific Plan, Lake Merritt Station Area Plan, North Oakland Hill Area Specific Plan, and West Oakland Specific Plan.

The Estuary Policy Plan (EPP) is part of the General Plan. This plan includes policies to enhance the Oakland waterfront as a resource for the City. Recommendations from the Estuary Policy Plan replace those in the General Plan for the estuary shoreline, extending from Castro Street to the East Creek Slough (City of Oakland 1999). All these plans provide guidance for the development of underutilized sites in the City with residential and commercial uses that will contribute to City revitalization and economic development.

The 2023-2031 City of Oakland Housing Element identifies areas of the city with the best potential for housing development, specifically addressing the needs of households by income level. The foundation for the Housing Element is a state-mandated requirement that all California cities provide for their fair share of the regional housing need for all income levels. In the Bay Area, assignments for each city are determined by the Association of Bay Area Governments. Under this requirement, Oakland needs to plan for 26,251 new housing units between 2023 and 2031 (City of Oakland Planning & Building Department 2023).

## 4.6 COMMUNITY LIFELINES

FEMA released initial guidance on the community lifelines concept in 2019 to describe the critical facilities or assets that enable the continuous operation of critical government and business functions and are essential to human health and safety or economic security. Lifelines are the most fundamental services in the community that, when stabilized, enable all other aspects of society to function. When disrupted, decisive intervention (e.g., rapid service re-establishment or employment of contingency response solutions) is required (FEMA 2023a).

The SC identified the critical facilities or lifelines that support the City before, during, and after hazard events. A summary of the critical facilities or lifelines located within the Planning Area is listed in Table 4-9 and shown on Figure 4-8.

Table 4-9. Community Lifelines in the City of Oakland

| Sub-Area | Communications | Energy | Food, Hydration, Shelter | Hazardous Materials | Health and Medical | Safety and Security | Transportation | Water Systems | Total |
|---|---|---|---|---|---|---|---|---|---|
| Central East Oakland | 23 | 2 | 0 | 153 | 1 | 61 | 18 | 0 | **258** |
| Coliseum/Airport | 72 | 2 | 0 | 113 | 0 | 12 | 24 | 1 | **224** |
| Downtown | 154 | 3 | 0 | 101 | 1 | 39 | 24 | 1 | **323** |
| East Oakland Hills | 19 | 1 | 0 | 26 | 0 | 25 | 14 | 1 | **86** |
| Eastlake/Fruitvale | 25 | 2 | 1 | 145 | 2 | 54 | 40 | 1 | **270** |
| Glenview/ Redwood Heights | 2 | 2 | 0 | 23 | 0 | 19 | 19 | 0 | **65** |
| North Oakland Hills | 52 | 3 | 0 | 17 | 0 | 18 | 16 | 0 | **106** |
| North Oakland/Adams Point | 31 | 2 | 2 | 149 | 7 | 42 | 79 | 0 | **312** |
| West Oakland | 81 | 9 | 1 | 149 | 1 | 23 | 74 | 5 | **343** |
| **Total** | **459** | **26** | **4** | **876** | **12** | **293** | **308** | **9** | **1,987** |

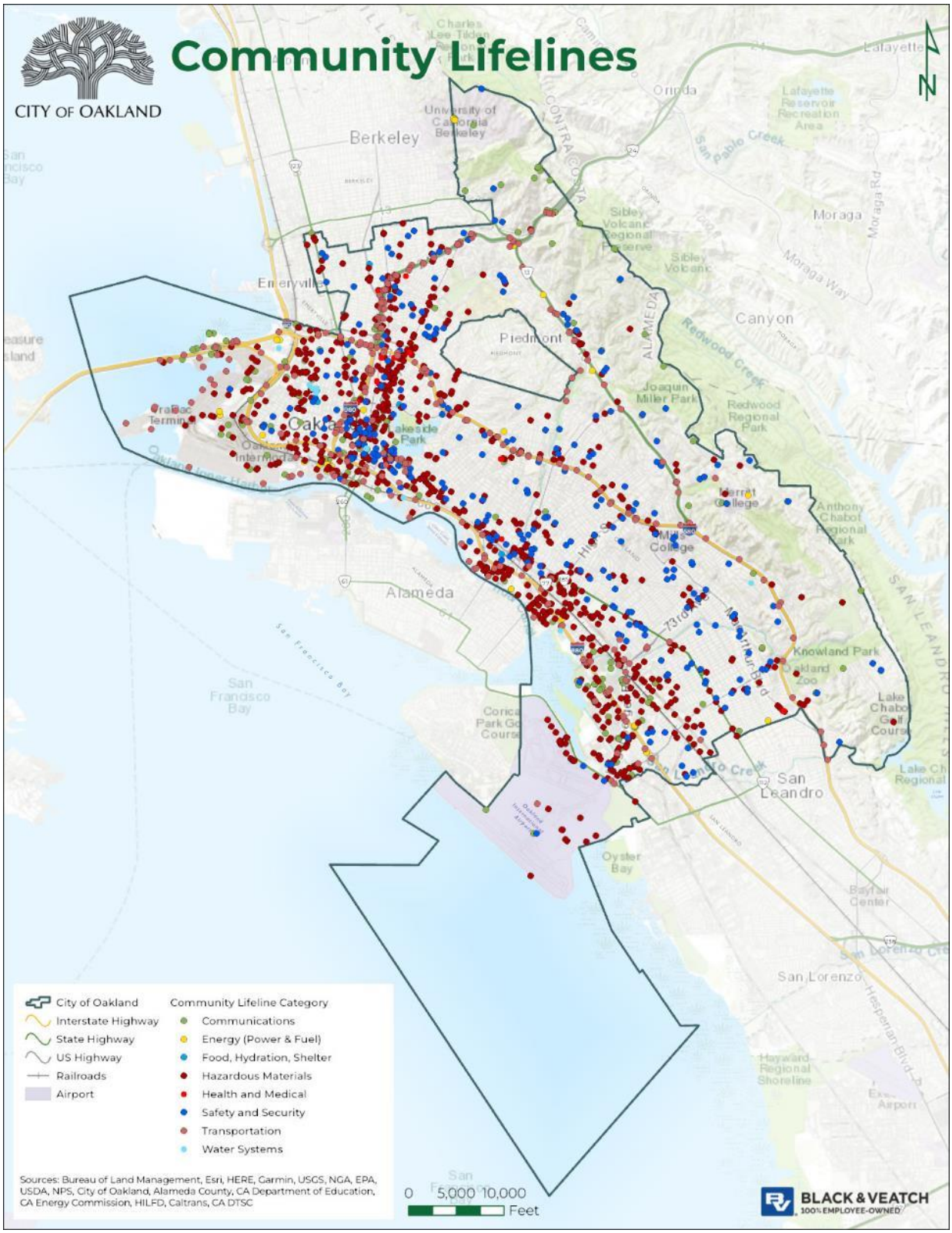



Figure 4-8. Community Lifelines in the City of Oakland

### 4.6.1 Safety and Security

Safety and security lifelines include law enforcement/security (e.g., police stations, correctional facilities, site security), fire service, search and rescue, government service (e.g., emergency operation centers, government offices, schools), and community safety (e.g., flood control, protective actions). The City identified the following facilities as safety and security lifelines: correctional facilities, emergency operation centers, fire stations, government offices, Head Start centers, historic/cultural resources, law enforcement/police stations, libraries, recreational centers, and schools (see Table 4-10). In total, there are 296 Safety and Security lifelines in the City of Oakland (see Table 4-11 and Figure 4-9).

Table 4-10. Safety and Security Lifelines, by Type, in the City of Oakland

| Sub-Area | Correctional Facilities | EOC | Fire Station | Government Offices | Head Start Centers | Historic/Cultural Resources | Law Enforcement | Public Library | Police Station | Post Office | Recreation Center | Schools |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Central East Oakland | 1 | 0 | 5 | 0 | 9 | 0 | 0 | 5 | 1 | 2 | 4 | 37 |
| Coliseum/Airport | 0 | 1 | 2 | 0 | 1 | 0 | 0 | 1* | 1 | 1 | 1 | 4 |
| Downtown | 1 | 2 | 2 | 7 | 1 | 3 | 0 | 3 | 3 | 4 | 3 | 11 |
| East Oakland Hills | 0 | 0 | 4 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 19 |
| Eastlake/Fruitvale | 0 | 0 | 2 | 0 | 4 | 0 | 0 | 2 | 2 | 1 | 8 | 36 |
| Glenview/ Redwood Heights | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 3 | 12 |
| North Oakland Hills | 0 | 0 | 4 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 10 |
| North Oakland/Adams Point | 0 | 0 | 4 | 0 | 1 | 0 | 0 | 5 | 1 | 4 | 3 | 24 |
| West Oakland | 0 | 1 | 3 | 0 | 3 | 0 | 0 | 1 | 0 | 1 | 2 | 11 |
| **Total** | **2** | **4** | **27** | **7** | **19** | **3** | **1** | **18** | **8** | **17** | **26** | **164** |

*Sources: (Alameda County 2023); (California Department of Education 2025); (City of Oakland 2017)*

**Facility has a public library and a senior center*

Table 4-11. Safety and Security Lifelines in the City of Oakland

| Sub-Area | Safety and Security |
|---|---|
| Central East Oakland | 64 |
| Coliseum/Airport | 11 |
| Downtown | 40 |
| East Oakland Hills | 25 |
| Eastlake/Fruitvale | 55 |
| Glenview/ Redwood Heights | 18 |
| North Oakland Hills | 18 |
| North Oakland/Adams Point | 42 |
| West Oakland | 22 |
| **Total** | **296** |

*Sources: (Alameda County 2023); (California Department of Education 2025); (City of Oakland 2017)*

### 4.6.2 Food, Hydration, Shelter

Food, hydration, and shelter lifelines include food (e.g., grocery stores, food banks), hydration (e.g., water supply chain, bottled water distribution), shelter, and agriculture. There are 4 food, hydration, shelter community lifelines in the City of Oakland. The City identified the following facilities as food, hydration, and shelter lifelines: animal shelters and senior centers (see Table 4-12). In total, there are 4 Safety and Security lifelines in the City of Oakland (see Table 4-13 and Figure 4-10).

Community lifelines exist within the City, but GIS data was not available for a spatial analysis or mapping. Many of these facilities, including grocery stores, are part of the general building stock analysis. Shelters, food distribution centers, and cooling centers are included in the safety and security lifeline category (e.g., library, religious institution).

Table 4-12. Animal Shelters and Senior Centers in the City of Oakland

| Sub-Area | Animal Shelter | Senior Center |
|---|---|---|
| Central East Oakland | 0 | 0 |
| Coliseum/Airport | 0 | 0* |
| Downtown | 0 | 0 |
| East Oakland Hills | 0 | 0 |
| Eastlake/Fruitvale | 1 | 0 |
| Glenview/ Redwood Heights | 0 | 0 |
| North Oakland Hills | 0 | 0 |
| North Oakland/Adams Point | 0 | 2 |
| West Oakland | 0 | 1 |
| **Total** | **1** | **3** |

*Source: (City of Oakland 2017)*

** The senior center in this sub-area is located in a library building and noted in Table 4-10*

Table 4-13. Food, Hydration, Shelter Lifelines in the City of Oakland

| Sub-Area | Food, Hydration, Shelter |
|---|---|
| Central East Oakland | 0 |
| Coliseum/Airport | 0 |
| Downtown | 0 |
| East Oakland Hills | 0 |
| Eastlake/Fruitvale | 1 |
| Glenview/ Redwood Heights | 0 |
| North Oakland Hills | 0 |
| North Oakland/Adams Point | 2 |
| West Oakland | 1 |
| **Total** | **4** |

*Source: (City of Oakland 2017)*

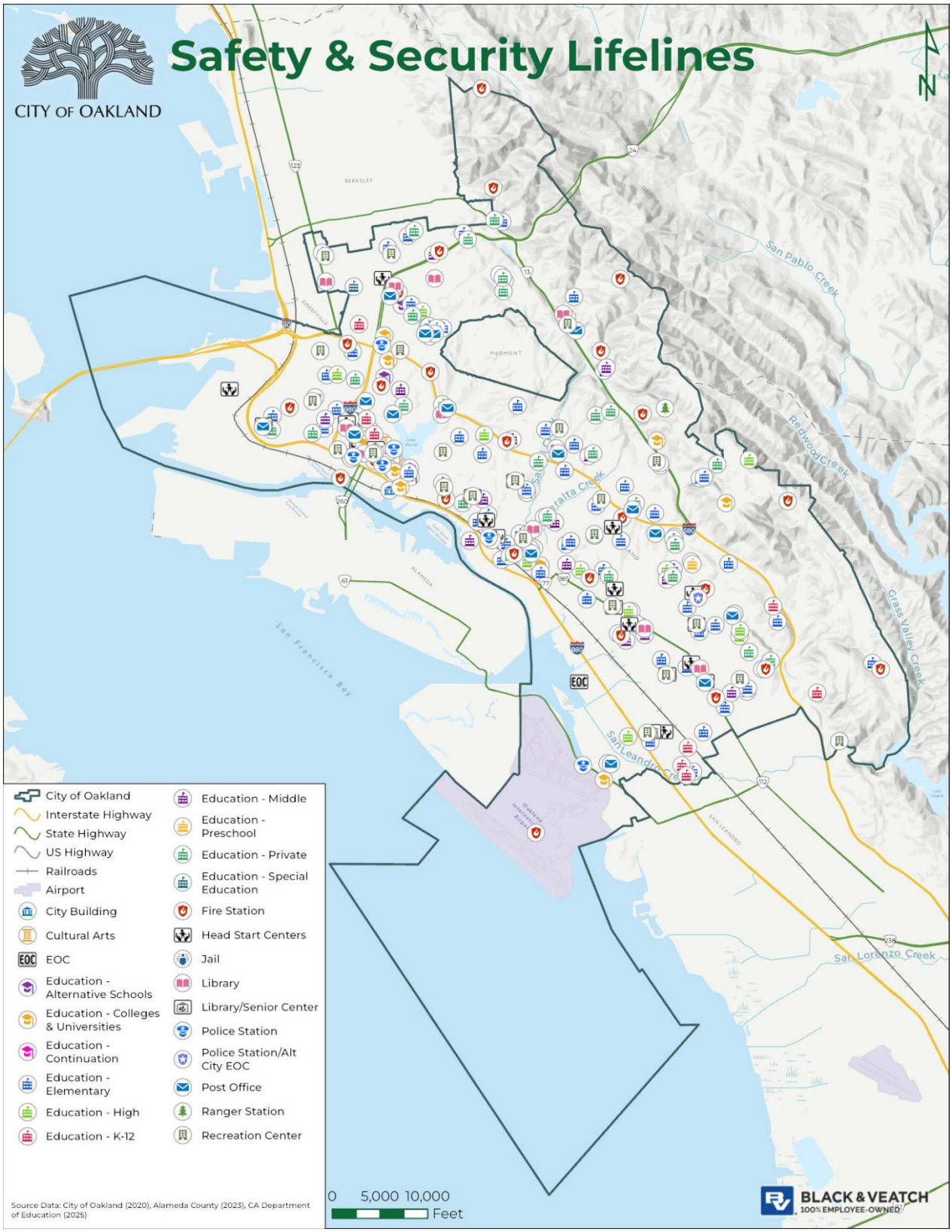



Figure 4-9 Safety and Security Lifelines in the City of Oakland

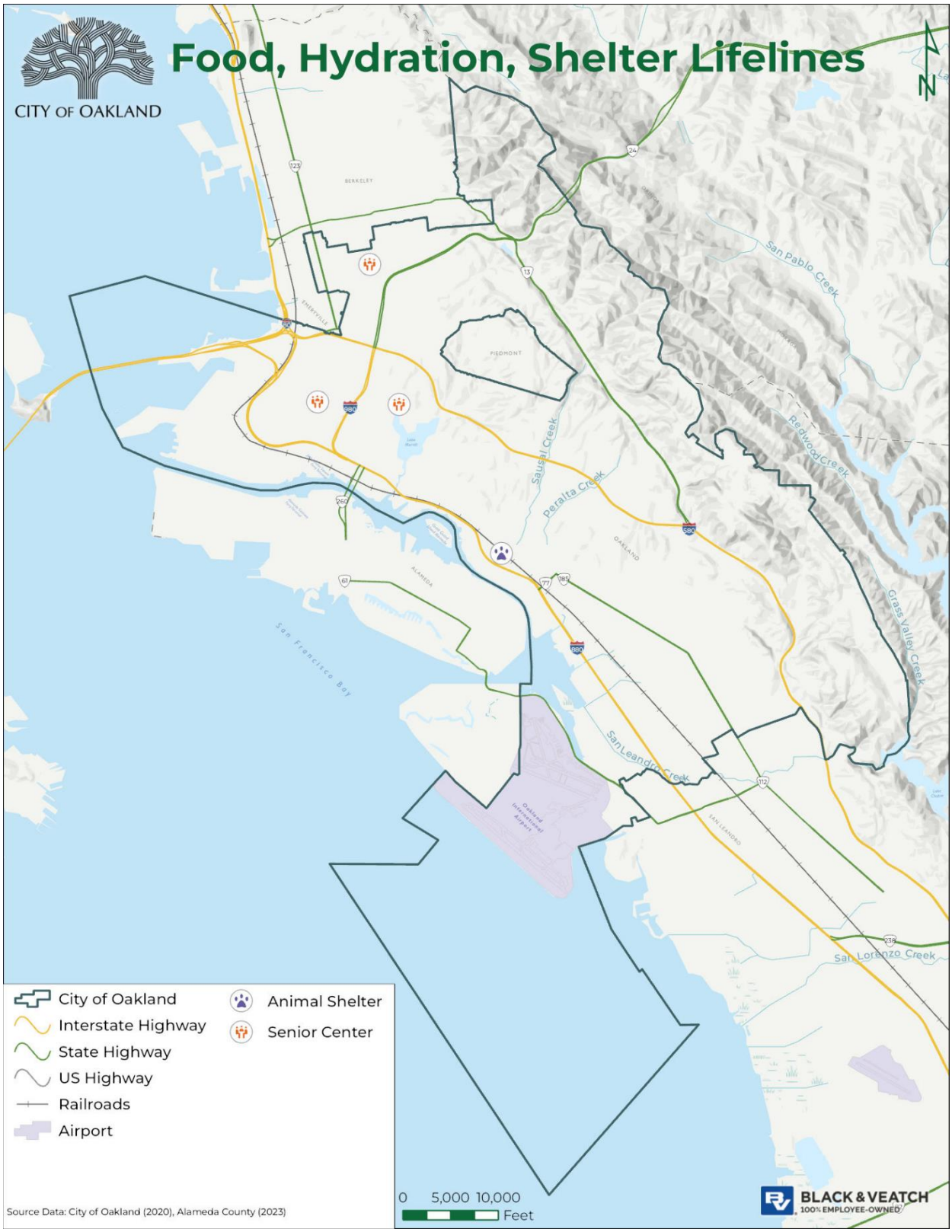



Figure 4-10 Food, Hydration, Shelter Lifelines in the City of Oakland

### 4.6.3 Health and Medical

Health and medical lifelines include medical care (e.g., hospitals, pharmacies, long-term care), public health (e.g., health surveillance, behavioral health, labs), patient movement (e.g., emergency medical service), fatality movement, and medical supply chain. The City identified the following facilities as health and medical lifelines: dialysis centers, hospitals, and VA health systems (see Table 4-14). In total, there are 12 health and medical lifelines in the City of Oakland (see Table 4-15 and Figure 4-11).

Table 4-14. Health and Medical Lifelines, by Type, in the City of Oakland

| Sub-Area | Dialysis Centers | Hospitals | VA Health Systems |
|---|---|---|---|
| Central East Oakland | 1 | 0 | 0 |
| Coliseum/Airport | 0 | 0 | 0 |
| Downtown | 0 | 0 | 1 |
| East Oakland Hills | 0 | 0 | 0 |
| Eastlake/Fruitvale | 1 | 1 | 0 |
| Glenview/ Redwood Heights | 0 | 0 | 0 |
| North Oakland Hills | 0 | 0 | 0 |
| North Oakland/Adams Point | 4 | 3 | 0 |
| West Oakland | 0 | 0 | 1 |
| **Total** | **6** | **4** | **2** |

*Sources: (City of Oakland 2017); (Alameda County 2023)*

Table 4-15. Health and Medical Lifelines in the City of Oakland

| Sub-Area | Health and Medical |
|---|---|
| Central East Oakland | 1 |
| Coliseum/Airport | 0 |
| Downtown | 1 |
| East Oakland Hills | 0 |
| Eastlake/Fruitvale | 2 |
| Glenview/ Redwood Heights | 0 |
| North Oakland Hills | 0 |
| North Oakland/Adams Point | 7 |
| West Oakland | 1 |
| **Total** | **12** |

*Sources: (City of Oakland 2017); (Alameda County 2023)*

### 4.6.4 Energy

Energy lifelines include power grid (e.g., generation systems, transmission systems, distribution systems) and fuel (e.g., refineries, fuel storage, pipelines, gas stations). The City identified the following facilities as energy lifelines: natural gas stations, power plants, and substations (see Table 4-17). In total, there are 26 energy lifelines in the City of Oakland (see Table 4-18 and Figure 4-12).

Table 4-16. Energy Lifelines, by Type, in the City of Oakland

| Sub-Area | Natural Gas Station | Power Plant | Substation |
|---|---|---|---|
| Central East Oakland | 0 | 0 | 2 |
| Coliseum/Airport | 1 | 0 | 1 |
| Downtown | 0 | 1 | 2 |
| East Oakland Hills | 0 | 1 | 0 |
| Eastlake/Fruitvale | 1 | 0 | 1 |
| Glenview/ Redwood Heights | 0 | 0 | 2 |
| North Oakland Hills | 0 | 0 | 3 |
| North Oakland/Adams Point | 0 | 0 | 2 |
| West Oakland | 1 | 3 | 5 |
| **Total** | **3** | **5** | **18** |

*Sources: (City of Oakland 2017); (CA Energy Commission 2025)*

Table 4-17. Energy in the City of Oakland

| Sub-Area | Energy |
|---|---|
| Central East Oakland | 2 |
| Coliseum/Airport | 2 |
| Downtown | 3 |
| East Oakland Hills | 1 |
| Eastlake/Fruitvale | 2 |
| Glenview/ Redwood Heights | 2 |
| North Oakland Hills | 3 |
| North Oakland/Adams Point | 2 |
| West Oakland | 9 |
| **Total** | **26** |

*Sources: (City of Oakland 2017); (CA Energy Commission 2025)*

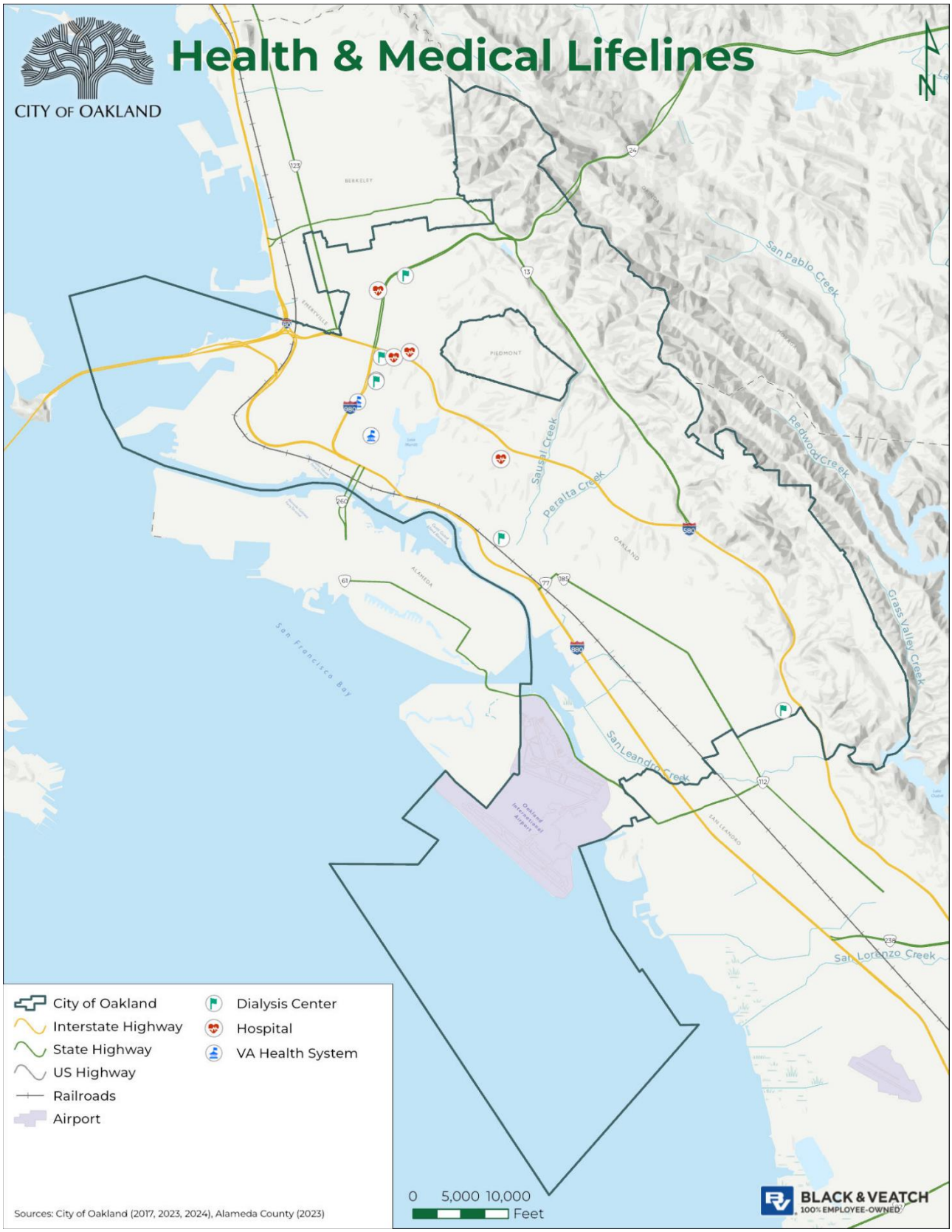



Figure 4-11 Health and Medical Lifelines in the City of Oakland

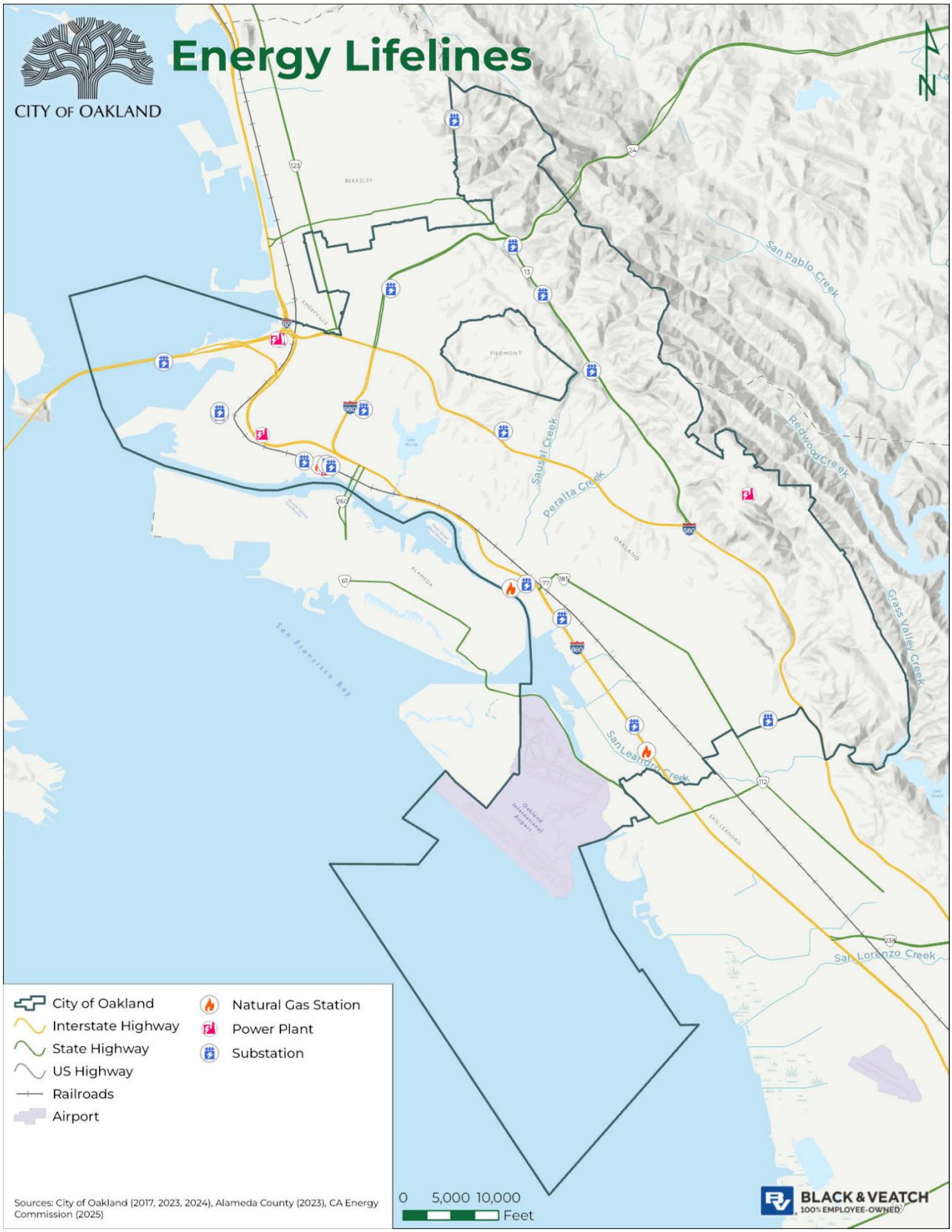



Figure 4-12 Energy Lifelines in the City of Oakland

### 4.6.5 Communication

Communication lifelines include infrastructure (e.g., wireless, cable systems, television/radio, internet), alerts/warnings/messages, 911 and dispatch, responder communications, and finance (e.g., banks and electronic payment processing). The City identified the following facilities as communication lifelines: AM transmission towers, FM transmission towers, land mobile broadcast towers, land mobile commercial towers, microwave service towers, and sirens (see Table 4-18). In total, there are 459 communication lifelines in the City of Oakland (see Table 4-19 and Figure 4-12).

Table 4-18. Communication Lifelines, by Type, in the City of Oakland

| Sub-Area | AM Transmission Tower | FM Transmission Tower | Land Mobile Broadcast Tower | Land Mobile Commercial Tower | Microwave Service Tower | Siren |
|---|---|---|---|---|---|---|
| Central East Oakland | 0 | 0 | 0 | 0 | 20 | 3 |
| Coliseum/Airport | 0 | 0 | 1 | 0 | 70 | 1 |
| Downtown | 0 | 0 | 6 | 6 | 140 | 2 |
| East Oakland Hills | 0 | 0 | 0 | 0 | 10 | 9 |
| Eastlake/Fruitvale | 0 | 0 | 0 | 0 | 23 | 2 |
| Glenview/ Redwood Heights | 0 | 0 | 0 | 0 | 0 | 2 |
| North Oakland Hills | 0 | 3 | 5 | 7 | 30 | 7 |
| North Oakland/Adams Point | 0 | 0 | 1 | 0 | 30 | 0 |
| West Oakland | 4 | 0 | 2 | 3 | 70 | 2 |
| **Total** | **4** | **3** | **15** | **16** | **393** | **28** |

*Sources: (City of Oakland 2017); (HIFLD 2024); (HIFLD 2024)*

Table 4-19. Communication Lifelines in the City of Oakland

| Sub-Area | Communication |
|---|---|
| Central East Oakland | 23 |
| Coliseum/Airport | 72 |
| Downtown | 154 |
| East Oakland Hills | 19 |
| Eastlake/Fruitvale | 25 |
| Glenview/ Redwood Heights | 2 |
| North Oakland Hills | 52 |
| North Oakland/Adams Point | 31 |
| West Oakland | 81 |
| **Total** | **459** |

*Sources: (City of Oakland 2017); (HIFLD 2024); (HIFLD 2024)*

### 4.6.6 Transportation

Transportation lifelines include highway/roadway/motor vehicle (e.g., roads, bridges), mass transit, railway (e.g., freight, passenger), aviation, and maritime. The City identified the following facilities as transportation lifelines: airports, BART stations, city bridges, ferries, heliports, port facilities, rail stations, and state bridges (see Table 4-18). In total, there are 308 transportation lifelines in the City of Oakland (see Table 4-21 and Figure 4-14).

Table 4-20. Transportation Lifelines, by Type, in the City of Oakland

| Sub-Area | Airport | BART Station | Ferry Facility | Heliport* | Port Facility | Rail Station | State Bridge |
|---|---|---|---|---|---|---|---|
| Central East Oakland | 0 | 1 | 9 | 0 | 0 | 1 | 1 |
| Coliseum/Airport | 1 | 0 | 10 | 0 | 0 | 0 | 0 |
| Downtown | 0 | 3 | 10 | 1 | 2 | 2 | 1 |
| East Oakland Hills | 0 | 0 | 2 | 0 | 1 | 0 | 0 |
| Eastlake/Fruitvale | 0 | 1 | 6 | 0 | 0 | 6 | 0 |
| Glenview/ Redwood Heights | 0 | 0 | 4 | 0 | 0 | 0 | 0 |
| North Oakland Hills | 0 | 0 | 2 | 0 | 0 | 0 | 0 |
| North Oakland/Adams Point | 0 | 2 | 1 | 0 | 1 | 0 | 0 |
| West Oakland | 0 | 1 | 5 | 0 | 0 | 26 | 0 |
| **Total** | **1** | **8** | **49** | **1** | **4** | **35** | **2** |

*Sources: (City of Oakland 2017); (Alameda County 2025); (Caltrans 2024)*
**Other heliports in the City are included in the lifeline where they are located (ex., hospital)*

Table 4-21. Transportation Lifelines in the City of Oakland

| Sub-Area | Transportation |
|---|---|
| Central East Oakland | 18 |
| Coliseum/Airport | 24 |
| Downtown | 24 |
| East Oakland Hills | 14 |
| Eastlake/Fruitvale | 40 |
| Glenview/ Redwood Heights | 19 |
| North Oakland Hills | 16 |
| North Oakland/Adams Point | 79 |
| West Oakland | 74 |
| **Total** | **308** |

*Sources: (City of Oakland 2017); (Alameda County 2025); (Caltrans 2024)*

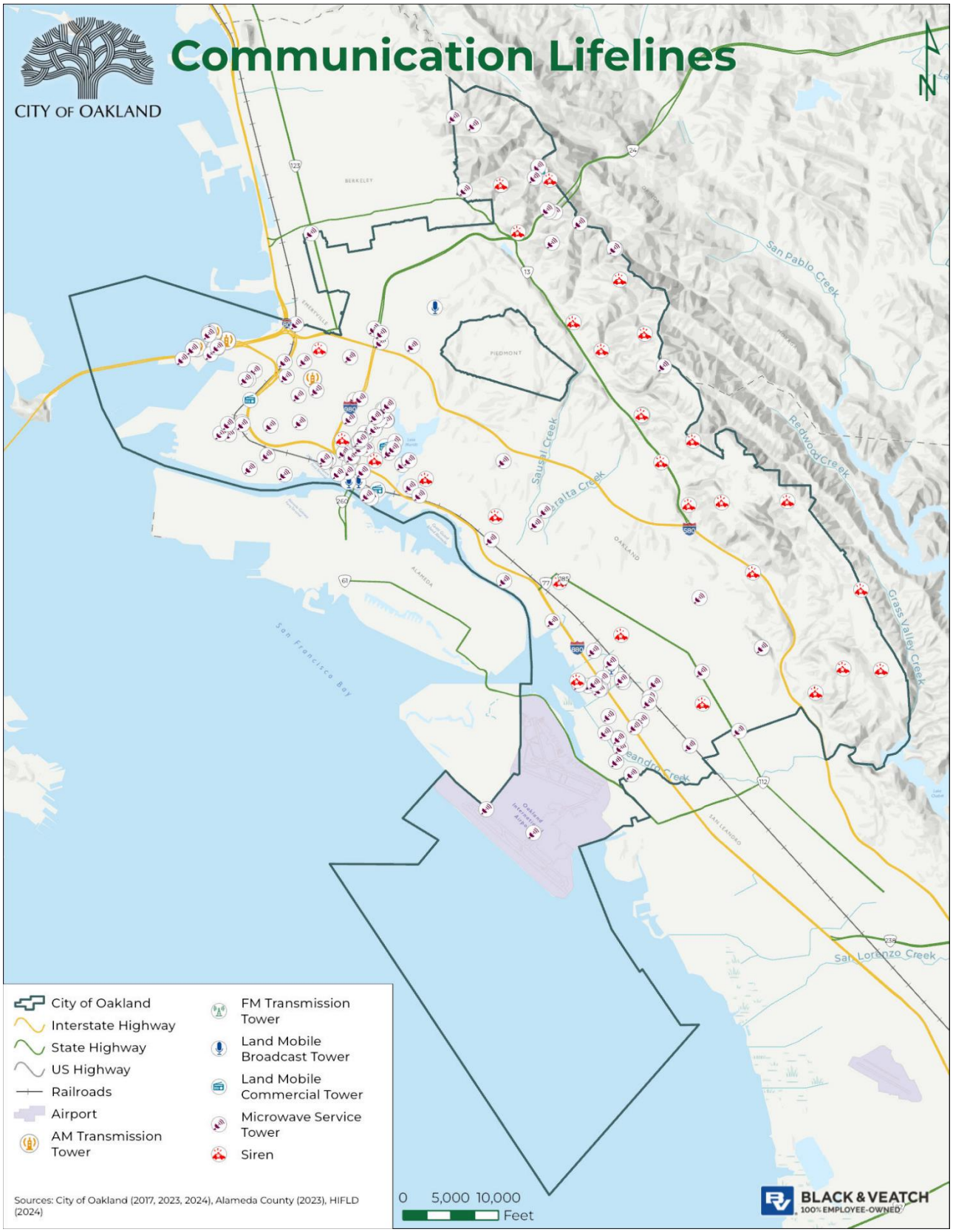



Figure 4-13 Communication Lifelines in the City of Oakland

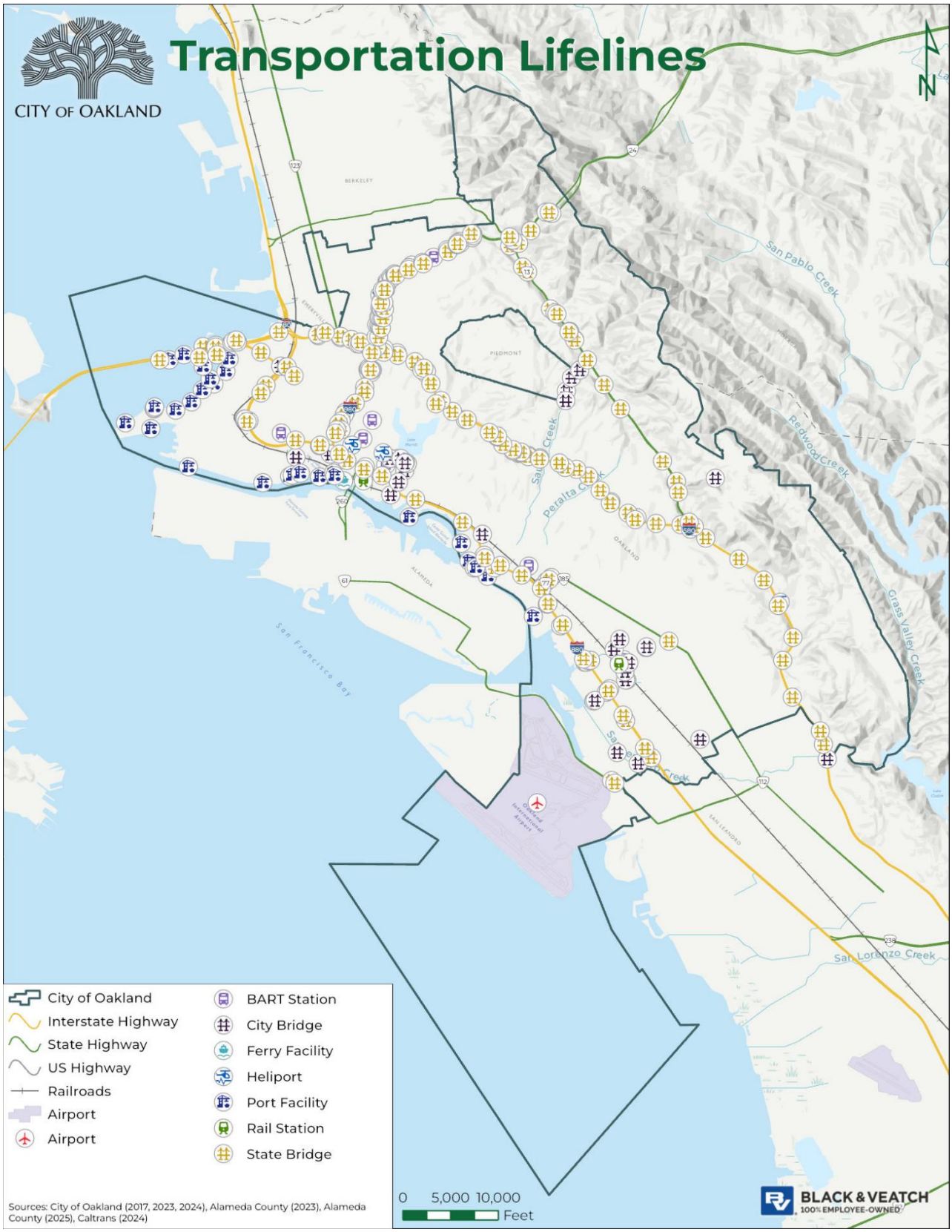



Figure 4-14 Transportation Lifelines in the City of Oakland

### 4.6.7 Hazardous Materials

Hazardous materials lifelines include facilities and HAZMAT, pollutants, or contaminants. The City identified the following facilities as hazardous materials lifelines: chemical hazards and hazardous materials (see Table 4-22). In total, there are 876 hazardous materials lifelines in the City of Oakland (see Table 4-23 and Figure 4-15).

Table 4-22. Hazardous Materials Lifelines, by Type, in the City of Oakland

| Sub-Area | Chemical Hazard | Hazardous Materials |
|---|---|---|
| Central East Oakland | 3 | 150 |
| Coliseum/Airport | 0 | 113 |
| Downtown | 0 | 101 |
| East Oakland Hills | 0 | 26 |
| Eastlake/Fruitvale | 1 | 144 |
| Glenview/ Redwood Heights | 0 | 23 |
| North Oakland Hills | 0 | 17 |
| North Oakland/Adams Point | 0 | 149 |
| West Oakland | 1 | 148 |
| **Total** | **5** | **871** |

*Sources: (City of Oakland 2017); (CA DTSC 2025); (CA DTSC 2024)*

Table 4-23. Hazardous Materials Lifelines in the City of Oakland

| Sub-Area | Hazardous Materials |
|---|---|
| Central East Oakland | 153 |
| Coliseum/Airport | 113 |
| Downtown | 101 |
| East Oakland Hills | 26 |
| Eastlake/Fruitvale | 145 |
| Glenview/ Redwood Heights | 23 |
| North Oakland Hills | 17 |
| North Oakland/Adams Point | 149 |
| West Oakland | 149 |
| **Total** | **876** |

*Sources: (City of Oakland 2017); (CA DTSC 2025); (CA DTSC 2024)*

### 4.6.8 Water Systems

Water systems lifelines include potable water infrastructure (e.g., intake, treatment, storage, distribution) and wastewater management (e.g., collection, storage, treatment, discharge). The City identified the following facilities as water system lifelines: potable water treatment facilities, utility facilities, and wastewater treatment facilities (see Table 4-24). In total, there are nine water system lifelines in the City of Oakland (see Table 4-25 and Figure 4-16).

Table 4-24. Water Systems Lifelines, by Type, in the City of Oakland

| Sub-Area | Potable Water Treatment Facility | Utility Facility | Wastewater Treatment Facility |
|---|---|---|---|
| Central East Oakland | 0 | 0 | 0 |
| Coliseum/Airport | 0 | 0 | 1 |
| Downtown | 0 | 1 | 0 |
| East Oakland Hills | 1 | 0 | 0 |
| Eastlake/Fruitvale | 0 | 1 | 0 |
| Glenview/ Redwood Heights | 0 | 0 | 0 |
| North Oakland Hills | 0 | 0 | 0 |
| North Oakland/Adams Point | 0 | 0 | 0 |
| West Oakland | 0 | 4 | 1 |
| **Total** | **1** | **6** | **2** |

*Sources: (City of Oakland 2017); (City of Oakland 2021)*

Table 4-25. Water Systems Lifelines in the City of Oakland

| Sub-Area | Water Systems |
|---|---|
| Central East Oakland | 0 |
| Coliseum/Airport | 1 |
| Downtown | 1 |
| East Oakland Hills | 1 |
| Eastlake/Fruitvale | 1 |
| Glenview/ Redwood Heights | 0 |
| North Oakland Hills | 0 |
| North Oakland/Adams Point | 0 |
| West Oakland | 5 |
| **Total** | **9** |

*Sources: (City of Oakland 2017); (City of Oakland 2021)*

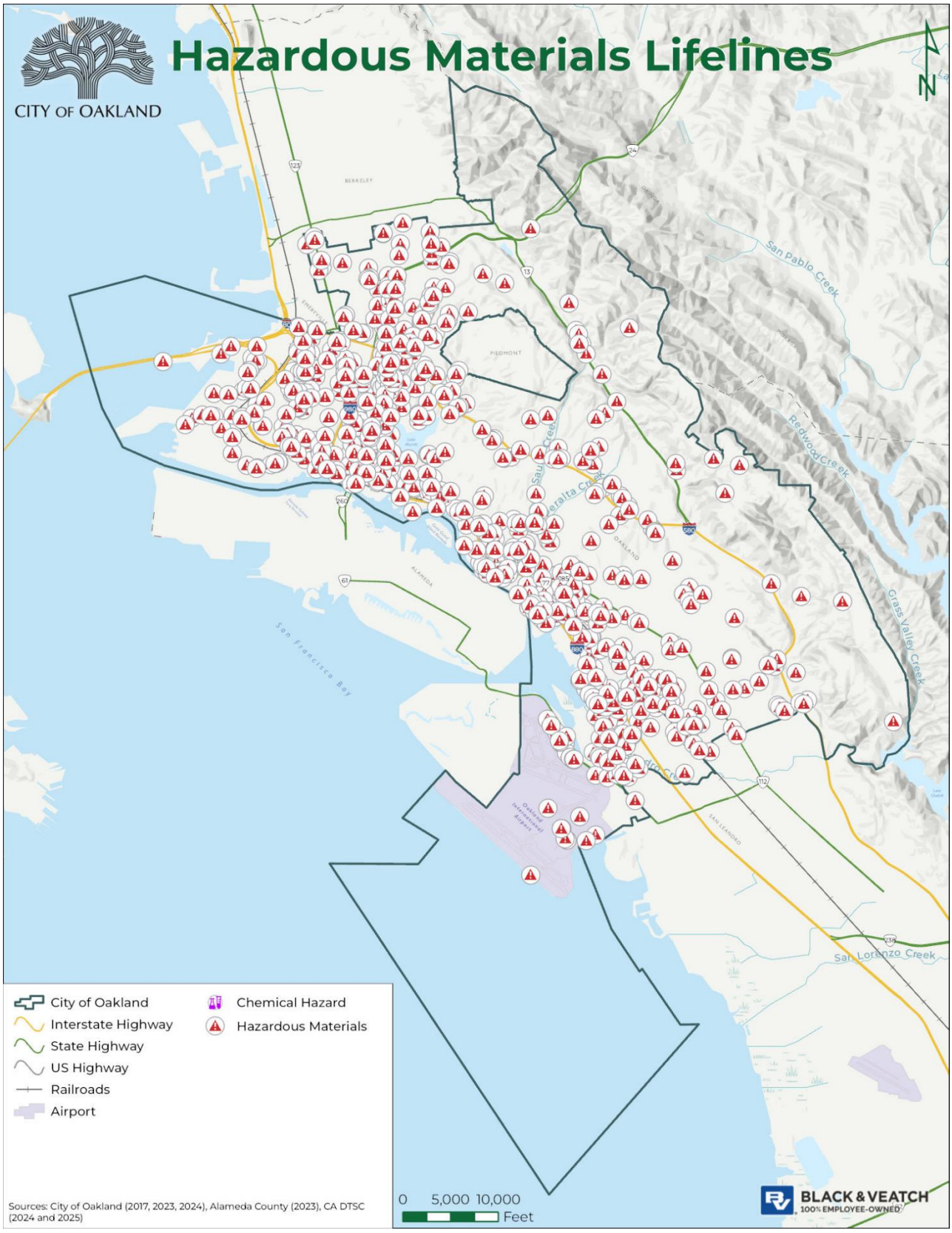



Figure 4-15 Hazardous Materials Lifelines in the City of Oakland

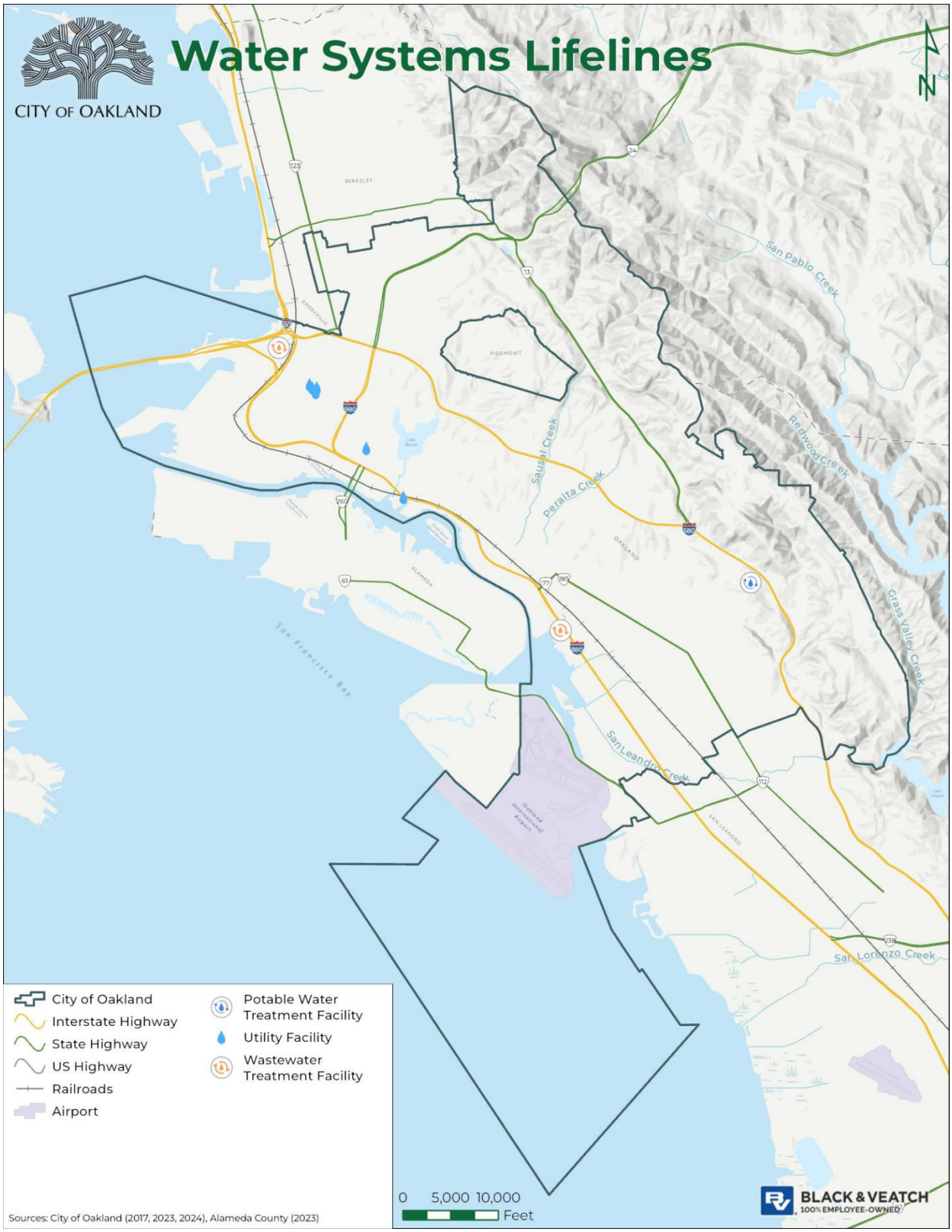



Figure 4-16 Water Systems Lifelines in the City of Oakland

## 4.7 ECONOMY

### 4.7.1 Industry, Businesses, and Institutions

The 2019-2023 ACS data identified 232,417 civilian employed persons over the age of 16 in Oakland's labor force. Table 4-26 summarizes the breakdown of industry types in the City and how many residents of Oakland are employed by each industry. Of Oakland's employed residents, the "Educational services, and health care and social assistance" industry employed the most people at 22.3%. The second largest employment sector was the "Professional, scientific, and management, and administrative and waste management services" industry, which accounted for 20.3% of the total employed persons in Oakland.

The City's workforce holds a variety of types of jobs as shown in Table 4-27, with the largest sector (51.3%) working in management, business, science, and arts occupations, followed by 22.79% in the educational services, and health care and social assistance sector (Census Reporter n.d.).

Table 4-26. Number of City Residents Employed, by Industry

| Industry Sector | Number | Percentage |
|---|---|---|
| Agriculture, forestry, fishing and hunting, and mining | 1,155 | 0.50% |
| Construction | 14,253 | 6.14% |
| Manufacturing | 16,584 | 7.14% |
| Wholesale trade | 3,989 | 1.72% |
| Retail trade | 18,807 | 8.10% |
| Transportation, warehousing, and utilities | 16,183 | 6.97% |
| Information, finance, insurance, real estate, rental and leasing | 17,794 | 7.66% |
| Professional, scientific, management, administration | 47,147 | 20.30% |
| Educational, health and social services | 51,824 | 22.31% |
| Arts, entertainment, recreation, and services | 22,845 | 9.83% |
| Other services | 12,245 | 5.27% |
| Public administration | 9,225 | 3.97% |
| Armed Forces | 245 | 0.10% |

*Source (Census Reporter n.d.)*

*Note: The table above captures the number of City residents employed by each industry regardless of where their employer is located.*

Table 4-27. Jobs by Occupation in the City of Oakland

| Occupation Sector | Number | Percentage |
|---|---|---|
| Management, business, science, and arts occupations | 119,918 | 51.60% |
| Services occupations | 37,878 | 16.30% |
| Sales and office occupations | 37,390 | 16.10% |
| Natural resources, construction, and maintenance occupations | 13,813 | 5.90% |
| Production, transportation, and material moving | 23,151 | 10.00% |
| Military Specific Occupation | 143 | 0.10% |

*Source: (Census Reporter n.d.)*

### 4.7.2 Employment Trends

According to the 5-year American Community Survey (2023), about 232,417, or 64.1 percent of the City of Oakland's population 16 years old or older is in the labor force. Of the working-age population, 49.5 percent of men and 50.5 percent of women are in the labor force.

The 2023 U.S. Census Bureau data shows 47.6 percent of the City's population work and live in Oakland; 52.4 percent commute to other places. In 2023, 46.4 percent of Oakland commuters spent more than 30 minutes travelling to work.

Based on the American Community Survey 2019-2023 5-year estimates data profiles from the U.S. Census Bureau, the unemployment rate for California in 2023 was approximately 6.4%. In contrast, the City of Oakland reported a slightly lower unemployment rate of 4.1%. Figure 4-17 illustrates the unemployment rates for Oakland in relation to the State.

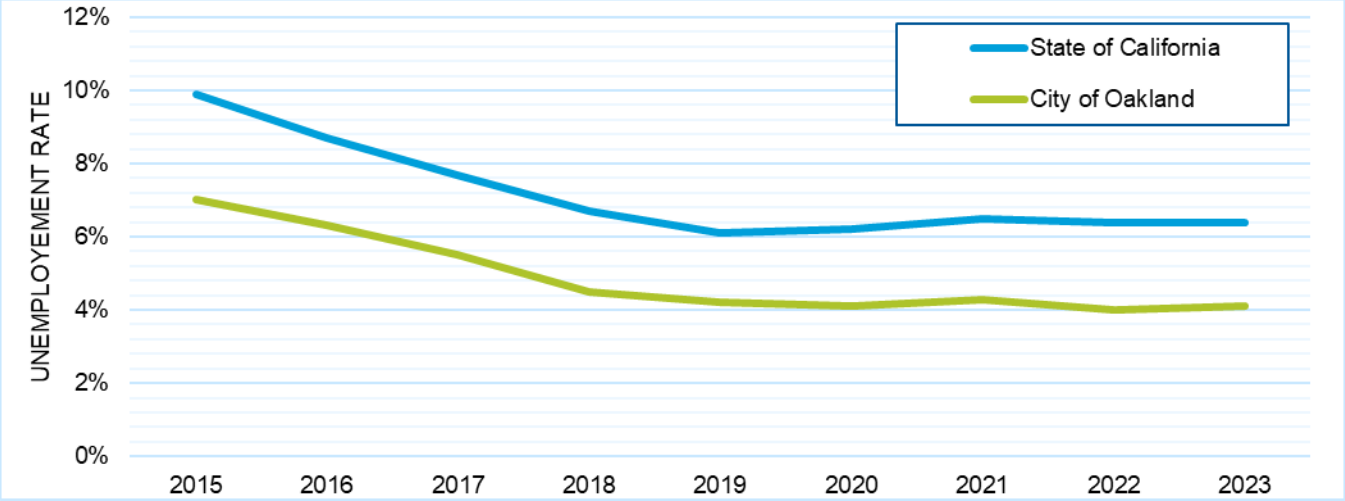



Figure 4-17 Recent Unemployment Rates for California and the City of Oakland

*Source: (U.S. Census 2025)*

# Part 2 - Risk Assessment

# 5. HAZARDS OF CONCERN

## 5.1 WHAT IS A HAZARD OF CONCERN?

Defining the hazards that present the greatest risk to the Planning Area is the first step in assessing overall risk to the community. The CPT and SC reviewed available information to determine what types of hazards may affect the Planning Area, how often they can occur, and their potential severity.

For the 2026 LHMP, the City identified the following as hazards of concern. *Hazards are listed in alphabetical order, not by level of risk*:

- Dam Failure
- Drought
- Earthquake
- Flood
- Landslide
- Sea-Level Rise
- Severe Weather
- Tsunami/Seiche
- Wildfire

The following sections provide details on how the City determined the hazards of concerns for this LHMP.

## 5.2 FEDERAL DISASTER DECLARATIONS

Federal disaster declarations are typically issued for hazard events that cause more damage state and local governments can handle without assistance from the federal government, although no specific dollar loss threshold has been established for these declarations. A presidential disaster declaration puts federal recovery programs into motion to help disaster victims, businesses, and public entities. Some of the programs are matched by state programs. Review of presidential disaster declarations helps establish the probability of reoccurrence for each hazard and identify targets for risk reduction. Table 5-1 lists the federal disaster (DR), emergency (EM), and fire management assistance (FM) declarations that included Alameda County since 1954.

Table 5-1. Federal Disaster Declaration History in Alameda County

| Disaster Number | Declaration Date | Incident Type | Title | Designated Area |
|---|---|---|---|---|
| DR-15-CA | February 5, 1954 | Flood | Flood & Erosion | Statewide |
| DR-47-CA | December 23, 1955 | Flood | Flood | Statewide |
| DR-65-CA | December 29, 1956 | Fire | Forest Fire | Statewide |
| DR-82-CA | April 4, 1958 | Flood | Heavy Rainstorms & Flood | Statewide |
| DR-122-CA | March 6, 1962 | Flood | Floods | Statewide |
| DR-119-CA | November 16, 1961 | Fire | Fire (Los Angeles County) | Statewide |
| DR-145-CA | February 25, 1963 | Flood | Severe Storms, Heavy Rains & Flooding | Statewide |
| DR-138-CA | October 24, 1962 | Flood | Severe Storms & Flooding | Statewide |
| DR-169-CA | April 1, 1964 | Other | Seismic Sea Wave | Statewide |

| Disaster Number | Declaration Date | Incident Type | Title | Designated Area |
|---|---|---|---|---|
| DR-161-CA | December 21, 1963 | Dam/Levee Break | Flood Due To Broken Dam | Statewide |
| DR-295-CA | September 29, 1970 | Fire | Forest & Brush Fires | Alameda County |
| DR-283-CA | February 16, 1970 | Flood | Severe Storms & Flooding | Alameda County |
| EM-3023-CA | January 20, 1977 | Drought | Drought | Alameda County |
| FM-2028-CA | August 7, 1977 | Fire | Scarface Fire | Statewide |
| DR-651-CA | January 7, 1982 | Flood | Severe Storms, Flood, Mudslides & High Tide | Alameda County |
| DR-677-CA | February 9, 1983 | Coastal Storm | Coastal Storms, Floods, Slides & Tornadoes | Alameda County |
| FM-2055-CA | July 11, 1985 | Fire | Hidden Valley Lake Fire | Statewide |
| FM-2054-CA | July 11, 1985 | Fire | Lexington Fire | Statewide |
| DR-758-CA | February 21, 1986 | Flood | Severe Storms & Flooding | Alameda County |
| FM-2065-CA | September 2, 1987 | Fire | Stanislaus Complex Fire | Statewide |
| FM-2071-CA | September 13, 1988 | Fire | Forty Niner Fire | Statewide |
| DR-845-CA | October 18, 1989 | Earthquake | Loma Prieta Earthquake | Alameda County |
| DR-894-CA | February 11, 1991 | Freezing | Severe Freeze | Alameda County |
| DR-919-CA | October 22, 1991 | Fire | Oakland Hills Fire | Alameda County |
| DR-1046-CA | March 12, 1995 | Severe Storm | Severe Winter Storms, Flooding Landslides, Mud Flow | Alameda County |
| DR-1044-CA | January 10, 1995 | Severe Storm | Severe Winter Storms, Flooding, Landslides, Mud Flows | Alameda County |
| DR-1155-CA | January 4, 1997 | Severe Storm | Severe Storms, Flooding, Mud And Landslides | Alameda County |
| DR-1203-CA | February 9, 1998 | Severe Storm | Severe Winter Storms and Flooding | Alameda County |
| EM-3248-CA | September 13, 2005 | Hurricane | Hurricane Katrina Evacuation | Alameda County |
| DR-1646-CA | June 5, 2006 | Severe Storm | Severe Storms, Flooding, Landslides, and Mudslides | Alameda County |
| DR-1628-CA | February 3, 2006 | Severe Storm | Severe Storms, Flooding, Mudslides, and Landslides | Alameda County |
| DR-4308-CA | April 1, 2017 | Flood | Severe Winter Storms, Flooding, and Mudslides | Alameda County |
| DR-4305-CA | March 16, 2017 | Flood | Severe Winter Storms, Flooding, and Mudslides | Alameda County |
| DR-4301-CA | February 14, 2017 | Severe Storm | Severe Winter Storms, Flooding, and Mudslides | Alameda County |
| DR-4482-CA | March 22, 2020 | Biological | Covid-19 Pandemic | Alameda County |
| EM-3428-CA | March 13, 2020 | Biological | Covid-19 | Alameda County |
| DR-4699-CA | April 3, 2023 | Severe Storm | Severe Winter Storms, Straight-Line Winds, Flooding, Landslides, and Mudslides | Alameda County |
| DR-4683-CA | January 14, 2023 | Flood | Severe Winter Storms, Flooding, Landslides, and Mudslides | Alameda County |

| Disaster Number | Declaration Date | Incident Type | Title | Designated Area |
|---|---|---|---|---|
| EM-3591-CA | January 9, 2023 | Flood | Severe Winter Storms, Flooding, and Mudslides | Alameda County |

*Source: FEMA, 2025*

## 5.3 NATIONAL RISK INDEX

FEMA's National Risk Index (NRI) is a dataset and online tool developed to help illustrate risk for 18 natural hazards. The NRI was used as a starting point for natural hazard selection for this LHMP. Hazard chapters align with the NRI hazard types, except for the flood chapter which focuses on the urban flooding concern for the City. Refer to Table 5-2 for the NRI ranking of natural hazards to the Planning Area, at the county level. The SC chose to exclude hail, lightning, and tornadoes due to its ranking and the lack of historical impacts to the Planning Area.

Table 5-2. National Risk Index for the City of Oakland

| Hazard | Risk Index | Included in the Plan? |
|---|---|---|
| Avalanche | Not Applicable | No |
| Coastal Flooding | Relatively Low | Yes |
| Cold Wave | No Rating | No |
| Drought | Relatively High | Yes |
| Earthquake | Very High | Yes |
| Hail | Relatively Low | No |
| Heat Wave | Relatively Moderate | Yes |
| Hurricane | Not Applicable | No |
| Ice Storm | Not Applicable | No |
| Landslide | Relatively High | Yes |
| Lightning | Very Low | No |
| Riverine Flooding | Relatively High | Yes |
| Strong Wind | Very Low | Yes |
| Tornado | Relatively Moderate | No |
| Tsunami | Relatively Moderate | Yes |
| Volcanic Activity | Not Applicable | No |
| Wildfire | Relatively Moderate | Yes |
| Winter Weather | Very Low | No |

## 5.4 HAZARDS OF CONCERN

Based on a review of the 2023 California State Hazard Mitigation Plan, the National Risk Index, and input from the Steering Committee, nine hazards, listed alphabetically, are identified as natural hazards of concern affecting Oakland and will be addressed in this plan.

- Dam Failure
- Drought
- Earthquake
- Flood
- Landslide
- Sea-Level Rise
- Severe Weather
- Tsunami/Seiche
- Wildfire

Refer to the table below for a complete comparison of hazards included in the 2023 California State Hazard Mitigation Plan, the Alameda County Plan, and this plan.

Table 5-3. Hazard Mitigation Plan Comparison

| 2023 California State Hazard Mitigation Plan | Alameda County Hazard Mitigation | 2026 Oakland LHMP | Comment |
|---|---|---|---|
| Air Pollution | - | Wildfire | Air pollution from wildfire smoke is a concern for the City and is discussed in the Wildfire chapter |
| Civil Disorder | - | Terrorism, Active Shooter, Cyber-Terrorism, Civil Unrest | This local hazard aligns with the State |
| Cyber Threats | - | Terrorism, Active Shooter, Cyber-Terrorism, Civil Unrest | This local hazard aligns with the State |
| Dam Failure | Dam Failure | Dam Failure | This local hazard aligns with the State |
| Drought | Drought | Drought | This local hazard aligns with the State |
| Earthquake | Earthquake | Earthquake | This local hazard aligns with the State |
| Electromagnetic Pulse Attack | - | - | Not a concern for the City |
| Energy Shortage | - | - | Addressed in other plans |
| Epidemic/Pandemic/Vector-Borne Disease | Infectious Disease | Public Health Incidents | This local hazard aligns with the State |
| Extreme Cold or Freeze | - | Severe Weather | This local hazard aligns with the State |
| Extreme Heat | - | Severe Weather | This local hazard aligns with the State |
| Geomagnetic Storm | - | - | Not a concern for the City |
| Hazardous Materials Release | - | Hazardous Materials and Radiological Incidents | This local hazard aligns with the State |
| Invasive and Nuisance Species | - | - | Addressed in other plans |
| Landslide, Debris Flows, and Other Mass Movements | Landslide | Landslide | This local hazard aligns with the State |
| Levee Failure | - | - | Not a concern for the City |
| Natural Gas Pipeline Hazards | - | - | Addressed in other plans |
| Oil Spills | - | - | Addressed in other plans |
| Other Potential Long-Term Electrical Outrages | - | - | Addressed in other plans |
| Public Safety Power Shutoff | Public Safety Power Shutoff | - | Addressed in other plans |
| Radiological Accidents | - | Hazardous Materials and Radiological Incidents | This local hazard aligns with the State |
| Riverine, Stream, Alluvial Flood | Flood | Flood | This local hazard aligns with the State |
| Sea-Level Rise, Coastal Flooding and Erosion | - | Sea-Level Rise | This local hazard aligns with the State |

| 2023 California State Hazard Mitigation Plan | Alameda County Hazard Mitigation | 2026 Oakland LHMP | Comment |
|---|---|---|---|
| Severe Wind, Weather, and Storms | - | Severe Weather | This local hazard aligns with the State |
| Snow Avalanche | - | - | Not a concern for the City |
| Subsidence | - | - | Not a concern for the City |
| Terrorism | - | Terrorism, Active Shooter, Cyber-Terrorism, Civil Unrest | This local hazard aligns with the State |
| Transportation accidents Resulting in Explosions or Toxic Releases | - | - | Addressed in other plans |
| Tree Mortality | - | - | Addressed in other plans |
| Tsunami and Seiche | Tsunami | Tsunami/Seiche | This local hazard aligns with the State |
| Urban Structural Fire | - | - | Addressed in other plans |
| Volcano | - | - | Not a concern for the City |
| Well Stimulation and Hydraulic Fracturing | - | - | Not a concern for the City |
| Wildfire | Wildfire | Wildfire | This local hazard aligns with the State |
| Incorporated in each profile | Climate Change | Incorporated in each profile | This local hazard aligns with the State |

# 6. RISK ASSESSMENT METHODOLOGY AND TOOLS

## 6.1 ASSESSING RISK

In hazard mitigation planning, risk is the potential for damage or loss when natural hazards interact with people or assets, such as buildings, infrastructure, and resources. A risk assessment is a process used to identify potential hazards and analyze what could happen if a disaster or hazard occurs. It involves a data-driven analysis to identify potential hazards, what could happen if hazards occur, and determine vulnerabilities to hazards (FEMA 2023).

The risk assessment process focuses on three main elements – hazard identification, exposure identification, and vulnerability identification and loss estimation.

## 6.2 RISK ASSESSMENT TOOLS

**Local Plan Requirement A4 – 44 CFR Part 201.6(b)(3)**

***Review and incorporation, if appropriate, of existing plans, studies, reports, and technical information.***

For this LHMP, GIS and FEMA's Hazus software programs were used to conduct the risk assessment.

### 6.2.1 Mapping

GIS tools provide a mechanism to perform quantitative analysis. Hazards that have specified geographic boundaries permit analysis using GIS. These hazards include the following:

- Dam Failure
- Earthquake
- Flood
- Landslide
- Sea-Level Rise
- Tsunami
- Wildfire

### 6.2.2 Modeling

FEMA's Hazus model version 6.1 was used to evaluate the following hazards:

- **Dam Failure**—A Level 2 user-defined analysis was performed for general building stock and critical facilities and infrastructure in inundation areas. Potential losses for the combined inundation areas of multiple dams, specific dams noted later in this section, were estimated using the Hazus flood module.
- **Earthquake**—A Level 2 analysis was performed to assess earthquake exposure and vulnerability for three deterministic scenarios: Calaveras (No) M6.86, Hayward M7.05, and San Andreas (Peninsula) M7.38. The Hazus methodology uses ground motion and ground failure fragility curves to estimate damage state probabilities which are then used to estimate losses at the structure level.

- **Flood**—A Level 2 user-defined analysis was performed for general building stock and critical facilities and infrastructure in flood zones. The effective and preliminary FEMA flood mapping for the planning area was used to delineate flood hazard areas and estimate potential losses from the 1%- and 0.2%-annual chance flood events. To estimate damage that would result from a flood, Hazus uses pre-defined relationships between flood depth at a structure and resulting damage, with damage given as a percent of total replacement value. Curves defining these relationships have been developed for damage to structures and for damage to typical contents within a structure. By inputting flood depth data, estimated first floor elevations, and known property replacement cost values, dollar-value estimates of damage were generated.
- **Tsunami**—A modified Level 2 user-defined analysis was performed for general building stock, critical facilities and infrastructure in the tsunami hazard area. Potential losses for the hazard area were estimated using the Hazus flood module as described for flood above. Flood module parameters typically used in coastal flood analyses were modified to accommodate the nature of tsunamis.

## Overview

FEMA developed the Hazards U.S., or Hazus, model in 1997 to estimate losses caused by earthquakes and identify areas that face the highest risk and potential for loss. Hazus was later expanded into a multi-hazard methodology with new models for estimating potential losses from hurricanes and floods. The use of Hazus for hazard mitigation planning offers numerous advantages:

- Provides a consistent methodology for assessing risk across geographic and political entities.
- Provides a way to save data so that it can readily be updated as population, inventory, and other factors change and as mitigation planning efforts evolve.
- Facilitates the review of mitigation plans because it helps to ensure that FEMA methodologies are incorporated.
- Supports grant applications by calculating benefits using FEMA definitions and terminology.
- Produces hazard data and loss estimates that can be used in communication with local stakeholders.
- Is administered by the local government and can be used to manage and update an LHMP throughout its implementation.

Hazus is a GIS-based software program used to support risk assessments, mitigation planning, and emergency planning and response. It provides a wide range of inventory data, such as demographics, building stock, community lifelines, transportation and utility lifelines, and multiple models to estimate potential losses from natural disasters. The program can be used to map hazard data, and the results of damage and economic loss estimates for buildings and infrastructure.

## Level of Detail for Evaluation

Hazus provides default data for inventory, vulnerability and hazards; this default data can be supplemented with local data to provide a more refined analysis. The model can carry out

three levels of analysis, depending on the format and level of detail of information about the Planning Area:

- **Level 1**—All of the information needed to produce an estimate of losses is included in the software's default data. This data is derived from national databases and describes in general terms the characteristic parameters of the Planning Area.
- **Level 2**—More accurate estimates of losses require more detailed information about the Planning Area. To produce Level 2 estimates of losses, detailed information is required about local geology, hydrology, hydraulics and building inventory, as well as data about utilities and critical facilities. This information is needed in a GIS format.
- **Level 3**—This level of analysis generates the most accurate estimate of losses. It requires detailed engineering and geotechnical information to customize it for the Planning Area.

## 6.3 RISK ASSESSMENT APPROACH

This plan evaluated risks associated with each identified hazard for Oakland. Each hazard was profiled using the following steps:

- **Identify and profile each hazard** – the following information is given for each hazard of concern:
  - **Description of the Hazard:** Defining the hazard and a discussion of potential impacts.
  - **Location:** Geographic areas most affected by the hazard.
  - **Extent:** Measuring the intensity of the hazard, warning time for preparations, and the reasonable worst-case scenario.
  - **Previous Occurrences:** Summary of past events that have impacted the Planning Area.
  - **Future Conditions:** Probability estimates, including potential frequency and intensity shifts caused by climate change and population and development trends.

- **Determine exposure to each hazard** – one of the following assessment approaches was used, depending on the type of information available for the hazard
  - **Quantitative assessment:** Performed when numerical data are available to define risk. Available numerical hazard data may include financial impact and probability.
  - **Qualitative assessment:** Uses words to describe and categorize the likelihood and consequences of a risk when numerical data are unavailable.

- **Assess the vulnerability of exposed facilities** - Vulnerability of exposed structures and infrastructure was evaluated by estimating the probability of occurrence of each event and assessing structures, facilities, and systems that are exposed to each hazard.
  - **Impact on Life, Health, and Safety** (general population and Equity Priority Community population)
  - **Impact on General Building Stock**
  - **Impact on Community Lifelines**
  - **Impact on the Economy**

  - **Impact on Historic and Cultural Resources**
  - **Impact on Ecosystems and Natural Resources**
- **Identify potential mitigation opportunities** –a range of potential opportunities for mitigating each hazard at the following scales:
  - **Community:** Mitigation actions that can be implemented by the general public
  - **Organizational:** Mitigation actions that can be implemented by businesses and non-profits.
  - **Government:** Mitigation actions that can be implemented by local governments.

## 6.4 SOURCES OF DATA USED IN RISK ASSESSMENT

Hazard information and data were collected for all hazards from a variety of sources, described in the sections below.

### 6.4.1 Building and Cost Data

Parcel and building information from the Alameda County Assessor were used to compile a detailed, citywide structure inventory including replacement costs. Replacement cost is the cost to replace the entire structure with one of equal quality and utility. Replacement cost is based on industry-standard cost-estimation models published in RS Means Square Foot Costs. It is calculated using the RS Means square foot cost for a structure, which is based on the Hazus occupancy class (i.e., multi-family residential or commercial retail trade), multiplied by the square footage of the structure from the tax assessor data. The construction class and number of stories for single-family residential structures also factor in determining the square foot costs.

### 6.4.2 Community Lifelines

The inventory of critical facilities and infrastructure developed for the City's 2021 LHMP was updated utilizing the most recent versions of the source datasets as listed in Table 6-1. The facilities were categorized by FEMA's Community Lifelines: Safety and Security; Food, Hydration, Shelter; Health and Medical; Energy; Communications; Transportation; Hazardous Material; and Water Systems. To protect individual privacy and the security of assets, information in this plan is presented in aggregate, without details about specific individual properties or facilities.

### 6.4.3 Population

2020 Census block-level data, provided with Hazus, was used to estimate the total population in each planning area. This data was also used to calculate the exposed population, displaced population and shelter needs for each hazard scenario.

#### Equity Priority Communities

The City of Oakland used the identified Environmental Justice Communities (EJC) from the City's General Plan Environmental Justice Element to determine the Equity Priority Communities exposed to and at risk from natural hazards. As part of the General Plan Environmental Justice Element, the City developed a screening analysis to identify EJC that consists of a composite set of indicators (quantitative metrics of EJ issues). Each indicator is scored and then combined to identify the topmost cumulatively burdened communities

(City of Oakland 2023). Refer to the Environmental Justice Element of the General Plan for further details on the how the City identified the EJC.

For this LHMP update, the composite score of each census tract was divided into three categories (91-100, 81-90, and ≤80). Populations in these categories are recognized as priority communities that are most affected by the hazard.

### 6.4.4 Hazus Data Inputs

The following hazard datasets were used for the Hazus analyses conducted for the risk assessment:

- Dam Failure—Dam failure inundation area, and associated inundation depth grids, provided by California Department of Water Resources (CA DWR). Combined dam inundation areas and depth grids data were developed for the City's 2021 LHMP from this source data and were utilized for the analysis of this hazard. No data for additional dams, or updated versions of the data incorporated into the 2021 combined data, were available from CA DWR. The combined inundation depth grids use the maximum depth were inundation areas overlap. The inundation areas for the following dams are included: Central, Cabot, Dunsmuir, Lake Temescal, and New Upper San Leandro.
- Earthquake—ShakeMap data from the USGS Building Seismic Safety Council 2014 Event Set were used for the analysis of this hazard. This set of ShakeMap earthquake scenarios is the authoritative USGS collection for the continental United States. The scenario fault ruptures are derived from the latest National Seismic Hazard Model. Landslide susceptibility data from the California Geological Survey (CGS) and liquefaction susceptibility data from USGS were also incorporated into the Hazus model to replace the default data.
- Flood—The effective FEMA Digital Flood Insurance Rate Map (DFIRM), and the flood depth grids developed for the City's 2021 LHMP risk assessment, were used to estimate the potential losses from the 0.2%- and 1%-annual-chance flood events. The effective flood mapping for Peralta Creek was replaced with Preliminary FIRM data provided by FEMA Region 9.
- Tsunami—Tsunami hazard area data provided by the California Department of Conservation were used for the analysis of this hazard. A depth grid developed using the hazard area data and the USGS 1/3 arc-second digital elevation model was integrated into the Hazus model.

### 6.4.5 Other Local Hazard Data

Local sources used in the risk and vulnerability assessment include the following:

- Landslide—An exposure analysis was conducted using deep-seated landslide susceptibility data from CGS. This data differentiates areas based on rock strength and steepness of slopes combined to create susceptibility classes. For the purposes of the exposure analysis, the classes were grouped as follows: High – Susceptibility Classes VII, VIII, and IX; Very High – Susceptibility Class X.
- Sea-Level Rise—Sea-level rises of 0.8 ft (2050) and 4.9 feet (2100 Intermediate-High), with 100-year storm surge and shallow groundwater rise, data were downloaded from San Francisco Bay Conservation and Development Commission's (BCDC) Regional

Shoreline Adaptation Plan Atlas Open Data portal. The portal provides coastal hazard data for sea level rise scenarios based on the California Sea Level Rise Guidance (2024) statewide averages. These data were compiled from BCDC's Adapting to Rising Tides (ART) sea level rise and USGS' Coastal Storm Modeling System (CoSMoS) shallow groundwater rise datasets.

- Wildfire—An exposure analysis was conducted using fire hazard severity zones data provided the City. These zones were mapped based on fuel loading, slope, fire weather, and other relevant factors including winds. The zones are classified as Very High fire hazard.
    - In February 2025, the State Fire Marshal released maps for the Local Responsibility Area Fire Hazard Severity Zones. The State Fire Marshal map proposed to remove large portions of the Oakland Hills that had been designated as Very Fire Hazard Severity Zone and rezone as moderate and high severity zones or would not be labeled with any severity zone designation. The City did not agree with the decision by CAL FIRE to reduce the land area in Oakland. By adopting our own map, the City is demonstrating and protecting its long-standing interest in proactive prevention efforts in neighborhoods known to be at greatest risk because of a multitude of hazards. City Council adopted an ordinance to designate the Oakland Fire Hazard Severity Zone.

### 6.4.6 Data Source Summary

Table 6-1 describes the data used for spatially-based exposure and vulnerability assessments.

Table 6-1. Data Source Summary

| Data | Source | Date(s) | Format(s) |
|---|---|---|---|
| City of Oakland Parcels | City of Oakland | 2025 | Digital (GIS) format |
| Building footprints | Open Street Map | 2025 | Digital (GIS) format |
| Building replacement costs | RS Means | 2024 | Digital (tabular) format |
| Population data | Hazus v6.1 | 2020 | Digital (GIS) format |
| Environmental Justice (EJ) Communities | City of Oakland | 2023 | Digital (GIS) format |
| California Dam Breach Inundation Maps, Approved Inundation Boundaries DIVISION OF SAFETY OF DAMS (DSOD) | CA DWR | 2025 | Digital (GIS) format |
| Dam failure inundation depth grids developed for the 2021 Local Hazard Mitigation Plan | City of Oakland | 2021 | Digital (GIS) format |
| Calaveras (No) M6.86 ShakeMap M 6.9 Scenario Earthquake - Calaveras (No) | USGS Earthquake Hazards Program website | 2017 | Digital (GIS) format |
| Haywired M7.05 ShakeMap M 7.1 Scenario Earthquake - Haywired M7.05 Scenario | USGS Earthquake Hazards Program website | 2018 | Digital (GIS) format |
| San Andreas (Peninsula) M7.38 M 7.4 Scenario Earthquake - San Andreas (Peninsula) | USGS Earthquake Hazards Program website | 2017 | Digital (GIS) format |
| Maps of Quaternary deposits and liquefaction susceptibility in the central San Francisco Bay region, California (USGS Open File Report 06-1037) | USGS | 2006 | Digital (GIS) format |

| Data | Source | Date(s) | Format(s) |
|---|---|---|---|
| Maps of Quaternary Deposits and Liquefaction Susceptibility in the Central San Francisco Bay Region, California | | | |
| Shear-wave Velocity in Upper 30m of Surficial Geology (Vs30) / NEHRP Soils Earthquake Shaking Potential for California | CGS | 2015 | Digital (GIS) format |
| Digital Flood Insurance Rate Map (effective 12/21/2018; last LOMR 11/20/2024) FEMA Flood Map Service Center \| Search All Products | FEMA | 2024 | Digital (GIS) format |
| Preliminary Flood Insurance Rate Map (issued 6/28/2024) FEMA Flood Map Service Center \| Search All Products | FEMA | 2024 | Digital (GIS) format |
| Flood depth grids developed for the 2021 Local Hazard Mitigation Plan | City of Oakland | 2021 | Digital (GIS) format |
| Preliminary Flood Insurance Rate Map depth grids | FEMA Region 9 | Provided 2025 | Digital (GIS) format |
| CGS Map Sheet 58: Susceptibility to Deep-Seated Landslides in California MS58 Deep-Seated Landslide Susceptibility - Overview | CGS | 2018 | Digital (GIS) format |
| Regional Shoreline Adaptation Plan (RSAP) Coastal Flood Hazards - 0.8 ft (2050) SLR Scenario Coastal Flood Hazards \| RSAP Open Data | BCDC | 2025 | Digital (GIS) format |
| Regional Shoreline Adaptation Plan (RSAP) Coastal Flood Hazards - 4.9 ft (2100 Intermediate-High) SLR Coastal Flood Hazards \| RSAP Open Data | BCDC | 2025 | Digital (GIS) format |
| Tsunami Hazard Area Map, Alameda County CA Tsunami Hazard Area - Overview | CA Dept of Conservation | 2022 | Digital (GIS) format |
| USGS 1/3 Arc Second Digital Elevation Model (DEM) GIS Data Download \| U.S. Geological Survey | USGS | 2025 | Digital (GIS) format |
| Fire Severity Zone in Local Responsibility Areas (LRA) | City of Oakland | Provided 2025 | Digital (GIS) format |
| Community Lifelines Inventory developed for the 2021 Local Hazard Mitigation Plan | City of Oakland | 2021 | Digital (GIS) format |
| Post Offices Post Offices \| Alameda County Open Data Hub | Alameda County | 2023 | Digital (GIS) format |
| California Public Schools 2024-25 California Public Schools 2024-25 \| California State Geoportal | CA Department of Education | 2025 | Digital (GIS) format |
| California Private Schools 2024-25 California Private Schools 2023-24 \| California State Geoportal | CA Department of Education | 2025 | Digital (GIS) format |
| Dialysis Centers Dialysis Centers \| Alameda County Open Data Hub | Alameda County | 2023 | Digital (GIS) format |

| Data | Source | Date(s) | Format(s) |
|---|---|---|---|
| California Power Plants<br>California Power Plants \| California State Geoportal | CA Energy Commission | 2025 | Digital (GIS) format |
| Land Mobile Broadcast Towers | HIFLD | 2024 | Digital (GIS) format |
| Land Mobile Commercial Towers | HIFLD | 2024 | Digital (GIS) format |
| Microwave Service Towers | HIFLD | 2024 | Digital (GIS) format |
| State Bridges<br>State Highway Bridges \| California State Geoportal | Caltrans | 2024 | Digital (GIS) format |
| Hazardous Waste Tracking System - Active Facilities<br>Hazardous Waste Tracking System - Active Facilities \| California State Geoportal | CA DTSC | 2025 | Digital (GIS) format |

## 6.5 DATA LIMITATIONS

Loss estimates, exposure assessments, and hazard-specific vulnerability evaluations rely on the best available data and methodologies. Uncertainties are inherent in any loss estimation methodology and arise in part from incomplete scientific knowledge concerning natural hazards and their effects on the built environment.

Uncertainties also result from the following:

1. Approximations and simplifications necessary to conduct the study
2. Incomplete or dated inventory, demographic, or economic parameter data
3. The unique nature, geographic extent, and severity of each hazard
4. Mitigation measures already employed by the City
5. The amount of advance notice residents have to prepare for a specific hazard event
6. Uncertainty of climate change projections

Hazus currently represents the industry's best management practice for assessing risk in support of hazard mitigation planning. However, the Hazus model is limited by the availability of data to support its working components. The model makes assumptions when data are not available. These model limitations can lead to an understatement or overstatement of risk.

These factors can result in a range of uncertainty in loss estimates, possibly by a factor of two or more. Therefore, potential exposure and loss estimates are approximate. These results do not predict precise results and should be used to understand relative risk. Over the long term, the City will collect additional data to update and refine existing inventories to assist in estimating potential losses.

Potential economic loss is based on the present value of the general building stock utilizing best available data. The City acknowledges significant impacts may occur to critical facilities and infrastructure as a result of these hazard events causing great economic loss. However, monetized damage estimates to critical facilities and infrastructure, and economic impacts were not quantified and require more detailed loss analyses.

# 7. DAM FAILURE

## 7.1 HAZARD PROFILE

**Local Plan Requirement B1 – 44 CFR Part 201.6(c)(2)(i)**

*Include a description of the type, location, and extent for the identified hazards of concern and include information on previous occurrences of hazard events and the probability of future hazard events.*

### 7.1.1 Description of the Hazard

#### Definition and Classification of Dams

A dam is an artificial barrier that can store water, wastewater, or liquid-borne materials for many reasons—flood control, human water supply, irrigation, livestock water supply, energy generation, containment of mine tailings, recreation, or pollution control. Many dams fulfill a combination of these functions. In California, dams are regulated by the State of California Division of Safety of Dams. Additional regulatory oversight of dams is cited in Chapter 18 and described in Appendix C (Federal & State Agencies, Programs & Regulations).

The California Water Code (Division 3) defines a dam as any artificial barrier, together with appurtenant works, which does or may impound or divert water, and that either:

- It has a height of more than 6 feet, and it impounds 50 acre-feet or more of water, or
- It has a height of 25 feet or higher and impounds more than 15 acre-feet of water.

Dams can be classified according to their purpose, the construction material or methods used, their slope or cross section, the way they resist the force of the water pressure, or the means used for controlling seepage. Materials used to construct dams include earth, rock, tailings from mining or milling, concrete, masonry, steel, timber, plastic, rubber, and combinations of these.

Over time, dams decay and require maintenance to retain their level of protection. Despite efforts to provide sufficient structural integrity and to perform inspection and maintenance, problems can develop that lead to failure. In the United States, the average age of dams is 53 years. Approximately 15,600 dams pose a significant hazard to life and property if failure occurs and about 2,000 unsafe dams are dispersed throughout the United States (FEMA 2021).

When dams fail or overtop, they can cause catastrophic impacts and lead to major flooding (Association of State Dam Safety Officials 2021). While most dams have storage volumes small enough that failures would have little or no consequences, the failure of dams with large storage amounts could cause significant flooding downstream (FEMA 2013). Partial or full failure of dams has the potential to cause massive destruction to the ecosystems and communities located downstream.

#### Cause of the Hazard

Partial or full failure of a dam can occur because of one or a combination of the following reasons (FEMA 2016):

- Overtopping that can be caused by extreme flood events, inadequate spillway design, debris blockage.
- Prolonged periods of rainfall and flooding.
- Deliberate acts of sabotage (terrorism).
- Structural failure of materials used in dam construction.
- Movement and/or failure of the foundation supporting the dam.
- Settlement and cracking concrete or embankment dams.
- Piping and internal erosion of soil in embankment dams.
- Inadequate or negligent operation, maintenance, and upkeep.
- Failure of upstream dams on the same waterway.
- Earthquake (liquefaction/landslides).

Many dam failures in the United States have been secondary results of other disasters. The most common causes are earthquakes, landslides, extreme storms, equipment malfunction, structural damage, foundation failures, and sabotage. Poor construction, lack of maintenance and repair, and deficient operational procedures are preventable or correctable by a program of regular inspections. Terrorism and vandalism are serious concerns that all operators of public facilities must plan for; these threats are under continuous review by public safety agencies.

## Planning Requirements

### *State of California*

All dams whose inundation areas may impact the Planning Area have emergency action plans (EAPs) on file. The EAPs must include the following (Cal OES 2021):

- Emergency notification flow charts.
- Information on a four-step response process.
- Description of agencies' roles and actions in response to an emergency incident.
- Description of actions to be taken in advance of an emergency.
- Inundation maps.
- Additional information such as revision records and distribution lists.

After the EAPs are approved by the state, the law requires dam owners to send the approved EAPs to relevant stakeholders. Local public agencies can then adopt emergency procedures that incorporate the information in the EAP in a manner that conforms to local needs and includes methods and procedures for alerting and warning the public and other response and preparedness related items (Cal OES 2021).

### *Federal Energy Regulatory Commission*

Dams that fall under the jurisdiction of the Federal Energy Regulatory Commission (FERC) also have specified planning requirements. FERC has the largest dam safety program in the United States. It cooperates with a large number of federal and state agencies to ensure and promote dam safety and, more recently, homeland security. FERC requires licensees to prepare EAPs and conducts training sessions on how to develop and test these plans. The plans are designed to serve as an early warning system if there is a potential for, or a sudden release of water from, a dam failure or accident to the dam. The plans include operational procedures that may be used, such as reducing reservoir levels and reducing downstream

flows and procedures for notifying affected residents and agencies responsible for emergency management. These plans are frequently updated and tested to ensure that in emergency situations everyone knows what to do, thus saving lives and minimizing property damage.

### *FEMA Guidance for Flood Mapping*

FEMA's *Federal Guidelines for Inundation Mapping of Flood Risks Associated with Dam Incidents and Failures* is part of the National Dam Safety Program, a partnership of states, federal agencies, and other stakeholders formed to encourage individual and community responsibility for dam safety. Under this program, states are responsible for regulating non-federal dams. The guidelines provide information for federal and state agencies, local governments, dam owners, and emergency management officials to use for reducing flood hazards and the resulting potential for economic damage and loss of life. It is a resource for developing state-specific guidelines for dam safety and as a reference manual for mapping dam breach inundation zones (FEMA 2013).

#### Rehabilitation of High Hazard Potential Dams

FEMA's Rehabilitation of High Hazard Potential Dams grant program provides 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 2020).

## Summary of Potential Impacts

Dam failure can be catastrophic to all life and property downstream. California's Division of Safety of Dams has developed a hazard potential classification system for state-jurisdiction dams, as shown in Table 7-1. This system is modified from federal guidelines, which recommend three-tier classification. The California system adds a fourth hazard classification of "extremely high." Dams classified as extremely high hazard may impact highly populated areas or critical infrastructure or have short evacuation warning times.

Table 7-1. State of California Downstream Hazard Potential Classification

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

*Source: (DWR Division of Safety of Dams 2021)*

## Cascading Hazard Impacts

Cascading impacts are the impacts that result when one type of hazard event triggers one or more other hazard events, which may in turn trigger still others. The notable cascading impacts associated with dam failure are flooding, landslides, bank erosion, and destruction

of habitat (Cal OES 2023). Notable cascading impacts from dam failures include the following:

- Potential to impact multiple downstream jurisdictions.
- Loss of power associated with facilities that provide hydropower.
- Loss of water supply.
- Damage to agricultural lands.
- Impacts on multiple jurisdictions (Cal OES 2023).

### 7.1.2 Location

The State of California Division of Dam Safety (DSOD) and the USACE both maintain databases of dams in California. The DSOD lists only dams under state regulation, while the USACE National Inventory of Dams (NID) includes all dams under state or federal regulation. Based on an analysis of state and federal dam data, Table 7-2 lists the dams that have the potential to impact the City of Oakland should they fail. The list includes all state- or federal-regulated high hazard dams with mapped inundation areas at least partly within the Oakland city limits. Tyson Lake Dam in the City of Piedmont does not have inundation mapping and therefore cannot be analyzed for potential impacts to the City of Oakland (City of Piedmont 2025).

Table 7-2. State or Federally Regulated High/Extremely High Hazard Dams in Alameda County with Potential to Impact Oakland

| Name | Hazard Class[1] | Water Course | Owner | Year Built | Dam Type | Crest Length (feet) | Height (feet) | Storage Capacity (acre-feet) | Drainage Area (sq. mi.) | Condition Assessment |
|---|---|---|---|---|---|---|---|---|---|---|
| Central | Extremely High | Off stream | EBMUD | 1910 (reconstructed 1961) | Earth | 929 | 55 | 472 | N/A | Satisfactory |
| Chabot | Extremely High | San Leandro Creek | EBMUD | 1875 (seismically upgraded, 2017 | Earth | 500 | 135 | 10,350 | 41.4 | Satisfactory |
| Dunsmuir Reservoir | Extremely High | Off stream | EBMUD | 1968 (rehabilitated, 2005) | RECT[a] | 2,275 | 43 | 197 | N/A | Satisfactory |
| New Upper San Leandro | Extremely High | San Leandro Creek | EBMUD | 1977 | Earth | 1,430 | 182 | 38,905 | 29.95 | Satisfactory |
| Lake Temescal | Extremely High | Temescal Creek | East Bay Regional Park District | 1869 | Earth | 650 | 116 | 200 | 2.7 | Satisfactory |

*Sources: (USACE 2025); (State of California 2024)*

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

*a Reinforced concrete tank*

The figure below presents the combined dam inundation areas in the City. It is important to note that the inundation from a singular dam failure event would be limited to the area

downstream of the specific dam that has failed and would not result in flooding for the entire combined dam inundation areas presented in Figure 7-1.

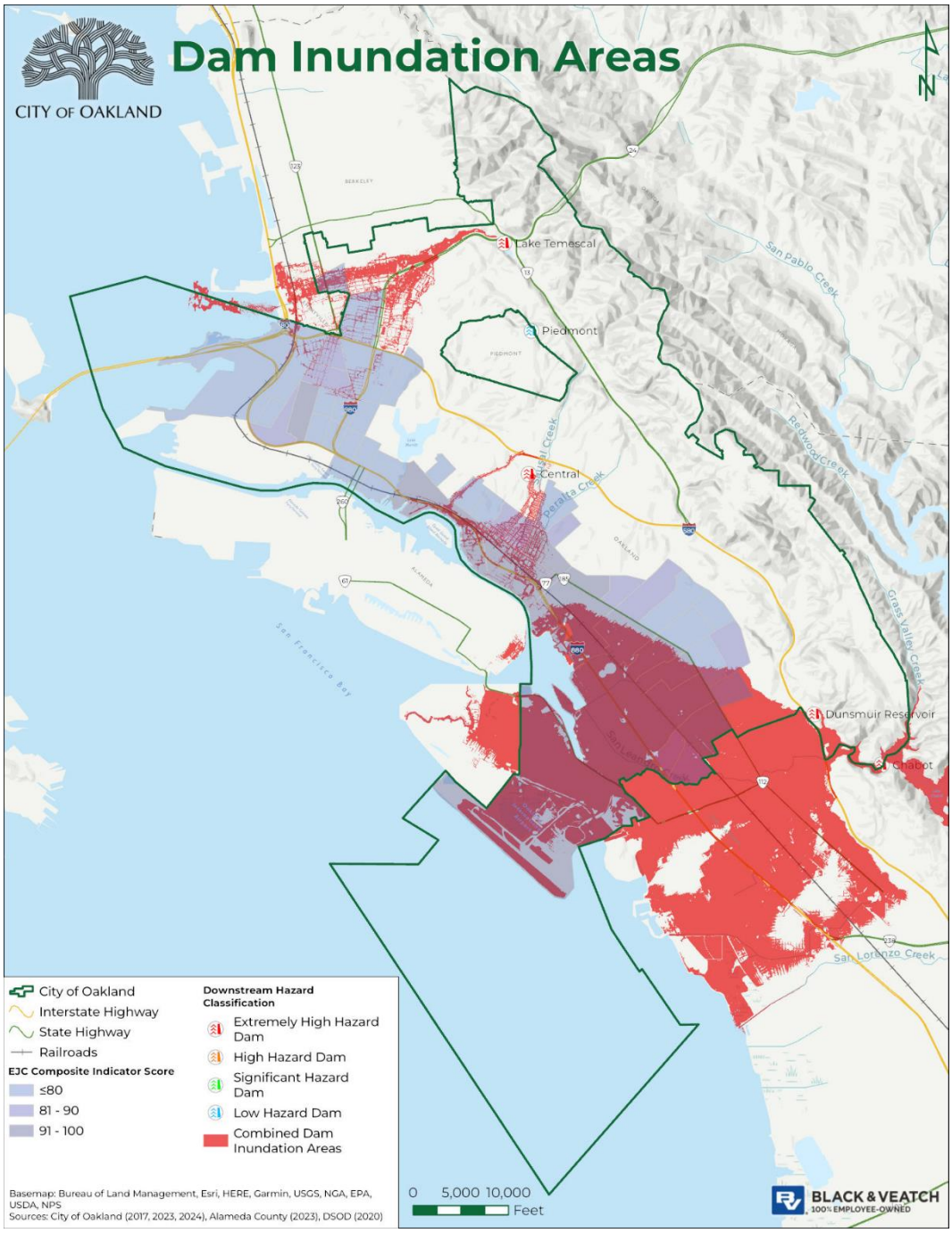


Figure 7-1. Dam Inundation Areas in the City of Oakland

### 7.1.3 Extent

The Stanford University study of dam failures nationwide found that many failures were of small dams, with limited flooding or downstream effect. More than 96 percent of the failures

did not result in life-safety consequences or significant property damage (Stanford University 2018). However, dam failure can be catastrophic to all life and property downstream. If a dam failure is severe, a large amount of water will enter the downstream body of water and overflow the stream banks for miles.

## Measuring Intensity

Any dam has the potential to adversely affect downstream areas and lives, and many dams, should they fail, can also affect the delivery of essential utilities or flood control. The risk that a dam poses to communities can be split into three components, as shown in Table 7-3 (FEMA 2022).

Table 7-3. Dam Failure Risk to Communities

| Risk Type | Description |
|---|---|
| Non-Breach Risk | The risk in the reservoir pool area and downstream floodplain due to normal operation of the dam (e.g., large spillway flows within the design capacity that exceed channel capacity) or "overtopping of the dam without breaching" scenarios. |
| Incremental Risk | The risk that can be attributed to the presence of a dam should the dam breach or undergo component malfunction or mis-operation, where the consequences are over and above those that would occur without dam breach. The consequences typically are due to downstream inundation, but significant consequences in the pool area upstream of the dam can be caused by loss of the pool. |
| Residual Risk | The risk that remains after decisions related to a specific dam safety issue are made and prudent actions have been taken to address the risk. It is the remote risk associated with a condition that was judged to not be a credible dam safety issue. |

*Source: (FEMA 2022)*

California's dam hazard ratings, as described in Table 7-1, describe the potential consequences of dam failure. For the dams assessed in this plan, with hazard ratings of extremely high, complete failure is expected to cause loss of at least one human life and inundate an area with a population of 1,000 or more or community lifelines whose inundation poses a significant threat to public safety. In addition, dam failures can also be measured in volume of water released and the depth and acreage of flooded areas.

## Warning Time

Warning time for dam failure depends on the cause of the failure. In events of extreme precipitation or massive snowmelt, evacuations can be planned with sufficient time. In the event of a structural failure due to earthquake, it is possible that there would be no warning time. The USGS Earthquake Hazards Program has several dam-safety related earthquake programs, including dam-specific earthquake monitoring programs in California to help monitor safety concerns following seismic events.

A dam's structural type affects warning time. Earthen dams do not tend to fail completely or instantaneously. Once a breach is initiated, discharging water erodes the breach until the reservoir is empty or the erosion stops. Concrete dams also tend to begin with a partial breach. The time of breach formation ranges from a few minutes to a few hours (U.S. Army Corps of Engineers 2025).

### Worst-Case Scenario

A worst-case dam failure scenario for the City of Oakland would be the "probable maximum flood" for the New Upper San Leandro Dam. The probable maximum flood is defined as the hypothetical flood that may be expected from the most severe combination of reasonable possible meteorological and hydrologic conditions. Given that nearly 13% of Oakland's building stock is vulnerable to dam failure inundation, this is a pressing issue for the City (California Department of Water Resources 2025).

## 7.1.4 Previous Occurrences

### Declarations

#### *Federal Declarations*

Between 1954 and 2025, the federal government declared that Alameda County experienced one disaster (DR) related to dam failure (FEMA 2025).

Table 7-4. Federal Disaster Declarations for Dam Failure

| Title | Event Date(s) | Disaster Number | Declaration Date |
|---|---|---|---|
| Flood Due to Broken Dam | December 21, 1963 | DR-161-CA | December 21, 1963 |

*Source: (FEMA 2025)*

#### *State Proclamations*

Between 1954 and 2025, California included Alameda County in one state-proclaimed dam failure disaster (California Department of Transportation 2025).

Table 7-5. State Disaster Proclamation for Dam Failure

| Event Name | Disaster Number | Proclamation Date |
|---|---|---|
| Bradford Levee Failure | 83-05 | December 9, 1983 |

*Source: (California Department of Transportation 2025)*

#### *United States Department of Agriculture Declarations*

Between 2012 and 2025, United States Department of Agriculture (USDA) has not included Alameda County in declarations relating to dam failure (U.S. Department of Agriculture 2025).

### Summary of Significant Events

According to the Association of State Dam Safety Officials, "no one knows precisely how many dam failures have occurred in the United States, but they have been documented in every state. The historical record indicates that California has had about 45 failures of non-federal dams; however, none of the failures occurred within Alameda County or the City of Oakland. Below is a partial list of significant dam failures in California.

- **Oroville Dam, 2017** - In February 2017, heavy rain in Northern California caused the water level to rise to a dangerous level in the Oroville Dam in the Sierra Nevada foothills. The state released water down the main spillway to relieve the pressure. A crack appeared in the spillway and grew into a 250-foot crater. Officials shut off water to the main spillway, but the reservoir continued to fill. The State released small amounts of water, which further eroded the spillway's hole. The erosion threatened to undercut the dam, which could send a 30-foot wall of water downstream; 188,000

people were evacuated. Officials further released 100,000 cubic feet per second of water down the main spillway, damaging it further. The dam held, and the reservoir eventually dropped below 850 feet (City of Oakland 2021).

- **Pacoima Dam, 1994** - The Pacoima Dam in Los Angeles County was damaged during the 1994 Northridge earthquake. The dam received enormous ground accelerations, which reached a peak level of twice the force of gravity. The dam's location was approximately 8 miles from the epicenter. Thirteen additional dams in the greater Los Angeles area moved or cracked during the earthquake, however, none were severely damaged, in part due to completion of retrofitting pursuant to the 1972 State Dam Safety Act (City of Oakland 2021).
- **Multiple Dams, San Fernando Earthquake, 1971** - The February 9, 1971, San Fernando earthquake damaged the following dams (City of Oakland 2021):
    - Lower San Fernando Dam—Perched above the densely populated San Fernando Valley, the 142-foothigh, 2,100-foot-long Lower San Fernando Dam held a reservoir 1.6 miles long, and up to 130 feet deep. The quake shook loose a massive slide in the upstream slope of the Lower San Fernando Dam that lowered the crest about 30 feet and carried away much of upstream concrete facing of the dam. Eighty thousand people were evacuated from an 11-square-mile area while the water behind the earthen dam was lowered over a three-day period. The dam could not be repaired to safely hold its water supply and the $33 million Los Angeles Dam was built to replace it in 1975-76.
    - Van Norman Dam—Van Norman Lake reportedly sank 1 foot, causing the evacuation of several thousand people from their homes south of the dam in north Los Angeles. A 60-foot section of the concrete dam at the lake's southern edge collapsed, and portions were reported as still crumbling during the evacuation. The dam held back more than 6 billion gallons of water.
    - Hansen Dam—The Hansen Dam, located in north Los Angeles, suffered cracks during the earthquake.
- **Baldwin Hills Reservoir Collapse, 1963** - On December 14, 1963, the dam at the head of Cloverdale Road broke in the Baldwin Hills section of Los Angeles. Lost homes, ruined property, and even death resulted from a river of rushing water from the broken dam. Automobiles, fragments of houses, and chunks of concrete were carried along the flood path and deposited on the ruins of Village Green. Eighteen people were rescued by helicopter and flown out to a safety (City of Oakland 2021).
- **St. Francis Dam, 1928** - The most catastrophic dam failure in California's history was that of the St. Francis Dam in Los Angeles County in March 1928. This failure resulted in the deaths of more than 450 people and destruction of nearly 1,000 homes and buildings. Numerous roads and bridges were destroyed or damaged beyond repair. California's Division of Safety of Dams came into existence as a direct result of this catastrophe (City of Oakland 2021).

## Recent Events

From January 2020 through October 2025, state dam safety programs reported 74 dam failures and 136 incidents in the United States—episodes that, without intervention, would likely have resulted in dam failure" (Association of State Dam Safety Officials 2025). No recent dam failure events have been reported in Alameda County or the City of Oakland since the 2021 LHMP.

### 7.1.5 Future Conditions

Future hazard conditions, including frequency and severity of future events, is discussed in the sections below.

#### Probability

Large-scale dam failure events are infrequent and usually coincide with events that cause them, such as earthquakes and excessive rainfall. A Stanford University study found an average of about 10 dam failures per year nationwide over a period of record from 1848 through 2017 (Stanford University 2018).

Since no recorded failures have occurred on a dam that impacted the Planning Area, no estimate of frequency or probability of future occurrence can be developed based on the historical record. However, the risk of failure increases as dams age (Association of State Dam Safety Officials 2024).

#### Climate Change

All dams face a "residual risk" of failure, which represents the risk that conditions may exceed those for which the dam was designed. For example, dams may be designed to withstand a "probable maximum precipitation," defined as the greatest depth of precipitation that can occur over a specific area, given the most extreme theoretically possible meteorological conditions. The chance of a precipitation event of a greater magnitude than that represents residual risk for such dams. This represents a theoretical probability of future occurrence for a dam failure event, though the probability of an event exceeding the assumed maximum is not generally calculated as part of dam design.

Probability of dam failure could increase with changing climate conditions. Increases in the frequency and intensity of extreme rain events could increase the probability that dams will fail or overtop. Although it is unclear how climate change may affect the probability of catastrophic dam failure, a changing hydrograph is likely to change the probability of these design failures. The DSOD has indicated that climate change may result in the need for increased safety precautions to address higher winter runoff, frequent fluctuations of water levels, and increased potential for sedimentation and debris accumulation from changing erosion patterns and increases in wildfires. According to the DSOD, climate change also will affect the ability of dam operators to predict extreme flood events (DWR 2022).

#### Potential Future Impacts

According to population projections by the California Department of Finance, Alameda County's population is expected to increase to 1.84 million by 2050. This represents an 11.5 percent increase from the 2025 population of 1.65 million (California Department of Finance 2025). While the City is completely built out in the dam failure inundation area, redevelopment may increase the population and structural value exposed to the hazard.

## 7.2 VULNERABILITY ASSESSMENT

**Local Plan Requirement B1 – 44 CFR Part 201.6(c)(2)(ii)**

***The plan must include a description of the jurisdiction's vulnerability to the hazards of concern and include an overall summary of the hazard's impact on the community. The impacts need to include the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the hazard areas, and estimate of potential dollar losses to vulnerable structures, and a description of land uses and development trends.***

### 7.2.1 Summary of Vulnerability

To assess the City's vulnerability to the dam failure hazard, dams rated as extremely high or high hazard with mapped inundation areas are combined into a single inundation area. This includes the following dams: Central, Chabot, Dunsmuir, Lake Temescal, and New Upper San Leandro. The data for individual dams was originally provided by CA DWR and USACE, and developed into a combined inundation area for the City's LHMP update. While the combined dam inundation areas are used to analyze risk, it is unlikely that all dams will fail at once; however, all populations, structures, infrastructure, and community lifelines located in the combined inundation areas are vulnerable.

### 7.2.2 Impact on Life, Health, and Safety

Populations exposed to the dam failure hazard are estimated based on data for the Census-defined blocks that lie at least partially within the mapped dam failure inundation zone. Because many of those Census blocks extend outside the inundation zone, the estimates are greater than the actual exposed populations, but they provide reasonable relative data for use in mitigation planning.

Table 7-6 summarizes the estimated population located within the combined dam failure inundation area. Based on the analysis, approximately 14.3% of the City's population (63,194) live within the hazard area.

Table 7-6. Estimated Number of Persons in the Combined Dam Failure Inundation Area

| | | Combined Dam Failure Inundation Area | |
|---|---|---|---|
| **Sub-Areas** | **Estimated Population[1]** | **Population Exposed[2]** | **% Population** |
| Central East Oakland | 105,554 | 42,912 | 40.7% |
| Coliseum/Airport | 4,879 | 4,879 | 100.0% |
| Downtown | 21,616 | 0 | 0.0% |
| East Oakland Hills | 31,326 | 904 | 2.9% |
| Eastlake/Fruitvale | 101,468 | 3,034 | 3.0% |
| Glenview/ Redwood Heights | 32,929 | 0 | 0.0% |
| North Oakland Hills | 24,816 | 0 | 0.0% |
| North Oakland/Adams Point | 85,380 | 10,877 | 12.7% |
| West Oakland | 32,669 | 588 | 1.8% |
| **Total** | **440,637** | **63,194** | **14.3%** |

*Sources: (CA DWR n.d.); (USACE n.d.)*

*Notes: (1) Population calculated using 2020 Census data from Hazus v6.1.*
*(2) Percent of residential buildings exposed multiplied by the estimated population.*

## Equity Priority Communities

For this LHMP update, the composite score of each census tract is divided into three categories (91-100, 81-90, and ≤80) based on social vulnerabilities. Populations in these categories are recognized as communities facing social vulnerabilities creating additional barriers in the face of natural hazards (Equity Priority Communities). The table below summarizes the Equity Priority Communities population exposed to the combined dam failure inundation areas. Potential impacts to the Equity Priority Communities after a dam failure incident include loss of life and homes, access to drinking water and food, long-term power outages, inability to evacuate, and lack of resources to recover (National Academies Press 2012).

Table 7-7. Estimated Number of Equity Priority Community Members in the Combined Dam Failure Inundation Area

| Sub-Areas | Equity Priority Community Thresholds[1] | EPC Population Exposed[2] | % of Total Population Exposed to the Hazard[3] |
|---|---|---|---|
| Central East Oakland | 91-100 | 24,290 | 56.6% |
| | 81-90 | 6,511 | 15.2% |
| | ≤80 | 5,423 | 12.6% |
| Coliseum/Airport | 91-100 | 4,879 | 100.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 0 | 0.0% |
| Downtown | 91-100 | 0 | 0.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 0 | 0.0% |
| East Oakland Hills | 91-100 | 0 | 0.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 0 | 0.0% |
| Eastlake/Fruitvale | 91-100 | 993 | 32.7% |
| | 81-90 | 1,273 | 41.9% |
| | ≤80 | 272 | 9.0% |
| Glenview/ Redwood Heights | 91-100 | 0 | 0.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 0 | 0.0% |
| North Oakland Hills | 91-100 | 0 | 0.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 0 | 0.0% |
| North Oakland/Adams Point | 91-100 | 0 | 0.0% |
| | 81-90 | 2,398 | 0.0% |
| | ≤80 | 0 | 22.0% |
| West Oakland | 91-100 | 242 | 0.0% |
| | 81-90 | 346 | 41.2% |
| | ≤80 | 0 | 58.8% |
| **Totals** | **91-100** | **30,162** | **47.7%** |
| | **81-90** | **8,026** | **12.7%** |
| | **≤80** | **8,439** | **13.4%** |

*Sources: (CA DWR n.d.); (USACE n.d.); (City of Oakland 2023)*

*Notes: (1) These thresholds are determined by the City of Oakland to be the most burdened communities in the City in the General Plan EJ Element.*
*(2) Population, by census tract, within the EPC threshold exposed to the hazard.*
*(3) EPC population exposed compared with total population in sub area.*

### 7.2.3 Impact on General Building Stock

Dam failure can result in significant damage to structures in the combined dam failure inundation area. Table 7-8 displays the estimated number of buildings located in the combined dam failure inundation areas, with Table 7-9 presenting the totals based on occupancy class. In total, 13,780 buildings (13% of total) in the City are located in the combined dam failure inundation area. The majority of buildings that are exposed are residential buildings (12,458).

Table 7-8. Estimated Number of Buildings in the Combined Dam Failure Inundation Area

| Sub-Areas | Total Buildings[1] | Buildings Exposed[1] | % Buildings |
|---|---|---|---|
| Central East Oakland | 22,271 | 8,611 | 38.7% |
| Coliseum/Airport | 1,229 | 1,219 | 99.2% |
| Downtown | 5,087 | 0 | 0.0% |
| East Oakland Hills | 10,993 | 334 | 3.0% |
| Eastlake/Fruitvale | 17,046 | 484 | 2.8% |
| Glenview/ Redwood Heights | 11,192 | 0 | 0.0% |
| North Oakland Hills | 10,125 | 0 | 0.0% |
| North Oakland/Adams Point | 21,103 | 2,976 | 14.1% |
| West Oakland | 6,497 | 156 | 2.4% |
| **Total** | **105,543** | **13,780** | **13.1%** |

*Sources: (CA DWR n.d.); (USACE n.d.)*
*Notes: (1) Values based off of 2025 tax assessor data provided by Alameda County.*

Table 7-9. Estimated Number of Buildings, by Occupancy Class, in the Combined Dam Failure Inundation Area

| Sub-Areas | Residential | Commercial | Industrial | Agriculture | Religion | Government | Education | Total |
|---|---|---|---|---|---|---|---|---|
| Central East Oakland | 7,935 | 384 | 174 | 1 | 41 | 56 | 20 | 8,611 |
| Coliseum/Airport | 934 | 176 | 72 | 0 | 7 | 27 | 3 | 1,219 |
| Downtown | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| East Oakland Hills | 323 | 8 | 0 | 0 | 1 | 2 | 0 | 334 |
| Eastlake/Fruitvale | 389 | 74 | 7 | 0 | 2 | 8 | 4 | 484 |
| Glenview/ Redwood Heights | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| North Oakland Hills | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| North Oakland/Adams Point | 2,758 | 180 | 8 | 0 | 9 | 16 | 5 | 2,976 |
| West Oakland | 119 | 10 | 26 | 0 | 0 | 0 | 1 | 156 |
| **Total** | **12,458** | **832** | **287** | **1** | **60** | **109** | **33** | **13,780** |

*Sources: (CA DWR n.d.); (USACE n.d.)*

*Notes: (1) Values based off of 2025 tax assessor data provided by Alameda County.*

### 7.2.4 Impact on Community Lifelines

Community lifelines located within the combined dam failure inundation areas are the most at risk of experiencing damage if a dam failure were to occur. Transportation lifelines may be compromised if flooded, resulting in road closures, restricted access to certain areas of the city, and prolonged emergency response times. Additionally, communication networks, along with food, water, shelter, and energy supplies, could be affected, potentially causing power outages, water shortages, and infrastructure damages.

Table 7-10 summarizes the number of community lifelines, by category, which are located within and exposed to the combined dam failure inundation area. In total 485 community lifelines are located in the combined dam failure inundation area.

Table 7-10. Community Lifelines Located in the Combined Dam Failure Inundation Area

| Sub-Areas | Communications | Energy | Food, Hydration, Shelter | Hazardous Materials | Health and Medical | Safety and Security | Transportation | Water Systems | Total |
|---|---|---|---|---|---|---|---|---|---|
| Central East Oakland | 18 | 2 | 0 | 93 | 1 | 23 | 10 | 0 | 147 |
| Coliseum/Airport | 69 | 2 | 0 | 105 | 0 | 11 | 21 | 1 | 209 |
| Downtown | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| East Oakland Hills | 0 | 0 | 0 | 4 | 0 | 1 | 3 | 0 | 8 |
| Eastlake/Fruitvale | 0 | 2 | 0 | 51 | 1 | 2 | 5 | 0 | 61 |
| Glenview/ Redwood Heights | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| North Oakland Hills | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| North Oakland/Adams Point | 2 | 1 | 0 | 29 | 1 | 4 | 2 | 0 | 39 |
| West Oakland | 2 | 0 | 0 | 19 | 0 | 0 | 0 | 0 | 21 |
| **Total** | **91** | **7** | **0** | **301** | **3** | **41** | **41** | **1** | **485** |

*Sources: (CA DWR n.d.); (USACE n.d.)*

### 7.2.5 Impact on the Economy

Direct damage from dam failure can include varying degrees of damage to structures and infrastructure. Indirect economic losses from dam failure include the cost to rebuild assets, cost to respond and recover, downstream damages, and long-term costs due to environmental damage (Department of Homeland Security 2011).

Table 7-11 displays the estimated exposed value to the combined dam failure inundation area in the City. Approximately $17.2 billion in total building value (structure and contents) is located in the combined dam failure inundation area (13.3% of the total City building value).

Table 7-11. Estimated Exposed Building Values to the Combined Dam Failure Inundation Area

| Sub-Areas | Total Building Value[1] | Value Structure Exposed[1] | Value Contents Exposed[1] | Total Value (Structure and Contents) Exposed[1] | % Total |
|---|---|---|---|---|---|
| Central East Oakland | $17,986,229,601 | $4,634,290,531 | $3,826,537,207 | $8,460,827,738 | 47.0% |
| Coliseum/Airport | $5,646,390,094 | $2,323,626,849 | $2,242,797,613 | $4,566,424,462 | 80.9% |
| Downtown | $21,475,904,408 | $0 | $0 | $0 | 0.0% |
| East Oakland Hills | $8,434,796,515 | $130,402,622 | $71,303,212 | $201,705,834 | 2.4% |
| Eastlake/Fruitvale | $20,713,824,637 | $428,231,411 | $316,764,374 | $744,995,785 | 3.6% |
| Glenview/ Redwood Heights | $7,699,736,380 | $0 | $0 | $0 | 0.0% |
| North Oakland Hills | $9,022,389,851 | $0 | $0 | $0 | 0.0% |
| North Oakland/ Adams Point | $26,981,073,354 | $1,770,678,415 | $1,349,251,329 | $3,119,929,744 | 11.6% |
| West Oakland | $11,010,987,509 | $68,553,457 | $51,384,262 | $119,937,719 | 1.1% |
| **Total** | **$128,971,332,346** | **$9,355,783,285** | **$7,858,037,995** | **$17,213,821,280** | **13.3%** |

*Sources: (CA DWR n.d.); (USACE n.d.)*
*Notes: (1) Values based off of 2025 tax assessor data provided by Alameda County.*

Table 7-12 presents the Hazus generated results for anticipated damage in the combined dam failure area. An event that results in full failure of all dams could result in $5.9 billion in total value damage (structure and contents) of 4.6% of the City's total value. However, an event of this magnitude would be considered very unlikely.

Table 7-12. Estimated Damages to Buildings in the Combined Dam Failure Inundation Area

| Sub-Areas | Total Building Value[1] | Value Structure Damaged | Value Contents Damaged | Total Value (Structure and Contents) Damaged | % Total Value Damaged |
|---|---|---|---|---|---|
| Central East Oakland | $17,986,229,601 | $1,451,125,341 | $2,257,360,854 | $3,708,486,195 | 20.6% |
| Coliseum/Airport | $5,646,390,094 | $616,225,449 | $1,313,926,866 | $1,930,152,315 | 34.2% |
| Downtown | $21,475,904,408 | $0 | $0 | $0 | 0.0% |
| East Oakland Hills | $8,434,796,515 | $74,139,152 | $43,179,866 | $117,319,018 | 1.4% |
| Eastlake/Fruitvale | $20,713,824,637 | $47,993,124 | $71,419,999 | $119,413,123 | 0.6% |
| Glenview/ Redwood Heights | $7,699,736,380 | $0 | $0 | $0 | 0.0% |
| North Oakland Hills | $9,022,389,851 | $0 | $0 | $0 | 0.0% |
| North Oakland/ Adams Point | $26,981,073,354 | $22,639,419 | $37,125,795 | $59,765,214 | 0.2% |
| West Oakland | $11,010,987,509 | $65,602 | $142,109 | $207,710 | 0.0% |
| **Total** | **$128,971,332,346** | **$2,212,188,086** | **$3,723,155,489** | **$5,935,343,575** | **4.6%** |

*Sources: (CA DWR n.d.); (USACE n.d.)*
*Notes: (1) Values based off of 2025 tax assessor data provided by Alameda County.*

### 7.2.6 Impact on Historic and Cultural Resources

Depending on severity, dam failure events affecting the City of Oakland could bring devastating loss of life, property damage, and business disruption to the area in and around historical and cultural landmarks. All historic and cultural landmarks within the City combined dam failure inundation area are considered vulnerable to the effects of a dam failure event.

### 7.2.7 Impact on Ecosystems and Natural Resources

Dam failures can cause downstream flooding and can transport large volumes of sediment and debris. Other examples of environmental impacts include pollution from septic system failures, pollution of potable water supplies, changes in configurations of streams, loss of wildlife habitats, and degradation of wetlands (FEMA 2012).

### 7.2.8 Land Uses and Development Trends

New development or redevelopment anywhere in the combined dam failure inundation areas exposes that development to the dam failure hazard.

## 7.3 MITIGATION OPPORTUNITIES

Table 7-13 presents a range of potential opportunities for mitigating the dam failure hazard.

Table 7-13. Potential Opportunities to Mitigate the Dam Failure Hazard

| Community Scale | Organizational Scale | Government Scale |
|---|---|---|
| **Manipulate the Hazard** | | |
| • None | • Remove dams<br>• Harden dams | • Remove dams<br>• Harden dams |
| **Reduce Exposure and Vulnerability** | | |
| • Relocate out of dam failure inundation areas<br>• Elevate home to appropriate levels | • Replace or rehabilitate dams with deficiencies<br>• Flood-proof facilities within dam failure inundation areas | • Replace earthen dams with hardened structures<br>• Relocate critical facilities out of dam failure inundation areas<br>• Consider open space land use in designated dam failure inundation areas<br>• Adopt higher floodplain standards in mapped dam failure inundation areas<br>• Retrofit critical facilities within dam failure inundation areas<br>• Restore and reconnect floodplains that intersect dam failure inundation areas that have been degraded by development and structural flood control<br>• Use soft approaches for stream bank restoration and hardening. Soft approaches can include but are not limited to the introduction of large woody debris into a system<br>• Acquire property within dam failure inundation areas, remove or relocate structures, and preserve these areas as open space in perpetuity<br>• Preserve floodplain storage capacity by limiting or prohibiting the use of fill within the floodplain |
| **Build Local Capacity** | | |
| • Learn about risk reduction for the dam failure hazard | • Educate employees on the probable impacts of a dam failure | • Map dam failure inundation areas<br>• Enhance emergency operations plan to include a dam failure component |

| Community Scale | Organizational Scale | Government Scale |
|---|---|---|
| • Learn the evacuation routes for a dam failure event<br>• Become educated about early warning systems and the<br>• dissemination of warnings | • Develop a continuity of operations plan | • Institute monthly communications checks with dam operators<br>• Inform the public on risk reduction techniques<br>• Adopt real-estate disclosure requirements for the re-sale of property located within dam failure inundation areas<br>• Consider the probable impacts of climate change in assessing the risk associated with the dam failure hazard<br>• Establish early warning capability downstream of listed high-hazard dams<br>• Consider the residual risk associated with protection provided by dams in future land use decisions |

# 8. DROUGHT

## 8.1 HAZARD PROFILE

**Local Plan Requirement B1 – 44 CFR Part 201.6(c)(2)(i)**

***Include a description of the type, location, and extent for the identified hazards of concern and include information on previous occurrences of hazard events and the probability of future hazard events.***

### 8.1.1 Description of the Hazard

#### Defining the Hazard

Drought is defined as the deficiency in precipitation over an extended period, resulting in a water shortage (NOAA 2024). The severity of a drought depends on the degree of moisture deficiency, the duration, and the size and location of the affected area.

The occurrence of drought is a normal phase in the climate cycle of most regions, originating from a deficiency of precipitation over an extended period of time, usually a season or more. This leads to a water shortage for some activity, group, or environmental sector. Drought can be characterized based on the following (National Drought Mitigation Center 2025):

- Meteorological measurements such as rainfall deficit compared to normal or expected rainfall
- Agricultural impacts due to reduced rainfall and water supply (e.g., crop loss, herd culling, etc.)
- Hydrological measurements of stream flows, groundwater, and reservoir levels relative to normal conditions
- Direct and indirect socio-economic impacts on society and the economy (e.g., increased unemployment due to failure of an industry because of drought)

#### Cause of the Hazard

Droughts are climatic patterns that occur over long periods of time as the result of many causes. Global weather patterns that produce persistent, upper-level high-pressure systems along the West Coast result in warm, dry air and reduced precipitation. Anomalies of precipitation and temperature may last from several months to several decades. How long they last depend on interactions between the atmosphere and the oceans, soil moisture and land surface processes, topography, internal dynamics, and the accumulated influence of global weather systems.

Droughts originate from a deficiency of precipitation resulting from an unusual weather pattern. If the weather pattern lasts a short time (a few weeks or a couple of months), the drought is considered short-term. If the weather pattern becomes entrenched and the precipitation deficits last for several months or years, the drought is considered long-term. It is possible for a region to experience a long-term pattern that produces drought, and to have short-term changes that result in wet spells within the long-term pattern. Likewise, it is possible for a long-term wet pattern to be interrupted by weather spells that result in short-term drought.

## Summary of Potential Impacts

Drought can have a widespread impact on the environment and the economy, although it typically does not result in loss of life or damage to structures, as do other natural disasters.

The National Drought Mitigation Center uses three categories to describe likely drought impacts (National Drought Mitigation Center 2025):

- **Economic Impacts**—These impacts of drought cost people (or businesses) money. Farmers' crops are destroyed; low water supply necessitates spending on irrigation or drilling of new wells; water-related businesses (such as sales of boats and fishing equipment) may experience reduced revenue.
- **Environmental Impacts**—Plants and animals depend on water. When a drought occurs, their food supply can shrink, and their habitat can be damaged.
- **Social Impacts**—Social impacts include public safety, health, conflicts between people when there is not enough water to go around, and changes in lifestyle.

The demand that society places on water systems and supplies—such as expanding populations, irrigation, and environmental needs—contributes to drought impacts. Drought can lead to difficult decisions regarding the allocation of water, as well as stringent water use restrictions, water quality problems, and inadequate water supplies for fire suppression. There are also issues such as growing conflicts between agricultural uses of surface water and in-stream uses, surface water and groundwater interrelationships, and the effects of growing water demand on uses of water.

Vulnerability of an activity to drought depends on its water demand and the water supplies available to meet the demand. The impacts of drought vary between sectors of the community in both timing and severity:

- **Water supply**—The water supply sector encompasses urban and rural drinking water systems that are affected when a drought depletes groundwater supplies due to reduced recharge from rainfall or reduced surface water supplies due to climate change and reduced snowpack.
- **Agriculture and commerce**—Impacts on the agriculture and commerce sectors include the reduction of crop yield and livestock sizes due to insufficient water supply for crop irrigation and maintenance of ground cover for grazing.
- **Environment, public health, and safety**—The environmental, public health, and safety sector focuses on wildfires that are both detrimental to the forest ecosystem and hazardous to the public. It also includes the impact of desiccating streams, such as the reduction of in-stream habitats for native species.

## Cascading Hazard Impacts

The cascading impact most commonly associated with drought is wildfire. A prolonged lack of precipitation dries out vegetation, which becomes increasingly susceptible to ignition as the duration of the drought extends.

Drought is also often accompanied by extreme heat, exposing people to the risk of sunstroke, heat cramps, and heat exhaustion. Pets and livestock are also vulnerable to heat-related injuries.

### 8.1.2 Location

The entirety of the City of Oakland is exposed and vulnerable to drought. The effects of drought depend on the climate zone, the type of water supply available, and water users' ability to manage drought impacts (Cal OES 2023).

EBMUD is the primary water purveyor for the City of Oakland. EBMUD's water system serves approximately 1.4 million people in a 332-square-mile area extending from Crockett on the north to San Lorenzo and the San Ramon Valley on the south (encompassing the major cities of Oakland and Berkeley) and from the east San Francisco Bay on the west to Walnut Creek on the east. EBMUD's water supply begins at the Mokelumne River watershed in the Sierra Nevada and extends 90 miles to the East Bay (EBMUD 2025). Therefore, drought impacting the Mokelumne River watershed would impact the City's water supply.

EBMUD's Urban Water Management Plan (UWMP) and Water Shortage Contingency Plan (WSCP), are directly applicable to the City of Oakland with respect to the measures that would be implemented in the event of a drought, or any water shortage for that matter.

The U.S. Drought Monitor is a map that is updated weekly to show the location and intensity of drought across the country. The drought monitor uses a five-category system to describe the drought and its potential impacts (see Figure 8-1). Drought impacting the planning area or the Mokelumne River watershed would impact the City. Refer to Figure 4-3 for watersheds in the City of Oakland.

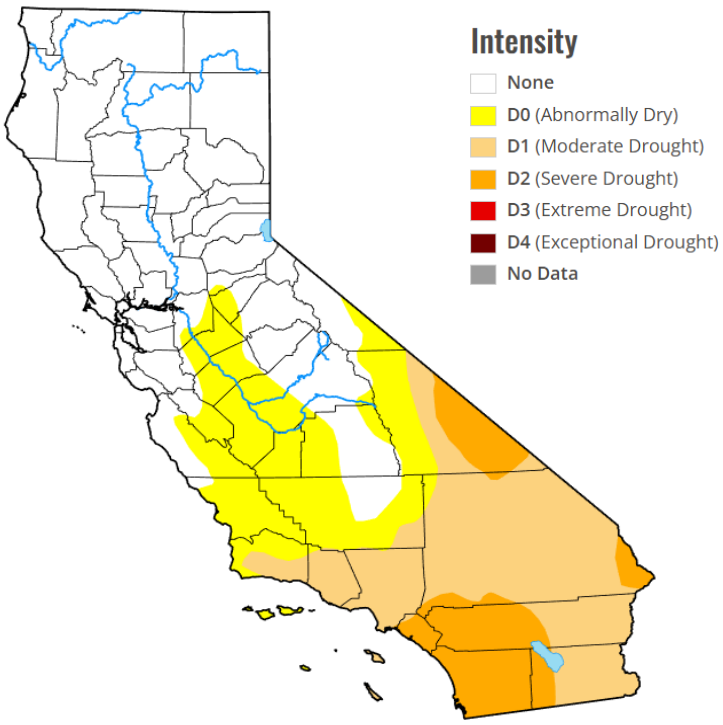



Figure 8-1 U.S. Drought Monitor Map of California

*Source: (U.S. Drought Monitor 2025)*

### 8.1.3 Extent

The severity of any given drought depends on the degree of moisture deficiency, the duration, and the size and location of the affected area. The longer the duration of the drought and the larger the area impacted, the more severe the potential impacts.

#### Measuring Intensity

Several quantitative methods are used for measuring drought in the United States. How these indices measure drought depends on the drought classification and the region being considered.

##### *United States Drought Monitor*

The U.S. Drought Monitor assesses multiple numeric measures of drought to depict the drought conditions and locations across the United States. The U.S. Drought Monitor uses five drought intensity categories, D0 through D4, to identify areas of drought. These categories are shown on Figure 8-2.

| Category | Description | Possible Impacts |
|---|---|---|
| D0 | Abnormally Dry | Going into drought:<br>• short-term dryness slowing planting, growth of crops or pastures<br>Coming out of drought:<br>• some lingering water deficits<br>• pastures or crops not fully recovered |
| D1 | Moderate Drought | • Some damage to crops, pastures<br>• Streams, reservoirs, or wells low, some water shortages developing or imminent<br>• Voluntary water-use restrictions requested |
| D2 | Severe Drought | • Crop or pasture losses likely<br>• Water shortages common<br>• Water restrictions imposed |
| D3 | Extreme Drought | • Major crop/pasture losses<br>• Widespread water shortages or restrictions |
| D4 | Exceptional Drought | • Exceptional and widespread crop/pasture losses<br>• Shortages of water in reservoirs, streams, and wells creating water emergencies |

Figure 8-2 . U.S. Drought Monitor Categories

*Source: (U.S. Drought Monitor 2024)*

##### *National Oceanic and Atmospheric Administration Drought Indices*

National Oceanic and Atmospheric Administration (NOAA) has developed several indices to measure drought impacts and severity and to map their extent and locations (Figure 8-3) (U.S. Drought Monitor 2025) (NOAA 2025):

- The ***Crop Moisture Index*** measures short-term drought weekly to assess impacts on agriculture.
- The ***Palmer Z Index*** measures short-term drought on a monthly scale.

- The ***Palmer Drought Severity Index*** is based on long-term weather patterns. The intensity of drought in a given month is dependent on current weather plus the cumulative patterns of previous months. Weather patterns can change quickly, and the Palmer Drought Severity Index can respond fairly rapidly.
- The ***Palmer Hydrological Drought Index*** quantifies hydrological effects (reservoir levels, groundwater levels, etc.), which take longer to develop and last longer. This index responds more slowly to changing conditions than the Palmer Drought Index.
- The ***Standardized Precipitation Index*** considers only precipitation. A value of zero indicates the median precipitation amount; the index is negative for drought and positive for wet conditions. The Standardized Precipitation Index is computed for time scales ranging from 1 month to 24 months.

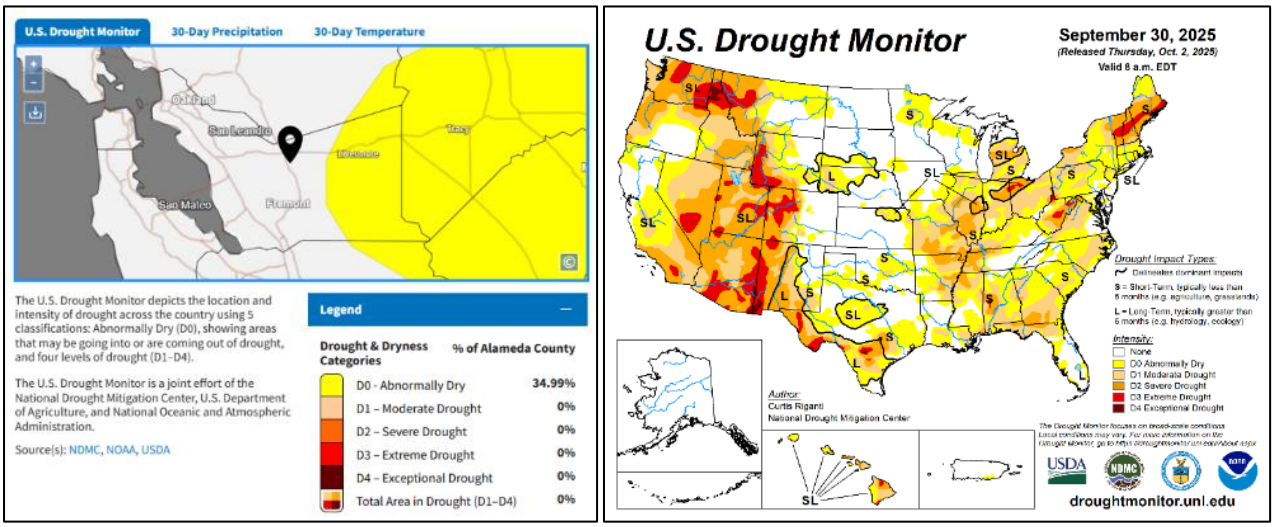



Figure 8-3 Example Local and National Drought Index Maps (September-October 2025)

*Sources: (U.S. Drought Monitor 2025) (NOAA 2025)*

Maps of these indices show drought at a given point in time and are not necessarily indicators of the Planning Area's long-term susceptibility to drought.

## Warning Time

Droughts are climatic patterns that occur over long periods of time. Only generalized warning can take place due to the numerous variables that scientists have not pieced together well enough to make accurate and precise predictions.

Empirical studies conducted over the past century have shown that meteorological drought is never the result of a single cause. It is the result of many causes, often synergistic in nature; these include global weather patterns that produce persistent, upper-level high-pressure systems along the West Coast with warm, dry air resulting in less precipitation.

At this time, scientists do not know how to predict drought more than a month in advance for most locations. Predicting drought depends on the ability to forecast precipitation and temperature. Anomalies of precipitation and temperature may last from several months to several decades.

### Worst-Case Scenario

An extreme multi-year drought can impact the region with little warning. Combinations of low precipitation and unusually high temperatures could occur over several consecutive years. Intensified by such conditions, extreme wildfires could break out throughout Alameda County, as seen with the 2025 Palisades and Eaton Fires in Southern California, increasing the need for water. Surrounding communities, also in drought conditions, could increase their demand for water supplies relied upon in the City of Oakland, causing social and political conflicts. If such conditions persisted for several years, the economy of Alameda County and Oakland could experience setbacks, especially in water dependent industries.

## 8.1.4 Previous Occurrences

The following sections provide a review of previous drought occurrences in Alameda County.

### Declarations

#### *Federal Declarations*

Between 1954 and 2025, there has been one federal declaration for drought for Alameda County (FEMA 2025).

Table 8-1. FEMA Declarations for Drought

| Title | Event Date(s) | Disaster Number | Declaration Date |
|---|---|---|---|
| Drought | January 20, 1977 | EM-3025 | January 20, 1977 |

*Source: (FEMA 2025)*

#### *State Proclamations*

Between 1954 and 2025, California included Alameda County in three state-proclaimed drought disasters (California Department of Transportation 2025).

Table 8-2. State Disaster Proclamations for Drought

| Event Name | Disaster Number | Proclamation Date |
|---|---|---|
| 1976 Drought | - | February 9, 1976 |
| Drinking Water Shortage | 2014-03 | September 18, 2024 |
| Drought – Tree Mortality | 2015-05 | October 30, 2015 |

*Source: (California Department of Transportation 2025)*

#### *USDA Declarations*

Between 2012 and 2025, USDA included Alameda County in 13 drought-related declarations (USDA 2025).

Table 8-3. USDA Disaster Declarations for Drought

| Event Name | Designation Number | Effective Dates |
|---|---|---|
| Drought | S3248 | October 1, 2011 – Continuing |
| Drought | S3379 | January 1, 2012 – Continuing |
| Drought – FAST TRACK | S3547 | May 7 - July 1, 2013 |
| Drought – FAST TRACK | S3558 | June 4 – July 29, 2013 |
| Drought – FAST TRACK | S3569 | May 25 – August 9, 2013 |
| Drought – FAST TRACK | S3784 | January 1, 2015 – N/A |
| Drought | S3943 | January 2, 2015 – Continuing |
| Drought – FAST TRACK | S3952 | January 1, 2016 – N/A |

| Event Name | Designation Number | Effective Dates |
|---|---|---|
| Drought – FAST TRACK | S4144 | January 1, 2017 – N/A |
| Drought – FAST TRACK | S4163 | October 1, 2016 – N/A |
| Drought – FAST TRACK | S4697 | April 21, 2020 – N/A |
| Drought – FAST TRACK | S5146 | October 1, 2021 – N/A |
| Drought – FAST TRACK | S5371 | October 1, 2022 – N/A |

*Source: (USDA 2025)*

## Summary of Significant Events

Drought is an ongoing hazard that has shaped California's history. In the mid-1800s, the Great Drought contributed to the demise of the cattle rancho system. Then in the 1920s and 1930s, dry conditions were prevalent in California and throughout the nation during the Great Depression and Dust Bowl. Later in the 20th century, significant droughts impacting water supplies occurred in the mid-1970s and mid- to early-1990s. Recent multi-year droughts occurred in 2012 to 2016, and 2020 to early 2022. Drought conditions rose again in Alameda County in September 2024 and are ongoing at the time of writing (U.S. Drought Monitor 2025). Recent drought periods are described as follows:

- **1976 to 1977 Drought** - California had a severe drought due to lack of rainfall during the winters of 1976 and 1977. 1977 was the driest period on record in California to that time, with the previous winter recorded as the fourth driest. The cumulative impact led to widespread water shortages and severe water conservation measures throughout the state. Only 37 percent of the average Sacramento Valley runoff was received. A federal disaster declaration was declared, which included Alameda County.
- **1987 to 1992 Drought** - California received precipitation well below average levels for four consecutive years. By February 1991, all 58 counties in California were suffering from drought conditions. Urban areas as well as rural and agricultural areas were impacted.
- **2007 to 2009 Drought** - The governor proclaimed a statewide drought emergency on June 4, 2008 after spring 2008 was the driest spring on record and snowmelt runoff was low. On February 27, 2009, the governor proclaimed a state of emergency for the entire state as the severe drought conditions continued widespread impacts and the largest court-ordered water restriction in state history (at the time).
- **2012 to 2017 Drought** - The 2012-2016 California drought led to the most severe moisture deficits in the last 1,200 years and a 1-in-500 year low in Sierra snowpack. Importantly, paleoclimatic records show that mega-droughts spanning multiple decades have occurred in California's past. The 2012-2016 record low snowpack resulted in $2.1 billion in economic losses, 21,000 jobs lost in the agricultural and recreational sectors statewide and exacerbated an ongoing trend of groundwater overdraft (California's Fourth Climate Change Assessment 2018). The period from 2012 to 2014 ranked as the driest three consecutive years for statewide precipitation.
  - 2014 set new climate records for statewide average temperatures and for record-low water allocations in the State Water Project and federal Central Valley Project.
  - 2013 set minimum annual precipitation records for many communities.
  - On January 17, 2014, the governor declared a state of emergency for drought throughout California. This declaration followed release of a report that stated that California had had the least amount of rainfall in its 163-year history. Californians

were asked to voluntarily reduce their water consumption by 20 percent. Drought conditions worsened into 2015. On April 1, 2015, following the lowest snowpack ever recorded, the governor announced actions to save water, increase enforcement to prevent wasteful water use, streamline the state's drought response, and invest in new technologies to make California more drought-resilient. The governor directed the State Water Resources Control Board to implement mandatory water reductions in cities and towns across California to reduce water usage by 25 percent on average.
    - The statewide hydrologic drought from 2012 through 2016 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 year in terms of statewide average temperatures.
    - On April 7, 2017, the governor ended the drought state of emergency in most of California, following unprecedented water conservation and plentiful winter rain and snow.
- **2020 to 2022 Drought** - The most recent multi-year drought in California lasted from 2020-2022. Drought conditions were exacerbated by the repeated presence of La Niña during winters. Additionally, the average temperature over this time period was 3.5 degrees above the twentieth-century average. The overall effect was devastating to the state's agricultural industry, where an estimated $1.1 billion of revenue, and approximately 8,700 jobs were lost (Medellín-Azuara 2022).

### Recent Events

For the 2026 LHMP update, drought events that impacted the City of Oakland since January 2020 are listed in the table below. For events prior to January 2020, refer to the 2021 LHMP.

Table 8-4. Recent Drought Events Impacting the City of Oakland

| Date(s) of Event | Event Type | FEMA / State Declaration Number (if applicable) | Alameda County included in declaration? | Description |
|---|---|---|---|---|
| 2020-2023 | Drought | S4697, S5146, S5371 | Yes | Drought conditions were exacerbated by the repeated presence of La Niña during winters. Additionally, the average temperature over this time period was 3.5 degrees above the twentieth-century average. The overall effect was devastating to the state's agricultural industry, where an estimated $1.1 billion of revenue, and approximately 8,700 jobs were lost. The drought ended after record-breaking levels of precipitation in late 2022. |

*Sources: (FEMA 2025); (NOAA NCEI 2025); (Cal OES 2025); (Medellín-Azuara 2022).*

## 8.1.5 Future Conditions

Future hazard conditions, including frequency and severity of future events, is discussed in the sections below.

### Probability

Drought has a high probability of occurrence in the City. From January 2000 to September 2025, some part of Alameda County experienced a U.S. Drought Monitor rating of D0 (abnormally dry) or higher in 798 out of 1,349 weeks—nearly 60% of the weeks (refer to Figure 8-2) (U.S. Drought Monitor 2025). The Planning Area has also been included in USDA drought disaster declarations in 9 of the last 14 years. Historical drought data for the Planning Area indicate there have been four significant multi-year droughts in the last 35 years (1987 to 2024), amounting to a severe drought every 9 years on average.

### Climate Change

Climate change is already impacting the City of Oakland, and it is expected to continue impacting the City. Warmer and drier conditions will reduce the Sierra Nevada snowpack and make precipitation more variable with more intense dry spells between heavy rainfall events. As the City's water supply begins at the Mokelumne River Watershed in the Sierra Nevada, reductions to the Sierra Nevada snowpack and increases in dry spells could increase the risk of drought. These impacts will lead to water shortages and contribute to more frequent and severe wildfires.

With a warmer climate, droughts could become more frequent, more severe, and longer lasting. The Fourth National Climate Assessment Report for the United States indicates that "rising air and water temperatures and changes in precipitation are intensifying droughts. Changes in the relative amounts and timing of snow and rainfall are leading to mismatches between water availability and needs in some regions. Groundwater depletion is exacerbating drought risk" (USGCRP 2018).

Because changes in precipitation patterns are still uncertain, the potential impacts and likelihood of drought are uncertain. CA DWR has noted impacts of climate change on statewide water resources by charting changes in snowpack, sea level, and river flow. As temperatures rise and more precipitation comes in the form of rain instead of snow, these changes will likely continue or grow even more significantly. CA DWR estimates that parts of the state will experience a 48 to 65 percent loss in snowpack by the end of the century compared to historical averages (CA DWR 2021). Increasing temperatures may also increase net evaporation from reservoirs.

### Potential Future Impacts

According to population projections by the California Department of Finance, Alameda County's population is expected to increase to 1.84 million by 2050. This represents an 11.5 percent increase from the 2025 population of 1.65 million (California Department of Finance 2025). While the City is mostly built out, redevelopment may increase the population and structural value exposed to the hazard.

Increase in population and continued development are likely to add additional stressors to the City's water supply. Climate change is likely to result in more severe drought events in the future. The City of Oakland has a General Plan that includes landscaping goals and policies that deal with issues of water supply and the protection of water resources. This plan provides the capability at the local level to protect future development from the impacts of drought.

## 8.2 VULNERABILITY ASSESSMENT

**Local Plan Requirement B1 – 44 CFR Part 201.6(c)(2)(ii)**

*The plan must include a description of the jurisdiction's vulnerability to the hazards of concern and include an overall summary of the hazard's impact on the community. The impacts need to include the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the hazard areas, and estimate of potential dollar losses to vulnerable structures, and a description of land uses and development trends.*

### 8.2.1 Summary of Vulnerability

To understand the potential impacts and risk drought can have on the City of Oakland, a qualitative assessment was done to evaluate what assets are exposed or vulnerable to drought. The following discusses City's vulnerability to drought.

### 8.2.2 Impact on Life, Health, and Safety

The entire population of the City (440,637) is exposed to drought events. Some drought-related health effects are experienced in the short-term and can be directly observed and measured. However, the slow rise or chronic nature of drought can result in longer term, indirect health impacts that are not always easy to anticipate or monitor. Health impacts include drinking water quantity and quality, increased recreational risks, effects on air quality, compromised food and nutrition, and increased rate of illnesses and diseases (see Figure 8-4) (CDC 2024).

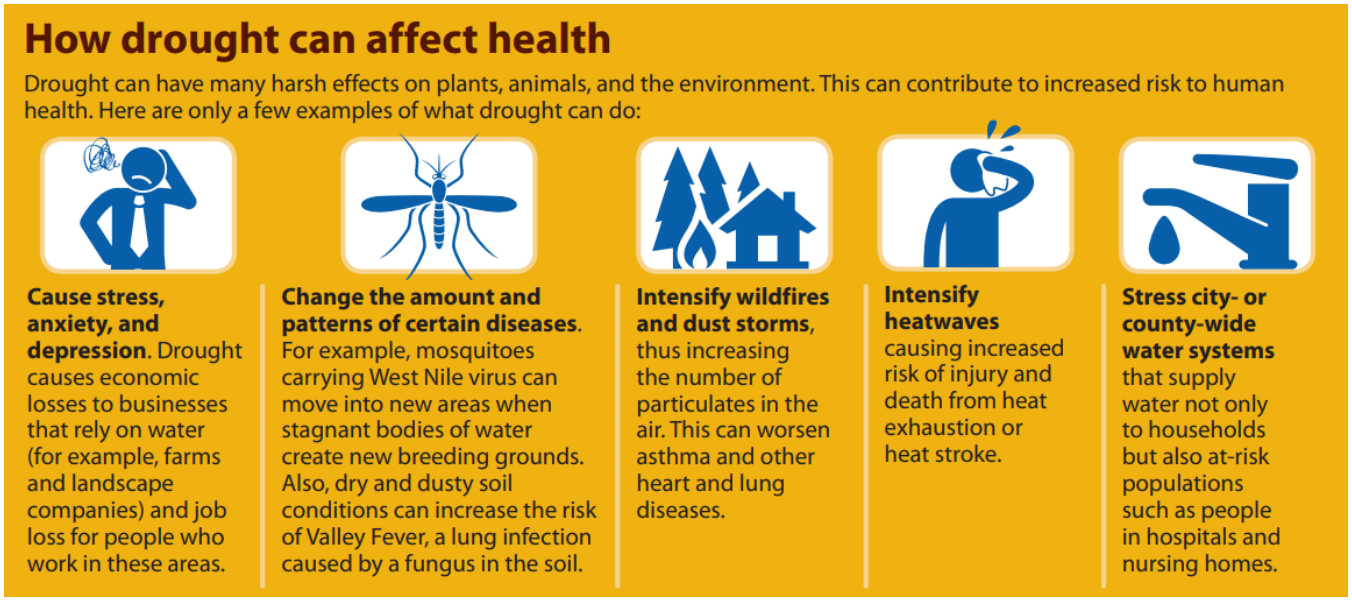



Figure 8-4 How Drought Can Affect Health

*Source: CDC n.d.*

## Equity Priority Communities

For this LHMP update, the composite score of each census tract is divided into three categories (91-100, 81-90, and ≤80) based on social vulnerabilities. Populations in these categories are recognized as communities facing social vulnerabilities creating additional barriers in the face of natural hazards (Equity Priority Communities). Overall, everyone in the City of Oakland is at risk and can be impacted by drought. However, some groups are more vulnerable than others, especially those in Equity Priority Communities. These groups face greater health problems, limited access to drinking water, more financial difficulties, and increased environmental stress during drought events (CDC 2024).

Table 8-5. Estimated Number of Equity Priority Community Members Exposed to Drought

| Sub-Areas | Equity Priority Community Thresholds[1] | EPC Population Exposed[2] | % of Total Population Exposed to the Hazard[3] |
|---|---|---|---|
| Central East Oakland | 91-100 | 34,939 | 33.1% |
| | 81-90 | 23,907 | 22.6% |
| | ≤80 | 25,659 | 24.3% |
| Coliseum/Airport | 91-100 | 4,879 | 100.0% |
| | 81-90 | 0 | 0% |
| | ≤80 | 0 | 0% |
| Downtown | 91-100 | 0 | 0% |
| | 81-90 | 0 | 0% |
| | ≤80 | 15,144 | 70.1% |
| East Oakland Hills | 91-100 | 0 | 0% |
| | 81-90 | 0 | 0% |
| | ≤80 | 0 | 0% |
| Eastlake/Fruitvale | 91-100 | 17,933 | 17.7% |
| | 81-90 | 13,346 | 13.2% |
| | ≤80 | 17,531 | 17.3% |
| Glenview/ Redwood Heights | 91-100 | 0 | 0% |
| | 81-90 | 0 | 0% |
| | ≤80 | 0 | 0% |
| North Oakland Hills | 91-100 | 0 | 0% |
| | 81-90 | 0 | 0% |
| | ≤80 | 0 | 0% |
| North Oakland/Adams Point | 91-100 | 0 | 0% |
| | 81-90 | 0 | 0% |
| | ≤80 | 20,378 | 23.9% |
| West Oakland | 91-100 | 2,553 | 7.8% |
| | 81-90 | 8,882 | 27.2% |
| | ≤80 | 20,979 | 64.3% |
| **Totals** | **91-100** | **60,304** | **13.7%** |
| | **81-90** | **46,135** | **10.5%** |
| | **≤80** | **99,691** | **22.6%** |

*Source: (City of Oakland 2023)*

*Notes: (1) These thresholds are determined by the City of Oakland to be the most burdened communities in the City in the General Plan EJ Element.*
*(2) Population, by census tract, within the EPC threshold exposed to the hazard.*
*(3) EPC population exposed compared with total population in sub area.*

### 8.2.3 Impact on General Building Stock

The general building stock will not be directly affected by drought conditions. Droughts can have significant impacts on landscapes, which could cause a financial burden to property owners. Droughts can also increase wildfire risk, with the risk to life and property greatest where forests are adjacent to urbanized areas. All assets in and adjacent to this zone are considered vulnerable to wildfire. Refer to Chapter 15 (Wildfire) for the wildfire risk assessment.

### 8.2.4 Impact on Community Lifelines

While drought events generally do not impact buildings, they can potentially impact critical facilities and community lifelines that are associated with potable water supplies and agriculture-related facilities. The community lifelines most likely to be impacted by drought in the City include food, hydration, shelter and energy.

- **Food, Hydration, Shelter** impacts from drought can include reduced water supply for drinking, sanitation, and firefighting and crop failures and livestock losses reduce food availability.
- **Energy** impacts include decline in hydropower generation, and higher energy demands that lead to stress on the grid and increase risk of power outages.

### 8.2.5 Impact on the Economy

A prolonged drought can have a serious economic impact on a community. For instance, drought affects water supply. When drought conditions persist with little to no relief, water restrictions may be put into place by local or state agencies. These restrictions may include placing limitations on when or how frequently lawns can be watered, car washing services, or any other recreational/commercial outdoor use of water supplies. In exceptional drought conditions, watering of lawns and crops may not be an option. If crops are not able to receive water, farmland will dry out and crops will die. This can lead to crop shortages, which, in turn, increases the price of food in all communities including those that do not directly grow crops.

Increased demand can also result in shortages and higher water costs. Industries, such as landscaping companies, which rely on water for business could be impacted the most. Although most businesses will still be operational, they may be impacted aesthetically if their landscaping cannot be maintained.

### 8.2.6 Impact on Historic and Cultural Resources

Limited water supply and the cascading effects of drought (such as increased wildfire risk and decreased availability of electricity) can make the maintenance of important resources such as libraries and museums more difficult. People may not be able to access these resources during a drought due to the social effects of drought. Droughts can also impact lakes, rivers, and parks used for recreation within the City, limiting its access to residents.

### 8.2.7 Impact on Ecosystems and Natural Resources

Drought can significantly impact ecosystems and natural resources. Environmental losses from drought are associated with damage to plants, animals, wildlife habitat, and air and water quality; forest and range fires; degradation of landscape quality; loss of biodiversity;

and soil erosion. Some of the effects are short-term and conditions quickly return to normal following the end of the drought. Other environmental effects linger for some time or may even become permanent. Wildlife habitat may be degraded through the loss of wetlands, lakes and vegetation. The degradation of landscape quality, including increased soil erosion, may lead to a more permanent loss of biological productivity (City of Oakland 2021).

Drought generally does not affect groundwater sources as quickly as surface water supplies, but groundwater supplies generally take longer to recover. Reduced precipitation during a drought means that groundwater supplies are not replenished at a normal rate. This can lead to a reduction in groundwater levels and problems such as reduced pumping capacity or wells going dry. Shallow wells are more susceptible than deep wells. However, the groundwater basin is being sustainably managed under the East Bay Plain Subbasin Groundwater Sustainability Plan, and pumping capacities in wells have been maintained, even during recent droughts. Reduced replenishment of groundwater can also affect streams. Streamflow within the planning area comes from surface runoff and, to a lesser extent, groundwater Reduced groundwater levels may result in less water entering the streams. However, the creeks within the planning area are partially or fully culverted and therefore have limited interactions with groundwater. (Cal OES 2023)Water quality often declines as pollutant concentrations rise, and reduced streamflow can lead to stagnation and lower dissolved oxygen levels.

## 8.3 MITIGATION OPPORTUNITIES

Table 8-6 presents a range of potential opportunities for mitigating the drought hazard.

Table 8-6. Potential Opportunities to Mitigate the Drought Hazard

| Community Scale | Organizational Scale | Government Scale |
|---|---|---|
| **Manipulate the Hazard** | | |
| • None | • None | • Stormwater and floodplain management<br>• Identify alternative water sources |
| **Reduce Exposure and Vulnerability** | | |
| • Drought-resistant landscapes<br>• Reduce water system losses<br>• Modify plumbing systems<br>• (through water saving kits) | • Drought-resistant landscapes<br>• Reduce private water system losses | • Water use conflict regulations<br>• Reduce water system losses<br>• Distribute water saving kits<br>• Implement/expand water reuse projects<br>• Promote and use reclaimed water supplies |
| **Build Local Capacity** | | |
| • Practice active water conservation | • Practice active water conservation | • Public education on drought resistance and alternative water supplies".<br>• Expand recycled water network<br>• Identify alternative water supplies for times of drought; mutual aid |

| Community Scale | Organizational Scale | Government Scale |
|---|---|---|
| | | agreements with alternative suppliers<br>• Develop drought contingency plan<br>• Develop criteria “triggers” for drought-related actions<br>• Improve accuracy of water supply forecasts<br>• Modify rate structure to influence active water conservation techniques<br>• Increase emergency storage capacity<br>• Increase capacity for stored surface water to create habitats and ecosystems for aquatic species<br>• Promote and use active groundwater recharge |

# 9. EARTHQUAKE

## 9.1 HAZARD PROFILE

**Local Plan Requirement B1 – 44 CFR Part 201.6(c)(2)(i)**

*Include a description of the type, location, and extent for the identified hazards of concern and include information on previous occurrences of hazard events and the probability of future hazard events.*

### 9.1.1 Description of the Hazard

#### Defining the Hazard

An earthquake is the vibration of the earth's surface following a release of energy in the earth's crust. This energy can be generated by a sudden dislocation of the crust or by a volcanic eruption. Most destructive quakes are caused by dislocation of the crust. The crust may first bend and then, when the stress exceeds the strength of the rocks, break and snap to a new position. In the process of breaking, vibrations called "seismic waves" are generated. These waves travel outward from the source of the earthquake at varying speeds.

According to the USGS Earthquake Hazards Program, an earthquake hazard is anything associated with an earthquake that may affect people's normal activities. This includes the following:

- **Surface Faulting**—Displacement that reaches the earth's surface during slip along a fault. Commonly occurs with shallow earthquakes, those with an epicenter less than 20 kilometers.
- **Ground Motion** (shaking)—The movement of the earth's surface from earthquakes or explosions. Ground motion or shaking is produced by waves that are generated by sudden slip on a fault or sudden pressure at the explosive source and travel through the earth and along its surface.
- **Landslide**—A movement of surface material down a slope.
- **Liquefaction**—A process by which water-saturated sediment temporarily loses strength and acts as a fluid. Earthquake shaking can cause this effect.
- **Tectonic Deformation**—A change in the original shape of a material due to strain.

#### Cause of the Hazard

##### *Tectonic Plates*

The Earth's crust, which is the rigid outermost shell of the planet, is broken into seven or eight major tectonic plates (depending on how they are defined) and many minor plates. Where the plates meet, they move in one of three ways along their mutual boundary: convergent (two plates moving together), divergent (two plates moving apart), or transform (two plates moving parallel to one another). Earthquakes, volcanic activity, mountain-building, and oceanic trench formation occur along these plate boundaries. Subduction is a geological process that takes place at convergent boundaries of tectonic plate, in which one plate moves under another. Regions where this process occurs are known as subduction zones, and they have the potential to generate highly damaging earthquakes (USGS 2025).

California is seismically active because of movement of the North American Plate, east of the San Andreas Fault, and the Pacific Plate to the west, which includes the state's coastal communities. The transform (parallel) movement of these tectonic plates against one another creates stresses that build as the rocks are gradually deformed. The rock deformation, or strain, is stored in the rocks as elastic strain energy. When the strength of the rock is exceeded, rupture occurs along a fault. The rocks on opposite sides of the fault slide past each other as they spring back into a relaxed position. The strain energy is released partly as heat and partly as elastic waves called seismic waves. The passage of these seismic waves produces the ground shaking in earthquakes (USGS 2016).

### *Seismic Fault Lines*

Geologists have found that earthquakes reoccur along faults, which are zones of weakness in the earth's crust. When a fault experiences an earthquake, there is no guarantee that all the stress has been relieved. Another earthquake can still occur. In fact, relieving stress along one part of a fault may increase it in another part.

Faults are more likely to have future earthquakes if they have more rapid rates of movement, have had recent earthquakes along them, experience greater total displacements, and are aligned so that movement can relieve the accumulating tectonic stresses. Geologists classify faults by their relative hazards. "Active" faults, which represent the highest hazard, are those that have ruptured to the ground surface during the Holocene period (about the last 11,000 years). "Potentially active" faults are those that displaced layers of rock from the Quaternary period (the last 1,600,000 years) (USGS 2022).

Determining if a fault is "active" or "potentially active" depends on geologic evidence, which may not be available for every fault. The majority of the seismic hazards are on well-known active faults. However, inactive faults, where no displacements have been recorded, also have the potential to reactivate or experience displacement along a branch sometime in the future. An example of a fault zone that has been reactivated is the Foothills Fault Zone. The zone was considered inactive until evidence of an earthquake (approximately 1.6 million years ago) was found near Spenceville, California. Then, in 1975, an earthquake occurred on another branch of the zone near Oroville, California (now known as the Cleveland Hills Fault). The California Geological Survey indicates that increased earthquake activity throughout California may cause tectonic movement along currently inactive fault systems (California Geological Survey 2018).

## Summary of Potential Impacts

The greatest earthquake threat in the United States is along tectonic plate boundaries and seismic fault lines located in the central and western states; however, the Eastern United States does face moderate risk to less frequent, less intense earthquake events. Figure 9-1 shows relative seismic risk for the United States.

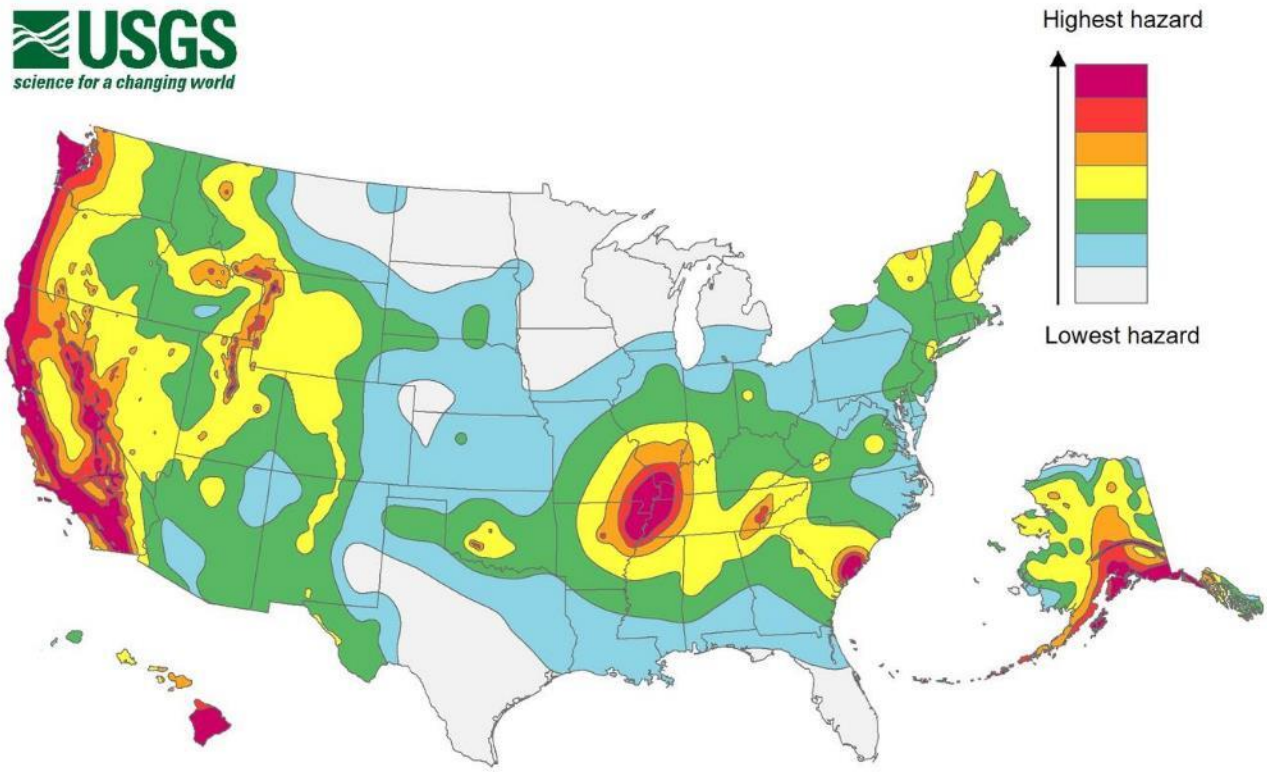



Figure 9-1 USGS National Seismic Hazard Map

*Source: (USGS 2018)*

## Cascading Hazard Impacts

Cascading impacts are the impacts that result when one type of hazard event triggers one or more other hazard events, which may, in turn, trigger still others. The following are notable cascading impacts associated with earthquakes beyond the hazards associated with ground shaking (Cal OES 2023):

- **Surface Fault Rupture**—When a fault rupture extends to the earth's surface, the displacement can catastrophically damage structures or utilities. Fissuring, settlement, and permanent horizontal and vertical ground shifting often accompany large earthquakes. Such displacement can significantly increase damage and may be a contributing cause of damage.
- **Fires**—Fires following earthquakes may result from multiple causes, including overturned burning candles, sparking from downed power lines, and broken gas pipelines. Fires after earthquakes may severely strain fire departments that must respond to multiple simultaneous ignitions. Impaired communications, water supply, transportation, and other demands such as structural collapses, hazardous materials releases, or medical emergencies affect fire department response.
- **Liquefaction**—Ground settlement during liquefaction can cause damage when the amount of settlement varies significantly across the length of a structure. Liquefaction can occur in susceptible soils below bodies of water. It can severely damage dams,

bridges, wharves, piers, and other structures at ports and harbors, as well as underwater utility lines.

- **Landslides**—Landslides caused by earthquakes can be widespread over the area of the highest shaking intensity and at greater distances if hillsides are susceptible. Earthquake-induced landslides can significantly damage structures and transportation and utility lifelines.
- **Tsunami**— Fault rupture and earthquake-induced landslides along the coast and offshore can trigger tsunamis that can cause flooding in low-lying coastal areas.
- **Dam or Levee Failure**—Earthquake ground shaking in and around dams and levees can affect the performance of these structures. The type of foundation the dam or levee is constructed on (such as peat or alluvium) will influence its performance during a seismic event or under certain static loading conditions.
- **Power Outages**—Earthquakes can cause significant impacts associated with loss of power. Earthquakes of all sizes can damage electrical facilities and power lines, impacting community lifelines that rely on power to maintain their critical functions.
- **Hazardous Materials Release**—Earthquakes can result in collapsed buildings and severed pipelines, leading to the release of hazardous materials, which may include oil spills, the release of gases, and runoff of hazardous materials.

### 9.1.2 Location

The location of an earthquake is commonly described by its focal depth and the geographic position of its epicenter. The focal depth of an earthquake is the depth from the Earth's surface to the region where an earthquake's energy originates (the focus or hypocenter). The epicenter of an earthquake is the point on the Earth's surface directly above the hypocenter.

#### Faults

A direct relationship exists between a fault's length and location and its ability to generate damaging ground motion at a given site. Small, local faults produce lower magnitude quakes, but ground shaking can be strong, and damage can be significant in areas close to the fault. Large regional faults can generate earthquakes of great magnitudes but, because of their distance and depth, they may result in only moderate shaking in an area.

Oakland is within a region that is well known for its many active faults. The Hayward Fault is the major tectonic boundary that runs along the East Bay Hills. Figure 9-2 shows the regional faults closest to the City.

- The **San Andreas fault** is a continental transform fault that extends roughly 800 miles through California. It forms the tectonic boundary between the Pacific Plate and the North American Plate, and its motion is right-lateral strike-slip (horizontal). The fault divides into three segments, each with different characteristics and a different degree of earthquake risk. The San Andreas Fault has the potential for experiencing a major to great event, with a magnitude up to 8.1.

- The **Hayward Fault** runs along the foot of the East Bay hills. USGS studies show that Hayward Fault quakes have repeatedly jolted the region in the past and that the fault may be ready to produce an earthquake of magnitude 6.8 to 7.0.

- The **Calaveras Fault** system stretches 80 miles from south of Hollister to the Danville-Walnut Creek area. Based on present creep rates, the fault can be divided into two overall segments: the Calaveras segment south of the Calaveras Reservoir and the San Ramon segment between Sunol and Danville.

Most researchers believe that strain accumulated along the Calaveras south of Calaveras Reservoir is transferred to the Hayward fault on the Mission Hills fault. Despite the apparent lessened activity on the northernmost trace of the Calaveras segment, it does appear to have spawned a Magnitude 6.9 earthquake on July 3, 1861, causing continuous ground rupture 6 to 8 miles long between the Amador Valley and Danville.

The San Ramon segment is the dominant structural feature of the Amador and San Ramon Valleys, forming their western boundaries and creating the structural barrier that comprises the Livermore Basin. This segment of the fault is typified by minor seismic activity and an apparently low slip rate. In much of the segment, its surface trace is uncertain because it appears to be buried beneath massive ancient landslides, earth/debris flow deposits and colluvium.

### National Earthquake Hazards Reduction Program Soils

National Earthquake Hazards Reduction Program (NEHRP) soil types define locations that will be significantly impacted by an earthquake. NEHRP Soils B and C typically can sustain low-magnitude ground shaking without much effect. Areas with NEHRP Soils D, E and F are most commonly affected by ground shaking.

Figure 9-3 shows NEHRP soil classifications within the City.

### Liquefaction

Liquefaction occurs when loosely packed, water-logged sediments at or near the ground surface lose their strength in response to strong ground shaking. This makes the materials behave like a liquid, damaging building foundations and causing pipes to leak or break and paved surfaces to buckle. Liquefaction beneath buildings and other structures can cause significant damage during earthquakes. Figure 9-4 shows the areas of liquefaction susceptibility in the City.

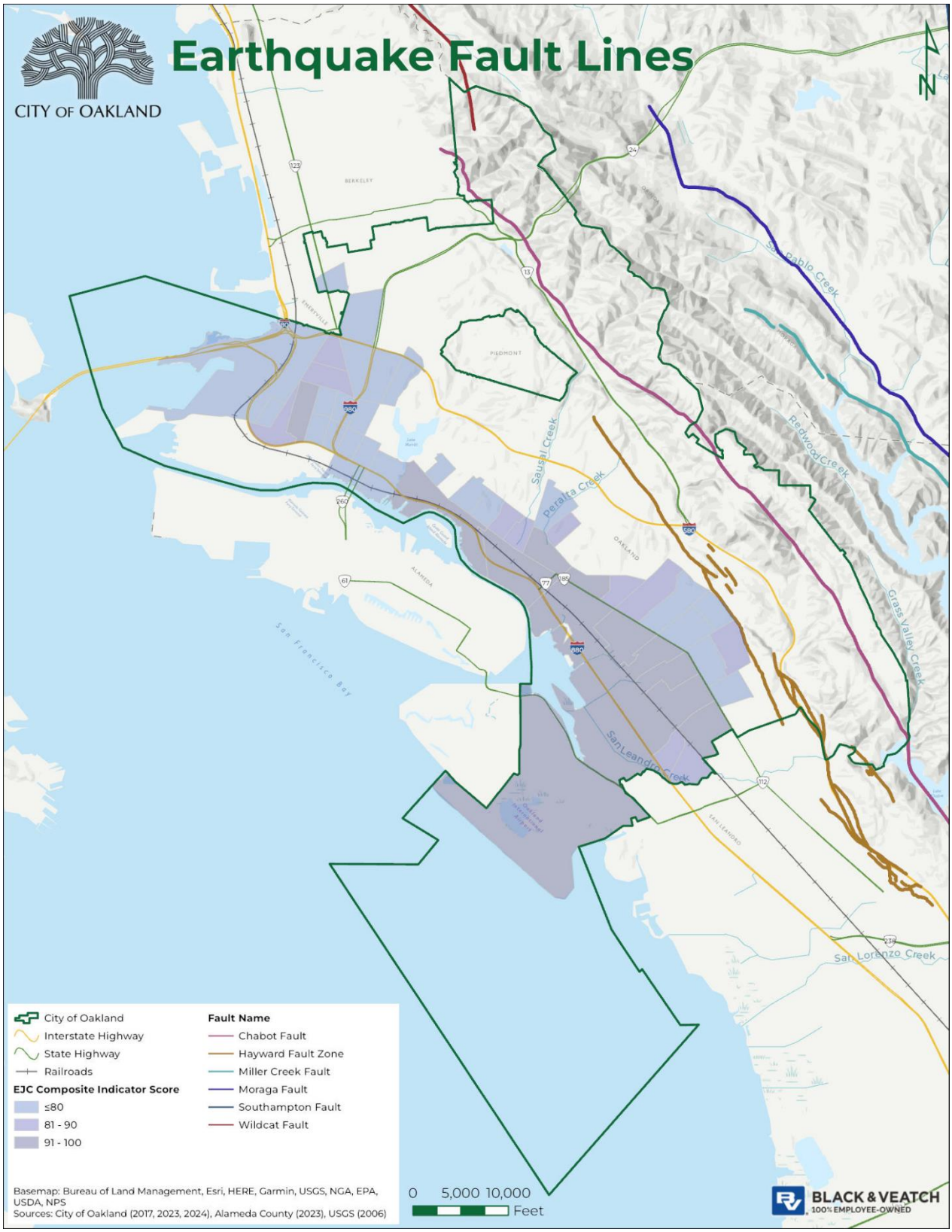



Figure 9-2 Earthquake Faults

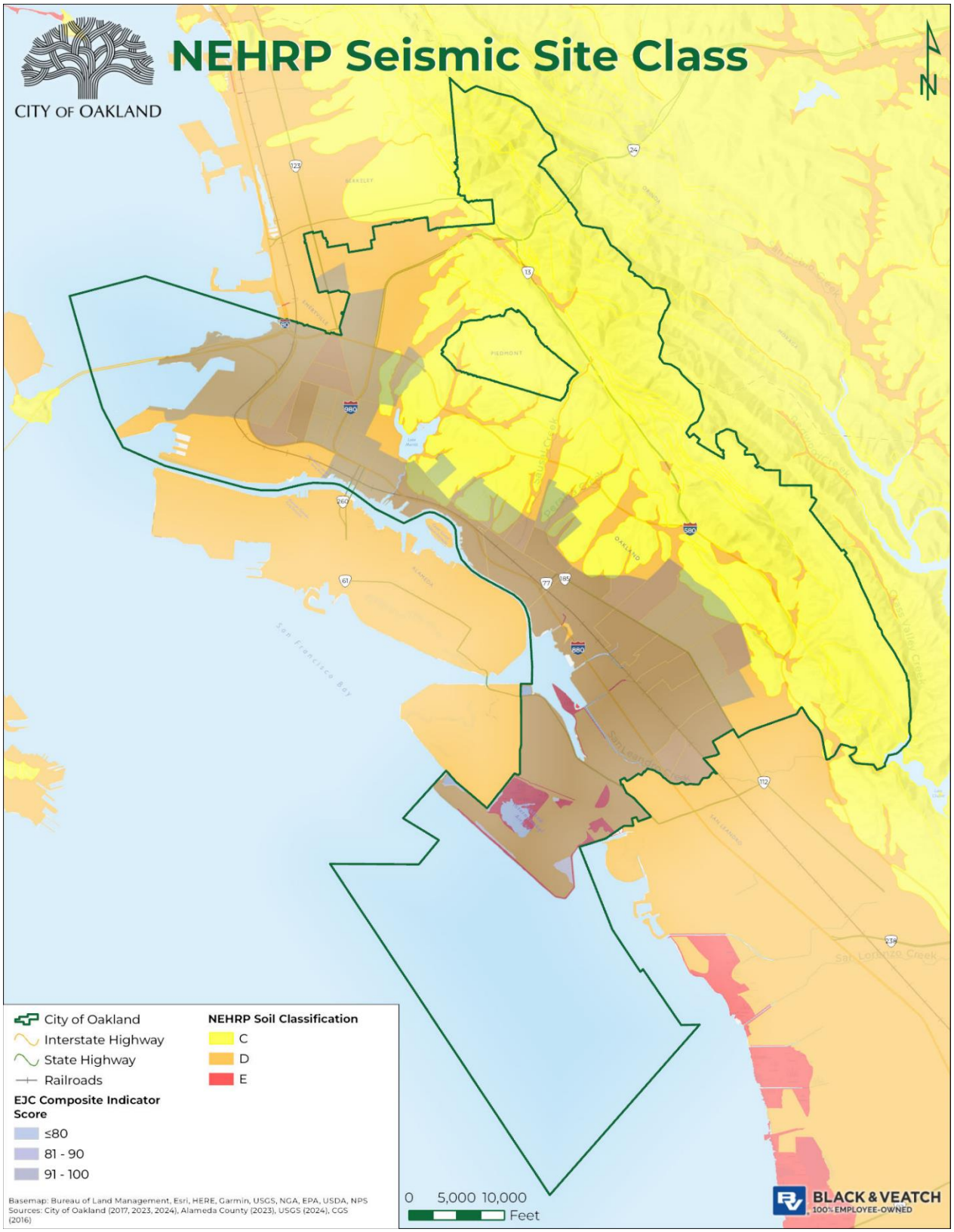



Figure 9-3 City of Oakland NEHRP Seismic Site Class

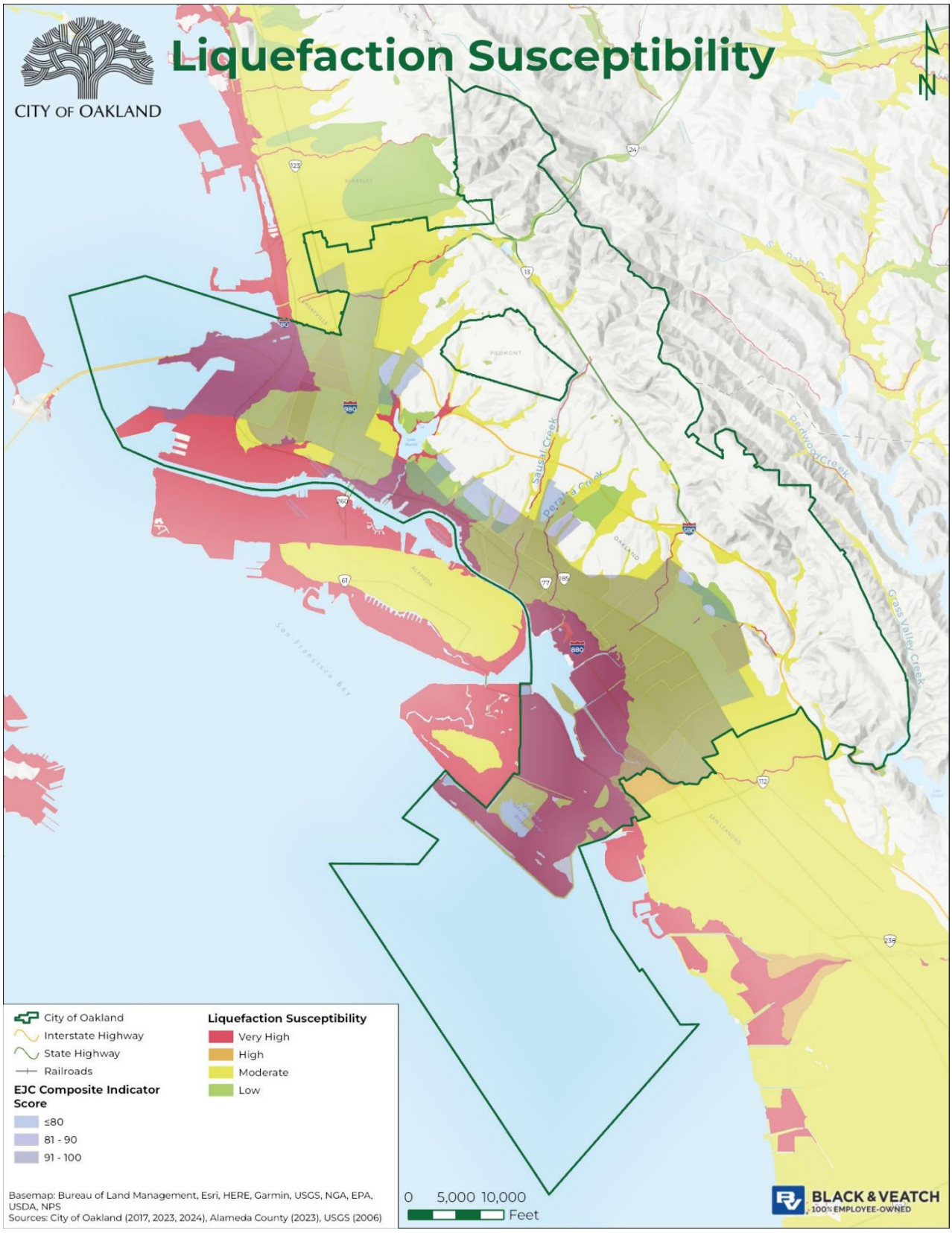



Figure 9-4 City of Oakland Liquefaction Susceptibility

### 9.1.3 Extent

#### Measuring Intensity

Earthquakes are typically classified in one of two ways: by the amount of energy released, measured as magnitude; or by the impact on people and structures, measured as intensity.

##### *Magnitude*

An earthquake's magnitude is a measure of the energy released at the source of the earthquake. Magnitude is commonly expressed by ratings on the moment magnitude scale (Mw), the most common scale used today (USGS n.d.). This scale is based on the total moment release of the earthquake (the product of the distance a fault moved, and the force required to move it). The scale is as follows:

- Great—Mw > 8
- Major—Mw = 7.0 – 7.9
- Strong—Mw = 6.0 – 6.9
- Moderate—Mw = 5.0 – 5.9
- Light—Mw = 4.0 – 4.9
- Minor—Mw = 3.0 – 3.9
- Micro—w < 3

##### *Ground Motion*

Earthquake hazard assessment is based on expected ground motion. During an earthquake when the ground is shaking, it also experiences acceleration. The peak acceleration is the largest increase in velocity recorded by a particular station during an earthquake. Estimates are developed of the annual probability that certain ground motion accelerations will be exceeded; the annual probabilities can then be summed over a time period of interest.

The most commonly mapped ground motion parameters are horizontal and vertical peak ground accelerations (PGA) for a given soil type. PGA is a measure of how hard the earth shakes, or accelerates, in a given geographic area. Instruments called accelerographs record levels of ground motion due to earthquakes at stations throughout a region. PGA is measured in g (the acceleration due to gravity) or expressed as a percent acceleration force of gravity (%g). These readings are recorded by state and federal agencies that monitor and predict seismic activity.

Maps of PGA values form the basis of seismic zone maps that are included in building codes such as the International Building Code. Building codes that include seismic provisions specify the horizontal force due to lateral acceleration that a building should be able to withstand during an earthquake. PGA values are directly related to these lateral forces that could damage "short period structures" (e.g., single-family dwellings). Longer period response components determine the lateral forces that damage larger structures with longer natural periods (apartment buildings, factories, high-rises, bridges). Table 9-1 also lists damage potential and perceived shaking by PGA factors, compared to the Mercalli scale.

##### *Intensity*

The most commonly used intensity scale is the modified Mercalli intensity scale. Ratings of the scale as well as the perceived shaking and damage potential for structures are shown in Table 9-1. The modified Mercalli intensity scale is generally represented visually using a USGS product called a ShakeMap, which shows the expected ground shaking at any given location

produced by an earthquake with a specified magnitude and epicenter. An earthquake has only one magnitude and one epicenter, but it produces a range of ground shaking at sites throughout the region, depending on the distance from the earthquake, the rock and soil conditions at sites, and variations in the propagation of seismic waves from the earthquake due to complexities in the structure of the earth's crust.

Table 9-1. Mercalli Scale and Peak Ground Acceleration Comparison

| Modified Mercalli Scale | Perceived Shaking | Potential Structure Damage | | Estimated PGA a (%) |
|---|---|---|---|---|
| | | Resident Buildings | Vulnerable Buildings | |
| I | Not felt | None | None | <0.17% |
| II | Weak | None | None | 0.17%-1.4% |
| IV | Light | None | None | 1.4%-3.9% |
| V | Moderate | Very Light | Light | 3.9%-9.2% |
| VI | Strong | Light | Moderate | 9.2%-18% |
| VII | Very Strong | Moderate | Moderate/Heavy | 18%-34% |
| VIII | Severe | Moderate/Heavy | Heavy | 34%-65% |
| IX | Violent | Heavy | Very Heavy | 65%-124% |
| X-XII | Extreme | Very Heavy | Very Heavy | >124% |

[a] PGA measure in percent of g, where g is the acceleration of gravity (Explained Below)

*Source: (USGS 2011) (USGS 2025b)*

### ShakeMaps

The USGS Earthquake Hazards Program produces maps called ShakeMaps that map ground motion and shaking intensity following significant earthquakes. ShakeMaps focus on the ground shaking caused by the earthquake, rather than on characteristics of the earthquake source, such as magnitude and epicenter.

A ShakeMap shows the extent and variation of ground shaking immediately across the surrounding region following significant earthquakes. Such mapping is derived from peak ground motion amplitudes recorded on seismic sensors, with interpolation where data are lacking based on estimated amplitudes. Color-coded instrumental intensity maps are derived from empirical relations between peak ground motions and Modified Mercalli intensity. In addition to the maps of recorded events, the USGS creates the following (USGS 2022a):

- **Scenario ShakeMaps** of hypothetical earthquakes of an assumed magnitude on known faults.
- **Probabilistic ShakeMaps**, based on predicted shaking from all possible earthquakes over a 10,000-year period. In a probabilistic map, information from millions of scenario maps is combined to make a forecast for the future. The maps indicate the ground motion at any given point that has a given probability of being exceeded in a given timeframe, such as a 100-year (1 percent annual chance) event.

The earthquake scenarios modeled for the risk assessment are shown in the following figures:

- Figure 9-5 Calaveras M6.86 Scenario
- Figure 9-6 Hayward M7.05 Scenario
- Figure 9-7 San Andreas Peninsula M7.38 Scenario

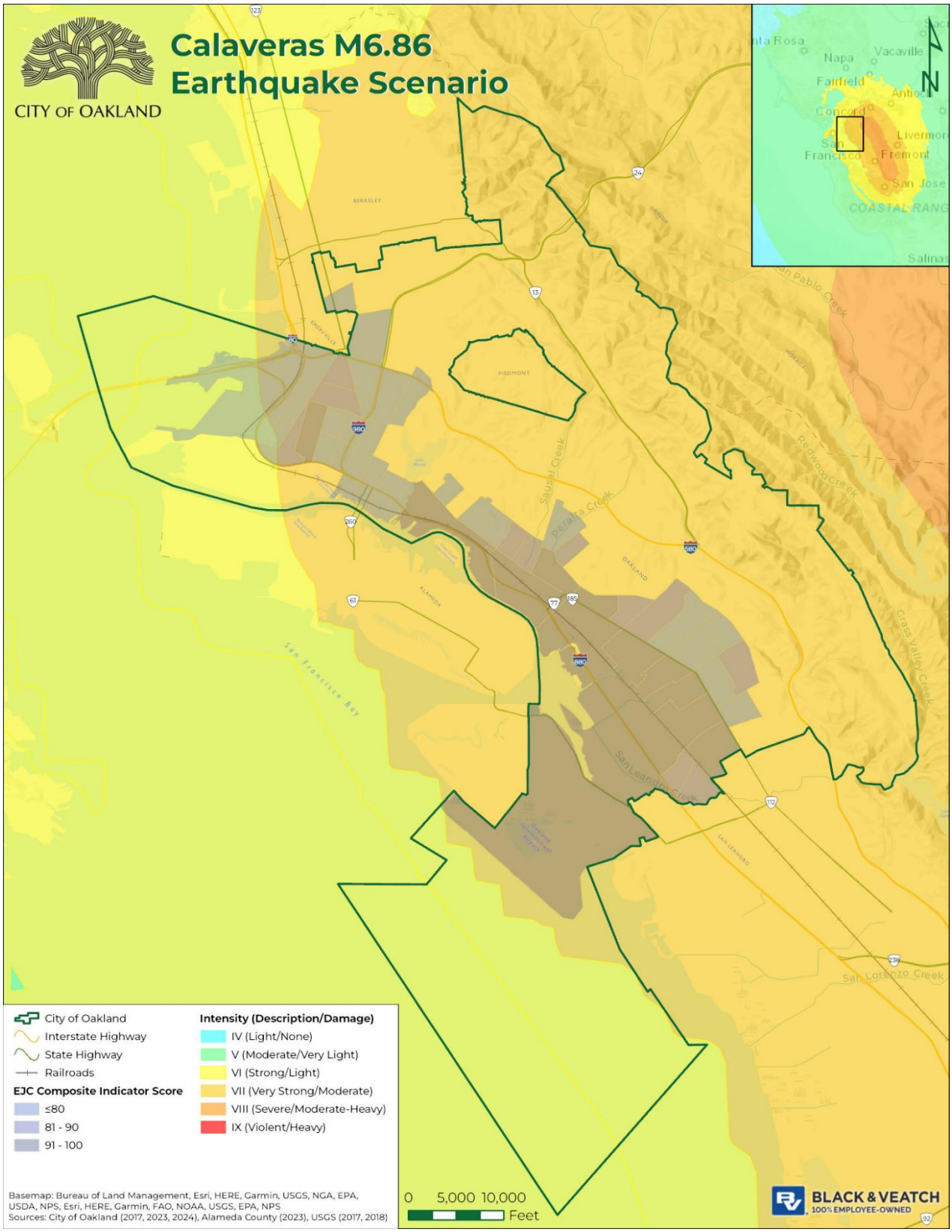



Figure 9-5. Calaveras M6.86 Earthquake Scenario

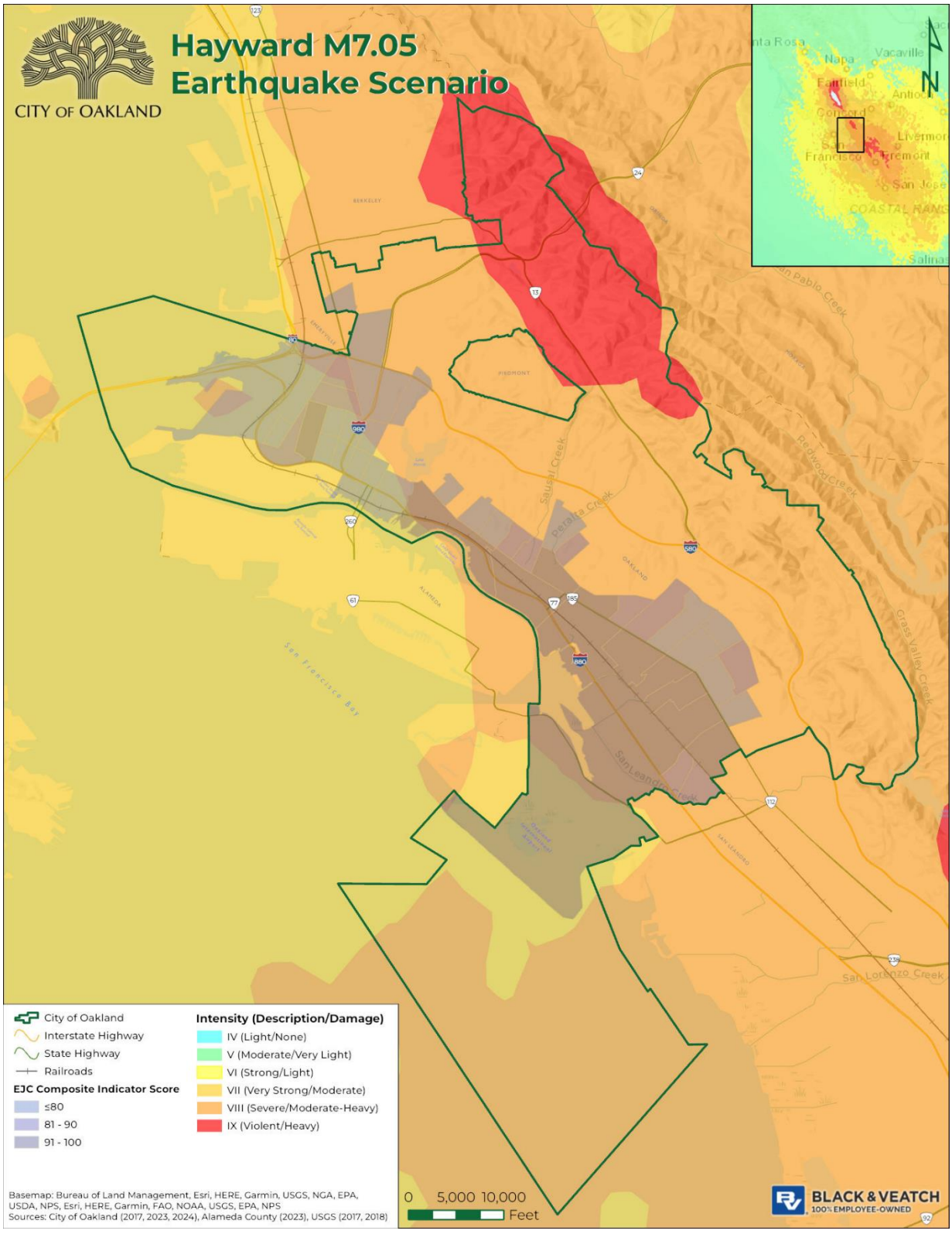



Figure 9-6. Hayward M7.05 Scenario

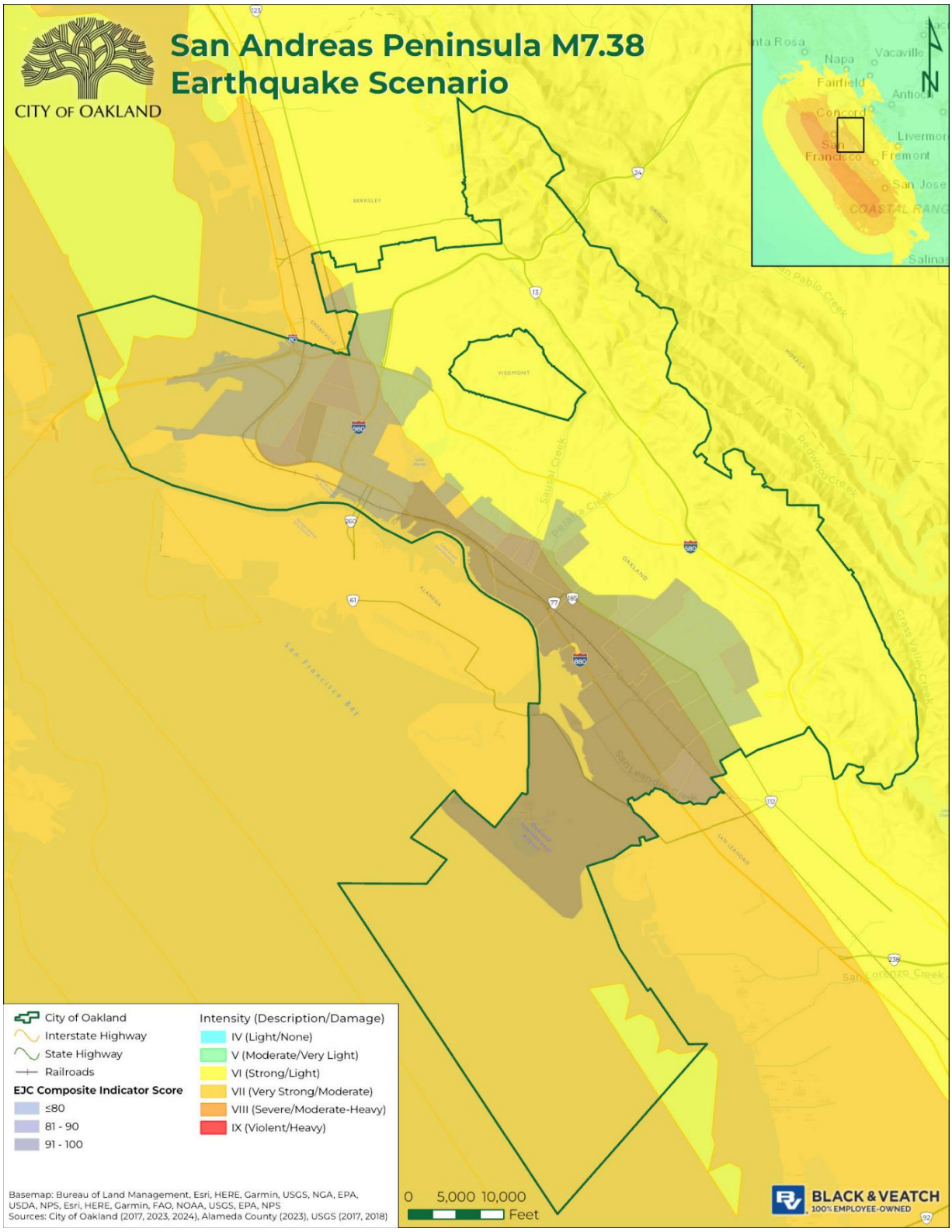



Figure 9-7. San Andreas Peninsula M7.38 Scenario

### National Seismic Hazard Map

National maps of earthquake shaking hazards provide information for creating and updating seismic design requirements for building codes, insurance rate structures, earthquake loss studies, retrofit priorities and land use planning. After thorough review of the studies, professional organizations of engineers update the seismic-risk maps and seismic design requirements contained in building codes (Brown, et al. 2001). The USGS updated the National Seismic Hazard Maps in 2018. New seismic, geologic, and geodetic information on earthquake rates and associated ground shaking are incorporated into these revised maps (Figure 9-1).

## Liquefaction and Soil Types

Soil liquefaction occurs when water-saturated sands, silts or gravelly soils are shaken so violently that the individual grains lose contact with one another and float freely in the water, turning the ground into a pudding-like liquid. Building and road foundations lose load-bearing strength and may sink into the ground (USGS 2025a).

The NEHRP creates maps based on soil characteristics to help identify locations subject to liquefaction. NEHRP soil types define the locations that will be significantly impacted by an earthquake. Table 9-2 summarizes NEHRP soil classifications. NEHRP Soils B and C typically can sustain ground shaking without much effect, dependent on the earthquake magnitude. The areas that are commonly most affected by ground shaking have NEHRP Soils D, E, and F. In general, these areas are also most susceptible to liquefaction.

According to Figure 9-3, NEHRP soil types C, D, and E are located in the City of Oakland.

Table 9-2. NEHRP Soil Classification System

| NEHRP Soil Type | Description | Mean Shear Velocity to 30 m (m/s) |
|---|---|---|
| A | Hard Rock | 1,500 |
| B | Firm to Hard Rock | 760-1,500 |
| C | Dense Soil/Soft Rock | 360-760 |
| D | Stiff Soil | 180-360 |
| E | Soft Clays | <180 |
| F | Special Study Soils (liquefiable soils, sensitive clays, organic soils, soft clays > 36 m thick) | - |

## Warning Time

While there is no current reliable way to predict the day or month an earthquake will occur, there are tools in place that can help with earthquake warnings. Cal OES's Earthquake Early Warning California (MyShake), developed in partnership with UC Berkeley and USGS ShakeAlert, is the country's first publicly available, statewide warning system that provides seconds or tens of seconds to take cover or other preventive measures before shaking occurs, depending on the location of the event. The system uses data from motion sensors and Global Navigation Satellite System across the State to detect earthquakes before humans can feel them and to notify Californians of an earthquake in advance. Individuals can download the MyShake App on their phones to receive earthquake warnings (Cal OES 2023).

### Worst-Case Scenario

With the abundance of fault exposure in California, the potential scenarios for earthquake activity are many. Any earthquake above a magnitude of 5.0 or greater on faults near the City would have significant impacts. With the added potential for liquefaction throughout the city, structural failure of buildings, damage to utilities such as water pipes, and sources of power are inevitable. Potential warning systems could give approximately 40 seconds notice that a major earthquake is about to occur but would not provide enough warning other than to duck, cover and hold on for personal safety.

## 9.1.4 Previous Occurrences

### Declarations

#### *Federal Declarations*

Between 1954 and 2025, there has been one earthquake-related federal declaration for Alameda County (FEMA 2025).

Table 9-3. FEMA Declarations for Earthquakes

| Title | Event Date(s) | Disaster Number | Declaration Date |
|---|---|---|---|
| 1989 Loma Prieta Earthquake | October 17 – December 18, 1989 | DR-845 | October 18, 1989 |

*Source: (FEMA 2025)*

#### *State Proclamations*

Between 1954 and 2025, California included Alameda County in one state-proclaimed earthquake disasters (California Department of Transportation 2025).

Table 9-4. State Disaster Proclamations for Earthquake

| Event Name | Disaster Number | Proclamation Date |
|---|---|---|
| Loma Prieta Earthquake | 89-05 | October 18 – October 30, 1989 |

*Source: (California Department of Transportation 2025), (Cal OES 2023)*

#### *USDA Declarations*

Between 2012 and 2025, USDA included Alameda County in no declarations related to earthquake (USDA 2025).

### Summary of Significant Events

- **1868 Hayward Earthquake** - On October 21, 1868, a magnitude 6.8 earthquake struck the San Francisco Bay Area along the Hayward fault. It was considered the "Great Earthquake" until 1906. Although the region was sparsely populated, the quake on the Hayward Fault was one of the most destructive in California's history. It destroyed downtown Hayward, killing five people and injuring 30, and caused damage throughout the area. San Francisco suffered $350,000 in property damage (USGS 2018).
- **1989 Loma Prieta Earthquake** - Alameda County and the City of Oakland have been impacted by one earthquake receiving a major federal disaster declaration—the 1989 Loma Prieta Earthquake. The Loma Prieta Earthquake was a 6.9 magnitude earthquake that struck the Bay Area for 20 seconds on Tuesday, October 17, 1989. The

epicenter was on the San Andreas fault roughly 56 miles south of San Francisco and 10 miles northeast of Santa Cruz, near Mt. Loma Prieta in the Santa Cruz Mountains. The focal depth was 11 miles (typical California earthquake focal depths are 4 to 6 miles) (California Department of Conservation 2025).
    - This earthquake ruptured the southernmost 30 miles of the break that caused the 1906 San Francisco Earthquake. A magnitude 5.2 aftershock occurred 2 or 3 minutes after the main shock. In the week following the earthquake, 20 aftershocks of magnitude 4.0 or greater and more than 300 of magnitude 2.5 or greater were recorded. The aftershock zone stretched 25 miles, from north of Los Gatos near Highway 17 to south of Watsonville near Highway 101 (California Department of Conservation 2025).
    - This earthquake killed 63 people, injured 3,757, and displaced 12,053. Notable damage included the collapse of the elevated Cypress Structure section of Interstate 880 in Oakland, the collapse of a section of roadbed on the Bay Bridge, and extensive damage to downtown Santa Cruz and San Francisco's Marina District. The Bay Bridge was unusable for a month. Damage and business interruption estimates reached as high as $10 billion, with direct damage estimated at $6.8 billion. The earthquake damaged 18,306 houses and destroyed 963. It damaged 2,575 businesses and destroyed 147 (California Department of Conservation 2025).
- **2007 Alum Rock Earthquake** - The Alum Rock Earthquake was a 5.6 magnitude event that occurred 5 miles from Alum Rock, California on October 30, 2007. The quake was located at a depth of about 5 miles on the Calaveras Fault. The event caused strong shaking in the epicentral region with over 60,000 felt reports, extending beyond Santa Rosa to the northwest, the Sierras to the east, and King City to the south. Ground shaking also reached San Francisco and Oakland. Effects included broken windows and shelving, but no major damage or loss of life was reported. The quake was the largest to hit the Bay Area at that time since the Loma Prieta earthquake.
- **2014 South Napa Earthquake** - The Napa Valley was shaken by a magnitude 6.0 earthquake on August 24, 2014. This was the largest in the San Francisco Bay Area in over 25 years, and the first since the Magnitude-7.9 earthquake in 1906 to rupture on the surface. The South Napa Earthquake occurred in the West Napa Fault Zone and caused extensive damage through both ground shaking and surface cracking. Ongoing fault movement along the surface continued for several months and caused further damage to foundations and structures. One person was killed and 200 injured, and total damage in the southern Napa Valley and Vallejo areas was in the range of $362 million to $1 billion. The quake was felt widely throughout the region, with people reporting its effects more than 200 miles south of Napa and as far east as the Nevada border. Amtrak suspended service through the Bay Area so tracks could be inspected.

## Recent Events

For the 2026 LHMP update, earthquake events of magnitude 5.0 or greater (pre-2021) and 4.0 greater (post-2021) that have occurred within 100 miles of the City of Oakland since January 1980 are listed in the table below. For events prior to January 2000, refer to the 2021 LHMP.

Table 9-5. Recent Earthquake Hazard Events Within 100 Miles of Oakland

| Date(s) of Event | FEMA / State Declaration Number (if applicable) | Alameda County included in declaration? | Magnitude | Epicenter Location | Fault Line |
|---|---|---|---|---|---|
| January 24, 1980 | N/A | N/A | 5.8 | 7.5 miles southeast of Mount Diablo, in Livermore Valley | Greenville-Mount Diablo |
| January 27, 1980 | N/A | N/A | 5.4 | 7 miles south of 1/24/1980 epicenter | Greenville-Mount Diablo |
| April 4, 1984 | N/A | N/A | 6.2 | 9.9 miles northeast of San Jose | Calaveras |
| January 26, 1986 | N/A | N/A | 5.5 | 6.2 miles southeast of Hollister | San Andreas |
| March 31, 1986 | N/A | N/A | 5.7 | Alum Rock, CA | N/A |
| June 13, 1988 | N/A | N/A | 5.3 | 10 miles northeast of San Jose | Calaveras |
| June 27, 1988 | N/A | N/A | 5.3 | Los Gatos, CA | San Andreas |
| August 8, 1989 | N/A | N/A | 5.4 | Los Gatos, CA | San Andreas |
| October 17, 1989 | DR-845, 89-05 | Yes | 6.9 | 56 miles south of San Francisco | San Andreas |
| April 18, 1990 | N/A | N/A | 5.4 | Watsonville, CA | San Andreas |
| October 31, 2007 | N/A | N/A | 5.45 | Alum Rock, CA | Calaveras |
| August 24, 2014 | N/A | N/A | 6.02 | South Napa, CA | West Napa |
| June 2, 2022 | N/A | N/A | 4.14 | 4.3 miles NW of Bay Point, CA | N/A |
| October 25, 2022 | N/A | N/A | 5.06 | 9.3 miles east-southeast of Alum Rock, CA | Calaveras |
| September 22, 2025 | N/A | N/A | 4.29 | 1.2 miles ESE of Berkeley, CA | N/A |

*Source: (Southern California Earthquake Data Center 2025); (Cal OES 2025); (FEMA 2025)*

### 9.1.5 Future Conditions

Future hazard conditions, including frequency and severity of future events, is discussed in the sections below.

#### Probability

California experiences hundreds of earthquakes each year, most with magnitudes below 3.0 and minimal damage. Earthquakes that cause moderate damage to structures occur several times a year. According to the USGS, a strong earthquake measuring greater than Magnitude 5.0 occurs statewide every 2 to 3 years, and major earthquakes of more than Magnitude 7.0 occur once a decade. The San Andreas Fault has the potential for experiencing major to great events.

Based on the most recent earthquake forecast model for California, scientists estimate that in the next 30 years the San Francisco Bay Area has a 72 percent probability of an earthquake of Magnitude 6.7 or greater, a 51 percent probability of an earthquake of Magnitude 7 or greater, and a 23 percent probability of an earthquake of Magnitude 7.5 (USGS n.d.).

The Uniform California Earthquake Rupture Forecast, Version 3 (UCERF3) predicts the probability of an earthquake of Magnitude 6.7 or greater over the next 30 years as shown on Figure 9-8 (Southern California Earthquake Center 2017). The UCERF3 also defined the following recurrence intervals for the deterministic earthquake scenarios used for the risk assessment in this LHMP:

- Calaveras M6.86
- Hayward M7.05
- San Andreas Peninsula M7.38

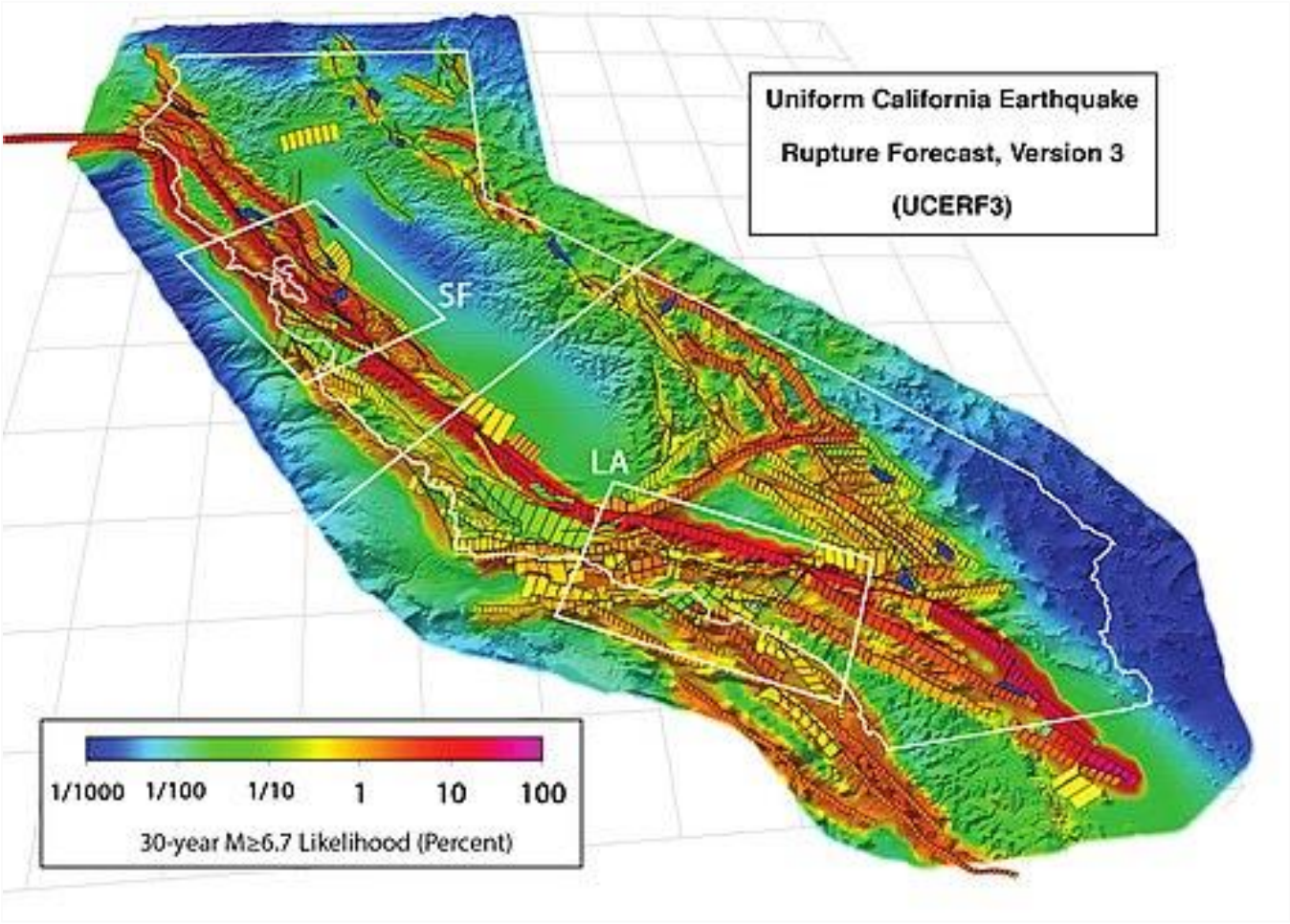



Figure 9-8 UCERF3 Earthquake Probability

## Climate Change

It is unknown whether climate change has a direct impact on earthquake probability or severity. However, cascading hazards related to earthquakes are exacerbated by climate change. Increasing air temperatures and extreme weather events can affect soil integrity and affect erosion, sedimentation, landslide, and wildfire occurrence associated with earthquakes.

Due to rising sea levels, water supplies along the shoreline will experience an increase in groundwater levels and salinity intrusions. This will cause costly damage to below- or at-grade infrastructure and increase the risk of earthquake induced liquefaction (Adapting to Rising Tides n.d.).

### Potential Future Impacts

According to population projections by the California Department of Finance, Alameda County's population is expected to increase to 1.84 million by 2050. This represents an 11.5 percent increase from the 2025 population of 1.65 million (California Department of Finance 2025). While the City is mostly built out, redevelopment may increase the population and structural value exposed to the hazard.

Since all of the Planning Area is located within earthquake hazard zones, all future development will, to some extent, be exposed to the earthquake hazard. The City of Oakland strictly enforces seismic building codes and design standards to prevent loss of life and property from earthquakes. Public education, cooperation with the development community, and individual preparedness are essential.

## 9.2 VULNERABILITY ASSESSMENT

**Local Plan Requirement B1 – 44 CFR Part 201.6(c)(2)(ii)**

***The plan must include a description of the jurisdiction's vulnerability to the hazards of concern and include an overall summary of the hazard's impact on the community. The impacts need to include the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the hazard areas, and estimate of potential dollar losses to vulnerable structures, and a description of land uses and development trends.***

### 9.2.1 Summary of Vulnerability

A probabilistic assessment was conducted for three earthquake scenarios (Calaveras M6.86, Hayward M7.05, and San Andreas Peninsula M7.38) through a Level 2 analysis in Hazus to analyze the earthquake hazard and provide a range of loss estimates in the City of Oakland. These scenarios are identified as those with the greatest potential impacts to the City and/or those most likely to occur based on probabilities assigned by the USGS. As earthquake intensity increases, impacts in the City also increase.

### 9.2.2 Impact on Life, Health, and Safety

The entire City of Oakland can experience an earthquake; however, the degree of impact depends on many factors including the age and type of construction of buildings, the soil types buildings are located on, and the intensity of the earthquake. Those living and working in the City may experience direct and indirect impacts of earthquakes, from business and road closures isolating populations to disruptions in the operation of community lifelines, critical facilities, and utilities.

The entire population of the City (440,637) is exposed to earthquake events. While the overall risk to public safety and potential loss of life from low-magnitude earthquakes in the City is minimal, there is an increased risk for individuals within buildings due to possible structural

damage. Furthermore, individuals walking beneath building embellishments and chimneys face a heightened risk, as these elements may become dislodged and fall during an earthquake.

As a result of a significant earthquake event, residents may be displaced or require temporary and long term sheltering. The number of people requiring shelter is generally less than the number displaced as some displaced persons use hotels or stay with family or friends following a disaster event. Table 9-6 summarizes the estimated number of displaced households and persons seeking short-term sheltering caused by the three earthquake scenarios. These numbers are estimated using FEMA's Hazus risk analysis platform.

Table 9-6. Estimated Earthquake Impact on Persons and Households

| Sub-Area | Calaveras M6.86 | | Hayward M7.05 | | San Andreas Peninsula M7.38 | |
|---|---|---|---|---|---|---|
| | Displaced Households | Short-Term Shelter | Displaced Households | Short-Term Shelter | Displaced Households | Short-Term Shelter |
| Central East Oakland | 105 | 100 | 552 | 517 | 42 | 40 |
| Coliseum/Airport | 0 | 0 | 0 | 0 | 0 | 0 |
| Downtown | 136 | 57 | 1,309 | 548 | 138 | 60 |
| East Oakland Hills | 1 | 0 | 21 | 10 | 0 | 0 |
| Eastlake/Fruitvale | 50 | 27 | 645 | 337 | 31 | 16 |
| Glenview/ Redwood Heights | 1 | 0 | 25 | 9 | 0 | 0 |
| North Oakland Hills | 2 | 1 | 203 | 77 | 0 | 0 |
| North Oakland/Adams Point | 89 | 32 | 1,354 | 479 | 51 | 19 |
| West Oakland | 17 | 10 | 214 | 137 | 19 | 12 |
| **Total** | **400** | **228** | **4,324** | **2,115** | **280** | **147** |

*Source: (USGS 2025d); (CGS 2025)*
*Note: Calculated using a Census tract level, general building stock (GBS) analysis in Hazus 6.1.*

## Equity Priority Communities

For this LHMP update, the composite score of each census tract is divided into three categories (91-100, 81-90, and ≤80) based on social vulnerabilities. Populations in these categories are recognized as communities facing social vulnerabilities creating additional barriers in the face of natural hazards (Equity Priority Communities). Overall, everyone in the City of Oakland is at risk and can be impacted by earthquakes. However, some groups are more vulnerable than others, especially those in Equity Priority Communities. Earthquake hazards pose significant risks populations facing barriers that limit their ability to prepare for and respond effectively to warnings. Research on the ShakeAlert early warning system highlights that technological solutions alone are insufficient. Equitable communication strategies are essential to ensure all communities benefit from mitigation efforts. Individuals, such as those in Equity Priority Communities, may experience challenges related to language, accessibility, cultural norms, resource limitations, and trust in authorities, which can reduce the effectiveness of emergency messaging. To address these disparities,

mitigation planning should incorporate inclusive outreach, culturally appropriate education, and accessible warning systems. By pairing technology with equity-focused communication, jurisdictions can reduce disproportionate impacts and strengthen resilience among at-risk populations (Jenkins, et al. 2022).

Earthquakes strike rapidly, leaving people with only seconds to protect themselves. Those with physical disabilities or movement limitations may need to take specific precautions before, during, and after earthquakes. Public information campaigns and community resources can help protect individuals with disabilities from the impacts of disaster (FEMA 2020).

Table 9-7. Estimated Number of Equity Priority Community Members Exposed to Earthquake

| Sub-Areas | Equity Priority Community Thresholds[1] | EPC Population Exposed[2] | % of Total Population Exposed to the Hazard[3] |
|---|---|---|---|
| Central East Oakland | 91-100 | 34,939 | 33.1% |
| | 81-90 | 23,907 | 22.6% |
| | ≤80 | 25,659 | 24.3% |
| Coliseum/Airport | 91-100 | 4,879 | 100.0% |
| | 81-90 | 0 | 0% |
| | ≤80 | 0 | 0% |
| Downtown | 91-100 | 0 | 0% |
| | 81-90 | 0 | 0% |
| | ≤80 | 15,144 | 70.1% |
| East Oakland Hills | 91-100 | 0 | 0% |
| | 81-90 | 0 | 0% |
| | ≤80 | 0 | 0% |
| Eastlake/Fruitvale | 91-100 | 17,933 | 17.7% |
| | 81-90 | 13,346 | 13.2% |
| | ≤80 | 17,531 | 17.3% |
| Glenview/ Redwood Heights | 91-100 | 0 | 0% |
| | 81-90 | 0 | 0% |
| | ≤80 | 0 | 0% |
| North Oakland Hills | 91-100 | 0 | 0% |
| | 81-90 | 0 | 0% |
| | ≤80 | 0 | 0% |
| North Oakland/Adams Point | 91-100 | 0 | 0% |
| | 81-90 | 0 | 0% |
| | ≤80 | 20,378 | 23.9% |
| West Oakland | 91-100 | 2,553 | 7.8% |
| | 81-90 | 8,882 | 27.2% |
| | ≤80 | 20,979 | 64.3% |
| **Totals** | **91-100** | **60,304** | **13.7%** |
| | **81-90** | **46,135** | **10.5%** |
| | **≤80** | **99,691** | **22.6%** |

*Source: (City of Oakland 2023)*

*Notes: (1) These thresholds are determined by the City of Oakland to be the most burdened communities in the City in the General Plan EJ Element.*
*(2) Population, by census tract, within the EPC threshold exposed to the hazard.*
*(3) EPC population exposed compared with total population in sub area.*

### 9.2.3 Impact on General Building Stock

The entire building stock of the City of Oakland is considered at risk and exposed to earthquakes. A building's construction determines how well it can withstand the force of an earthquake. Unreinforced masonry buildings are most at risk during an earthquake because the walls are prone to collapse outward, whereas steel and wood buildings absorb more of the earthquake's energy. Additional attributes that affect a building's capability to withstand an earthquake's force include its age, number of stories, and quality of construction. Hazus considers building construction and age of building as part of the analysis. Because a custom general building stock was used for this Hazus analysis, the building ages and building types from the inventory were incorporated into the Hazus model.

Potential building damage was evaluated by Hazus across the following damage categories: none, slight, moderate, extensive, and complete. Table 9-8 provides definitions of these five categories of damage for a light wood-framed building. Definitions for other building types are included in the Hazus technical manual documentation.

Table 9-8. Example of Structural Damage State Definitions for a Wood, Light Frame Building

| Damage Category | Description |
|---|---|
| Slight | Small plaster or gypsum-board cracks at corners of door and window openings and wall-ceiling intersections; small cracks in masonry chimneys and masonry veneer |
| Moderate | Large plaster or gypsum-board cracks at corners of door and window openings; small diagonal cracks across shear wall panels exhibited by small cracks in stucco and gypsum wall panels; large cracks in brick chimneys; toppling of tall masonry chimneys. |
| Extensive | Large diagonal cracks across shear wall panels or large cracks at plywood joints; permanent lateral movement of floors and roof; toppling of most brick chimneys; cracks in foundations; splitting of wood sill plates and/or slippage of structure over foundations; partial collapse of "room-over-garage" or other "soft-story" configurations; small foundations cracks. |
| Complete | Structure may have large permanent lateral displacement, may collapse, or be in imminent danger of collapse due to cripple wall failure or the failure of the lateral load-resisting system; some structures may slip and fall off the foundations; large foundation cracks. |

*Source: (FEMA 2022)*

Damages for all building types in the City, as a result of the three earthquake scenarios, were estimated for the City using Hazus.

Table 9-9. Estimated Building Damages (Structures and Contents) from Earthquakes

| Sub-Area | Total RCV | Calaveras M6.86 | | Hayward M7.05 | | San Andreas Peninsula M7.38 | |
|---|---|---|---|---|---|---|---|
| | | Estimated Total Damage | % of RCV | Estimated Total Damage | % of RCV | Estimated Total Damage | % of RCV |
| Central East Oakland | $17,986,229,601 | $961,451,174 | 5.3% | $3,374,996,005 | 18.8% | $449,629,370 | 2.5% |
| Coliseum/ Airport | $5,646,390,094 | $486,582,189 | 8.6% | $846,472,435 | 15.0% | $488,011,773 | 8.6% |
| Downtown | $21,475,904,408 | $658,434,419 | 3.1% | $2,274,960,980 | 10.6% | $707,517,507 | 3.3% |
| East Oakland Hills | $8,434,796,515 | $378,415,055 | 4.5% | $862,171,904 | 10.2% | $195,540,225 | 2.3% |
| Eastlake/ Fruitvale | $20,713,824,637 | $794,767,913 | 3.8% | $3,028,541,428 | 14.6% | $595,976,890 | 2.9% |

| Sub-Area | Total RCV | Calaveras M6.86 | | Hayward M7.05 | | San Andreas Peninsula M7.38 | |
|---|---|---|---|---|---|---|---|
| | | Estimated Total Damage | % of RCV | Estimated Total Damage | % of RCV | Estimated Total Damage | % of RCV |
| Glenview/ Redwood Heights | $7,699,736,380 | $352,619,611 | 4.6% | $1,075,459,833 | 14.0% | $206,365,743 | 2.7% |
| North Oakland Hills | $9,022,389,851 | $431,601,365 | 4.8% | $1,498,758,018 | 16.6% | $245,075,744 | 2.7% |
| North Oakland/ Adams Point | $26,981,073,354 | $762,782,274 | 2.8% | $2,940,352,167 | 10.9% | $462,093,442 | 1.7% |
| West Oakland | $11,010,987,509 | $512,860,347 | 4.7% | $1,270,253,610 | 11.5% | $592,547,473 | 5.4% |
| **Total** | **$128,971,332,346** | **$5,339,514,348** | **4.1%** | **$17,171,966,379** | **13.3%** | **$3,942,758,169** | **3.1%** |

*Source: (Hazus v6.1 2023)*

### 9.2.4 Impact on Community Lifelines

The entire City is vulnerable to earthquakes, including all community lifelines. Table 9-10 summarizes the number of community lifelines, by category, which are located within and exposed to the very high and high liquefaction susceptibility area. In total 505 community lifelines are located in the very high and high liquefaction susceptibility area.

Table 9-10. Community Lifelines Located in the Very High & High Liquefaction Susceptibility Area

| Planning Area | Communications | Energy | Food, Hydration, Shelter | Hazardous Materials | Health and Medical | Safety and Security | Transportation | Water Systems | Total |
|---|---|---|---|---|---|---|---|---|---|
| Central East Oakland | 5 | 1 | 0 | 31 | 0 | 1 | 4 | 0 | 42 |
| Coliseum/Airport | 66 | 0 | 0 | 98 | 0 | 6 | 12 | 0 | 182 |
| Downtown | 43 | 1 | 0 | 17 | 0 | 6 | 9 | 0 | 76 |
| East Oakland Hills | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Eastlake/Fruitvale | 2 | 0 | 0 | 19 | 0 | 2 | 7 | 1 | 31 |
| Glenview/ Redwood Heights | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| North Oakland Hills | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| North Oakland/Adams Point | 0 | 0 | 1 | 2 | 0 | 2 | 0 | 0 | 5 |
| West Oakland | 51 | 7 | 0 | 59 | 0 | 1 | 45 | 4 | 167 |
| **Total** | **167** | **9** | **1** | **226** | **0** | **18** | **79** | **5** | **505** |

*Sources: (CA DWR n.d.); (USACE n.d.)*

#### Time to Restore Community Lifelines to Functionality

Hazus estimates the time to restore community lifelines to fully functional use. Results are presented as probability of being functional at specified time increments: 1, 3, 7, 14, 30 and 90 days after the event. For example, Hazus may estimate that a facility has 5 percent chance of being fully functional at Day 3, and a 95 percent chance of being fully functional at Day 90. The analysis of community lifelines in the planning area was performed for the assessed earthquake scenarios. The results are summarized in Figure 9-9 through Figure 9-11. These figures show the average functionality for all community lifelines in each category.

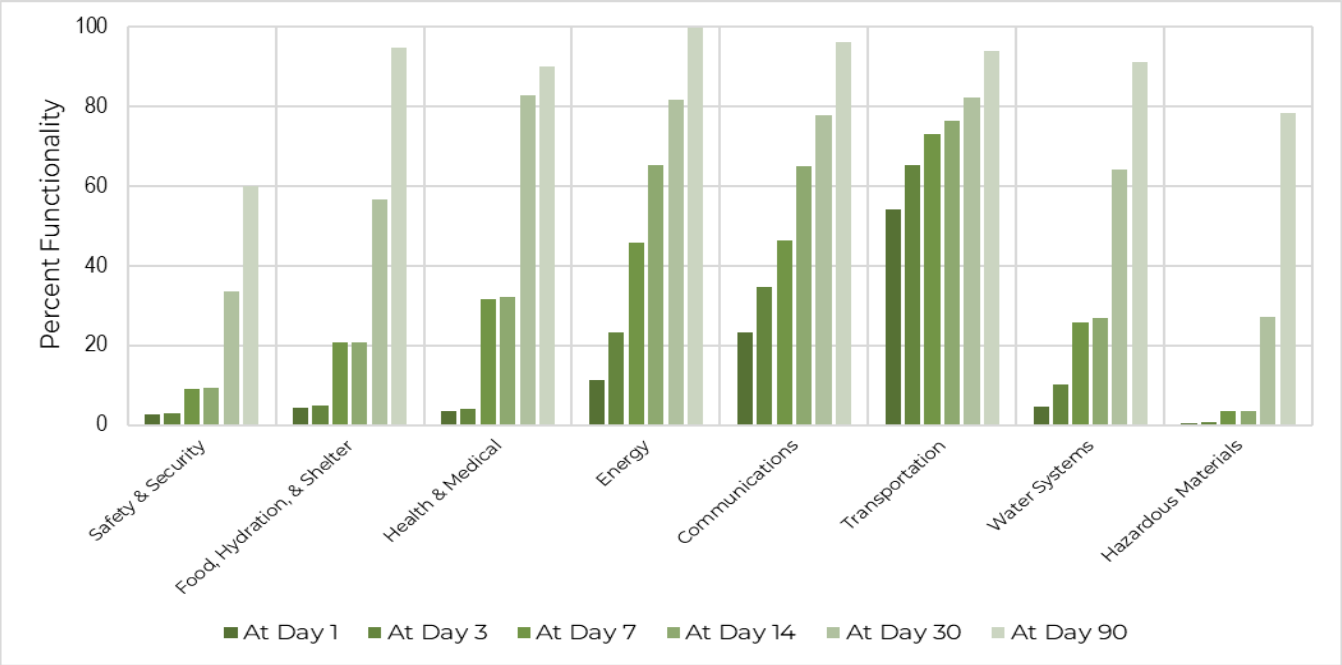



Figure 9-9. Average Community Lifeline Functionality by # of Days Post-Event, Hayward Fault Scenario

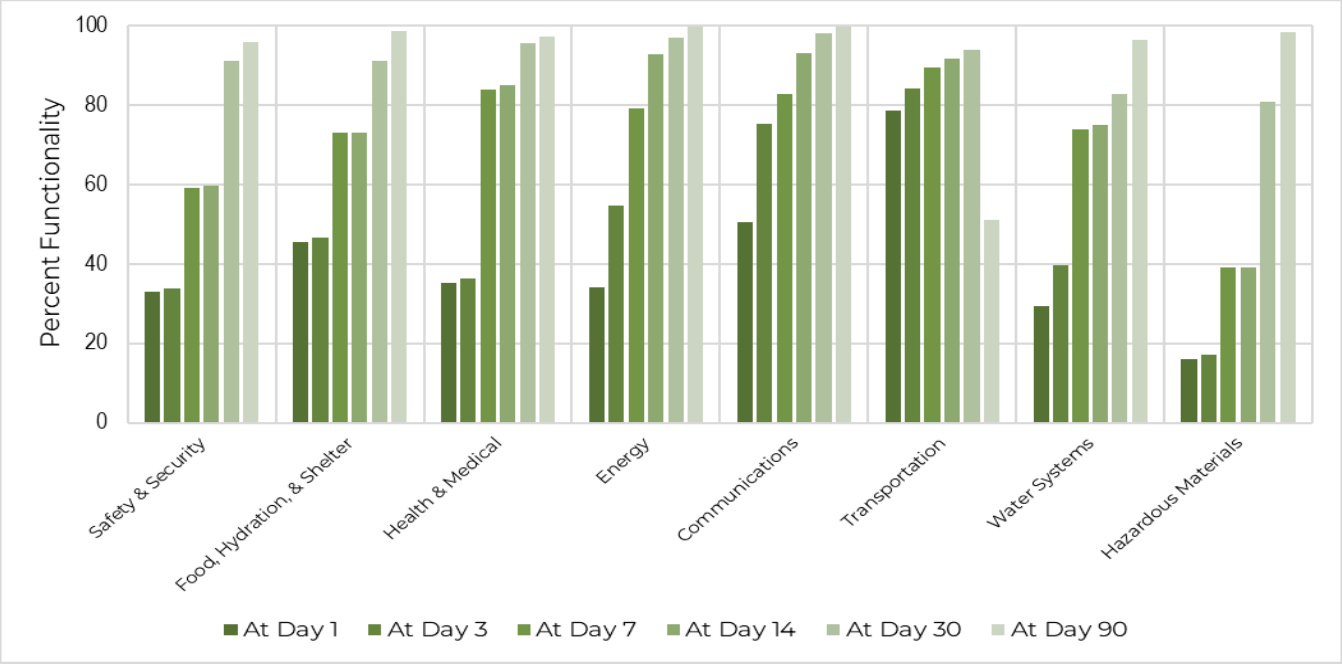



Figure 9-10. Average Community Lifeline Functionality by # of Days Post-Event, Calaveras Fault Scenario

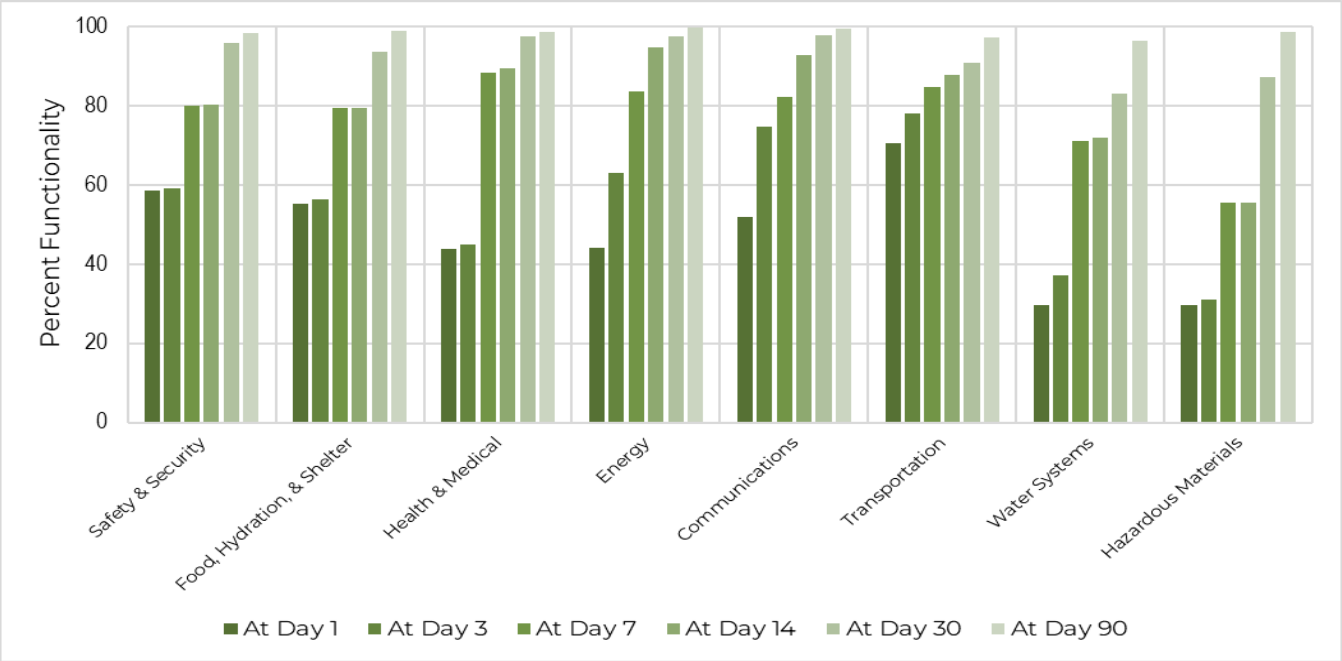



Figure 9-11. Average Community Lifeline Functionality by # of Days Post-Event, San Andreas Fault Scenario

### 9.2.5 Impact on the Economy

Large-scale earthquakes can inflict significant economic damage, including direct losses from destroyed property and infrastructure, and indirect impacts like disruptions to businesses and supply chains, potentially leading to long-term economic hardship. The scenario earthquakes modeled for this risk assessment estimate as much as 13% of the total replacement cost value of the City could be damaged from earthquakes. That is 13% of the tax base, the economic engine for the City. Each of these earthquake scenarios would have regional impacts that would stress regional resources that would impact recovery times for the City.

Hazus estimates the volume of debris that may be generated as a result of an earthquake event to enable the study region to prepare and rapidly and efficiently manage debris removal and disposal (FEMA 2020). Table 9-11 summarizes the overall estimated debris generated as a result of these events for the City.

Table 9-11. Estimated Debris Generated by Earthquake Scenarios

| Scenario | Structure Debris (tons) |
|---|---|
| Calaveras M6.86 | 531,829 |
| Hayward M7.05 | 2,618,373 |
| San Andreas Peninsula M7.38 | 393,535 |

*Source: (Hazus v6.1 2023)*
*Note: Calculated using a Census tract level, general building stock (GBS) analysis in Hazus 6.1.*

Potential building damage was evaluated by Hazus across the following damage categories: none, slight, moderate, extensive, and complete. Table 9-12 provides definitions of these five categories of damage for a light wood-framed building. Definitions for other building types are included in the Hazus technical manual documentation (FEMA 2025).

Table 9-12. Example of Structural Damage State Definitions for a Wood, Light Frame Building

| Damage Category | Description |
|---|---|
| Slight | Small plaster or gypsum-board cracks at corners of door and window openings and wall-ceiling intersections; small cracks in masonry chimneys and masonry veneer |
| Moderate | Large plaster or gypsum-board cracks at corners of door and window openings; small diagonal cracks across shear wall panels exhibited by small cracks in stucco and gypsum wall panels; large cracks in brick chimneys; toppling of tall masonry chimneys. |
| Extensive | Large diagonal cracks across shear wall panels or large cracks at plywood joints; permanent lateral movement of floors and roof; toppling of most brick chimneys; cracks in foundations; splitting of wood sill plates and/or slippage of structure over foundations; partial collapse of "room-over-garage" or other "soft-story" configurations; small foundations cracks. |
| Complete | Structure may have large permanent lateral displacement, may collapse, or be in imminent danger of collapse due to cripple wall failure or the failure of the lateral load-resisting system; some structures may slip and fall off the foundations; large foundation cracks. |

*Source: (FEMA 2022)*

Building damage as a result of the three earthquake scenarios were estimated for each sub-area using Hazus. Table 9-13 summarizes the estimated building and content losses caused by these scenarios.

Table 9-13. Estimated Building Damages (Structure and Contents) from Earthquakes

| | | Calaveras M6.86 | | Hayward M7.05 | | San Andreas Peninsula M7.38 | |
|---|---|---|---|---|---|---|---|
| Sub-Area | Total Replacement Cost Value | Estimated Total Damage | % of Replacement Cost Value | Estimated Total Damage | % of Replacement Cost Value | Estimated Total Damage | % of Replacement Cost Value |
| Central East Oakland | $17,986,229,601 | $961,451,174 | 5.3% | $3,374,996,005 | 18.8% | $449,629,370 | 2.5% |
| Coliseum/Airport | $5,646,390,094 | $486,582,189 | 8.6% | $846,472,435 | 15.0% | $488,011,773 | 8.6% |
| Downtown | $21,475,904,408 | $658,434,419 | 3.1% | $2,274,960,980 | 10.6% | $707,517,507 | 3.3% |
| East Oakland Hills | $8,434,796,515 | $378,415,055 | 4.5% | $862,171,904 | 10.2% | $195,540,225 | 2.3% |
| Eastlake/Fruitvale | $20,713,824,637 | $794,767,913 | 3.8% | $3,028,541,428 | 14.6% | $595,976,890 | 2.9% |
| Glenview/ Redwood Heights | $7,699,736,380 | $352,619,611 | 4.6% | $1,075,459,833 | 14.0% | $206,365,743 | 2.7% |
| North Oakland Hills | $9,022,389,851 | $431,601,365 | 4.8% | $1,498,758,018 | 16.6% | $245,075,744 | 2.7% |
| North Oakland/Adams Point | $26,981,073,354 | $762,782,274 | 2.8% | $2,940,352,167 | 10.9% | $462,093,442 | 1.7% |
| West Oakland | $11,010,987,509 | $512,860,347 | 4.7% | $1,270,253,610 | 11.5% | $592,547,473 | 5.4% |
| **Total** | **$128,971,332,346** | **$5,339,514,348** | **4.1%** | **$17,171,966,379** | **13.3%** | **$3,942,758,169** | **3.1%** |

*Source: (Hazus v6.1 2023)*

### 9.2.6 Impact on Historic and Cultural Resources

Historic and cultural buildings in the City of Oakland are vulnerable to structural damage from earthquakes. This damage can affect buildings, monuments, and other structures, with

older buildings that do not meet modern building codes being particularly at risk. Artifacts, artwork, and historical documents housed within these buildings are also susceptible to damage or destruction. The costs of repair and restoration can be substantial, leading to significant economic impacts on the City.

### 9.2.7 Impact on Ecosystems and Natural Resources

According to USGS, earthquakes can cause damage to the surface of the Earth in various forms depending on the magnitude and distribution of the event. Surface faulting is one of the major seismic components to earthquakes that can create wide ruptures in the ground. Ruptures can have a direct impact on the landscape and natural environment because it can disconnect habitats for miles isolating animal species or tear apart plant roots (USGS n.d.).

Facilities holding hazardous materials are of particular concern because of possible isolation of neighborhoods surrounding them. Hazardous material releases can occur during an earthquake from fixed facilities or transportation-related incidents. During an earthquake, structures storing these materials could rupture and leak into the surrounding area or an adjacent waterway, having a disastrous effect on the environment. Transportation corridors can be disrupted during an earthquake, leading to the release of materials to the surrounding environment (City of Oakland 2021).

Furthermore, ground failure as a result of soil liquefaction can have an impact on soil pores and retention of water resources. The greater the seismic activity and liquefaction properties of the soil, the more likely drainage of groundwater can occur which depletes groundwater resources. In areas where there is higher pressure of groundwater retention, the pores can build up more pressure and make soil behave more like a fluid rather than a solid increasing risk of localized flooding and deposition or accumulation of silt (USGS n.d.).

## 9.3 MITIGATION OPPORTUNITIES

Table 9-14 presents a range of potential opportunities for mitigating the earthquake hazard.

Table 9-14. Potential Opportunities to Mitigate the Earthquake Hazard

| Community Scale | Organizational Scale | Government Scale |
|---|---|---|
| **Manipulate the Hazard** | | |
| • None | • None | • None |
| **Reduce Exposure and Vulnerability** | | |
| • Locate outside of hazard area (off soft soils)<br>• Retrofit structure (anchor house structure to foundation)<br>• Secure household items that can cause injury or damage (such as water heaters, bookcases, and other appliances)<br>• Build to higher design | • Locate or relocate critical functions outside hazard area where possible<br>• Build redundancy for critical functions and facilities<br>• Retrofit critical buildings and areas housing critical functions | • Locate critical facilities or functions outside hazard area where possible<br>• Harden infrastructure<br>• Provide redundancy for critical functions<br>• Adopt higher regulatory standards<br>• Perform seismic retrofits for vulnerable critical buildings and areas |

| Community Scale | Organizational Scale | Government Scale |
|---|---|---|
| **Build Local Capacity** | | |
| • Practice "drop, cover, and hold"<br>• Develop household mitigation plan, such as creating a retrofit savings account, communication capability with outside, 72-hour self-sufficiency during an event<br>• Keep cash reserves for reconstruction<br>• Become informed on the hazard and risk reduction alternatives available<br>• Develop a post-disaster action plan for your household | • Adopt higher standard for new construction; consider "performance-based design" when building new structures<br>• Keep cash reserves for reconstruction<br>• Inform your employees on the possible impacts of earthquake and how to deal with them at your work facility.<br>• Develop a continuity of operations plan | • Provide better hazard maps<br>• Provide technical information and guidance<br>• Enact tools to help manage development in hazard areas (e.g., tax incentives, information)<br>• Include retrofitting and replacement of critical system elements in capital improvement plan<br>• Develop strategy to take advantage of post-disaster opportunities<br>• Warehouse critical infrastructure components such as pipe fittings, valves, pumps, power line, and road repair materials<br>• Solidify supplemental power supply to tanks and pump stations (generator program)<br>• Develop and adopt a continuity of operations plan<br>• Initiate triggers guiding improvements (such as <50% substantial damage or improvements)<br>• Further enhance seismic risk assessment to target high hazard buildings for mitigation opportunities<br>• Develop a post-disaster action plan that includes grant funding and debris removal components |

# 10. FLOOD

## 10.1 HAZARD PROFILE

**Local Plan Requirement B1 – 44 CFR Part 201.6(c)(2)(i)**

*Include a description of the type, location, and extent for the identified hazards of concern and include information on previous occurrences of hazard events and the probability of future hazard events.*

### 10.1.1 Description of the Hazard

#### Defining the Hazard

Flooding is any overflowing of water onto land that is normally dry, due to rain, ocean waves, or the failure of a dam or levee (NOAA National Severe Storms Laboratory 2023). Floods are the most common of all weather-related natural disasters. Areas near rivers or streams are at risk from floods during heavy rain or periods of upstream snowmelt. In urban areas, where buildings, highways, driveways, and parking lots reduce the ground's ability to absorb rainfall, the resulting increase in runoff can overwhelm constructed storm drain systems, resulting in flooding on nearby roads and buildings. The City of Oakland is typically exposed to the following flood types, with each further described below:

- Riverine (inland) flooding.
- Flash flooding.
- Urban and stormwater flooding.
- Coastal flooding.

#### *Riverine (Inland) Flooding*

Riverine flooding, or fluvial flooding, is when streams and rivers exceed the capacity of their natural or constructed channels to accommodate water flow and water overflows the banks, spilling out into adjacent low-lying, dry land. This occurs when the flow of a river exceeds the bank sides and causes damage or obstruction to a nearby floodplain. Riverine flooding can turn into a flash flood if the river is at or above its flood stage and if the soil is saturated (FEMA 2019).

#### *Flash Flooding*

A flash flood is a rapid inundation of low-lying areas caused by heavy rain associated with severe thunderstorms, tropical systems, or melting water from ice or snow. Flash flooding also occurs far away from water bodies when a large volume of water cannot be absorbed by the soil or storm water systems and travels overland unimpeded (NWS 2019).

#### *Urban Stormwater Flooding*

Flooding is categorized as urban/stormwater flooding (NOAA 2022). Local urban drainage systems collect stormwater and rising groundwater from rainfall that produces runoff in developed areas. Water that does not evaporate or become absorbed by the ground is carried by conduits to waterways such as creeks, rivers, or the ocean. These systems have two purposes: 1) to control stormwater runoff during periods of heavy rainfall; and 2) to control stormwater runoff from more frequently occurring, less significant storms. Flooding

occurs when runoff exceeds system capacity, or because systems are blocked from illegal dumping, tidal flows, and/or lack of maintenance. Stormwater systems are typically designed to use gravity to drain excess water from roads, yards, and developed areas. However, their efficiency depends on the difference in water levels—known as the head difference—between the storm drain system and the receiving waterbody (NOAA 2022).

During low tide, the head difference is large, meaning water can flow freely from storm drains into nearby waterbodies. Stormwater moves quickly through outfall pipes, reducing standing water and minimizing flood risks (NOAA 2022).

During high tide, the head difference is small or nonexistent, significantly slowing down drainage. In extreme cases, high water levels can cause backflow, where water from the receiving body enters the storm drain system rather than flowing out. This can result in flooding, even on sunny days without rain (NOAA 2022).

These tidal influences can create temporary closed basins, where stormwater has nowhere to drain. This leads to prolonged standing water in streets, yards, and sometimes even homes, increasing the risk of property damage and infrastructure strain. Sea level rise, extreme weather events, and king tides exacerbate this issue (NOAA 2022).

### *Coastal Flooding*

Coastal areas can experience various kinds of flooding including storm surge and sea-level rise. The combination of these events can result in the total perceived coastal flooding event (cumulative, firsthand experience of flooding). Refer to Chapter 12 for details on sea-level rise.

## Cause of the Hazard

Most flooding in California is the result of heavy precipitation over one or two days. Short streams and steep watersheds emptying onto lowlands that may be heavily populated produce large volumes of water in short periods and can result in damage to structures and infrastructure. While rare, the problem is sometimes compounded by the denuding of large areas of watershed by fire during the previous season (Western Regional Climate Center 2023). The following are several types of flooding presented and defined by CA DWR:

- **Riverine Flooding** can be caused by excessive runoff from heavy rainfall and accumulation of water flowing over broad flat areas, levee failure, and channel erosion.
- **Flash Flooding** is typically caused by intense rainfall. Flash floods can also occur from the collapse of a manmade structure.
- **Urban and Stormwater Flooding** occurs when a drainage system backs up during or after a storm.
- **Coastal Flooding** happens when ocean waves are significantly larger than normal. If a storm event corresponds with a higher than normal tide, extensive flooding can occur. Winds blowing in an onshore direction (from the sea toward the land) can cause the water to “pile up” against the coast, overtopping natural and manmade flood protection structures like sea walls (CA DWR 2019).

The land area susceptible to being inundated or flooded by water from any source (e.g., river, stream, lake, estuary) is referred to as a floodplain. The floodplain includes the floodway and the floodway fringe to convey the flood event and provide flood water storage. These areas form a complex physical and biological system that not only supports a variety of natural

resources but also provides natural flood and erosion control. However, not all flooding occurs in such areas. Flash and localized flooding often occur outside of designated floodplain areas.

### Summary of Potential Impacts

Floods have the potential for numerous severe impacts (Cal OES 2023), including the following:

- Injuries and deaths occur.
- Residences, businesses, and personal property are damaged.
- Critical infrastructure is damaged and could be out of service for long periods.
- Vital services become isolated or are closed.
- Jobs are lost or put at risk when businesses are dislocated or closed.
- The economy can be disrupted due to damage to commercial and industrial buildings.
- Water supplies and water quality are affected.
- Communities are displaced.
- Natural resources and public access are damaged or eliminated.
- Usable land is lost through erosion, contamination, or other flood-related means.
- The transport of hazardous materials and debris could impact human and animal health and the environment.

### Cascading Hazard Impacts

The most problematic secondary hazard for flooding is bank erosion. In many cases, the threat and effects of erosion are worse than actual flooding. This is especially true on the upper courses of rivers where there are steep gradients. Floodwater in these reaches may pass quickly and without much damage, but scour the banks, edging properties closer to the floodplain or causing them to fall in.

Flooding is also responsible for hazards such as landslides when high flows over-saturate soils on steep slopes, causing them to fail. Hazardous materials spills are also a secondary hazard of flooding if storage tanks rupture and spill into streams, rivers, or drainage sewers. Flooding can also result in utility failures and the spread of disease.

## 10.1.2 Location

FEMA defines flood hazard areas through statistical analyses of records of river flow, storm tides, and rainfall; information obtained through consultation with the community; floodplain topographic surveys; and hydrologic and hydraulic analyses. The combined flood hazard areas for coastal and riverine flooding are delineated on Flood Insurance Rate Maps (FIRMs), which are official maps of a community on which the Federal Insurance and Mitigation Administration has delineated special flood hazard areas (SFHAs). The SFHA is the land area on a digital FIRM covered by floodwaters of the “base flood,” which is the flood with a 1 percent chance of occurrence in any given year (also called the 1 percent annual chance flood). Localized flooding and stormwater flooding are not included in FEMA FIRMs (FEMA 2025).

The primary areas of flooding in Oakland are along the shoreline of the San Francisco Bay, Oakland Estuary, and San Leandro Bay. Flooding is also associated with Lake Merritt and Glen Echo Creek, as well as Arroyo Viejo, Lion, Sausal, and Peralta creeks. The areas close to these bodies of water are at the most risk of being impacted by flood events. Most of the City's developed shoreline is not within the effective 1% annual chance flood hazard area, except the north part of the Oakland San Francisco Bay Airport. No growth areas are located in areas within the effective 1% annual chance flood hazard area (City of Oakland n.d.).

Locations of flood zones in the City as depicted on the FEMA 2018 effective DFIRMs are illustrated on Figure 10-1.

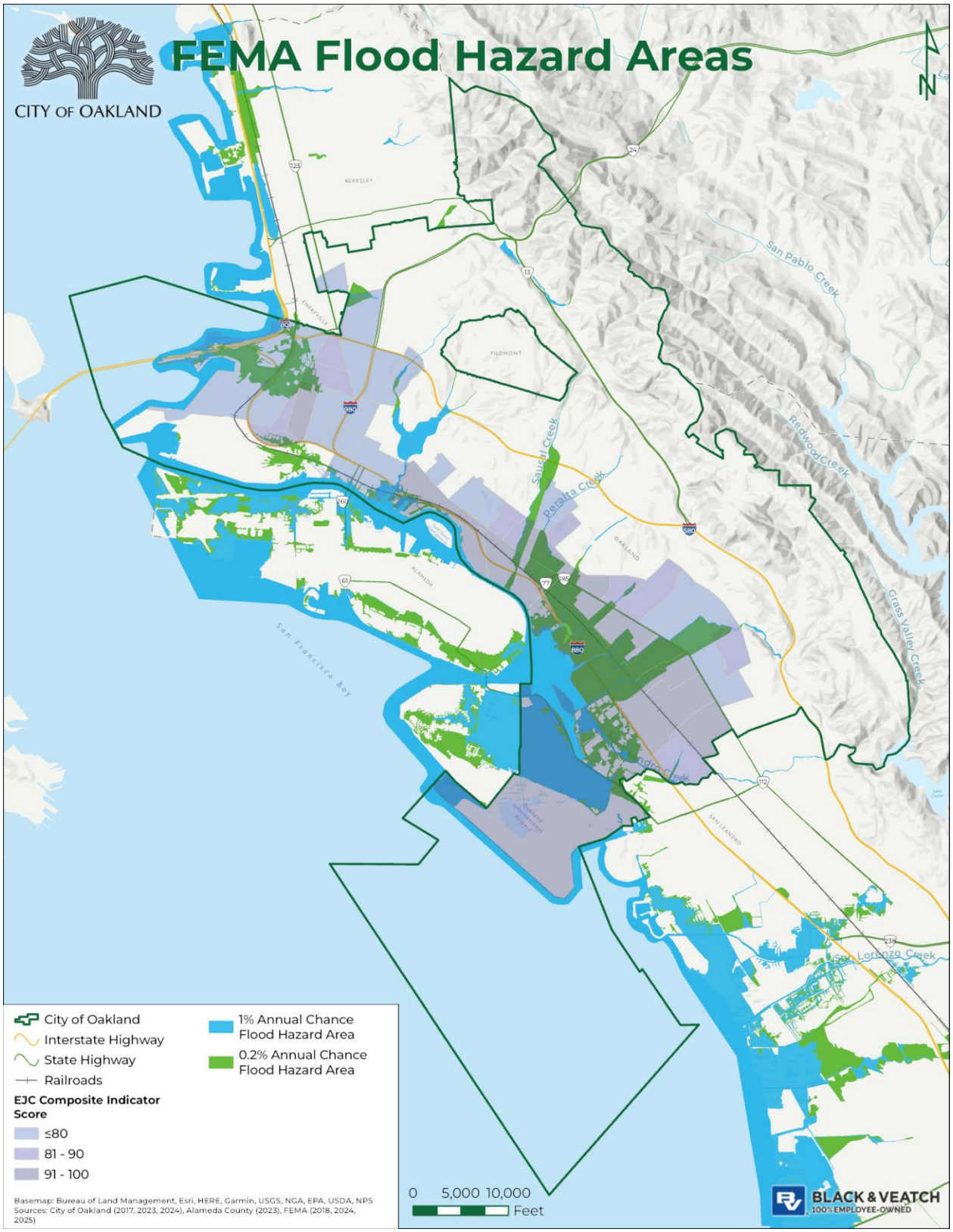



Figure 10-1 FEMA Flood Hazard Areas

### 10.1.3 Extent

The severity of a flooding event is typically determined by a combination of several major factors, including stream and river basin topography and physiography; precipitation and weather patterns; recent soil moisture conditions; and the degree of vegetative clearing and impervious surface (Harris 2001).

#### Measuring Intensity

In the case of the riverine flood hazard, once a river reaches flood stage, the flood extent or severity categories used by the NWS include minor flooding, moderate flooding, and major flooding. Each category has a definition based on property damage and public threat:

Currently, there is no measurement used to further define the frequency and severity of stormwater/urban flooding.

- **Minor Flooding**—minimal or no property damage, but possibly some public threat or inconvenience.
- **Moderate Flooding**—some inundation of structures and roads near streams. Some evacuations of people and/or transfer of property to higher elevations are necessary.
- **Major Flooding**—extensive inundation of structures and roads. Significant evacuations of people and/or transfer of property to higher elevations (NOAA 2021).

The NWS also categorizes coastal flooding into three levels of severity: minor, moderate, and major. The classifications measure how much water levels exceed average astronomical high tide for that location (NOAA NOS n.d.):

- **Minor High Tide Flooding**—water levels reach 0.55 meters (1.8 feet) above average high tide. This minor flooding is mostly disruptive, causing stormwater backups and road closures.
- **Moderate High Tide Flooding**—0.85 meters (2.8 feet) above average high tide. This can cause more disruption and damage homes and businesses.
- **Major Flooding**—1.20 meters (3.9 feet) above average high tide. Floods of this severity are destructive, may lead to evacuations, and often require repairs to infrastructure and property.

#### Warning Time

Most floods are preceded by a warning period that allows emergency managers to communicate the need to prepare for the event. A flood may last from minutes to days (O'Connor, Grant and Costa 2002). Warnings issued through official sources, such as the National Weather Service (NWS) and the Storm Prediction Center, provide the most reliable and timely preparedness information, but the exact flood location and depth depends on the amount, duration, and location of rainfall.

The NWS uses the following advisory, watch, and warnings when flooding conditions are anticipated (NWS 2025):

Figure 10-2 Flood Watches and Warnings

*Source: (NWS n.d.)*

- **Flood Advisory**—Issued when flooding is forecast to occur, generally within the next 6 hours, but is not expected to substantially threaten life and property.
- **Flash Flood Warning**—Issued when flash flooding is imminent, generally within the next 6 hours. This is usually based on observed heavy rainfall (measured or radar estimated) for dangerous small stream or urban flooding, but may also be issued for significant dam or levee failures that have occurred or are imminent.
- **Areal Flood Warning**—Issued when widespread general flooding is forecast to occur throughout an identifiable geographic area.
- **Coastal Flood Advisory**—Issued when minor tidal flooding is forecast to occur along coastal areas.
- **Coastal Flood Warning**—Issued when at least moderate tidal flooding is forecast to occur along coastal areas.
- **Storm Surge Watch**—Issued when there is potential of life-threatening inundation (3 feet or greater at ground level) from rising water moving inland from the shoreline somewhere within the specified area, generally within 48 hours, in association with a tropical, subtropical, or post-tropical cyclone.
- **Storm Surge Warning**—Issued when there is danger of life-threatening inundation (3 feet or greater at ground level) from rising water moving inland from the shoreline somewhere within the specified area, generally within 36 hours, in association with a tropical, subtropical, or post-tropical cyclone.

### Worst-Case Scenario

The worst-case scenario for flooding in the City of Oakland would be a combination of coastal flooding and flash and localized flooding from rainfall. Given the City's location in the San Francisco Bay, this would likely result in severe bank erosion and property damage in the floodplains.

## 10.1.4 Previous Occurrences

The following sections provide a review of previous flood occurrences in Alameda County which may or may not have had impacts within the City of Oakland.

## Declarations

### *Federal Declarations*

Between 1954 and 2025, The federal government declared that Alameda County experienced 13 flood disasters (DR) or emergencies (EM) (FEMA 2025).

Table 10-1. Federal Disaster Declarations for Flood

| Title | Event Date(s) | Disaster Number | Declaration Date |
|---|---|---|---|
| Flood & Erosion | February 5, 1954 | DR-15-CA | February 5, 1954 |
| Flood | December 23, 1955 | DR-47-CA | December 23, 1955 |
| Heavy Rainstorms & Flood | April 4, 1958 | DR-82-CA | April 4, 1958 |
| Floods | March 6, 1962 | DR-122-CA | March 6, 1962 |
| Severe Storms & Flooding | October 24, 1962 | DR-138-CA | October 24, 1962 |
| Severe Storms, Heavy Rains, & Flooding | February 25, 1963 | DR-145-CA | February 25, 1963 |
| Severe Storms & Flooding | February 16, 1970 | DR-283-CA | February 16, 1970 |
| Severe Storms, Flood, Mudslides, & High Tide | December 19, 1981 – January 8, 1982 | DR-651-CA | January 7, 1982 |
| Severe Storms & Flooding | February 12 – March 10, 1986 | DR-758-CA | February 21, 1986 |
| Severe Winter Storms, Flooding, and Mudslides | January 18 – 23, 2017 | DR-4305-CA | March 16, 2017 |
| Severe Winter Storms, Flooding, and Mudslides | February 1 – 23, 2017 | DR-4308-CA | April 1, 2017 |
| Severe Winter Storms, Flooding, Landslides, and Mudslides | December 27, 2022 – January 31, 2023 | DR-4683-CA | January 14, 2023 |
| Severe Winter Storms, Flooding, and Mudslides | January 8 – 31, 2023 | EM-3591-CA | January 9, 2023 |

*Source: (FEMA 2025)*

### *State Proclamations*

Between 1950 and 2025, California included Alameda County in 21 state-proclaimed flood disasters (Cal OES 2025).

Table 10-2. State Disaster Proclamations for Flood

| Event Name | Disaster Number | Proclamation Date |
|---|---|---|
| 1950 Floods | 50-01 | November 21, 1950 |
| 1955 Floods | — | December 22, 1955 |
| 1958 April Storms & Floods | — | April 2, 1958 |
| 1962 Floods and Rains | — | October 17, 1962 |
| 1970 Northern California Flooding | — | January 27, 1970, February 3, 1970, |
| 1982 Winter Storms | — | January 5 – 9, 1982 |
| 1982-83 Floods | 82-18 | December 8, 1982 – March 21, 1983 |
| Bradford Levee Failure | 83-05 | December 9, 1983, January 18, 1984 |
| 1986 Storms | 86-01 | February 18, 1986 – March 12, 1986 |
| 1995 Winter Storms (Northern CA) | 95-01 | Varies from January 9, 1995 – February 17, 1995 |
| 1995 Severe Winter Storms | 95-01, 95-02, 95-03, 95-04 | January 6, 1995 – March 14, 1995 |
| 1995 Late Winter Storms (Northern CA) | 95-03 | Varies from March 12 – 24, 1995 |
| Winter Storms | 97-01 | Varies from January 2 – 31, 1997 |

| Event Name | Disaster Number | Proclamation Date |
|---|---|---|
| State Road Damage | — | January 1, 2003 |
| 2005/06 Winter Storms | 2006-01 | January 12, 2006 |
| Spring Storms 2006 | 2006-03 | April 10, 2006 |
| 2008 January Storms | 2008-01 | January 5, 2008 |
| December 2022-January 2023 Storms | N-1-23, N-2-23, N-10-23 | January 4, 2023 |
| February-March 2024 Storms – additional four counties | N-6-23, N-7-23, N-9-23, N-10-23 | March 28, 2023 |
| Early February 2024 Storms | — | March 22, 2024 |
| March 2024 Storms | — | May 3, 2024 |

*Sources: (State of California 2023) (Cal OES 2025)*

### *USDA Declarations*

Between 2012 and 2025, the USDA has not included Alameda County in declarations relating to flooding (U.S. Department of Agriculture 2025).

## Summary of Significant Events

- **1962 Floods** - The Pacifica Coast from central California to British Colombia experienced winds of gale or hurricane force October 10-14. Several storm fronts with heavy precipitation created severe floods in Northern California. In the coastal areas south of San Francisco Bay, the heavy runoff was concentrated in the East Bay area and in parts of the Santa Clara Valley. The City of Oakland was virtually isolated as local floodwaters and mud slides closed many access roads and streets (Rostvedt et al. 1968).
- **1982 January Flood** - The storm of January 3-5, 1982 had a stable atmospheric structure, and the layer of moist maritime air was confined to altitudes between 50 and 700 feet; this phenomenon caused the rain to fall most heavily along the lower slopes of the coastal mountains. As a result of previously occurring rainfall, streamflow in the San Francisco Bay area exceeded normal from the end of October to the end of December 1981 (Blodgett and Chin 1989).
    - For most streams, the January 1982 flood was the largest since the flood of December 1955, but it was not significantly large in comparison with historic peak-flow data. Damages associated with the storm were substantial, but flooding from stream runoff was not the major problem. Greater than normal antecedent rainfall, together with the prolonged heavy rain, liquified the supersaturated soil cover and caused numerous slope failures and debris flows on steep, unstable slopes (Blodgett and Chin 1989).
- **1986 February 11-20 Floods** - In 1986, a prolonged series of back-to-back Pacific storms whose origins were deeply rooted in the subtropics below Hawaii slammed into the west coast, taking aim at northern California in the middle of February 1986. A destructive combination of heavy precipitation and moderately-high snow levels lasting for nearly 10 days brought catastrophic flooding to much of northern California and also carried across the Sierra Nevada crest into western Nevada. By the time it was over, many precipitation gages over much of California and western Nevada measured storms totals over half of their annual normals (California Nevada River Forecast Center 2012).
    - Based on damage estimates by Cal OES and a 1999 assessment of the damages by the U.S. Army Corps of Engineers, dollar losses totaled $720 million statewide, of which $466 million occurred in the central valley. The loss of human life totaled 13

statewide in California with one of those in the central valley. Nearly 14,000 homes and just over 1,100 businesses were damaged or destroyed by flooding statewide, which included just over 7,000 homes and over 600 businesses located in the central valley. More than 50,000 Californians were evacuated from their homes (California Nevada River Forecast Center 2012).

- **2023 Late February and March Floods** - The 2023 Water Year, in particular the period from late December through the first half of January, and then again from late February through March, brought historical precipitation and snowpack conditions to parts of California and Nevada. Many of the storm systems were characterized by cool temperatures and low snow levels, brought on by numerous moist and strong low pressure systems, including over a dozen Atmospheric Rivers (also referred to as ARs) and three bomb cyclones (a rapidly developing area of low pressure where the atmospheric pressure drops at least 24 millibars over a 24-hour period) during the period from December 2022 through March 2023 (California Nevada River Forecast Center 2024).
    - From December 2022 through March 2023, almost all of California and Nevada saw above-normal precipitation, with the most anomalous amounts primarily falling across central CA into central NV. According to the NOAA National Centers for Environmental Information (NCEI) "Climate at a Glance", California saw the 7th-wettest December through March since 1895 (California Nevada River Forecast Center 2024). In the City of Oakland, over 18 inches of rain fell between December 26, 2022 and January 17, 2023, and peak wind gusts reached 72 mph. The strong winds downed trees and power lines (NWS 2023).

## Recent Events

For the 2026 LHMP update, flood events that impacted the City of Oakland since January 1996 are listed in the table below. For events prior to January 1996, refer to the 2021 LHMP.

Table 10-3. Recent Flood Events Impacting the City of Oakland

| Date(s) of Event | Event Type | FEMA / State Declaration Number (if applicable) | Alameda County included in declaration? | Description |
|---|---|---|---|---|
| December 25, 1997 | Flash Flood | DR-1155-CA | Yes | Rainstorms brought flooding problems to the Bay Area. San Lorenzo Creek, Alameda Creek and Dry Creek all showed moderate increases in stream flow during the warning period. Castro Valley Creek showed sharp increases in stream flow. |
| January 13, 1998 | Flash Flood | DR-1203-CA | Yes | Flooded basement at Whittier Elementary School, located on East 17th St. in Oakland. |
| December 13, 2002 | Flood | N/A | N/A | There were three primary episodes of precipitation in December. The first was a two-day storm with less than an inch and a half accumulation at any one location; flooding problems were not an issue, but the rainfall helped to saturate |

| Date(s) of Event | Event Type | FEMA / State Declaration Number (if applicable) | Alameda County included in declaration? | Description |
|---|---|---|---|---|
| | | | | the soil. The next and by far most serious storm episode lasted on and off for nine days. A very strong and moist jet stream developed across the Pacific Ocean and brought a series of storms into California. Locally heavy rain pounded the north bay counties for days. Flooding was a serious issue, not just for urban and small stream flooding, but for riverine flooding as well. 24-hour rain falls recorded at the Oakland airport for 12/13 to 12/16 were 1.17", 1.88", 0.2", and 1.27". |
| January 16, 2020 | Flood/Heavy Rain | N/A | N/A | A potent cold front swept through the region on January 16, bringing widespread rain, gusty winds, low elevation snow, and thunderstorms. This system brought widespread roadway flooding, downed trees, small hail, and snow as low as 2,400 feet in elevation. Numerous flights were delayed or canceled at San Francisco Airport due to the weather. In Oakland, roadway flooding occurred at I-580 W and Coolidge Ave off ramp. Number 1 lane was flooded from Coolidge to Grand. |
| December 27, 2022 – January 31, 2023 | Flood/Heavy Rain | DR-4683 | N/A | Severe storms with heavy rains over several days caused embankments to erode, undermining road bases, guardrails, and damaging drainage culverts and ditches at nine sites in the City. |

*Sources: (FEMA 2025); (NOAA 2025); (Cal OES 2025); (City of Oakland)*

### 10.1.5 Future Conditions

Future hazard conditions, including frequency and severity of future events, are discussed in the sections below.

#### Probability

The chance of heavy flooding and flash flooding is greatest during California's rainy season from November to April. However, the diversity of climate patterns in California makes flooding more than a seasonal risk. The following are some of the weather and climate conditions that have a significant impact on the occurrence of flooding (Cal OES 2023):

- El Niño conditions
- La Niña conditions

- Desert monsoons
- Tropical storms
- Gulf of Alaska storms
- Atmospheric river patterns

The number of years between floods of any given size varies because of the natural variations in climate and weather events. FEMA conducts flood studies that use historical records to determine the probability of occurrence for different flood levels in a community. FEMA FIRMs identify the flood hazard area as the area that would be inundated by a flood with a 1 percent chance of occurring in any given year (the 1 percent annual chance flood). FIRMs also typically show the extent of the flood with a 0.2 percent chance of occurring in any given year (0.2 percent annual chance flood). These measurements reflect statistical averages only, and it is possible for two or more floods with a 1 percent annual chance to occur in a short time period (USGS n.d.). Table 10-4 summarizes the concept of recurrence intervals and probabilities.

Table 10-4. Recurrence Intervals and Probabilities of Occurrence

| Recurrence Interval (in years) | Probability of Being Equaled or Exceeded in Any Given Year | Percent Chance of Being Equaled or Exceeded in Any Given Year |
|---|---|---|
| 100 | 1 in 100 | 1% |
| 50 | 1 in 50 | 2% |
| 25 | 1 in 25 | 4% |
| 10 | 1 in 10 | 10% |
| 5 | 1 in 5 | 20% |
| 2 | 1 in 2 | 50% |

*Source: (USGS n.d.)*

## Climate Change

Cal-Adapt data shows that California's precipitation patterns are shifting as the climate warms. While overall precipitation is expected to decrease in many southern and inland regions, this does not necessarily mean less flooding. In fact, greater climate variability is projected to bring more intense, episodic rainfall to these areas. Warmer ocean temperatures are increasing the amount of moisture in the atmosphere, which can lead to heavier downpours and a higher likelihood of flash flooding (Cal OES 2023).

The timing of precipitation is also changing. Most rainfall in the State typically occurs from October through April, with runoff peaking in winter and spring. Climate studies indicate that more precipitation will fall as rain instead of snow, causing peak runoff to shift earlier in the season. Earlier snowmelt and increased rainfall, especially in rain-dominated watersheds, rivers can experience higher and earlier peak flows, leading to an increase flood risk during times of the year when communities typically do not expect flooding (Cal OES 2023).

Snowpack in northern and coastal mountains and the Sierra Nevada mountains is projected to be reduced and accompanied by earlier rainfall with subsequent runoff downstream, particularly in the Sacramento River and San Joaquin River watersheds that converge in the California Delta. These trends suggest the potential for increased incidence of intense flooding in the Central Valley and the San Francisco Bay region (Cal OES 2023).

Climate change will also increase other hazards that contribute to flood risk, most notably wildfires. According to California's Fourth Climate Change Assessment, continued increases in greenhouse gas emissions are expected to drive a substantial rise in large wildfires, with a projected 50% increase in fires over 25,000 acres and a 77% increase in average area burned by 2100. Post-fire landscapes are highly vulnerable: vegetation loss and soil damage make it easier for rain to trigger destructive debris flows and mudflows. When storms pass over recently burned areas, runoff can carry ash, sediment, and debris downslope, dramatically intensifying flood impacts and causing significant damage (see Figure 10-3) (Cal OES 2023).

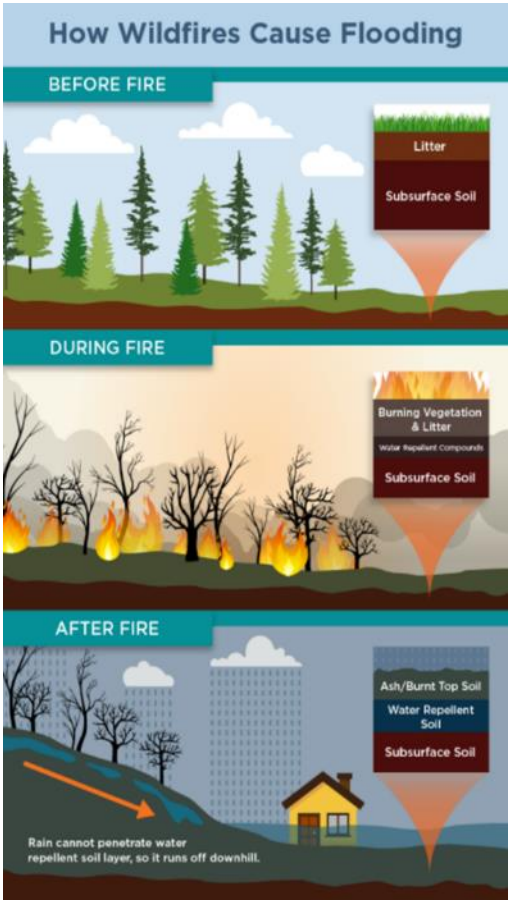



Figure 10-3. How Wildfires Cause Flooding

*Source: (Mesa County 2025)*

## Potential Future Impacts

According to population projections by the California Department of Finance, Alameda County's population is expected to increase to 1.84 million by 2050. This represents an 11.5 percent increase from the 2025 population of 1.65 million (California Department of Finance 2025). Additionally, the population of the City of Oakland is anticipated to rise. On average, the City is expected to grow by 40% over the next 20 years (City of Oakland 2025).

As more people move into the City and redevelopment adds new housing and businesses, a growing population means more residents and structures are located in areas that could be affected by flooding. Even though the City is largely built out, increased density can place more people directly in harm's way when flood events occur.

While floodplains have previously been mapped by FEMA, the City is in the process of remapping floodplains. The City will be well-equipped to manage growth in floodplains with its flood damage prevention ordinance, its building code, and the Safety Element of its General Plan. Proper application of these tools requires accurate hazard mapping. Flood mapping should be taken into account as future land use decisions are made for areas impacted by flooding (see Section 19.4 Mitigation Action Plan and Implementation).

## 10.2 VULNERABILITY ASSESSMENT

**Local Plan Requirement B1 – 44 CFR Part 201.6(c)(2)(ii)**

***The plan must include a description of the jurisdiction's vulnerability to the hazards of concern and include an overall summary of the hazard's impact on the community. The impacts need to include the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the hazard areas, and estimate of potential dollar losses to vulnerable structures, and a description of land uses and development trends.***

### 10.2.1 Summary of Vulnerability

FEMA's Hazus program provides software, data, methods, and guidance for estimating risk from natural hazards. Hazus can estimate building damages, economic losses, displaced households, casualties, debris generation and more resulting from a natural hazard event, and can be used in all phases of emergency management (FEMA 2025).

Flood vulnerability in the City of Oakland is focused within the floodplain; however, flooding also takes place outside the floodplain during severe rainfall events and in areas of urban flooding. A Hazus Level 2 user-defined analysis was performed for general building stock, critical facilities and infrastructure in flood zones. Both the effective and preliminary FEMA flood mapping were used to delineate flood hazard areas and estimate potential losses from the 1% and 0.2% annual chance flood events (Table 10-5). The preliminary FIRM covers Peralta Creek only; therefore, the effective maps were used for the remainder of the City.

Table 10-5. Flood Scenarios for the Riverine Flood Vulnerability Assessment

| Flood Scenario | Description |
|---|---|
| 100-Year (1%) | A 100-Year Annual Chance Flood has a 1% chance of occurring or being exceeded each year. An example of this type of event would be a flood caused by high rates of precipitation from a larger storm such as a tropical storm, atmospheric river, or a similar type of storm that rains heavily over several days, which could be about 2 inches or more of rain in one hour that results in flooding. |
| 500-Year (0.2%) | A 500-Year Annual Chance Flood has a 0.2% chance of occurring or being exceeded each year. The event could have about 3 inches or more of rain in one hour that results in flooding. This is the least common and most intense event of the flood events in this assessment. |

### 10.2.2 Impact on Life, Health, and Safety

Floods present threats to public health and safety. Floodwater is generally contaminated by pollutants such as sewage, human and animal feces, pesticides and insecticides, fertilizers, oil, asbestos, and rusting building materials. The following health and safety risks are commonly associated with flood events:

- **Unsafe food**–Floodwaters contain disease-causing bacteria, dirt, oil, human and animal wastes, and farm and industrial chemicals. They carry away whatever lies on the ground and upstream. Their contact with food items, including food crops in agricultural lands, can make that food unsafe to eat and hazardous to human health. Power failures caused by floods damage stored food. Refrigerated and frozen foods

are affected during the outage periods, and thus must be carefully monitored and examined prior to consumption. Foods kept inside cardboard, plastic bags, jars, bottles, and paper packaging are subject to disposal if contaminated by floodwater. Even though the packages do not appear to be wet, they may be unhygienic with mold contamination and deteriorate rapidly.

- **Contaminated drinking/washing water and poor sanitation**–Flooding impairs clean water sources with pollutants and affects sanitary toilets. Direct and indirect contact with the contaminants—whether through direct food intake, vector insects such as flies, unclean hands, or dirty plates and utensils—can result in waterborne infectious disease. Wastewater treatment plants, if flooded and caused to malfunction, can be overloaded with polluted runoff waters and sewage beyond their disposal capacity, resulting in backflows of raw sewage to homes and low-lying grounds. Private wells can be contaminated or damaged severely by floodwater, while private sewage disposal systems can become a cause of infection and illnesses if they are broken or overflow. Unclean drinking and washing water and sanitation, coupled with lack of adequate sewage treatment, can lead to disease outbreaks, including life-threatening cholera, typhoid, dysentery, and some forms of hepatitis.
- **Mosquitoes and animals** – Prolonged rainfall and floods provide new breeding grounds for mosquitoes—wet areas and stagnant pools—and can lead to an increase in the number of mosquito-borne diseases such as malaria and dengue and West Nile fevers. Rats, other rodents, and wild animals can carry viruses and diseases.
- **Molds and mildews**–Excessive exposure to molds and mildews can cause flood victims—especially those with allergies and asthma—to contract upper respiratory diseases and to trigger cold-like symptoms such as sore throat, watery eyes, wheezing and dizziness. Molds grow in as short a period as 24 to 48 hours in wet and damp areas of buildings and homes that have not been cleaned after flooding, such as water-infiltrated walls, floors, carpets, toilets, and bathrooms. Very small mold spores can be easily inhaled by human bodies and, in large enough quantities, cause allergic reactions, asthma episodes, and other respiratory problems. Infants, children, elderly people and pregnant women are considered most vulnerable to mold-induced health problems.
- **Carbon monoxide poisoning**–Carbon monoxide poisoning is a potential hazard after major floods. Carbon monoxide can be found in combustion fumes, such as those generated by small gasoline engines, stoves, generators, lanterns and gas ranges, or by burning charcoal or wood. In the event of power outages following floods, flood victims tend to use alternative sources of fuels for heating, cooling, or cooking inside enclosed or partly enclosed houses, garages or buildings without an adequate level of air ventilation. Carbon monoxide builds up from these sources and poisons the people and animals inside.
- **Hazards when reentering and cleaning flooded homes and buildings**–Flooded buildings can pose health hazards after floodwaters recede. Electrical power systems can become hazardous. Gas leaks from pipelines or propane tanks can trigger explosions when entering and cleaning damaged buildings or working to restore utility service. Flood debris, such as broken bottles, wood, stones, and walls, may cause wounds and injuries when cleaning damaged buildings. Containers of hazardous chemicals, including pesticides, insecticides, fertilizers, car batteries, propane tanks and other industrial chemicals, may be hidden or buried under flood debris. A health

hazard can also occur when hazardous dust and mold in ducts, fans and ventilators of air-conditioning and heating equipment are circulated through a building and inhaled, such as by those engaged in cleanup.

- **Mental stress and fatigue** – Exposure to extreme disaster events can cause psychological distress and long-term psychological impact. The expense and effort required to repair flood-damaged homes places severe financial and psychological burdens on the people affected, in particular the unprepared and uninsured. Post-flood recovery—especially when prolonged—can cause anxiety, anger, depression, lethargy, hyperactivity, sleeplessness, and, in an extreme case, suicide. Behavior changes may also occur in children. There is also a long-term concern among the affected that their homes can be flooded again in the future.

To estimate population exposure to the 1% and 0.2% annual chance flood events, the digital flood insurance rate map (DFIRM) flood boundaries were used. Based on the spatial analysis, there are an estimated 2,114 residents living in the 1% annual chance floodplain, or 0.5% of the City's total population. There are an estimated 29,738 residents living in the 0.2% annual chance floodplain, or 6.7% of the City's total population. Table 10-6 summarizes the population exposed to the flood hazard by jurisdiction.

A Flood Insurance Rate Map (FIRM) is the official map of a community which defines both the special flood hazard areas and applicable flood zones within a community. FIRMs are used for floodplain management, mitigation, and insurance purposes. Digital FIRMs (DFIRMs) GIS-compatible versions of FIRMs.

Table 10-6. Estimated Number of Persons in the City of Oakland Living in the 1% and 0.2% Annual Chance Flood Hazard Area

| | | 1% Annual Chance Flood Hazard Area | | 0.2% Annual Chance Flood Hazard Area | |
|---|---|---|---|---|---|
| **Sub-Area** | **Total Population[1]** | **Population Exposed[2]** | **% Total** | **Population Exposed[2]** | **% Total** |
| Central East Oakland | 105,554 | 640 | 0.6% | 13,879 | 13.1% |
| Coliseum/Airport | 4,879 | 31 | 0.6% | 883 | 18.1% |
| Downtown | 21,616 | 9 | 0.0% | 895 | 4.1% |
| East Oakland Hills | 31,326 | 50 | 0.2% | 50 | 0.2% |
| Eastlake/Fruitvale | 101,468 | 580 | 0.6% | 9,657 | 9.5% |
| Glenview/ Redwood Heights | 32,929 | 148 | 0.5% | 214 | 0.7% |
| North Oakland Hills | 24,816 | 159 | 0.6% | 178 | 0.7% |
| North Oakland/Adams Point | 85,380 | 497 | 0.6% | 1,899 | 2.2% |
| West Oakland | 32,669 | 0 | 0.0% | 2,084 | 6.4% |
| **Total** | **440,637** | **2,114** | **0.5%** | **29,738** | **6.7%** |

*Sources: (FEMA 2018); City of Oakland 2017; City of Oakland 2025*

*Note: (1) Population calculated using 2020 Census data from Hazus v6.1.*

*(2) Percent of residential buildings exposed multiplied by the Estimated Population.*

As a result of a significant flood event, residents may be displaced or require temporary to long term sheltering. The number of people requiring shelter is generally less than the number displaced as some displaced persons use hotels or stay with family or friends following a disaster event. Table 10-7 summarizes the estimated number of displaced households and people seeking short-term sheltering caused by the 1% and 0.2% annual chance flood events.

Table 10-7. Estimated Flood Impact on Persons and Households

| Sub-Area | 1% Annual Chance Flood Event | | 0.2% Annual Chance Flood Event | |
|---|---|---|---|---|
| | Displaced Households | Short-Term Shelter | Displaced Households | Short-Term Shelter |
| Central East Oakland | 52 | 31 | 8,151 | 1,079 |
| Coliseum/Airport | 2 | 1 | 425 | 38 |
| Downtown | 3 | 0 | 419 | 24 |
| East Oakland Hills | 4 | 3 | 4 | 3 |
| Eastlake/Fruitvale | 49 | 22 | 4,351 | 627 |
| Glenview/ Redwood Heights | 9 | 2 | 23 | 3 |
| North Oakland Hills | 21 | 3 | 18 | 3 |
| North Oakland/Adams Point | 46 | 19 | 398 | 75 |
| West Oakland | 0 | 0 | 1,044 | 36 |
| **Total** | **186** | **81** | **14,832** | **1,889** |

*Source: (FEMA 2018); City of Oakland 2017; City of Oakland 2025*
*Note: Calculated using a Census tract level, general building stock (GBS) analysis in Hazus 6.1, and adjusted to reflect the estimated population.*

## Equity Priority Communities

For this LHMP update, the composite score of each census tract is divided into three categories (91-100, 81-90, and ≤80) based on social vulnerabilities. Populations in these categories are recognized as communities facing social vulnerabilities creating additional barriers in the face of natural hazards (Equity Priority Communities). In the City of Oakland, people that live within the 1% and 0.2% annual chance flood hazard areas are exposed and vulnerable to the flood hazard. Within the number of people exposed to flood hazards, the table below shows the Equity Priority Communities population exposed to flooding. Low-income populations, individuals with limited English proficiency, and certain minority groups are disproportionately concentrated in flood-prone areas with poorly maintained infrastructure. Low-income individuals may only be able to afford to rent or buy property in areas more prone to disaster, such as in floodplains. Renters often have less resources or agencies to prepare for or recover from flooding and may face housing instability after disaster. Language and culture barriers may limit access to information and resources that influence choosing where to live. Additionally, physical disabilities may reduce geographic mobility (EPA n.d.). Mobile homes are less resilient to flood damage due to lack of elevation and cost-effective construction. (Princeton University 2025).

Flooding is associated with contaminated water, the spread of diseases, and carbon monoxide poisoning related to power outages. People with disabilities who live in flood

zones or flood prone areas face greater vulnerability to health disparities (National Council on Disability n.d.)

Table 10-8. Estimated Number of Equity Priority Community Members Exposed to Flood – 1% Annual Chance Flood Hazard Area

| Sub-Areas | Equity Priority Community Thresholds[1] | EPC Population Exposed[2] | % of Total Population Exposed to the Hazard[3] |
|---|---|---|---|
| Central East Oakland | 91-100 | 9 | 1.3% |
| | 81-90 | 290 | 45.2% |
| | ≤80 | 121 | 18.9% |
| Coliseum/Airport | 91-100 | 31 | 100% |
| | 81-90 | 0 | 0% |
| | ≤80 | 0 | 0% |
| Downtown | 91-100 | 0 | 0% |
| | 81-90 | 0 | 0% |
| | ≤80 | 9 | 100% |
| East Oakland Hills | 91-100 | 0 | 0% |
| | 81-90 | 0 | 0% |
| | ≤80 | 0 | 0% |
| Eastlake/Fruitvale | 91-100 | 178 | 30.7% |
| | 81-90 | 62 | 10.8% |
| | ≤80 | 159 | 27.4% |
| Glenview/ Redwood Heights | 91-100 | 0 | 0% |
| | 81-90 | 0 | 0% |
| | ≤80 | 0 | 0% |
| North Oakland Hills | 91-100 | 0 | 0% |
| | 81-90 | 0 | 0% |
| | ≤80 | 0 | 0% |
| North Oakland/Adams Point | 91-100 | 0 | 0 |
| | 81-90 | 0 | 0 |
| | ≤80 | 298 | 60% |
| West Oakland | 91-100 | 0 | 0 |
| | 81-90 | 0 | 0 |
| | ≤80 | 0 | 0 |
| **Totals** | **91-100** | **218** | **10.3%** |
| | **81-90** | **352** | **16.7%** |
| | **≤80** | **587** | **27.8%** |

*Sources: (FEMA 2018); City of Oakland 2017; (City of Oakland 2023)*

*Notes: (1) These thresholds are determined by the City of Oakland to be the most burdened communities in the City in the General Plan EJ Element.*
*(2) Population, by census tract, within the EPC threshold exposed to the hazard.*
*(3) EPC population exposed compared with total population in sub area.*

Table 10-9. Estimated Number of Equity Priority Community Members Exposed to Flood – 0.2% Annual Chance Flood Hazard Area

| Sub-Areas | Equity Priority Community Thresholds[1] | EPC Population Exposed[2] | % of Total Population Exposed to the Hazard[3] |
|---|---|---|---|
| Central East Oakland | 91-100 | 9,970 | 57.4% |
| | 81-90 | 1,387 | 10.0% |
| | ≤80 | 4,225 | 30.4% |
| Coliseum/Airport | 91-100 | 883 | 100.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 0 | 0.0% |
| Downtown | 91-100 | 0 | 0.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 895 | 100.0% |
| East Oakland Hills | 91-100 | 0 | 0.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 0 | 0.0% |
| Eastlake/Fruitvale | 91-100 | 5,304 | 54.9% |
| | 81-90 | 1,760 | 18.2% |
| | ≤80 | 324 | 3.4% |
| Glenview/ Redwood Heights | 91-100 | 0 | 0.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 0 | 0.0% |
| North Oakland Hills | 91-100 | 0 | 0.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 0 | 0.0% |
| North Oakland/Adams Point | 91-100 | 0 | 0.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 1,279 | 67.4% |
| West Oakland | 91-100 | 0 | 0.0% |
| | 81-90 | 388 | 18.6% |
| | ≤80 | 1,691 | 81.1% |
| **Totals** | **91-100** | **14,157** | **47.6%** |
| | **81-90** | **3,535** | **11.9%** |
| | **≤80** | **8,414** | **28.3%** |

*Sources: (FEMA 2018); City of Oakland 2017; (City of Oakland 2023)*

*Notes: (1) These thresholds are determined by the City of Oakland to be the most burdened communities in the City in the General Plan EJ Element.*
*(2) Population, by census tract, within the EPC threshold exposed to the hazard.*
*(3) EPC population exposed compared with total population in sub area.*

### 10.2.3 Impact on General Building Stock

After considering the population exposed and vulnerable to flooding, the general building stock was evaluated. Exposure includes those buildings located within FEMA's SFHA. Table 10-10 summarizes the number of structures located in the 1% and 0.2% annual chance flood hazard areas. In summary, 532 buildings are located in the 1% annual chance flood hazard area, and 6,041 buildings are located in the 0.2% annual chance flood hazard area.

Table 10-10. Estimated Number of Buildings Located in the SFHA

| | | 1% Annual Chance Flood Hazard Area | | 0.2% Annual Chance Flood Hazard Area | |
|---|---|---|---|---|---|
| Sub-Area | Total Buildings | Buildings Exposed[2] | % Total | Buildings Exposed | % Total |
| Central East Oakland | 22,271 | 149 | 0.7% | 2,667 | 12.0% |
| Coliseum/Airport | 1,229 | 14 | 1.1% | 297 | 24.2% |
| Downtown | 5,087 | 13 | 0.3% | 229 | 4.5% |
| East Oakland Hills | 10,993 | 17 | 0.2% | 18 | 0.2% |
| Eastlake/Fruitvale | 17,046 | 108 | 0.6% | 1,584 | 9.3% |
| Glenview/ Redwood Heights | 11,192 | 52 | 0.5% | 95 | 0.8% |
| North Oakland Hills | 10,125 | 67 | 0.7% | 76 | 0.8% |
| North Oakland/Adams Point | 21,103 | 110 | 0.5% | 463 | 2.2% |
| West Oakland | 6,497 | 2 | 0.0% | 612 | 9.4% |
| **Total** | **105,543** | **532** | **0.5%** | **6,041** | **5.7%** |

*Sources: (FEMA 2018); City of Oakland 2017; City of Oakland 2025*
*Note: Values based off of 2025 tax assessor data provided by Alameda County.*

### 10.2.4 Impact on Community Lifelines

Critical facilities and community lifelines at high risk to flooding are likely to experience functional downtime following a flood event, which could increase the net impact of the event. Other secondary effects of a flood include disruption of services, gas and electrical service disruption, and transportation systems disruptions. These effects can result in shortages of food, utility failures, and contamination of drinking water (Cal OES 2023).

Table 10-11. Community Lifelines Exposed to the Flood Hazard Areas

| Planning Area | Communications | Energy | Food, Hydration, Shelter | Hazardous Materials | Health and Medical | Safety and Security | Transportation | Water Systems | Total |
|---|---|---|---|---|---|---|---|---|---|
| **1% Annual Chance Flood Hazard Area** | | | | | | | | | |
| Central East Oakland | 0 | 0 | 0 | 0 | 0 | 0 | 7 | 0 | 7 |
| Coliseum/Airport | 0 | 0 | 0 | 19 | 0 | 2 | 12 | 0 | 33 |
| Downtown | 8 | 0 | 0 | 2 | 0 | 1 | 8 | 0 | 19 |
| East Oakland Hills | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Eastlake/Fruitvale | 0 | 0 | 0 | 0 | 0 | 0 | 2 | 1 | 3 |
| Glenview/ Redwood Heights | 0 | 0 | 0 | 3 | 0 | 0 | 0 | 0 | 3 |
| North Oakland Hills | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| North Oakland/Adams Point | 0 | 0 | 0 | 3 | 0 | 2 | 0 | 0 | 5 |

| Planning Area | Communications | Energy | Food, Hydration, Shelter | Hazardous Materials | Health and Medical | Safety and Security | Transportation | Water Systems | Total |
|---|---|---|---|---|---|---|---|---|---|
| West Oakland | 14 | 0 | 0 | 0 | 0 | 0 | 9 | 0 | 23 |
| **Total** | **22** | **0** | **0** | **27** | **0** | **5** | **38** | **1** | **93** |
| **0.2% Annual Chance Flood Hazard Area** | | | | | | | | | |
| Central East Oakland | 7 | 1 | 0 | 76 | 0 | 10 | 12 | 0 | 106 |
| Coliseum/Airport | 56 | 0 | 0 | 79 | 0 | 4 | 19 | 1 | 159 |
| Downtown | 9 | 1 | 0 | 7 | 0 | 2 | 8 | 0 | 27 |
| East Oakland Hills | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Eastlake/Fruitvale | 0 | 0 | 0 | 29 | 0 | 6 | 8 | 1 | 44 |
| Glenview/ Redwood Heights | 0 | 0 | 0 | 5 | 0 | 1 | 0 | 0 | 6 |
| North Oakland Hills | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| North Oakland/Adams Point | 0 | 0 | 1 | 5 | 0 | 4 | 0 | 0 | 10 |
| West Oakland | 33 | 0 | 0 | 51 | 0 | 0 | 16 | 2 | 102 |
| **Total** | **105** | **2** | **1** | **253** | **0** | **27** | **63** | **4** | **455** |

*Sources: (FEMA 2018); City of Oakland 2017; City of Oakland 2025*

### 10.2.5 Impact on the Economy

Flood events have the potential to severely impact the economy. Both direct and indirect interruptions and losses could be significant. Table 10-12 displays the estimated exposure to the 1 percent annual chance flood event and Table 10-13 displays the estimated exposure to the 0.2 percent annual chance flood event. For the 1 percent annual chance flood event, over $1.6 billion is exposed (1.3% of total RCV). For the 0.2 percent annual chance flood event, over $12 billion is exposed (10.0% of total RCV).

Table 10-12. Estimated Exposure from the 1 Percent Annual Chance Flood Event

| Sub-Area | Total RCV | Value Structure Exposed ($) | Value Contents Exposed ($) | Total RCV Exposed ($) | % Total |
|---|---|---|---|---|---|
| Central East Oakland | $17,986,229,601 | $109,836,978 | $76,384,957 | $186,221,935 | 1.0% |
| Coliseum/Airport | $5,646,390,094 | $306,143,451 | $305,428,890 | $611,572,341 | 10.8% |
| Downtown | $21,475,904,408 | $71,011,724 | $70,441,504 | $141,453,228 | 0.7% |
| East Oakland Hills | $8,434,796,515 | $38,706,290 | $27,190,173 | $65,896,463 | 0.8% |
| Eastlake/Fruitvale | $20,713,824,637 | $144,796,011 | $158,594,987 | $303,390,998 | 1.5% |
| Glenview/ Redwood Heights | $7,699,736,380 | $28,846,784 | $16,157,544 | $45,004,328 | 0.6% |
| North Oakland Hills | $9,022,389,851 | $28,639,785 | $15,048,263 | $43,688,048 | 0.5% |

| Sub-Area | Total RCV | Value Structure Exposed ($) | Value Contents Exposed ($) | Total RCV Exposed ($) | % Total |
|---|---|---|---|---|---|
| North Oakland/Adams Point | $26,981,073,354 | $127,862,943 | $77,596,320 | $205,459,263 | 0.8% |
| West Oakland | $11,010,987,509 | $27,533,760 | $41,300,640 | $68,834,400 | 0.6% |
| **Total** | **$128,971,332,346** | **$883,377,726** | **$788,143,277** | **$1,671,521,003** | **1.3%** |

*Sources: (FEMA 2018); City of Oakland 2017; City of Oakland 2025*
*Note: Values based off of 2025 tax assessor data provided by Alameda County.*

Table 10-13. Estimated Exposure from the 0.2 Percent Annual Chance Flood Event

| Sub-Area | Total RCV | Value Structure Exposed ($) | Value Contents Exposed ($) | Total RCV Exposed ($) | % Total |
|---|---|---|---|---|---|
| Central East Oakland | $17,986,229,601 | $2,294,634,088 | $2,165,938,017 | $4,460,572,105 | 24.8% |
| Coliseum/Airport | $5,646,390,094 | $1,256,805,902 | $1,283,347,241 | $2,540,153,143 | 45.0% |
| Downtown | $21,475,904,408 | $123,522,265 | $102,584,690 | $226,106,955 | 1.1% |
| East Oakland Hills | $8,434,796,515 | $39,582,074 | $28,065,957 | $67,648,031 | 0.8% |
| Eastlake/Fruitvale | $20,713,824,637 | $1,349,646,114 | $989,330,322 | $2,338,976,436 | 11.3% |
| Glenview/ Redwood Heights | $7,699,736,380 | $76,687,892 | $51,457,941 | $128,145,833 | 1.7% |
| North Oakland Hills | $9,022,389,851 | $30,567,434 | $16,152,638 | $46,720,072 | 0.5% |
| North Oakland/Adams Point | $26,981,073,354 | $419,694,154 | $241,880,172 | $661,574,326 | 2.5% |
| West Oakland | $11,010,987,509 | $1,182,988,900 | $1,212,172,746 | $2,395,161,646 | 21.8% |
| **Total** | **$128,971,332,346** | **$6,774,128,823** | **$6,090,929,722** | **$12,865,058,545** | **10.0%** |

*Sources: (FEMA 2018); City of Oakland 2017; City of Oakland 2025*
*Note: Values based off of 2025 tax assessor data provided by Alameda County.*

Hazus estimates the volume of debris that may be generated as a result of a flood event to enable the study region to prepare and rapidly and efficiently manage debris removal and disposal (FEMA 2020). Table 10-14 summarizes the overall estimated debris generated as a result of the 1 percent and 0.2 percent annual chance flood events for the City.

Table 10-14. Estimated Debris Generated by Flood Scenarios

| Sub-Area | 1 Percent Annual Chance Flood Event | 0.2 Percent Annual Chance Flood Event |
|---|---|---|
| | Structure Debris | Structure Debris |
| **Central East Oakland** | 594 | 6,451 |
| **Coliseum/Airport** | 49 | 300 |
| **Downtown** | 112 | 138 |
| **East Oakland Hills** | 69 | 89 |
| **Eastlake/Fruitvale** | 663 | 9,516 |
| **Glenview/ Redwood Heights** | 99 | 505 |

| Sub-Area | 1 Percent Annual Chance Flood Event<br>Structure Debris | 0.2 Percent Annual Chance Flood Event<br>Structure Debris |
|---|---|---|
| North Oakland Hills | 20 | 34 |
| North Oakland/Adams Point | 270 | 685 |
| West Oakland | 0 | 270 |
| **Total** | **1,876** | **17,988** |

*Source: (Hazus v6.1 2023)*
*Note: Calculated using a Census tract level, general building stock (GBS) analysis in Hazus 6.1.*

Hazus was used to estimate damages from the 1% and 0.2% annual chance flood events. For the 1% annual chance flood event, over $219 million in damages is expected (0.2% of total RCV). For the 0.2% annual chance flood event, over $1 billion in damage is anticipated (0.8% of total RCV).

Table 10-15. Estimated Damages from the 1 Percent Annual Chance Flood Event

| Sub-Area | Total RCV (1) | Value Structure Damaged ($) (2) | Value Contents Damaged ($) (2) | Total Value Damaged ($) (2) | % Total |
|---|---|---|---|---|---|
| Central East Oakland | $17,986,229,601 | $0 | $59,896 | $59,896 | 0.0% |
| Coliseum/Airport | $5,646,390,094 | $79,604,982 | $109,430,076 | $189,035,058 | 3.3% |
| Downtown | $21,475,904,408 | $635,612 | $3,025,137 | $3,660,749 | 0.0% |
| East Oakland Hills | $8,434,796,515 | $891,263 | $638,733 | $1,529,996 | 0.0% |
| Eastlake/Fruitvale | $20,713,824,637 | $5,432,320 | $17,479,993 | $22,912,313 | 0.1% |
| Glenview/ Redwood Heights | $7,699,736,380 | $46,239 | $22,940 | $69,179 | 0.0% |
| North Oakland Hills | $9,022,389,851 | $51,349 | $32,170 | $83,519 | 0.0% |
| North Oakland/Adams Point | $26,981,073,354 | $1,183,894 | $897,938 | $2,081,832 | 0.0% |
| West Oakland | $11,010,987,509 | $0 | $0 | $0 | 0.0% |
| **Total** | **$128,971,332,346** | **$87,845,660** | **$131,586,882** | **$219,432,542** | **0.2%** |

*Sources: (FEMA 2018); City of Oakland 2017; City of Oakland 2025*
*Notes:*
*(1) Values based off of 2025 tax assessor data provided by Alameda County.*
*(2) Calculated using a user-defined (UDF) analysis in Hazus 6.1.*

Table 10-16. Estimated Damages from the 0.2 Percent Annual Chance Flood Event

| Sub-Area | Total RCV (1) | Value Structure Damaged ($) (2) | Value Contents Damaged ($) (2) | Total Value Damaged ($) (2) | % Total |
|---|---|---|---|---|---|
| Central East Oakland | $17,986,229,601 | $137,100,687 | $358,137,322 | $495,238,009 | 2.8% |
| Coliseum/Airport | $5,646,390,094 | $125,450,479 | $173,695,164 | $299,145,643 | 5.3% |
| Downtown | $21,475,904,408 | $679,192 | $3,120,963 | $3,800,155 | 0.0% |

| Sub-Area | Total RCV (1) | Value Structure Damaged ($) (2) | Value Contents Damaged ($) (2) | Total Value Damaged ($) (2) | % Total |
|---|---|---|---|---|---|
| East Oakland Hills | $8,434,796,515 | $989,131 | $927,389 | $1,916,520 | 0.0% |
| Eastlake/Fruitvale | $20,713,824,637 | $73,269,971 | $92,919,219 | $166,189,189 | 0.8% |
| Glenview/ Redwood Heights | $7,699,736,380 | $4,825,362 | $11,263,514 | $16,088,876 | 0.2% |
| North Oakland Hills | $9,022,389,851 | $305,956 | $190,048 | $496,004 | 0.0% |
| North Oakland/Adams Point | $26,981,073,354 | $5,569,374 | $3,230,443 | $8,799,816 | 0.0% |
| West Oakland | $11,010,987,509 | $21,813,352 | $64,570,470 | $86,383,822 | 0.8% |
| **Total** | **$128,971,332,346** | **$370,003,503** | **$708,054,532** | **$1,078,058,035** | **0.8%** |

*Sources: (FEMA 2018); City of Oakland 2017; City of Oakland 2025*
*Notes:*

*(1) Values based off of 2025 tax assessor data provided by Alameda County.*
*(2) Calculated using a user-defined (UDF) analysis in Hazus 6.1.*

## National Flood Insurance Program

The City of Oakland has been participating in the NFIP since September 31, 1982, and has adopted and enforced floodplain management regulations that meet or exceed the requirements of the NFIP. Communities participating in the NFIP may adopt regulations that are more stringent than those contained in 44 CFR 60.3, but not less stringent. The City of Oakland Municipal Code requires new construction to be elevated to 1 foot above the base flood elevation.

Full compliance and good standing under the NFIP are application prerequisites for all FEMA grant programs for which participating jurisdictions are eligible under this plan. At the time of the preparation of this plan, the City is in good standing with NFIP requirements. However, the City's last Community Assistance Visit (CAV), performed by FEMA on September 26, 2017, did identify five (5) property addresses in the City of Oakland that had floodplain violations, interfering with the City's ability to be in good standing with the program. After property owners addressed these issues, the City received communication from FEMA acknowledging that the City sufficiently resolved all deficiencies and violations identified during the CAV.

The first FIRMs in the planning area were available in May 1982. The most recent preliminary FIRMs are dated December 21, 2018. These effective FIRMs form the basis of the risk assessment outlined later in this chapter. In NFIP participating communities, structures permitted or built in the planning area before NFIP and related building code regulations went into effect are called "pre-FIRM" structures, and structures built afterwards are called "post-FIRM."

Table 10-17 lists recent NFIP flood insurance statistics for the City of Oakland. As of January 14, 2026, the City has 511 NFIP flood insurance policies, 240 claims have been filed for flood damages totaling $594,471 in payments.

Table 10-17. National Flood Insurance Program Statistics

| NFIP Criteria | Statistic |
|---|---|
| **Date of Entry Initial FIRM Effective Date** | September 30, 1982 |
| **Current Effective FIRM Date** | December 21, 2018 |
| **# of Flood Insurance Policies** | 511 |
| **Insurance In Force** | $185,453,653.00 |
| **Premium in Force** | $362,923 |
| **# of Total Loss Claims filed** | 240 |
| **Total Claims paid** | $594,471 |
| **Average Claim Paid** | $2,477 |

Data as of 01/14/2026

### *Repetitive Loss Properties*

A repetitive loss property is defined by FEMA as an NFIP-insured property that has experienced at least 2 paid flood losses of more than $1,000 each in any 10-year period since 1978 (FEMA 2020). The government has instituted programs encouraging communities to identify and mitigate the causes of repetitive losses. Studies have found that many of these properties are outside any mapped 1 percent annual chance (100-year) floodplain. The key identifiers for repetitive loss properties are the existence of flood insurance policies and claims paid by the policies.

According to data provided by FEMA, the City of Oakland has eight (8) identified repetitive loss properties as of January 14, 2026, (see Table 10-18). One is located inside the SFHA while the remaining seven are located outside of the SFHA. This represents an increase of one property since the completion of the 2021-2026 City of Oakland Hazard Mitigation Plan. The average claim paid for repetitive loss properties is $7,279.68. This would correlate to an approximate flood depth of less than 0.5 feet based on the USACE Flood depth Damage Curves for a 1-story residential structure with no basement. This type of flooding would associate with “nuisance” type of flooding typically attributed to urban drainage issues.

FEMA has not identified any severe repetitive loss properties in the City of Oakland.

Table 10-18. Repetitive Loss Data

| Repetitive Loss Properties | Total Losses | Total Building Payments | Total Contents Payments | Total Payments |
|---|---|---|---|---|
| 8 | 16 | $99,911.39 | $16,563.53 | $116,474.92 |

At the time of this plan update, FEMA had changed its policies regarding the acquisition of information on repetitive loss properties due to implications of the Privacy Act. The “routine use” provision for acquiring this data involves certifications and assurances on how the data will be utilized by entities requesting the data. Due to the expedited timeline for this plan update process, there was not sufficient time to exercise the routine use provisions to acquire repetitive loss data for analysis and assessment. Future updates to this plan will allow for sufficient time to request this data to support the flood hazard risk assessment. An Information Sharing Access Agreement (ISAA) was processed with FEMA during this plan update process. Once that data is received from FEMA, the City will update this section of the plan via the plan maintenance strategy identified in Chapter 20 of this plan.

### 10.2.6 Impact on Historic and Cultural Resources

Historic structures were not constructed to the modern building code and are less likely to be able to withstand the forces of flooding events. This may result in structures being pushed off their foundations, collapses, and other structural failures. Historic structures in the floodplain are also very unlikely to be built to the modern design elevation, making them more likely to be damaged by flooding events.

### 10.2.7 Impact on Ecosystems and Natural Resources

#### Negative Impacts

Flooding can impact the environment in negative ways. Pollution from roads, such as oil and hazardous materials, can wash into rivers and streams. During floods, these can settle onto normally dry soils, polluting them for agricultural uses. Human development, such as bridge abutments, can increase stream bank erosion, causing rivers and streams to migrate into non-natural courses (Cal OES 2023).

Many species of mammals, birds, reptiles, amphibians, and fish live in plant communities dependent on streams, wetlands, and floodplains. Wildlife and fish are impacted when plant communities are eliminated or fundamentally altered, reducing habitat. Since water supply is a major limiting factor for many animals, riparian communities are of special importance (Cal OES 2023).

Floodwater can also alter the landscape, for instance, by eroding riverbanks and causing them to collapse. As floodwater carries material from the eroded banks, it suspends sediment in the water, which can degrade water quality and lead to harmful algae blooms. Suspended sediment eventually settles out of the water in a process called sedimentation, which can clog riverbeds and streams, smother aquatic organisms, and destroy habitats. Erosion and sedimentation have a more negative impact on ecosystems that are already degraded or heavily modified (Cal OES 2023).

#### Positive Impacts

While floods bring hazards, they also bring nutrients and essential components for life. Seasonal floods can renew ecosystems. Floods transport nutrients such as nitrogen, phosphorus, and organic material to the surrounding land. When the water recedes, it leaves sediment and nutrients behind on the floodplain. This rich, natural fertilizer improves soil quality and has a positive effect on plant growth, thus increasing productivity in the ecosystem (Cal OES 2023).

Floods can replenish underground water sources. Floodwater gets absorbed into the ground and then percolates through layers of soil and rock, eventually reaching underground aquifers. These aquifers supply clean freshwater to springs, wells, lakes, and rivers. Ecosystems rely heavily on groundwater during dry spells when it may be the only freshwater supply. A good groundwater supply positively impacts soil health and leads to more productive crop and pasture lands (Cal OES 2023).

Floods can trigger breeding events, migrations, and dispersal in some species. Small seasonal floods can be beneficial to native fish stocks and can help those fish outcompete invasive species that are not adapted to the river's cycles. Sediment deposited on riverbeds

during floods can provide a nursery site for small fish. Nutrients carried by floodwater can support aquatic food webs by boosting productivity (Cal OES 2023).

## 10.3 MITIGATION OPPORTUNITIES

Table 10-19 presents a range of potential opportunities for mitigating the flood hazard.

Table 10-19. Potential Opportunities to Mitigate the Flood Hazard

| Community Scale | Organizational Scale | Government Scale |
|---|---|---|
| **Manipulate the Hazard** | | |
| • Clear storm drains and culverts<br>• Use low-impact development techniques | • Clear storm drains and culverts<br>• Use low-impact development techniques | • Maintain drainage systems<br>• Institute low-impact development techniques on property<br>• Structural flood control, levees, channelization, or revetments<br>• Stormwater management regulations and master planning<br>• Acquire vacant land or promote open space uses in developing watersheds to control increases in runoff<br>• Restore and reconnect floodplains that have been degraded by development and structural flood control |
| **Reduce Exposure and Vulnerability** | | |
| • Locate outside of hazard area<br>• Elevate utilities above base flood elevation<br>• Use low-impact development techniques<br>• Raise structures above base flood elevation<br>• Elevate items within house above base flood elevation<br>• Build new homes above base flood elevation<br>• Flood-proof structures | • Locate outside of hazard area<br>• Use low-impact development techniques<br>• Build critical function redundancy or retrofit critical buildings<br>• Provide floodproofing when new critical infrastructure must be located in floodplains | • Use soft approaches for stream bank restoration and hardening<br>• Locate or relocate critical facilities outside of hazard area<br>• Acquire or relocate identified repetitive loss properties<br>• Promote open space uses in identified high hazard areas via techniques such as: planned unit developments, easements, setbacks, greenways, sensitive area tracks<br>• Adopt land development criteria such as planned unit developments, density transfers, clustering Institute low impact development techniques on property<br>• Acquire vacant land or promote open space uses in developing watersheds to control increases in runoff<br>• Harden infrastructure, bridge replacement program<br>• Provide redundancy for critical functions and infrastructure<br>• Adopt regulatory standards such as freeboard standards, cumulative substantial improvement or damage, lower substantial damage threshold, compensatory storage, non-conversion deed restrictions<br>• Stormwater management regulations and master planning<br>• Adopt “no-adverse impact” floodplain management policies that strive to not increase the flood risk on downstream communities<br>• Improve unpaved roads to reduce their likelihood to fail due to flooding<br>• Preserve floodplain storage capacity by limiting or prohibiting the use of fill in the floodplain<br>• Incorporated green infrastructure into stormwater management facilities<br>• Protect and/or restore riparian buffers |
| **Build Local Capacity** | | |
| • Buy flood insurance<br>• Develop household plan, such as retrofit savings, communication with outside, 72 hour self-sufficiency | • Keep cash reserves for reconstruction<br>• Support and implement hazard disclosure for sale of property in risk zones | • Produce better hazard maps<br>• Provide technical information and guidance<br>• Enact tools to help manage development in hazard areas (stronger controls, tax incentives, and information)<br>• Incorporate retrofitting or replacement of critical system elements in capital improvement plan<br>• Develop strategy to take advantage of post-disaster opportunities |

| | | |
|---|---|---|
| during and after an event | • Solicit cost-sharing through partnerships on projects with multiple benefits | • Warehouse critical infrastructure components<br>• Develop and adopt a continuity of operations plan<br>• Consider participation in the Community Rating System<br>• Maintain and collect data to define risks and vulnerability<br>• Train emergency responders<br>• Create an elevation inventory of structures in the floodplain<br>• Develop and implement a public information strategy<br>• Charge a hazard mitigation fee<br>• Integrate floodplain management policies into other planning mechanisms within the Planning Area.<br>• Consider impacts of climate change on the risk associated with the flood hazard<br>• Consider the residual risk associated with structural flood control in future land use decisions<br>• Enforce National Flood Insurance Program<br>• Adopt a Stormwater Management Master Plan |

# 11. LANDSLIDE

## 11.1 HAZARD PROFILE

**Local Plan Requirement B1 – 44 CFR Part 201.6(c)(2)(i)**

*Include a description of the type, location, and extent for the identified hazards of concern and include information on previous occurrences of hazard events and the probability of future hazard events.*

### 11.1.1 Description of the Hazard

#### Defining the Hazard

A landslide is the downward and outward movement of slope-forming soil, rock, and vegetation driven by gravity. Both natural and human-induced changes in the environment can trigger landslides. The following are the several types of landslides (USGS 2004):

- **Rock falls** are rapid movements of bedrock, which result in bouncing or rolling.
- **Topple** is a section or block of rock that rotates or tilts before falling to the slope below.
- **Slides** are movements of soil or rock along a distinct surface of rupture, which separates the slide material from the more stable underlying material.
- **Mudflows**, sometimes referred to as mudslides, mudflows, lahars, or debris avalanches, are fast-moving rivers of rock, earth, and other debris saturated with water. They develop when water rapidly accumulates in the ground, such as heavy rainfall or rapid snowmelt, changing the soil into a flowing river of mud or "slurry."
- **Slurry** can flow rapidly down slopes or through channels and can strike with little or no warning at avalanche speeds. Slurry can travel several miles from its source, growing larger as it picks up trees, cars, and other materials along the way. As the flows reach flatter ground, the mudflow spreads over a broad area where it can accumulate in thick deposits.
- **Creep** is the imperceptibly slow downward movement of slope forming rock or soil that can be accelerated during wet weather events or earthquakes.

#### Cause of the Hazard

Landslides are caused by a combination of geological and climate conditions and the influence of urbanization. They can be initiated by storms, earthquakes, fires, volcanic eruptions, or human modification of the land. Vulnerable natural conditions are affected by human development and the infrastructure that supports it. In some cases, irrigation increases the landslide potential. The following factors can contribute to slide formation (USGS 2004):

- Change in slope of the terrain
- Increased load on the land
- Shocks and vibrations
- Change in water content
- Groundwater movement
- Frost action
- Weathering of rocks

- Removing or changing the type of vegetation covering slopes
- Wildfire history

Areas that are generally prone to landslide hazards include previous landslide areas, the bases of steep slopes, the bases of drainage channels, and developed hillsides where leach-field septic systems are used. Areas that are typically considered safe from landslides include areas that have not moved in the past, relatively flat-lying areas away from sudden changes in slope, and areas at the top or along ridges set back from the tops of slopes.

While small landslides are frequently a result of human activity, the largest landslides are often naturally occurring phenomena with little or no human contribution. The sites of large landslides are typically areas of previous landslide movement that are periodically reactivated by significant precipitation or seismic events.

### Summary of Potential Impacts

Landslides in hillside terrain can pose serious hazard to downslope property and structures. They can disrupt roadways and other infrastructure lifelines, destroy private property, and cause flooding, bank erosion, and rapid channel migration. A slide can move rapidly down slopes or through channels and can strike with little or no warning. It can travel miles from its source, growing as it descends, picking up trees, boulders, cars, and anything else in its path. Although slides behave as fluids, they convey many times the hydraulic force of water due to the mass of material they carry.

### Cascading Hazard Impacts

Landslides can cause secondary impacts such as blocking roads, which can isolate residents and businesses and delay commercial, public, and private transportation. This can result in economic losses. Other potential problems resulting from landslides are power and communication failures. Vegetation or poles on slopes can be knocked over, resulting in possible losses to power and communication lines. Landslides also have the potential of destabilizing the foundation of structures, which may result in monetary loss for residents. Landslides that block rivers or streams can contribute to flooding. In addition, they also can damage rivers or streams, potentially harming water quality, fisheries, and spawning habitat.

## 11.1.2 Location

The City of Oakland also has areas with land movement (landslide and debris flow) potential. These areas are primarily in the northern foothills of the city. In 2011, the California Geological Survey conducted a statewide analysis using a combination of regional rock strength and slope data to create classes of susceptibility to deep-seated landslides. The analysis assumed, in general, that susceptibility to deep-seated landslides is low on very low slopes in all rock materials and increases with slope and in weak rocks. The analysis also factored in locations of past landslides.

Figure 11-1 shows deep-seated landslide susceptibility classes (none, low, moderate, high, and very high).

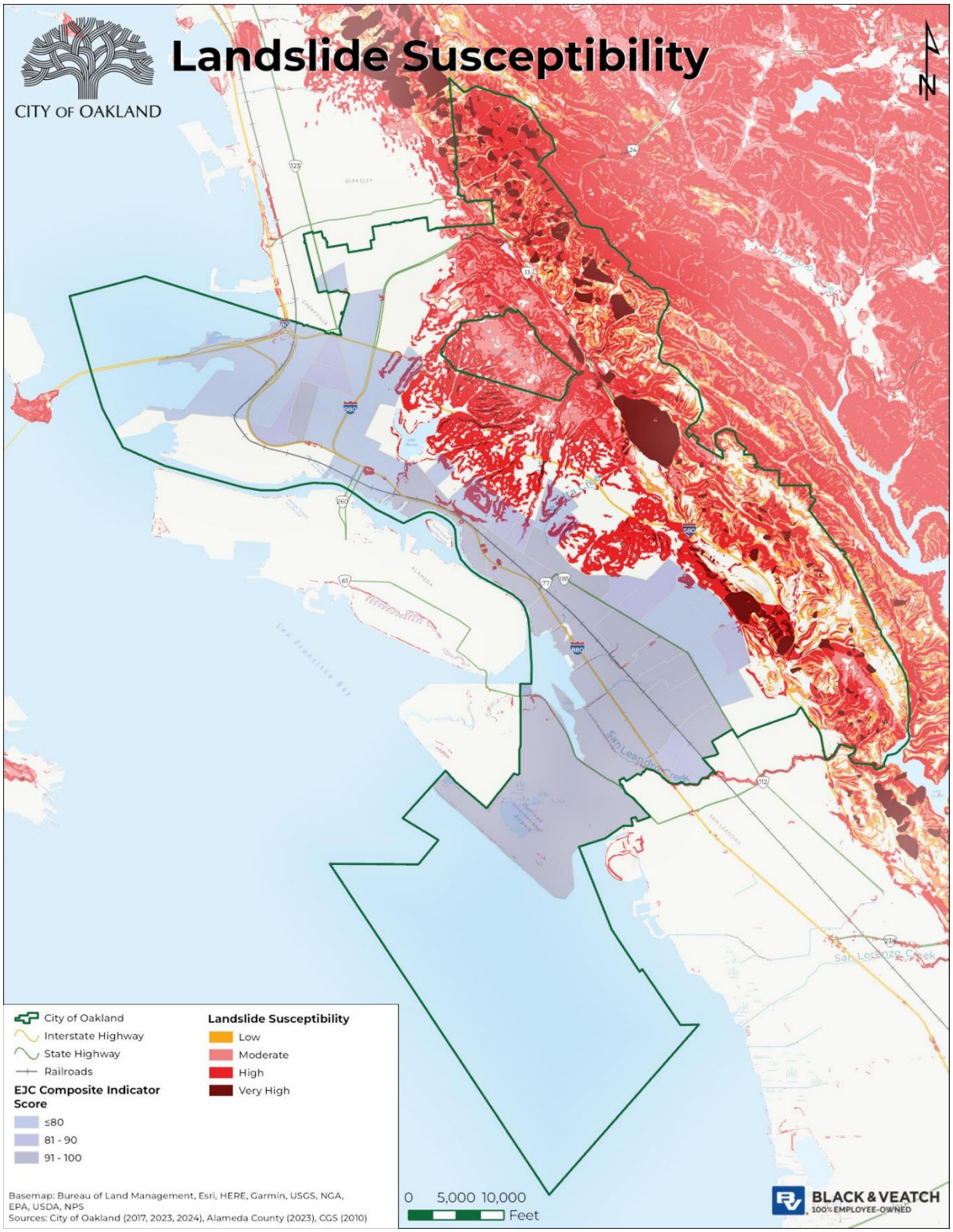



Figure 11-1 Landslide Susceptibility

### 11.1.3 Extent

#### Measuring Intensity

Landslides are typically a function of soil type and steepness of slope. Soil type is a key indicator for landslide potential and is used by geologists and geotechnical engineers to determine soil stability for construction standards. In general, landslide hazard areas are where the land has characteristics that contribute to the risk of the downhill movement of material, such as the following:

- A slope greater than 33 percent.
- Post-wildfire areas.
- A history of landslide activity or movement during the last 10,000 years.
- Stream or wave activity, which has caused erosion, undercut a bank or cut into a bank to cause the surrounding land to be unstable.
- The presence or potential for snow avalanches.
- The presence of an alluvial fan, indicating vulnerability to the flow of debris or sediments.
- The presence of impermeable soils, such as silt or clay, mixed with granular soils, such as sand or gravel.

The best predictor of where slides might occur is the location of past movements. Past landslides can be recognized by their distinctive topographic shapes, which can remain in place for thousands of years. Most landslides recognizable in this fashion range from a few acres to several square miles. Most show no evidence of recent movement and are not currently active. A small proportion of them may become active in any given year, with movements concentrated within all or part of the landslide masses or around their edges. The recognition of ancient dormant landslide sites is important in the identification of areas susceptible to flows and slides because they can be reactivated by earthquakes or by exceptionally wet weather. Also, because they consist of broken materials and frequently involve disruption of groundwater flow, these dormant sites are vulnerable to construction-triggered sliding.

#### Warning Time

Landslides can occur suddenly or slowly. The velocity of slide may range from a slow creep of inches per year to many feet per second, depending on slope angle, material, and water content. Generally accepted warning signs for landslide activity include the following (USGS 2008):

- Springs, seeps, or saturated ground in areas that have not typically been wet before
- New cracks or unusual bulges in the ground, street pavements, or sidewalks
- Soil moving away from foundations
- Ancillary structures such as decks and patios tilting or moving relative to the main house
- Tilting or cracking concrete floors and foundations
- Broken water lines and other underground utilities
- Leaning telephone poles, trees, retaining walls or fences
- Offset fence lines
- Sunken or down-dropped roadbeds

- Rapid increase in creek water levels, possibly accompanied by increased turbidity (soil content)
- Sudden decrease in creek water levels though rain is still falling or just recently stopped
- Sticking doors and windows and visible open spaces indicating frames out of plumb
- A faint rumbling sound that increases in volume as the landslide nears
- Unusual sounds, such as trees cracking or boulders knocking together

Some methods used to monitor landslides can provide an idea of the type of slide and the amount of time prior to failure. Assessing the geology, vegetation, and amount of predicted precipitation for an area can help in predictions of what areas are at risk during general time periods. Currently, there is no practical warning system for individual landslides, however. The standard operating procedure is to monitor situations on a case-by-case basis and respond after an event has occurred.

### Worst-Case Scenario

The worst-case scenario for landslide hazards in the Planning Area would generally correspond to a severe storm with heavy rain that caused flooding in an area that had been burned by fire. Landslides are more likely during the late winter when the water table is high. After heavy rains from November to December, soil become saturated with water. As water seeps downward through upper soils that may consist of permeable sand and gravels and as it accumulates on impermeable silt, it will weaken and destabilize the slope. A short intense storm could cause saturated soil to move, resulting in landslides. As rain continues, the groundwater table rises, adding to the weakening of the slope. Gravity, poor drainage, a rising groundwater table, and poor soil exacerbate hazardous conditions.

## 11.1.4 Previous Occurrences

The following sections provide a review of previous landslide occurrences in Alameda County which may or may not have had impacts within the City of Oakland.

### Declarations

#### *Federal Declarations*

Between 1954 and 2025, FEMA included that Alameda County in 12 disaster declarations (DR) related to landslide (FEMA 2025).

Table 11-1. Federal Disaster Declarations for Landslide

| Event Name | Disaster Number | Declaration Date |
|---|---|---|
| Severe storms, flooding, mudslides, and high tide | DR-651-CA | January 7, 1982 |
| Severe winter storms, flooding, landslides, mud flow | DR-1044-CA | January 10, 1995 |
| Severe winter storms, flooding, landslides, mud flow | DR-1046-CA | March 12, 1995 |
| Severe storms, flooding, mudslides, and landslides | DR-1155-CA | January 4, 1997 |
| Severe, flooding, mudslides, and landslides | DR-1628-CA | February 3, 2006 |
| Severe, flooding, mudslides, and landslides | DR-1646-CA | June 5, 2006 |
| Severe storms, flooding, and mudslides | DR-4301-CA | February 14, 2017 |
| Severe storms, flooding, and mudslides | DR-4305-CA | March 16, 2017 |
| Severe storms, flooding, and mudslides | DR-4308-CA | April 1, 2017 |
| Severe storms, flooding, mudslides, and landslides | DR-4683-CA | January 14, 2023 |
| Severe storms, flooding, and mudslides | EM-3591-CA | January 9, 2023 |

| Event Name | Disaster Number | Declaration Date |
|---|---|---|
| Severe winter storms, straight-line winds, flooding, landslides and mudslides | DR-4699-CA | April 3, 2023 |

*Source: (FEMA 2025)*

### State Proclamations

Between 1954 and 2025, California included Alameda County in zero state-proclaimed landslide disasters (Cal OES 2025).

Table 11-2. State Disaster Proclamations for Landslide

| Event Name | Disaster Number | Proclamation Date |
|---|---|---|
| March 2024 Storms | - | May 3, 2024 |
| Early February 2024 Storms-Additional Counties | - | March 22, 2024 |

*Sources: (State of California 2023) (Cal OES 2025)*

### USDA Declarations

Between 2012 and 2025, there have been no USDA agricultural disaster declaration related to landslide for Alameda County (USDA 2025).

## Summary of Significant Events

The City of Oakland has had several small-scale debris flow events over the years, as well as major landslide events. Significant events are further described in the sections below.

### January 2023

A hillside north of the Oakland Zoo, collapsed multiple times over a two-week period due to the intense rainstorms and soil saturation in the region. OPW crews spent hours removing debris and sludge.

### April 6, 2017

On April 6, 2017, a large section of Aitken Drive collapsed onto Banning Drive, a street running below. OFD and the Oakland Police Department (OPD) responded to the event, evacuating about six homes in the area. This event left 23 homes in the area without water service for several days. Down power lines left 401 customers in the dark. By early Friday afternoon, the number of those without power was down to 21 and all were expected to have power restored later that day. The landslide brought firefighters, OPW, PG&E, and EBMUD workers to the scene.

### January 3 – 12, 2017

Three storm systems hit the Bay Area in January 2017, causing widespread damage and disruption, primarily to roads and bridges. The City of Oakland received 0.93 inches of rain, and several flights were canceled at Oakland San Francisco Bay Airport due to high winds and reduced visibility. The storm was part of a series of rainstorms starting in October that sent an above normal amount of rainfall to the Bay Area. Oakland recorded 13.54 inches from October 2016 to January 2017, which was 132 percent of the normal total. Alameda County was awarded public assistance funding based on the per capita impact.

### December 17 – January 3, 2006

Heavy precipitation resulted in landslides, damaging the embankment and stormwater conveyance features at three City of Oakland sites. OPW proposed to fix the stormwater

conveyance features damaged by the landslides. FEMA authorized funds to stabilize and restore damage caused by the landslides at each site.

## Recent Events

The City of Oakland has had several small-scale debris flow events over the years, as well as major landslide events. For the 2026 LHMP update, landslide events that occurred in the vicinity of the City of Oakland since January 2017 are listed in the table below. For events prior to January 2017, refer to the 2021 LHMP.

Table 11-3. Recent Landslide Events In and Near the City of Oakland

| Date(s) of Event | Event Type | FEMA / State Declaration Number (if applicable) | Alameda County included in declaration? | Description |
|---|---|---|---|---|
| January 3 – 12, 2017 | Severe Winter Storms, Flooding, and Mudslides | DR-4301-CA | Yes | Three storm systems hit the Bay Area in January 2017, causing widespread damage and disruption, primarily to roads and bridges. The City of Oakland received 0.93 inches of rain, and several flights were canceled at Oakland San Francisco Bay Airport due to high winds and reduced visibility. The storm was part of a series of rainstorms starting in October that sent an above normal amount of rainfall to the Bay Area. Oakland recorded 13.54 inches from October 2016 to January 2017, which was 132 percent of the normal total. Alameda County was awarded public assistance funding based on the per capita impact. |
| January 18 – 23, 2017 | Severe Winter Storms, Flooding, and Mudslides | DR-4305-CA | Yes | Heavy precipitation and high-elevation snow brought totals to near-record or record breaking amounts. |
| February 1 – 23, 2017 | Severe Winter Storms, Flooding, and Mudslides | DR-4301-CA | Yes | A third period of heavy precipitation for the year brought heavy precipitation to the area causing mudslides that made roadways throughout the County impassable. |
| April 6, 2017 | Landslide | - | - | A large section of Aitken Drive collapsed, and six homes were evacuated. Water and power services were impacted. |
| December 27, 2022 – January 31, 2023 | Severe Winter Storms, Flooding, Landslides, and Mudslides | DR-4683-CA | Yes | An atmospheric river struck the region and brought torrential rainfall which set off landslides and mudslides. |

| Date(s) of Event | Event Type | FEMA / State Declaration Number (if applicable) | Alameda County included in declaration? | Description |
|---|---|---|---|---|
| January 8 – 31, 2023 | Severe Winter Storms, Flooding, and Mudslides | EM-3591-CA | Yes | Slope failure and mudslides left homes red-tagged or yellow-tagged, and roads closed to traffic. |
| February 21 – July 10, 2024 | Severe winter storms, straight-line winds, flooding, landslides and mudslides | DR-4699-CA | Yes | An atmospheric brought heavy rainfall that triggered mudslides and landslides that eroded and blocked roadways. |

*Sources: (Cal OES 2025); (FEMA 2025); (NOAA 2025); (City of Oakland)*

### 11.1.5 Future Conditions

Future hazard conditions, including frequency and severity of future events, is discussed in the sections below.

#### Probability

Mass movements are often triggered by other natural hazards such as earthquakes, heavy rain, floods, or wildfires, so their frequency is often related to the frequency of the precipitating hazards. In the City of Oakland, landslides may occur during and after severe storms, so the potential for landslides largely coincides with the potential for sequential severe storms that saturate steep, vulnerable soils. Most weather-induced landslides occur in the winter after the water table has risen. Landslides that result from earthquakes can occur at any time. At least one landslide, whether small or large, is expected to occur annually in the City.

#### Climate Change

According to California's Fourth Climate Change Assessment, the San Francisco Bay Area average annual maximum temperature increased by 1.7°F (0.95 °C) from 1950 to 2005. Even with substantial global efforts to reduce greenhouse gas emissions in the coming decades, the Bay Area will likely see a significant increase in temperature by mid-century. Precipitation in the Bay Area will continue to exhibit high year-to-year variability - "booms and busts" - with very wet and very dry years. Future increases in temperature, regardless of whether total precipitation goes up or down, will likely cause longer and deeper California droughts, posing major problems for water supplies, natural ecosystems, and agriculture. Under a high emissions scenario, average Sierra Nevada snowpack is projected to decline by nearly 20% in the next 2-3 decades, 30% to 60% in mid-century, and by over 80% in late century. The Bay Area's largest winter storms will likely become more intense, and potentially more damaging, in the coming decades (California's Fourth Climate Change Assessment 2018). Increases in frequency and severity of drought and heavy rainfall events increases the risk for landslides.

Warming temperatures combined with expansion of the wildland-urban interface are projected to increase fire risk in most of the Bay Area, though risks may decline in some areas as they become more heavily urbanized (California's Fourth Climate Change Assessment 2018). Changes in wildfire frequency would impact vegetation which helps support steep slopes.

### Potential Future Impacts

According to population projections by the California Department of Finance, Alameda County's population is expected to increase to 1.84 million by 2050. This represents an 11.5 percent increase from the 2025 population of 1.65 million (California Department of Finance 2025). While the City is mostly built out, redevelopment may increase the population and structural value exposed to the hazard. Redevelopment creates an opportunity to correct past land use decisions, including development in areas susceptible to landslides. The City will be well-equipped to manage development with its building code, and the Safety Element of its General Plan.

## 11.2 VULNERABILITY ASSESSMENT

**Local Plan Requirement B1 – 44 CFR Part 201.6(c)(2)(ii)**

***The plan must include a description of the jurisdiction's vulnerability to the hazards of concern and include an overall summary of the hazard's impact on the community. The impacts need to include the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the hazard areas, and estimate of potential dollar losses to vulnerable structures, and a description of land uses and development trends.***

### 11.2.1 Summary of Vulnerability

To evaluate the landslide hazard in the City of Oakland, the California Geological Survey (CGS) deep seated landslide susceptibility data was used to perform a quantitative assessment. Deep seated landslide susceptibility shows the relative likelihood of future landslides based solely on prior failure, rock or soil strength, and steepness of slope. The assessment focused on assets having high or very high susceptibility to landslides based on the CGS data.

### 11.2.2 Impact on Life, Health, and Safety

Typically, a landslide occurs in an isolated area and impacts those populations within the immediate area of the incident. Those that live in areas of high to very high susceptibility have a higher chance of experiencing landslides than those located outside of the hazard area. Table 11-4 presents the estimated number of people located in the landslide susceptibility area. In the City of Oakland, 24% of the population live in the high landslide susceptibility area and 2.8% live in the very high landslide susceptibility area.

Table 11-4. Estimated Number of Persons Located in the High and Very High Landslide Susceptibility Areas

| | | High | | Very High | |
|---|---|---|---|---|---|
| Sub-Area | Total Population[1] | Population Exposed[2] | % Total | Population Exposed[2] | % Total |
| Central East Oakland | 105,554 | 9,476 | 9.0% | 241 | 0.2% |

| | | High | | Very High | |
|---|---|---|---|---|---|
| Sub-Area | Total Population[1] | Population Exposed[2] | % Total | Population Exposed[2] | % Total |
| Coliseum/Airport | 4,879 | 0 | 0.0% | 0 | 0.0% |
| Downtown | 21,616 | 1,899 | 8.8% | 11 | 0.1% |
| East Oakland Hills | 31,326 | 7,708 | 24.6% | 4,412 | 14.1% |
| Eastlake/Fruitvale | 101,468 | 34,058 | 33.6% | 1,066 | 1.1% |
| Glenview/ Redwood Heights | 32,929 | 17,289 | 52.5% | 2,376 | 7.2% |
| North Oakland Hills | 24,816 | 11,697 | 47.1% | 3,246 | 13.1% |
| North Oakland/Adams Point | 85,380 | 23,522 | 27.5% | 962 | 1.1% |
| West Oakland | 32,669 | 0 | 0.0% | 0 | 0.0% |
| **Total** | **440,637** | **105,649** | **24.0%** | **12,314** | **2.8%** |

*Sources: (CGS n.d.)(City of Oakland 2025); (Hazus v6.1 2023)*
*Notes: (1) Population calculated using 2020 Census data from Hazus v6.1.*
*(2) Percent of residential buildings exposed multiplied by the Estimated Population.*

## Equity Priority Communities

For this LHMP update, the composite score of each census tract is divided into three categories (91-100, 81-90, and ≤80) based on social vulnerabilities. Populations in these categories are recognized as communities facing social vulnerabilities creating additional barriers in the face of natural hazards (Equity Priority Communities). In the City of Oakland, people that live within the high to very high landslide susceptibility areas are most at risk to the impacts of landslide events. Within the number of people exposed to landslides, the table below shows the Equity Priority Communities population exposed to landslides. Vulnerability to landslides is impacted by infrastructure quality, community resources, and socio-economic factors such as population density. (Pande, Bhagat and Dhengare 2025). Landslides are frequently secondary hazards triggered by earthquakes, flooding, and wildfire (USGS 2022b). This can exacerbate financial struggles for low-income individuals and complicate already displaced communities (FEMA 2025).

Table 11-5. Estimated Number of Equity Priority Community Members Exposed to the Combined High and Very High Landslide Susceptibility Areas

| Sub-Areas | Equity Priority Community Thresholds[1] | EPC Population Exposed[2] | % of Total Population Exposed to the Hazard[3] |
|---|---|---|---|
| Central East Oakland | 91-100 | 13 | 0.1% |
| | 81-90 | 74 | 0.8% |
| | ≤80 | 189 | 2.0% |
| Coliseum/Airport | 91-100 | 0 | 0.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 0 | 0.0% |
| Downtown | 91-100 | 0 | 0.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 13 | 0.7% |
| East Oakland Hills | 91-100 | 0 | 0.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 0 | 0.0% |
| Eastlake/Fruitvale | 91-100 | 427 | 1.2% |

| Sub-Areas | Equity Priority Community Thresholds[1] | EPC Population Exposed[2] | % of Total Population Exposed to the Hazard[3] |
|---|---|---|---|
| | 81-90 | 3,243 | 9.2% |
| | ≤80 | 6,877 | 19.6% |
| Glenview/ Redwood Heights | 91-100 | 0 | 0.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 0 | 0.0% |
| North Oakland Hills | 91-100 | 0 | 0.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 0 | 0.0% |
| North Oakland/Adams Point | 91-100 | 0 | 0.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 3,013 | 100.0% |
| West Oakland | 91-100 | 0 | 0.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 0 | 12.3% |
| **Totals** | **91-100** | **440** | **0.4%** |
| | **81-90** | **3,318** | **2.8%** |
| | **≤80** | **10,101** | **8.6%** |

*Sources: (City of Oakland 2023); (CGS n.d.)(City of Oakland 2025); (Hazus v6.1 2023)*

*Notes: (1) These thresholds are determined by the City of Oakland to be the most burdened communities in the City in the General Plan EJ Element.*
*(2) Population, by census tract, within the EPC threshold exposed to the hazard.*
*(3) EPC population exposed compared with total population in sub area.*

### 11.2.3 Impact on General Building Stock

Similar to impacts on life, health, and safety, buildings located in high to very high landslide susceptibility are more likely to experience impacts from landslide events. The table below summarizes the number of buildings located in each of the landslide hazard areas (high and very high). In summary, there are 27,998 buildings located in the high hazard area and 4,083 located in the high hazard area.

Table 11-6. Estimated Building Stock Located in the High and Very High Landslide Susceptibility Areas

| | | | High | | Very High | |
|---|---|---|---|---|---|---|
| Sub-Area | Total Buildings | Total Replacement Cost Value | Buildings Exposed | % Total | Buildings Exposed | % Total |
| Central East Oakland | 22,271 | $17,986,229,601 | 2,626 | 11.8% | 65 | 0.3% |
| Coliseum/Airport | 1,229 | $5,646,390,094 | 0 | 0.0% | 0 | 0.0% |
| Downtown | 5,087 | $21,475,904,408 | 404 | 7.9% | 1 | 0.0% |
| East Oakland Hills | 10,993 | $8,434,796,515 | 2,620 | 23.8% | 1,456 | 13.2% |
| Eastlake/Fruitvale | 17,046 | $20,713,824,637 | 6,090 | 35.7% | 202 | 1.2% |
| Glenview/ Redwood Heights | 11,192 | $7,699,736,380 | 5,911 | 52.8% | 824 | 7.4% |
| North Oakland Hills | 10,125 | $9,022,389,851 | 4,778 | 47.2% | 1,328 | 13.1% |
| North Oakland/ Adams Point | 21,103 | $26,981,073,354 | 5,569 | 26.4% | 207 | 1.0% |
| West Oakland | 6,497 | $11,010,987,509 | 0 | 0.0% | 0 | 0.0% |

| | | | High | | Very High | |
|---|---|---|---|---|---|---|
| Sub-Area | Total Buildings | Total Replacement Cost Value | Buildings Exposed | % Total | Buildings Exposed | % Total |
| **Total** | **105,543** | **128,971,332,346** | **27,998** | **26.5%** | **4,083** | **3.9%** |

*Sources: (CGS n.d.); (City of Oakland 2025); (Hazus v6.1 2023)*
*Notes: Values based off of 2025 tax assessor data provided by Alameda County.*

### 11.2.4 Impact on Community Lifelines

Community lifelines could be directly impacted by landslides and experience damages. Landslides that impact roadways could impact access to lifeline facilities. Lifeline facilities that are directly and indirectly exposed to the landslide hazard are likely to experience functional downtime following these events, which could increase the net impact of these events (Cal OES 2023). Table 11-7 summarizes the community lifelines located in the combined high and very high landslide susceptibility area. In total, 233 community lifelines are exposed to the landslide hazard.

Table 11-7. Community Lifelines Exposed to the Combined High & Very High Landslide Susceptibility Area

| Planning Area | Communications | Energy | Food, Hydration, Shelter | Hazardous Materials | Health and Medical | Safety and Security | Transportation | Water Systems | Total |
|---|---|---|---|---|---|---|---|---|---|
| Central East Oakland | 0 | 0 | 0 | 6 | 0 | 4 | 3 | 0 | 13 |
| Coliseum/ Airport | 0 | 0 | 0 | 4 | 0 | 0 | 3 | 0 | 7 |
| Downtown | 6 | 0 | 0 | 1 | 0 | 0 | 5 | 0 | 12 |
| East Oakland Hills | 6 | 1 | 0 | 2 | 0 | 12 | 4 | 0 | 25 |
| Eastlake/ Fruitvale | 5 | 0 | 0 | 11 | 1 | 9 | 14 | 0 | 40 |
| Glenview/ Redwood Heights | 1 | 1 | 0 | 11 | 0 | 10 | 10 | 0 | 33 |
| North Oakland Hills | 37 | 2 | 0 | 8 | 0 | 6 | 8 | 0 | 61 |
| North Oakland/ Adams Point | 0 | 1 | 0 | 17 | 0 | 7 | 14 | 0 | 39 |
| West Oakland | 0 | 0 | 0 | 0 | 0 | 0 | 3 | 0 | 3 |
| **Total** | **55** | **5** | **0** | **60** | **1** | **48** | **64** | **0** | **233** |

*Sources: (CGS n.d.)(City of Oakland 2025)*

### 11.2.5 Impact on the Economy

Geological hazards, like landslides, can impose direct and indirect impacts on society. Direct costs include the actual damage sustained by buildings, property, and infrastructure. Indirect costs, such as clean-up costs, business interruption, loss of tax revenues, reduced property values, and loss of productivity are difficult to measure. Additionally, landslides threaten transportation corridors, fuel and energy conduits, and communication lines (USGS 2003). Estimated exposure to the general building stock can be quantified as shown below in Table 11-8. 2.4% of the total replacement cost of the city's building stock is exposed to the very high landslide hazard area while 19.5% is exposed to the high landslide susceptibility hazard area.

Table 11-8. Estimated Exposure to the High and Very High Landslide Susceptibility Hazard Areas

| Sub-Area | Value of Structure Exposed ($) | Value of Contents Exposed ($) | Value (Structures and Contents Exposed) ($) | % of Total Replacement Value |
|---|---|---|---|---|
| **Very High Landslide Susceptibility Hazard Area** | | | | |
| Central East Oakland | $20,030,571 | $10,015,286 | $30,045,857 | 0.2% |
| Coliseum/Airport | $0 | $0 | $0 | 0.0% |
| Downtown | $271,124 | $135,562 | $406,686 | 0.0% |
| East Oakland Hills | $691,200,639 | $426,965,448 | $1,118,166,087 | 13.3% |
| Eastlake/Fruitvale | $161,144,718 | $80,920,807 | $242,065,525 | 1.2% |
| Glenview/ Redwood Heights | $353,324,318 | $181,268,714 | $534,593,032 | 6.9% |
| North Oakland Hills | $674,004,799 | $351,364,375 | $1,025,369,174 | 11.4% |
| North Oakland/ Adams Point | $108,999,618 | $54,499,809 | $163,499,427 | 0.6% |
| West Oakland | $0 | $0 | $0 | 0.0% |
| **Total** | **$2,008,975,787** | **$1,105,170,001** | **$3,114,145,788** | **2.4%** |
| **High Landslide Susceptibility Hazard Area** | | | | |
| Central East Oakland | $840,369,755 | $460,440,813 | $1,300,810,568 | 7.2% |
| Coliseum/Airport | $0 | $0 | $0 | 0.0% |
| Downtown | $188,536,975 | $115,549,581 | $304,086,556 | 1.4% |
| East Oakland Hills | $1,242,422,367 | $665,091,915 | $1,907,514,282 | 22.6% |
| Eastlake/Fruitvale | $3,806,489,973 | $2,750,890,009 | $6,557,379,982 | 31.7% |
| Glenview/ Redwood Heights | $2,469,367,197 | $1,310,916,163 | $3,780,283,360 | 49.1% |
| North Oakland Hills | $2,888,439,175 | $1,495,088,306 | $4,383,527,481 | 48.6% |
| North Oakland/ Adams Point | $4,329,759,287 | $2,617,053,451 | $6,946,812,738 | 25.7% |
| West Oakland | $0 | $0 | $0 | 0.0% |
| **Total** | **$15,765,384,729** | **$9,415,030,237** | **$25,180,414,966** | **19.5%** |

*Sources: (CGS n.d.)(City of Oakland 2025); (Hazus v6.1 2023)*
*Notes: Values based off of 2025 tax assessor data provided by Alameda County.*

### 11.2.6 Impact on Historic and Cultural Resources

Landslides can cause damage to historical and cultural resources, ranging from structural damage to buildings and monuments to the destruction of artifacts and archaeological sites, impacting cultural heritage.

### 11.2.7 Impact on Ecosystems and Natural Resources

Landslides can cause significant environmental impacts. A landslide alters the landscape. In addition to changes in topography, vegetation and wildlife habitats may be damaged or destroyed. Soil and sediment runoff will accumulate downslope, potentially block waterways and roadways and impairing the quality of streams and other water bodies. Landslides that fall into streams may impact fish and wildlife habitat, as well as affect water quality. Hillsides that provide wildlife habitat can be lost for prolonged periods due to landslides (Cal OES 2023).

In spite of their destructive potential, landslides can serve beneficial functions to the natural environment. They supply sediment and large wood to the channel network and can contribute to complexity and dynamic channel behavior critical for aquatic and riparian ecological diversity.

## 11.3 MITIGATION OPPORTUNITIES

Table 11-9 presents a range of potential opportunities for mitigating the landslide hazard.

Table 11-9. Potential Opportunities to Mitigate the Landslide Hazard

| Community Scale | Organizational Scale | Government Scale |
|---|---|---|
| **Manipulate the Hazard** | | |
| • Stabilize slope (dewater, armor toe)<br>• Reduce weight on top of slope<br>• Minimize vegetation removal and the addition of impervious surfaces | • Stabilize slope (dewater, armor toe) | • Stabilize slope (dewater, armor toe)<br>• Reduce weight on top of slope |
| **Reduce Exposure and Vulnerability** | | |
| • Locate structures outside of hazard area (off unstable land and away from slide-run out area)<br>• Retrofit home | • Locate structures outside of hazard area (off unstable land and away from slide-run out area)<br>• Retrofit at-risk facilities | • Adopt higher regulatory standards for new development within unstable slope areas<br>• Armor/retrofit critical infrastructure against the impact of landslides |
| **Build Local Capacity** | | |
| • Subscribe to warning systems, and develop evacuation plan<br>• Keep cash reserves for reconstruction<br>• Educate yourself on risk reduction techniques for landslide hazards | • Institute warning system, and develop evacuation plan<br>• Keep cash reserves for reconstruction<br>• Develop a continuity of operations plan<br>• Educate employees on the potential exposure to | • Produce better hazard maps<br>• Provide technical information and guidance<br>• Enact tools to help manage development in hazard areas: better land controls, tax incentives, information |

| Community Scale | Organizational Scale | Government Scale |
|---|---|---|
| | landslide hazards and emergency response protocol | • Develop strategy to take advantage of post-disaster opportunities<br>• Warehouse critical infrastructure components<br>• Develop and adopt a continuity of operations plan<br>• Educate the public on the landslide hazard and appropriate risk reduction alternatives<br>• Replace or restore native vegetation known to stabilize steep slopes<br>• Hybrid solutions that combine engineering with a nature-based approach using appropriate vegetation |

# 12. SEA-LEVEL RISE

## 12.1 HAZARD PROFILE

**Local Plan Requirement B1 – 44 CFR Part 201.6(c)(2)(i)**

*Include a description of the type, location, and extent for the identified hazards of concern and include information on previous occurrences of hazard events and the probability of future hazard events.*

### 12.1.1 Description of the Hazard

#### Defining the Hazard

Sea-level rise is the increase in the average height of the ocean's surface, caused primarily by two factors related to global warming: the added water from melting ice sheets and glaciers; and the expansion of seawater as it warms. In the past century, global mean sea level has increased by 9 to 12 inches, with human influence the dominant cause of observed atmospheric and oceanic warming. Given current trends in greenhouse gas emissions and increasing global temperatures, sea-level rise has accelerated in the last decade and is expected to continue to accelerate in the coming decades. Impacts will generally become more frequent and more severe in the latter half of this century (National Oceanic and Atmospheric Administration 2022).

The science of sea-level rise is being continuously revised as climate models are improved and updated with new data and observations. These revisions improve understanding of climate variability and the global oceanic response. Keeping up to date with such scientific advances is vital for developing appropriate adaptation strategies that prove implementable over time.

To support community resilience and adaptation to sea-level, the City of Oakland is involved in the Oakland Alameda Adaptation Committee (OAAC). The committee is a coalition of shoreline communities and stakeholders working to accelerate sea-level rise adaptation, protect and restore water quality, habitat and recreation and promote community resilience (Alameda County n.d.).

#### Cause of the Hazard

Greenhouse gas emissions from human activity have led to climate change. Climate change is characterized by a warming planet and warming oceans that experience thermal expansion and lead to melting glaciers and ice sheets. Sea-level rise is not uniform across geographies and is subject to other factors (National Oceanic and Atmospheric Administration 2022).

#### Summary of Potential Impacts

As a bayfront city, Oakland has long been vulnerable to flooding. Rising waters in San Francisco Bay already affect Oakland with periodic flooding of low-lying shorelines, loss of valuable saltwater marshes, and saltwater impacts on wastewater treatment systems. When heavy rains are coupled with higher-than-normal tides, the high tides can slow the drainage of runoff into the Bay, increasing the potential for urban stormwater flooding. The Oakland

Coliseum and Lake Merritt areas, for example, are near channel restrictions and experience flooding from rainwater that is unable to properly drain when downstream channels reach capacity during high tides. In the Lake Merritt area, several capital projects have been implemented to alleviate upstream flooding, and the City is continuing to further manage lake water levels (City of Oakland 2016).

Rising sea levels represent new challenges to Oakland's future. As bay water levels continue to rise, the extent and frequency of flooding will increase. Areas once considered to be outside of the floodplain will begin to experience periodic coastal and/or urban flooding. Sections of Oakland's shoreline built on bay fill, such as the Port of Oakland and the Oakland San Francisco Bay Airport (OAK), are increasingly vulnerable, because they are at a higher risk of liquefaction during seismic events.

Led by the OAAC, the City of Oakland and neighboring partners are supporting sea-level rise adaptation projects such as the Oakland-Alameda Estuary Adaptation Project. The project is a near-term sea-level rise adaptation concept to address increased coastal, stormwater, and groundwater flooding for up to two feet of sea-level rise over the coming decades (Alameda County n.d.).

### Cascading Hazard Impacts

While an increase of several inches of sea levels of the course of several decades may seem like a small change, coastline flooding has gotten increasingly worse with relatively small increases in the past few decades. Storm surge, high tides, coastal erosion, and wetland loss are amplified with rising sea levels even if storm frequency does not increase. (National Oceanic and Atmospheric Administration 2022). Longer, more frequent and more extensive flooding will occur more frequently as well as worsened shoreline erosion and loss of land (Adapting to Rising Tides n.d.). For more information on flooding, refer to Chapter 10-110 (Flood).

## 12.1.2 Location

In the City of Oakland, the potential for new or prolonged flooding as the sea level rises will not be confined to the shoreline. Sea-level rise will increase the likelihood of major flood events because higher water levels in tidal creeks and flood control channels will reduce capacity to discharge rainfall runoff. While some creeks and coastal infrastructure already flood when rainstorms coincide with high tides, rising sea levels will increasingly cause flooding during smaller, more frequent rainfall events (City of Oakland 2021).

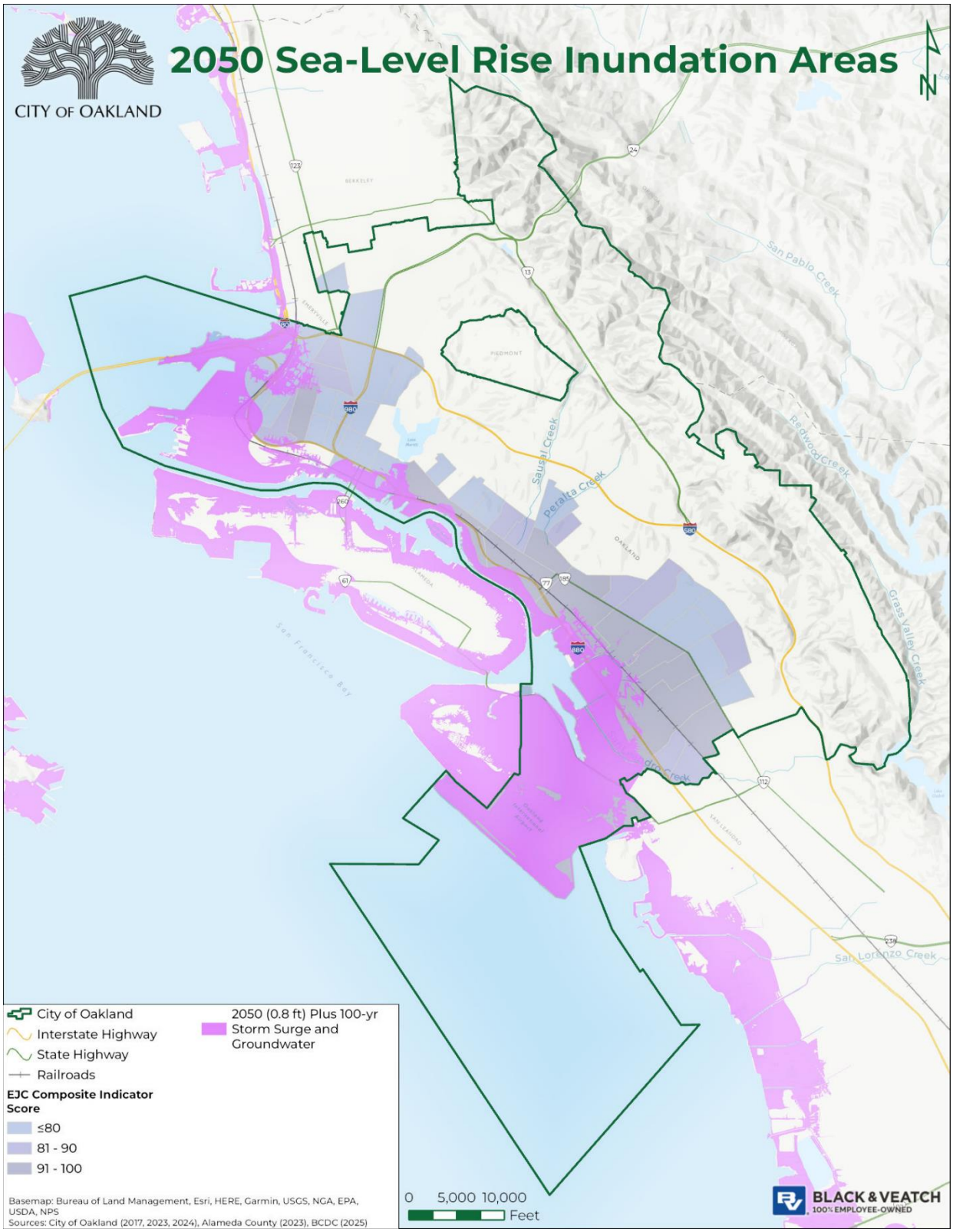



Figure 12-1. 48-inch Sea-Level Rise Projections

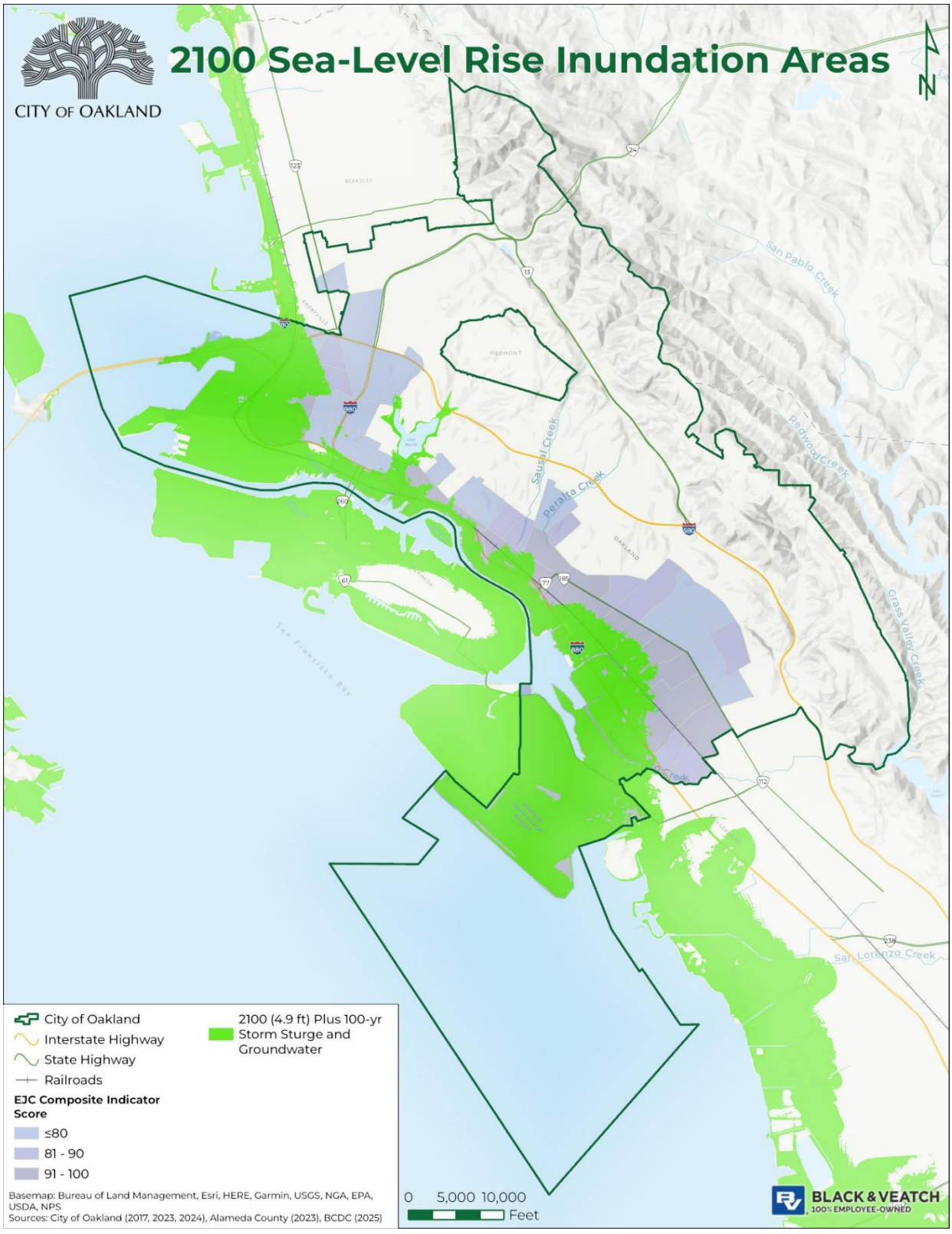



Figure 12-2. 108-inch Sea-Level Rise Projections

## 12.1.3 Extent

### Measuring Intensity

The severity of sea-level rise to the City of Oakland is projected to evolve from chronic to more severe over the next 30 to 80 years. The specific level of severity could be exacerbated by the following conditions:

- **Daily tidal inundation**—As sea-level rises, the amount of land and infrastructure subjected to daily inundation by high tides – also known as increases in mean higher high water – will increase. This would result in increased permanent future inundation of low-lying areas.
- **Annual high tide inundation (King Tides)**—King Tides are abnormally high, predictable astronomical tides that occur approximately twice per year. King Tides are the highest tides that occur each year during the winter and summer when the Earth, moon and sun are aligned. In the winter (December, January, and February), King Tides may be amplified by winter weather, making these events more dramatic. King Tides result in temporary inundation, particularly associated with nuisance flooding, such as inundation of low-lying roads, boardwalks, and waterfront promenades.
- **Extreme high tide inundation (storm surge)**—When Pacific Ocean storms coincide with high tides, storm surge due to meteorological effects can elevate Pacific Ocean and San Francisco Bay water levels and produce extreme high tides, resulting in temporary inundation. Such storm surge events occurred on January 27, 1983, December 3, 1983, February 6, 1998, January 8, 2005, and December 31, 2006. Extreme high tides can cause severe inundation of low-lying roads, boardwalks, and promenades; can exacerbate coastal and riverine flooding and cause upstream flooding; and can interfere with stormwater outfalls.
- **El Niño winter storms—**During El Niño winters, atmospheric and oceanographic conditions in the Pacific Ocean produce severe winter storms that impact the San Francisco shorelines. Pacific Ocean storms follow a more southerly route and bring intense rainfall and storm conditions to the Bay Area. Tides are often elevated 0.5 to 1.0 feet above normal along the coast, and wind setup can elevate water levels even further. El Niño winter conditions prevailed in 1977–1978, 1982– 1983, 1997–1998, 2009–2010, and 2015–2016. Typical impacts include severe inundation of low-lying roads, boardwalks, and waterfront promenades; storm drain backup; wave damage to coastal structures; and erosion of natural shorelines.
- **Ocean swell and wind-wave events (storm waves)—**Pacific Ocean storms and strong thermal gradients can produce strong winds that blow across the ocean and the Bay. When the wind blows over long reaches of open water, large waves can be generated that impact the shoreline and cause damage. Typical impacts include wave damage along the shoreline, particularly to coastal structures such as levees, docks and piers, wharves, and revetments; backshore inundation due to wave overtopping of structures; and erosion of natural shorelines.

#### *Oakland Preliminary Sea-Level Rise Road Map*

Oakland was selected in 2013 to join 100 Resilient Cities, an initiative pioneered by the Rockefeller Foundation to help cities build resilience for the social, economic, and physical challenges of the 21st century. The Oakland Preliminary Sea-Level Rise Road Map was developed in 2017 to identify sea-level rise adaptation actions as part of Resilient Oakland, a

coordinated effort to align resources in support of a resilient community. The working group for The Road Map was made up of City and Port of Oakland staff, county and regional agencies and districts, educational organizations, and community stakeholders, such as the San Francisco Estuary Institute, and the Pacific Institute (City of Oakland 2017a).

#### *Adapting to Rising Tides Program*

The San Francisco Bay Conservation and Development Commission's Adapting to Rising Tides (ART) program works with local, state, regional and federal agencies and organizations to gather, develop and analyze the data needed to understand the impacts of a changing climate on Bay Area communities, infrastructure, services, and natural resources. The ART program has defined potential scenarios for sea-level rise over coming decades and prepared maps showing areas that would become inundated under each scenario. Each ART program project has a repository of data, maps and analysis about various assets and sectors (ART Program 2025).

### Warning Time

Sea-level rise is not a hazard that requires near-term advance warning systems to support response and recovery operations. Programs such as the ART program described above and NOAA's sea-level rise programs are keeping an active watch on the sea-level rise phenomena to keep communities like Oakland informed of the progression. This stream of information will feed City programs such as the Sea-Level Rise Roadmap to help the City to be prepared for and mitigate the long-term impacts from sea-level rise.

### Worst-Case Scenario

Sea levels within the San Francisco Bay could rise three to five feet or more by the end of the century, and the City of Oakland will be adversely impacted by that rise. The impacts are already happening and will progress over time. The City is already preparing for these impacts using programs such as the ART program and the Sea-Level Rise Action Plan Mitigating the impacts from sea-level rise will take resources and some tough land use decisions over the next 75 years.

## 12.1.4 Previous Occurrences

The following sections provide a review of previous Sea-Level Rise occurrences in Alameda County.

### Declarations

#### *Federal Declarations*

There have been no federal declarations for Sea-Level Rise for Alameda County (FEMA 2025).

#### *State Proclamations*

There have been no state proclamations for Sea-Level Rise for Alameda County (Cal OES 2025).

#### *USDA Declarations*

There have been no USDA declarations for Sea-Level Rise for Alameda County (USDA 2025).

### Summary of Recent Significant Events

In the last century, San Francisco Bay water levels have risen 8 inches (State of California Office of Environmental Health Hazard Assessment 2024).

## 12.1.5 Future Conditions

Future hazard conditions, including frequency and severity of future events, is discussed in the sections below.

### Probability

Sea-level rise is an ongoing phenomenon that progresses over time. Neither its past history nor its projected future is based on discrete, countable events. However, scientists do measure long-term values of historical rise and use those data, combined with climate projections, to predict ongoing Sea-Level Rise over defined time periods. The probability of additional sea-level rise inundation in Oakland by 2100 is high, though specific levels are uncertain. The *2017 Oakland Sea Level Rise Road Map* and ART program scenarios (described above) are shown in Table 12-1.

Table 12-1. Range of Estimates for Bay Area Sea-Level Rise

| | Oakland Sea-Level Rise Road Map | | ART Scenarios | |
|---|---|---|---|---|
| Year | Total Rise | Annual Average | Total Rise | Annual Average |
| 2050 | 11 – 24 inches | 0.37 – 0.8 inches per year | 48 inches | 1.6 inches per year |
| 2100 | 36 – 66 inches | 0.45 – 0.825 inches per year | 108 inches | 1.35 inches per year |

*Sources: (City of Oakland 2017); ART, 2017*

### Climate Change

Sea-level rise is driven by the changing and increasing temperatures of earth's surface. As humans continue to burn fossil fuels, greenhouse gases will continue to accumulate in the atmosphere, driving up the earth's temperature and ultimately melting glaciers and ice sheets. The oceans respond to an increase in the earth's temperature over a prolonged period of time, meaning that even if greenhouse gas emissions slow, sea levels will continue to rise due to warming that has already occurred. Scenarios for sea-level rise are intrinsically linked to climate change and how much the earth continues to warm (National Oceanic and Atmospheric Administration 2022).

### Potential Future Impacts

According to population projections by the California Department of Finance, Alameda County's population is expected to increase to 1.84 million by 2050. This represents an 11.5 percent increase from the 2025 population of 1.65 million (California Department of Finance 2025). While the City is mostly built out, redevelopment may increase the population and structural value exposed to the sea-level rise hazard.

Coastal areas that are not currently exposed to the tide will become inundated, displacing people and infrastructure. Beaches, trails, and other shoreline recreation areas will be lost. Changing tidal and wave energy will lead to increased soil erosion and cause shoreline

protection such as levees to be overtopped. Water supplies along the shoreline will experience an increase in groundwater levels and salinity intrusions. This will cause costly damage to below- or at-grade infrastructure and increase the risk of earthquake induced liquefaction (Adapting to Rising Tides n.d.).

## 12.2 VULNERABILITY ASSESSMENT

**Local Plan Requirement B1 – 44 CFR Part 201.6(c)(2)(ii)**

***The plan must include a description of the jurisdiction's vulnerability to the hazards of concern and include an overall summary of the hazard's impact on the community. The impacts need to include the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the hazard areas, and estimate of potential dollar losses to vulnerable structures, and a description of land uses and development trends.***

### 12.2.1 Summary of Vulnerability

Sea-level rise vulnerability is primarily focused on the areas of the City along the San Francisco Bay. Rising bay waters already affect Oakland with periodic coastal flooding of low-lying shorelines, loss of valuable saltwater marshes, and saltwater impacts to wastewater treatment systems serving Oakland. When heavy rains are coupled with higher-than-normal tides, tide levels can slow the drainage of runoff into San Francisco Bay, increasing the potential for urban stormwater flooding (City of Oakland 2017).

For the 2026 LHMP update, sea-level rise projections that align with the General Plan were used to determine the long-term risk of flooding in coastal areas. Sea-level rise is likely to increase the reach of coastal flooding and lead to permanent inundation of low-lying areas. To determine the risk of sea-level rise, two scenarios were selected for the assessment of this plan:

- 2050 scenario – 0.8 feet sea-level rise plus 100-year storm surge and groundwater
- 2100 scenario – 4.9 feet sea-level rise plus 100-year storm surge and groundwater

### 12.2.2 Impact on Life, Health, and Safety

The populations most likely to experience impacts from sea-level rise are those who reside near coastal areas. To estimate population exposure to sea-level rise, mapping of the 0.8 feet and 4.9 feet sea-level rise scenarios plus the 100-year storm surge and groundwater event was used to access vulnerability. The populations most likely to experience impacts from sea-level rise are those who reside near beaches and low-lying shorelines.

Table 12-2. Estimated Number of Persons Exposed to Sea-Level Rise

| | | 2050 Scenario | | 2100 Scenario | |
|---|---|---|---|---|---|
| Sub-Areas | Estimated Population | Population Exposed | % Population | Population Exposed | % Population |
| Central East Oakland | 105,554 | 106 | 0.1% | 3,903 | 3.7% |
| Coliseum/Airport | 4,879 | 872 | 17.9% | 2,225 | 45.6% |
| Downtown | 21,616 | 3,311 | 15.3% | 4,776 | 22.1% |

| | | 2050 Scenario | | 2100 Scenario | |
|---|---|---|---|---|---|
| Sub-Areas | Estimated Population | Population Exposed | % Population | Population Exposed | % Population |
| East Oakland Hills | 31,326 | 0 | 0.0% | 0 | 0.0% |
| Eastlake/Fruitvale | 101,468 | 2,691 | 2.7% | 6,911 | 6.8% |
| Glenview/ Redwood Heights | 32,929 | 0 | 0.0% | 0 | 0.0% |
| North Oakland Hills | 24,816 | 0 | 0.0% | 0 | 0.0% |
| North Oakland/ Adams Point | 85,380 | 0 | 0.0% | 89 | 0.1% |
| West Oakland | 32,669 | 2,132 | 6.5% | 12,783 | 39.1% |
| **Total** | **440,637** | **9,112** | **2.1%** | **30,687** | **7.0%** |

*Sources: (City of Oakland 2025); (RSAP 2025)*
*Notes: (1) Population calculated using 2020 Census data from Hazus v6.1.*
*(2) Percent of residential buildings exposed multiplied by the Estimated Population.*

## Equity Priority Communities

For this LHMP update, the composite score of each census tract is divided into three categories (91-100, 81-90, and ≤80) based on social vulnerabilities. Populations in these categories are recognized as communities facing social vulnerabilities creating additional barriers in the face of natural hazards (Equity Priority Communities). In the City of Oakland, people that live along the coastline are exposed to the potential impacts of sea-level rise. Of the total population exposed to sea-level rise in the 2050 scenario, 5,227 people are located within areas designated as Equity Priority Communities. Of the total population exposed to sea-level rise in the 2100 scenario, 11,911 people are located within areas designated as Equity Priority Communities.

The table below provides the number of people located in the sea-level rise hazard areas within the designated Equity Priority Communities, by sub-areas. Sea-level rise is projected to continue to increase over the coming decades, ultimately displacing coastal and waterfront communities. Climate migration is an emerging phenomenon where those who are financially able to flee from areas prone to floods, storms, heatwaves, droughts, and wildfires. This drives up prices for housing inland areas. Cost-prohibitive housing may impair vulnerable communities' ability to relocate to less flood-prone areas, ultimately subjecting them to increased flood and flood-related impacts (University of Michigan School for Environment and Sustainability 2024).

Table 12-3. Estimated Number of Equity Priority Community Members Exposed to Sea-Level Rise – 2050 Scenario

| Sub-Areas | Equity Priority Community Thresholds[1] | EPC Population Exposed[2] | % of Total Population Exposed to the Hazard[3] |
|---|---|---|---|
| Central East Oakland | 91-100 | 106 | 100.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 0 | 0.0% |
| Coliseum/Airport | 91-100 | 872 | 100.0% |
| | 81-90 | 0 | 0.0% |

| Sub-Areas | Equity Priority Community Thresholds[1] | EPC Population Exposed[2] | % of Total Population Exposed to the Hazard[3] |
|---|---|---|---|
| | ≤80 | 0 | 0.0% |
| Downtown | 91-100 | 0 | 0.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 3,311 | 100.0% |
| East Oakland Hills | 91-100 | 0 | 0.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 0 | 0.0% |
| Eastlake/Fruitvale | 91-100 | 2,691 | 100.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 0 | 0.0% |
| Glenview/ Redwood Heights | 91-100 | 0 | 0.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 0 | 0.0% |
| North Oakland Hills | 91-100 | 0 | 0.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 0 | 0.0% |
| North Oakland/Adams Point | 91-100 | 0 | 0.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 0 | 0.0% |
| West Oakland | 91-100 | 0 | 0.0% |
| | 81-90 | 178 | 8.3% |
| | ≤80 | 1,916 | 89.9% |
| **Totals** | **91-100** | **3,669** | **40.3%** |
| | **81-90** | **178** | **2.0%** |
| | **≤80** | **5,227** | **57.4%** |

*Sources: (City of Oakland 2023); (CGS n.d.)(City of Oakland 2025); (Hazus v6.1 2023)*

*Notes: (1) These thresholds are determined by the City of Oakland to be the most burdened communities in the City in the General Plan EJ Element.*

*(2) Population, by census tract, within the EPC threshold exposed to the hazard.*

*(3) EPC population exposed compared with total population in sub area.*

Table 12-4. Estimated Number of Equity Priority Community Members Exposed to Sea-Level Rise – 2100 Scenario

| Sub-Areas | Equity Priority Community Thresholds[1] | EPC Population Exposed[2] | % of Total Population Exposed to the Hazard[3] |
|---|---|---|---|
| Central East Oakland | 91-100 | 3,903 | 100.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 0 | 0.0% |
| Coliseum/Airport | 91-100 | 2,225 | 100.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 0 | 0.0% |
| Downtown | 91-100 | 0 | 0.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 3,982 | 83.4% |
| East Oakland Hills | 91-100 | 0 | 0.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 0 | 0.0% |
| Eastlake/Fruitvale | 91-100 | 5,841 | 84.5% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 108 | 1.6% |
| Glenview/ Redwood Heights | 91-100 | 0 | 0.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 0 | 0.0% |
| North Oakland Hills | 91-100 | 0 | 0.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 0 | 0.0% |
| North Oakland/Adams Point | 91-100 | 0 | 0.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 35 | 39.5% |
| West Oakland | 91-100 | 1,382 | 10.8% |
| | 81-90 | 3,419 | 26.7% |
| | ≤80 | 7,786 | 60.9% |
| **Totals** | **91-100** | **13,351** | **43.5%** |
| | **81-90** | **3,419** | **11.1%** |
| | **≤80** | **11,911** | **38.8%** |

*Sources: (City of Oakland 2023); (CGS n.d.)(City of Oakland 2025); (Hazus v6.1 2023)*

*Notes: (1) These thresholds are determined by the City of Oakland to be the most burdened communities in the City in the General Plan EJ Element.*
*(2) Population, by census tract, within the EPC threshold exposed to the hazard.*
*(3) EPC population exposed compared with total population in sub area.*

### 12.2.3 Impact on General Building Stock

Table 12-5 summarizes the number of structures located within the two sea-level rise scenarios. Structures most vulnerable to sea-level rise are those situated on beaches and low-lying shorelines. These structures face increased risk of flooding, erosion, and long-term damage as sea levels continue to rise.

Table 12-5. Estimated Number of Buildings Exposed to Sea-Level Rise

| | | 2050 Scenario | | 2100 Scenario | |
|---|---|---|---|---|---|
| **Sub-Area** | **Total Buildings** | **Buildings Exposed** | **% Buildings** | **Buildings Exposed** | **% Buildings** |
| Central East Oakland | 22,271 | 72 | 0.3% | 684 | 3.1% |
| Coliseum/Airport | 1,229 | 372 | 30.3% | 697 | 56.7% |
| Downtown | 5,087 | 1,167 | 22.9% | 1,516 | 29.8% |
| East Oakland Hills | 10,993 | 0 | 0.0% | 0 | 0.0% |
| Eastlake/Fruitvale | 17,046 | 509 | 3.0% | 1,211 | 7.1% |
| Glenview/ Redwood Heights | 11,192 | 0 | 0.0% | 2 | 0.0% |
| North Oakland Hills | 10,125 | 0 | 0.0% | 0 | 0.0% |
| North Oakland/ Adams Point | 21,103 | 0 | 0.0% | 56 | 0.3% |
| West Oakland | 6,497 | 592 | 9.1% | 2,862 | 44.1% |
| **Total** | **105,543** | **2,712** | **2.6%** | **7,028** | **31,338** |

*Sources: (City of Oakland 2025); (RSAP 2025)*
*Notes: Values based off of 2025 tax assessor data provided by Alameda County.*

Table 12-6 and Table 12-7 present the number of buildings by building type exposed to the 2050 and 2100 sea level rise. Residential and commercial buildings are the most exposed to the sea level rise scenarios.

Table 12-6. Estimated Number of Buildings by Building Type Exposed to Sea-Level Rise, 2050 Scenario

| | | 2050 Scenario | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Sub-Area** | **Total Buildings** | **Residential** | **Commercial** | **Industrial** | **Agriculture** | **Religion** | **Government** | **Education** | **Total** |
| Central East Oakland | 22,271 | 11 | 50 | 9 | 0 | 0 | 2 | 0 | 72 |
| Coliseum/Airport | 1,229 | 167 | 136 | 47 | 0 | 5 | 17 | 0 | 372 |
| Downtown | 5,087 | 970 | 166 | 16 | 0 | 0 | 13 | 2 | 1,167 |
| East Oakland Hills | 10,993 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Eastlake/Fruitvale | 17,046 | 391 | 49 | 47 | 0 | 0 | 18 | 4 | 509 |
| Glenview/ Redwood Heights | 11,192 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| North Oakland Hills | 10,125 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| North Oakland/Adams Point | 21,103 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |

| | | 2050 Scenario | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Sub-Area** | **Total Buildings** | **Residential** | **Commercial** | **Industrial** | **Agriculture** | **Religion** | **Government** | **Education** | **Total** |
| West Oakland | 6,497 | 450 | 58 | 51 | 0 | 3 | 30 | 0 | 592 |
| **Total** | **105,543** | **1,989** | **459** | **170** | **0** | **8** | **80** | **6** | **2,712** |

*Sources: (City of Oakland 2025); (RSAP 2025)*

Table 12-7. Estimated Number of Buildings by Building Type Exposed to Sea-Level Rise, 2100 Scenario

| | | 2050 Scenario | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Sub-Area** | **Total Buildings** | **Residential** | **Commercial** | **Industrial** | **Agriculture** | **Religion** | **Government** | **Education** | **Total** |
| Central East Oakland | 22,271 | 461 | 136 | 67 | 0 | 2 | 16 | 2 | 684 |
| Coliseum/Airport | 1,229 | 426 | 169 | 67 | 0 | 5 | 28 | 2 | 697 |
| Downtown | 5,087 | 1,275 | 204 | 18 | 0 | 0 | 17 | 2 | 1,516 |
| East Oakland Hills | 10,993 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Eastlake/Fruitvale | 17,046 | 873 | 216 | 78 | 0 | 4 | 30 | 10 | 1,211 |
| Glenview/ Redwood Heights | 11,192 | 0 | 2 | 0 | 0 | 0 | 0 | 0 | 2 |
| North Oakland Hills | 10,125 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| North Oakland/Adams Point | 21,103 | 17 | 37 | 0 | 0 | 0 | 2 | 0 | 56 |
| West Oakland | 6,497 | 2,373 | 227 | 188 | 0 | 19 | 52 | 3 | 2,862 |
| **Total** | **105,543** | **5,425** | **991** | **418** | **0** | **30** | **145** | **19** | **7,028** |

*Sources: (City of Oakland 2025); (RSAP 2025)*

### 12.2.4 Impact on Community Lifelines

Table 12-8 and Table 12-9 provide the estimated number of community lifelines at risk to sea-level rise. The City has 508 community lifelines at risk to the 2050 scenario and 765 at risk to the 2100 scenario. The City's existing coastal flood issues, including damaged infrastructure, impacted sewage systems, and road closures, will increase in frequency and extent, because rising seas will further elevate extreme tides. Several key assets such as the Oakland San Francisco Bay Airport, rail lines connecting to the seaport of Oakland, and three wastewater treatment plants are vulnerable to future extreme tides (City of Oakland 2017).

Table 12-8. Estimated Community Lifelines Exposed to Sea-Level Rise (2050 Scenario)

| Planning Area | Communications | Energy | Food, Hydration, Shelter | Hazardous Materials | Health and Medical | Safety and Security | Transportation | Water Systems | Total |
|---|---|---|---|---|---|---|---|---|---|
| Central East Oakland | 5 | 1 | 0 | 18 | 0 | 0 | 8 | 0 | 32 |
| Coliseum/Airport | 61 | 1 | 0 | 101 | 0 | 6 | 19 | 1 | 189 |
| Downtown | 46 | 2 | 0 | 17 | 0 | 3 | 8 | 0 | 76 |
| East Oakland Hills | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Eastlake/Fruitvale | 2 | 1 | 0 | 29 | 0 | 2 | 8 | 1 | 43 |
| Glenview/ Redwood Heights | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| North Oakland Hills | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| North Oakland/Adams Point | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| West Oakland | 48 | 5 | 0 | 64 | 0 | 1 | 49 | 1 | 168 |
| **Total** | **162** | **10** | **0** | **229** | **0** | **12** | **92** | **3** | **508** |

*Sources: (City of Oakland 2025); (RSAP 2025)*

Table 12-9. Estimated Community Lifelines Exposed to Sea-Level Rise (2100 Scenario)

| Planning Area | Communications | Energy | Food, Hydration, Shelter | Hazardous Materials | Health and Medical | Safety and Security | Transportation | Water Systems | Total |
|---|---|---|---|---|---|---|---|---|---|
| Central East Oakland | 8 | 1 | 0 | 66 | 0 | 3 | 10 | 0 | 88 |
| Coliseum/Airport | 72 | 2 | 0 | 112 | 0 | 8 | 22 | 1 | 217 |
| Downtown | 52 | 2 | 0 | 30 | 0 | 7 | 15 | 0 | 106 |
| East Oakland Hills | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Eastlake/Fruitvale | 15 | 2 | 1 | 59 | 0 | 6 | 12 | 1 | 96 |
| Glenview/ Redwood Heights | 0 | 0 | 0 | 2 | 0 | 0 | 0 | 0 | 2 |
| North Oakland Hills | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| North Oakland/Adams Point | 0 | 0 | 1 | 2 | 0 | 2 | 0 | 0 | 5 |
| West Oakland | 72 | 9 | 0 | 105 | 0 | 6 | 54 | 5 | 251 |
| **Total** | **219** | **16** | **2** | **376** | **0** | **32** | **113** | **7** | **765** |

Sources: (City of Oakland 2025); (RSAP 2025)

### 12.2.5 Impact on the Economy

Healthy coastal ecosystems support fisheries, tourism, human health, and public safety. Many of these ecosystems are being transformed, degraded, or lost due in part to climate change, particularly sea-level rise and higher numbers of extreme weather events. As sea level continues to rise, repeated disruptions by coastal flooding will aggravate existing impacts on infrastructure, initiate cascading impacts on the larger economy, and burden people. Indirect economic costs (such as lost business) and adverse socio-psychological impacts have the potential to negatively affect people and their communities (Cal OES 2023).

Table 12-10. Estimated Exposure to Sea-Level Rise, 2050 Scenario

| | | 2050 Scenario | | | |
|---|---|---|---|---|---|
| Sub-Area | Total Building Value (Structure and Contents) | Value (Structure) Exposed | Value (Contents) Exposed | Total Building Value (Structure and Contents Exposed) | % of Total Value Exposed |
| Central East Oakland | $17,986,229,601 | $317,340,378 | $329,487,689 | $646,828,067 | 3.6% |
| Coliseum/Airport | $5,646,390,094 | $2,034,687,079 | $2,040,745,832 | $4,075,432,911 | 72.2% |
| Downtown | $21,475,904,408 | $1,262,339,866 | $927,962,766 | $2,190,302,632 | 10.2% |
| East Oakland Hills | $8,434,796,515 | $0 | $0 | $0 | 0.0% |
| Eastlake/Fruitvale | $20,713,824,637 | $1,457,909,574 | $1,065,723,599 | $2,523,633,173 | 12.2% |
| Glenview/ Redwood Heights | $7,699,736,380 | $0 | $0 | $0 | 0.0% |
| North Oakland Hills | $9,022,389,851 | $0 | $0 | $0 | 0.0% |
| North Oakland/Adams Point | $26,981,073,354 | $0 | $0 | $0 | 0.0% |
| West Oakland | $11,010,987,509 | $1,197,226,209 | $1,168,682,151 | $2,365,908,360 | 21.5% |
| **Total** | **$128,971,332,346** | **$6,269,503,106** | **$5,532,602,036** | **$11,802,105,142** | **9.2%** |

*Sources: (City of Oakland 2025); (RSAP 2025)*

Table 12-11. Estimated Exposure to Sea-Level Rise, 2100 Scenario

| | | 2100 Scenario | | | |
|---|---|---|---|---|---|
| Sub-Area | Total Building Value (Structure and Contents) | Value (Structure) Exposed | Value (Contents) Exposed | Total Building Value (Structure and Contents Exposed) | % of Total Value Exposed |
| Central East Oakland | $17,986,229,601 | $1,336,142,248 | $1,478,337,822 | $2,814,480,070 | 15.6% |
| Coliseum/Airport | $5,646,390,094 | $2,644,486,365 | $2,628,731,834 | $5,273,218,199 | 93.4% |
| Downtown | $21,475,904,408 | $2,170,224,733 | $1,769,691,211 | $3,939,915,944 | 18.3% |
| East Oakland Hills | $8,434,796,515 | $0 | $0 | $0 | 0.0% |
| Eastlake/Fruitvale | $20,713,824,637 | $2,437,959,739 | $1,858,001,906 | $4,295,961,645 | 20.7% |
| Glenview/ Redwood Heights | $7,699,736,380 | $1,413,245 | $1,413,245 | $2,826,490 | 0.0% |
| North Oakland Hills | $9,022,389,851 | $0 | $0 | $0 | 0.0% |
| North Oakland/Adams Point | $26,981,073,354 | $144,788,612 | $130,681,761 | $275,470,373 | 1.0% |
| West Oakland | $11,010,987,509 | $3,372,479,849 | $3,079,932,621 | $6,452,412,470 | 58.6% |
| **Total** | **$128,971,332,346** | **$12,107,494,791** | **$10,946,790,398** | **$23,054,285,189** | **17.9%** |

*Sources: (City of Oakland 2025); (RSAP 2025)*

### 12.2.6 Impact on Historic and Cultural Resources

The City's historical and cultural assets and resources are vulnerable to sea-level rise, especially those located in low-lying coastal areas. Downtown Oakland's waterfront community, including the historic Jack London District, are vulnerable to sea-level rise and will need to adopt adaptive strategies to prepare existing infrastructure and future development to mitigate urban stormwater and high-tide flooding.

### 12.2.7 Impact on Ecosystems and Natural Resources

Sea-level rise and long-term erosion can result in migration of ecosystems inland. When coastal ecosystems are able to migrate inland, it can help to preserve coastal habitat acreage, but it comes at the expense of the former inland habitats that are replaced. However, if beaches, wetlands, and other coastal habitats are unable to migrate inland as sea levels

rise—because of sediment availability, shoreline armoring, or other development that blocks natural migration—they can be lost to permanent inundation or degraded by saltwater intrusion. This can have resulting impacts related to land subsidence, loss of habitat for fish and wildlife, and loss of aesthetic, recreational, and commercial uses (Cal OES 2023).

Sea-level rise could also lead to rising water tables and permanent inundation at contaminated sites, leading to the release of buried toxins. This is especially true in industrialized coastal areas (Cushing 2025). This increases the potential of hazardous substances migrating through soil. A UC Berkeley study identified more than 5,200 state- and federally managed contaminated sites in the San Francisco Bay Area alone that could be impacted by rising groundwater (UC Berkeley 2023).

## 12.3 MITIGATION OPPORTUNITIES

Table 12-12 presents a range of potential opportunities for mitigating the sea-level rise hazard.

Table 12-12. Potential Opportunities to Mitigate the Sea-Level Rise Hazard

| Community Scale | Organizational Scale | Government Scale |
|---|---|---|
| **Manipulate the Hazard** | | |
| • Barriers (sea wall), only when no nature-based alternative is feasible<br>• Pumps<br>• Protect, preserve, and restore beaches and dunes | • Barriers (sea wall), only when no nature-based alternative is feasible<br>• Pump stations<br>• Protect, preserve, and restore wetlands<br>• Protect, preserve, and restore beaches and dunes | • Barriers (sea wall), only when no nature-based alternative is feasible<br>• Pump Stations<br>• Protect, preserve, and restore wetlands<br>• Protect, preserve, and restore beaches and dunes |
| **Reduce Exposure and Vulnerability** | | |
| • Voluntary retreat<br>• Elevate on fill above sea-level rise elevation<br>• Elevate utilities above sea-level rise elevation<br>• Use low-impact development<br>• Floodproof | • Relocate out hazard zone<br>• Elevate on fill above sea-level rise elevation<br>• Locate critical facilities or functions outside hazard area<br>• Use low-impact development techniques<br>• Build redundancy for critical functions or retrofit critical buildings<br>• Maintain drainage facilities that service your property<br>• Provide flood-proofing when new critical infrastructure must be located in coastal areas | • Buyout/Relocation Program<br>• Promote open space uses in identified high-hazard areas via techniques such as planned unit developments, easements, setbacks, greenways, sensitive area tracks<br>• Adopt land development criteria such as planned unit developments, density transfers, clustering<br>• Institute low impact development techniques<br>• Acquire vacant land or promote open space uses in developing watersheds to control increases in runoff<br>• Harden infrastructure<br>• Provide redundancy for critical infrastructure nodes and systems<br>• Higher regulatory standards in sea-level rise zones<br>• Require accounting of sea-level rise in applications for new shoreline development<br>• Facilitate managed retreat from, or upgrade of, the most at-risk areas |

| Community Scale | Organizational Scale | Government Scale |
|---|---|---|
| | | • Implement tree management programs<br>• Elevate roads that are vital/critical to evacuation and local community operations<br>• Include nature-based elements in infrastructure adaptation projects (e.g., roads) such as living shorelines, ecotone levees, and habitat restoration to increase resilience<br>• Design or enhance existing drainage systems for higher design storms to provide increased capacity of the drainage system |
| **Build Local Capacity** | | |
| • Buy flood insurance<br>• Develop household plan, such as retrofit savings, 72-hour self-sufficiency during and after an event | • Be informed and understand future impacts of sea-level rise on your business<br>• Develop a Continuity of Operations Plan | • Provide technical information and guidance<br>• Promote the purchase of flood insurance<br>• Enact tools to help manage development in hazard areas (stronger controls, tax incentives, information)<br>• Incorporate retrofitting or replacement of critical system elements in capital improvement plan<br>• Develop strategy to take advantage of post-disaster opportunities<br>• Provide incentives to guide development away from hazard areas or to retrofit in place<br>• Provide residents with sea-level rise inundation maps<br>• Develop an adaptive management plan to address the long-term sea-level rise<br>• Restore wetlands, marshes, mudflats, oyster reefs, dunes, beaches, eelgrass, kelp forests, living shorelines and other coastal habitats to enhance resilience and reduce wave impacts during storms<br>• Preserve/restore tidal marshes to enhance resilience and provide multiple benefits, including absorbing floodwaters and reducing wave impacts during storms<br>• Conserve and protect coastal habitat and non-habitat areas suitable for habitat restoration<br>• Establish living shorelines (natural elements including plants, reefs, and oyster beds) to prevent erosion<br>• Incentivize voluntary retreat from coastal hazard areas |

# 13. SEVERE WEATHER

## 13.1 HAZARD PROFILE

**Local Plan Requirement B1 – 44 CFR Part 201.6(c)(2)(i)**

***Include a description of the type, location, and extent for the identified hazards of concern and include information on previous occurrences of hazard events and the probability of future hazard events.***

### 13.1.1 Description of the Hazard

#### Defining the Hazard

Severe weather refers to any dangerous meteorological phenomena with the potential to cause damage, serious social disruption, or loss of human life. The most significant severe weather events to impact the planning area are high winds and extreme heat. For this risk assessment, the term "severe weather" refers to these event types in aggregate. They are assessed as a single hazard for the following reasons:

- Records indicate that each of these weather event types has impacted the planning area to some degree, and all have similar frequencies of occurrence.
- None of these weather event types have a clearly defined extent or location. Therefore, no quantitative, geospatial analysis is available to support exposure or vulnerability analysis; the analyses for this hazard are qualitative.

#### *High Wind*

Windstorms are generally short-duration events involving straight-line winds or gusts of over 50 miles per hour (mph), strong enough to cause property damage. Windstorms are especially dangerous in areas with significant tree stands and areas with exposed property, poorly constructed buildings, mobile homes (manufactured housing units), major infrastructure, and above-ground utility lines. A windstorm can topple trees and power lines, cause damage to residential, commercial and critical facilities, and leave tons of debris in its wake. There are seven types of damaging winds (NOAA n.d.):

- **Straight-line winds**—Any thunderstorm wind that is not associated with rotation; this term is used mainly to differentiate from tornado winds. Most thunderstorms produce some straight-line winds as a result of outflow generated by the thunderstorm downdraft.
- **Downdrafts**—A small-scale column of air that rapidly sinks toward the ground.
- **Downbursts**—A strong downdraft with horizontal dimensions larger than 2.5 miles resulting in an outward burst or damaging winds on or near the ground. Downburst winds may begin as a microburst and spread out over a wider area, sometimes producing damage similar to a strong tornado. Although usually associated with thunderstorms, downbursts can occur with showers too weak to produce thunder.
- **Microbursts**—A small, concentrated downburst that produces an outward burst of damaging winds on the surface. Microbursts are generally less than 2.5 miles across and short-lived, lasting only 5 to 10 minutes, with maximum wind speeds up to 168 mph. There are two kinds of microbursts: wet and dry. A wet microburst is

accompanied by heavy precipitation at the surface. Dry microbursts, common in places like the high plains and the west intermountain, occur with little or no precipitation reaching the ground.

- **Gust front**—A gust front is the leading edge of rain-cooled air that clashes with warmer thunderstorm inflow. Gust fronts are characterized by a wind shift, temperature drop, and gusty winds out ahead of a thunderstorm. Sometimes the winds push up air above them, forming a shelf cloud or detached roll cloud.
- **Derecho**—A derecho is a widespread thunderstorm wind caused when new thunderstorms form along the leading edge of an outflow boundary (the boundary formed by horizontal spreading of thunderstorm-cooled air). The word "derecho" is of Spanish origin and means "straight ahead." Thunderstorms feed on the boundary and continue to reproduce. Derechos typically occur in summer when complexes of thunderstorms form over plains, producing heavy rain and severe wind. The damaging winds can last a long time and cover a large area.
- **Bow echo**—A bow echo is a linear wind front bent outward in a bow shape. Damaging straight-line winds often occur near the center of a bow echo. Bow echoes can be 200 miles long, last for several hours, and produce extensive damage to the ground.

### *Extreme Heat*

Extreme heat is defined as temperatures that hover 10°F or more above the average high temperatures for a region for several days or weeks (CDC, Heat Health 2024). Extreme heat events can lead to an increase in heat-related illnesses and deaths, cause drought, and impact water supplies. Such events do not typically impact buildings; however, losses may be associated with the urban heat island effect and overheating of heating, ventilation, and air conditioning systems.

Extreme heat is the primary weather-related cause of death in the United States. In a 10-year record of weather fatalities across the nation (2015-2024), excessive heat claimed more lives each year than floods, tornadoes, and hurricanes (NOAA n.d.). According to the *California Climate Adaptation Strategy*, heat waves have claimed more lives in California than all other declared disaster events combined. Despite this history, not a single heat emergency was proclaimed in California at the state or federal level between 1960 and 2025, however the NOAA National Centers for Environmental Information has recorded five heat and two excessive heat events within the San Francisco Bay Shoreline Zone which includes Oakland. Heat waves do not strike victims immediately, but their cumulative effects slowly cause harm to vulnerable populations. Older adults, children, and sick or overweight individuals are at greater risk from extreme heat.

## Cause of the Hazard

### *High Wind*

Longer-period windstorms have two main causes: (1) large differences in atmospheric pressure across a region and (2) strong jet stream winds overhead. Horizontal pressure differences may accelerate the surface winds substantially as air travels from a region of higher atmospheric pressure to one of lower.

### *Extreme Heat*

Extreme heat is caused by persistent high-pressure weather systems trapping warm air. Climate change from human-caused greenhouse gases making these events more frequent and intense. The Urban Heat Island effect also causes extreme heat events, due to a densely built environment absorbing and re-emitting heat from the sun.

## Summary of Potential Impacts

### *High Wind*

There are direct consequences to the local economy resulting from windstorms related to both physical damage and interrupted services. Windstorms can result in collapsed or damaged buildings, damaged or blocked roads and bridges, damaged traffic signals, streetlights and parks, and other damage. Wind speeds as low as 32 mph can cause structural damage, and winds of 100 mph can destroy wood-frame structures.

Wind pressure can create a direct and frontal assault on a structure, pushing walls, doors, and windows inward. Conversely, passing winds can create lift and suction forces that act to pull building components and surfaces outward. As positive and negative forces impact a building's doors, windows, and walls, the result can be roof or building component failures and considerable structural damage. The effects of winds are magnified in the upper levels of multi-story structures.

Debris carried along by extreme winds can contribute directly to loss of life and indirectly to the failure of protective building envelopes. Falling trees and branches can damage buildings, power lines, and other properties and infrastructure. Tree limbs breaking in winds of only 45 mph can be thrown over 75 feet, so overhead power lines can be damaged even in relatively minor windstorm events. During wet winters, saturated soils cause trees to become less stable and more vulnerable to uprooting from high winds. Utility lines brought down by summer thunderstorms have also been known to cause fires, which start in dry roadside vegetation. Electric power lines falling down to the pavement create the possibility of lethal electric shock.

Downed trees and power lines, and damaged property also can be major hindrances to emergency response and disaster recovery. Emergency response operations can be complicated when roads are blocked or when power supplies are interrupted. Industry and commerce can suffer losses from interruptions in electric service and from extended road closures.

Tornados, though rare, have occurred in Northern California and can cause localized damage. A tornado is a violent windstorm characterized by a twisting, funnel-shaped cloud extending to the ground. Tornadoes are most often generated by severe thunderstorm activity when cool, dry air intersects and overrides a layer of warm, moist air, forcing the warm air to rise rapidly. The damage caused by a tornado is a result of the high wind velocity and wind-blown debris, also accompanied by lightning or large hail. According to the NWS, tornado wind speeds normally range from 40 mph to more than 300 mph (NWS n.d.).

### *Extreme Heat*

Extreme heat is one of the leading causes of weather-related deaths in the United States, killing more people than all other weather hazards (except hurricanes) combined. Heat-

related illness includes a spectrum of illnesses ranging from heat cramps to severe heat exhaustion and life-threatening heat stroke. Heat-related illness results from the body's inability to dissipate heat produced by metabolic activity, often as a result of increased ambient temperature. Heat waves can create immediate health effects and have harmful cumulative health effects over time. Elevated nighttime temperatures are likely to cause heat-related illness and mortality. When there is no break from the heat at night, it can cause discomfort and lead to health problems, especially for those who lack access to cooling and health care, which include people with low incomes or who are experiencing homelessness. Other groups that are particularly vulnerable to heat stress include older adults, infants and children, people with chronic health conditions, people with disabilities, outdoor workers, people living in homes with poor insulation and others within identified Equity Priority Communities.

Extreme heat events do not typically impact buildings; however, losses may be associated with the urban heat island effect and overheating of heating, ventilation, and air conditioning systems. Extreme heat can increase stress applied on water, power, and transportation systems. Extreme heat can compromise infrastructure safety and reliability and cause issues such as train track buckling and road material softening.

## Cascading Hazard Impacts

### *High Wind*

High winds can quickly spread wildfires, inundating nearby areas with heavy smoke.

### *Extreme Heat*

A secondary impact of extreme heat is poor air quality, which can occur during summer, when stagnant atmospheric conditions trap humid air and pollutants near the ground and closer to residents. Ozone, a major component of smog, is created in the presence of sunlight via reactions between chemicals in gasoline vapors and industrial smokestacks. Hot weather can increase ozone levels. High ozone levels often cause or worsen respiratory problems.

Public Safety Power Shutoff events (PSPSs) also are secondary hazards associated with severe weather. Under certain severe weather conditions, utility service providers shut off power to help prevent wildfire and keep communities safe. A combination of dry vegetation and high winds can uproot trees, blow branches onto power lines or create sparks if power lines contact one another. These conditions call for a PSPS. These outages occur across the state to prevent wildfires and keep communities safe. Table 13-1 shows the weather conditions that are monitored by utility service providers that trigger PSPS events. PSPS events can impact areas beyond where severe weather conditions are being observed due to the grid nature of electrical power distribution systems. Sustained periods of downtime could lead to significant economic impacts. Power outages can have an adverse effect on individuals requiring power for medical devices or mobility,

Table 13-1. Triggers for Public Safety Power Shutoff Events

| Monitor Factor | Metrics |
|---|---|
| Red Flag Warning | A warning declared by the National Weather Service that weather conditions could lead to fire and rapid spread. |

| Monitor Factor | Metrics |
|---|---|
| Low Humidity | 20% or lower humidity. Low humidity creates dry vegetation, which fuel fire. |
| High Winds | Sustained wind speeds above 25 MPH and wind gusts above 45 MPH can cause fire to spread. |
| Utility Observations | On-the-ground findings from Utility crews. |

*(PG&E 2026)*

### 13.1.2 Location

#### High Wind and Extreme Heat

High wind and extreme heat have the potential to happen anywhere in the planning area. Extreme heat events may be exacerbated in the City where reduced air flow, reduced vegetation, and increased generation of waste heat can contribute to temperatures that are several degrees higher than in surrounding less urbanized areas.

The California Healthy Places Index (HPI): Extreme Heat Edition is a tool developed by the Public Health Alliance in partnership with the UCLA Luskin Center for Innovation. The tool provides datasets on projected heat exposure for California, place-based indicators measuring community conditions, and sensitive populations. It also provides a list of resources and funding opportunities that can be used to address extreme heat.

The tool can be used to:

- Understand the underlying heat vulnerability and resilience characteristics of a community.
- Identify resources to mitigate the adverse effects of extreme heat.
- Prioritize public and private investments, resources, and programs.

The HPI combines 25 community characteristics, based on the social determinants of health, into a single score for each California census tract. Neighborhood-by-neighborhood, the HPI maps data on social conditions that drive health — like education, job opportunities, and clean air and water. The HPI tool evaluates the relationship between 23 identified key drivers of health and life expectancy at birth — which can vary dramatically by neighborhood. Based on that analysis, it produces a score ranking from 1 to 99 that shows the relative impact of conditions in a selected area compared to all other such places in the state. The HPI scores and compares geographies across the state, now with the ability to view data neighborhood-by-neighborhood, providing an even more granular view of community wellbeing. Figure 13-1 shows the HPI Extreme Heat Edition data generated for the City of Oakland.

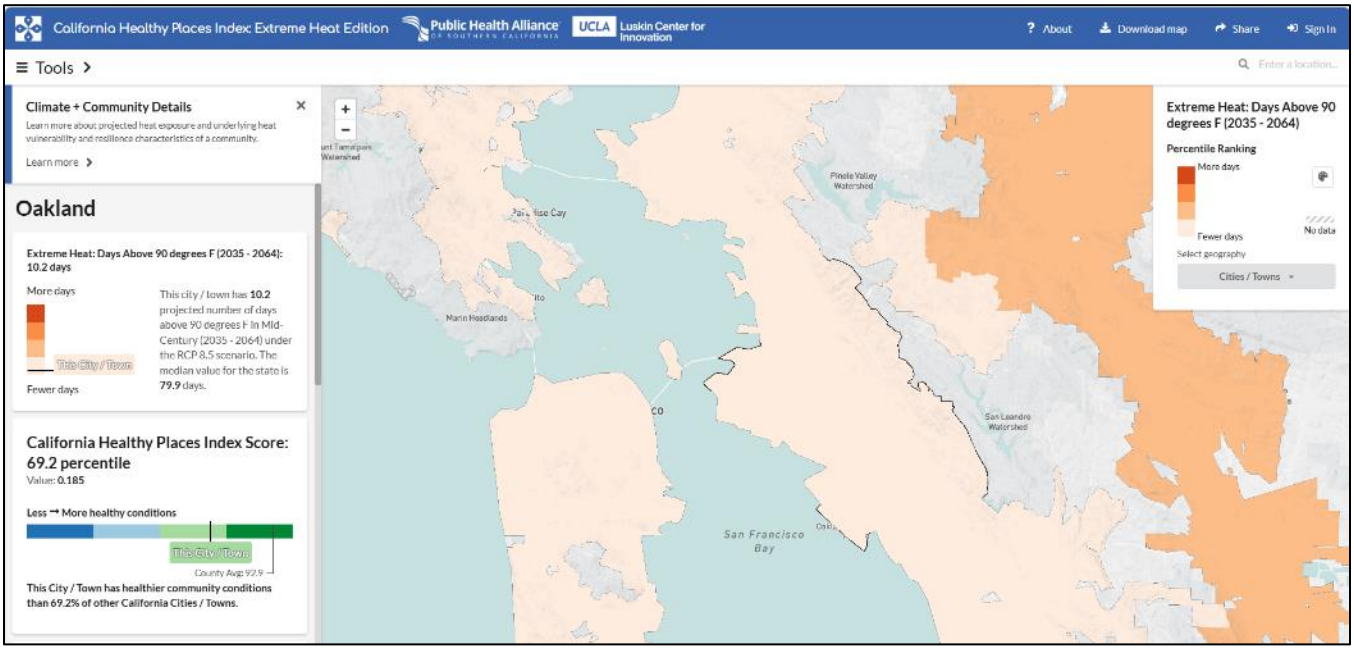



Figure 13-1. HPI Extreme Heat Edition Data Outputs for the City of Oakland

Because of its expansive urban size, the City of Oakland can experience urban heat island effects, in which materials such as asphalt, concrete and other materials absorb the heat. Radiation from the sun is absorbed by these surfaces during the day and re-radiated at night, raising ambient temperatures. Urban heat islands have high nighttime minimum temperatures compared to neighboring areas. Waste heat from air conditioners, vehicles, and other equipment contributes to the urban heat island effect. When temperatures rise above 80 °F, it could be 5 °F hotter in the city's industrial flatlands than in the Oakland Hills due to the urban heat island effect.

### 13.1.3 Extent

## Measuring Intensity

### *High Wind*

Damage from winds accounts for half of all severe weather reports in the lower 48 states. Wind speeds can reach up to 100 mph and can produce a damage path extending for hundreds of miles. The Beaufort Wind Chart in Table 13-2 provides terminology and a description of potential wind impacts at different levels.

Table 13-2. Beaufort Wind Chart

| Beaufort Number | Range (mph) | Terminology | Description |
|---|---|---|---|
| 0 | 0 | Calm | Calm. Smoke rises vertically. |
| 1 | 1-3 | Light air | Wind motion visible with smoke. |
| 2 | 4-7 | Light breeze | Wind felt on exposed skin. Leave rustle. |
| 3 | 8-12 | Gentle breeze | Leaves and smaller twigs in constant motion. |
| 4 | 13-18 | Moderate breeze | Dust and loose paper is raised. Small branches begin to move. |
| 5 | 19-24 | Fresh breeze | Smaller trees sway. |

| Beaufort Number | Range (mph) | Terminology | Description |
|---|---|---|---|
| 6 | 25-31 | Strong breeze | Large branches in motion. Whistling heard in overhead wires. Umbrella use is difficult. |
| 7 | 32-38 | Near gale | Whole trees in motion. Some difficulty when walking into the wind. |
| 8 | 39-46 | Gale | Twigs broken from trees. Car veer on road. |
| 9 | 47-54 | Severe gale | Light structure damage. |
| 10 | 55-63 | Storm | Trees uprooted. Considerable structural damage. |
| 11 | 64-73 | Violent storm | Widespread structural damage. |
| 12 | 74-95 | Hurricane | Considerable and widespread damage. |

*Source: (NWS n.d.)*

### *Extreme Heat*

In extreme heat, evaporation is slowed and the body must work extra hard to maintain a normal temperature, which can lead to death by overworking the human body. Extreme heat can cause heat exhaustion, in which the body becomes dehydrated, resulting in an imbalance of electrolytes. Without intervention, heat exhaustion can lead to collapse and heatstroke, which occurs when perspiration cannot occur and the body overheats. Without intervention, heatstroke can lead to confusion, coma, and death. Long-term exposure to extreme heat can lead to damage to the brain, heart, and kidneys. Chronic conditions like respiratory conditions, diabetes and mental health disorders (due to sustained strain and sleep disruption) can also increase due to long-term exposure.

## Warning Time

### *High Wind*

NOAA issues watch, warning, and advisory information for high winds. Weather stations and media outlets warn residents of upcoming storms so they may prepare and plan accordingly. Emergency alerts and warning are issued when needed.

### *Extreme Heat*

Weather station reports, media reports and emergency alerts and warnings may be issued for extreme heat.

To better address heat risk and allow people to prepare for upcoming heat events, the NWS and CDC have developed the Heat Risk forecast (see Table 13-3), which 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 or the UV Index. It provides one value each day that indicates the approximate level of heat risk concern for any location, along with identifying the groups who are most at risk.

Table 13-3. NWS Heat Risk Forecasting System

| 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 |

The NWS continues to issue excessive heat watches, excessive heat warnings and heat advisories to warn of an extreme heat event (a "heat wave") within the next 36 hours. If NWS forecasters predict an excessive heat event beyond 36 hours, then the NWS will issue messaging in the form of a special weather statement, emails and social media in the three- to seven-day timeframe. The NWS uses the Heat Risk Forecasting System to determine if an excessive heat watch/warning or heat advisory is warranted. The NWS issues the following types of heat-related advisories:

- **Heat Advisory**—Tied to events where Heat Risk output is on the orange/red (Level 2-3) thresholds (orange will not be an automatic heat advisory).
- **Excessive Heat Watch/Warning**— Tied to events where Heat Risk output is on the red/magenta (Level 3-4) thresholds.

The NWS will issue an excessive heat watch generally two to three days in advance. An excessive heat watch is a way to give the public and emergency officials a warning that extreme temperatures are expected. If significantly hot temperatures remain in the forecast for 24 to 28 hours, the excessive heat watch will be upgraded to an excessive heat warning, indicating that extreme heat has either arrived or is expected soon.

In Alameda County, although the summers are hot, the combination of high temperature and high humidity that is the requirement for the National Weather Service to declare a heat emergency is relatively rare.

According to a study published by the University of Berkely, California's Department of Earth and Planetary Science, the over 300 existing heat indices used around the world by scientists to notify the public of extreme heat do not adequately communicate the physiological risk to the human body. Many indices are not triggered due to lack of humidity, despite high temperatures. The varying criteria for a heat advisory endangers lives as people underestimate their overall risk. As climate change continues to cause record-breaking temperatures, scientists need to adjust indices to clearly and accurately communicate the dangers of extreme heat on any given day.

## Worst-Case Scenario

### *High Wind*

The worst-case scenario occurred in Alameda County in 1991 when the Tunnel Fire spread rapidly due to high winds. This fire was known for producing a firestorm - a phenomenon in which the fire generates its own weather. The intense heat created powerful winds that,

combined with an already gusty day, rapidly fueled the fire's spread. Winds blew in excess of 65 miles per hour and temperatures hit record highs into the nineties. Drought-stricken brush and freeze-damaged trees provided fuel for the already dire fire conditions. The fire burned over 1,500 acres within an area of 5.25 square miles, destroyed 3,810 dwelling units, killed 25, and left 150 injured. More than 10,000 people were evacuated and over $1 billion in damage was caused.

#### *Extreme Heat*

Extreme heat events are expected to increase in frequency in California, including the Bay Area. Increased temperatures will affect human health, public health systems, and the energy grid. The number of extreme heat days in the Bay Area may increase from the 1960-1990 average of three to four events per year to an average of seven between 2035-2064 and an average of 15 between 2070 and 2099 (City of San Francisco 2023) This will increase the likelihood of heat-related illness and death, especially among the poor, the elderly and the very young.

### 13.1.4 Previous Occurrences

The following sections provide a review of previous severe weather occurrences in Alameda County which may or may not have had impacts within the City of Oakland.

#### Declarations

#### *Federal Declarations*

Between 1954 and 2025, the federal government declared that Alameda County experienced one disaster (DR) related to severe weather (wind or heat) (FEMA 2025).

Table 13-4. Federal Disaster Declarations for Severe Weather

| Event name | Disaster Number | Declaration Date |
|---|---|---|
| Severe winter storms, straight-line winds, flooding, landslides, and mudslides | DR-4699-CA, EM-3591 (consolidated into DR-4683) | April 4, 2023 |

*Source: (FEMA 2025)*

#### *State Proclamations*

Between 1954 and 2025, California included Alameda County in four state-proclaimed severe weather disasters (Cal OES 2025).

Table 13-5. State Disaster Proclamations for Severe Weather

| Event Name | Disaster Number | Proclamation Date |
|---|---|---|
| January 2017 Storms | 2017-01 | January 23, 2017 |
| Late January 2017 Storms | 2017-02 | February 10, 2017 |
| February 2017 Storms | 2017-03 | March 7, 2017 |
| 2022-2023 Early Winter Storms | 2023-01 | January 4, 2023 |

*Sources: (State of California 2023) (Cal OES 2025)*

### *USDA Declarations*

Between 2012 and 2025, the USDA included Alameda County in nine declarations relating to severe weather (USDA 2025).

Table 13-6. USDA Declarations for Severe Weather

| Event name | Disaster Number | Declaration Date |
|---|---|---|
| Wind, heat, excessive heat, fire, wildfire, insects, drought | S3547 | July 3, 2013 |
| Wind, heat, excessive heat, fire, wildfire, insects, drought | S3558 | July 31, 2013 |
| Wind, heat, excessive heat, fire, wildfire, insects, drought | S3569 | August 21, 2013 |
| Wind, heat, excessive heat, fire, wildfire, insects, drought | S3784 | February 4, 2015 |
| Wind, heat, excessive heat, fire, wildfire, insects, drought | S3952 | February 17, 2016 |
| Excessive rain, hail, wind | S4164 | March 31, 2016 |
| Excessive rain, hail, winds, below-normal temperature | S4170 | April 28, 2017 |
| Excessive rain | S4237 | October 13, 2017 |
| Heat, excessive heat | S5353 | January 13, 2022 |

*Source: (USDA 2025)*

## Recent Events

For the 2026 LHMP update, severe weather events that impacted the City of Oakland since January 2000 are listed in the table below. For events prior to January 2000, refer to the 2021 LHMP.

Table 13-7. Recent Severe Weather Events Impacting the City of Oakland

| Date(s) of Event | Event Type | FEMA / State Declaration Number (if applicable) | Alameda County included in declaration? | Description |
|---|---|---|---|---|
| June 14, 2000 | Excessive Heat | N/A | N/A | This unusual early summer record breaking heat wave was responsible for 10 deaths in the Bay Area and a large number of heat-related injuries. Temperature of 103 degrees in San Francisco tied the record high temperature. High temperature caused overloading of power resources and rolling blackouts were implemented to keep the power system from exceeding capacity, so many people lost power for a period during the heat. |
| December 18, 2000 | High Winds | N/A | N/A | A gust of 71 mph was reported at the Oakland North Remote Automated Weather Station in Contra Costa County. Power to over 2500 customers was lost due to trees blowing into power lines. Three cars were crushed by two trees falling into the road in the Broadway Terrace neighborhood. Trees blown down across Highway 13 and the entry ramp to I-580 snarled traffic. |

| Date(s) of Event | Event Type | FEMA / State Declaration Number (if applicable) | Alameda County included in declaration? | Description |
|---|---|---|---|---|
| January 25, 2001 | High Winds | N/A | N/A | A severe thunderstorm watch was issued for only the second time in 25 years for the San Francisco Bay Area. No severe thunderstorms were reported, but rotation was noted near Richmond. There was damage from mainly strong gradient winds and lightning strikes. A number of trees were downed, causing power outages in the Bay Area. |
| November 7, 2002 | High Winds | N/A | N/A | For a three-day period starting on November 7, rainfall totaling 2 to 5 inches fell across the North Bay counties. Many trees and branches were down, blocking roads and interrupting power. Winds also blew down power poles and lines. As many as 1 million homes were without power at one time. A number of trees fell on homes and automobiles. Total damage to the area was estimated at $2.5 million. |
| December 14, 2003 | High Winds | N/A | N/A | High winds hit the Bay Area with winds gusting to 62 mph at Las Trampas in the East Bay Hills, causing thousands of power outages. |
| February 17, 2004 | High Winds | N/A | N/A | Strong winter storm produced a 74 mph wind gust on Kregor Peak in the East Bay Hills. |
| January 19, 2010 | High Winds | N/A | N/A | High winds hit the Bay Area with winds gusting to 62 mph that caused power outages. |
| February 15, 2011 | High Winds | N/A | N/A | High winds hit the Bay Area with winds gusting to 60 mph and caused an estimated $150,000 in damage. |
| April 8, 2013 | High Winds | N/A | N/A | Strong and gusty northwest winds impacted the Bay Area, resulting in downed trees, downed power lines, and broken windows. The wind gusts were in excess of 35 mph with a few locations over 60 mph. |
| May 1, 2013 | High Winds | N/A | N/A | Strong northeast winds which gusted up to 62 mph led to critical fire weather conditions. |
| October 27, 2013 | High Winds | N/A | N/A | Strong and gusty northwest winds up to 45 mph impacted the Bay Area resulting in downed trees, downed power lines, toppled scaffolding, and blown over tractor trailers. |
| October 24, 2016 | High Winds | N/A | N/A | Moderately strong winds occurred across the region and caused an 80-foot tree to topple over in a neighboring county. |
| January 3, 2017 | High Winds | 2017-01 | Yes | The first in a series of three atmospheric river events between January 2 and January 10. Strong winds, flooding, and debris flows occurred throughout this event. |
| January 7, 2017 | High Winds | 2017-02 | Yes | Potent atmospheric river brought heavy rain, strong southerly winds, and storm surge issues. This atmospheric river followed a normal to slightly above normal 3 month period, meaning the grounds were saturated. |

| Date(s) of Event | Event Type | FEMA / State Declaration Number (if applicable) | Alameda County included in declaration? | Description |
|---|---|---|---|---|
| | | | | A tree fell on a woman in the East Bay Interior Valleys region, resulting in her death. |
| February 6-7, 2017 | High Winds | 2017-03 | Yes | An atmospheric river swept through the Bay Area beginning on the night of February 6. This system produced widespread roadway flooding, debris flows, and strong winds gusting over 50 knots. |
| June 10-11, 2019 | Excessive Heat | N/A | N/A | Multiple daily records were broken, and multiple power outages were reported due to the heat. More than 50,000 people across the region lost power. One man died as a direct result of heat related illness and two others drowned while attempting to cool down. Hot temperatures and dry grass resulted in a vegetation fire that spread to a residence. |
| August 14, 2020 | Excessive Heat | N/A | N/A | A prolonged heat wave swept the Central Coast and Bay Area for almost a week with widespread record-breaking temperatures. Multiple days of triple digit afternoon highs were recorded inland with some coastal locations reaching the mid-90s. |
| September 7-8, 2020 | Excessive Heat | N/A | N/A | Numerous high temperature records were broken. Temperatures breached 110 degrees across the interior with 90s along the coast. Offshore winds increased flaring up some of the wildfires that had been ignited during August's lightning storm. These winds also enabled smoke from various wildfires across the state to blanket much of the Bay Area. |
| January 19, 2021 | Strong Wind | N/A | N/A | A rare wintertime offshore wind event affected the Greater Bay Area in mid to late January. It was unusual given the long duration and wide area coverage as well as the time of year. Lower elevations were notably in excess of 40 mph. These winds resulted in tree damage, downed trees, and downed powerlines causing power outages. |
| March 21, 2023 | Strong Wind | N/A | N/A | A rapidly intensifying cyclone brought high winds to the region. A High Wind Warning was issued for the San Mateo Peninsula Coast, the Santa Cruz Mountains, and the Central Coast. In addition, a couple of Severe Thunderstorm Warnings were issued in light of the expected extreme winds for the Monterey and Santa Cruz areas. Over 110,000 customers lost power throughout the Bay Area and Santa Cruz County as a result of the cyclone.<br><br>A tree fell on an unhoused man in his tent near Lake Merritt in Oakland. Authorities |

| Date(s) of Event | Event Type | FEMA / State Declaration Number (if applicable) | Alameda County included in declaration? | Description |
|---|---|---|---|---|
| | | | | pronounced him dead on the scene. A tree fell onto a white van traveling eastbound near the area of Alpine Road and La Cuesta Drive just west of Interstate 280 in Portola Valley. CHP responded to the scene at 1:34 PM, cleared some large branches, and found a man dead inside. Alpine Road was closed west of Interstate 280 in both directions. |
| April 3, 2023 | Straight-line Winds | DR-4699-CA, EM-3591 (consolidated into DR-4683) | Yes | Strong winds, tornadoes, and heavy flooding brought landslides, downed trees and left residents stranded. |

*Sources: (FEMA 2025); (NOAA 2025); (Cal OES 2025)Future Conditions*

Future hazard conditions, including frequency and severity of future events, are discussed in the sections below.

## Probability

### *High Wind*

The City regularly experiences extreme wind events, especially when Diablo winds occur. The Diablo winds (or North winds) are strong, dry downslope winds most frequent in October with a declining frequency trend from November to June and minimum occurrence in the summer (McClung and Mass 2020). Based on historic events and projected conditions, there is a high probability of occurrence of at least one high wind event in the Planning Area every year.

### *Extreme Heat*

Extreme heat events are becoming significantly more likely and intense in the Bay Area due to climate change, with projections showing major jumps in heat wave frequency and more "hot days", even in traditionally mild coastal areas, pushing temperatures and risks far beyond historical norms. Based on recent events and projected conditions, there is a high probability of occurrence of at least one extreme heat event in the Planning Area each year.

## Climate Change

### *High Wind*

The Bay Area's largest winter storms will likely become more intense, and potentially more damaging, in the coming decades (California's Fourth Climate Change Assessment 2018). It is uncertain whether high wind events are becoming more or less frequent under a changing climate. However, impacts from climate change are increasing the intensity and frequence of wildfires which spread quickly by high winds.

### *Extreme Heat*

According to California's Fourth Climate Change Assessment, the San Francisco Bay Area average annual maximum temperature increased by 1.7°F (0.95 °C) from 1950 to 2005. Even

with substantial global efforts to reduce greenhouse gas emissions in the coming decades, the Bay Area will likely see a significant increase in temperature by mid-century. By the end of the century, the difference between lower and higher global emissions scenarios will make a major difference in how much Bay Area temperatures rise. While all parts of the Bay Area are projected to get warmer, inland areas will heat up more than coastal areas. Warming near the coast will be affected by changes in fog and sea breeze, but the influence of climate change on these highly localized features of the Bay Area climate is poorly understood at this time (California's Fourth Climate Change Assessment 2018).

### Potential Future Impacts

#### *High Wind*

According to population projections by the California Department of Finance, Alameda County's population is expected to increase to 1.84 million by 2050. This represents an 11.5 percent increase from the 2025 population of 1.65 million (California Department of Finance 2025). While the City is mostly built out, redevelopment may increase the population and structural value exposed to high wind. Redevelopment creates an opportunity to build to a higher code. The City will be well-equipped to manage development with its building code, and the Safety Element of its General Plan.

#### *Extreme Heat*

Extreme heat events may increase power grid vulnerabilities as the population increases.

## 13.2 VULNERABILITY ASSESSMENT

**Local Plan Requirement B1 – 44 CFR Part 201.6(c)(2)(ii)**

***The plan must include a description of the jurisdiction's vulnerability to the hazards of concern and include an overall summary of the hazard's impact on the community. The impacts need to include the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the hazard areas, and estimate of potential dollar losses to vulnerable structures, and a description of land uses and development trends.***

### 13.2.1 Summary of Vulnerability

The entirety of the City of Oakland is considered vulnerable to severe weather. To assess the City's risk to the severe weather hazard, a qualitative assessment was conducted to analyze the severe weather hazard for the City.

### 13.2.2 Impact on Life, Health, and Safety

The entire population of the City of Oakland is exposed and vulnerable to the severe weather hazard.

#### High Wind

The impact of high wind events on life, health, and safety depends on several factors, including the severity of the event and whether adequate warning time was provided to residents. Downed trees, flying debris, and structural failures from high wind events can lead

to injuries, widespread power outages, disruption to transportation systems, and damage to homes and businesses.

## Extreme Heat

Extreme heat events have potential health impacts including injury and death. According to the Centers for Disease Control and Prevention (CDC), populations most at risk to extreme heat events include the following: 1) people, especially children, with asthma; 2) People with heart disease; 3) pregnant women; 4) people 65 years of age or older; 5) the general public who may overexert during work or exercise during extreme heat events; and 6) people who are working or exercising outside in the heat or lack air conditioning (CDC, Heat Health 2024).

## Equity Priority Communities

For this LHMP update, the composite score of each census tract is divided into three categories (91-100, 81-90, and ≤80) based on social vulnerabilities. Populations in these categories are recognized as communities facing social vulnerabilities creating additional barriers in the face of natural hazards (Equity Priority Communities). Overall, everyone in the City of Oakland is at risk and can be impacted by severe weather. However, some groups are more vulnerable than others, especially those in Equity Priority Communities.

Severe weather events disproportionately affect the socially vulnerable populations and may exacerbate existing inequality.

### *High Wind*

Economically disadvantaged people are at high risk for high wind events because of the potential inability to afford up-to-code homes and buildings that are deemed safe from storms passing through.

### *Extreme Heat*

Groups, such as the elderly, children, and those with pre-existing health conditions, are at higher risk of heat-related illnesses such as heat stress, heat exhaustion, and heat stroke. The Equity Priority Communities, largely located around sources of pollution, often have higher rates of health conditions such as asthma. Households lacking air conditioning or which cannot afford to run their air conditioning are also vulnerable.

Table 13-8. Estimated Number of Equity Priority Community Members Exposed to Severe Weather

| Sub-Areas | Equity Priority Community Thresholds[1] | EPC Population Exposed[2] | % of Total Population Exposed to the Hazard[3] |
|---|---|---|---|
| Central East Oakland | 91-100 | 34,939 | 33.1% |
| | 81-90 | 23,907 | 22.6% |
| | ≤80 | 25,659 | 24.3% |
| Coliseum/Airport | 91-100 | 4,879 | 100.0% |
| | 81-90 | 0 | 0% |
| | ≤80 | 0 | 0% |
| Downtown | 91-100 | 0 | 0% |
| | 81-90 | 0 | 0% |
| | ≤80 | 15,144 | 70.1% |
| East Oakland Hills | 91-100 | 0 | 0% |

| Sub-Areas | Equity Priority Community Thresholds[1] | EPC Population Exposed[2] | % of Total Population Exposed to the Hazard[3] |
|---|---|---|---|
| | 81-90 | 0 | 0% |
| | ≤80 | 0 | 0% |
| Eastlake/Fruitvale | 91-100 | 17,933 | 17.7% |
| | 81-90 | 13,346 | 13.2% |
| | ≤80 | 17,531 | 17.3% |
| Glenview/ Redwood Heights | 91-100 | 0 | 0% |
| | 81-90 | 0 | 0% |
| | ≤80 | 0 | 0% |
| North Oakland Hills | 91-100 | 0 | 0% |
| | 81-90 | 0 | 0% |
| | ≤80 | 0 | 0% |
| North Oakland/Adams Point | 91-100 | 0 | 0% |
| | 81-90 | 0 | 0% |
| | ≤80 | 20,378 | 23.9% |
| West Oakland | 91-100 | 2,553 | 7.8% |
| | 81-90 | 8,882 | 27.2% |
| | ≤80 | 20,979 | 64.3% |
| **Totals** | **91-100** | **60,304** | **13.7%** |
| | **81-90** | **46,135** | **10.5%** |
| | **≤80** | **99,691** | **22.6%** |

*Source: (City of Oakland 2023)*

*Notes: (1) These thresholds are determined by the City of Oakland to be the most burdened communities in the City in the General Plan EJ Element.*
*(2) Population, by census tract, within the EPC threshold exposed to the hazard.*
*(3) EPC population exposed compared with total population in sub area.*

### 13.2.3 Impact on General Building Stock

All buildings are exposed to the severe weather hazard.

#### High Wind

With high winds, damages are dependent on factors including wind speed, storm duration, and path of the storm track. Building construction also plays a major role in the extent of damage resulting from a severe weather event. Due to differences in construction, residential structures are generally more susceptible to wind damage than commercial and industrial structures. Wood and masonry buildings, in general, regardless of their occupancy class, tend to experience more damage than concrete or steel buildings. Furthermore, high-rise buildings are also very vulnerable structures as wind speed normally increases with height above ground level.

#### Extreme Heat

While extreme heat generally does not impact buildings, elevated temperatures increase the energy demand for cooling. Losses can be associated with the overheating of heating, ventilation, and air conditioning (HVAC) systems.

To summarize the potential impacts to the general building stock, the table below provides loss estimates, by percentage, of the replacement cost value.

Table 13-9. General Building Stock Replacement Cost Values

| Sub-Area | Total Buildings | Total Replacement Cost Value | 10% of RCV | 30% of RCV | 50% of RCV |
|---|---|---|---|---|---|
| Central East Oakland | 22,271 | $17,986,229,601 | $1,798,622,960.10 | $3,597,245,920.20 | $8,993,114,800.50 |
| Coliseum/Airport | 1,229 | $5,646,390,094 | $564,639,009.40 | $1,129,278,018.80 | $2,823,195,047.00 |
| Downtown | 5,087 | $21,475,904,408 | $2,147,590,440.80 | $4,295,180,881.60 | $10,737,952,204.00 |
| East Oakland Hills | 10,993 | $8,434,796,515 | $843,479,651.50 | $1,686,959,303.00 | $4,217,398,257.50 |
| Eastlake/Fruitvale | 17,046 | $20,713,824,637 | $2,071,382,463.70 | $4,142,764,927.40 | $10,356,912,318.50 |
| Glenview/ Redwood Heights | 11,192 | $7,699,736,380 | $769,973,638.00 | $1,539,947,276.00 | $3,849,868,190.00 |
| North Oakland Hills | 10,125 | $9,022,389,851 | $902,238,985.10 | $1,804,477,970.20 | $4,511,194,925.50 |
| North Oakland/ Adams Point | 21,103 | $26,981,073,354 | $2,698,107,335.40 | $5,396,214,670.80 | $13,490,536,677.00 |
| West Oakland | 6,497 | $11,010,987,509 | $1,101,098,750.90 | $2,202,197,501.80 | $5,505,493,754.50 |
| **Total** | **105,543** | **128,971,332,346** | **$12,897,133,234.60** | **$25,794,266,469.20** | **$64,485,666,173.00** |

### 13.2.4 Impact on Community Lifelines

All community lifelines within the City of Oakland are vulnerable to the direct and cascading impacts from severe weather events. Community lifelines that lack backup power generation capabilities are especially vulnerable.

#### High Wind

Facilities located near trees or power lines that are likely to fall are vulnerable. Roads and other transportation infrastructure could be blocked by downed trees or other debris.

#### Extreme Heat

Facilities used as cooling centers that do not have redundant power will not be able to provide services to the community during a PSPS event. Hospitals may be overwhelmed with patients suffering from heat-related illnesses and have diminished capacity to adequately care for other emergencies.

### 13.2.5 Impact on the Economy

According to FEMA's National Risk Index, Alameda County's expected annual losses from the following severe weather events include:

- Heat Wave - $1.3 million
- Strong Wind - $20,036

Severe weather events can have short- and long-lasting impacts on the City's economy. Property damage can be extensive to homes, businesses, and infrastructure which can be costly to repair or replace. These events can also disrupt local businesses due to power outages and infrastructure damage, leading to lost revenue. Overall, economic impacts include the loss of business function (e.g., tourism, recreation), damage to inventory, relocation costs, wage loss, and rental loss due to the repair/replacement of buildings (NOAA n.d.).

Extreme winds can cause damage to structure and infrastructure resulting in significant repair or construction costs. Businesses may temporarily close if power is lost due to a wind event. Extreme heat events also have impacts on the economy, including loss of business function from power interruption and damage to and loss of inventory. Business-owners can

be faced with increased financial burdens due to unexpected repairs caused to the building (e.g., higher than normal utility bills, or business interruption due to power failure (i.e., loss of electricity, telecommunications).

Impacts on transportation lifelines affect both short-term (e.g., evacuation activities) and long-term (e.g., day-to-day commuting and goods transport) transportation needs. Utility infrastructure (power lines, gas lines, electrical systems) could suffer damage, and impacts can result in the loss of power, which can impact business operations and can impact heating or cooling provision to the population. Direct building losses are the estimated costs to repair or replace the damage caused to the building. This is reported in the "Impact on General Building Stock" section discussed earlier. Business interruption losses are the losses associated with the inability to operate a business because of the wind damage sustained during the storm or the temporary living expenses for those displaced from their home because of the event.

### 13.2.6 Impact on Historic and Cultural Resources

Historic structures and cultural resources are often not designed to withstand extreme weather conditions. High winds can cause substantial damage to these resources, leading to costly repairs or retrofits that must preserve the integrity and character of the original design.

Extreme heat poses additional risks. Prolonged exposure to high temperatures accelerates material degradation, making preservation efforts more challenging and expensive. Heat can cause building materials such as wood, stone, and metal to expand and contract, resulting in cracks, warping, and structural weakening over time. These impacts threaten the long-term stability and authenticity of historic and cultural assets.

### 13.2.7 Impact on Ecosystems and Natural Resources

Natural resources are highly vulnerable to extreme winds. Natural areas and parks may experience damage to trees and other plants. Extreme heat may cause rises in water temperatures, affecting fish populations and altering their distribution and breeding patterns. This can impact commercial and recreational fishing industries. Change in extreme temperatures can force species to migrate to cooler areas, disrupting existing ecosystems and potentially leading to the decline or extinction of species unable to adapt or move.

## 13.3 MITIGATION OPPORTUNITIES

Table 13-10 presents a range of potential opportunities for mitigating the severe weather hazard.

Table 13-10. Potential Opportunities to Mitigate the Severe Weather Hazard

| Community Scale | Organizational Scale | Government Scale |
|---|---|---|
| **Manipulate the Hazard** | | |
| • Plant trees to create shade in urban areas.<br>• Remove concrete and other hard surfaces and | • Plant trees in urban areas experiencing urban heat island effects or with below | • Plant trees in urban areas experiencing urban heat island effects or with below average tree canopy coverage |

| Community Scale | Organizational Scale | Government Scale |
|---|---|---|
| replace them with native vegetation. | average tree canopy coverage<br>• Remove concrete and other hard surfaces and replace them with native vegetation | • Remove concrete and other hard surfaces and replace them with native vegetation |
| **Reduce Exposure and Vulnerability** | | |
| • Provide redundant power<br>• Plant appropriate trees near home and power lines (“Right tree, right place” National Arbor Day Foundation Program)<br>• Insulate residential and non-residential structures to provide greater thermal efficiency<br>• Provide redundant power sources<br>• Get air conditioning installed | • Relocate critical infrastructure (such as power lines) underground<br>• Reinforce or relocate critical infrastructure such as power lines to meet performance expectations<br>• Install tree wire in place of bare power lines<br>• Provide cooling centers for employees<br>• Install “cool roofs” and “green roofs.” | • Harden infrastructure such as locating utilities underground<br>• Trim trees back from power lines<br>• Install “cool roofs,” “green roofs,” and other green infrastructure<br>• Use the best available technology to enhance the warning systems for all severe weather events |
| **Build Local Capacity** | | |
| • Trim or remove trees that could affect power lines<br>• Promote 72-hour self-sufficiency<br>• Obtain a NOAA weather radio<br>• Obtain an emergency generator | • Trim or remove trees that could affect power lines<br>• Create redundancy<br>• Equip facilities with a NOAA weather radio<br>• Equip vital facilities with emergency power sources | • Increase communication alternatives<br>• Enhance public awareness campaigns to address actions to take during extreme heat events<br>• Coordinate severe weather warning capabilities and the dissemination of warning among agencies with the highest degree of capability<br>• Modify land use and environmental regulations to support vegetation management activities that improve reliability in utility corridors<br>• Modify landscape and other ordinances to encourage appropriate planting near overhead power, cable, and phone lines<br>• Provide NOAA weather radios to the public<br>• Review and update heat response plan in light of climate change projections<br>• Promote programs that support community-scale microgrids<br>• Evaluate and revise, as needed, building codes to address and mitigate extreme heat impacts on residents<br>• Green roofs can be up to 40 °F cooler than typical roofs and reduce community temperatures by up to 5 °F. They can reduce building air conditioning costs by up to 75 percent. Green roofs provide benefits up to $14 |

| Community Scale | Organizational Scale | Government Scale |
|---|---|---|
| | | more per square foot than traditional roofs<br>• Tree can lower surface temperatures by providing shade and through evapotranspiration, which can reduce peak local summer temperatures by 2 °F to 9° F. Shady areas can be between 20 °F and 45 °F cooler than sunny areas, providing safe resting places outside. A study found cities see benefits equivalent to $1.50 to $3 for every $1 invested in tree planting<br>• The Planting of native plants—including along parking lots, streets, and in yards—can provide cooling effects. Vertical gardens, also referred to as green or living walls, involve planting on walls to provide shade for buildings. This helps to cool the building and surrounding area<br>• Any solutions that convert built environments to natural environments such as forests, wetlands, and vegetation can aid in lowering temperatures. Natural environments and green vegetation provide more shade, moisture, and evaporation than built environments, all of which help reduce temperatures. These systems sequester carbon, helping to minimize future warming |

# 14. TSUNAMI/SEICHE

## 14.1 HAZARD PROFILE

**Local Plan Requirement B1 – 44 CFR Part 201.6(c)(2)(i)**

*Include a description of the type, location, and extent for the identified hazards of concern and include information on previous occurrences of hazard events and the probability of future hazard events.*

### 14.1.1 Description of the Hazard

#### Defining the Hazard

A tsunami is a series of high-energy waves that radiate outward like pond ripples from an area where a generating event occurs, arriving at shorelines over an extended period. Tsunamis can be induced by earthquakes, landslides and submarine volcanic explosions.

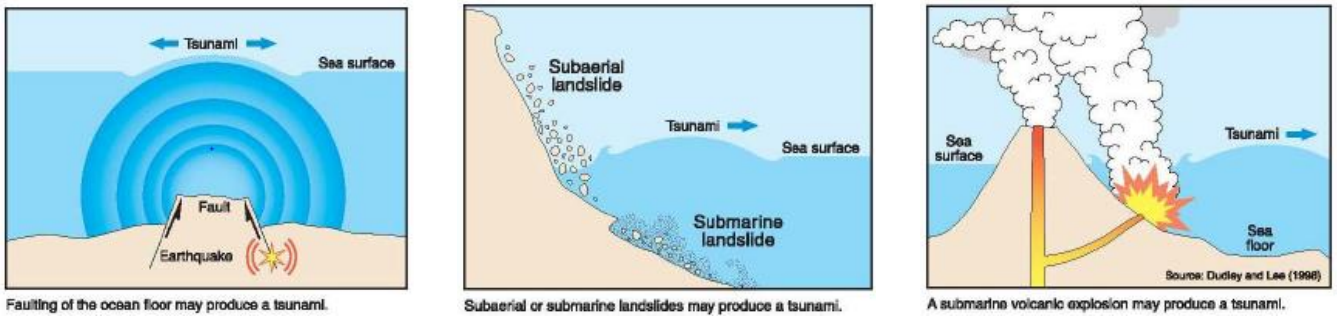



Figure 14-1. Common Sources of Tsunamis

A seiche is a resonant, side-to-side movement of water in a closed or mostly closed body of water such as the San Francisco Bay or Lake Merrit.

#### Cause of the Hazard

Tsunamis are typically classified as local or distant, depending on the location of their source in comparison to where waves occur:

- The waves nearest to the generating source represent a local tsunami. Such events have minimal warning time, leaving few options except to run to high ground after a strong, prolonged local earthquake. Damage from the tsunami adds to damage from the triggering earthquake due to ground shaking, surface faulting, liquefaction, and landslides.
- The waves far from the generating source represent a distant tsunami. Distant tsunamis may travel for hours before striking a coastline, giving a community a chance to implement evacuation plans if a warning is received.

In the open ocean, a tsunami may be only a few inches or feet high, but it can travel with speeds approaching 600 miles per hour. As a tsunami enters the shoaling waters near a coastline, its speed diminishes, its wavelength decreases, and its height increases greatly. At the shoreline, tsunamis 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). The first wave is usually followed by several larger and more destructive waves.

The configuration of the coastline, the shape of the ocean floor, and the characteristics of advancing waves play important roles in the destructiveness of the waves. Bays, sounds, inlets, rivers, streams, offshore canyons, islands, and flood control channels may cause various effects that alter the level of damage. Offshore canyons can focus tsunami wave energy, and islands can filter the energy. It has been estimated that a tsunami wave entering a flood control channel could reach a mile or more inland, especially if it enters at high tide. The orientation of the coastline determines whether the waves strike head-on or are refracted from other parts of the coastline. A wave may be small at one point on a coast and much larger at other points.

A seiche is a resonant, side-to-side movement of water in a closed or mostly closed body of water such as Lake Merrit or the San Francisco Bay. It can be caused by a number of factors, but all feature resonance where the acting force is more or less in time with the natural sloshing frequency of the body of water. The USGS defines a seiche as the sloshing of a closed body of water from earthquake shaking. Unlike tsunamis, which are created by the sudden uplift of the sea floor, seismic seiches are standing waves set up on rivers, reservoirs, ponds, and lakes when seismic waves from an earthquake pass through the area.

## Summary of Potential Impacts

The Safety Element of the Oakland General Plan describes the following risks to Oakland from tsunamis (City of Oakland 2023):

> *[…] tsunamis have not been a major problem in Alameda County or most of the Bay Area and have resulted in insignificant damage. Further, the hazard in the bay is much smaller than along the Pacific Coast, as the bay is an enclosed body of water. From 1812 to 2000, NOAA recorded 22 tsunamis in the Bay Area.*
>
> *Flooding from tsunamis would affect low-lying areas along San Francisco Bay and the Oakland Estuary, especially filled areas that are only a few feet above sea level. Areas that could be flooded with several feet of water include the Bay Bridge landing, the outer and middle harbor of the Port of Oakland's seaport, the San Leandro Bay shoreline (including Martin Luther King, Jr. Regional Shoreline) and the Oakland International Airport's shoreline. Areas along the inner harbor, Brooklyn Basin and the tidal channel would be sheltered by the island of Alameda. The likelihood of large-scale devastation in Oakland resulting from tsunamis appears to be small, especially as there would usually be several hours to evacuate residents and undertake other emergency preparations for most tsunamis approaching the coast. Despite this small risk, there are portions Oakland, particularly along the shoreline, that are within a Tsunami Hazard Area, areas mapped by the California Department of Conservation that could be exposed to tsunami hazards during a tsunami event.*

The Safety Element of the City of Oakland General Plan includes the following language related to seiche:

> *[…] Unlike tsunamis, which are created by the sudden uplift of the sea floor, seismic seiches are standing waves that occur when an earthquake passes through the area.*

*In Oakland, the only threat of large-scale damage from seiches appears to come from downstream flooding that would be caused by large volumes of water overtopping a dam or reservoir. Thus, the likelihood of large-scale devastation in Oakland resulting from seiches is minimal.*

### Cascading Hazard Impacts

Flooding from tsunamis would affect low-lying areas along San Francisco Bay and the Oakland Estuary, especially filled areas that are only a few feet above sea level. Areas that could be flooded with several feet of water include the Bay Bridge landing, the outer and middle harbor of the Port of Oakland's seaport, the San Leandro Bay shoreline (including Martin Luther King, Jr. Regional Shoreline), West Oakland, and the Oakland San Francisco Bay Airport's shoreline. Areas along the inner harbor, Brooklyn Basin and the tidal channel would be sheltered by the island of Alameda. The likelihood of large-scale devastation in Oakland resulting from tsunamis appears to be small, especially as there would usually be ample time to evacuate residents at risk.

## 14.1.2 Location

Low lying areas that are only a few feet above sea-level along the San Francisco Bay and Oakland Estuary are at highest risk. Most of the Alameda County coastline is in the tsunami inundation area, including the City of Oakland. Figure 14-1 shows the extent and the location of the tsunami inundation areas based on mapping that was prepared by California Department of Conservation in cooperation with the University of Southern California, California Geological Survey, and California Emergency Management Agency. This map does not represent risk from a single event but shows a composite area of risk that combines the inundation areas from a number of local and distant potential sources, including the Cascadia subduction zone, the Central Aleutians Island subduction zone, historical earthquake events, and other sources (City of Oakland 2021).

The inundation areas represent the maximum considered tsunami runup from a number of extreme, yet realistic, tsunami sources. The tsunami hazard zone is mostly influenced by a major earthquake directly off the coast of the Pacific Northwest; however, distant sources can result in notable wave run ups. Additional tsunami mapping information is available from the California Department of Conservation and the Redwood Coast Tsunami Work Group (City of Oakland 2021).

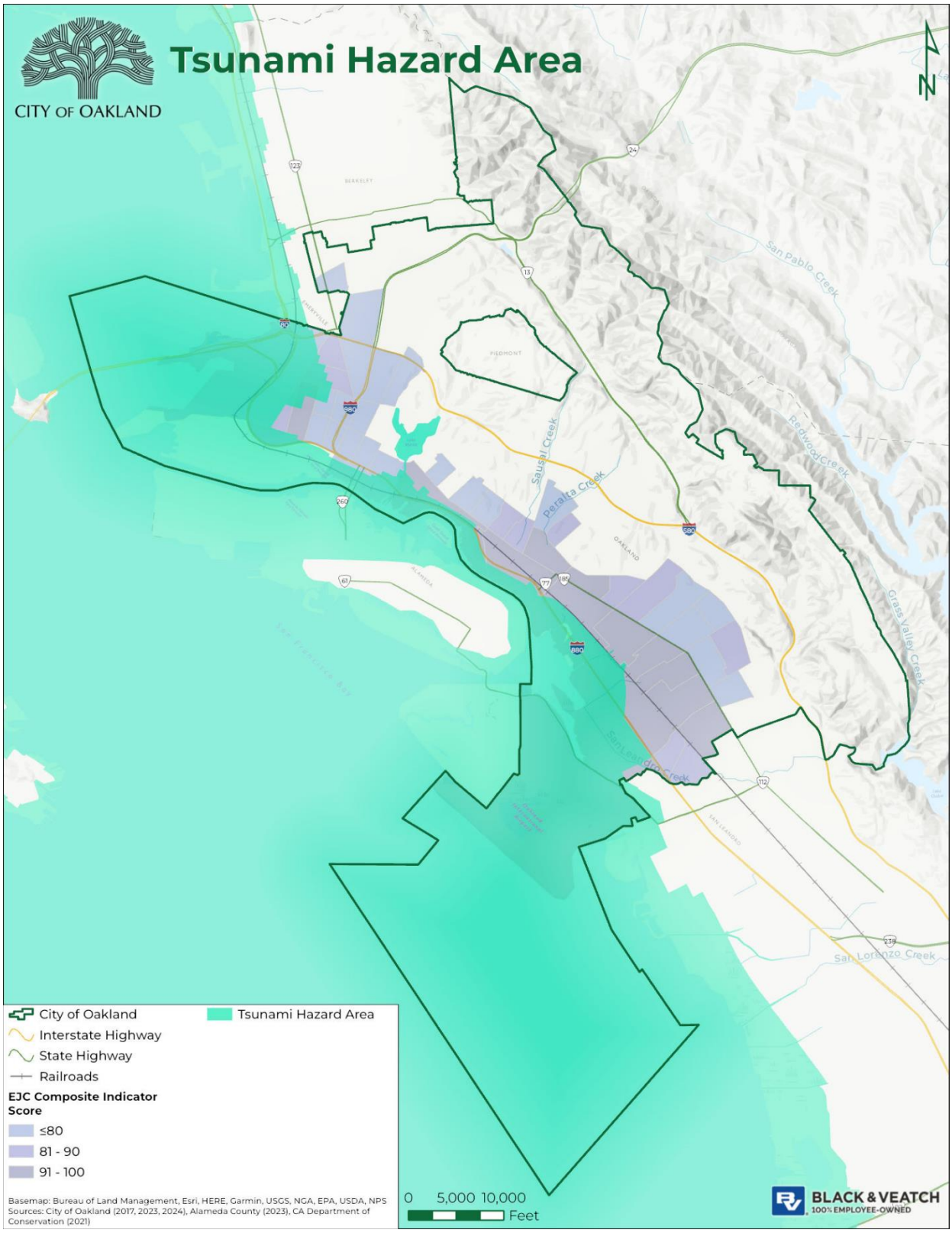



Figure 14-2. Tsunami Inundation Areas in the City of Oakland

### 14.1.3 Extent

Tsunamis are a threat to life and property to anyone living near the ocean. From 1950 to 2025, 87 tsunamis were recorded in the United States. Nine of these events caused a total of 150 fatalities (NOAA 2025). Historically, tsunamis originating in the northern Pacific and along the west coast of South America have caused more damage on the west coast of the United States than tsunamis originating in Japan and the Southwest Pacific. A tsunami's size and speed, as well as the coastal area's form and depth, affect the impact of the tsunami.

#### Measuring Intensity

Tsunamis can be measured in terms of wave height, number of waves, and area inundated.

#### Warning Time

Tsunamis are difficult to detect in the open ocean; as their waves are generally less than 3 feet high. However, the cause of a tsunami (e.g., earthquake, landslide) and its distance from the coast can be used to determine the warning time (Cal OES 2023). The first visible indication of an approaching tsunami may be either a rise or drop in water surface levels (NTHMP 2001):

- A drop in water level (draw down) can be caused by the trough preceding the advancing, large inbound wave crest. Rapid drawdown can create strong currents in harbor inlets and channels that can severely damage coastal structures due to erosive scour around piers and pilings. As the water's surface drops, piers can be damaged by boats or ships straining at or breaking their mooring lines. The vessels can overturn or sink due to strong currents, collisions with other objects, or impact with the harbor bottom.
- The advancing tsunami may initially arrive as a strong surge increasing the sea level. This can be similar to the rising tide, but the tsunami surge rises faster and does not stop at the shoreline. The strength of the accompanying surge can be deadly. Waist-high surges can cause strong currents that float cars, small structures, other debris, and hazardous materials. Boats and debris are often carried inland by the surge and left stranded when the water recedes.

The National Tsunami Warning Center serves the continental United States, Alaska and Canada and is staffed 24 hours a day, 7 days a week. The main mission of the warning center is to help protect life and property from tsunamis. To do this, warning center staff monitor for tsunamis and the earthquakes that may cause them, forecast tsunami impacts, issue tsunami messages, conduct public outreach and coordinate with partners to continually improve warning operations (NWS n.d.).

Tsunami warnings are issued by the National Tsunami Warning Center under the ANCTSUAT1 and ANCTSUATE products. The TSUAT1 product is a tabular formatted product that contains technical details of the tsunami including location, magnitude and forecasted arrival time(s). The TSUATE product is a narrative styled product that will contain the same warning/watch information as the TSUAT1 product, but presented in a less technical style suitable for the general public (NWS 2025).

Potential notifications are as follows (NOAA NWS 2024):

- **Tsunami Information Statement**—A tsunami information statement is issued to specific recipients when an earthquake or tsunami has occurred. In most cases, information statements are issued to indicate the threat of a destructive basin-wide tsunami does not exist, in order to prevent unnecessary evacuations.
- **Tsunami Watch**—A tsunami watch is typically issued for the California coastline when a tsunami may later impact the watch area.
- **Tsunami Advisory**—A tsunami watch is upgraded to a tsunami advisory if tsunami wave heights are forecast to be 0.3 meters to less than 1 meter.
- **Tsunami Warning**—A tsunami watch is upgraded to a tsunami warning if tsunami wave heights are forecast to be 1 meter or larger.

The National Tsunami Warning Center will cancel/expire watches, warnings, or advisories if tide gauges and buoys indicate no significant tsunami was generated or if tsunami waves no longer meet the criteria for at least 3 hours. Local agencies may then issue all-clear messages based on observed local conditions.

This system is not considered to be effective for communities close to the tsunami source, because the first wave would arrive before the data could be processed and analyzed, and communications systems may be affected by the precipitating event. In this case, strong ground shaking would provide the first warning of a potential tsunami, and evacuations should begin immediately.

### *Sirens in Oakland*

The City of Oakland has 25 sirens strategically placed through Oakland to alert community members of an emergency. These sirens produce different sounds to tell you how to stay safe during the emergency (City of Oakland 2025).

- If you hear a steady tone, you should shelter in place.
- If you hear a slow wail tone, there might be a tsunami.
- If you hear a fast wail tone, there might be a wildfire.

Figure 14-3. Emergency Siren Locations in Oakland

## Worst-Case Scenario

The worst-case scenario for the planning area is a local tsunami or seiche event originating in the San Francisco Bay triggered by a seismic event. This can occur anytime, and the series of floodwater waves can carry damaging debris and cause environmental impacts.

## 14.1.4 Previous Occurrences

The following sections provide a review of previous tsunami/seiche occurrences impacting the City of Oakland.

## Declarations

### *Federal Declarations*

Between 1954 and 2025, FEMA has not included Alameda County in any tsunami-related disasters (DR) or emergencies (EM) (FEMA 2025).

### *State Proclamations*

Between 1962 and 2025, the State of California did not issue any emergency proclamations for tsunami-related events for Alameda County (Cal OES 2025).

### *USDA Declarations*

There have been no USDA declarations for tsunami/seiche for Alameda County (USDA 2025).

## Significant Events

California has been impacted by numerous tsunami events. In 1859, a tsunami generated by an earthquake in Northern California generated 15-foot wave heights near Half Moon Bay. The 1868 earthquake on the Hayward Fault is reported to have created a local tsunami in the San Francisco Bay. In 1960, Pacifica experienced high water resulting from a Magnitude-9.5 earthquake off the coast of Chile. The tsunami generated by a 1964 Alaskan earthquake caused wave heights of 10 to 23 feet off the Coast of Northern California, Oregon, and Washington. Eleven people were killed in Crescent City as a result of this tsunami. Along the coast of San Francisco, Marin, and Sonoma Counties, maximum wave heights of about 4 feet were recorded, and no significant damage was experienced. The 2011 Japan earthquake generated a Pacific-wide tsunami that significantly impacted the Santa Cruz area, causing over $100 million in damage, flooding the harbor where boats were tossed and docks damaged, closing beaches, and leading to two fatalities as surges inundated the coast. On January 15, 2022, the eruption of the Hunga Tonga-Hunga Ha'apai volcano created a tsunami that impacted the entire Pacific Ocean basin and was the largest tsunami to impact California, with 1.42-meter waves in Santa Cruz, since 2011.

## Recent Events

For the 2026 LHMP update, tsunami events that impacted the City of Oakland since January 2020 are listed in the table below. For events prior to January 2020, refer to the 2021 LHMP.

Table 14-1. Recent Tsunami Events Impacting the City of Oakland

| Date(s) of Event | Event Type | FEMA / State Declaration Number (if applicable) | Alameda County included in declaration? | Description |
|---|---|---|---|---|
| December 5, 2024 | Earthquake (M7.0) | - | - | An M7.0 earthquake offshore of Cape Mendocino, CA caused three runups measuring up to 0.09 meters. There were no reports of damages associated with this event. The City issued alerts using the tsunami siren system. |

*Source: (NOAA-NCEI 2025); (FEMA 2025); (Cal OES 2025)*

## 14.1.5 Future Conditions

Future hazard conditions, including frequency and severity of future events, are discussed in the sections below.

## Probability

The 22 tsunami events known to have impacted Alameda County and the City of Oakland over 170 years amount to a tsunami event every 7.8 years on average. Most of these events

were minor (3 feet or less of runup) (City of Oakland 2021). Tsunamis originating in, and impacting, the Pacific are rare and generally occur on average every ten to twelve years (NPS 2024). The National Tsunami Hazard Mitigation Program rates the risk to the U.S. west coast from the tsunami hazard as high to very high (Dunbar 2015).

### Climate Change

Although tsunamis are not directly related to climate change, there is the possibility that the earthquakes and landslides that create tsunamis could be impacted by climate change. Some scientists say that melting glaciers could induce tectonic activity. Heavy rainfall could cause soil instability that may increase the likelihood of landslides into water bodies, which can generate tsunamis. Increases in severe storms may result in an increased probability of seiches. Rising seas could result in an increase in wave runup when tsunamis occur. Even modest rises in sea level will dramatically increase the frequency and intensity of flooding when a tsunami occurs, as the tsunami can travel further inland. Future smaller tsunamis could have the same impact as larger tsunamis today (Cal OES 2023).

### Potential Future Impacts

According to population projections by the California Department of Finance, Alameda County's population is expected to increase to 1.84 million by 2050. This represents an 11.5 percent increase from the 2025 population of 1.65 million (California Department of Finance 2025). While the City is mostly built out, redevelopment may increase the population and structural value exposed to the sea-level rise hazard.

## 14.2 VULNERABILITY ASSESSMENT

**Local Plan Requirement B1 – 44 CFR Part 201.6(c)(2)(ii)**

***The plan must include a description of the jurisdiction's vulnerability to the hazards of concern and include an overall summary of the hazard's impact on the community. The impacts need to include the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the hazard areas, and estimate of potential dollar losses to vulnerable structures, and a description of land uses and development trends.***

### 14.2.1 Summary of Vulnerability

Overall, tsunami vulnerability in the City of Oakland occurs everywhere within the vicinity of the coastal shoreline. For this LHMP, California Geological Survey (CGS) tsunami hazard information was used to perform a quantitative vulnerability assessment of the tsunami hazard for the City of Oakland. Potential losses for the hazard area were estimated using the Hazus flood module.

### 14.2.2 Impact on Life, Health, and Safety

The populations most vulnerable to the tsunami hazard are individuals with barriers to evacuation who reside near beaches, low-lying coastal areas, tidal flats and river deltas that empty into ocean-going waters. The table below shows the estimated population in the City located in the tsunami hazard area. Approximately 4.4% of the City's total population is living within the hazard area.

Table 14-2. Estimated Number of Persons Living in the Tsunami Hazard Area

| Sub-Area | Total Population[1] | Population Exposed[2] | % Total |
|---|---|---|---|
| Central East Oakland | 105,554 | 68 | 0.1% |
| Coliseum/Airport | 4,879 | 1,614 | 33.1% |
| Downtown | 21,616 | 3,518 | 16.3% |
| East Oakland Hills | 31,326 | 0 | 0.0% |
| Eastlake/Fruitvale | 101,468 | 3,237 | 3.2% |
| Glenview/ Redwood Heights | 32,929 | 0 | 0.0% |
| North Oakland Hills | 24,816 | 0 | 0.0% |
| North Oakland/Adams Point | 85,380 | 0 | 0.0% |
| West Oakland | 32,669 | 11,014 | 33.7% |
| **Total** | **440,637** | **19,450** | **4.4%** |

*Sources: (CGS 2025) (City of Oakland 2025) (Hazus v6.1 2023)*
*Notes: (1) Population calculated using 2020 Census data from Hazus v6.1.*
*(3) Percent of residential buildings exposed multiplied by the Estimated Population.*

As a result of a significant tsunami event, residents may be displaced or require temporary to long term sheltering. The number of people requiring shelter is generally less than the number displaced as some displaced persons use hotels or stay with family or friends following a disaster event. Table 14-3 summarizes the estimated number of displaced households and persons seeking short-term sheltering caused by a tsunami event impacting the entirety of the tsunami hazard area.

Table 14-3. Estimated Tsunami Impact on Persons and Households

| Sub-Area | Tsunami Hazard Area | |
|---|---|---|
| | Displaced Households | Short-Term Shelter |
| Central East Oakland | 56 | 1 |
| Coliseum/Airport | 1,302 | 75 |
| Downtown | 3,061 | 77 |
| East Oakland Hills | 0 | 0 |
| Eastlake/Fruitvale | 2,231 | 108 |
| Glenview/ Redwood Heights | 0 | 0 |
| North Oakland Hills | 0 | 0 |
| North Oakland/Adams Point | 0 | 0 |
| West Oakland | 9,251 | 312 |
| **Total** | **15,900** | **573** |

*Source: (FEMA 2018); City of Oakland 2017; City of Oakland 2025*
*Note: Calculated using a Census tract level, general building stock (GBS) analysis in Hazus 6.1, and adjusted to reflect the estimated population.*

## Equity Priority Communities

For this LHMP update, the composite score of each census tract is divided into three categories (91-100, 81-90, and ≤80) based on social vulnerabilities. Populations in these categories are recognized as communities facing social vulnerabilities creating additional barriers in the face of natural hazards (Equity Priority Communities). The cost of measures to

protect properties from tsunami and seiche risks can place a financial burden on lower- and middle-income residents. Relocation may also be challenging due to high expenses, limited availability of accessible housing, or the time required to make housing accessible.

Individuals over the age of 65 face additional vulnerabilities. Physical limitations may make evacuation during tsunami or seiche events more difficult, requiring extra time or outside assistance. They are also more likely to need medical care, which may be unavailable due to isolation during such events (Cal OES 2023).

Table 14-4. Estimated Number of Equity Priority Community Members Exposed to Tsunami

| Sub-Areas | Equity Priority Community Thresholds[1] | EPC Population Exposed[2] | % of Total Population Exposed to the Hazard[3] |
|---|---|---|---|
| Central East Oakland | 91-100 | 68 | 100.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 0 | 0.0% |
| Coliseum/Airport | 91-100 | 1,614 | 100.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 0 | 0.0% |
| Downtown | 91-100 | 0 | 0.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 3,518 | 100.0% |
| East Oakland Hills | 91-100 | 0 | 0.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 0 | 0.0% |
| Eastlake/Fruitvale | 91-100 | 3,237 | 100.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 0 | 0.0% |
| Glenview/ Redwood Heights | 91-100 | 0 | 0.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 0 | 0.0% |
| North Oakland Hills | 91-100 | 0 | 0.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 0 | 0.0% |
| North Oakland/Adams Point | 91-100 | 0 | 0.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 0 | 0.0% |
| West Oakland | 91-100 | 276 | 2.5% |
| | 81-90 | 2,012 | 18.3% |
| | ≤80 | 8,549 | 77.6% |
| **Totals** | **91-100** | **5,195** | **26.7%** |
| | **81-90** | **2,012** | **10.3%** |
| | **≤80** | **12,067** | **62.0%** |

*Source: (City of Oakland 2023)*

*Notes: (1) These thresholds are determined by the City of Oakland to be the most burdened communities in the City in the General Plan EJ Element.*
*(2) Population, by census tract, within the EPC threshold exposed to the hazard.*
*(3) EPC population exposed compared with total population in sub area.*

### 14.2.3 Impact on General Building Stock

All structures along beaches, low-lying coastal areas, tidal flats, and river deltas are vulnerable to a tsunami. The table below displays the number of structures located in the tsunami hazard area. Overall, 5,071 structures are exposed to the tsunami hazard. Of the structures exposed, the majority (3,916) are residential structures, followed by commercial structures (680), and industrial buildings (333). Overall, 4.8% of structures in the City of Oakland are located in the tsunami hazard area.

Table 14-5. Estimated Number of Structures Located in the Tsunami Hazard Area

| Sub-Area | Total Buildings | Total Buildings Exposed | % Total |
|---|---|---|---|
| Central East Oakland | 22,271 | 119 | 0.5% |
| Coliseum/Airport | 1,229 | 503 | 40.9% |
| Downtown | 5,087 | 1,207 | 23.7% |
| East Oakland Hills | 10,993 | 0 | 0.0% |
| Eastlake/Fruitvale | 17,046 | 573 | 3.4% |
| Glenview/ Redwood Heights | 11,192 | 0 | 0.0% |
| North Oakland Hills | 10,125 | 0 | 0.0% |
| North Oakland/Adams Point | 21,103 | 0 | 0.0% |
| West Oakland | 6,497 | 2,669 | 41.1% |
| **Total** | **105,543** | **5,071** | **4.8%** |

*Sources: (CGS 2025); (City of Oakland 2025); (Hazus v6.1 2023)*
*Notes: Values based off of 2025 tax assessor data provided by Alameda County*

Table 14-6. Estimated Number of Buildings, by Structure Type, Located in the Tsunami Hazard Area

| Sub-Area | Total Buildings | Tsunami Hazard Area | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Residential | Commercial | Industrial | Agriculture | Religion | Government | Education | Total Buildings |
| Central East Oakland | 22,271 | 7 | 76 | 29 | 0 | 0 | 7 | 0 | 119 |
| Coliseum/Airport | 1,229 | 309 | 122 | 46 | 0 | 4 | 21 | 1 | 503 |
| Downtown | 5,087 | 1,014 | 167 | 15 | 0 | 1 | 9 | 1 | 1,207 |
| East Oakland Hills | 10,993 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Eastlake/Fruitvale | 17,046 | 409 | 84 | 49 | 0 | 0 | 26 | 5 | 573 |
| Glenview/ Redwood Heights | 11,192 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| North Oakland Hills | 10,125 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| North Oakland/Adams Point | 21,103 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| West Oakland | 6,497 | 2,177 | 231 | 194 | 0 | 13 | 50 | 4 | 2,669 |
| **Total** | **105,543** | **3,916** | **680** | **333** | **0** | **18** | **113** | **11** | **5,071** |

*Sources: (CGS 2025); (City of Oakland 2025); (Hazus v6.1 2023)*
*Notes: Values based off of 2025 tax assessor data provided by Alameda County.*

### 14.2.4 Impact on Community Lifelines

Table 14-7 provides the number of community lifelines located in the tsunami hazard area. The City has 608 community lifelines located in the tsunami hazard area. Community lifelines impacted by tsunami are likely to experience damage and access issues that could lead to functional downtime. Several key assets such as the Oakland San Francisco Bay Airport, rail lines connecting to the seaport of Oakland, and three wastewater treatment plants are vulnerable to tsunami (City of Oakland 2017).

Table 14-7. Estimated Community Lifelines Located in the Tsunami Hazard Area

| Planning Area | Communications | Energy | Food, Hydration, Shelter | Hazardous Materials | Health and Medical | Safety and Security | Transportation | Water Systems | Total |
|---|---|---|---|---|---|---|---|---|---|
| Central East Oakland | 5 | 1 | 0 | 36 | 0 | 0 | 4 | 0 | 46 |
| Coliseum/Airport | 63 | 1 | 0 | 96 | 0 | 8 | 22 | 1 | 191 |
| Downtown | 42 | 2 | 0 | 18 | 0 | 2 | 12 | 0 | 76 |
| East Oakland Hills | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Eastlake/Fruitvale | 5 | 1 | 0 | 34 | 0 | 2 | 9 | 1 | 52 |
| Glenview/ Redwood Heights | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| North Oakland Hills | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| North Oakland/Adams Point | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| West Oakland | 70 | 9 | 0 | 99 | 0 | 7 | 53 | 5 | 243 |
| **Total** | **185** | **14** | **0** | **283** | **0** | **19** | **100** | **7** | **608** |

*Sources: (City of Oakland 2025); (CGS 2025)*

### 14.2.5 Impact on the Economy

Table 14-8 presents the value (structure and contents) of buildings located in the tsunami hazard area. In total, $16.9 billion in replacement cost value is exposed to the tsunami hazard.

Table 14-8. Building Values Located in the Tsunami Hazard Area

| Sub-Area | Total Replacement Cost Value | Value Structure Exposed | Value Contents Exposed | Total Exposed | % Exposed |
|---|---|---|---|---|---|
| Central East Oakland | $17,986,229,601 | $557,801,713 | $603,044,791 | $1,160,846,504 | 6.5% |
| Coliseum/Airport | $5,646,390,094 | $2,157,040,115 | $2,136,374,314 | $4,293,414,429 | 76.0% |
| Downtown | $21,475,904,408 | $1,273,930,018 | $919,038,933 | $2,192,968,951 | 10.2% |
| East Oakland Hills | $8,434,796,515 | $0 | $0 | $0 | 0.0% |
| Eastlake/Fruitvale | $20,713,824,637 | $1,734,878,086 | $1,336,678,561 | $3,071,556,647 | 14.8% |
| Glenview/ Redwood Heights | $7,699,736,380 | $0 | $0 | $0 | 0.0% |
| North Oakland Hills | $9,022,389,851 | $0 | $0 | $0 | 0.0% |
| North Oakland/Adams Point | $26,981,073,354 | $0 | $0 | $0 | 0.0% |
| West Oakland | $11,010,987,509 | $3,227,520,006 | $3,019,159,268 | $6,246,679,274 | 56.7% |
| **Total** | **$128,971,332,346** | **$8,951,169,938** | **$8,014,295,866** | **$16,965,465,804** | **13.2%** |

*Sources: (CGS 2025); (City of Oakland 2025); (Hazus v6.1 2023)*
*Notes: Values based off of 2025 tax assessor data provided by Alameda County*

Table 14-9 presents the value (structure and contents) of buildings located in the tsunami hazard area. In total, $3.5 billion in replacement cost value (2.8% of the total replacement cost value for the City) is anticipated to be damaged by a tsunami event that impacts the entirety of the tsunami hazard area.

Table 14-9. Estimated Exposure and Total Value of Damages from the Tsunami Hazard Area

| Sub-Area | Total Replacement Cost Value | Buildings Impacted | Value Structure in $ Damaged | Value Contents in $ Damaged | Total Value (Structure and Contents in $) Damaged | % of Total Value Damaged |
|---|---|---|---|---|---|---|
| Central East Oakland | $17,986,229,601 | 61 | $17,575,391 | $55,478,228 | $73,053,619 | 0.4% |
| Coliseum/Airport | $5,646,390,094 | 160 | $314,334,990 | $678,786,535 | $993,121,526 | 17.6% |
| Downtown | $21,475,904,408 | 1,026 | $178,276,997 | $292,666,155 | $470,943,152 | 2.2% |
| East Oakland Hills | $8,434,796,515 | 0 | $0 | $0 | $0 | 0.0% |
| Eastlake/Fruitvale | $20,713,824,637 | 433 | $303,880,853 | $428,155,108 | $732,035,961 | 3.5% |
| Glenview/ Redwood Heights | $7,699,736,380 | 0 | $0 | $0 | $0 | 0.0% |
| North Oakland Hills | $9,022,389,851 | 0 | $0 | $0 | $0 | 0.0% |
| North Oakland/Adams Point | $26,981,073,354 | 0 | $0 | $0 | $0 | 0.0% |
| West Oakland | $11,010,987,509 | 1,595 | $355,210,110 | $939,561,779 | $1,294,771,889 | 11.8% |
| **Total** | **$128,971,332,346** | 3,275 | $1,169,278,342 | $2,394,647,805 | $3,563,926,147 | 2.8% |

*Sources: (CGS 2025); (City of Oakland 2025); (Hazus v6.1 2023)*
*Notes: Calculated using a user-defined (UDF) analysis in Hazus 6.1.*

### 14.2.6 Impact on Historic and Cultural Resources

Historic structures are at high risk of damage from tsunamis. These structures are unlikely to be built to modern building code requirements which can help reduce the damage from a tsunami. Outdoor cultural sites are also likely to be heavily damaged by a tsunami event.

### 14.2.7 Impact on Ecosystems and Natural Resources

Ecosystems within the inundation areas for tsunamis and seiches that can withstand periodic inundation, such as wetlands, may be relatively unharmed by minor events. However, severe events that result in larger inundation areas may result in negative environmental impacts due to sediment, erosion, debris, saltwater and pollutant contamination of soil and water bodies, and other impacts (Cal OES 2023).

## 14.3 MITIGATION OPPORTUNITIES

Table 14-10 presents a range of potential opportunities for mitigating the tsunami hazard.

Table 14-10. Potential Opportunities to Mitigate the Tsunami Hazard

| Community Scale | Organizational Scale | Government Scale |
|---|---|---|
| **Manipulate the Hazard** | | |
| • Implement tsunami construction measures at a project level, including elevated living spaces and debris deflection structures | • Implement tsunami construction measures at a project level, including elevated living spaces and debris deflection structures | • Build wave abatement structures (e.g., sea walls and Tetrapods) |
| **Reduce Exposure and Vulnerability** | | |
| • Construct or relocate structures outside of hazard area<br>• Elevating structures above the inundation levels<br>• Apply personal property mitigation techniques to residential structures (e.g., anchoring foundations and foundation openings to allow flow through) | • Locate structure or mission critical functions outside of hazard area whenever possible<br>• Elevating structures above the inundation levels<br>• Construct vertical evacuation shelters | • Locate structure or functions outside of hazard area whenever possible<br>• Harden infrastructure for tsunami impacts<br>• Relocate identified critical facilities located in tsunami high hazard areas<br>• Adopt higher regulatory standards that will provide higher levels of protection to structures built in a tsunami inundation area<br>• Use tsunami mapping and land use planning to guide development away from high-risk areas<br>• Construct vertical evacuation shelters |
| **Build Local Capacity** | | |
| • Develop and practice a household evacuation plan<br>• Become educated about the risk exposure from the tsunami hazard and ways to minimize that risk<br>• Understand tsunami warning signs and signals | • Develop and practice a corporate response and evacuation plan<br>• Educate employees on the risk exposure from the tsunami hazard and ways to minimize that risk | • Use probabilistic tsunami mapping and land use guidance from the State<br>• Provide incentives to guide development away from hazard areas<br>• Improve the tsunami warning and response system<br>• Provide residents with updated tsunami hazard and inundation maps for the coast and vulnerable inland waterbodies<br>• Join NOAA's Tsunami Ready program |

| Community Scale | Organizational Scale | Government Scale |
|---|---|---|
| | | • Develop and communicate evacuation time products and routes<br>• Enhance the public information program to include risk reduction options for the tsunami hazard<br>• Develop products useful for tsunami mitigation and recovery<br>• Restore wetlands, marshes, and oyster reefs, and install living shorelines to help reduce wave impacts<br>• Preserve/restore tidal marshes<br>• Establish living shorelines (plants and natural elements designed to stabilize and protect coastlines) to prevent erosion<br>• Incentivize voluntary retreat from coastal hazard areas |

# 15. WILDFIRE

## 15.1 HAZARD PROFILE

**Local Plan Requirement B1 – 44 CFR Part 201.6(c)(2)(i)**

*Include a description of the type, location, and extent for the identified hazards of concern and include information on previous occurrences of hazard events and the probability of future hazard events.*

### 15.1.1 Description of the Hazard

#### Defining the Hazard

Wildfire is any uncontrolled fire occurring on undeveloped land that requires fire suppression. Wildfires can be ignited by natural forces such as lightning, or by human activity such as smoking, campfires, equipment use, and arson. Wildfire can also be ignited by the transport of burning embers by high winds miles away from the initial ignition source. The potential for significant damage to life and property exists in or in close proximity to areas designated as "wildland/urban interface areas," where development is adjacent to densely vegetated areas.

#### Cause of the Hazard

In California, wildfire is common due to the combination of complex terrain, Mediterranean climate that annually facilitates rain-free periods lasting several months, productive natural plant communities that provide ample fuels, and ample natural and anthropogenic ignition sources. The State has an extensive history of severe wildfire events and faces the probability of future events that are even more destructive than those of the past (Cal OES 2023).

Flammable expanses of brush, diseased timberland, overstocked forests, hot and dry summers, extreme topography, intense fire weather wind events, summer lightning storms, and human acts all contribute to California's wildfire threat. Wildfires are generally classified as follows:

- Ground fires occur when fuel ignites and burn underground. Ground fires may eventually burn through the ground surface and become surface fires.
- Surface fires burn on the surface of the ground and are primarily fueled by low-lying vegetation.
- Ladder fuels are vegetation that allow surface fires to climb into the tree canopy and become crown fires.
- Crown fires spread from treetop to treetop spread at a rapid pace. Crown fires are often pushed by wind and can be extremely intense (Cal OES 2023).

Wildfire spreads include phases of ignition, active spread, fully developed and decay. During the ignition phase, wildfires can be sparked by natural causes or human activities. Approximately 85 percent of wildfires in the United States are caused by human activities (Short 2022). Early detection of ignition is the most critical but challenging thing to minimize the fire's impact.

The active spread phase is when the fire begins to grow rapidly, driven by dry vegetation, extreme winds and terrain. Fires in California have been found to spread up to 14 times faster under high winds, like the Diablo winds, present in the East Bay, which exacerbate fire intensity and movement. Diablo winds in the Bay Area are strong, hot, and dry northeasterly winds flowing from inland mountains, named after the Diablo Range, that significantly increase wildfire risk in Northern California, especially in fall. High winds not only accelerate the fire's spread but also carry embers and firebrands over long distances, igniting new spot fires far ahead of the main fire. These flying embers can travel up to a mile or more, making it difficult to predict and contain the advancement of fire. Firefighting and resource coordination during this phase is challenging as high winds can hinder the deployment of aerial resources, such as water-dropping helicopters and firefighting planes.

In the fully developed phase, the fire reaches its peak intensity, consuming significant fuel and spreading aggressively. Extreme heat from wildfires can create pyrocumulonimbus clouds, which can spark new fires miles away. These clouds can exacerbate fire spread by generating erratic winds and even sparking new fires through lightning strikes.

In the decay phase, fire intensity decreases as it runs out of fuel or is under control. However, lingering hotspots can reignite under the favoring conditions.

### Summary of Potential Impacts

California wildfires have devastating impacts, including loss of life, homes, and livelihoods, along with significant environmental and economic consequences, including air and water quality issues, and increased mental health challenges.

Human impacts include:

- Loss of Life and Property-Wildfires can cause fatalities and destroy homes, businesses, and infrastructure.
- Displacement and Evacuation-Hundreds to thousands of people are forced to evacuate their homes, leading to temporary or long-term displacement.
- Air Quality Issues-Wildfire smoke contains harmful pollutants that can exacerbate respiratory and cardiovascular conditions, and even lead to premature death.
- Mental Health Impacts-The trauma and uncertainty associated with wildfires can lead to increased rates of depression, anxiety, and post-traumatic stress.
- Economic Costs-Wildfires cause significant economic losses, including property damage, business closures, and increased insurance premiums.

Environmental impacts include:

- Air Pollution-Wildfire smoke releases pollutants into the atmosphere, impacting air quality and human health both locally and downwind.
- Water Quality Issues-Ash and debris from fires can contaminate water sources, and burned watersheds are prone to increased flooding and erosion.
- Habitat Loss and Ecosystem Changes-Wildfires can destroy forests and other habitats, leading to changes in vegetation and wildlife populations.
- Marine Ecosystems-Firefighting runoff and ash can enter coastal waters, potentially harming marine life and ecosystems.

- Soil Erosion-Burned areas are more vulnerable to erosion, which can lead to landslides and further damage to the environment.

Economic impacts include:

- Property and Capital Losses-Wildfires can cause billions of dollars in property damage and economic losses.
- Increased Insurance Premiums-The cost of wildfires can lead to higher insurance premiums or even un-insurability for homeowners and businesses.
- Tourism Impacts-Wildfires can disrupt tourism and negatively impact local economies.
- Supply Chain Disruptions-Wildfires can disrupt transportation and supply chains, leading to shortages and price increases.

### Cascading Hazard Impacts

Wildfires can generate a range of secondary effects, which in some cases may cause more widespread and prolonged damage than the fire itself. A major fire can lead to ancillary effects such as landslides in steep ravine areas and flooding due to the effects of silt in local watersheds. Wildfires cause the contamination of reservoirs, destroy transmission lines and contribute to flooding. They strip slopes of vegetation, exposing them to greater amounts of runoff. This in turn can weaken soil and cause failures on slopes, sometimes several years after a wildfire.

### Ember Activity

Damages in numerous fire events globally such as the January 2025 LA Wildfires have been attributed to ember activity over radiant heat and direct flame losses. In addition to the impact of embers on properties, embers are responsible for accelerating the fire front and creating spot fires, which generate significant challenges for fire suppression. The ember risk of a property refers to the likelihood that a property will sustain damage because of embers. The ember risk of a property is a function of many factors of the built and natural environment, and is further influenced by the decisions made by agencies and residents of the surrounding community. Factors of the built environment include choice of building materials, the shape and orientation of homes, distance between structures, and the presence of shade sails, decks and pergolas. Other include the presence of screens covering ventilation openings, absence of flammable materials or vegetation near the house, the availability of firefighting resources such as water supplies, and emergency responder access to the property.

### Impacts from Smoke

Wildfires can have a significant effect on air quality, especially with prolonged periods of burning combined with climatic conditions. Smoke generated by wildfire consists of visible and invisible emissions that contain particulate matter (soot, tar, water vapor, and minerals), gases (carbon monoxide, carbon dioxide, nitrogen oxides), and toxics (formaldehyde, benzene). Emissions from wildfires depend on the type of fuel, the moisture content of the fuel, the efficiency (or temperature) of combustion, and the weather.

The danger of wildfire smoke comes primarily from particulate matter, consisting of fine particles that are 2.5 micrometers (about a ten-thousandth of an inch) or less in diameter ($PM_{2.5}$). On a given day, California wildfires can produce 10 times more $PM_{2.5}$ air pollution than is produced by all other pollution sources combined (Associated Press 2020). The small particles in $PM_{2.5}$ pollution are capable of reaching deep into the lungs, causing a host of complications, including significantly increased risks of heart disease, respiratory disease, asthma, and premature mortality. Health problems related to wildfire smoke exposure can be as mild as eye and respiratory tract irritation and as serious as worsening of heart and lung disease, including asthma, and even death. Smoke from wildfires that burn homes and other structures can contain toxic materials such as asbestos and heavy metals. Studies indicate that wildfire smoke is up to 10 times more harmful than other forms of $PM_{2.5}$ pollution (Aguilera, et al. 2021).

Not all individuals are equally exposed to the hazard of wildfire smoke, nor are they equally vulnerable. Outdoor workers and unhoused individuals have especially high exposure to outdoor air, and younger individuals are especially vulnerable to unhealthy air. Because $PM_{2.5}$ pollution affects the immune and cardiovascular systems, other vulnerable populations include people with medical conditions, including diabetes and heart and lung conditions. These vulnerable populations together represent a significant fraction of the California population and indicate inequity in impacts. See Section 15.2.2 for additional details.

At least 95 percent of Californians suffered unhealthy levels of particle pollution due to wildfires in 2020 (Los Angeles Times 2020). Worse air quality leads to illnesses, emergency room visits, and hospitalizations for chronic health conditions, including chronic obstructive pulmonary disease, asthma, chronic bronchitis, and other respiratory and cardiovascular conditions as well as increased risk for respiratory infections, which all result in greater health costs to the State (Romley, Hackbarth and Goldman 2010, Wang, Aaron and Madrigano 2019, Inserro 2018).

### Wildfire Protection Responsibility in California

Hundreds of local, state, and federal agencies have fire protection responsibility for wildfires in California. To address wildfire jurisdictional responsibilities, the California state legislature adopted legislation establishing the following responsibility areas:

- **Federal Responsibility Areas (FRAs)**—FRAs are fire-prone wildland areas that are owned or managed by a federal agency such as the US Forest Service, National Park Service, Bureau of Land Management, US Fish and Wildlife Service, or US Department of Defense. Primary financial and rule-making jurisdictional authority rests with the federal land agency. In many instances, FRAs are interspersed with private land ownership or leases. Fire protection for developed private property is usually not the responsibility of the federal land management agency; structural protection responsibility is that of a local government agency.
- **State Responsibility Areas (SRAs)**—SRAs are lands in California where CAL FIRE has legal and financial responsibility for wildfire protection and where CAL FIRE administers fire hazard classifications and building standard regulations. SRAs are defined as lands that meet the following criteria:
  - Are county unincorporated areas
  - Are not federally owned

  - Have wildland vegetation cover rather than agricultural or ornamental plants
  - Have watershed or range/forage value
  - Have housing densities not exceeding three units per acre.

Where SRAs contain built environment or development, the responsibility for fire protection of those improvements (non-wildland) is that of a local government agency.

- **Local Responsibility Areas (LRAs)**—LRAs include land in cities, cultivated agriculture lands, non-flammable areas in unincorporated areas, and lands that do not meet the criteria for SRA or FRA. LRA fire protection is typically provided by city fire departments, fire protection districts, and counties, or by CAL FIRE under contract to local governments. LRAs may include flammable vegetation and areas where the financial and jurisdictional responsibility for improvement and wildfire protection is that of a local government agency.

State law requires local governments to update the safety elements in their general plans to recognize wildfire risks in SRAs and "Very High" Fire Hazard Severity Zones (FHSZs) (based on statewide criteria). The safety element must include information and policies on unreasonable risk from potential hazards, including fire. The state encourages integration among jurisdictions to enhance mitigation and prevention efforts.

CAL FIRE is required to classify the severity of fire hazards in areas of California. The State Fire Marshal is mandated to classify lands within both State Responsibility Areas and Local Responsibility Areas into FHSZs.

### 15.1.2 Location

FHSZs fall into one of the following classifications:

- Moderate
- High
- Very High

The FHSZ maps are developed using a science-based and field-tested model that assigns a hazard score based on the factors that influence fire likelihood and fire behavior. Many factors are considered such as fire history, existing and potential fuel (natural vegetation), predicted flame length, blowing embers, terrain, and typical fire weather for the area.

In February 2025, the State Fire Marshal released maps for the Local Responsibility Area Fire Hazard Severity Zones. State government code requires the State Fire Marshal to make recommendations of fire hazard severity zones to local municipalities for their designation and adoption by ordinance. The State Fire Marshal map proposed to remove large portions of the Oakland Hills that had been designated as Very Fire Hazard Severity Zone and rezone as moderate and high severity zones or would not be labeled with any severity zone designation. The City did not agree with the decision by CAL FIRE to reduce the land area in Oakland. By adopting its own map, the City is demonstrating and protecting its long-standing interest in proactive prevention efforts in neighborhoods known to be at greatest risk because of a multitude of hazards. In May 2025, Oakland City Council adopted an ordinance to designate the Oakland Fire Hazard Severity Zone.

The California laws that require FHSZs include California Public Resources Code 4201-4204, California Code of Regulations Title 14, Section 1280 and California Government Code 51175-89. The City of Oakland has enhanced the CAL FIRE FHSZ data and enhanced it with pertinent local data to identify fire hazard severity zones within the City. Figure 15-1 shows the enhanced FHSZs within the Local Responsibility Area (LRA), as adopted by the City of Oakland in May 2025.

### 15.1.3 Extent

#### Measuring Intensity

Fire intensity describes the energy released from the fire or characteristics of the fire behavior such as flame length and rate of spread. A widely used measure of fire intensity is fire line intensity, which is the rate of heat transfer per unit length of the fire line (measured in kW m−1) and represents the radiant energy release in the flaming front. Fireline intensity is a good measure of how likely the fire is to propagate and how difficult it will be to stop, and thus, it is a critical component of fire behavior models used to inform fire suppression activities. Very seldom is fire line intensity actually measured, rather it is generally inferred based on flame length, which has been found to correlate with fire line intensity; however, this correlation has not been widely tested.

Factors that influence wildfire intensity include the following:

- **Fuel**—The type, amount, and moisture content of vegetation (fuel) significantly impact intensity.
- **Topography**—Steep slopes and canyons can concentrate wind and fuel, increasing intensity.
- **Weather**—Hot, dry, and windy conditions exacerbate fire intensity.

Understanding wildfire intensity is important because it can aid planners and first responders as follows:

- **Fire behavior prediction**—Intensity helps predict how a fire will spread and behave.
- **Fire suppression strategies**—Understanding intensity is crucial for determining the most effective firefighting tactics.
- **Risk assessment**—Intensity helps assess the potential danger to communities and ecosystems.

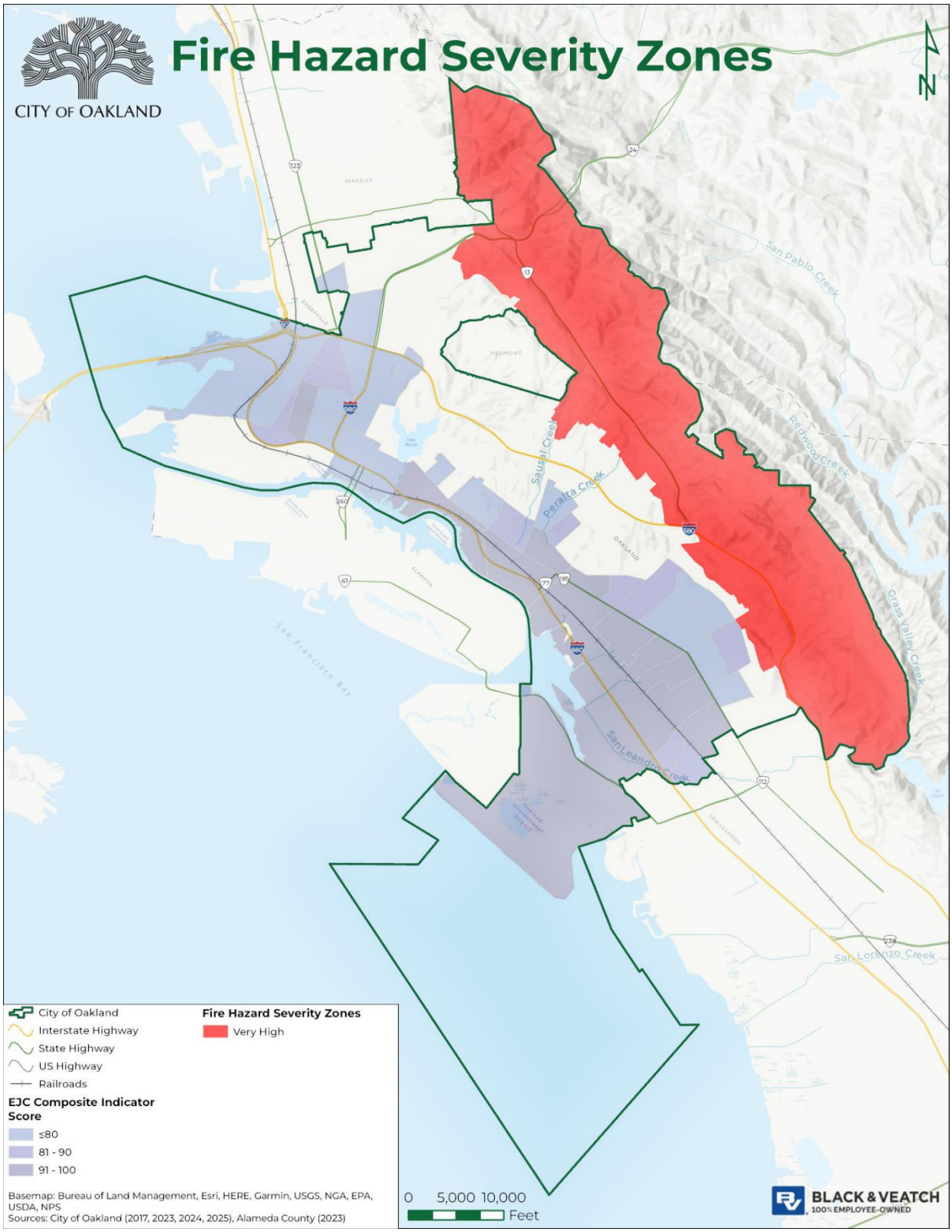



Figure 15-1. City of Oakland Fire Hazard Severity Zones

## Warning Time

Wildfires are often caused by humans, intentionally or accidentally. There is no way to predict when one might break out. Since fireworks often cause brush fires, it is known that extra risk occurs around the Fourth of July. Dry seasons and droughts greatly increase fire likelihood. Dry lightning may trigger wildfires. Severe weather can be predicted, so special attention can be paid during weather events that may include lightning. Reliable NWS lightning warnings are available on average 24 to 48 hours prior to a significant electrical storm.

The most common and effective methods used currently to detect wildfires in California are remote sensing and satellite monitoring. Satellites like NASA's MODIS and VIIRS provide real-time data on fire location, size, and intensity. These tools help identify new ignitions and monitor fire progression, even in remote areas. Thermal imaging from drones and ground-based radar complements satellite data, offering high-resolution insights for on-the-ground operations. California is also using an artificial intelligence (AI)-powered wildfire detection system using AI to train a forest-based camera network to recognize early signs of fire (https://alertcalifornia.org/).

There have been many controlled or prescribed burns implemented to reduce excess vegetation, like thinning dense forests and clearing underbrush, to mitigate fire severity. These efforts may model the methods that Native Americans used to manage the landscape and reduce buildup of fuels with intentional fire activities. There have been efforts to test conducting controlled burns with the help of robots. Autonomous helicopters have demonstrated the ability to detect and suppress fires independently.

Additionally, there are computational models with wildland-urban interface extensions, which simulate fire spread through communities. These tools incorporate data on vegetation, structure materials and fire dynamics to reconstruct past events and predict future risks.

### *Sirens in Oakland*

The City of Oakland has 25 sirens strategically placed through Oakland to alert community members of an emergency. These sirens produce different sounds to tell you how to stay safe during the emergency (City of Oakland 2025).

- If you hear a steady tone, you should shelter in place.
- If you hear a slow wail tone, there might be a tsunami.
- If you hear a fast wail tone, there might be a wildfire.

## Worst-Case Scenario

The worst-case scenario occurred within Alameda County in 1991. The Tunnel Fire, also known as the Oakland-Berkely Hills fire of 1991, devastated the Oakland Hills, a complex wildfire environment and one of the highest risk areas in the country.

At the time this plan was written, CAL FIRE records list the Tunnel Fire as the 5$^{th}$ most destructive in the State (CAL FIRE 2026). According to the U.S. Forest Service in 1995, the Tunnel Fire was the costliest urban-wildland fire and one of the worst fires involving life and property since the Great San Francisco Earthquake and Fire of 1906 (USDA Forest Service

1995). This fire was known for producing a firestorm - a phenomenon in which the fire generates its own weather. The intense heat created powerful winds that, combined with an already gusty day, rapidly fueled the fire's spread. Winds blew in excess of 65 miles per hour and temperatures hit record highs into the nineties. Drought-stricken brush and freeze-damaged trees provided fuel for the already dire fire conditions. The fire burned over 1,500 acres within an area of 5.25 square miles, destroyed 2,900 dwelling units, killed 25, and left 150 injured. More than 10,000 people were evacuated and over $1 billion in damage was caused.

## 15.1.4 Previous Occurrences

The following sections provide a review of previous wildfire occurrences in Alameda County.

### Declarations

#### *Federal Declarations*

Between 1970 and 2025, The federal government declared that Alameda County experienced 2 disasters (DR) or emergencies (EM) related to wildfire (FEMA 2025).

Table 15-1. Federal Disaster Declarations for Wildfire

| Event Name | Disaster Number | Event Date(s) |
|---|---|---|
| Forest and Brush Fires | DR-295-CA | September 29, 1970 |
| Oakland Hills Fire | DR-919-CA | October 22, 1991 |

*Source: (FEMA 2025)*

#### *State Proclamations*

Between 1954 and 2025, California included Alameda County in 4 state-proclaimed wildfires disasters that were not declared as Federal disasters, as noted in Table 15-2.

Table 15-2. State Disaster Proclamations for Wildfire

| Event Name | Disaster Number | Proclamation Date |
|---|---|---|
| Fires and Explosions | - | September 14, 1962 |
| 1970 Fires | DR-295 | September 24 – November 14, 1970 |
| East Bay Hills Fire | DR-919, 91-05 | October 22, 1991 |
| Freeway Collapse Fire | 2007-03 | April 29, 2007 |

*Source: (Cal OES 2025)*

#### *USDA Proclamations*

Between 2012 and 2025, USDA has included Alameda County in five declarations relating to wildfire; however, the event name is noted as a drought (U.S. Department of Agriculture 2025).

Table 15-3. USDA Disaster Declarations for Wildfire

| Event Name | Designation Number | Effective Dates |
|---|---|---|
| Drought-FAST TRACK | S3547 | May 7 – July 1, 2013 |
| Drought-FAST TRACK | S3558 | June 4 – July 29, 2013 |
| Drought-FAST TRACK | S3569 | May 25 – August 19, 2013 |
| Drought-FAST TRACK | S3784 | January 2, 2015 - Continuing |
| Drought-FAST TRACK | S3952 | January 1, 2016 – Continuing |

*Source: (USDA 2025)*
*Note: The USDA classifies fire and wildfire within drought events.*

### Summary of Significant Events

The most significant wildfire in recent history was the 1991 Tunnel Fire (aka Oakland Hills Fire and East Bay Hills Fire). The fire started October 19 and was brought under control on October 23. It burned 1,520 acres, destroyed more than 3,200 structures, and had 25 confirmed deaths. Northeasterly winds, known as Diablo Winds, that periodically occur in the fall contributed to the growth of the grass fire eventually generating its own wind, now known as a firestorm (East Bay Regional Park District 2025).

### Recent Events

For the 2026 LHMP update, wildfire events that impacted the City of Oakland since January 2020 are listed in the table below. For events prior to January 2020, refer to the 2021 LHMP.

Table 15-4. Recent Wildfire Events Impacting the City of Oakland

| Date(s) of Event | Event Type | FEMA / State Declaration Number (if applicable) | Alameda County included in declaration? | Description |
|---|---|---|---|---|
| October 22, 2024 | Keller Fire | - | - | 15 acres burned in the area of Edwards Ave. and Mountain Boulevard, in the City of Oakland |

*Sources: (CAL FIRE 2025b); (FEMA 2025); (NOAA NCEI 2025); (Cal OES 2025)*

## 15.1.5 Future Conditions

Future hazard conditions, including frequency and severity of future events, is discussed in the sections below.

### Probability

Wildfire is a common hazard in the Bay Area. In the past 60 years the region has experienced over 500 wildfires, including fast-moving and dangerous wildfires like the 2017 North Bay fires, which killed 31 residents and destroyed more than 8,000 structures. Wildfire risk is increasing in some of the communities located in the Bay Area due to climate change (Association of Bay Area Governments 2025).

With two FEMA disaster declarations in 55 years (1970 to 2025) the annual probability for wildfire events within the City is relatively low based on past events, with one major wildfire every 27 years. It is important note that while infrequent, the fires have been devastating.

### Climate Change

According to California's Fourth Climate Change Assessment, the San Francisco Bay Area average annual maximum temperature increased by 1.7°F (0.95 °C) from 1950 to 2005. Even with substantial global efforts to reduce greenhouse gas emissions in the coming decades, the Bay Area will likely see a significant increase in temperature by mid-century. By the end of the century, the difference between lower and higher global emissions scenarios will make a major difference in how much Bay Area temperatures rise. (California's Fourth Climate Change Assessment 2018).

Precipitation in the Bay Area will continue to exhibit high year-to-year variability - "booms and busts" - with very wet and very dry years. Warming temperatures combined with expansion of the wildland-urban interface are projected to increase fire risk in most of the Bay Area, though risks may decline in some areas as they become more heavily urbanized (California's Fourth Climate Change Assessment 2018).

Climate change may also increase the frequency of lightning strikes. A warmer atmosphere holds more moisture which is one of the key items for triggering a lightning strike. The number of lightning strikes across the continental United States is likely to increase by about 12% for every degree of rise in global temperature. Lightning strikes cause approximately half the wildfires in the United States (Romps, Seeley, Vollaro, and Molinari 2014). If the frequency of lightning strikes increases, the potential for wildfires from these strikes also increases.

According to California's Fourth Climate Change Assessment, if greenhouse gas emissions continue to rise, California is likely to see a 50 percent increase in fires larger than 25,000 acres as well as a 77 percent increase in average area burned by 2100. Numerous climactic drivers will influence wildfire risk differently between California regions:

- **Increasing Temperatures**—Wildfire risk in the Northern California region is rising in tandem with increasing temperatures. Mixed forests in the Oakland Hills that experience drought are also more susceptible to wildfire. High heat not only influences fire risk directly but can also produce indirect impacts. Warming temperatures will likely worsen air quality due to extended agriculture fallowing. This, in turn, can exacerbate health impacts from wildfire smoke.
- **Shifting Wind Patterns**—The Santa Ana, Sundowner, and Diablo winds will continue to shape wildfire activity across Southern, Central, and Northern California, respectively. Modelers are still working to determine how these wind events will be impacted by climate change.
- **Shifting Insect Habitat**— Bark beetle infestations, observed in forests near Oakland, are increasing due to climate change, leading to higher tree mortality and reduced carbon storage. As more trees die, the amount of fuel for wildfire grows, which can, in turn, increase both the frequency and intensity of these fires.
- **Human Impacts**—Across all of California's landscapes human factors, such as development patterns and risk mitigation strategies, will have a direct impact on communities' ability to mitigate and adapt to the impacts of climate change. Local decisions are a large factor in determining mitigation efforts in a community.

### Potential Future Impacts

In the Bay Area, future fire activity will be driven by both changes in urban development and changes in climate (California's Fourth Climate Change Assessment 2018). According to population projections by the California Department of Finance, Alameda County's population is expected to increase to 1.84 million by 2050. This represents an 11.5 percent increase from the 2025 population of 1.65 million (California Department of Finance 2025). While the City is mostly built out, redevelopment may increase the population and structural value exposed to the wildfire hazard.

## 15.2 VULNERABILITY ASSESSMENT

**Local Plan Requirement B1 – 44 CFR Part 201.6(c)(2)(ii)**

***The plan must include a description of the jurisdiction's vulnerability to the hazards of concern and include an overall summary of the hazard's impact on the community. The impacts need to include the types and numbers of existing and future buildings, infrastructure, and critical facilities located in the hazard areas, and estimate of potential dollar losses to vulnerable structures, and a description of land uses and development trends.***

### 15.2.1 Summary of Vulnerability

A quantitative analysis was conducting using the City of Oakland's Fire Hazard Severity Zones (FHSZ) dataset adopted by the City in May 2025. For the purposes of this assessment, an asset (population, structures, critical facilities, and lifelines) is considered exposed and potentially vulnerable to the wildfire hazard if it is located in the very high FHSZ. In general, wildfire risk is highest where wooded areas abut development. Ember activity can create additional indirect vulnerabilities.

### 15.2.2 Impact on Life, Health, and Safety

Potential losses from wildfire include impacts to human health and life (of residents and emergency responders), structures, infrastructure and natural resources. In addition, wildfire events can have major economic impacts from the initial loss of structures and the subsequent loss of revenue from destroyed business and decreased tourism. The most vulnerable populations include emergency responders and those within a short distance of the interface between the built environment and the wildland environment. First responders are exposed to the dangers from the initial incident and after-effects from smoke inhalation and heat stroke.

Larger and more intense wildfires are creating the potential for greater smoke production and chronic exposures in the U.S. Wildfire smoke contains particulate matter, carbon monoxide, nitrogen oxides, and various volatile organic compounds and can significantly reduce air quality, both locally and in areas downwind of fires (CDC 2024a). The effects from wildfires can range from eye and respiratory tract irritation to more serious disorders, including reduced lung function, bronchitis, exacerbation of asthma and heart failure, and premature death. Children, pregnant people, and the elderly are especially vulnerable to smoke exposure (USEPA 2025).

Based on the analysis, an estimated 61,417 people, or 13.9% of the City's population, are located in the FHSZ.

Table 15-5. Estimated Number of Persons Living in the Very High FHSZ

| Sub-Area | Total Population[1] | Population Exposed[2] | % Total |
|---|---|---|---|
| Central East Oakland | 105,554 | 7 | 0.0% |
| Coliseum/Airport | 4,879 | 0 | 0.0% |
| Downtown | 21,616 | 0 | 0.0% |
| East Oakland Hills | 31,326 | 24,364 | 77.8% |
| Eastlake/Fruitvale | 101,468 | 0 | 0.0% |

| Sub-Area | Total Population[1] | Population Exposed[2] | % Total |
|---|---|---|---|
| Glenview/ Redwood Heights | 32,929 | 10,203 | 31.0% |
| North Oakland Hills | 24,816 | 24,394 | 98.3% |
| North Oakland/Adams Point | 85,380 | 2,448 | 2.9% |
| West Oakland | 32,669 | 0 | 0.0% |
| **Total** | **440,637** | **61,417** | **13.9%** |

*Sources: (CAL FIRE 2025a); (City of Oakland 2025); (Hazus v6.1 2023)*

*Notes: (1) Population calculated using 2020 Census data from Hazus v6.1.*

*(2) Percent of residential buildings exposed multiplied by the Estimated Population.*

## Equity Priority Communities

For this LHMP update, the composite score of each census tract is divided into three categories (91-100, 81-90, and ≤80) based on social vulnerabilities. Populations in these categories are recognized as communities facing social vulnerabilities creating additional barriers in the face of natural hazards (Equity Priority Communities). Wildfires disproportionately impact vulnerable communities, including low-income households, migrants, non-English speakers, older adults, and individuals with health conditions or access and functional needs. Barriers such as immigration concerns, shared housing arrangements, and language delays hinder access to aid and evacuation information. Fires also drive-up housing costs, displacing affected residents and increasing homelessness, while indigenous communities face cultural losses and older adults struggle with mobility. Beyond property and job loss, wildfires disrupt food systems and heighten mental health challenges like stress and anxiety, especially among equity-priority groups living in high-risk areas (Cal OES 2023).

While this analysis identified no Equity Priority Communities within the City's mapped fire hazard severity zones, individuals in Equity Priority Communities could be vulnerable to secondary impacts from wildfires such as smoke and exposure to fire risk due to ember activity. The smoke impacts could include respiratory/cardiovascular health issues due to limited access to clean air shelters and resources, and increased risk due to inadequate housing. The vulnerability to ember activity could be associated with sub-standard housing and vegetation management. To estimate this population, a 3-mile buffer was added to the FHSZ mapping, following the standard practice utilized under "ember-cast" modeling. The results of this supplemental analysis are shown in Table 15-6.

Table 15-6. Estimated Number of Equity Priority Community Members Exposed to Wildfire in FHSZ Buffer Area

| Sub-Areas | Equity Priority Community Thresholds[1] | EPC Population Exposed[2] | % of Total Population Exposed to the Hazard[3] |
|---|---|---|---|
| Central East Oakland | 91-100 | 34,939 | 33.1% |
| | 81-90 | 23,907 | 22.6% |
| | ≤80 | 25,659 | 24.3% |
| Coliseum/Airport | 91-100 | 0 | 100.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 0 | 0.0% |
| Downtown | 91-100 | 0 | 0.0% |
| | 81-90 | 0 | 0.0% |

| Sub-Areas | Equity Priority Community Thresholds[1] | EPC Population Exposed[2] | % of Total Population Exposed to the Hazard[3] |
|---|---|---|---|
| | ≤80 | 9,860 | 60.4% |
| East Oakland Hills | 91-100 | 0 | 0.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 0 | 0.0% |
| Eastlake/Fruitvale | 91-100 | 17,933 | 17.7% |
| | 81-90 | 13,346 | 13.2% |
| | ≤80 | 17,531 | 17.3% |
| Glenview/ Redwood Heights | 91-100 | 0 | 0.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 0 | 0.0% |
| North Oakland Hills | 91-100 | 0 | 0.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 0 | 0.0% |
| North Oakland/Adams Point | 91-100 | 0 | 0.0% |
| | 81-90 | 0 | 0.0% |
| | ≤80 | 20,378 | 23.9% |
| West Oakland | 91-100 | 263 | 1.6% |
| | 81-90 | 5,632 | 33.8% |
| | ≤80 | 10,783 | 64.7% |
| **Totals** | **91-100** | **58,104** | **13.8%** |
| | **81-90** | **42,885** | **10.2%** |
| | **≤80** | **84,220** | **20.1%** |

*Source: (City of Oakland 2023)*

*Notes: (1) These thresholds are determined by the City of Oakland to be the most burdened communities in the City in the General Plan EJ Element.*
*(2) Population, by census tract, within the EPC threshold exposed to the hazard.*
*(3) EPC population exposed compared with total population in sub area.*

### 15.2.3 Impact on General Building Stock

Buildings located in the very high FHSZ maps adopted by the City of Oakland are exposed and considered vulnerable to the wildfire hazard. Buildings constructed of wood or vinyl siding are generally more likely to be impacted by the fire hazard than buildings constructed of brick or concrete. Table 15-7 presents the estimated number of buildings located in the very high FHSZ. Table 15-8 presents the number of buildings by structure type. Of the structures exposed, the majority (23,028) are residential structures, followed by commercial structures (156), and government buildings (80). Overall, 22.1% of structures in the City of Oakland are located in the very high FHSZ.

Table 15-7. Estimated Number of Buildings Located in the Very High FHSZ

| Sub-Area | Total Buildings | Total Buildings Exposed | % Total |
|---|---|---|---|
| Central East Oakland | 22,271 | 5 | 0.02% |
| Coliseum/Airport | 1,229 | 0 | 0.00% |
| Downtown | 5,087 | 0 | 0.00% |
| East Oakland Hills | 10,993 | 8,954 | 81.45% |
| Eastlake/Fruitvale | 17,046 | 0 | 0.00% |

| Sub-Area | Total Buildings | Total Buildings Exposed | % Total |
|---|---|---|---|
| Glenview/ Redwood Heights | 11,192 | 3,474 | 31.04% |
| North Oakland Hills | 10,125 | 9,966 | 98.43% |
| North Oakland/Adams Point | 21,103 | 937 | 4.44% |
| West Oakland | 6,497 | 0 | 0.00% |
| **Total** | **105,543** | **23,336** | **22.11%** |

*Sources: (CAL FIRE 2025a); (City of Oakland 2025); (Hazus v6.1 2023)*
*Notes: Values based off of 2025 tax assessor data provided by Alameda County.*

Table 15-8. Estimated Number of Buildings, by Structure Type, Located in the Very High FHSZ

| Sub-Area | Total Buildings | Very High FHSZ | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | | Residential | Commercial | Industrial | Agriculture | Religion | Government | Education | Total Buildings |
| Central East Oakland | 22,271 | 2 | 1 | 0 | 0 | 0 | 2 | 0 | 5 |
| Coliseum/Airport | 1,229 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Downtown | 5,087 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| East Oakland Hills | 10,993 | 8,838 | 43 | 1 | 0 | 14 | 39 | 19 | 8,954 |
| Eastlake/Fruitvale | 17,046 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Glenview/ Redwood Heights | 11,192 | 3,445 | 10 | 0 | 0 | 6 | 5 | 8 | 3,474 |
| North Oakland Hills | 10,125 | 9,812 | 100 | 0 | 1 | 8 | 32 | 13 | 9,966 |
| North Oakland/Adams Point | 21,103 | 931 | 2 | 0 | 0 | 0 | 2 | 2 | 937 |
| West Oakland | 6,497 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total** | **105,543** | **23,028** | **156** | **1** | **1** | **28** | **80** | **42** | **23,336** |

*Sources: (CAL FIRE 2025a); (City of Oakland 2025); (Hazus v6.1 2023)*
*Notes: Values based off of 2025 tax assessor data provided by Alameda County.*

### *Building Codes and Associated Vulnerability*

Modern building codes significantly reduce wildfire vulnerability by mandating fire-resistant materials, construction practices, and features like enclosed eaves and meshed vents, ultimately increasing the likelihood of home survival in high-risk areas. Every wildfire creates an opportunity to mitigate future wildfire risk through recovery with the application of strong codes and standards.

The State of California is a mandatory building code state. California first mandated building code adopted locally in 1978 with state legislation (SB 331, Robbins) requiring that building standards be unified in a single code within the California Code of Regulations, designated as Title 24, the California Building Standards Code. The basis for the California Building Code has always been the International Building Code (IBC), or its predecessor, the Uniform Building Code (UBC). The IBC (International Building Code) has always included requirements for fire and smoke protection features, but the first edition of the IBC, which was adopted in 2000, was the first time these requirements were codified in a single, comprehensive building code. Chapter 7 of the IBC includes detailed requirements for fire and smoke protection features, including the following:

- Fire-resistance-rated construction: This includes requirements for the fire resistance of structural members, walls, partitions, and horizontal assemblies.
- Fire alarm systems: The IBC specifies requirements for the installation and maintenance of fire alarm systems.
- Fire suppression systems: The IBC includes requirements for fire suppression systems, such as sprinkler systems.
- Smoke control systems: The IBC includes requirements for smoke control systems, such as smoke vents and exhaust fans.

Working under the premise that any structure not built to Chapter 7 of the IBC standards would be more vulnerable to fire starts from ember transport by high winds, and that any structure not held to any codes or standards would be the most vulnerable, an exposure analysis was performed using the date of construction as an identifier for potential vulnerability. Table 15-9 shows residential building counts in the following categories:

- Structures built before 1978, where codes and standards were not required by state mandate.
- Structures built between 1978 and 2000, where codes and standards applied to new construction, but not with specificity to smoke and fire protection.
- Structures built after 2000 where application of Chapter 7 of the IBC is applied.

Table 15-9. General Building Stock by Date of Construction

| Building Code Milestone | Residential (includes multi-family) |
|---|---|
| Built before 1978 | 80,015 |
| Built between 1978 and 2000 | 10,157 |
| Built after 2000 | 7,897 |
| Total | **98,069** |

With over 80,000 residential structures built before 1978, there could be an assumed level of vulnerability to that building stock from wildfire risk, assuming exposure to ember casting from regional wildfires. The degree of vulnerability is uncertain, but any structure built before 1978, surrounded by tree canopy, would be considered to be the highest degree of risk.

### 15.2.4 Impact on Community Lifelines

All community lifelines located in the FHSZ are exposed and vulnerable to the wildfire hazard and are likely to experience functional downtime following wildfire events that could increase the overall impact of such events. Wildfires can have an impact on water supplies because of residual pollutants like char or debris landing in water resources which can clog wastewater pipes, culverts, etc. Wildfires may also impact transportation routes, blocking residents and commuters from getting in and out of the City during a wildfire event because of heavy smoke making it difficult to drive, or where the flames have close proximity to the roadways, making the route an unsafe passageway.

Table 15-10 provides the number of community lifelines located in the FHSZ. The City has 205 community lifelines are located in the FHSZ.

Table 15-10. Estimated Community Lifelines Located in the FHSZ

| Sub-Area | Communications | Energy | Food, Hydration, Shelter | Hazardous Materials | Health and Medical | Safety and Security | Transportation | Water Systems | Total |
|---|---|---|---|---|---|---|---|---|---|
| Central East Oakland | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 |
| Coliseum/Airport | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Downtown | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| East Oakland Hills | 19 | 1 | 0 | 18 | 0 | 20 | 14 | 1 | 73 |
| Eastlake/Fruitvale | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Glenview/ Redwood Heights | 2 | 1 | 0 | 2 | 0 | 6 | 11 | 0 | 22 |
| North Oakland Hills | 51 | 3 | 0 | 14 | 0 | 18 | 16 | 0 | 102 |
| North Oakland/Adams Point | 0 | 1 | 0 | 0 | 0 | 1 | 5 | 0 | 7 |
| West Oakland | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| **Total** | **72** | **6** | **0** | **34** | **0** | **45** | **47** | **1** | **205** |

*Sources: (CAL FIRE 2025a); (City of Oakland 2025)*

### 15.2.5 Impact on the Economy

Wildfire can have both positive and negative effects on local economies. Positive effects come from economic activity generated in the community during fire suppression and post-fire rebuilding. These may include forestry support work, such as building fire lines and performing other defenses, or providing firefighting teams with food, ice, and amenities such as temporary shelters and washing machines.

However, local economies only experience positive effects if fire suppression spending and contracting is done locally. In addition, future benefits are only possible if the fire stimulates, rather than stops, economic development efforts associated with recovery and forest restoration.

Among other negative economic effects for communities, wildfires can burn timber, make recreation and tourism unappealing, and affect agricultural production. Local communities often become concerned about the effects of smoke on health and safety, as well. Depending on the severity and location of a wildfire, post-disaster recovery can come with a considerable price tag. Factors that affect state and local budgets in the long-term include the following:

- Replacement of lost facilities and associated infrastructure,
- Watershed and water quality mitigation, and
- Sensitive species and habitat restoration.

Of the City's $128.9 billion in total replacement cost values of structures, 14.9% ($19.2 billion) are exposed to the FHSZ.

Table 15-11. Estimated Replacement Cost Value of Buildings Located in the FHSZ

| Sub-Area | Total Replacement Cost Value ($) | Value Structure ($) Exposed | Value Contents ($) Exposed | Total Exposed | % Total Exposed |
|---|---|---|---|---|---|
| Central East Oakland | $17,986,229,601 | $2,893,183 | $2,157,715 | $5,050,898 | >0.1% |
| Coliseum/Airport | $5,646,390,094 | $0 | $0 | $0 | 0.0% |
| Downtown | $21,475,904,408 | $0 | $0 | $0 | 0.0% |
| East Oakland Hills | $8,434,796,515 | $4,515,923,133 | $2,599,533,194 | $7,115,456,327 | 84.4% |
| Eastlake/Fruitvale | $20,713,824,637 | $0 | $0 | $0 | 0.0% |
| Glenview/ Redwood Heights | $7,699,736,380 | $1,499,475,231 | $832,702,291 | $2,332,177,522 | 30.3% |
| North Oakland Hills | $9,022,389,851 | $5,685,183,713 | $2,976,066,202 | $8,661,249,915 | 96.0% |
| North Oakland/Adams Point | $26,981,073,354 | $751,974,922 | $389,584,708 | $1,141,559,630 | 4.2% |
| West Oakland | $11,010,987,509 | $0 | $0 | $0 | 0.0% |
| **Total** | $128,971,332,346 | **$12,455,450,182** | **$6,800,044,108** | **$19,255,494,290** | **14.9%** |

*Sources: (CAL FIRE 2025a); (City of Oakland 2025); (Hazus v6.1 2023)*
*Notes: Values based off of 2025 tax assessor data provided by Alameda County.*

### 15.2.6 Impact on Historic and Cultural Resources

The impact to historic cultural resources from direct and indirect exposure to fire and fire-related activities may be swift and detrimental. Buildings may burn, cultural landscapes may be destroyed by trenching, archeological sites may erode. Fire and fire-related activities, however, may be beneficial. Fire may restore a fire-maintained cultural landscape and encourage growth of vegetation valued by Native American communities, or clear out flammable wood around a historic cabin to create defensible space.

### 15.2.7 Impact on Ecosystems and Natural Resources

Fire is a natural process in most terrestrial ecosystems, affecting the types, structure, and spatial extent of native vegetation. Fire can act as a catalyst for promoting biological diversity and healthy ecosystems, reducing buildup of organic debris, releasing nutrients into the soil, and triggering changes in vegetation community composition (California Department of Fish and Wildlife 2022d). However, in some circumstances, it can also cause severe negative environmental impacts, such as the following:

- **Soil Erosion**—The protective covering provided by foliage and dead organic matter is removed, leaving the soil fully exposed to wind and water erosion. Accelerated soil erosion occurs, causing landslides and threatening aquatic habitats (California Ecosystems Climate Solutions 2020).
- **Reduced Agricultural Resources**—Wildfire can have disastrous consequences on agricultural resources, removing them from production and necessitating lengthy restoration programs (Philip 2019).

- **Spread of Invasive Plant Species**—Non-native woody plant species frequently invade burned areas. When weeds become established, they can dominate the plant cover over broad landscapes, and become difficult and costly to control (U.S. Department of the Interior, Office of Wildland Fire 2022).
- **Disease and Insect Infestations**—Unless diseased or insect-infested trees are swiftly removed, infestations and disease can spread to healthy forests and private lands. Timely active management actions are needed to remove diseased or infested trees (The White House n.d.).
- **Destroyed Endangered Species Habitat**—Wildfire can have negative consequences on endangered species by degrading their habitat (Butcher, Kristin 2019).
- **Soil Sterilization**—Some wildfires burn so hot that they can sterilize the soil. Topsoil exposed to extreme heat can become water repellant, and soil nutrients may be lost (FireSafe Sonoma 2020).
- **Damaged Fisheries**—Fisheries can suffer from increased water temperatures, sedimentation, and changes in water quality (NASA Jet Propulsion Laboratory, California Institute of Technology 2022); (Beakes, et al. 2014).
- **Damaged Cultural and Historical Resources**—The destruction of cultural and historic resources may occur, scenic vistas can be damaged, and access to recreational areas can be reduced (National Park Service 2021).

## 15.3 MITIGATION OPPORTUNITIES

Table 15-12 presents a range of potential opportunities for mitigating the wildfire hazard.

Table 15-12. Potential Opportunities to Mitigate the Wildfire Hazard

| Community Scale | Organizational Scale | Government Scale |
|---|---|---|
| **Manipulate the Hazard** | | |
| • Clear potential fuels on property such as dry overgrown underbrush and dead, dying, or diseased trees | • Clear potential fuels on property such as dry overgrown underbrush and dead, dying, or diseased trees | • Clear potential fuels on property such as dry overgrown underbrush and dead, dying, or diseased trees<br>• Implement best management practices on public lands |
| **Reduce Exposure and Vulnerability** | | |
| • Create and maintain defensible space around structures and provide water on site<br>• Locate outside of hazard area<br>• Mow regularly<br>• Use fire-resistant building materials | • Create and maintain defensible space around structures and infrastructure and provide water on site<br>• Locate outside of hazard area<br>• Use fire-resistant building materials<br>• Use fire-resistant plantings in buffer | • Create and maintain defensible space around structures and infrastructure<br>• Locate outside of hazard area<br>• Enhance building code to include use of fire-resistant materials in high hazard area<br>• Use fire-resistant plantings in buffer areas of high wildfire threat<br>• Consider higher regulatory standards (such as Class A roofing)<br>• Establish biomass reclamation activities<br>• In high-risk areas, use heat-resistant materials like welded steel, and avoid heat-susceptible materials like polyvinyl chloride and high-density polyethylene |

| Community Scale | Organizational Scale | Government Scale |
|---|---|---|
| | areas of high wildfire threat | |
| **Build Local Capacity** | | |
| • Employ techniques from the National Fire Protection Association's Firewise Communities program to safeguard home<br>• Identify alternative water supplies for fire fighting<br>• Install/replace roofing material with non-combustible roofing materials | • Support Firewise community initiatives<br>• Create/establish stored water supplies to be utilized for firefighting | • More public outreach and education efforts, including an active Firewise program<br>• Possible weapons of mass destruction funds available to enhance fire capability in high-risk areas<br>• Identify fire responses and alternative evacuation routes<br>• Seek alternative water supplies<br>• Become a Firewise community<br>• Use academia to study impacts/solutions to wildfire risk<br>• Establish/maintain mutual aid agreements between fire service agencies<br>• Develop, adopt, and implement integrated plans for mitigating wildfire impacts in wildland areas bordering on development<br>• Consider the probable impacts of climate change on the risk associated with the wildfire hazard in future land use decisions<br>• Provide incentives for existing structures to be hardened against wildfire<br>• Use tools to detect, forecast, and take action ahead of wildfire<br>• Manage invasive species that are susceptible to increased wildfire risk<br>• Create riparian corridors in wildfire hazard areas as fire breaks<br>• Incorporate nature-based wildfire risk reduction buffers into existing ecosystem-friendly land uses (e.g., green space, trains, or parks) |

# 16. HAZARDS OF INTEREST

After reviewing the previous plan and considering options for other hazards of interest to address, the LHMP Steering Committee (SC) selected a limited number of hazards of interest to include in the development of this Local Hazard Mitigation Plan. The sections below provide short profiles of each hazard of interest, including a qualitative discussion of their potential impact in the Planning Area. No formal risk assessment was performed and the hazards are not included in the risk ranking.

## 16.1 HAZARDOUS MATERIALS AND RADIOLOGICAL INCIDENTS

As an urban city, the day-to-day operations of industry and human activity often also mean use, handling, or production of hazardous materials. Exposure to hazardous materials can result in lung damage, cancer, cardiovascular disease, low birth weight infants, and other negative health outcomes that reduce life expectancy. Hazardous sites and materials threaten environmental quality and can result in soil and groundwater contamination. This is especially true of sites that used hazardous materials before adoption of current environmental regulations. Exposure to hazardous materials can also result in lung damage, cancer, cardiovascular disease, low birth weight infants, and other negative health outcomes that reduce life expectancy.

There are approximately 1,700 documented hazardous materials sites currently identified within the city. The vast majority of these sites are concentrated in areas with industrial and uses in East and West Oakland. About 57 percent of sites have been “closed” to indicate that they have completed remediation and/or have demonstrated that existing site uses do not present a significant risk to human health or the environment. Almost a quarter of all sites are actively being remediated and five percent of these sites are operational facilities that are currently certified to handle hazardous materials.

Risks associated with hazardous sites, closed or not, may be worsened by seismic activity, flooding, groundwater intrusion, or new development. Excavation and grading work that occur during construction have the possibility to expose the public to contaminated materials either through physical contact or hazardous vapors. Mismanagement or mishandling of contaminated groundwater and soil may spread contamination through surface water runoff or airborne dust, increasing the public’s exposure to these hazards.

The Safety Element of the Oakland General Plan includes detailed maps and discussion of hazardous materials (City of Oakland 2023).

## 16.2 PUBLIC HEALTH INCIDENTS

Climate scientists and public health experts warn that climate change will increase the risk of infectious disease transmission and potential pandemics. The COVID-19 pandemic has demonstrated the indispensable role of cooperation and coordination across a wide range of sectors, including city departments, public organizations, businesses, nonprofits, and the community, in effectively responding to and planning for future public health emergencies.

In the event of a public health emergency, the coordination and acquisition of medical/health mutual aid resources involves federal, state, and local agencies as well as the private sector (hospitals, medical supply vendors, ambulance companies, etc.). The Oakland Fire Department and Oakland Department of Human Services will work with the Alameda County Department of Public Health to coordinate medical and health responses. At the State level, Cal OES responds to and aids in the recovery from emergencies within the State of California under the authority of the California Services Act, California Disaster Assistance Act, and the Stafford Act. Cal OES is responsible for managing disaster recovery and aiding local governments, special districts, certain nonprofit organizations, individuals, businesses, and agricultural communities impacted by disasters.

The California Department of Public Health contains the Emergency Preparedness Office, which maintains and manages the Medical and Health Coordination Center, distributes funds to local health departments for disaster planning, and operates the California Health Alert Network. The Department also manages the Climate Change & Health Equity Program, whose goal is to systematically integrate work from climate change planning and public health planning with policies and principles that promote equity. To plan for an effective, coordinated response, the City is also preparing a Pandemic Annex of the Emergency Operations Plan, which provides an overview of considerations for City response to a global pandemic affecting the Bay Area. One of the key assumptions of any pandemic planning model is that vulnerable populations, including people of color, will tend to experience worse health outcomes because of historic and current impacts of systemic racism. As part of the next update of the Integrated Preparedness Plan, the City will incorporate the best available data on racial disparities and policy recommendations from the Pandemic Annex to keep Oaklanders safe and healthy (City of Oakland 2023).

Alameda County Public Health Department has an array of programs and services to protect the health and safety of County residents. The agency serves 1.5 million residents in unincorporated county areas and 13 cities (Albany, Emeryville, Alameda, Piedmont, Oakland, San Leandro, Hayward, Union City, Fremont, Newark, Dublin, Pleasanton, Livermore; the City of Berkeley has its own health department). The backbone of Public Health includes assessments of the health status of residents, disease prevention and control, community mobilization and outreach, policy development, education, and assurance of access to quality medical and health care services. To be effective, they actively seek community involvement – partnerships with grass roots and corporate entities, with individuals and groups.

## 16.3 TERRORISM, ACTIVE ATTACKER, CYBERTERRORISM, CIVIL UNREST

Terrorism, active attacker incidents, cyberterrorism and civil unrest are similar in that they are all human-caused criminal activities. Some rise to the level of a disaster, and some are more localized.

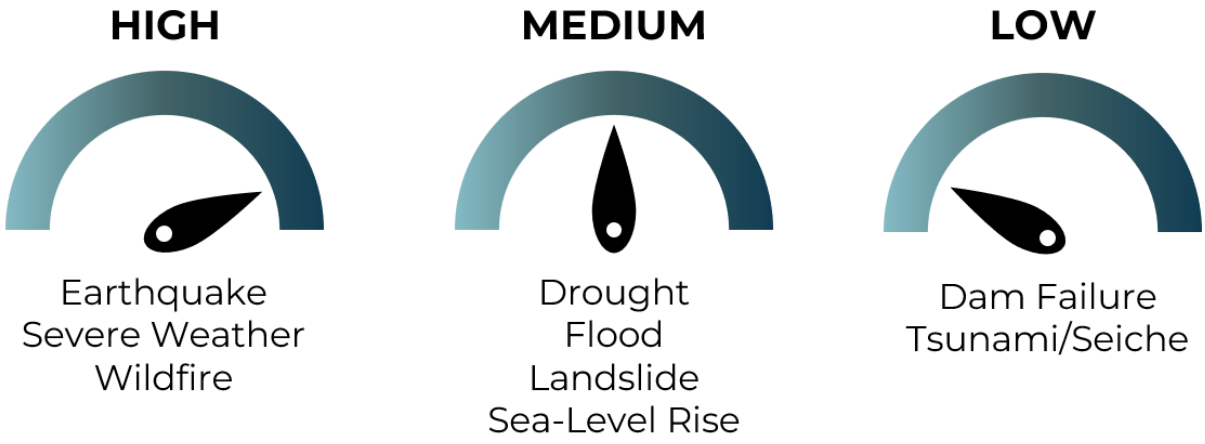
The Federal Bureau of Investigation (FBI) defines terrorism as “the unlawful use of force or violence committed by a group or individual against persons or property to intimidate or coerce a government, the civilian population, or any segment thereof, in furtherance of political or social objectives.” It could also include use of weapons of mass destruction, cyber terrorism (communications and information systems), or agroterrorism (disruption to food

supplies). In April 2021, the City of Oakland prepared a Terrorism Annex to the Emergency Operations Plan to facilitate an effective local response to a terrorist attack on the city. As part of the next update of the Integrated Preparedness Plan, the City will incorporate policy recommendations from the Terrorism Annex to protect against potential terrorist attacks (City of Oakland 2023).

Civil unrest refers to acts of violence and disorder detrimental to the public law and order. It includes riots, vandalism, insurrections, unlawful obstructions, or assemblages. Federal law defines “civil disorder” as any public disturbance involving acts of violence by assemblages of three or more persons, which causes an immediate danger of or results in damage or injury to the property or person of any other individual.

# 17. HAZARD RANKING

Based on the risk assessment, the hazards of concern are ranked as the risk they pose to the City. Results are as follows:




The prioritization and categorization of identified hazards for Oakland is based principally on the Priority Risk Index (PRI), a tool commonly used in hazard mitigation planning, to measure the degree of risk for identified hazards in a particular Planning Area. The PRI described below, was used to assist the City in identifying hazards that pose the most significant threat to the City. Results are depicted on Table 17-1 and a description of the calculations is below.

Table 17-1. Natural Hazard Risk Ranking

| Hazard | Probability | Impact | Spatial Extent | Warning Time | Climate Change | QAF | PRI | Risk Ranking |
|---|---|---|---|---|---|---|---|---|
| Dam Failure | .30 | .30 | .20 | .40 | .40 | 0 | 1.6 | Low |
| Drought | 1.2 | .30 | .80 | .10 | .40 | 0 | 2.8 | Medium |
| Earthquake | 1.2 | .60 | .80 | .40 | 0.0 | 2.0 | 5.0 | High |
| Flood | 1.2 | .60 | .60 | .10 | .40 | 0 | 2.9 | Medium |
| Landslide | .60 | .60 | .60 | .40 | .40 | 0 | 2.6 | Medium |
| Sea-Level Rise | 1.2 | .30 | .2 | .40 | .40 | 0 | 2.5 | Medium |
| Severe Weather | 1.2 | .90 | .80 | .20 | .40 | 0 | 3.5 | High |
| Tsunami/ Seiche | .60 | .30 | .60 | .20 | 0.0 | 0 | 1.7 | Low |
| Wildfire | .90 | .60 | .60 | .30 | .40 | 2.0 | 4.8 | High |

*Notes: PRI value 1 to 1.9 = Low Hazard Risk Ranking*
*PRI Value 2.0 to 2.9 = Medium Hazard Risk Ranking*
*PRI Value ≥3.0 = High Hazard Risk Ranking*

The PRI results provide a numerical value for each hazard, allowing hazards to be ranked against one another (i.e., the higher the PRI value, the greater the hazard risk). PRI values are obtained by assigning varying degrees of risk to five categories for each hazard: probability, impact, spatial extent, warning time, and climate change. Each degree of risk has been assigned a value (1 to 4), and a weighting factor. To emphasize the risk of the earthquake and

wildfire hazards, the Steering Committee chose to add a qualitative adjustment factor (QAF) to those hazards:

- Resident Displacement – 0.5 points
- Economic Impacts – 0.5 points
- Environmental Impacts – 0.5 points
- Transportation Impacts – 0.5 points

To calculate the PRI value for a given hazard, the assigned risk value for each category is multiplied by the weighting factor. The sum of all five categories equals the final PRI value, as demonstrated in the example equation below:

**PRI VALUE = [(PROBABILITY x .30) + (IMPACT x .30) + (SPATIAL EXTENT x .20) + (WARNING TIME x .10) + (CLIMATE CHANGE x .10) + (QAF)]**

According to the weighting scheme applied, the highest possible PRI value is 6.0. Table 17-2 shows the weighting schemes for each category. The assigned weighting factors are typical for hazard mitigation planning efforts. The City had the option to amend these values if desired if additional factors should be considered for hazard rankings. By determining a value for each hazard that can be compared to other hazards threatening the Planning Area, hazards can be ranked with greater ease.

Many of the PRI categories are described within the natural hazard profiles. A hazard risk ranking for each hazard of concern was assigned to the range of PRI values as follows:

- PRI Value 1 to 1.9 = Low Hazard Risk Ranking
- PRI Value 2.0 to 2.9 = Medium Hazard Risk Ranking
- PRI Value 3.0 to 4.0 = High Hazard Risk Ranking

The final PRI results, including the calculated values for each hazard in Oakland are summarized in Table 17-1.

Table 17-2. Priority Risk Index Scoring Criteria

| PRI Category | Degree of Risk | | | Assigned Weighting Factor |
|---|---|---|---|---|
| | Level | Criteria | Index Value | |
| Probability | Unlikely | Less than 1% annual probability. | 1 | 30% |
| | Possible | Between 1 and 10% annual probability. | 2 | |
| | Likely | Between 10 and 90% annual probability. | 3 | |
| | Highly Likely | 90%+ annual probability. | 4 | |
| Impact | Minor | Only minor property damage and minimal disruption to government functions and services. No shutdown of critical facilities. | 1 | 30% |
| | Limited | Minor injuries to the total and Equity Priority Communities and individuals with AFN population are possible, more than 10% of buildings damaged or destroyed, temporary shutdown of critical facilities (less than 1 week). | 2 | |

| PRI Category | Degree of Risk | | | Assigned Weighting Factor |
|---|---|---|---|---|
| | Level | Criteria | Index Value | |
| | Critical | Multiple deaths/injuries to the total and Equity Priority Communities and individuals with AFN population are possible, more than 25% of buildings damaged or destroyed, complete shutdown of critical facilities for more than 1 week. | 3 | |
| | Catastrophic | High number of deaths/injuries to the total and Equity Priority Communities and individuals with AFN population are possible, more than 50% of buildings damaged or destroyed, complete shutdown of critical facilities for 30 days or more. | 4 | |
| Spatial Extent | Negligible | Limited to one specific area. | 1 | 20% |
| | Small | Small areas affected. | 2 | |
| | Moderate | Large areas affected. | 3 | |
| | Large | All areas affected. | 4 | |
| Warning Time | More than 24 hours | Self-explanatory. | 1 | 10% |
| | 12 to 24 hours | Self-explanatory. | 2 | |
| | 6 to 12 hours | Self-explanatory. | 3 | |
| | Less than 6 hours | Self-explanatory. | 4 | |
| Climate Change | Decreasing Risk | Climate change is likely to result in a decrease in the frequency and/or severity of hazard events. | -1 | 10% |
| | No Impact | Climate change is not expected to impact frequency and/or severity of hazard events. | 0 | |
| | Increasing Risk | Climate change is likely to result in an increase in the frequency/severity of hazard events. | 4 | |

# Part 3 - Capability Assessment & Mitigation Strategy

# 18. CAPABILITY ASSESSMENT

**FEMA Mitigation Plan Requirement – 44 CFR Part 201.6(c)(3)**

***The plan shall include a mitigation strategy that provides the jurisdiction's blueprint for reducing the potential losses identified in the risk assessment, based on existing authorities, policies, programs, and resources, and its ability to expand on and improve these existing tools.***

The purpose of the capability assessment is to understand the planning, regulatory, administrative, technical, and financial capabilities present in the City of Oakland. This assessment helps the City identify strengths and opportunities that can be used to reduce losses from hazard events and reduce risks throughout the City.

## 18.1 OVERVIEW

Existing laws, ordinances, plans, and programs at the federal, state, and local level can support or impact hazard mitigation actions identified in this plan. Hazard mitigation plans are required to include a review and incorporation, if appropriate, of existing plans, studies, reports, and technical information as part of the planning process (44 CFR, Section 201.6(b)(3)). Federal and state programs identified through this review are those that may interface with the actions identified in this plan. Each program enhances capabilities to implement mitigation actions or has a nexus with a mitigation action in this plan.

During the LHMP update process, the City updated the capability assessment, paying particular attention to evaluating the effectiveness of these capabilities in supporting hazard mitigation and identifying opportunities to enhance local capabilities to integrate hazard mitigation into their plans, programs, and day-to-day operations.

## 18.2 PLANNING AND REGULATORY CAPABILITY

Planning and regulatory capabilities are based on the implementation of ordinances, policies, local laws, state statutes, plans, and programs that relate to guiding and management growth and development. Planning and regulatory capabilities refer not only to current plans and regulations, but also to the jurisdiction's ability to change and improve those plans and regulations as needed.

State and federal regulations and programs that need to be considered in hazard mitigation are constantly evolving. For this plan, a review was performed to determine which regulations and programs are currently most relevant to hazard mitigation planning. The findings are summarized in Table 18-1 and Table 18-2. Short descriptions of each program are provided in Appendix C (Federal & State Agencies, Programs & Regulations).

City of Oakland and Alameda County capabilities relative to implementing mitigation actions are described in the sections below.

### 18.2.1 Federal Agencies, Programs, and Capabilities

This section summarizes federal programs that may interface with the actions identified in this plan. Each program enhances capabilities to implement mitigation actions or has a nexus with a mitigation action in this plan.

Table 18-1. Summary of Federal Agencies, Programs, and Regulatory Capabilities

| Agency, Program or Regulation | Hazard Mitigation Area Affected | Relevance |
|---|---|---|
| Americans with Disabilities Act | Action Plan Implementation | FEMA hazard mitigation project grant applications require full compliance with applicable federal acts. |
| Bureau of Land Management | Wildfire Hazard | The Bureau funds and coordinates wildfire management programs and structural fire management and prevention on BLM lands. |
| Civil Rights Act of 1964 | Action Plan Implementation | FEMA hazard mitigation project grant applications require full compliance with applicable federal acts. |
| Clean Water Act | Action Plan Implementation | FEMA hazard mitigation project grant applications require full compliance with applicable federal acts. |
| Community Development Block Grant Disaster Resilience Program | Action Plan Funding | This is a potential alternative source of funding for actions identified in this plan. |
| Community Rating System | Flood Hazard | This voluntary program encourages floodplain management activities that exceed the minimum National Flood Insurance Program requirements. |
| Disaster Mitigation Act | Hazard Mitigation Planning | This is the current federal legislation addressing hazard mitigation planning. |
| Emergency Relief for Federally Owned Roads Program | Action Plan Funding | This is a possible funding source for actions identified in this plan. |
| Emergency Watershed Program | Action Plan Funding | This is a possible funding source for actions identified in this plan. |
| Endangered Species Act | Action Plan Implementation | FEMA hazard mitigation project grant applications require full compliance with applicable federal acts. |
| Federal Energy Regulatory Commission Dam Safety Program | Dam Failure Hazard | This program cooperates with a large number of federal and state agencies to ensure and promote dam safety. |
| National Dam Safety Act | Dam Failure Hazard | This act requires periodic engineering analysis of most dams in the country. |
| National Environmental Policy Act | Action Plan Implementation | FEMA hazard mitigation project grant applications require full compliance with applicable federal acts. |
| National Flood Insurance Program | Flood Hazard | This program makes federally backed flood insurance available to homeowners, renters, and business owners in exchange for communities enacting floodplain regulations. |
| National Incident Management System | Action Plan Development | Adoption of this system for government, nongovernmental organizations, and the private sector to work together to manage incidents involving hazards is a prerequisite for federal preparedness grants and awards |

| Agency, Program or Regulation | Hazard Mitigation Area Affected | Relevance |
|---|---|---|
| Presidential Executive Order 11988 (Floodplain Management) | Flood Hazard | This order requires federal agencies to avoid long, and short-term adverse impacts associated with modification of floodplains. |
| Presidential Executive Order 11990 (Protection of Wetlands) | Action Plan Implementation | FEMA hazard mitigation project grant applications require full compliance with applicable presidential executive orders. |
| U.S. Army Corps of Engineers Dam Safety Program | Dam Failure Hazard | This program is responsible for safety inspections of dams that meet size and storage limitations specified in the National Dam Safety Act. |
| U.S. Army Corps of Engineers Flood Hazard Management | Flood Hazard, Action Plan Implementation, Action Plan Funding | The Corps of Engineers offers multiple funding and technical assistance programs available for flood hazard mitigation actions. |
| U.S. Fire Administration | Wildfire Hazard | This agency provides leadership, advocacy, coordination, and support for fire agencies and organizations. |
| U.S. Fish and Wildlife Service | Wildfire Hazard | This service's fire management strategy employs prescribed fire throughout the National Wildlife Refuge System to maintain ecological communities. |

### 18.2.2 State Agencies, Programs, and Regulatory Capabilities

Table 18-2 lists California State programs that can support or enhance mitigation capabilities of the City of Oakland.

Table 18-2. Summary of State Agencies, Programs, and Regulatory Capabilities

| Agency, Program or Regulation | Hazard Mitigation Area Affected | Relevance |
|---|---|---|
| AB 32: The California Global Warming Solutions Act | Action Plan Development | This act establishes a state goal of reducing greenhouse gas emissions to 1990 levels by 2020. |
| AB 70: Flood Liability | Flood Hazard | A city or county may be required to partially compensate for property damage caused by a flood if it unreasonably approves new development in areas protected by a state flood control project. |
| AB 162: Flood Planning | Flood Hazard | Cities and counties must address flood-related matters in the land use, conservation, and safety and housing elements of their general plans. |
| AB 747: General Plans—Safety Element | Hazard Mitigation Planning | The safety elements of cities' and counties' general plans must address evacuation routes and include any new information on flood and fire hazards and climate adaptation and resiliency strategies. |
| AB 2140: General Plans—Safety Element | Hazard Mitigation Planning | This bill enables state and federal disaster assistance and mitigation funding to communities with compliant hazard mitigation plans. |
| AB 2800: Climate Change—Infrastructure Planning | Action Plan Development | This act requires state agencies to take into account the impacts of climate change when developing state infrastructure. |

| Agency, Program or Regulation | Hazard Mitigation Area Affected | Relevance |
|---|---|---|
| Alquist-Priolo Earthquake Fault Zoning Act | Earthquake Hazard | This act restricts construction of buildings used for human occupancy on the surface trace of active faults. |
| California Coastal Management Program | Flood, Landslide, Tsunami and Wildfire Hazards | This program requires coastal communities to prepare coastal plans and requires that new development minimize risks to life and property in areas of high geological, flood, and fire hazard. |
| California Department of Forestry and Fire Protection (CAL FIRE) | Wildfire Hazard | CAL FIRE has responsibility for wildfires in areas that are not under the jurisdiction of the Forest Service or a local fire organization. |
| California Department of Parks and Recreation | Wildfire Hazard | State Parks Resources Management Division has wildfire protection resources available to suppress fires on State Park lands. |
| California Department of Water Resources | Flood Hazard | This state department is the state coordinating agency for floodplain management. |
| California Division of Safety of Dams | Dam Failure Hazard | This division monitors the dam safety program at the state level and maintains a working list of dams in the state. |
| California Environmental Quality Act | Action Plan Implementation | This act establishes a protocol of analysis and public disclosure of the potential environmental impacts of development projects. Any project action identified in this plan will seek full California Environmental Quality Act compliance upon implementation. |
| California Fire Alliance | Wildfire Hazard | The alliance works with communities at risk from wildfires to facilitate the development of community fire loss mitigation plans. |
| California Fire Plan | Wildfire Hazard | This plan's goal is to reduce costs and losses from wildfire through pre-fire management and through successful initial response. |
| California Fire Safe Council | Wildfire Hazard | This council facilitates the distribution of National Fire Plan grants for wildfire risk reduction and education. |
| California Fire Service and Rescue Emergency Mutual Aid Plan | Wildfire Hazard | This plan provides guidance and procedures for agencies developing emergency operations plans, as well as training and technical support. |
| California General Planning Law | Hazard Mitigation Planning | This law requires every county and city to adopt a comprehensive long-range plan for community development, and related laws call for integration of hazard mitigation plans with general plans. |
| California Multi-Hazard Mitigation Plan | Hazard Mitigation Planning | Local hazard mitigation plans must be consistent with their state's hazard mitigation plan. |
| California Residential Mitigation Program | Earthquake Hazard | This program helps homeowners with seismic retrofits to lessen the potential for damage to their houses during an earthquake. |
| California State Building Code | Action Plan Implementation | Local communities must adopt and enforce building codes, which include measures to improve buildings' ability to withstand hazard events. |
| Disadvantaged and Low-Income Communities Investments | Action Plan Funding | This is a potential source of funding for actions located in disadvantaged or low-income communities. |

| Agency, Program or Regulation | Hazard Mitigation Area Affected | Relevance |
|---|---|---|
| Division of the State Architect's AB 300 List of Seismically At-Risk Schools | Earthquake Hazard, Action Plan Development | The Division of the State Architect recommends that local school districts conduct detailed seismic evaluations of seismically at-risk schools identified in the inventory that was required by AB 300. |
| Governor's Executive Order S-13-08 (Climate Impacts) | Action Plan Implementation | This order includes guidance on planning for sea-level rise in designated coastal and floodplain areas for new projects. |
| Office of the State Fire Marshal | Wildfire Hazard | This office has a wide variety of fire safety and training responsibilities. |
| Senate Bill 92: Public Resources Portion of Biennial Budget Bill | Dam Failure Hazard | This bill requires dams (except for low-risk dams) to have emergency action plans that are updated every 10 years and inundation maps updated every 10 years, or sooner if specific circumstances change. |
| Senate Bill 97: Guidelines for Greenhouse Gas Emissions | Action Plan Implementation | This bill establishes that greenhouse gas emissions and the effects of greenhouse gas emissions are appropriate subjects for California Environmental Quality Act analysis. |
| Senate Bill 99: General Plans: Safety Element: Emergency Evacuation Routes | Action Plan Implementation | This bill requires the safety element must include information to identify residential developments in hazard areas that do not have at least two emergency evacuation routes. |
| Senate Bill 182: Local Government: Planning and Zoning: Wildfires | Wildfire Hazard | This bill made a number of changes to state law regarding planning for and permitting development in areas designated as very high fire risk areas. |
| Senate Bill 379: General Plans: Safety Element—Climate Adaptation | Action Plan Implementation | This bill requires cities and counties to include climate adaptation and resiliency strategies in the safety element of their general plans. |
| Senate Bill 1000: General Plan Amendments—Safety and Environmental Justice Elements | Action Plan Implementation | Under this bill, review and revision of general plan safety elements are required to address only flooding and fires (not climate adaptation and resilience), and environmental justice is required to be included in general plans. |
| Senate Bill 1035: Fire, Flood, and Adaptation Safety Element Updates | Action Plan Implementation | Clarifies that revisions to the Safety Element to address fire hazards, flood hazards, and climate adaptation and resilience strategies all must occur upon each revision to a Housing Element or Local Hazard Mitigation Program. |
| Senate Bill 1241: General Plans: Safety Element—Fire Hazard Impacts | Wildfire Hazard | This bill requires cities and counties to make findings regarding available fire protection and suppression services before approving a tentative map or parcel map. |
| Standardized Emergency Management System | Action Plan Implementation | Local governments must use this system to be eligible for state funding of response-related personnel costs. |
| Proposition 4 | Wildfire and Climate Change | Authorizes bonds for safe drinking water, wildfire prevention, and protecting communities and natural lands from climate risks. Legislative statute. Authorizes $10 billion in general obligation bonds for water, wildfire prevention, and protection of communities and lands. |

### 18.2.3 Alameda County Capabilities

#### Alameda County Flood Control and Water Conservation District

The Alameda County Flood Control & Water Conservation District provides flood protection for Western Alameda County residents and businesses, including the City of Oakland. The District plans, designs, constructs, and maintains flood control systems such as natural creeks, channels, levees, pump stations, dams, and reservoirs. It also cares for the natural environment through public outreach and enforcement of pollution control regulations governing waterways.

The California State Legislature created the District in 1949 at the request of Alameda County residents, primarily to build flood control infrastructure across the County. Cities and unincorporated areas have joined the District over the years in order to gain protection from devastating floods.

Today, Alameda County's flood control infrastructure protects nine zones in western Alameda County. This includes pump stations, erosion control structures, dams, and hundreds of miles of pipelines, channels, levees, and creeks. The District maintains equipment, keeps flood control channels clear of silt and debris, and evaluates impacts of new developments on creeks and channels.

As a state recognized special purpose district enabled with taxing authorities, the District generates revenue within a flood control zone. Tax and benefit assessments from properties within each zone can only be spent within that zone.

### 18.2.4 City of Oakland Capabilities

#### General Plan

The Planning & Building Department works with the Planning Commission and the community to make long-term plans for growth and development in Oakland. The General Plan is a comprehensive set of purposes, policies, and programs to guide the future form and development of the City. The General Plan is a strategic, long-term document that affects the lives of City residents and the business community. It is implemented by decisions that direct the allocation of public resources and that shape private development. The General Plan contains the following elements or plans that outline policies for land use and development throughout Oakland:

- **Land Use and Transportation Element—**Designates the kinds, location, and intensity of land uses, as well as appropriate zoning controls to achieve development policies. The Pedestrian and Bicycle Master Plans are considered part of this element.
- **Estuary Policy Plan**—Includes objectives and policies to enhance the Oakland waterfront as a resource for the City. The Estuary Policy Plan (EPP) serves as the Land Use Element for the Estuary shoreline area, extending from Castro Street to the East Creek Slough.

- **Historic Preservation Element**—Provides the goals, policies, and actions to encourage the preservation of older buildings, districts, and other physical features with historic value.
- **Housing Element**—Provides an assessment of the need for housing and an inventory of housing; statement of goals with regard to housing residents; and a program for providing the needed amount of housing throughout the City.
- **Noise Element**—Analyzes and quantifies the existing and projected noise levels from noise sources such as traffic and commercial and aviation activities; includes implementation measures to address any foreseeable noise problems.
- **Open Space, Conservation and Recreation Element—**Contains policies addressing the management of open land, natural resources, and parks in the City.
- **Safety Element**—Includes a policy framework to guide public decision-making with regard to safety hazards. The Safety Element addresses public safety, geological hazards, fire hazards, hazardous materials, and flooding hazards.
- **Scenic Highways—**Addresses the preservation and enhancement of attractive roadways and major thorough fares traversing the City.

### Neighborhood and Specific Area Plans

Oakland has embarked on a series of plans for creating sustainable and vibrant neighborhoods. This program includes the development of nine neighborhood and specific area plans, which are functional components of the General Plan.

### Title 17 Oakland Planning Code

The City of Oakland Planning Code (Title 17 of the City of Oakland Municipal Code) implements the policies of the General Plan and other City plans, policies, and ordinances. The Planning Code divides the City into zones and assigns land use and development regulations to each zone. These regulations direct the construction, nature, and extent of building use. In the event of conflict between the Oakland Planning Code and the General Plan, Chapter 17.01 establishes that the direction of the City's General Plan shall prevail over the Planning Code:

> *Until the Planning Code is fully updated, land use designations, zoning controls, and subdivision controls specified by the Planning Code and Subdivision Regulations shall apply, except where such action would expressly conflict with the Oakland General Plan. Where an express conflict does arise, the General Plan policies and land use designations shall apply. An "express conflict" shall be deemed to be any situation where a proposal clearly conforms with the General Plan but is not permitted by the portion of Zoning Regulations that have not been fully updated, or where a proposal clearly does not conform with the General Plan, but is permitted or conditionally permitted by the portion of Zoning Regulations that have not been fully updated.*

### Soft-Story Retrofit Program

The City of Oakland's Soft Story Retrofit Program works to save lives by strengthening buildings with large ground-floor openings that are particularly prone to collapse during an

earthquake. Effective January 22, 2019, Municipal Ordinance No. 13516 requires residential property owners to strengthen these vulnerable buildings with seismic retrofits.

Title 15, Chapter 15.27 establishes a program of mandatory seismic evaluation and retrofit of certain residential buildings vulnerable to earthquake damage. The program is intended to reduce earthquake-related deaths and injuries, improve the durability of Oakland's housing stock, facilitate post-earthquake emergency response, improve community stability, minimize displacement during retrofits and after an earthquake, and reduce the economic impacts of an earthquake. This regulation targets buildings with a wood-frame target story and five or more dwelling units that was constructed or permitted for construction before 1991 or designed based on a version of the Uniform Building Code from 1985 or earlier. If an owner adds dwelling units to a building so that it becomes a building with five or more units, then the building shall be considered a subject building at the time building permits are issued for the additional units.

### Sustainability

The Sustainable Oakland Program is housed in the Sustainability and Resilience Division of the City Administrator's Office. This team fosters collaboration with staff across all City departments and with community leaders and experts on equitable climate change and adaptation. The Sustainable Oakland program is an evolution of the Sustainable Community Development Initiative, established by Oakland's City Council in 1997, and is charged with developing plans, ensuring implementation, and tracking progress related to the Council's climate goals and targets.

Title 18 of the City's municipal code promotes economic development and enhancement of the health, safety, and welfare of residents, workers, and visitors through the integration of environmentally sustainable strategies in building construction and landscapes. The minimum standards set forth are intended to minimize the use of natural resources and the production of waste and maximize the healthfulness of enclosed environments.

### Oakland Equity Indicators

Oakland was chosen in 2017 to be among the first cohort of five cities to develop local equity indicators, in partnership with the City University of New York's Institute for State and Local Governance and with funding from the Rockefeller Foundation. The project, a joint effort between the Resilient Oakland Office and the DRE, resulted in a 2018 report that provides strategies for advancing equity, selected through a focus on racial and ethnic disparities and their root causes. The purpose of the *Equity Indicators Report* is to provide a framework that City staff and community members can use to better understand the impacts of race, measure inequities, and track changes in disparities for different groups over time. This framework can then be used to guide and inform policies that address these disparities.

Indicators listed in the report are quantifiable metrics for equity in each of four topics under each of six themes. Oakland's 2018 Citywide equity score, which encompasses all indicators, was 33.5 (out of 100), demonstrating substantial room for improvement. The indicator scores by theme were as follows:

- Neighborhood and Civic Life—50.6
- Economy—41.8
- Housing—36.8

- Education—29.0
- Public Health—25.8
- Public Safety—17.3

The information in the 2018 *Equity Indicators Report* positions the City to use data to drive equity outcomes, but it is only one step in a larger effort to address inequities. To complement this quantitative baseline, the DRE is also working with community partners to gather qualitative data from diverse community members in Oakland. This will provide context and insights into the root causes of disparities and meaningful solutions to the problems illuminated in the *Equity Indicators Report*.

### Equitable Climate Action Plan

In 2018, Oakland's City Council adopted a Climate Emergency and Just Transition Resolution, calling for an urgent climate mobilization effort to reverse global warming, rapidly reduce greenhouse gas emissions, and be more resilient in the face of intensifying climate impacts. This includes creating good green jobs, reducing pollution, and helping Oaklanders to thrive. The 2030 Equitable Climate Action Plan (ECAP) is the City's roadmap to bring about an equitable transition to a low-carbon economy. The goal of this plan is to identify an equitable path toward cost-effectively reducing Oakland's local climate emissions a minimum of 56 percent, transitioning away from fossil fuel dependence, and ensuring that all of Oakland's communities are resilient to the foreseeable impacts of climate change by 2030.

### Oakland Vegetation Management Plan

In May 2024, The Oakland City Council formally adopted a 10 year Vegetation Management Plan. The plan outlines a framework for managing fuel loads and vegetation on City-owned properties and along roadways in the City's Very High Fire Hazard Severity Zone (VHFHSZ), is an actionable step to reduce the likelihood of a catastrophic wildfire, such as the 1991 Oakland Hills Fire. The Council also certified the Environmental Impact Report which provided formal approval to ensure that the City follows the California Environmental Quality Act ("CEQA"). The Vegetation Management (Plan) covers more than 1,900 acres of City property plus treatment areas along approximately 300 miles of roadside. Vegetation management activities conducted on these lands currently includes goat grazing on nine sites covering approximately 1,300 acres, vegetation clearing along 16 roadways (58 miles), monitoring for vegetation clearance along approximately 300 miles of road within the High and Very High Fire Hazard Severity Zones (16.5 square miles), and brush clearance on critical City-owned properties (~332 acres). The Plan and EIR evaluate these and additional vegetation management practices to reduce fire hazard.

### Oakland Tree Inventory and Urban Forest Master Plan

The City of Oakland has inventoried all trees growing on sidewalks, medians, and landscaped parks to develop its first-ever 50-Year Urban Forest Master Plan. This plan provides a long-term vision for the management and growth of the city's urban forest.

## 18.3 LOCAL CAPABILITY ASSESSMENT

Local capabilities are existing authorities, policies, programs, and resources that reduce hazard impacts, carry out the mitigation plan, and increase overall resilience in the community. The City of Oakland performed an inventory and analysis of existing capabilities, plans, programs, and policies that enhance its ability to implement mitigation strategies.

### 18.3.1 Planning and Regulatory Capabilities

Planning and regulatory capabilities are the codes, ordinances, policies, laws, plans, and programs that guide growth and development. These capabilities can either support risk reduction or create areas that are more vulnerable to disaster. Common planning capabilities include comprehensive or master plans, housing plans, capital improvement programs, transportation plans, economic development strategies, disaster recovery plans and others (FEMA 2023). An assessment of planning and regulatory capabilities is presented in Table 18-3.

Table 18-3. Planning and Regulatory Capabilities for the City of Oakland

| | Local Authority | Other Jurisdiction Authority | State Mandated | Integration Opportunity? |
|---|---|---|---|---|
| **Codes, Ordinances, and Requirements** | | | | |
| **Building Code** | Yes | No | Yes | Yes |
| *Comment:* Oakland Code of Ordinances (OCOO), Chapter 15.04, Article I, Ord. No. 13576 amends the 2019 editions of the CA Building Standards Code, which is based on the 2019 International Building Code. | | | | |
| **Zoning Code** | Yes | No | Yes | Yes |
| *Comment:* Oakland Planning Code, Chapter 17, Articles 1-158, Ord. 12054 § 2, 1998<br>Integration Opportunity: Future updates to the Planning Code could reference the Safety Element and consider language referencing the Local Hazard Mitigation Plan and hazard specific data included in this hazard mitigation plan for appropriate standards to mitigate future risk. | | | | |
| **Subdivisions** | Yes | No | Yes | Yes |
| *Comment:* OCOO, Chapter 16, Article 4-36, 16.04.010 – outlines purpose, Prior code § 7-4.01<br>*Integration Opportunity:* Future updates to Chapter 16 may consider provisions for sub-dividing land in known hazard areas assessed under this hazard mitigation plan. | | | | |
| **Stormwater Management** | Yes | No | No | Yes |
| *Comment*: OCOO, Chapter 13, Article 13.14.010 – storm drainage standards, Ord. No. 12916, § 1, 2-17-2009<br>*Integration Opportunity:* City-owned facilities constructed under this code may be eligible for FEMA Hazard Mitigation Assistance (HMA) grants. Future updates to this plan should consider eligible stormwater management activities as potential actions. | | | | |
| **Post-Disaster Recovery** | Yes | No | No | Yes |
| *Comment*: OCOO, Title 8 (Health and Safety), Chapter 8.50 (Emergency Services Organization and Disaster Council). Ord. No. 13437, § 2, adopted June 20, 2017. Section 8.50.060 adopts the City's "Emergency Plan" which included recovery components.<br>*Integration Opportunity:* Future updates to the City's "Emergency Plan" should consider utilizing information from this mitigation plan on risk and vulnerability to inform the recovery components of that plan. | | | | |
| **Real Estate Disclosure** | No | No | Yes | No |
| *Comment*: State of California Natural Hazards Disclosure Act, effective 6/1/1998 (California Civil Code Section 1003) states that real estate sellers and brokers are legally required to disclose if a property being sold lies within one or more state or locally mapped hazard areas. | | | | |
| **Flood Damage Prevention Ordinance** | Yes | No | No | Yes |
| *Comment*: Ordinance 10956, adopted 3/8/1988 and amended by ordinance 12960, adopted July 21, 2009 | | | | |

| | Local Authority | Other Jurisdiction Authority | State Mandated | Integration Opportunity? |
|---|---|---|---|---|
| *Integration Opportunity:* As of 2026 the City is reviewing and updating as deemed feasible its regulatory floodplain administration program in coordination with FEMA Region IX and the state Department of Water Resources. This includes a plan to replace Ordinance 10956 with an ordinance based on a template provided by FEMA in 2025. The City may also consider higher regulatory standards in support of its future application to the Community Rating System (CRS) program. | | | | |
| **Growth Management** | Yes | No | No | Yes |
| *Comment*: OCOO, Title 17, Chapter 17.01, Codified through Ordinance No. 13611, enacted July 28, 2020. (Supp. No. 53, 12-20). The General Plan is the blueprint for land use in the City of Oakland. It includes maps that show the location and intensity of specific land uses, as well as land use policies that guide future decisions about growth. The Land Use and Transportation element, including the land use map, was approved in March 1998, and last amended in 2014.<br>*Integration Opportunity:* The General Plan's Safety Element and the Hazard Mitigation plan are already linked by reference pursuant to AB 2140. The Safety Element was most recently updated in 2023. | | | | |
| **Site Plan Review** | No | No | No | No |
| *Comment*: OCOO, Title 17, Chapter 17.136. Ord. No. 13357, § 3 (Exhibit A), 2-16-2016; prior planning code § 9300 | | | | |
| **Environmental Protection** | Yes | No | Yes | Yes |
| *Comment*: OCOO, Chapter 17.158, Article 1-2, Ord. 11766 § 2 (part), 1994: prior planning code § 1000<br>*Integration Opportunity:* The City could consider integrating the policies and implementation actions from the Environmental Element as potential actions for this plan. | | | | |
| **Emergency Management** | Yes | No | Yes | Yes |
| *Comment*: OCOO, Chapter 8.50, Article 8.50.010, Ord. No. 13437, § 2, 6-20-2017<br>*Integration Opportunity:* Future updates to the City's "Emergency Plan" should consider utilizing information from this mitigation plan on risk and vulnerability to inform components of that plan. | | | | |
| **Climate Change** | Yes | No | No | Yes |
| *Comment*: OCOO, Title 18 Sustainability. Ord. No. 13040, § 4, 10-19-2010. This Chapter is intended to promote economic development and enhance the health, safety, and welfare of residents, workers, and visitors through the integration of environmentally sustainable strategies in building construction and landscapes in the City. The minimum standards set forth are intended to minimize the use of natural resources and the production of waste and maximize the healthfulness of enclosed environments.<br>*Integration Opportunity:* This code provision is a regulatory capability of the City to mitigate the impacts from climate change, which could be actions identified in this plan. | | | | |
| **Other: Creek Protection, Stormwater Management and Discharge Control** | Yes | No | Yes | Yes |
| *Comment*: OMC, Title 13, Chapter 13.16, Ordinance 12024, 1997. The intent of this chapter is to protect and enhance the water quality of the city's watercourses, water bodies and wetlands in a manner pursuant to and consistent with the federal Clean Water Act.<br>*Integration Opportunity:* This program would be creditable under FEMA's CRS program. When the City decides to participate in the CRS program, this activity should be incorporated into the City's CRS program. | | | | |
| **Earthquake damaged Structures** | Yes | No | No | Yes |
| *Comment*: OMC, Title 15, Chapter 15.24. Ordinance 13574, 12/2019. The purpose of this Chapter is to facilitate the provision of just, equitable, expedient and practicable program with specific procedures whereby structures that are damaged by earthquakes may be altered, repaired, restored, rehabilitated or demolished.<br>*Integration Opportunity:* This ordinance can support the implementation of this plan by reducing seismic risk through recovery operations following earthquakes; could also lead to the identification of future actions for this plan. | | | | |
| **Unreinforced Masonry Buildings** | Yes | No | No | Yes |

| | Local Authority | Other Jurisdiction Authority | State Mandated | Integration Opportunity? |
|---|---|---|---|---|
| *Comment:* OMC, Title 15, Chapter 15,28, Ordinance 18-16.01. Promotes public safety by mitigating the potential hazards of those buildings in Oakland that were built of unreinforced masonry walls and were subject to the building code prior to November 26, 1948<br>*Integration Opportunity:* The program supported by this ordinance could lead to mitigation actions to be incorporated into this plan. | | | | |
| **Voluntary Seismic Strengthening for Residential Buildings** | Yes | No | No | Yes |
| *Comment:* OMC, Title 15, Chapter 15.30, Ordinance 12812, 2007. This chapter is intended to promote public safety and welfare and safeguard life and limb, health, and property through a voluntary program for structurally strengthening the portions of wood framed residential buildings that are most vulnerable to earthquake damage. The prescriptive structural strengthening standards set forth herein will reduce the risk of seismically induced damage by improving the structural resistance of these buildings.<br>*Integration Opportunity:* The program supported by this ordinance could lead to mitigation actions to be incorporated into this plan. | | | | |
| **Planning Documents** | | | | |
| **General Plan** | Yes | No | Yes | Yes |
| *Is the plan compliant with Assembly Bill 2014?:* Yes<br>*Comment:* Integration Opportunity: Mitigation plan components should inform future updates to the General Plan Safety Element. | | | | |
| **Capital Improvement Plan** | Yes | No | No | Yes |
| *How often is the plan updated?* Builds or provides upgrades to City facilities, transportation (streets/sidewalks) and public spaces<br>*Comment*: 2025-27 Capital Improvement Program (CIP), 2025-27 CIP Adopted Budget<br>*Integration Opportunity*: City should consider the inclusion of HMA grant eligible projects contained in the CIP as mitigation actions for this plan. | | | | |
| **ADA Curb Ramp Transition Plan** | Yes | No | Yes | Yes |
| *Comment:* Sets forth policy and plans how the City addresses curb ramp access and construction. | | | | |
| **ADA Buildings & Facilities Transition Plan** | Yes | No | Yes | Yes |
| *Comment:* Sets forth policy and plans how the City addresses access barriers to City-owned buildings and facilities. | | | | |
| **Floodplain or Watershed Plan** | No | Yes | No | No |
| *Comment:* East Bay Municipal Utility District 2020 Urban Water Management Plan discusses the Mokelumne Watershed & Hydrology | | | | |
| **Stormwater Plan** | Yes | No | No | Yes |
| *Comment:* September 2019 Green Stormwater Infrastructure (GSI) Plan and 2024 GSI Plan Addendum Storm Drainage Master Plan (started in 2021 to be completed by 2027) | | | | |
| **Urban Water Management Plan** | No | Yes | No | Yes |
| Comment: East Bay Municipal Utility District 2020 Urban Water Management Plan | | | | |
| **Habitat Conservation Plan** | No | No | No | No |
| Comment: - | | | | |
| **Economic Development Plan** | Yes | No | No | Yes |
| Comment: 2018-2020 Economic Development Strategy | | | | |
| **Community Wildfire Protection Plan** | Yes | No | No | Yes |
| Comment: Oakland Vegetation Management Plan (Adopted May 2024) describes the actions that the Oakland Fire Department will take over the 10-year plan timeframe to reduce fire hazard on city-owned land and along roadways in Oakland's very high fire hazard severity zone.<br>*Integration Opportunity*: Actions identified in this plan should be considered for inclusion in this or future updates to the hazard mitigation plan. | | | | |
| **Forest Management Plan** | Yes | No | No | Yes |

| | Local Authority | Other Jurisdiction Authority | State Mandated | Integration Opportunity? |
|---|---|---|---|---|
| *Comment:* Oakland Tree Inventory and Urban Forest Plan (was adopted December 2024 and assesses Oakland's urban forest and provides an equitable vision for the care, maintenance, and growth of our trees).<br>*Integration Opportunity*: Information on wildfire risk and vulnerability and mitigation strategies to mitigate that risk could be utilized to inform this plan. | | | | |
| **Shoreline Management Plan** | Yes | No | No | No |
| *Comment:* Estuary Policy Plan (June 1999) | | | | |
| **Climate Adaptation/Action Plan** | No | No | No | No |
| Comment: City is currently working on a Comprehensive Environmental Sustainability Plan that will include many components of a Climate Adaptation/Action Plan. | | | | |
| **Other Relevant Plans** | Yes | No | No | Yes |
| Comment: Sanitary Sewer Master Plan (started Feb 2020) seeks to reduce stormwater intrusion and overflows to protect public health | | | | |
| **Response/Recovery Planning** | | | | |
| **Emergency Operations Plan** | Yes | No | No | Yes |
| Comment: Oakland Emergency Operations Plan (2023) | | | | |
| **Threat and Hazard Identification and Risk Assessment** | No | Yes | No | No |
| Comment: Member of Bay Area Urban Area Security Initiative | | | | |
| **Hazard Specific Annex: Terrorism** | No | No | No | No |
| Comment: The 2023 Emergency Operations Plan contains a Hazard Specific Annex for terrorism response. | | | | |
| **Post-Disaster Recovery Plan** | No | No | No | No |
| Comment: The City of Oakland has a Post-Disaster Recovery Plan (2010) and an updated draft (2017). A Post Disaster Recovery Plan update will be prioritized for CY27. | | | | |
| **Continuity of Operations Plan** | Yes | No | No | Yes |
| Comment: Departments updated COOPs in 2017. All Departments are working on updating their COOPs by CY2026. | | | | |
| **Public Health Plan** | No | Yes | No | No |
| Comment: Alameda County Community Health Improvement Plan: https://acphd.org/chip/ and the Alameda County Disaster Preparedness Health Coalition (https://acphd.org/dphc/) | | | | |
| **Other: Substantial Damage Response Plan** | No | No | No | No |
| Comment: - | | | | |

### Expansion of Existing Planning and Regulatory Capabilities

The City has identified numerous opportunities to integrate the LHMP into plans, codes, and ordinances. This includes:

- Subdivision Code (Chapter 16)
- Emergency Operations Plan
- General Plan Safety Element
- General Plan Environmental Element
- Community Wildfire Protection Plan
- Urban Forest Plan

## 18.3.2 Development and Permitting Capabilities

As noted in the table above, the City has adopted codes and standards as well as a General Plan that require the application for a building permit for all development that occurs within

the City. Permitting and its enforcement is a capability that ensures new development is fully compliant with the provisions specified in each code and/or standard. Table 18-4 illustrates the development and permitting capabilities for the City.

Table 18-4. Development and Permitting Capability

| Criterion | Response |
|---|---|
| Which department issues development permits? | Planning & Building |
| Does your jurisdiction track the permits by hazard area? | Yes |
| Does your jurisdiction do its own inspections for permit compliance? | No |
| Does your jurisdiction have a buildable lands inventory? | No |
| Does the jurisdiction have a written plan to address permit and inspection activities following a natural or man-made disaster? | No |
| Does the building department have a mutual aid agreement with other building departments to share resources following a natural or man-made disaster? | Yes |
| Does the City's Building Official possess any professional certifications (i.e., Certified Building Official certification, licensed engineer, or architect)? | Yes |

### 18.3.3 Administrative and Technical Capabilities

Administrative and technical capabilities are a community's staff, skills and tools. These capabilities can be used for mitigation planning and to carry out specific mitigation actions. They also include the ability to access, coordinate and implement these resources effectively (FEMA 2023). An assessment of administrative and technical capabilities is presented in Table 18-5.

Table 18-5. Administrative and Technical Capabilities for the City of Oakland

| Staff/Personnel Resources | Available (Yes or No) | Department or Agency (Positions) |
|---|---|---|
| Planners or engineers with knowledge of land development and land management practices | Yes | Planning & Building |
| Engineers or professionals trained in construction practices related to buildings and/or infrastructure | Yes | Planning & Building |
| Planners or engineers with an understanding of natural hazards | No | None in-house but could contract for this service |
| Floodplain manager | Yes | City Engineer, OakDOT |
| Surveyors | Yes | OPW |
| Personnel skilled or trained in GIS applications | Yes | Planning & Building, OPW, ITD, OakDOT |
| Scientist familiar with local natural hazards | No | None in-house but could contract for this service |
| Emergency manager | Yes | Jessica Feil, EMSD Manager |
| Mutual aid agreements | No | None in-house but could contract for this service |
| Grant writers | No | None in-house but could contract for this service |
| Resilience officer | Yes | City Administrator's Office |
| Staff with expertise or training in benefit/cost analysis | Yes | Planning & Building |

### Expansion of Existing Administrative and Technical Capabilities

The City will strengthen and expand its existing administrative and technical capabilities by investing in staff development, enhancing operational processes, and leveraging advanced technologies. These efforts will improve efficiency, support data-driven decision-making, and ensure the City can effectively manage current responsibilities while adapting to future challenges.

## 18.3.4 Fiscal Capabilities

Fiscal capabilities are the resources available to fund mitigation strategies (FEMA 2023). An assessment of fiscal capabilities is presented in Table 18-6.

Table 18-6. Fiscal Capabilities for the City of Oakland

| Financial Resources | Accessible or Eligible to Use (Yes or No) |
|---|---|
| Community Development Block Grants | Yes |
| Capital Improvements Project Funding | Yes |
| Authority to Levy Taxes for Specific Purposes | Yes, with a 2/3 voter-approved majority |
| User Fees for Water, Wastewater, and Electric Service | Yes. City relies on outside sources (PG&E and EBMUD) for Water and Electric Service. The City's Sewer Service Fund covers the costs associated with the City's sanitary sewer system. |
| Impact Fees for Buyers or Developers of New Development/Homes | Yes |
| Incur Debt through General Obligation Bonds | Yes |
| Incur Debt through Special Tax Bonds | Yes |
| Incur Debt through Private Activity Bonds | Yes, but have not done so historically |
| Could Withhold Public Expenditures in Hazard-Prone Areas | No |
| State-Sponsored Grant Programs | Yes |

### Expansion of Existing Fiscal Capabilities

The City will expand its current hazard mitigation fiscal capabilities by integrating resilience and hazard mitigation into long-term financial planning, improving grant readiness, and expanding revenue sources. This includes incorporating mitigation priorities into the City budget, identifying potential funding options, and leveraging partnerships to secure and manage resources for cost effective and equitable projects.

## 18.3.5 Education and Outreach

Education and outreach capabilities are programs and methods that can communicate about and encourage risk reduction. These programs may be run by volunteers or a community-based partner (FEMA 2023). An assessment of education and outreach capabilities is presented in Table 18-7.

Table 18-7. Education and Outreach Capabilities for the City of Oakland

| Capability | Response |
|---|---|
| Public information officer or communications office | Yes |
| Personnel skilled or trained in website development | Yes |
| Hazard mitigation information available on your website | https://www.oaklandca.gov/Public-Safety-Streets/Ready-Oakland/Stay-Informed/Local-Hazard-Mitigation-Plan-LHMP |
| Social media used for hazard mitigation education and outreach | Instagram, Facebook, X |
| Resident boards or commissions that address issues related to hazard mitigation | Yes |
| Other programs already in place that could be used to communicate hazard-related information | The Wildfire Prevention Commission addresses wildfire mitigation. I am not sure if the Disaster Council would fall into this category, but they would address mitigation as a whole. |
| Established warning systems for hazard events | AC Alert, GovDelivery, Emergency Sirens (tested first Wed of every month) |

### Expansion of Existing Education and Outreach Capabilities

While Oakland already implements comprehensive public education and outreach capabilities, the City is committed to increasing these efforts. The City identified opportunities for expansion as shown in the mitigation action plan (refer to Section 19.4):

## 18.3.6 National Flood Insurance Program

**Local Plan Requirement C2—44 CFR Part 201.6(c)(3)(ii)**

***The plan shall address each jurisdiction's participation in the NFIP and continued compliance with NFIP requirements.***

Communities across the country build their flood management capabilities by participating in the NFIP. The NFIP supports flood risk reduction before and after disasters. It helps reduce the socioeconomic impact of floods. The NFIP allows property owners and renters in participating communities to purchase federal flood insurance policies to recover financial losses after a flood (FEMA 2023). Table 18-8 discusses how the city complies and enforces the NFIP.

Table 18-8. National Flood Insurance Program Capabilities for the City of Oakland

| Criterion | Response |
|---|---|
| NFIP Community ID No. | 065048B |
| Effective FIRM date | Digital Flood Insurance Rate Map (effective 12/21/2018; last LOMR 11/20/2024) |
| Local department responsible for floodplain management | The role of Floodplain Administrator is filled by the City Administrator. The role of Floodplain Manager is filled by the Building Official, Planning & Building Department. Floodplain management roles of other City departments will be clarified in 2026. |
| Floodplain administrator | City Administrator. Floodplain Manager is the Building Official, Bureau of Building, Planning & Building Department. |

| Criterion | Response |
|---|---|
| Are any certified floodplain managers on staff in your jurisdiction? | Not at this time |
| Date that flood damage prevention ordinance was last amended | Ordinance 10956, adopted 3/8/1988 and amended by ordinance 12960, adopted July 21, 2026. A revised FDPO will be considered for adoption by the City Council on 4/21/2026. |
| Floodplain management program minimum requirements | As of 2026 the City is reviewing and updating as deemed feasible its regulatory floodplain administration program in coordination with FEMA Region IX and the state Department of Water Resources. This includes a plan to replace Ordinance 10956 with an ordinance based on a template provided by FEMA in 2025. The City may also consider higher regulatory standards in support of its future application to the Community Rating System (CRS) program. |
| Most recent Community Assistance Visit or Community Assistance Contact | According to CA DWR, the last CAV was 9/26/2017 |
| Outstanding NFIP compliance violations that need to be addressed | During the 2017 CAV, four items were noted during the field inspection and were cleared, and no violations were noted during the CAV. |
| Does the City have a substantial Damage Response Plan (SDRP)? | Not at this time. |
| How does your jurisdiction make Substantial Damage determinations? | Per Chapter 15.80 of the Oakland Municipal Code, for applications for building permits to improve buildings and structures, including alterations, movement, enlargement, replacement, repair, additions, rehabilitations, renovations, substantial improvements, repairs of substantial damage, and any other improvement of or work on such buildings and structures, the City Administrator, in coordination with the Building Official, shall:<br>1) Estimate the market value or require the applicant to obtain an appraisal of the market value prepared by a qualified independent appraiser, of the building or structure before the start of construction of the proposed work; in the case of repair, the market value of the building or structure shall be the market value before the damage occurred and before any repairs are made.<br>2) Compare the cost to perform the improvement, the cost to repair the damaged building to its pre-damaged condition, or the combined costs of improvements and repairs, when applicable, to the market value of the building or structure.<br>3) Determine and document whether the proposed work. constitutes substantial improvement or repair of substantial damage.<br>4) Notify the applicant when it is determined that the work constitutes substantial improvement or repair of substantial damage and that compliance with the flood resistant construction requirements of the building code is required and notify the applicant when it is determined that work does not constitute substantial improvement or repair of substantial damage. |
| RiskMAP projects currently underway | None |

| Criterion | Response |
|---|---|
| Flood hazard maps that adequately address the flood risk within your jurisdiction | No |
| If no, state why. | A comprehensive watershed study to assess the accuracy and potential for revision of the Flood Insurance Rate Map (FIRM) and Flood Boundary and Floodway Map (FBFM) for the community is underway. |
| Floodplain management staff assistance or training needed to support its floodplain management program | Assistance is needed in the process to update the flood hazard maps |
| Community Rating System (CRS) | The City does not participate but will explore options for participation in the future including accessing funding to support this effort. |
| Flood insurance policies are in force[a] | 511 |
| Insurance in force[a] | $185,453,653.00 |
| Premium in force[a] | $362,923 |
| Average premium cost[a] | $710.22 |
| Total loss claims filed[a] | 240 |
| Total payments for losses[a] | $594,471 |
| Average claim paid[a] | $2,477 |

*a. According to FEMA statistics as of 01/14/2026*

### Expansion of Existing Local Capabilities

The City will be improving its local capabilities to administer its Special Flood Hazard Area with the pending adoption of a new flood damage prevention ordinance scheduled for March of 2026. This ordinance is based upon the State of California model flood damage prevention ordinance prepared by the CA Department of Water Resources. Adoption of this ordinance will clarify floodplain administration roles and responsibilities and position the City for future success. The improved ordinance supports potential future participation in the Community Rating System.

### Plan Integration

#### *Future Integration*

Any future updates to flood hazard mapping under the National Flood Insurance program will inform all future updates to this hazard mitigation plan. As the City completes strategies that will impact the flood hazards within the City, these impacts will be reflected in all future updates. Lastly, as the city identifies new strategies that could mitigate flood risk, these strategies will be incorporated into this plan via plan maintenance or future updates.

## 18.3.7 Participation in Other Programs

Other programs, such as the Community Rating System, NWS StormReady® Program, and Firewise USA®, enhance a jurisdiction's ability to mitigate, prepare for, and respond to natural hazards. These programs indicate a jurisdiction's desire to go beyond minimum requirements set forth by local, state, and federal regulations to create a more resilient community. These programs complement each other by focusing on communication, mitigation, and community preparedness to save lives and minimize the impact of natural

hazards on a community. The following describes other programs that the City participates in.

Table 18-9. Community Classifications for the City of Oakland

| | Participating? | Number or Classification | Date Classified |
|---|---|---|---|
| FIPS Code | 06-53000 | | |
| DUNS# | 05-067-2427 | | |
| Unique Entity Identifier (UEI) | Yes | WZN1MD35H235 | N/A |
| Community Rating System | No | N/A | N/A |
| Building Code Effectiveness Grading Schedule | Yes | 3/3 | 3/3/2019 |
| Public Protection | Yes | 2/2 | N/A |
| Firewise | Yes | 15 neighborhoods in the City participate in Firewise* | - |
| Storm Ready | No | N/A | N/A |
| Tsunami Ready | No | N/A | N/A |

**TAs of the time of publication, 15 neighborhoods in the City participate in Firewise:*

- *CABS*
- *Crane Way Neighborhood*
- *Crownridge HOA*
- *Estates Fountain*
- *Grand View*
- *Kaiser School Neighborhood Fire Break*
- *Klamath-Brunell*
- *LaMasNa Plus*
- *LaMasNa Plus*
- *Parkridge Estates*
- *Portal Neighbors*
- *Redwood Ridge Neighborhood Org*
- *Sayre/Saroni*
- *Skyline Boulevard*
- *Skyline/Moon Gate*
- *Valley View*

## 18.3.8 Adaptive Capacity for Climate Change

**California Senate Bill Compliance**

***SB 379: Include climate adaptation and resiliency strategies in the safety elements of the general plan or local hazard mitigation plan to address climate adaptation and resiliency strategies for the local jurisdiction.***
***SB 1000: Address environmental justice in local government planning.***

An adaptive capacity assessment evaluates a jurisdiction's ability to anticipate impacts from future climate conditions. By looking at public support, technical adaptive capacity, and other factors, the City of Oakland identified its core capability for resilience against changing conditions. The adaptive capacity assessment identifies areas for improvement by ranking capacity as high, medium, or low. The following summarizes the adaptive capacity assessment for the City.

Table 18-10. Adaptive Capacity for Climate Change

| Criterion | Jurisdiction Rating[a] |
|---|---|
| **Technical Capacity** | |
| **Jurisdiction-level understanding of potential climate change impacts** | Medium |

| Criterion | | Jurisdiction Rating[a] |
|---|---|---|
| **Comment:** | Comment: Oakland 2030 ECAP | |
| **Jurisdiction-level monitoring of climate change impacts** | | Medium |
| **Comment:** | Comment: 2018 Greenhouse Gas Emissions Report; Energy and Climate Action Plan (2017-2018 update) | |
| **Technical resources to assess proposed strategies for feasibility and externalities** | | Medium |
| **Comment:** | Comment: CURB Analysis (https://www.oaklandca.gov/resources/curb-analysis). Also, the ECAP and Racial Equity Impact Assessment and Implementation Guide provide high level of analysis for feasibility and externalities | |
| **Jurisdiction-level capacity for development of greenhouse gas emissions inventory** | | High |
| **Comment:** | Comment: Oakland Greenhouse Gas Emissions Inventory (https://www.oaklandca.gov/resources/oakland-greenhouse-gas-emissions-inventory-reports) | |
| **Capital planning and land use decisions informed by potential climate impacts** | | High |
| **Comment:** | Comment: ECAP - Transportation and Land Use (https://www.oaklandca.gov/topics/transportation-and-land-use). Climate scoring is done as part of the City's Capital Improvements Program. Measure KK Infrastructure Bond (2016) also has a special call out ($25 million) for climate projects. This is very high by City standards. | |
| **Participation in regional groups addressing climate risks** | | Medium |
| **Comment:** | Comment: City has active participation in the Bay Area Climate Adaptation Network, NorCal Resilience Network, Green Cities California, and the Urban Sustainability Directors Network. | |
| **Implementation Capacity** | | |
| **Clear authority/mandate to consider climate change impacts during public decision-making processes** | | Medium |
| **Comment:** | Comment: Recent legislation in California requires that greenhouse gas emissions and climate change be addressed by state and regional agencies, specifically greenhouse gas reduction targets established by Executive Order S-3-05, Assembly Bill 32 (AB 32), and Senate Bill 375 (SB 375). | |
| **Identified strategies for greenhouse gas mitigation efforts** | | High |
| **Comment:** | ECAP | |
| **Identified strategies for adaptation to impacts** | | High |
| **Comment:** | ECAP | |
| **Champions for climate action in local government departments** | | High |
| **Comment:** | ECAP | |
| **Political support for implementing climate change adaptation strategies** | | Medium |
| **Comment:** | The City Council and Mayor have shown their support climate change adaptation strategies through their adoptions of plans and programs such as the ECAP and Climate Action Plans. City Council support; Mayor support | |
| **Financial resources devoted to climate change adaptation** | | Medium |
| **Comment:** | ECAP | |
| **Local authority over sectors likely to be negative impacted** | | Low-Medium |
| **Comment:** | High level of control over buildings and energy sectors. Medium for waste. Low for transportation and climate adaptation. | |
| **Public Capacity** | | |
| **Residents' knowledge of and understanding of climate risk** | | Medium |

| Criterion | | Jurisdiction Rating[a] |
|---|---|---|
| **Comment:** | ECAP, public outreach and participation. The City has multiple active community groups focused on climate issues, and The Yale Program on Climate Change Communication ranks Alameda County as among the most concerned about climate change in the nation (Yale, 2020). | |
| **Residents' support of adaptation efforts** | | Medium |
| **Comment:** | ECAP community engagement, youth input, Community Advisory Committee | |
| **Residents' capacity to adapt to climate impacts** | | Low |
| **Comment:** | Overall cost of living in Oakland, rent-burdened residents, etc. | |
| **Local economy current capacity to adapt to climate impacts** | | Medium |
| **Comment:** | ECAP; green jobs training program needs to be highlighted | |
| **Local ecosystems capacity to adapt to climate impacts** | | Medium |
| **Comment:** | ECAP; park land and open space acreage | |

a. *High = Capacity exists and is in use*
*Medium = Capacity may exist but is not used or could use some improvement*
*Low = Capacity does not exist or could use substantial improvement*
*Unsure= Not enough information is known to assign a rating*

# 19. MITIGATION STRATEGY

## 19.1 MITIGATION ACCOMPLISHMENTS

**Local Plan Requirement C3 – 44 CFR Part 201.6(c)(3)**

***The plan must document how the plan was reviewed and revised to document changes in development, progress in mitigation efforts, and changes in priorities.***

### 19.1.1 Mitigation Accomplishments Since 2021

Since the 2021 LHMP, the City of Oakland has made significant accomplishments in mitigation. These accomplishments are directly tied to how the City successfully integrated the 2021 LHMP risk assessment and capability assessment into plans and programs. These included:

- **Vegetation Management Plan (VMP)** - In May 2024, the City of Oakland formally adopted a 10-year vegetation management plan. Adoption of the VMP will set in motion an actionable timeline to reduce fire hazards. The VMP and its Environmental Impact Report aim to reduce wildfire hazards on city lands and key access routes, enhancing public and firefighter safety while minimizing environmental impacts. These measures support ecosystem health, reduce habitat fragmentation, and align with regional wildfire prevention efforts. OFD already operates one of California's most comprehensive fire prevention programs, inspecting 20,000 parcels, conducting year-round fuel mitigation, roadside clearing, and deploying one of the state's largest goat herds to manage combustible vegetation.
    - The plan covers more than 1,400 acres of city property plus treatment areas approximately 300 miles roadside.
    - Vegetation management activities include goat grazing on nine sites covering approximately 1,300 acres; vegetation clearing along 16 roadways (58 miles); monitoring for vegetation clearance along 300 miles of road within the high and very high fire severity zones; and brush clearance on critical city-owned properties.

Figure 19-1. Goats in the Oakland Hills

- **Vegetation Removal Along Evacuation Routes** - In the summer of 2024, the City was awarded a $1 million grant by the Department of Forestry and Fire Protection (CAL FIRE) to fund its "Shepherd Canyon to Grass Valley Evacuation Route" project with funding from California Climate Investments (CCI). The CAL FIRE Wildfire Prevention Grant application was developed jointly by OPW and the OFD to fund ongoing vegetation management and emergency planning work along key evacuation routes in the city's high fire hazard severity zone. This project is supported by community groups, including Friends of Sausal Creek and Friends of Joaquin Miller Park. The

anticipated timeline for the project's completion is March 2030. As of May 29, 2025, this grant supported the following:
  - 29 trees removed, 5 raised, and miscellaneous clearing conducted on Skyline Boulevard between Joaquin Miller Road and Chabot Space and Science Center.
  - 62 trees removed, 56 trees raised on Shepherd Canyon Road between Skyline Boulevard and Snake Road.
- **CAL FIRE Fuel Reduction Grant** - The City of Oakland had a 2022 CAL FIRE Fuel Reduction grant of $824,000 for the "Skyline Boulevard Evacuation Corridor Project." A total of 805 trees were removed and 123 trees were pruned along the Skyline Boulevard evacuation route between Shepherd Canyon Road and Keller Avenue.
- **Continued Management of Wildfire Risk as a Citywide Priority** – On November 19, 2019, the City Council adopted Resolution No. 87940 C.M.S., declaring Wildfire Prevention a top priority for the City of Oakland. The City established a Wildfire Prevention Working Group that has been meeting regularly since 2020 to both address short term needs and to continue various long-term strategy planning and implementation activities. The Wildfire Prevention Working Group consists of the following Departments: OFD, OPW, OakDOT, Planning & Building, OPD and the City Administrator's Office (as convener). During the 2023-2024 reporting period, successful inter-departmental coordination included:
  - Collaboration with the California Department of Forestry and Fire Protection (CAL FIRE) through a Memorandum of Understanding. Through this collaboration, CAL FIRE is clearing vegetation with a focus on protecting paved roads, buildings, fences, active recreation areas and other infrastructure. The crews have removed ladder fuels and reduced overall vegetative fuel loads in these areas.
  - The closure of Grizzley Peak Boulevard during the 4th of July Holiday. The 24 to 48-hour closure is a collaborative safety effort by staff from the cities of Oakland and Berkeley and the East Bay Regional Park District. The closure is done so to prevent large crowds from gathering along that several mile corridor during the holiday period. Historically, large crowds gathering to watch or set off fireworks has caused fires, medical incidents and the congestion has prevented emergency responders from being able to navigate the hillside corridor.
  - The maintenance of barriers and chained logs along Grizzley Peak and Skyline Blvd that were installed in 2020 to prevent people from gathering in large groups, blocking emergency access, and potentially sparking fires in the Oakland and Berkeley hills.
  - Enhanced coordination with OakDOT and OPD to enforce parking restrictions on Red Flag Days.

- **Municipal Resilience Hub at Lincoln Community Center** - The City progressed significantly in the establishment of a Municipal Resilience Hub at Lincoln Community Center. In 2023, this project was awarded a grant from the California Department of Food and Agriculture in the amount of $9.25 million. The project is also funded through local Measure KK and Measure U, California Proposition 68 and a Federal earmark from Housing and Urban Development. Resilience features will mitigate future hazards and serve the estimated 1,000 participants who use the facility daily. The facility will be an asset that could be used as an Emergency Respite Center or as a place for the community to access resources and supplies. Features will include:
    - Cooling, heating and cleaner air (mitigating extreme heat, winter weather and poor air quality days)
    - Backup power from solar panels for charging phones and medical devices during power outages
    - Commercial kitchen, showers and broadband
    - Low-water landscaping, bio-filtration systems and permeable paving
    - Partnerships with community-based organizations invested in building community resilience and emergency preparedness.

  The project is the successful result of a partnership between multiple City agencies and Community Based Organizations. The day-to-day resilience building activities at the Municipal Resilience Hub will be developed and guided in partnership with community members and community-based organizations.
- **Stormwater Bioretention Conceptual Project** - The OPW Watershed and Stormwater Management Division (WSMD) developed a conceptual project to construct bioretention facilities around Raimondi Park in West Oakland. If this project can be prioritized, funded, and constructed it will treat 4 acres of impervious roadway with Green Stormwater Infrastructure (bioretention). This project would also remove PCBs from stormwater from a 43-acre drainage area using high-flow biofilters.
- **National Flood Insurance Program (NFIP)** - The City of Oakland is now in full compliance with the National Flood Insurance Program (NFIP). In 2017, a Community Assistance Visit (CAV) audit conducted by FEMA identified five (5) property addresses in the City of Oakland that had floodplain violations, interfering with the City's ability to be in good standing with the program. After property owners addressed these issues, the City received communication from FEMA acknowledging that the City sufficiently resolved all deficiencies and violations identified during the CAV.

  The City plans to update FEMA's Flood Insurance Rate Map for the Arroyo Viejo Creek Watershed. This is a joint project between Planning & Building and OPW. In addition, the City will pursue funding opportunities to revise FEMA's Flood Insurance Rate Maps for an additional eight watersheds in Oakland in the future.
- **Storm Drainage Master Plan** - The City of Oakland is developing the Storm Drainage Master Plan (SDMP), a comprehensive plan on how to best manage, improve, and extend the life of the City's storm drainage system. This SDMP will assess the condition and capacity of the existing system and then recommend a capital improvement program designed to improve future resiliency and water quality protection and to prevent flooding and creekbank erosion.

- In 2022, the City completed a Drainage Study of the Empire Road and Bernhardt Drive Drainage Areas, an early SDMP deliverable. This study identified two storm drainage improvement projects in East Oakland designed to reduce neighborhood flooding: Empire Road Storm Drain Improvement and Bernhardt Drive Storm Drain Improvement. Both projects received approval for funding for engineering design from Oakland City Council as a part of the Fiscal Year (FY) 23-25 Capital Improvement Program (CIP), but the projects were not funded as the City did not sell bonds as planned. City staff are requesting additional Measure U funding for both projects through the FY 25-27 budget process.
- The Oakland Alameda Adaptation Committee (OAAC) is a coalition of shoreline communities and stakeholders working to accelerate sea-level rise adaptation, protect and restore water quality, habitat and recreation and promote community resilience. The Committee submitted a FEMA Building Resilient Infrastructure and Communities (BRIC) grant to support the Empire Road project. FEMA and California Office of Emergency Services stated that they "recommended the project for further review". The OAAC is waiting for an update which may be provided by mid-2025. Changes in federal administration may impact on this funding source.
- The City's SDMP identified other flood risk reduction projects as part of a study to develop and prioritize multi-benefit green stormwater infrastructure (GSI) projects throughout Oakland. The plan identified a potential flood risk reduction priority project that would add a flood detention basin in Coliseum Gardens Park and improve storm drainpipe capacity to reduce flood risk in a drainage area bound by 66th Avenue, Foothill Boulevard, 73rd Avenue, and San Leandro Street. This potential project requires further technical study to determine feasibility and will be scored and assigned a priority rating as part of the SDMP project using the City's equity-focused project prioritization system. If prioritized and if required matching funds are secured, WSMD will pursue a FEMA Hazard Mitigation Assistance (HMA) grant to fund a portion of the project.

### 19.1.2 Status of 2021 Mitigation Actions

For the 2026 LHMP update, the actions were reviewed by the SC. For each action in the previous mitigation strategy, the SC provided a status update using the guidance below:

- **No Progress** – The mitigation action has not been completed, and evaluated if still a priority to address the identified risk.
- **In Progress** – Implementation of the mitigation action has begun but has not been completed. The action is included in the 2026 LHMP update.
- **Ongoing Capability** – The mitigation action has been implemented and will be completed on an annual or regular basis (for example, maintenance activities, annual outreach, etc.). These actions were removed from the updated mitigation strategy and included as capabilities in the 2026 LHMP update.
- **Completed** – The mitigation action has been fully implemented and was removed from the updated mitigation strategy.

Actions that were in progress or had no progress were evaluated to determine if they should be discontinued or included in the 2026 LHMP update. Reasons for discontinuing an action include that the action has been evaluated as being duplicative, impractical, unfeasible, or undesirable, or if the problem that the action was originally developed for is no longer present. Actions that were identified for inclusion in the updated mitigation strategy received additional evaluation to determine if the action should be revised to reflect any new information obtained as part of the plan update process (for example, changes in risk, capabilities, lead agency, or available funding sources).

The table below provides a status for each action from the 2021 LHMP. Some actions were combined or revised for this LHMP update.

Table 19-1. Status of 2021 LHMP Mitigation Actions

| Action Number | Description | Responsible Party | Status | Include in the 2026 LHMP? |
|---|---|---|---|---|
| **O-1** | Safer Housing for Oakland: Soft Story Apartment Retrofit Program | HCD | Complete | No |
| **O-2** | Continue the Earthquake Safe Homes Program | HCD | Complete | No |
| **O-3** | Green Stormwater Infrastructure Program—The City will implement its Green Stormwater Infrastructure (GSI) Plan to include GSI where feasible in public capital projects such as streetscape renovations, park projects, and parking lot retrofits, among others. GSI is a term for engineered stormwater detention systems that are designed to capture specific runoff volumes of various design storms and remove stormwater pollutants. Examples include bioretention areas (rain gardens), engineered tree well filters, green roofs, flow-through planters, and permeable pavement. | OPW Watershed and Stormwater Management, OPW CIP, OakDOT | In Progress | Yes 18-1 |
| **O-4** | Identify feasible and cost-effective stormwater infrastructure projects that have been identified in the City's capital improvement program and/or Storm Drain Master Plan, that would be good target projects for which to pursue funding under FEMA's Hazard Mitigation Assistance (HMA) grant programs. | OPW Watershed and Stormwater Management, OPW CIP, OakDOT | In Progress | Yes 17-1 |
| **O-5** | Defensible Space Vegetation Program to manage wildfire hazards; preparation of a Vegetation | OFD, OPW Watershed and Stormwater Management, OPW Tree Services | In Progress; action to be revised | Yes 12-2 |

| Action Number | Description | Responsible Party | Status | Include in the 2026 LHMP? |
|---|---|---|---|---|
| **O-6** | Continuity of Operations Emergency Planning | OFD EMSD | In Progress; action to be revised | Yes 25-1 |
| **O-7** | Implement the City's Energy Assurance Plan | OPW CIP, Office of Sustainability | In Progress; action to be revised | Yes 10-1 |
| **O-8** | Assessment and retrofits of critical facilities & infrastructure | OPW CIP | In Progress; action to be revised | Yes 4-2 |
| **O-9** | Continue to maintain the City's good standing and compliance under the National Flood Insurance Program | Planning & Building, OPW | In Progress | Yes 19-1 |
| **O-10** | Create a comprehensive master plan for three city facilities to reliably serve as resilience hubs | OPW CIP, Office of Sustainability | In Progress | Yes 4-1 |
| **O-11** | Develop an "integrated preparedness plan" that will consider the range of preparedness activities within the Integrated Preparedness Cycle | OFD EMSD | Complete | No |
| **O-12** | To support implementation of any future updates to the City's local hazard mitigation plan, Safety Element, and Environmental Justice Element, use the best available local data to identify racial disparities in the City of Oakland | OFD EMSD, DRE, OakDOT, Planning & Building, OPE | In Progress; action to be revised | Yes 2-2, 2-3 |
| **O-13** | Maritime Terminal Study on Liquefaction Potential | Port of Oakland | In Progress | Yes 26-6 |
| **O-14** | Middle Harbor Shoreline Park dike repair | Port of Oakland | Complete | No |
| **O-15** | Maritime Intelligent Transportation System | Port of Oakland | Complete | No |
| **O-16** | Maritime Area Seismic Monitor | Port of Oakland | In Progress | Yes 26-2 |
| **O-17** | Sea-Level Rise Vulnerability and Assessment Improvement Plan | Port of Oakland, Planning & Building, Office of Sustainability | In Progress | Yes 8-2 |
| **O-18** | Tree Planting | OPW Watershed and Stormwater Management, OPW Tree Services | In Progress | Yes 17-4 |
| **O-19** | Reestablish Full Compliance and Good Standing Under the NFIP | Planning & Building | Complete | No |
| **O-20** | Update Sea-Level Rise Road Map | Office of Sustainability | In Progress | Yes 8-2 |
| **O-21** | Vulnerability Assessment and Adaptation Plan | Port of Oakland, Planning & Building, Office of Sustainability | In Progress | Yes 8-1, 26-3 |
| **O-22** | Equity Analysis | OFD EMSD, DRE, ADA Division | In Progress | Yes 1-1 |

## 19.2 MITIGATION GOALS AND OBJECTIVES

**Local Plan Requirement C3 – 44 CFR Part 201.6(c)(3)(i)**

***The mitigation strategy must include a description of mitigation goals to reduce or avoid long-term vulnerabilities to identified hazards.***

Mitigation goals represent broad statements that are consistent with the hazards identified in the LHMP and achieved through the implementation of specific mitigation actions. Mitigation objectives are defined, short-term, measurable efforts that lead to achieving an overall goal. Mitigation goals and objectives provide guidance for the development of mitigation actions.

The SC has updated the goals for the 2026 LHMP to incorporate evolving priorities and best practices since 2021. The revised 2026 goals place a stronger emphasis on equity, accessibility, community engagement, operational integration, and climate resilience. Key enhancements include:

- **Equity** remains a fundamental component across all goals, with a focus on reducing racial disparities, individuals with AFN and enhancing ADA accessibility.
- **Community-Driven Approach** that focuses on empowering residents with resources and support for preparedness, response, recovery, and mitigation.
- **Integrated Operations** through coordinated efforts between departments and agencies to align with other plans and enhance operational efficiency.
- **Climate Adaptation and Equity** continues to be a central focus with goals incorporated targeted measures aimed at achieving equitable outcomes in climate resilience.

The updated goals for the City of Oakland LHMP update are as follows:

- **Goal 1:** Advance equity, reduce racial disparities, and ensure ADA accessibility for people with disabilities and individuals with access and functional needs in all phases of preparing for, responding to, and recovering from natural hazards.
- **Goal 2:** Protect life, property, the environment, and natural and cultural resources equitably.
- **Goal 3:** Advance community-driven outreach efforts to equip Oaklanders with the knowledge, resources, and support needed to prepare for, respond to, and recover from natural hazards.
- **Goal 4:** Implement strategies to enable departments of the City of Oakland to equitably respond to and mitigate hazards in accordance with the Emergency Operations Plan in an integrated manner.
- **Goal 5:** Pursue feasible, cost-effective, and environmentally appropriate hazard mitigation measures including adaptive capacity to reduce risk from a changing climate, incorporating targeted strategies to advance equitable outcomes.

For the 2026 LHMP, the SC reviewed the existing objectives and revised them to align more with the identified goals and the overall mission statement of the mitigation process. Objectives were developed through a structured process, with department staff aligning objectives with the five overarching goals, and addressing equity considerations, including accessibility for individuals with disabilities and access and functional needs. Each objective is paired with mitigation actions to ensure measurable progress over the five-year implementation period. Table presents each objective, its alignment with mitigation goals, and the hazards it addresses.

Table 19-2. 2026 LHMP Mitigation Objectives

| Objective | Goal 1 | Goal 2 | Goal 3 | Goal 4 | Goal 5 | Dam Failure | Drought | Earthquake | Flood | Landslide | Sea-Level Rise | Severe Weather – High Wind | Severe Weather – Extreme Heat | Tsunami/ Seiche | Wildfire |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Objective 1:** Ensure the LHMP is in alignment with the General Plan and utilizing General Plan Safety and EJ Element tools to ensure Equity Priority Communities have priority for funding, and access to City mitigation and emergency preparedness services. | X | X | | X | X | X | X | X | X | X | X | X | X | X | X |
| **Objective 2:** Individuals with AFN have priority for funding, access to City mitigation and emergency preparedness services regardless of geographic area. Services are accessible to individuals with AFN. | X | X | | X | X | X | X | X | X | X | X | X | X | X | X |
| **Objective 3:** Increase hazard awareness throughout Oakland with a focus on Equity Priority Communities and individuals with AFN. Reduce disparities in preparedness and mitigation of disaster risks. | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| **Objective 4:** Maximize potential for City facilities to protect the community from hazards. | X | X | | X | X | X | X | X | X | X | X | X | X | X | X |
| **Objective 5:** Encourage the incorporation of hazard mitigation measures into repairs, major alterations, new development, and redevelopment practices, and prioritize Equity Priority Communities and individuals with AFN that are subject to substantial hazard risk | X | X | | | X | X | X | X | X | X | X | X | X | X | X |
| **Objective 6:** Support and strengthen or replace property, infrastructure and lifelines to minimize post disaster disruption | X | X | | | X | X | X | X | X | X | X | X | X | X | X |

| Objective | Goal 1 | Goal 2 | Goal 3 | Goal 4 | Goal 5 | Dam Failure | Drought | Earthquake | Flood | Landslide | Sea-Level Rise | Severe Weather – High Wind | Severe Weather – Extreme Heat | Tsunami/ Seiche | Wildfire |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| and facilitate short-term recovery (1-5 years), with a focus on Equity Priority Communities and individuals with AFN impacted by a hazard event. | | | | | | | | | | | | | | | |
| **Objective 7:** Use the best available hazard data* to evaluate the potential threat and its impacts on Equity Priority Communities when reviewing proposed development opportunities. *Refer to Chapter 6. | X | X | | X | X | X | X | X | X | X | X | X | X | X | X |
| **Objective 8:** Develop and coordinate the City's Sea Level Rise strategy. | X | X | | X | X | | | | X | | X | | | | |
| **Objective 9:** Use the best available data on groundwater rise and its potential impacts on Equity Priority Communities while reviewing proposed development opportunities in areas vulnerable to contaminated groundwater rise. | X | X | | X | X | | | | X | X | | | | | |
| **Objective 10:** Reduce fire risk during natural hazard events by reducing natural gas infrastructure in Oakland. | X | X | | X | X | | | | | | | | | | X |
| **Objective 11:** Safer Housing for Oakland Program (SHOP): Soft Story Apartment Retrofit Program—Under this action, the City will invest in and seek Hazard Mitigation Grant Program (HMGP) funding from FEMA and CalOES to support property owners with buildings subject to Oakland's Mandatory Soft Story Retrofit Program, which the Department of Planning & Building developed to enforce 2019 municipal ordinance No. 13516. | X | X | | X | | | | X | | | | | | | |
| **Objective 12:** Increase public awareness of benefits of fire safety and mitigation practices. | X | X | X | X | X | X | X | X | X | X | X | X | X | X | X |
| **Objective 13:** Reduce the likelihood of catastrophic wildfires by limiting ignition potential, reducing fuel loads, and modifying fuel arrangements on City-owned lands. | X | X | | X | X | | | | | | | | | | X |

| Objective | Goal 1 | Goal 2 | Goal 3 | Goal 4 | Goal 5 | Dam Failure | Drought | Earthquake | Flood | Landslide | Sea-Level Rise | Severe Weather – High Wind | Severe Weather – Extreme Heat | Tsunami/ Seiche | Wildfire |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Objective 14:** Maintain 100% compliance on private and public parcels related to vegetation management. | X | X | | X | X | | | | | | | | | | X |
| **Objective 15:** In high hazard areas, identify State and/or federal programs or develop local programs to offer financial incentives to Equity Priority Communities for defensible space maintenance, home hardening, and training for evacuation procedures to reduce risk to people and property. | X | X | | X | X | | | | | | | | | | X |
| **Objective 16:** Reduce instances of storm-related tree and branch failures that may cause road closures, property damage, and threats to life by reinstating a regular pruning/maintenance cycle on all city trees. Prioritize tree maintenance activities in frontline communities. | X | X | | X | X | | | | | | | X | | | |
| **Objective 17:** Complete the City's Storm Drainage Master Plan. | X | X | | X | X | | | | X | | | | | | |
| **Objective 18:** Identify, integrate, and implement green infrastructure practices into streetscape improvement, and stormwater management projects. | X | X | | X | X | | | | X | | | | X | | |
| **Objective 19:** Minimize repetitive and potential losses due to flood by maintaining compliance with the NFIP and improving floodplain operations. | X | X | | X | X | | | | X | | | | | | |
| **Objective 20:** Explore resources and steps needed to participate in CRS program. | X | X | | X | | | | | X | | | | | | |
| **Objective 21:** Complete the City's Storm Drainage Master Plan. | X | X | | X | X | | | | X | | | | | | |
| **Objective 22:** Prevent discharge of wastewater contamination into waterways as a result of natural hazards. Enhance social equity by implementing sewer system improvement project with high CIP scores focusing on underserved communities. | X | X | | X | X | | | | X | | | | | | |

| Objective | Goal 1 | Goal 2 | Goal 3 | Goal 4 | Goal 5 | Dam Failure | Drought | Earthquake | Flood | Landslide | Sea-Level Rise | Severe Weather – High Wind | Severe Weather – Extreme Heat | Tsunami/ Seiche | Wildfire |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Objective 23:** Monitor and measure number of miles of sewer main rehabilitation annually. Complete sanitary sewer masterplan by end of 2025. Obtain priority of work with risk and equity components. | X | X | | X | X | | | | X | | | | | | |
| **Objective 24:** Integrate Integrated Preparedness Plan (IPP) priorities into departmental work plans. | X | X | | X | X | | | | X | | | | | | |
| **Objective 25:** To mitigate the effects of disruptions, ensure the city's ability to maintain internal operations and external services with a focus on the needs of Equity Priority Communities and individuals with AFN. | | | | | | X | X | X | X | X | X | X | X | X | X |
| **Objective 26:** Reduce risk to critical Port of Oakland facilities and infrastructure through targeted seismic, flood, and climate resilience improvements, enhanced monitoring capabilities, and modernization of energy systems to ensure operational continuity during hazard events. | X | X | | | X | X | | X | X | | X | X | X | X | |

## 19.3 COMPREHENSIVE RANGE OF MITIGATION ACTIONS

**Local Plan Requirement C3 – 44 CFR Part 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 effect of each hazard, with particular emphasis on new and existing buildings and infrastructure.***

A range of potential mitigation opportunities is included in each hazard risk assessment in Chapters 7 through 15. The potential actions are categorized by the following:

- **Who may implement the action:**
  - Community scale (individuals or groups)
  - Organizational scale (businesses, non-profits, community-based organizations)
  - Government scale (any government agency that has permit authorities and police powers within the planning area)

- **What the alternative would do:**

- Manipulate the hazard (actions to prevent hazard events from occurring)
- Reduce exposure and vulnerability (actions to safeguard people, property, and the environment from the impacts of the hazard)
- Build local capacity (actions to improve abilities to mitigate and respond to hazard events)
- Use nature-based solutions (actions that use green solutions to mitigate the hazard and provide additional environmental services)

## 19.4 MITIGATION ACTION PLAN AND IMPLEMENTATION

**Local Plan Requirement C3 – 44 CFR Part 201.6(c)(3)(iii)**

***The hazard mitigation strategy shall include an action plan, describing how the action identified in paragraph (c)(3)(ii) of this section will be prioritized, implemented, and administered by the local jurisdiction.***

Together with the various city departments, the CPT and the SC reviewed the range of mitigation actions and selected actions to be included in the LHMP. The selection of actions was based on the risk assessment results of the identified hazards, the assessment of current capabilities, and the mitigation goals and objectives defined. Table 19-3 lists the identified mitigation actions for the 2026 LHMP using the numbering format to include the objective and action for the objective.

Table 19-3. Mitigation Action Plan for the City of Oakland

| Mitigation Action | Community Lifeline(s) Addressed | Benefits New or Existing Assets | Lead Implementer | Support Implementer | Benefits EPCs | Estimated Cost | Potential Funding Sources | Timeline |
|---|---|---|---|---|---|---|---|---|
| **1-1.** Prioritize hazard preparedness and mitigation funding for communities identified in the General Plan and LHMP as Equity Priority Communities with vulnerability. | All | Both | OFD | ADA | Yes | Moderate ($10,000 – $49,999) | Staff Time, General Fund | Short Term (less than 5 years) |
| **1-2.** Prioritize mitigation and emergency preparedness services for communities identified in the General Plan and LHMP as Equity Priority Communities with vulnerability. | All | Both | OFD | ADA | Yes | Moderate ($10,000 – $49,999) | Staff Time, General Fund | Short Term (less than 5 years) |
| **2-1.** Mitigation and preparedness services will be compliant with ADA, Section 504, Section 508 requirements, and any applicable accessibility policies & laws. | N/A | N/A | ADA | - | Yes | Moderate ($10,000 – $49,999) | Staff Time, General Fund | Short Term (less than 5 years) |
| **2-2.** Advocate for the inclusion of considerations for individuals with AFN in planning efforts from other agencies in which Oakland staff participate. Connect planning efforts with city-affiliated groups. | N/A | N/A | DRE, ADA | - | Yes | Low ($0 - $9,999) | Staff Time | Short Term (less than 5 years) |
| **2-3.** Identify and build relationships with local organizations and agencies serving individuals with AFN. Build relationships with other agencies to connect with these organizations to better plan for their needs during a natural hazard event. | Safety and Security; Food, Hydration, Shelter; Health and Medical | N/A | ADA | - | Yes | Moderate ($10,000 – $49,999) | Staff Time, General Fund | Short Term (less than 5 years) |
| **3-1.** Strengthen partnerships with community-based organizations, faith-based groups, and the private sector to support mitigation outreach and implementation. | Safety and Security; Food, Hydration, Shelter; Health and Medical | N/A | OFD | ADA | Yes | Moderate ($10,000 – $49,999) | Staff Time, General Fund | Short Term (less than 5 years) |
| **3-2.** Develop multilingual hazard awareness campaign including campaign materials for populations facing higher risk, including specific content to meet the needs of individuals with AFN. Involve these communities in providing input to | N/A | N/A | OFD | ADA | Yes | Moderate ($10,000 – $49,999) | Staff Time, General Fund | Short Term (less than 5 years) |

| Mitigation Action | Community Lifeline(s) Addressed | Benefits New or Existing Assets | Lead Implementer | Support Implementer | Benefits EPCs | Estimated Cost | Potential Funding Sources | Timeline |
|---|---|---|---|---|---|---|---|---|
| ensure the campaign's accessibility and cultural competency. | | | | | | | | |
| **3-3.** Embed mitigation and preparedness messaging into programs that already serve equity priorities communities and individuals with AFN (e.g., clinics, food banks, youth programs). | Safety and Security; Food, Hydration, Shelter; Health and Medical | N/A | OFD | ADA | Yes | Moderate ($10,000 – $49,999) | Staff Time, General Fund | Short Term (less than 5 years) |
| **3-4.** Develop an Online 'Know Your Risk' + Equity Map: Create a web tool where residents can view hazards alongside indicators of social vulnerability and find tailored mitigation resources. | N/A | N/A | OFD | ADA | Yes | Moderate ($10,000 – $49,999) | Staff Time, General Fund | Short Term (less than 5 years) |
| **3-5.** Develop community engagement campaign to expand participation in AC Alert programs, hazard mitigation planning and the identification of mitigation projects. | N/A | N/A | OFD | ADA | Yes | Moderate ($10,000 – $49,999) | Staff Time, General Fund | Short Term (less than 5 years) |
| **4-1.** Facilitate resilience improvements in City facilities to reliably serve as resilience hubs or places of respite during hazard events. | Safety and Security; Food, Hydration, Shelter | Existing Assets | Sustainability | OFD, OPW, ADA | Yes | High ($50,000 - $249,999) | FEMA HMGP, Staff Time, State funding, General Fund | Short Term (less than 5 years) |
| **4-2.** Prioritize investment in City facilities that might be used as respite centers or emergency related support for retrofit and safety improvements. | Safety and Security; Food, Hydration, Shelter | Both | OPW | ADA, OFD, Sustainability | Yes | High ($50,000 - $249,999) | FEMA HMGP, Staff Time, General Fund | Short Term (less than 5 years) |
| **4-3.** Develop public communication methods to inform about City resources available in the event of a hazard. | No | Both | OFD | ADA, City Administrator's Office | Yes | Low ($0 - $9,999) | Staff Time, General Fund, CIP Budget | Short Term (less than 5 years) |
| **5-1.** Continue to seek funding to revive Housing Preservation Services programs supporting seismic retrofits of high-risk housing units in Equity Priority Communities. This includes two pending applications for Hazard Mitigation Grant Program (HMGP) funding from FEMA and Cal OES to re-open the Safer Housing for Oakland Program (SHOP): Soft Story Apartment Retrofit Program, providing financial assistance to property owners with | Safety and Security; Food, Hydration, Shelter; Health and Medical | Existing Assets | HCD | Planning & Building, ADA | Yes | Very High (>$250,000) | FEMA HMGP, Staff Time | Short Term (less than 5 years) |

| Mitigation Action | Community Lifeline(s) Addressed | Benefits New or Existing Assets | Lead Implementer | Support Implementer | Benefits EPCs | Estimated Cost | Potential Funding Sources | Timeline |
|---|---|---|---|---|---|---|---|---|
| buildings subject to Oakland's Mandatory Soft Story Retrofit Program. | | | | | | | | |
| **5-2.** Educate low-income homeowners seeking rehabilitation loans about the purpose and availability of publicly funded seismic retrofit assistance programs, such as the Earthquake Brace + Bolt (EBB) and Earthquake Soft-Story (ESS) programs funded by the State of California/ California Earthquake Authority. (Funding note: Also HCD has loans for retrofitting loans for individual with disability for home modification improvements – Access Improvement Program. At the state level, California's Low-Income Housing Tax Credit (LIHTC) program.) | Safety and Security; Food, Hydration, Shelter; Health and Medical | Existing Assets | HCD | ADA | Yes | Low ($0-$9,000) | Staff Time | Short Term (less than 5 years) |
| **6-1.** Fast track / streamline permitting process with prioritization for Equity Priority Communities and individuals with AFN. | N/A | Both | Planning & Building | HCD, ADA | Yes | Low ($0-$9,000) | Staff Time | Short Term (less than 5 years) |
| **6-2.** Consider adoption of a disaster reconstruction overlay zone. As part of this action, re-evaluate all development scenarios and requirements following a hazard event such as a wildfire, landslide, flood, earthquake; explore funding sources and create a low-interest construction loan program for income-qualified owners who are recovering from a disaster. | Safety and Security; Transportation | Both | Planning & Building | ADA | Yes | Low ($0-$9,000) | Staff Time | Short Term (less than 5 years) |
| **6-3.** Consider an ordinance requiring installation and periodic inspection and maintenance of gas shut-off valves in existing buildings at the time of sale, transfer of title, and when upgrades are planned for gas piping to minimize the risk of post-earthquake fires due to gas pipeline ruptures. | Safety and Security; Transportation; Hazardous Materials | Both | Planning & Building | ADA | Yes | Low ($0-$9,000) | Staff Time | Short Term (less than 5 years) |

| Mitigation Action | Community Lifeline(s) Addressed | Benefits New or Existing Assets | Lead Implementer | Support Implementer | Benefits EPCs | Estimated Cost | Potential Funding Sources | Timeline |
|---|---|---|---|---|---|---|---|---|
| **7-1.** In areas vulnerable to contaminated groundwater rise, study the compounding impacts of sea level rise in groundwater threats in areas with hazardous facilities and Equity Priority Communities. Coordinate with adjacent jurisdictions as appropriate to develop a Shallow Groundwater Rise Vulnerability assessment to establish a detailed understanding of the effects of rising shallow groundwater on people, the built environment, and water supply. | Safety and Security; Food, Hydration, Shelter; Water Systems | Both | Planning & Building | Sustainability and Resilience Division, City Administrator's Office, Planning & Building, OPW, ADA | Yes | High ($50,000 - $249,999) | Staff Time, CIP Budget | Short Term (less than 5 years) |
| **7-2.** Evaluate densities where slopes are at the greatest risk for landslides and consider reducing current permitted development densities and intensities by 2028. | All | Both | Planning & Building | ADA, Housing & Community Development | Yes | High ($50,000 - $249,999) | Staff Time, CIP Budget | Short Term (less than 5 years) |
| **8-1.** Develop the Regional Shoreline Adaptation Plan | All | Both | Sustainability | ADA | Yes | High ($50,000 - $249,999) | FEMA HMGP, Staff Time, General Fund | Short Term (less than 5 years) |
| **8-2.** Sea-Level Rise Vulnerability and Assessment Improvement Plan - The Port of Oakland's Sea-Level Rise Vulnerability and Assessment Improvement Plan will assess the potential effects of sea-level rise on maritime facilities. The study will evaluate facilities Port-wide for sea-level rise vulnerability and develop an implementation plan for near-term and long-term strategies to address potential impacts. The study will analyze the need for infrastructure such as sea walls, wharf improvements, and changes in port operations. In addition, the study will help establish design standards. | Safety and Security; Transportation; Water Systems | Both | Port of Oakland | Planning & Building, Sustainability, City Administrator's Office | No | Very High ($250,000 – Above) | CIP Budget, State Adaptation Planning Grant | Short Term (less than 5 years) |
| **9-1.** Study compounding impact of sea level rise on groundwater threats in areas with hazardous facilities. | Hazardous Materials | Both | Planning & Building | Sustainability, OPW, DRE, ADA | Yes | Very High ($250,000 – Above) | CIP Budget, State Adaptation | Short Term (less |

| Mitigation Action | Community Lifeline(s) Addressed | Benefits New or Existing Assets | Lead Implementer | Support Implementer | Benefits EPCs | Estimated Cost | Potential Funding Sources | Timeline |
|---|---|---|---|---|---|---|---|---|
| Coordinate with adjacent jurisdictions as appropriate to create a Shallow Groundwater Rise Vulnerability Assessment to establish a detailed understanding of the effects of rising shallow groundwater on people, the built environment, and water supply. This includes buoyancy, seepage, infiltration, liquefaction, corrosion, and contaminant mobilization hazards. The assessment should have an interactive map component that will be updated based on site-specific geotechnical and topographic data submitted by new developments. Continue to comply with performance standards pursuant to the National Pollutant Discharge Elimination System municipal stormwater permit | | | | | | | Planning Grant | than 5 years) |
| **10-1.** Work with PG&E to implement pilot projects under SB 1221 to identify and eliminate natural gas infrastructure through electrification of homes and businesses, prioritizing those with the potential to result in branch line decommissioning of natural gas piping. | Energy | Existing Assets | Sustainability | ADA | Yes | Very High | CIP Budget, General Fund | Short Term (less than 5 years) |
| **10-2.** Work with public agency partners to provide safety and security information regarding the emergency use of diesel and gasoline powered generators | Energy; Hazardous Materials | Both | Sustainability | ADA | Yes | Low ($0 - $9,999) | Staff Time, General Fund | Short Term (less than 5 years) |
| **10-3.** Promote the widespread use of carbon monoxide detectors in homes and businesses, including through the donation and giveaway programs of carbon monoxide detectors | Safety and Security; Food, Hydration, Shelter; Health and Medical | Existing Assets | Sustainability | ADA | Yes | Moderate ($10,000 – $49,999) | Staff Time, General Fund | Short Term (less than 5 years) |
| **11-1.** The program will be implemented by contacting owners of the remaining subject buildings that that have not yet completed the required retrofit. This is a discrete list, but these types of buildings tend to be in lower income | N/A | Existing Assets | HCD | ADA | Yes | Moderate ($10,000 – $49,999) | Staff Time, General Fund | Short Term (less than 5 years) |

| Mitigation Action | Community Lifeline(s) Addressed | Benefits New or Existing Assets | Lead Implementer | Support Implementer | Benefits EPCs | Estimated Cost | Potential Funding Sources | Timeline |
|---|---|---|---|---|---|---|---|---|
| areas of Oakland. The initial focus will be on Opportunity Zones and other priority areas of need. | | | | | | | | |
| **12-1.** Expand on existing strategies to reach low-income, historically hard to reach and non-English speaking populations and individuals with AFN through translated materials, earned media, and strategic engagement planning | N/A | N/A | OFD | ADA | Yes | Moderate ($10,000 – $49,999) | Staff Time, General Fund | Short Term (less than 5 years) |
| **12-2.** Introduce Firewise program to Equity Priority Communities in the WUI to reduce wildfire risk through resident-led action, education, and collaboration with local fire agencies, focusing on creating defensible space, hardening homes, and developing preparedness plans to become more resilient to wildfires criteria | N/A | Both | OFD | ADA | Yes | Moderate ($10,000 – $49,999) | Staff Time, General Fund | Short Term (less than 5 years) |
| **12-3.** Monitoring grant opportunities for the City of Oakland to increase fire safe and fuel mitigation efforts, and expand emergency preparedness. | Safety and Security | Both | OFD | ADA | Yes | Low ($0 - $9,999) | Staff Time, General Fund | Short Term (less than 5 years) |
| **13-1.** Full implementation of the 10 year Vegetation Management Plan to cover more than 1,400 acres of City property plus treatment areas approximately 300 miles of roadside using heavy equipment, hands crews and goats. | Safety and Security; Transportation; Water Systems | Both | OFD | ADA | Yes | High ($50,000 - $249,999) | FEMA HMGP Post-Fire, General Fund, CAL FIRE Wildfire Prevention Grant | Short Term (less than 5 years) |
| **13-2.** Collaborate with CAL FIRE, EBRPD, Oakland Firesafe Council Friends of Joaquin Miller, Friends of Sausal Creek, Firewise Communities to align fire prevention, fuel mitigation and public awareness campaigns to strengthen preparedness, prevention and resiliency strategies | Safety and Security; Food, Hydration, Shelter; Health and Medical; Transportation | Both | OFD | ADA | Yes | High ($50,000 - $249,999) | Staff Time, General Fund, CAL FIRE Wildfire Prevention Grant | Short Term (less than 5 years) |
| **14-1.** The Vegetation Management Unit of the Oakland Fire Department inspects properties in the Oakland Hills, much of which is designated as a Very | Safety and Security; Food, Hydration, Shelter; Health and Medical | Both | OFD | ADA, OPW | Yes | High ($50,000 - $249,999) | Staff Time, General Fund, CAL FIRE Wildfire | Short Term (less than 5 years) |

| Mitigation Action | Community Lifeline(s) Addressed | Benefits New or Existing Assets | Lead Implementer | Support Implementer | Benefits EPCs | Estimated Cost | Potential Funding Sources | Timeline |
|---|---|---|---|---|---|---|---|---|
| High Fire Hazard Severity Zone (VHFHSZ). The VMU works under the Oakland Fire Department's Fire Prevention Bureau. The VMU is responsible for the inspections of around 25,000 parcels in the VHFHSZ. The purpose of these inspections is to identify and mitigate hazards that could contribute to the spread, growth, and intensity of wildfire. Inspections are done annually, and property owners are required to actively maintain their parcels in a fire-safe condition year-round. | | | | | | | Prevention Grant | |
| **14-2.** Continue to deploy one of the largest herds of goats in CA to mitigate low lying and dry vegetation on roadside and in City open space. | Safety and Security; Food, Hydration, Shelter; Health and Medical; Transportation; Water Systems | Both | OFD | ADA | Yes | High ($50,000 - $249,999) | Staff Time, General Fund, CAL FIRE Wildfire Prevention Grant | Short Term (less than 5 years) |
| **15-1.** Continue to provide fire safety and public education efforts related to requirements for development, property maintenance, and emergency preparedness in the VHFHSZ and prioritize the most vulnerable populations in these areas. | N/A | Both | OFD | ADA | Yes | Low ($0 - $9,999) | Staff Time, General Fund | Short Term (less than 5 years) |
| **16-1.** Prune all trees in the public right of way on regular 7-year intervals, as described in the 2024 Oakland Urban Forest Plan, to address preventable whole tree and branch failures during wind and wind/rain events. | Safety and Security; Food, Hydration, Shelter; Health and Medical; Transportation; Water Systems | Both | OPW | ADA | Yes | Moderate ($10,000 – $49,999) | Staff Time, General Fund | Short Term (less than 5 years) |
| **16-2.** Implement the awarded USDA Forest Service Inflation Reduction Act funding to begin routine pruning in Oakland's highest-priority census tracts per the OakDOT Geographic Equity Toolbox. | Safety and Security; Food, Hydration, Shelter; Health and Medical; Transportation; Water Systems | Both | OPW | ADA | Yes | Moderate ($10,000 – $49,999) | Staff Time, USDA, General Fund | Short Term (less than 5 years) |
| **16-3.** Identify additional funding sources to regularly prune trees in the rest of Oakland, with work focusing on census | Safety and Security; Food, Hydration, Shelter; Health and | Both | OPW | ADA | Yes | Moderate ($10,000 – $49,999) | Staff Time, General Fund | Short Term (less |

| Mitigation Action | Community Lifeline(s) Addressed | Benefits New or Existing Assets | Lead Implementer | Support Implementer | Benefits EPCs | Estimated Cost | Potential Funding Sources | Timeline |
|---|---|---|---|---|---|---|---|---|
| tracts based on priority level identified in the Geographic Equity Toolbox. | Medical; Transportation; Water Systems | | | | | | | than 5 years) |
| **17-1.** Identify feasible, equitable (using the CIP prioritization system), and cost-effective stormwater infrastructure projects that would increase system capacity, have been identified in the City's capital improvement program and/or Storm Drainage Master Plan, that and would be good target projects for which to pursue funding under applicable local, state, and federal grant programs. | Safety and Security; Health and Medical; Hazardous Materials; Water Systems | Both | OPW – Civil Engineering | DOT, ADA | Yes | Very High ($250,000 – Above) | Staff Time, CIP Budget, USEDA Grant | Long Term (more than 5 years) |
| **17-2.** Conduct equitable outreach and engagement as we implement all CIP Storm Drainage projects. (Same as 21-2, but with a different objective) | Water Systems; Transportation | Both | OPW | DOT, ADA | Yes | Moderate ($10,000 – $49,999) | Staff Time, CIP Budget | Short Term (less than 5 years) |
| **17-3.** Leverage funding opportunities that may be available through government grants or projects conducted by DOT. | Water Systems; Transportation | Both | OPW | DOT, ADA | Yes | Low ($0 - $9,999) | Staff Time, CIP Budget | Short Term (less than 5 years) |
| **17-4.** Tree Planning. Implement the component of the City's Storm Drain Master Plan that looks to quantify the stormwater capture and pollutant removal benefit of tree planting and modeling where in the city stormwater runoff reduction could be achieved through increased tree canopy. Coordinate with Tree Services Division to make sure it corresponds to the Urban Forestry Master Plan. | Safety and Security; Food, Hydration, Shelter; Health and Medical; Transportation; Water Systems | Both | OPW | DOT, ADA | Yes | High ($50,000 - $249,999) | FEMA HMGP, Staff Time, CIP Budget | Short Term (less than 5 years) |
| **18-1.** The City will continue to implement its Green Stormwater Infrastructure (GSI) Plan to include GSI where required by the Municipal Regional Stormwater Permit and where feasible. Examples include bioretention areas, engineered tree well filters, green | Water Systems; Transportation | Both | OPW | OakDOT, Department, Planning & Building, ADA | Yes | Very High ($250,000 – Above) | FEMA HMGP, CIP Budget | Short Term (less than 5 years) |

| Mitigation Action | Community Lifeline(s) Addressed | Benefits New or Existing Assets | Lead Implementer | Support Implementer | Benefits EPCs | Estimated Cost | Potential Funding Sources | Timeline |
|---|---|---|---|---|---|---|---|---|
| roofs, flow-through planters, and permeable pavement. | | | | | | | | |
| **18-2.** Encourage developers to include green infrastructure practices. | N/A | New Assets | Planning & Building | OPW, ADA | Yes | Moderate ($10,000 – $49,999) | Staff Time | Short Term (less than 5 years) |
| **19-1.** Continue to maintain the City's good standing and compliance under the NFIP through:<br>• Enforce the City's flood damage prevention ordnance<br>• Update the City's flood damage prevention ordinance to ensure compliance with state and federal requirements | All | Both | City Administrator's Office | Planning & Building, OPW, ADA | Yes | Moderate ($10,000 – $49,999) | Staff Time | Short Term (less than 5 years) |
| **19-2.** Participate in floodplain and mapping updates and advocate for accuracy in updated maps based on locally documented conditions. | All | Both | OPW | Planning & Building, ADA | Yes | Moderate ($10,000 – $49,999) | Staff Time | Short Term (less than 5 years) |
| **19-3.** Build community knowledge of floodplain concerns and revised floodplain mapping in an inclusive manner. Provide public assistance/information on floodplain requirements and impacts. | All | Both | OPW and Planning & Building | ADA | Yes | Moderate ($10,000 – $49,999) | Staff Time | Short Term (less than 5 years) |
| **20-1.** Complete CRS assessment and determine City of Oakland readiness for participation. | N/A | N/A | City Administrator's Office, OPW, Planning & Building, DRE, ADA | - | Yes | Moderate ($10,000 – $49,999) | Staff Time | Short Term (less than 5 years) |
| **21-1.** Identify feasible, equitable (using the CIP prioritization system), and cost-effective stormwater infrastructure projects that would increase system capacity, have been identified in the City's capital improvement program and/or Storm Drainage Master Plan, that and would be good target projects for which to pursue funding under | Food, Hydration, Shelter; Water Systems; Transportation | Both | OPW | ADA | Yes | Very High ($250,000 – Above) | FEMA HMGP and FMA; CIP Budget | Long Term (more than 5 years) |

| Mitigation Action | Community Lifeline(s) Addressed | Benefits New or Existing Assets | Lead Implementer | Support Implementer | Benefits EPCs | Estimated Cost | Potential Funding Sources | Timeline |
|---|---|---|---|---|---|---|---|---|
| applicable local, state, and federal grant programs. | | | | | | | | |
| **21-2.** Conduct equitable outreach and engagement as the City implements all CIP Storm Drainage projects. (Same as 17-2, but with a different objective) | Water Systems; Transportation | Both | OPW | ADA | Yes | Moderate ($10,000 – $49,999) | Staff Time; CIP Budget | Short Term (less than 5 years) |
| **21-3.** Leverage funding opportunities that may be available through government grants or projects conducted by DOT and OPW. | Water Systems; Transportation | Both | OPW | DOT, ADA | Yes | Low ($0 - $9,999) | Staff Time | Short Term (less than 5 years) |
| **22-1.** Extend the service life of the City's sewer collection system. Complete 13-mile of sewer collection system rehabilitation annually to extend service life. Prioritize repairs based on risk factors and equity factors. | Safety and Security; Health and Medical; Hazardous Materials; Water Systems | Both | OPW – Civil Engineering | ADA | Yes | Very High ($250,000 – Above) | Staff Time, CIP Budget, U.S. Economic Development Administration (EDA) | Long Term (more than 5 years) |
| **22-2.** Enhance social equity by implementing sewer system improvement project with high CIP scores focusing on underserved communities. | Safety and Security; Food, Hydration, Shelter; Transportation; Water Systems | Both | OPW | ADA | Yes | Moderate ($10,000 – $49,999) | Staff Time, CIP Budget | Short Term |
| **22-3.** Complete 50-mile sewer pipelines with root control treatment to improve sewage conveyance annually | Safety and Security; Health and Medical; Hazardous Materials; Water Systems | Existing Assets | OPW – Civil Engineering | ADA | Yes | Very High ($250,000 – Above) | Staff Time, CIP Budget | Short to Long Term |
| **22-4.** Partner with Alameda County Health Department for Fat/Oil/Grease (FOG) enforcement and outreach focusing on Food Service Establishments and high FOG contributors | Safety and Security; Health and Medical; Hazardous Materials; Water Systems | Existing Assets | OPW | ADA | Yes | High ($50,000 - $249,999) | Staff Time | Short to Long Term |
| **22-5.** Continue to send abatement notices to property owners with private sewer lateral defects | Safety and Security; Health and Medical; Hazardous Materials; Water Systems | Both | OPW – Civil Engineering | ADA | Yes | Moderate ($10,000 – $49,999) | Staff Time, PSL Permits | Short to Long Term |
| **22-6.** Engage communities by sending out project notices and/or flyers prior and during project implementation to households and businesses in the targeted areas. | Safety and Security; Food, Hydration, Shelter; Transportation; Water Systems | Both | OPW | ADA | Yes | Moderate ($10,000 – $49,999) | Staff Time, CIP Budget | Short Term |

| Mitigation Action | Community Lifeline(s) Addressed | Benefits New or Existing Assets | Lead Implementer | Support Implementer | Benefits EPCs | Estimated Cost | Potential Funding Sources | Timeline |
|---|---|---|---|---|---|---|---|---|
| **22-7.** Faster project delivery by eliminating project barriers to expedite project implementation, including but not limited to, contractor outreach, enhanced contracting process, onsite support/enforcement. | Safety and Security; Food, Hydration, Shelter; Transportation; Water Systems | Both | OPW | ADA | Yes | Moderate ($10,000 – $49,999) | Staff Time, CIP Budget | Short Term |
| **22-8.** Equitable access by providing guidance to property owners on sewer lateral corrections | Safety and Security; Health and Medical; Hazardous Materials; Water Systems | Both | OPW Civil Engineering | ADA | Yes | Moderate ($10,000 – $49,999) | Staff Time, PSL Permits | Short to Long Term |
| **22-9.** For major capital sanitary sewer subbasin projects, the City will continue to replace private lower laterals where applicable within the City right-of-way where the sewer main is replaced. | Safety and Security; Food, Hydration, Shelter; Transportation; Water Systems | Both | OPW | ADA | Yes | High ($50,000 - $249,999) | Staff Time, CIP Budget | Short Term |
| **23-1.** Enhance social equity by implementing sewer system improvement project with high CIP scores focusing on underserved communities. | Water Systems | Both | OPW | ADA | Yes | Low to Moderate | Staff Time, General Fund, CIP Budget | Short Term (less than 5 years) |
| **23-2.** Engage communities by sending out project notices and/or flyers prior and during project implementation to households and businesses in the targeted areas. | Water Systems | Both | OPW | ADA | Yes | Low to Moderate | Staff Time, General Fund | Short Term (less than 5 years) |
| **23-3.** Faster project delivery by eliminating project barriers to expedite project implementation, including but not limited to, contractor outreach, enhanced contracting process, onsite support/enforcement | Water Systems | N/A | OPW | ADA | Yes | Low to Moderate | Staff Time, General Fund | Short Term (less than 5 years) |
| **23-4.** Send abatement notices to property owners with private sewer lateral defects. Provide equitable access by providing guidance to property owners on sewer lateral corrections | Water Systems | Existing Assets | OPW | ADA | Yes | Low to Moderate | Staff Time, General Fund | Short Term (less than 5 years) |
| **23-5.** For major capital sanitary sewer subbasin projects, the City will continue to replace private lower laterals where applicable within the City right-of-way where the sewer main is replaced. | Transportation | Existing Assets | OPW | ADA | Yes | High to Very High | Staff Time, CIP Budget | Short Term (less than 5 years) |

| Mitigation Action | Community Lifeline(s) Addressed | Benefits New or Existing Assets | Lead Implementer | Support Implementer | Benefits EPCs | Estimated Cost | Potential Funding Sources | Timeline |
|---|---|---|---|---|---|---|---|---|
| **24-1.** Develop the annual IPP Work Plan that lists priority preparedness activities, responsible departments, milestones, and supports implementation of relevant LHMP mitigation actions. | All | Both | OFD | ADA | Yes | Low to Moderate | Staff Time, General Fund | Short Term (less than 5 years) |
| **24-2.** Conduct an Annual Integrated Preparedness Planning Workshop (IPPW) with internal and external partners to review opportunities for capacity and capability improvements for risk reduction and update the multi-year IPP schedule. | N/A | Both | OFD | ADA | Yes | Low to Moderate | Staff Time, General Fund | Short Term (less than 5 years) |
| **24-3.** Maintain a Multi-Year Preparedness Calendar of trainings, exercises, plan updates, outreach events, and major projects. | Safety and Security; Communications | N/A | OFD | ADA | Yes | Low to Moderate | Staff Time, General Fund | Short Term (less than 5 years) |
| **25-1.** Each City department will submit Continuity of Operations Plans (COOPs) to the Emergency Management Services Division of OFD on an annual basis. Each department will keep these plans current by submitting revisions as needed. | Safety and Security; Communications; Transportation; Water Systems | Both | OFD | ADA | Yes | Moderate to High | Staff Time, General Fund | Short Term (less than 5 years) |
| **26-1.** Wharf Seismic and Structural Resilience Upgrade- Implement a comprehensive Wharf Repair and Upgrade Project to enhance resilience against earthquakes and severe storm conditions. The project will include:<br>• Seismic Upgrades: Strengthen wharf structures to withstand ground shaking and minimize catastrophic damage during major earthquakes.<br>• Structural Enhancements: Improve load distribution, reinforce critical connections, and repair or replace deteriorated piles to restore vertical and lateral support. | Safety and Security; Transportation; Water Systems | Both | Port of Oakland Engineering Division | - | No | Very High ($250,000 – Above) | FEMA HMGP, FEMA FMA, FEMA HMGP Post-Fire, General Funds | Short Term (less than 5 years) |

| Mitigation Action | Community Lifeline(s) Addressed | Benefits New or Existing Assets | Lead Implementer | Support Implementer | Benefits EPCs | Estimated Cost | Potential Funding Sources | Timeline |
|---|---|---|---|---|---|---|---|---|
| • Concrete Rehabilitation: Remove delaminated concrete, install corrosion-resistant reinforcement, and place new concrete to restore deck integrity and reduce maintenance needs. | | | | | | | | |
| **26-2.** Maritime Area Seismic Monitors - The Port of Oakland's Seaport terminals are generally constructed of pile-supported wharf structures with riprap bulkheads retaining soil at the back of the terminals. The Port proposes to implement additional seismic monitoring equipment at Berths 23–26 and Berths 57–58, as well as repair existing equipment at Berths 35–37. Port personnel have identified difficulty in assessing potential damage to terminals after a major earthquake due to limited functioning seismic monitoring equipment. The proposed installations will fill gaps in the current monitoring system by providing a more complete picture at Inner Harbor, Middle Harbor, and Outer Harbor locations. This will allow engineers to focus on inspections of areas most susceptible to damage and proceed with repairs to resume operations quickly. | Transportation; Water Systems | Existing Assets | Port of Oakland Engineering and Maintenance Division | - | No | Moderate ($10,000-$49,999) to High ($50,000-$249,999) | FEMA HMGP, General Funds | Short Term (less than 5 years) |
| **26-3.** North Field Flood Protection Study and Adaptation Plan - Building on the 2023 North Field Vulnerability Study, the Port of Oakland will lead a comprehensive analysis to:<br>• Confirm design of flood elevations and critical infrastructure vulnerabilities.<br>• Assess wetlands, culverts, and drainage systems. | Safety and Security; Transportation | Existing Assets | Port of Oakland Engineering and Maintenance Division | - | No | Moderate ($10,000-$49,999) to High ($50,000-$249,999) | FEMA HMGP, State Climate Adaptation Grants, General Funds | Short Term (less than 5 years) |

| Mitigation Action | Community Lifeline(s) Addressed | Benefits New or Existing Assets | Lead Implementer | Support Implementer | Benefits EPCs | Estimated Cost | Potential Funding Sources | Timeline |
|---|---|---|---|---|---|---|---|---|
| • Identify near-term flood protection measures and phased adaptation strategies.<br>• Develop coordination protocols with Caltrans, East Bay Regional Park District, City of Alameda, and other stakeholders | | | | | | | | |
| **26-4.** Old Earhart Road Floodwall Improvement - Based on the 2023 North Field Vulnerability Study, the Port of Oakland will implement a localized flood protection project at Old Earhart Road. The project will:<br>• Raise Old Earhart Road to connect two existing high points on the north side of North Field.<br>• Construct two short floodwalls totaling approximately 530 feet to close gaps and create a continuous barrier.<br>• Reduce flood risk for critical airport infrastructure and maintain operational continuity during extreme weather and sea level rise events. | Safety and Security; Transportation | Existing Assets | Port of Oakland Engineering and Maintenance Division | Caltrans, City of Alameda | No | Very High ($250,000 – Above) | FEMA HMGP, General Funds | Short Term (less than 5 years) |
| **26-5.** Modernize Port Energy Infrastructure for Resilience and Reliability - Port Public Power will strengthen energy resilience by modernizing the Port's electrical infrastructure and planning for future grid demands. This action includes:<br>• Conducting a comprehensive assessment of existing systems<br>• Identifying critical upgrades<br>• Integrating advanced technologies to support full-scale electrification | Safety and Security; Transportation | Both | Port of Oakland Public Power | - | No | Very High ($250,000+) | FEMA HMGP, General Funds | Short Term (less than 5 years) |

| Mitigation Action | Community Lifeline(s) Addressed | Benefits New or Existing Assets | Lead Implementer | Support Implementer | Benefits EPCs | Estimated Cost | Potential Funding Sources | Timeline |
|---|---|---|---|---|---|---|---|---|
| • Over the next decade, the Port will implement renewable generation projects, battery storage systems, and smart grid solutions to:<br>• Enhance operational flexibility<br>• Reduce greenhouse gas emissions<br>• Provide uninterrupted service to critical facilities during hazard events | | | | | | | | |
| **26-6.** Maritime Terminal Study on Liquefaction Potential - The Port of Oakland is located in a geographic area highly prone to liquefaction and, as a result, infrastructure damage from seismic activity. To mitigate risk and prepare for imminent seismic events, the Port will conduct a comprehensive liquefaction study at its marine terminals. This study will evaluate liquefaction potential throughout the terminals and its effects on Port infrastructure. It will identify areas and facilities most at risk and outline a plan for mitigation, retrofit, and emergency response. | Safety and Security; Transportation; Water Systems | Both | Port of Oakland Engineering and Planning Division | - | No | High ($50,000 - $249,999) | FEMA HMGP, , State Adaptation Planning Grant | Short Term (less than 5 years) |

## 19.5 ACTION PLAN PRIORITIZATION

**Local Plan Requirement C3 – 44 CFR Part 201.6(c)(3)(iii)**

***The hazard mitigation strategy shall include an action plan, describing how the action identified in paragraph (c)(3)(ii) of this section will be prioritized, implemented, and administered by the local jurisdiction.***

For this LHMP, the City followed a modified prioritization method used in the 2023 California State Hazard Mitigation Plan. This method applies more priority categories to each mitigation action than in the prior plan. Each action is reviewed and scored based on 15 questions, as presented in Table 19-4. The answers to the questions were weighed and scored. Then, based on the scoring of each action, each action was categorized as high, medium, or low priorities.

Table 19-4. Mitigation Action Prioritization Categories

| Category | Question |
|---|---|
| Life Safety | Will the action result in life safety? |
| Property Protection | Will the action result in property protection? |
| Cost-Effective | Will the action be cost-effective (future benefits exceed cost)? |
| Technically Feasible | Is the action technically feasible? |
| Legal Authority | Does the jurisdiction have the legal authority to implement? |
| Fiscal | Is funding currently available for the action? |
| Funding Available | Is the project eligible for grant funding? |
| Environmental | Will implementation of the action use nature-based solutions? |
| Climate Change | Will the action mitigate impacts from climate change? |
| Equity Priority Community / Individuals with AFN | Does the action benefit Equity Priority Communities or individuals with AFN? |
| Administrative Capability | Does the jurisdiction have the administrative capability to execute the action? |
| Multi-Hazard | Will the action reduce risk to more than one hazard? |
| Timeline | Can the action be completed in less than 5 years? |
| Support Policies | Does the action support the policies and objectives of other plans and programs? |
| Community Support | Would project implementation be supported by the community? |

The answers to each of these questions are weighed as follows:

- Yes = 3 points
- Not sure/could be either yes or no/question is difficult to answer = 1 point
- No = 0 points

Following scoring each action, priorities are assigned based on the following metrics:

- 31 or more = High Priority
- 15 to 30 = Medium Priority
- 0 to 14 = Low Priority

Table 19-5 indicates the priority for each action in the City's mitigation action plan.

Table 19-5. Mitigation Action Prioritization

| Objective & Action Number | Life Safety | Property Protection | Cost-Effective | Technically Feasible | Legal Authority | Fiscal | Grant Funding Available | Environmental | Climate Change | Equity Priority Community / Individuals with AFN | Administrative Capability | Multi-Hazard | Timeline | Support Policies | Community Support | Total | Priority |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1-1 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 3 | 3 | 1 | 1 | 29 | Medium |
| 1-2 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 3 | 3 | 1 | 1 | 29 | Medium |
| 2-1 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 3 | 3 | 1 | 1 | 29 | Medium |
| 2-2 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 3 | 3 | 1 | 1 | 29 | Medium |
| 2-3 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 3 | 3 | 1 | 1 | 29 | Medium |
| 3-1 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 3 | 3 | 1 | 1 | 29 | Medium |
| 3-2 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 3 | 3 | 1 | 1 | 29 | Medium |
| 3-3 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 3 | 1 | 1 | 1 | 27 | Medium |
| 3-4 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 3 | 1 | 1 | 1 | 27 | Medium |
| 3-5 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 3 | 1 | 1 | 1 | 27 | Medium |
| 4-1 | 3 | 3 | 3 | 3 | 1 | 1 | 3 | 1 | 1 | 3 | 1 | 3 | 1 | 1 | 1 | 29 | Medium |
| 4-2 | 3 | 3 | 3 | 3 | 1 | 1 | 3 | 1 | 1 | 3 | 1 | 3 | 1 | 1 | 1 | 29 | Medium |
| 4-3 | 3 | 3 | 3 | 3 | 3 | 1 | 3 | 1 | 1 | 3 | 1 | 3 | 3 | 1 | 1 | 33 | High |
| 5-1 | 3 | 3 | 3 | 3 | 3 | 1 | 3 | 1 | 1 | 3 | 3 | 1 | 3 | 3 | 3 | 37 | High |
| 5-2 | 3 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 3 | 3 | 1 | 3 | 3 | 3 | 35 | High |
| 6-1 | 3 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 3 | 1 | 1 | 29 | Medium |
| 6-2 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 3 | 3 | 3 | 1 | 31 | High |
| 6-3 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 3 | 3 | 1 | 29 | Medium |
| 7-1 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 3 | 3 | 1 | 3 | 3 | 3 | 3 | 35 | High |
| 7-2 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 3 | 3 | 1 | 1 | 29 | Medium |
| 8-1 | 3 | 3 | 3 | 3 | 1 | 1 | 3 | 1 | 3 | 3 | 1 | 3 | 1 | 1 | 1 | 31 | High |
| 8-2 | 3 | 3 | 3 | 3 | 3 | 1 | 3 | 1 | 3 | 1 | 3 | 3 | 3 | 3 | 3 | 39 | High |
| 9-1 | 3 | 3 | 3 | 3 | 1 | 1 | 3 | 1 | 3 | 3 | 1 | 3 | 1 | 1 | 1 | 31 | High |
| 10-1 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 25 | Medium |
| 10-2 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 25 | Medium |
| 10-3 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 25 | Medium |
| 11-1 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 25 | Medium |
| 12-1 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 0 | 3 | 1 | 3 | 1 | 1 | 1 | 26 | Medium |
| 12-2 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 3 | 1 | 1 | 1 | 27 | Medium |
| 12-3 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 3 | 1 | 1 | 1 | 27 | Medium |
| 13-1 | 3 | 3 | 3 | 3 | 1 | 1 | 3 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 27 | Medium |
| 13-2 | 3 | 3 | 3 | 3 | 1 | 1 | 3 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 27 | Medium |
| 14-1 | 3 | 3 | 3 | 3 | 1 | 1 | 3 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 27 | Medium |
| 14-2 | 3 | 3 | 3 | 3 | 1 | 1 | 3 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 27 | Medium |
| 15-1 | 3 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 0 | 3 | 3 | 1 | 3 | 3 | 1 | 32 | High |
| 16-1 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 3 | 3 | 3 | 1 | 3 | 3 | 1 | 1 | 33 | High |
| 16-2 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 3 | 3 | 3 | 1 | 1 | 3 | 1 | 1 | 31 | High |
| 16-3 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 3 | 3 | 1 | 1 | 31 | High |
| 17-1 | 3 | 3 | 3 | 3 | 3 | 1 | 3 | 1 | 1 | 3 | 3 | 1 | 1 | 3 | 3 | 35 | High |
| 17-2 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 3 | 1 | 1 | 27 | Medium |
| 17-3 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 3 | 1 | 1 | 27 | Medium |

| Objective & Action Number | Life Safety | Property Protection | Cost-Effective | Technically Feasible | Legal Authority | Fiscal | Grant Funding Available | Environmental | Climate Change | Equity Priority Community / Individuals with AFN | Administrative Capability | Multi-Hazard | Timeline | Support Policies | Community Support | Total | Priority |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 17-4 | 3 | 3 | 3 | 3 | 1 | 1 | 3 | 3 | 3 | 3 | 1 | 1 | 3 | 1 | 1 | 33 | High |
| 18-1 | 3 | 3 | 3 | 3 | 1 | 1 | 3 | 3 | 3 | 3 | 1 | 3 | 3 | 1 | 1 | 35 | High |
| 18-2 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 3 | 3 | 3 | 1 | 3 | 3 | 1 | 1 | 33 | High |
| 19-1 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 3 | 1 | 1 | 27 | Medium |
| 19-2 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 3 | 1 | 1 | 27 | Medium |
| 19-3 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 3 | 1 | 1 | 27 | Medium |
| 20-1 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 3 | 1 | 1 | 27 | Medium |
| 21-1 | 3 | 3 | 3 | 3 | 1 | 1 | 3 | 1 | 1 | 3 | 1 | 1 | 1 | 1 | 1 | 27 | Medium |
| 21-2 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 3 | 1 | 1 | 27 | Medium |
| 21-3 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 3 | 1 | 1 | 27 | Medium |
| 22-1 | 3 | 3 | 3 | 3 | 3 | 1 | 3 | 1 | 1 | 3 | 3 | 1 | 1 | 3 | 3 | 35 | High |
| 22-2 | 3 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 3 | 1 | 1 | 29 | Medium |
| 22-3 | 3 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 0 | 3 | 3 | 1 | 3 | 3 | 3 | 34 | High |
| 22-4 | 3 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 0 | 3 | 3 | 1 | 3 | 3 | 3 | 34 | High |
| 22-5 | 3 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 0 | 3 | 3 | 1 | 3 | 3 | 3 | 34 | High |
| 22-6 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 3 | 1 | 1 | 27 | Medium |
| 22-7 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 3 | 1 | 3 | 1 | 1 | 29 | Medium |
| 22-8 | 3 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 3 | 3 | 1 | 3 | 3 | 3 | 35 | High |
| 22-9 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 3 | 3 | 1 | 29 | Medium |
| 23-1 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 3 | 1 | 1 | 27 | Medium |
| 23-2 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 3 | 1 | 1 | 27 | Medium |
| 23-3 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 3 | 1 | 1 | 27 | Medium |
| 23-4 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 3 | 1 | 1 | 27 | Medium |
| 23-5 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 3 | 1 | 1 | 27 | Medium |
| 24-1 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 3 | 1 | 1 | 27 | Medium |
| 24-2 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 3 | 1 | 1 | 27 | Medium |
| 24-3 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 1 | 3 | 1 | 1 | 27 | Medium |
| 25-1 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 1 | 1 | 3 | 1 | 3 | 3 | 1 | 1 | 29 | Medium |
| 26-1 | 3 | 3 | 3 | 3 | 3 | 1 | 3 | 1 | 3 | 1 | 3 | 3 | 3 | 3 | 3 | 39 | High |
| 26-2 | 3 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 3 | 1 | 3 | 3 | 1 | 1 | 3 | 33 | High |
| 26-3 | 3 | 3 | 3 | 3 | 3 | 1 | 3 | 1 | 3 | 1 | 3 | 3 | 3 | 1 | 3 | 37 | High |
| 26-4 | 3 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 3 | 1 | 3 | 3 | 3 | 1 | 3 | 35 | High |
| 26-5 | 3 | 3 | 3 | 3 | 3 | 1 | 1 | 1 | 3 | 1 | 3 | 3 | 3 | 1 | 3 | 35 | High |
| 26-6 | 3 | 3 | 3 | 3 | 3 | 1 | 3 | 1 | 3 | 1 | 3 | 3 | 3 | 3 | 1 | 37 | High |

## 19.6 MITIGATION ACTION CATEGORIZATION

The mitigation actions identified cover a broad range of action types and address each of the identified hazards (Table 19-6). The action types are described below.

### 19.6.1 Prevention

These activities are intended to keep hazard problems from getting worse and are typically administered through plans, programs or regulatory actions that influence the way land is developed and assets are built. In the context of this plan, these measures also include security initiatives. Planning and regulatory measures are particularly effective in reducing an area's future vulnerability, especially in places where development has not occurred, or capital improvements have not been substantial.

### 19.6.2 Property Protection

These activities involve the modification of existing buildings, assets, structures and infrastructure to help them better withstand the forces of a hazard, or removal of the structures from hazardous locations.

### 19.6.3 Public Education and Awareness

Public education and awareness activities are used to advise residents, elected officials, business owners, potential property buyers, and visitors about hazards, hazardous areas, and mitigation techniques they can use to protect themselves and their property.

### 19.6.4 Natural Resource Protection

Natural resource protection activities reduce the impact of natural hazards by preserving or restoring natural areas and their protective functions. Such areas include floodplains, wetlands, and steep slopes.

### 19.6.5 Emergency Services

Although not typically considered a "mitigation" technique, emergency service activities do minimize the impact of a hazard event on people and property. These commonly are actions taken immediately prior to, during, or in response to a hazard event.

### 19.6.6 Structural Projects

Structural mitigation activities are intended to lessen the impact of a hazard by modifying the environmental natural progression of the hazard event through construction. They are usually designed by engineers and managed or maintained by jurisdiction staff.

### 19.6.7 Climate Resiliency

Climate resiliency actions incorporate methods to mitigate or adapt to the impacts of the changing climate.

### 19.6.8 Community Capacity Building

These actions increase local capabilities to adjust to potential damage, to take advantage of opportunities, or to respond to consequences of hazards.

Table 19-6. Mitigation Action Classification

| Action | Mitigation Classification | | | | | | | | | Hazards Addressed | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Prevention | Property Protection | Public Education and Awareness | Natural Resource Protection | Emergency Services | Structural Projects | Climate Resiliency | Community Capacity Building | Dam Failure | Drought | Earthquake | Flood | Landslide | Sea-Level Rise | Severe Weather – Extreme Heat | Severe Weather – High Wind | Tsunami/Seiche | Wildfire |
| 1-1. Prioritize hazard preparedness and mitigation funding for communities identified in the General Plan and LHMP as Equity Priority Communities with vulnerability. | X | | X | | | | | X | X | X | X | X | X | X | X | X | X | X |
| 1-2. Prioritize mitigation and emergency preparedness services for communities identified in the General Plan and LHMP as Equity Priority Communities with vulnerability. | X | | X | | | | | X | X | X | X | X | X | X | X | X | X | X |
| 2-1. Mitigation and preparedness services will be compliant with ADA, Section 504, Section 508 requirements, and any applicable accessibility policies & laws. | X | | X | | | | | X | X | X | X | X | X | X | X | X | X | X |
| 2-2. Advocate for the inclusion of considerations for individuals with AFN in planning efforts from other agencies in which Oakland staff participate. Connect planning efforts with city-affiliated groups. | X | | X | | | | | X | X | X | X | X | X | X | X | X | X | X |
| 2-3. Identify and build relationships with local organizations and agencies serving individuals with AFN. Build relationships with other agencies to connect with these organizations to better plan for their needs during a natural hazard event. | X | | X | | | | | X | X | X | X | X | X | X | X | X | X | X |
| 3-1. Strengthen partnerships with community-based organizations, faith-based groups, and the private sector to support mitigation outreach and implementation. | X | | X | | | | | X | X | X | X | X | X | X | X | X | X | X |
| 3-2. Develop multilingual hazard awareness campaign including campaign materials for populations facing higher risk, including specific content to meet the needs of individuals with AFN. Involve these communities in providing input to ensure the campaign's accessibility and cultural competency. | X | | X | | X | | | X | X | X | X | X | X | X | X | X | X | X |

| Action | Mitigation Classification | | | | | | | | | Hazards Addressed | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Prevention | Property Protection | Public Education and Awareness | Natural Resource Protection | Emergency Services | Structural Projects | Climate Resiliency | Community Capacity Building | Dam Failure | Drought | Earthquake | Flood | Landslide | Sea-Level Rise | Severe Weather – Extreme Heat | Severe Weather – High Wind | Tsunami/Seiche | Wildfire |
| 3-3. Embed mitigation and preparedness messaging into programs that already serve equity priorities communities and individuals with AFN (e.g., clinics, food banks, youth programs). | X | | X | | X | | | X | X | X | X | X | X | X | X | X | X | X |
| 3-4. Develop an Online 'Know Your Risk' + Equity Map: Create a web tool where residents can view hazards alongside indicators of social vulnerability and find tailored mitigation resources. | X | | X | | X | | | X | X | X | X | X | X | X | X | X | X | X |
| 3-5. Develop community engagement campaign to expand participation in AC Alert programs, hazard mitigation planning and the identification of mitigation projects. | X | | X | | | | | X | X | | X | X | X | | X | X | X | X |
| 4-1. Facilitate resilience improvements in City facilities to reliably serve as resilience hubs or places of respite during hazard events. | X | X | X | | X | X | | | X | | X | X | X | | X | X | X | X |
| 4-2. Prioritize investment in City facilities that might be used as respite centers or emergency related support for retrofit and safety improvements. | X | X | X | | X | X | | | X | | X | X | X | | X | X | X | X |
| 4-3. Develop public communication methods to inform about City resources available in the event of a hazard. | X | X | X | | X | | | X | X | X | X | X | X | X | X | X | X | X |
| 5-1. Continue to seek funding to revive Housing Preservation Services programs supporting seismic retrofits of high-risk housing units in Equity Priority Communities. This includes two pending applications for Hazard Mitigation Grant Program (HMGP) funding from FEMA and Cal OES to re-open the Safer Housing for Oakland Program (SHOP): Soft Story Apartment Retrofit Program, providing financial assistance to property owners with buildings subject to Oakland's Mandatory Soft Story Retrofit Program. | X | X | | | | X | | | | | X | | | | | | | |

| Action | Mitigation Classification | | | | | | | | | Hazards Addressed | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Prevention | Property Protection | Public Education and Awareness | Natural Resource Protection | Emergency Services | Structural Projects | Climate Resiliency | Community Capacity Building | Dam Failure | Drought | Earthquake | Flood | Landslide | Sea-Level Rise | Severe Weather – Extreme Heat | Severe Weather – High Wind | Tsunami/Seiche | Wildfire |
| 5-2. Educate low-income homeowners seeking rehabilitation loans about the purpose and availability of publicly funded seismic retrofit assistance programs, such as the Earthquake Brace + Bolt (EBB) and Earthquake Soft-Story (ESS) programs funded by the State of California/ California Earthquake Authority. (Funding note: Also HCD has loans for retrofitting loans for individual with disability for home modification improvements – Access Improvement Program. At the state level, California's Low-Income Housing Tax Credit (LIHTC) program.) | X | X | X | | | X | | | | | X | | | | | | | |
| 6-1. Fast track / streamline permitting process with prioritization for Equity Priority Communities and individuals with AFN. | X | X | X | | | X | | X | | | X | X | X | | | X | X | X |
| 6-2. Consider adoption of a disaster reconstruction overlay zone. As part of this action, re-evaluate all development scenarios and requirements following a hazard event such as a wildfire, landslide, flood, earthquake; explore funding sources and create a low-interest construction loan program for income-qualified owners who are recovering from a disaster. | X | X | | | | X | | X | | | X | X | X | | | X | | X |
| 6-3. Consider an ordinance requiring installation and periodic inspection and maintenance of gas shut-off valves in existing buildings at the time of sale, transfer of title, and when upgrades are planned for gas piping to minimize the risk of post-earthquake fires due to gas pipeline ruptures. | X | X | | | | | | X | | | X | | | | | X | | X |
| 7-1. In areas vulnerable to contaminated groundwater rise, study the compounding impacts of sea level rise in groundwater threats in areas with hazardous facilities and Equity Priority Communities. Coordinate with adjacent jurisdictions as appropriate to develop a Shallow Groundwater Rise Vulnerability assessment to establish a detailed | X | X | X | | | | | | | | | | | X | | | | |

| Action | Mitigation Classification | | | | | | | | | Hazards Addressed | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Prevention | Property Protection | Public Education and Awareness | Natural Resource Protection | Emergency Services | Structural Projects | Climate Resiliency | Community Capacity Building | Dam Failure | Drought | Earthquake | Flood | Landslide | Sea-Level Rise | Severe Weather – Extreme Heat | Severe Weather – High Wind | Tsunami/Seiche | Wildfire |
| understanding of the effects of rising shallow groundwater on people, the built environment, and water supply. | | | | | | | | | | | | | | | | | | |
| 7-2. Evaluate densities where slopes are at the greatest risk for landslides and consider reducing current permitted development densities and intensities by 2028. | X | X | | | | X | | X | | | | | X | | | | | |
| 8-1. Develop the Regional Shoreline Adaptation Plan | X | | X | X | | | X | | | | | | | X | | | | |
| 8-2. Sea-Level Rise Vulnerability and Assessment Improvement Plan - The Port of Oakland's Sea-Level Rise Vulnerability and Assessment Improvement Plan will assess the potential effects of sea-level rise on maritime facilities. The study will evaluate facilities Port-wide for sea-level rise vulnerability and develop an implementation plan for near-term and long-term strategies to address potential impacts. The study will analyze the need for infrastructure such as sea walls, wharf improvements, and changes in port operations. In addition, the study will help establish design standards. | X | X | | | | X | X | | | | | | | X | | | | |
| 9-1. Study compounding impact of sea level rise on groundwater threats in areas with hazardous facilities. Coordinate with adjacent jurisdictions as appropriate to create a Shallow Groundwater Rise Vulnerability Assessment to establish a detailed understanding of the effects of rising shallow groundwater on people, the built environment, and water supply. This includes buoyancy, seepage, infiltration, liquefaction, corrosion, and contaminant mobilization hazards. The assessment should have an interactive map component that will be updated based on site-specific geotechnical and topographic data submitted by new developments. Continue to comply with performance standards pursuant to the | X | | | X | | | X | X | | | | | | X | | | | |

| Action | Mitigation Classification | | | | | | | | | Hazards Addressed | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Prevention | Property Protection | Public Education and Awareness | Natural Resource Protection | Emergency Services | Structural Projects | Climate Resiliency | Community Capacity Building | Dam Failure | Drought | Earthquake | Flood | Landslide | Sea-Level Rise | Severe Weather – Extreme Heat | Severe Weather – High Wind | Tsunami/Seiche | Wildfire |
| National Pollutant Discharge Elimination System municipal stormwater permit | | | | | | | | | | | | | | | | | | |
| 10-1. Work with PG&E to implement pilot projects under SB 1221 to identify and eliminate natural gas infrastructure through electrification of homes and businesses, prioritizing those with the potential to result in branch line decommissioning of natural gas piping. | | X | | | | | | | | | X | | X | | | X | | X |
| 10-2. Work with public agency partners to provide safety and security information regarding the emergency use of diesel and gasoline powered generators | X | X | X | | | | | X | X | | X | X | X | | | X | | X |
| 10-3. Promote the widespread use of carbon monoxide detectors in homes and businesses, including through the donation and giveaway programs of carbon monoxide detectors | | | X | | | | | X | | | | | | | | | | X |
| 11-1. The program will be implemented by contacting owners of the remaining subject buildings that that have not yet completed the required retrofit. This is a discrete list, but these types of buildings tend to be in lower income areas of Oakland. The initial focus will be on Opportunity Zones and other priority areas of need. | | | X | | | | | | | | X | | | | | | | |
| 12-1. Expand on existing strategies to reach low-income, historically hard to reach and non-English speaking populations and individuals with AFN through translated materials, earned media, and strategic engagement planning | | | X | | | | | X | | | | | | | | | | X |
| 12-2. Introduce Firewise program to Equity Priority Communities in the WUI to reduce wildfire risk through resident-led action, education, and collaboration with local fire agencies, focusing on creating defensible space, hardening homes, and developing preparedness plans to become more resilient to wildfires criteria | X | | X | | X | | | X | | | | | | | | | | X |

| Action | Mitigation Classification | | | | | | | | | Hazards Addressed | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Prevention | Property Protection | Public Education and Awareness | Natural Resource Protection | Emergency Services | Structural Projects | Climate Resiliency | Community Capacity Building | Dam Failure | Drought | Earthquake | Flood | Landslide | Sea-Level Rise | Severe Weather – Extreme Heat | Severe Weather – High Wind | Tsunami/Seiche | Wildfire |
| 12-3. Monitoring grant opportunities for the City of Oakland to increase fire safe and fuel mitigation efforts, and expand emergency preparedness . | X | | | | X | | | X | | | | | | | | | | X |
| 13-1. Full implementation of the 10 year Vegetation Management Plan to cover more than 1,400 acres of City property plus treatment areas approximately 300 miles of roadside using heavy equipment, hands crews and goats. | | | | X | X | | | X | | | | | | | | | | X |
| 13-2. Collaborate with CAL FIRE, EBRPD, Oakland Firesafe Council Friends of Joaquin Miller, Friends of Sausal Creek, Firewise Communities to align fire prevention, fuel mitigation and public awareness campaigns to strengthen preparedness, prevention and resiliency strategies | | | | X | X | | | X | | | | | | | | | | X |
| 14-1. The Vegetation Management Unit of the Oakland Fire Department inspects properties in the Oakland Hills, much of which is designated as a Very High Fire Hazard Severity Zone (VHFHSZ). The VMU works under the Oakland Fire Department's Fire Prevention Bureau. The VMU is responsible for the inspections of around 25,000 parcels in the VHFHSZ. The purpose of these inspections is to identify and mitigate hazards that could contribute to the spread, growth, and intensity of wildfire. Inspections are done annually, and property owners are required to actively maintain their parcels in a fire-safe condition year-round. | | | | X | X | | | X | | | | | | | | | | X |
| 14-2. Continue to deploy one of the largest herds of goats in CA to mitigate low lying and dry vegetation on roadside and in City open space. | | | | X | X | | | X | | | | | | | | | | X |
| 15-1. Continue to provide fire safety and public education efforts related to requirements for development, property maintenance, and emergency preparedness in the VHFHSZ and | X | X | X | | X | | | X | | | | | | | | | | X |

| Action | Mitigation Classification | | | | | | | | | Hazards Addressed | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Prevention | Property Protection | Public Education and Awareness | Natural Resource Protection | Emergency Services | Structural Projects | Climate Resiliency | Community Capacity Building | Dam Failure | Drought | Earthquake | Flood | Landslide | Sea-Level Rise | Severe Weather – Extreme Heat | Severe Weather – High Wind | Tsunami/Seiche | Wildfire |
| prioritize the most vulnerable populations in these areas. | | | | | | | | | | | | | | | | | | |
| 16-1. Prune all trees in the public right of way on regular 7-year intervals, as described in the 2024 Oakland Urban Forest Plan, to address preventable whole tree and branch failures during wind and wind/rain events. | X | X | | X | X | | | X | | | | | | | | X | | |
| 16-2. Implement the awarded USDA Forest Service Inflation Reduction Act funding to begin routine pruning in Oakland's highest-priority census tracts per the OakDOT Geographic Equity Toolbox. | X | X | | X | X | | | X | | | | | | | | X | | |
| 16-3. Identify additional funding sources to regularly prune trees in the rest of Oakland, with work focusing on census tracts based on priority level identified in the Geographic Equity Toolbox. | X | X | | X | X | | | X | | | | | | | | X | | |
| 17-1. Identify feasible, equitable (using the CIP prioritization system), and cost-effective stormwater infrastructure projects that would increase system capacity, have been identified in the City's capital improvement program and/or Storm Drainage Master Plan, that and would be good target projects for which to pursue funding under applicable local, state, and federal grant programs. | X | X | X | X | | X | X | | | | | X | | | | | | |
| 17-2. Conduct equitable outreach and engagement as we implement all CIP Storm Drainage projects. | | | X | | | X | | | | | | X | | | | | | |
| 17-3. Leverage funding opportunities that may be available through government grants or projects conducted by DOT. | | | | | | | | X | | | | X | | | | | | |
| 17-4. Tree Planning. Implement the component of the City's Storm Drain Master Plan that looks to quantify the stormwater capture and pollutant removal benefit of tree planting and modeling where in the city stormwater runoff reduction could be achieved through increased tree canopy. | | | | X | | | | X | | | | X | | | | | | |

| Action | Mitigation Classification | | | | | | | | | Hazards Addressed | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Prevention | Property Protection | Public Education and Awareness | Natural Resource Protection | Emergency Services | Structural Projects | Climate Resiliency | Community Capacity Building | Dam Failure | Drought | Earthquake | Flood | Landslide | Sea-Level Rise | Severe Weather – Extreme Heat | Severe Weather – High Wind | Tsunami/Seiche | Wildfire |
| Coordinate with Tree Services Division to make sure it corresponds to the Urban Forestry Master Plan. | | | | | | | | | | | | | | | | | | |
| 18-1. The City will continue to implement its Green Stormwater Infrastructure (GSI) Plan to include GSI where required by the Municipal Regional Stormwater Permit and where feasible. Examples include bioretention areas, engineered tree well filters, green roofs, flow-through planters, and permeable pavement. | | | | | | | | | | | | X | | | | | | |
| 18-2. Encourage developers to include green infrastructure practices. | | | | X | | | | X | | | | X | | | | | | |
| 19-1. Continue to maintain the City's good standing and compliance under the NFIP through:<br>• Enforce the City's flood damage prevention ordnance<br>• Update the City's flood damage prevention ordinance to ensure compliance with state and federal requirements | | | | | | | | X | | | | X | | | | | | |
| 19-2. Participate in floodplain and mapping updates and advocate for accuracy in updated maps based on locally documented conditions. | | | | | | | | X | | | | X | | | | | | |
| 19-3. Build community knowledge of floodplain concerns and revised floodplain mapping in an inclusive manner. Provide public assistance/information on floodplain requirements and impacts. | | | | | | | | X | | | | X | | | | | | |
| 20-1. Complete CRS assessment and determine City of Oakland readiness for participation. | | | | | | | | X | | | | X | | | | | | |
| 21-1. Identify feasible, equitable (using the CIP prioritization system), and cost-effective stormwater infrastructure projects that would increase system capacity, have been identified in the City's capital improvement program and/or Storm Drainage Master Plan, that and would be good target projects | | | | X | | X | | | | | | X | | | | | | |

| Action | Mitigation Classification | | | | | | | | | Hazards Addressed | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Prevention | Property Protection | Public Education and Awareness | Natural Resource Protection | Emergency Services | Structural Projects | Climate Resiliency | Community Capacity Building | Dam Failure | Drought | Earthquake | Flood | Landslide | Sea-Level Rise | Severe Weather – Extreme Heat | Severe Weather – High Wind | Tsunami/Seiche | Wildfire |
| for which to pursue funding under applicable local, state, and federal grant programs. | | | | | | | | | | | | | | | | | | |
| 21-2. Conduct equitable outreach and engagement as we implement all CIP Storm Drainage projects. | | X | X | | | X | | | | | | X | | | | | | |
| 21-3. Leverage funding opportunities that may be available through government grants or projects conducted by DOT and OPW. | | X | | | | X | | | | | | X | | | | | | |
| 22-1. Extend the service life of the City's sewer collection system. Complete 13-mile of sewer collection system rehabilitation annually to extend service life. Prioritize repairs based on risk factors and equity factors. | X | X | X | X | | X | X | | | | X | X | | | | | | |
| 22-2. Enhance social equity by implementing sewer system improvement project with high CIP scores focusing on underserved communities. | X | X | X | | | | | X | | | X | X | | | | | | |
| 22-3. Complete 50-mile sewer pipelines with root control treatment to improve sewage conveyance annually | X | X | | X | | | | | | | X | X | | | | | | |
| 22-4. Partner with Alameda County Health Department for Fat/Oil/Grease (FOG) enforcement and outreach focusing on Food Service Establishments and high FOG contributors | X | X | X | X | | | | | | | | X | | | | | | |
| 22-5. Continue to send abatement notices to property owners with private sewer lateral defects | | X | X | | | | | | | | X | X | | | | | | |
| 22-6. Engage communities by sending out project notices and/or flyers prior and during project implementation to households and businesses in the targeted areas. | X | X | X | | | | | X | | | X | X | | | | | | |
| 22-7. Faster project delivery by eliminating project barriers to expedite project implementation, including but not limited to, contractor outreach, enhanced contracting process, onsite support/enforcement. | X | X | X | | | X | | X | | | X | X | | | | | | |
| 22-8. Equitable access by providing guidance to property owners on sewer lateral corrections | X | X | X | X | | | | | | | X | X | | | | | | |

| Action | Mitigation Classification | | | | | | | | | Hazards Addressed | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Prevention | Property Protection | Public Education and Awareness | Natural Resource Protection | Emergency Services | Structural Projects | Climate Resiliency | Community Capacity Building | Dam Failure | Drought | Earthquake | Flood | Landslide | Sea-Level Rise | Severe Weather – Extreme Heat | Severe Weather – High Wind | Tsunami/Seiche | Wildfire |
| 22-9. For major capital sanitary sewer subbasin projects, the City will continue to replace private lower laterals where applicable within the City right-of-way where the sewer main is replaced. | X | X | | | | X | | | | | X | X | | | | | | |
| 23-1. Enhance social equity by implementing sewer system improvement project with high CIP scores focusing on underserved communities. | | X | | | | X | | | | | X | X | | | | | | |
| 23-2. Engage communities by sending out project notices and/or flyers prior and during project implementation to households and businesses in the targeted areas. | | | X | | | | | X | | | X | X | | | | | | |
| 23-3. Faster project delivery by eliminating project barriers to expedite project implementation, including but not limited to, contractor outreach, enhanced contracting process, onsite support/enforcement | | | X | | | | | X | | | X | X | | | | | | |
| 23-4. Send abatement notices to property owners with private sewer lateral defects. Provide equitable access by providing guidance to property owners on sewer lateral corrections | | X | X | | | | | | | | X | X | | | | | | |
| 23-5. For major capital sanitary sewer subbasin projects, the City will continue to replace private lower laterals where applicable within the City right-of-way where the sewer main is replaced. | | X | | | | X | | | | | X | X | | | | | | |
| 24-1. Develop the annual IPP Work Plan that lists priority preparedness activities, responsible departments, milestones, and supports implementation of relevant LHMP mitigation actions. | X | | | | X | | | X | X | | X | X | X | | X | X | X | X |
| 24-2. Conduct an Annual Integrated Preparedness Planning Workshop (IPPW)with internal and external partners to review opportunities for capacity and capability improvements for risk reduction and update the multi-year IPP schedule. | X | | X | | X | | | X | X | | X | X | X | | X | X | X | X |

| Action | Mitigation Classification | | | | | | | | | Hazards Addressed | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Prevention | Property Protection | Public Education and Awareness | Natural Resource Protection | Emergency Services | Structural Projects | Climate Resiliency | Community Capacity Building | Dam Failure | Drought | Earthquake | Flood | Landslide | Sea-Level Rise | Severe Weather – Extreme Heat | Severe Weather – High Wind | Tsunami/Seiche | Wildfire |
| 24-3. Maintain a Multi-Year Preparedness Calendar of trainings, exercises, plan updates, outreach events, and major projects. | | | X | | | | | X | X | | X | X | X | | X | X | X | X |
| 25-1. Each City department will submit Continuity of Operations Plans (COOPs) to the Emergency Management Services Division of OFD on an annual basis. Each department will keep these plans current by submitting revisions as needed. | X | | | | X | | | X | X | X | X | X | X | X | X | X | X | X |
| 26-1. Wharf Seismic and Structural Resilience Upgrade- Implement a comprehensive Wharf Repair and Upgrade Project to enhance resilience against earthquakes and severe storm conditions. The project will include:<br>• Seismic Upgrades: Strengthen wharf structures to withstand ground shaking and minimize catastrophic damage during major earthquakes.<br>• Structural Enhancements: Improve load distribution, reinforce critical connections, and repair or replace deteriorated piles to restore vertical and lateral support.<br>• Concrete Rehabilitation: Remove delaminated concrete, install corrosion-resistant reinforcement, and place new concrete to restore deck integrity and reduce maintenance needs. | | X | | | X | X | X | X | | | X | | | | | | | |
| 26-2. Maritime Area Seismic Monitors - The Port of Oakland's Seaport terminals are generally constructed of pile-supported wharf structures with riprap bulkheads retaining soil at the back of the terminals. The Port proposes to implement additional seismic monitoring equipment at Berths 23–26 and Berths 57–58, as well as repair existing equipment at Berths 35–37. Port personnel have identified difficulty in assessing potential damage to | X | X | | | | X | | | | | X | | | | | | | |

| Action | Mitigation Classification | | | | | | | | | Hazards Addressed | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Prevention | Property Protection | Public Education and Awareness | Natural Resource Protection | Emergency Services | Structural Projects | Climate Resiliency | Community Capacity Building | Dam Failure | Drought | Earthquake | Flood | Landslide | Sea-Level Rise | Severe Weather – Extreme Heat | Severe Weather – High Wind | Tsunami/Seiche | Wildfire |
| terminals after a major earthquake due to limited functioning seismic monitoring equipment. The proposed installations will fill gaps in the current monitoring system by providing a more complete picture at Inner Harbor, Middle Harbor, and Outer Harbor locations. This will allow engineers to focus on inspections of areas most susceptible to damage and proceed with repairs to resume operations quickly. | | | | | | | | | | | | | | | | | | |
| 26-3. North Field Flood Protection Study and Adaptation Plan - Building on the 2023 North Field Vulnerability Study, the Port of Oakland will lead a comprehensive analysis to:<br>• Confirm design of flood elevations and critical infrastructure vulnerabilities.<br>• Assess wetlands, culverts, and drainage systems.<br>• Identify near-term flood protection measures and phased adaptation strategies.<br>• Develop coordination protocols with Caltrans, East Bay Regional Park District, City of Alameda, and other stakeholders | X | X | | | | X | | | | | | X | | | | | | |
| 26-4. Old Earhart Road Floodwall Improvement - Based on the 2023 North Field Vulnerability Study, the Port of Oakland will implement a localized flood protection project at Old Earhart Road. The project will:<br>• Raise Old Earhart Road to connect two existing high points on the north side of North Field.<br>• Construct two short floodwalls totaling approximately 530 feet to close gaps and create a continuous barrier. | X | X | | | | X | | | | | | X | | | | | | |

| Action | Mitigation Classification | | | | | | | | | Hazards Addressed | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Prevention | Property Protection | Public Education and Awareness | Natural Resource Protection | Emergency Services | Structural Projects | Climate Resiliency | Community Capacity Building | Dam Failure | Drought | Earthquake | Flood | Landslide | Sea-Level Rise | Severe Weather – Extreme Heat | Severe Weather – High Wind | Tsunami/Seiche | Wildfire |
| • Reduce flood risk for critical airport infrastructure and maintain operational continuity during extreme weather and sea level rise events. | | | | | | | | | | | | | | | | | | |
| 26-5. Modernize Port Energy Infrastructure for Resilience and Reliability - Port Public Power will strengthen energy resilience by modernizing the Port's electrical infrastructure and planning for future grid demands. This action includes:<br>• Conducting a comprehensive assessment of existing systems<br>• Identifying critical upgrades<br>• Integrating advanced technologies to support full-scale electrification<br>• Over the next decade, the Port will implement renewable generation projects, battery storage systems, and smart grid solutions to:<br>• Enhance operational flexibility<br>• Reduce greenhouse gas emissions<br>• Provide uninterrupted service to critical facilities during hazard events | X | X | | | | X | X | | | | X | X | | X | X | X | X | |

| Action | Mitigation Classification | | | | | | | | | Hazards Addressed | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Prevention | Property Protection | Public Education and Awareness | Natural Resource Protection | Emergency Services | Structural Projects | Climate Resiliency | Community Capacity Building | Dam Failure | Drought | Earthquake | Flood | Landslide | Sea-Level Rise | Severe Weather – Extreme Heat | Severe Weather – High Wind | Tsunami/Seiche | Wildfire |
| 26-6. Maritime Terminal Study on Liquefaction Potential - The Port of Oakland is located in a geographic area highly prone to liquefaction and, as a result, infrastructure damage from seismic activity. To mitigate risk and prepare for imminent seismic events, the Port will conduct a comprehensive liquefaction study at its marine terminals. This study will evaluate liquefaction potential throughout the terminals and its effects on Port infrastructure. It will identify areas and facilities most at risk and outline a plan for mitigation, retrofit, and emergency response. | X | X | | | | X | | | | | X | | | | | | | |

# Part 4 - Maintaining the Plan

# 20. PLAN ADOPTION, IMPLEMENTATION & MAINTENANCE

## 20.1 PLAN ADOPTION

**Local Plan Requirement F1 – 44 CFR Part 201.6(c)(5)**

***The plan shall include documentation that the plan has been formally adopted by the governing body of the jurisdiction requesting approval of the plan.***

Disaster Mitigation Act compliance and its benefits can only be achieved after the LHMP is adopted. This plan was submitted for review to Cal OES and FEMA Region 9. The Oakland City Council formally adopted the LHMP. Copies of the FEMA approval and the adoption resolution by the City are provided in Appendix E.

## 20.2 INTEGRATING THE PLAN

**Local Plan Requirement D3 – 44 CFR Part 201.6(c)(4)(ii)**

***The plan maintenance process shall include a process by which local governments incorporate the requirements of the mitigation plan into other planning mechanisms such as comprehensive or capital improvement plans, when appropriate.***

The City of Oakland will integrate the LHMP into relevant planning documents, processes, or mechanisms, such as strategic planning initiatives, general plans, local capital improvement plans, stormwater plans, emergency operation plans, and other future plans when it is feasible.

The City of Oakland's Emergency Management Services Division (EMSD) Manager and the Planning & Building Department will have co-lead responsibility for overseeing the plan implementation and maintenance strategy. Plan implementation and evaluation will be a shared responsibility among all agencies identified as lead agencies in the mitigation action plan.

Opportunities to integrate the requirements of this plan into other planning mechanisms will continue to be identified through future planning efforts. The City outlined the following mechanisms underway and under consideration:

- Ensuring that the goals, objectives, and mitigation actions of new and updated local planning documents are consistent, or do not conflict with, the goals and actions of the hazard mitigation plan, and will not contribute to increased hazard vulnerability in the planning area.
- Integration of the hazard mitigation plan will be considered on a case-by-case basis and identified at the onset of plan development.
- Integration of the hazard mitigation plan into the capital improvement program scoring criteria (e.g., does the project advance mitigation) will be implemented if deemed feasible.

## 20.3 IMPLEMENTING THE HAZARD MITIGATION PLAN THROUGH EXISTING PROGRAMS

It is the intent of the City of Oakland to fully integrate the Hazard Mitigation Plan into existing plans and programs, such as comprehensive land-use planning processes, capital improvement planning, and building enforcement implementation. The hazard mitigation plan's format allows sections to be reviewed and updated as new data becomes available, resulting in a plan that remains current and relevant.

The City of Oakland, through adoption of a General Plan and zoning ordinance, has planned for the impact of natural hazards. The process of updating this hazard mitigation plan provided the opportunity to review and expand policies in these planning mechanisms. The information on hazard, risk, vulnerability, and mitigation contained in this hazard mitigation plan is based on the best science and technology available at the time this plan was prepared. The General Plan and the hazard mitigation plan are complementary documents that work together to achieve the goal of reducing risk exposure. The General Plan is an integral part of this plan. An update to the General Plan may trigger an update to the hazard mitigation plan.

The City of Oakland will create a linkage between the hazard mitigation plan and the General Plan by identifying a mitigation action as such. As information becomes available from other planning mechanisms that can enhance this plan, that information will be integrated via the update process.

Planning processes and programs to be coordinated with the recommendations of the hazard mitigation plan include the following:

- City of Oakland General Plan
- Climate action plans
- Resilience plans
- Recovery plan
- Emergency response plans
- Capital improvement programs
- Municipal codes
- Community design guidelines
- Water-efficient landscape design guidelines
- Stormwater management programs
- Water system vulnerability assessments
- Master fire protection plans
- ADA transition plans

Many action items do not need to be implemented through regulation. Instead, these items can be implemented through the creation of new educational programs, continued interagency coordination, or improved public participation.

## 20.4 MONITORING THE PLAN

**Local Plan Requirement D2 – 44 CFR Part 201.6(c)(4)(i)**

***The plan shall include a plan maintenance process that includes a section describing the method and schedule of monitoring, evaluating and updating the mitigation plan within a 5-year-cycle.***

Periodic revisions and updates of the LHMP are required to ensure that the goals and objectives of the LHMP are kept current, considering potential changes in hazard vulnerability and mitigation priorities. Revisions may be necessary to ensure that the LHMP is in full compliance with applicable federal and state regulations. Periodic monitoring and evaluation of the plan will also ensure that specific mitigation actions are being reviewed and carried out according to the mitigation action plan. Monitoring refers to tracking the implementation of the plan over time. Evaluating refers to assessing the overall effectiveness of the plan intent and goals.

EMSD will be the lead agency responsible for monitoring the plan by coordinating with departments to track the status of all recommended mitigation actions in the action plan. City Departments will report on this status on an annual basis.

The plan will be evaluated by how successfully the implementation of identified actions has helped to achieve the LHMP goals and objectives. This will be assessed by a review of the changes in risk that occur over the performance period and by the degree to which mitigation goals and objectives are incorporated into existing plans, policies, and programs. Plan evaluation will be the responsibility of EMSD.

Based on the plan evaluation, EMSD staff will work with responsible City Departments to prepare the LHMP Annual Progress Report identifying any actions completed, actions that should be removed from the action plan, and new actions to be incorporated into the plan. EMSD will also convene a LHMP Oversight Committee comprised of City staff of departments responsible for the completion of action items, with the possible addition of other stakeholders.

Upon its completion, the LHMP Annual Progress Report will be made available for public comment. The final report will be reviewed and approved by the LHMP Oversight Committee. The report will be posted to the hazard mitigation website, and changes to the action plan will represent an amendment to this hazard mitigation plan.

The LHMP Oversight Committee will meet annually, at a minimum, during the five-year performance period of the LHMP. This frequency of meetings will also assist in implementation, as meetings will be coordinated with the strategic planning process. A key agenda item will be to determine which actions are being implemented by departments across the City.

The annual meetings provide the LHMP Oversight Committee with an opportunity to perform the following:

- Review plan goals and objectives.
- Document hazard occurrences that occurred during the prior year and their impacts on the planning area.
- Document mitigation action implementation or status.
- Evaluate the mitigation actions that have been successful.
- Discuss why mitigation actions were not completed.
- Revise the action plan if new timelines need to be established for projects (e.g., changing a long-term project to a short-term project due to funding availability).
- Consider recommendations for new mitigation projects.
- Review City actions taken related to new funding options, .
- Document potential losses avoided due to the implementation of specific mitigation measures or other planning programs, if feasible.
- Identify any new or additional vulnerabilities that may be faced by the City and may need to be addressed in a future update of this plan.
- Update the hazard mapping and impact tool to reflect new or revised hazard data

Any findings or recommendations made during the annual review shall be documented in the LHMP Annual Progress Report. The LHMP Oversight Committee will meet following any disaster event warranting a reexamination of the mitigation actions being implemented or proposed for future implementation. This will ensure that the plan is continuously updated to reflect changing conditions and needs within the City.

## 20.5 PLAN EVALUATION AND PROGRESS REPORTING

The LHMP will be evaluated by how successfully the implementation of identified actions has helped to achieve the goals and objectives identified of the plan. This will be assessed by a review of the changes in risk that occur over the performance period and by the degree to which mitigation goals and objectives are incorporated into existing plans, policies, and programs. Plan evaluation will be coordinated by EMSD.

As described above, EMSD staff will prepare the LHMP Annual Progress Report. This report will identify actions completed, actions that should be removed from the action plan, and any new actions to be incorporated into the plan. A template for the annual progress report is provided in Appendix D. Upon completion, the report will be made available for public comment, and reviewed and approved by the LHMP Oversight Committee. Once reviewed and approved, the report will be posted to the hazard mitigation website, and changes to the action plan will represent an amendment to this LHMP.

## 20.6 GRANT MONITORING AND COORDINATION

The City of Oakland will identify grant funding opportunities. Once these opportunities are identified, City agency stakeholders will convene to review the hazard mitigation plan and pursue a strategy to capture that grant funding. The City Administrator's Office, through their grants coordinator or a similar position, will assume lead responsibility for planning and

facilitating grant opportunity meetings. Review of the hazard mitigation plan at these meetings can include the following:

- Discussion of any hazard events that occurred during the prior year and their impact on the planning area.
- Impact of potential grant opportunities on the implementation of mitigation actions.
- Re-evaluation of the action plans to determine if the timeline for identified actions needs to be amended (such as changing a long-term action to a short-term action because of funding availability).
- Recommendations for new actions.
- Impact of any other planning programs or actions that involve hazard mitigation.

## 20.7 ONGOING PUBLIC INVOLVEMENT

**Local Plan Requirement D1 – 44 CFR Part 201.6(c)(4)(iii)**

***The plan maintenance process shall include a discussion on how the community will continue public participation in the plan maintenance process.***

Public involvement procedures were reviewed as part of the 2026 LHMP development process. As described in Section 20.8, significant changes or amendments to the plan shall require an opportunity for public comment prior to any adoption procedures by the City of Oakland. In addition, the City will post information about hazard and risk assessment on the hazard mitigation planning webpage maintained by EMSD. The webpage will include updates and the most current version of the plan along with instructions on how the public can provide feedback.

https://www.oaklandca.gov/Public-Safety-Streets/Fire/EMSD/Emergency-Operations-Plan/Local-Hazard-Mitigation-Plan-LHMP

By keeping the plan available on the City website with an invitation and instructions on providing feedback, public awareness will be maintained on a continuous basis. Public comment opportunities will be provided during any process to revise or update the plan, prior to adoption. Other efforts to involve the public in the maintenance, monitoring, evaluation, and revision process will be made as necessary. These efforts may include the following:

- Posting the annual LHMP Progress Report for public comment, as a part of the LHMP plan maintenance.

Figure 20-1. LHMP Progress Report Posting on the City Website

- Utilizing available communication channels to update the public on any maintenance and/or periodic review activities taking place
- Sharing information about the LHMP as a part of community outreach, such as personal emergency preparedness workshops.
- Keeping a current version of the hazard mitigation plan on the City webpage

Additionally, continued public involvement will be accomplished through implementation of the following mitigation action (Section 19.4):

- 3-5. Develop community engagement campaign to expand participation in AC Alert programs, hazard mitigation planning and the identification of mitigation projects.

## 20.8 UPDATING THE PLAN

### 20.8.1 Five-Year Plan Review and Update

**Local Plan Requirement D2 – 44 CFR Part 201.6(c)(4)(i)**

***The plan maintenance process shall include a section describing the method and schedule of monitoring, evaluating, and updating the mitigation plan within a 5-year cycle.***

The LHMP will be thoroughly reviewed by City staff and stakeholders every five years in alignment with federal regulations. This update is used to determine whether there have been any significant changes in the planning area that may, in turn, necessitate changes in the goals, objectives or actions. New development in identified hazard areas, an increased exposure to hazards, an increase or decrease in capability to address hazards, and changes to federal or state legislation are examples of factors that may affect the necessary content of the plan.

At least 24 months prior to the 2026 LHMP plan expiring, EMSD and Planning & Building, will reconvene stakeholders and conduct a five-year review. Upon completion of the review and update/amendment process, the LHMP will be submitted to the State Hazard Mitigation Officer at Cal OES for a compliance review in accordance with 44 CFR 201. The plan will then be reviewed by FEMA Region 9. This updated LHMP must be adopted by City Council. Following a federal disaster declaration, the City of Oakland LHMP may be revised as necessary to reflect lessons learned, or to address specific issues and circumstances arising from the event. It will be the responsibility of EMSD to reconvene appropriate stakeholders to participate in the plan revision.

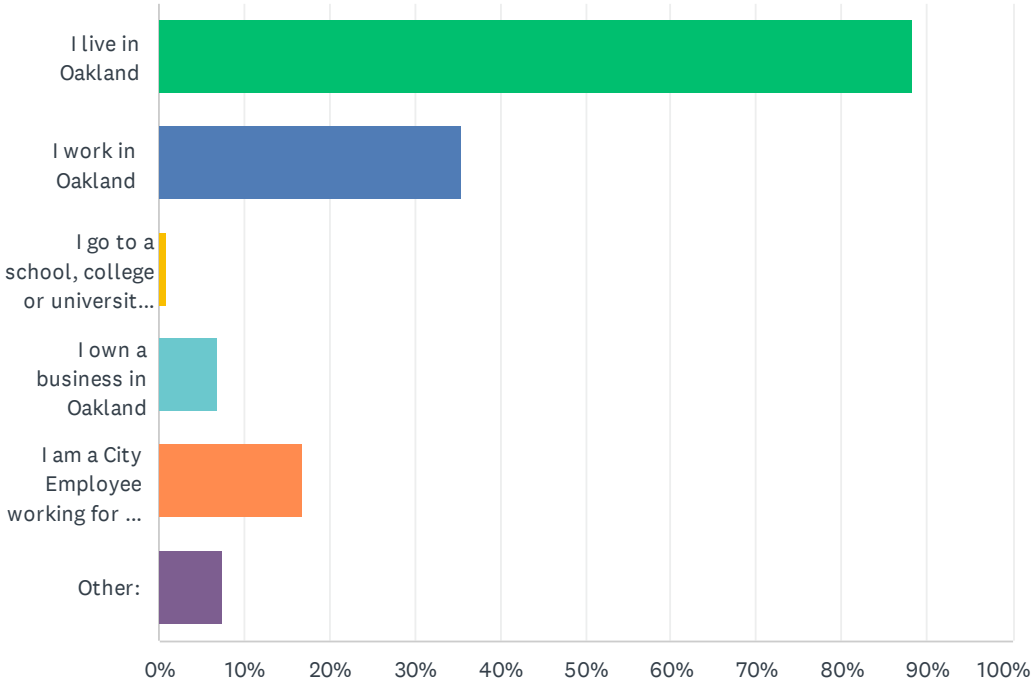
### 20.8.2 Plan Amendment Process

Unique circumstances, such as availability of critical data or an omission, may necessitate a plan amendment. Upon the initiation of the amendment process, the City will forward information on the proposed change(s) to all interested parties including, but not limited to, all directly affected departments, community stakeholders, and members of the public.

# Appendix A – Public Survey and Comment

# Q1 What is your relationship to Oakland? (Check all that apply)

Answered: 119 Skipped: 1




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| I live in Oakland | 88.24% | 105 |
| I work in Oakland | 35.29% | 42 |
| I go to a school, college or university in Oakland | 0.84% | 1 |
| I own a business in Oakland | 6.72% | 8 |
| I am a City Employee working for the City of Oakland | 16.81% | 20 |
| Other: | 7.56% | 9 |
| Total Respondents: 119 | | |

| # | OTHER: | DATE |
|---|---|---|
| 1 | Retired | 12/15/2025 4:45 PM |
| 2 | I am a volunteer with OFSC, ORCA member, and CERT | 11/19/2025 10:56 PM |
| 3 | All of my family and love when lives in Oakland so I'm there all the time | 10/31/2025 7:40 PM |
| 4 | My child goes to school on the Oakland/Emeryville border and extracurricular activities in West Oakland and Mills College area | 10/1/2025 2:41 PM |
| 5 | my hackerspace is in oakland | 10/1/2025 12:54 PM |
| 6 | I go to my Doctor,Dentist and senior center in Oak, | 9/30/2025 9:41 PM |
| 7 | Born and raised in Oakland | 9/30/2025 5:25 AM |

| | | |
|---|---|---|
| 8 | I work at a school in Oakland | 9/26/2025 1:50 PM |
| 9 | I am block captain in Oakland, have taken CERT in Oakland (CORE) and am working to start a business in Oakland. | 9/26/2025 11:21 AM |

# Q2 If you live in Oakland, please provide the street names of an intersection (where the streets cross) near your house. We use this to determine what specific neighborhoods are responding to the survey.

Answered: 107 Skipped: 13

| # | RESPONSES | DATE |
|---|---|---|
| 1 | Broadway Terracev& Swainland | 12/17/2025 10:23 AM |
| 2 | Colton and Snake | 12/17/2025 12:27 AM |
| 3 | Drake/Zinn | 12/16/2025 10:33 PM |
| 4 | El Centro & Dolores Ave | 12/16/2025 9:09 PM |
| 5 | Colton and Snake | 12/16/2025 2:39 PM |
| 6 | Rincon Drive and Drake Drive | 12/16/2025 1:54 PM |
| 7 | Zinn Dr. at Drake | 12/16/2025 1:28 PM |
| 8 | Colton and Asilomar | 12/16/2025 11:49 AM |
| 9 | Saroni Drive and Colton Ave | 12/16/2025 9:30 AM |
| 10 | Manzanita and Northwood court | 12/16/2025 8:24 AM |
| 11 | Drake Dr | 12/16/2025 8:07 AM |
| 12 | Darnby Drive and Chelton | 12/16/2025 7:55 AM |
| 13 | Chelsea Dr & Clive | 12/16/2025 1:52 AM |
| 14 | Saroni & Colton | 12/16/2025 1:41 AM |
| 15 | estates and lasalle | 12/16/2025 12:59 AM |
| 16 | Saroni and Colton | 12/16/2025 12:03 AM |
| 17 | Asilomar, Balboa | 12/15/2025 11:16 PM |
| 18 | Colton Blvd and Snake Blvd | 12/15/2025 10:44 PM |
| 19 | Thornhill X Pinehaven | 12/15/2025 9:27 PM |
| 20 | Colton Blvd./Snake Rd. | 12/15/2025 8:50 PM |
| 21 | Zinn Dr. and Drake | 12/15/2025 8:46 PM |
| 22 | Drake Ln at Drake Drive, 94611 | 12/15/2025 8:44 PM |
| 23 | Saroni Drive & Paso Robles & Heartwood | 12/15/2025 7:08 PM |
| 24 | Thornhill Dr and Woodhaven Way | 12/15/2025 5:33 PM |
| 25 | Colton and Asilomar Drive | 12/15/2025 5:33 PM |
| 26 | 2000 Asilomar Dr. /Balboa | 12/15/2025 5:07 PM |
| 27 | Thornhill x Pinehaven/Woodhaven | 12/15/2025 4:45 PM |
| 28 | Chestnut & 18th and 55th & Shattuck | 12/12/2025 5:38 PM |
| 29 | Swainland Rd between Fairlane and Fairlane | 12/10/2025 6:17 PM |
| 30 | Colton Blvd / Ridgewood Wy | 12/10/2025 6:09 PM |

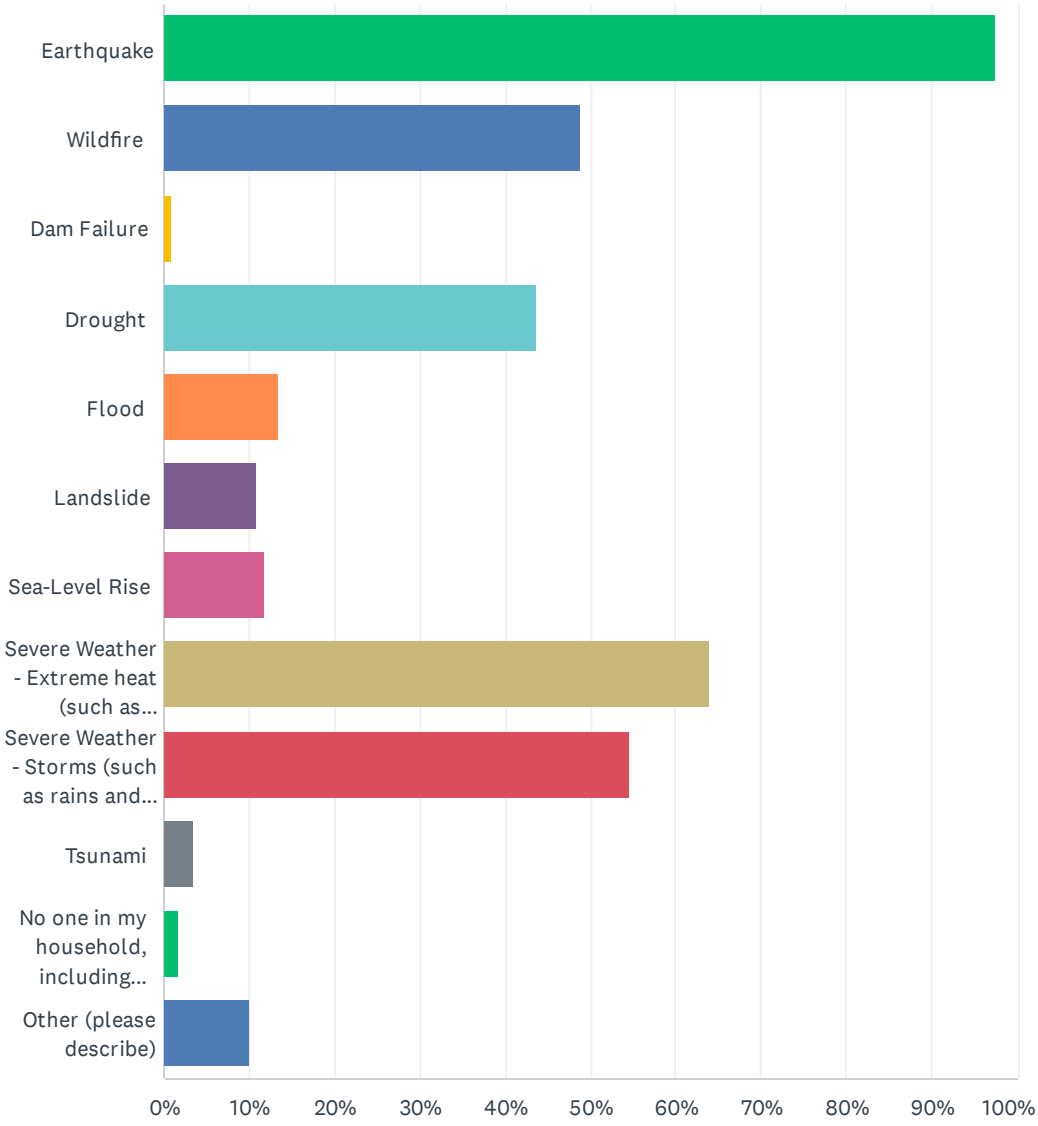
| | | |
|---|---|---|
| 31 | Asilomar Dr and Colton Blvd | 12/10/2025 6:05 PM |
| 32 | Girvin Dr and Thackeray | 12/10/2025 4:27 PM |
| 33 | Rockwell and Florio | 12/10/2025 3:34 PM |
| 34 | Paramount and Carlston | 12/10/2025 2:46 PM |
| 35 | Carson and Rienhardt | 12/10/2025 10:57 AM |
| 36 | 51st and Broadway | 12/1/2025 6:29 PM |
| 37 | 68th Ave and Macarthur Blvd | 11/25/2025 2:07 PM |
| 38 | Telegraph Ave and 24th St | 11/24/2025 4:31 PM |
| 39 | Ascot at Morley | 11/19/2025 10:56 PM |
| 40 | Cotter Street and Scotia | 11/18/2025 1:13 AM |
| 41 | Surrey Ln/Keller Ave | 11/17/2025 8:25 PM |
| 42 | Scotia Avenue and Golf Links Road | 11/8/2025 5:05 PM |
| 43 | 58th Street between Genoa Street and MLK Jr Way. | 11/6/2025 6:39 PM |
| 44 | 5th ave and Embarcadero | 11/5/2025 8:13 PM |
| 45 | Ellen and 47th ave | 11/4/2025 1:59 PM |
| 46 | 12th Ave and East 24th St | 11/3/2025 2:26 PM |
| 47 | Novelda dr and Bergedo | 11/1/2025 12:35 AM |
| 48 | N/A | 10/31/2025 9:34 PM |
| 49 | 9th Ave & Embarcadero | 10/31/2025 9:02 PM |
| 50 | Broadway and Ridgeway Ave | 10/31/2025 1:02 PM |
| 51 | Telegraph | 10/30/2025 3:15 PM |
| 52 | Ritchie | 10/30/2025 12:47 PM |
| 53 | Alice St & 14th St | 10/28/2025 3:51 PM |
| 54 | Linda and Lake Ave | 10/20/2025 5:58 PM |
| 55 | Park / park blvd way | 10/16/2025 2:01 PM |
| 56 | 24th St and 27th St | 10/16/2025 12:53 PM |
| 57 | Cairo road | 10/16/2025 12:35 PM |
| 58 | 17th Ave & e 23rd st | 10/16/2025 11:56 AM |
| 59 | 19th And Webster | 10/9/2025 4:10 PM |
| 60 | Hiller Drive and Charing Cross Rd | 10/9/2025 5:54 AM |
| 61 | Holman Road and Trestle Glen Road | 10/7/2025 11:57 AM |
| 62 | Rawson and Birdsall | 10/6/2025 10:14 PM |
| 63 | 4247 Terrace St, Oakland | 10/6/2025 9:31 PM |
| 64 | Holman and Grosvenor | 10/6/2025 9:02 PM |
| 65 | Ransom Ave and Carrington St. | 10/6/2025 5:02 PM |
| 66 | adeliene and market and 57th | 10/6/2025 10:45 AM |
| 67 | 16th st and 37th Ave | 10/5/2025 11:37 PM |
| 68 | 37th Ave & 16th St | 10/5/2025 3:14 PM |

| | | |
|---|---|---|
| 69 | 13th Ave and 27th street | 10/4/2025 7:47 PM |
| 70 | San Pablo and 60th St. | 10/3/2025 11:28 PM |
| 71 | 1860 64th Ave oakland | 10/3/2025 2:17 PM |
| 72 | Leimert blvd and park | 10/2/2025 9:01 PM |
| 73 | 13th Street and Harrison Street | 10/2/2025 2:32 PM |
| 74 | Maxwell & Birdsall | 10/2/2025 12:53 PM |
| 75 | 43rd & Market | 10/1/2025 5:10 PM |
| 76 | Olive st | 10/1/2025 12:20 PM |
| 77 | Kingsland & El Camile | 10/1/2025 12:18 PM |
| 78 | 73rd and Holly Street | 10/1/2025 11:05 AM |
| 79 | Peralta Hacienda Historical Park | 10/1/2025 12:56 AM |
| 80 | Peralta Hacienda Historical Park | 10/1/2025 12:44 AM |
| 81 | Jordan and MontereBlvd | 9/30/2025 11:03 PM |
| 82 | 81stAve & San Leandro | 9/30/2025 10:01 PM |
| 83 | N/a | 9/30/2025 9:41 PM |
| 84 | Terrace St. and Mather | 9/30/2025 7:34 PM |
| 85 | 19th Street and Brush Street, Oakland | 9/30/2025 6:06 PM |
| 86 | 19th street Brush West | 9/30/2025 3:44 PM |
| 87 | Lakeshore & Brooklyn Ave | 9/30/2025 1:48 PM |
| 88 | Shepherd and Carson | 9/30/2025 11:00 AM |
| 89 | Peralta Hacienda Historical Park | 9/30/2025 5:25 AM |
| 90 | 29th Ave and East 16th | 9/30/2025 3:05 AM |
| 91 | Grosvenor Place and Trestle Glen Road | 9/29/2025 10:41 PM |
| 92 | Edes and elmhurst | 9/29/2025 10:29 PM |
| 93 | Dimond macArthur | 9/29/2025 9:21 PM |
| 94 | 26th & Adeline | 9/29/2025 7:39 PM |
| 95 | Empire and Wistar Roads | 9/29/2025 11:59 AM |
| 96 | Clifton and Manila | 9/28/2025 12:29 PM |
| 97 | 11th Street and Willow Street | 9/28/2025 11:48 AM |
| 98 | 7th and Henry Streets | 9/27/2025 1:09 PM |
| 99 | 57th and Shattuck | 9/27/2025 4:46 AM |
| 100 | 5249 Manila Ave/ Glendale | 9/26/2025 9:34 PM |
| 101 | Martin Luther King and 14th | 9/26/2025 7:29 PM |
| 102 | Humboldt and Penniman | 9/26/2025 7:13 PM |
| 103 | Clifton and Desmond | 9/26/2025 1:50 PM |
| 104 | 8th St and Chester St | 9/26/2025 12:32 PM |
| 105 | 8th and Chester Streets (Prescott, West Oakland) | 9/26/2025 11:21 AM |
| 106 | College and Clifton | 9/26/2025 1:53 AM |

| | | |
|---|---|---|
| 107 | 13th and Alice | 9/23/2025 2:14 PM |

# Q3 Which of the following have you or anyone in your household experienced inside or outside of Oakland? (Check all that apply)

Answered: 119 Skipped: 1

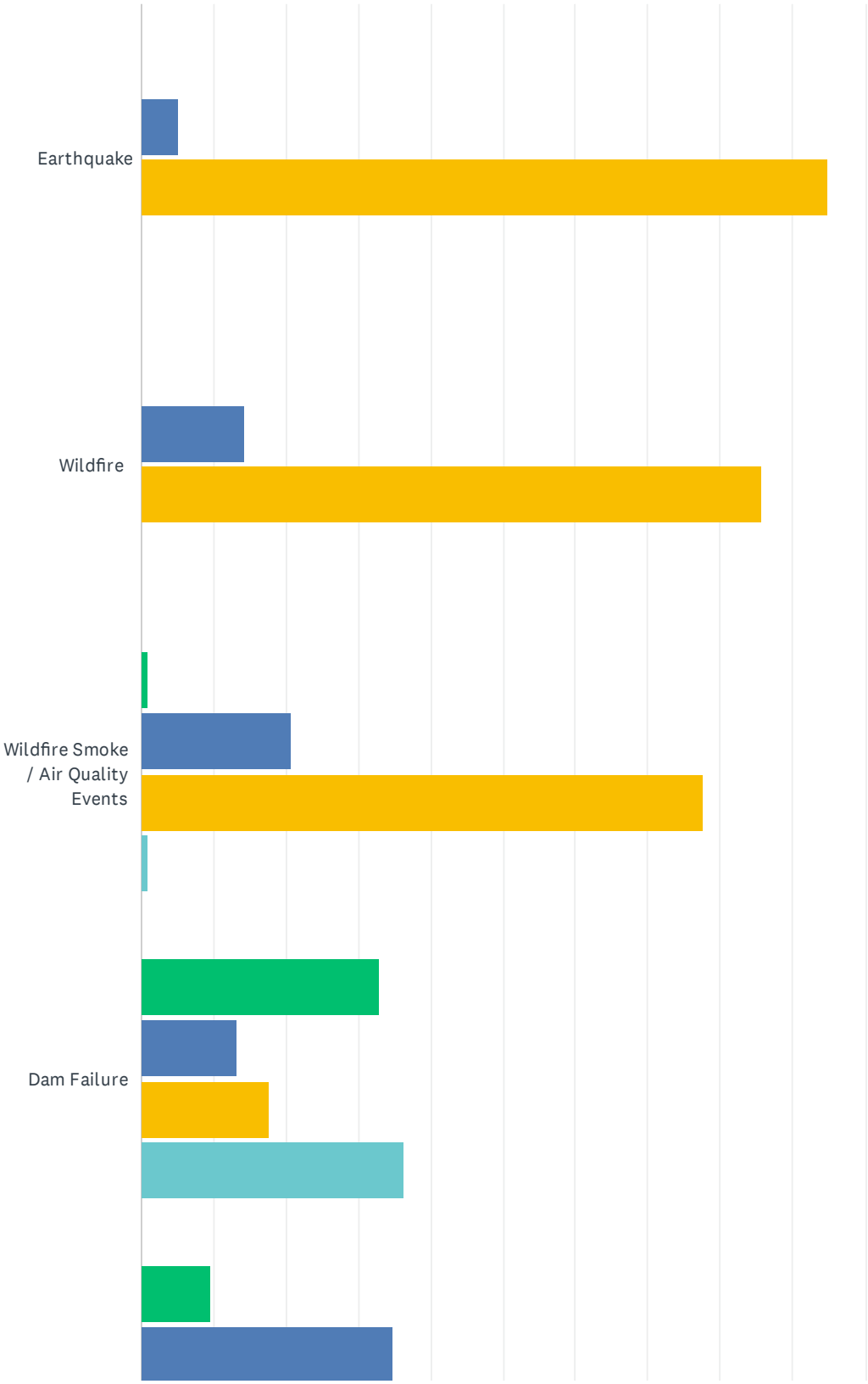


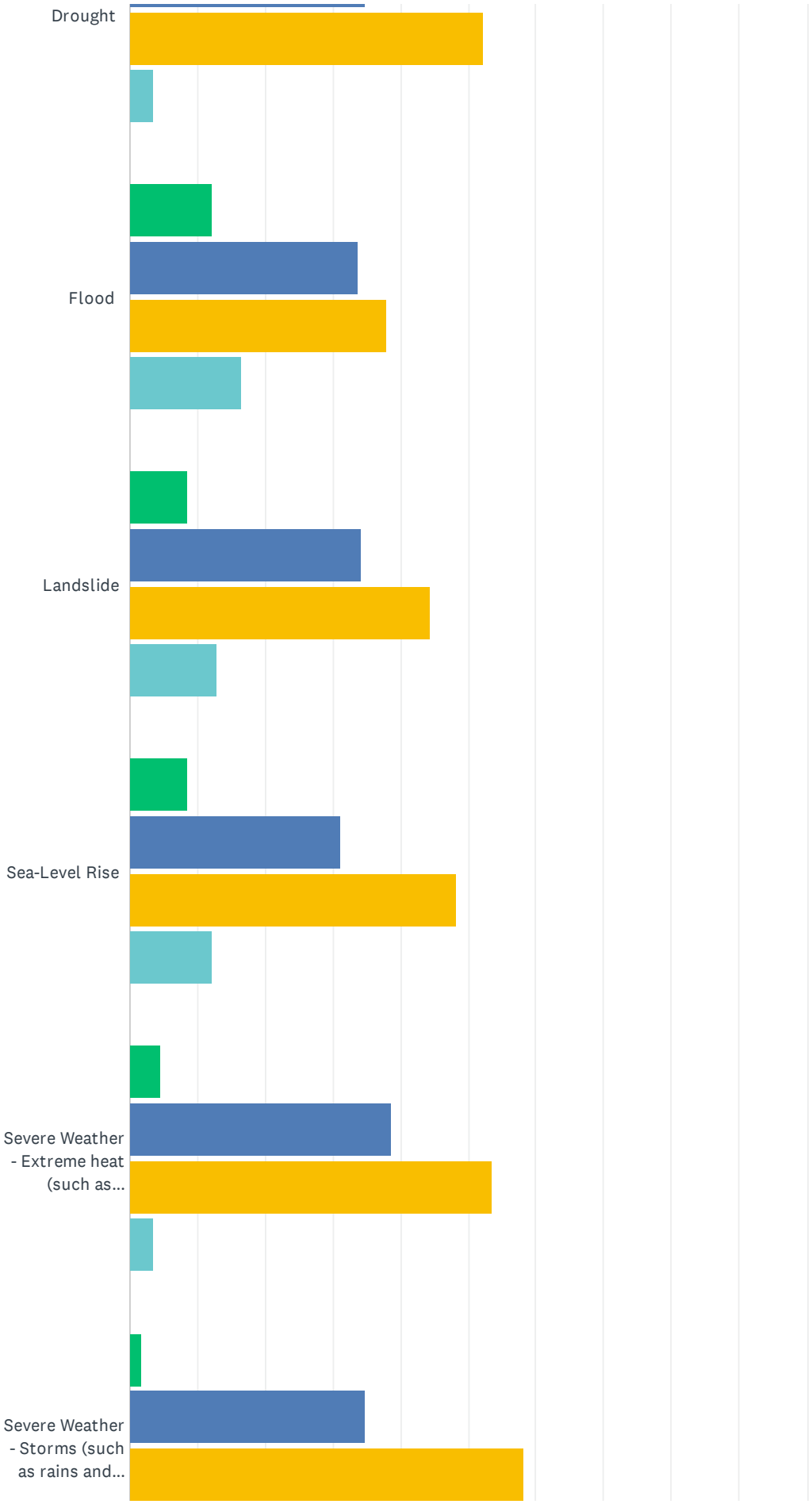
| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Earthquake | 97.48% | 116 |
| Wildfire | 48.74% | 58 |
| Dam Failure | 0.84% | 1 |
| Drought | 43.70% | 52 |
| Flood | 13.45% | 16 |
| Landslide | 10.92% | 13 |
| Sea-Level Rise | 11.76% | 14 |
| Severe Weather - Extreme heat (such as temperatures over 95 degrees) | 63.87% | 76 |
| Severe Weather - Storms (such as rains and/or winds causing damage) | 54.62% | 65 |
| Tsunami | 3.36% | 4 |
| No one in my household, including myself, has experienced a hazard event | 1.68% | 2 |
| Other (please describe) | 10.08% | 12 |
| Total Respondents: 119 | | |

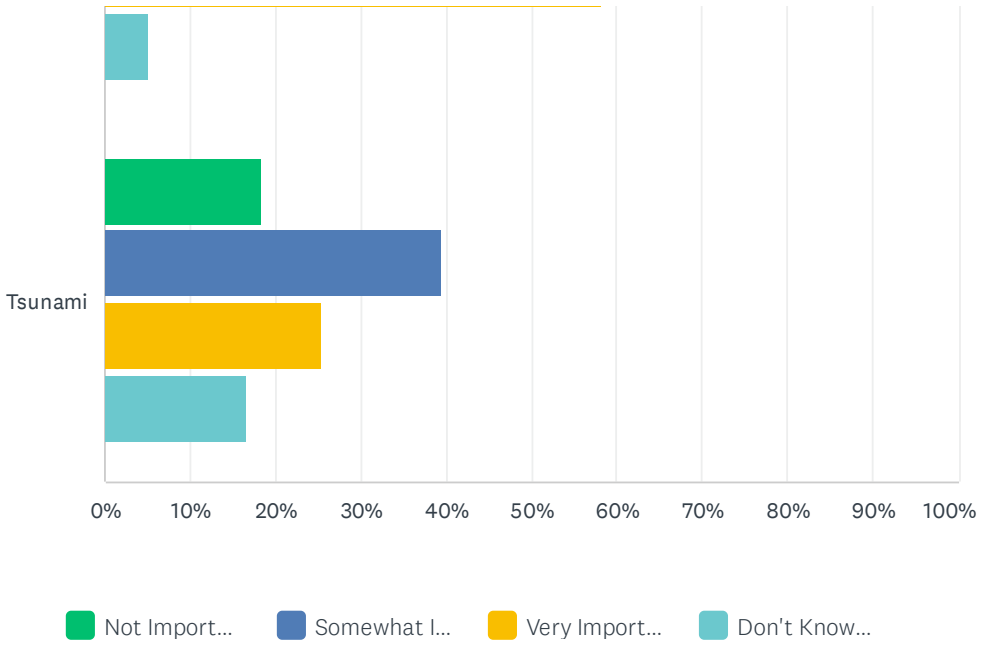
| # | OTHER (PLEASE DESCRIBE) | DATE |
|---|---|---|
| 1 | Smoke from nearby fire | 12/16/2025 1:54 PM |
| 2 | Bear encounter | 12/15/2025 11:16 PM |
| 3 | Riots | 10/31/2025 7:40 PM |
| 4 | Terrorist attacks | 10/31/2025 1:02 PM |
| 5 | Dangerous air quality | 10/28/2025 3:51 PM |
| 6 | driving on our street is a hazard event! | 10/6/2025 9:31 PM |
| 7 | Tornado, hurricane | 10/3/2025 11:28 PM |
| 8 | Disease Outbreak/Pandemic | 10/1/2025 12:56 AM |
| 9 | Disease Outbreak/Pandemic | 10/1/2025 12:44 AM |
| 10 | During Heavy Rainstorms, flooding becomes a problem in our basement, if the sunk pump malfuncations. | 9/30/2025 6:06 PM |
| 11 | Disease Outbreak/Pandemic | 9/30/2025 5:25 AM |
| 12 | hurricane while visiting in Florida & ice storms in Oregon | 9/29/2025 9:21 PM |

# Q4 How important is it for the City of Oakland to prepare for the following natural hazards?

Answered: 119 Skipped: 1




Drought
Flood
Landslide
Sea-Level Rise
Severe Weather - Extreme heat (such as...
Severe Weather - Storms (such as rains and...




| | NOT IMPORTANT | SOMEWHAT IMPORTANT | VERY IMPORTANT | DON'T KNOW / NO OPINION | TOTAL | WEIGHTED AVERAGE |
|---|---|---|---|---|---|---|
| Earthquake | 0.00%<br>0 | 5.08%<br>6 | 94.92%<br>112 | 0.00%<br>0 | 118 | 2.95 |
| Wildfire | 0.00%<br>0 | 14.29%<br>17 | 85.71%<br>102 | 0.00%<br>0 | 119 | 2.86 |
| Wildfire Smoke / Air Quality Events | 0.86%<br>1 | 20.69%<br>24 | 77.59%<br>90 | 0.86%<br>1 | 116 | 2.78 |
| Dam Failure | 32.74%<br>37 | 13.27%<br>15 | 17.70%<br>20 | 36.28%<br>41 | 113 | 2.58 |
| Drought | 9.57%<br>11 | 34.78%<br>40 | 52.17%<br>60 | 3.48%<br>4 | 115 | 2.50 |
| Flood | 12.07%<br>14 | 33.62%<br>39 | 37.93%<br>44 | 16.38%<br>19 | 116 | 2.59 |
| Landslide | 8.55%<br>10 | 34.19%<br>40 | 44.44%<br>52 | 12.82%<br>15 | 117 | 2.62 |
| Sea-Level Rise | 8.62%<br>10 | 31.03%<br>36 | 48.28%<br>56 | 12.07%<br>14 | 116 | 2.64 |
| Severe Weather - Extreme heat (such as temperatures over 95 degrees) | 4.39%<br>5 | 38.60%<br>44 | 53.51%<br>61 | 3.51%<br>4 | 114 | 2.56 |
| Severe Weather - Storms (such as rains and/or winds causing damage) | 1.74%<br>2 | 34.78%<br>40 | 58.26%<br>67 | 5.22%<br>6 | 115 | 2.67 |
| Tsunami | 18.42%<br>21 | 39.47%<br>45 | 25.44%<br>29 | 16.67%<br>19 | 114 | 2.40 |

# Q5 Are there any other natural hazards that you are concerned about?

Answered: 41 Skipped: 79

| # | RESPONSES | DATE |
|---|---|---|
| 1 | No | 12/16/2025 2:39 PM |
| 2 | Wildfires caused by the PG&E lines that are above ground near my home right next to lots of foliage and trees and dry grass. | 12/16/2025 1:54 PM |
| 3 | No | 12/16/2025 1:28 PM |
| 4 | High wind events causing power shutdowns and/or fires. We would like to be on the list of areas to have PG&E bury our power lines for safety. | 12/16/2025 11:49 AM |
| 5 | no | 12/16/2025 9:30 AM |
| 6 | Undereducated unemployed males committing crimes to support themselves | 12/16/2025 1:41 AM |
| 7 | Winds and our large trees- I have seen HUGE Monterey Cyprus trees fly through the air in high winds. We need grants to get the trees removed up here in the hills. | 12/16/2025 12:03 AM |
| 8 | - The natural concern with PG&E refusing to bury their power lines in Montclair. They are crooks, corrupt, and they are allowed to continue to be like that by the City of Oakland, the Alameda County, and the State of California. - Please enforce parking rules in narrow streets - Please cut the Eucalyptus - Please hire more firefighters | 12/15/2025 8:44 PM |
| 9 | Falling trees | 12/15/2025 5:07 PM |
| 10 | Falling trees from storms, landslides and drought. | 12/15/2025 4:45 PM |
| 11 | Toxic waste | 12/10/2025 6:05 PM |
| 12 | The intersection of these hazards is a concern. | 12/10/2025 2:46 PM |
| 13 | No. | 12/1/2025 6:29 PM |
| 14 | Soil erosion, Groundwater contamination | 11/24/2025 4:31 PM |
| 15 | None comes to mind | 11/17/2025 8:25 PM |
| 16 | The Federal Gov | 11/5/2025 8:13 PM |
| 17 | no | 11/4/2025 1:59 PM |
| 18 | no | 11/3/2025 2:26 PM |
| 19 | N/A | 10/31/2025 9:34 PM |
| 20 | Overnight freezes. | 10/31/2025 7:40 PM |
| 21 | Not now | 10/30/2025 3:15 PM |
| 22 | No | 10/30/2025 12:47 PM |
| 23 | Soil erosion | 10/28/2025 3:51 PM |
| 24 | Trees falling, branches falling off trees | 10/9/2025 5:54 AM |
| 25 | No | 10/3/2025 2:17 PM |
| 26 | High winds (can knock down power lines, etc.) | 10/1/2025 2:41 PM |
| 27 | No | 10/1/2025 12:20 PM |
| 28 | Severe weather in other locations impacting supply chains | 10/1/2025 11:19 AM |
| 29 | No | 10/1/2025 11:05 AM |

| | | |
|---|---|---|
| 30 | Disease outbreaks like the 2020 COVID19 pandemic could happen again. | 10/1/2025 12:56 AM |
| 31 | You should include disease outbreak like the covid19 pandemic. | 10/1/2025 12:44 AM |
| 32 | No | 9/30/2025 11:03 PM |
| 33 | None | 9/30/2025 9:41 PM |
| 34 | No | 9/30/2025 6:06 PM |
| 35 | I am concerned about future disease outbreaks like the 2020 COVID-19 pandemic. US healthcare is inadequate. Robert Kennedy is attacking public health and vaccines. | 9/30/2025 5:25 AM |
| 36 | Animal infestation, Structural collapse of buildings and freeway elevated systems. Structural collapse of bridges. House Landslide, Radiation exposure from nuclear plants, Exposure from nuclear explosion or bombs. Natural gas leaks underground, Electrical wires falling from overhead, Air pollution from garbage dumps, Railroad car hazardous cargo spills, Fireworks storage facility blowing up, Poisoned reservoir water and break in water supply lines. | 9/29/2025 10:41 PM |
| 37 | no | 9/29/2025 9:21 PM |
| 38 | Liquifaction in West Oakland | 9/28/2025 11:48 AM |
| 39 | No. | 9/26/2025 7:29 PM |
| 40 | Sinkholes | 9/26/2025 12:32 PM |
| 41 | General power outages | 9/26/2025 1:53 AM |

# Q6 What are your biggest concerns for your household and community if a disaster were to occur?

Answered: 110 Skipped: 10

| # | RESPONSES | DATE |
|---|---|---|
| 1 | Downed power lines and exploding transformers. We really need them undergrounded here! | 12/17/2025 12:10 PM |
| 2 | How to evacuate; whether property would be protected when not there; rebuilding neighborhood | 12/17/2025 10:23 AM |
| 3 | Evacuation difficulties, loss of services | 12/17/2025 12:27 AM |
| 4 | Support in terms of basic survival items: water, heat, fuel, food. We all need to prepare for a couple days but in the event not everyone is prepared there should be assistance. | 12/16/2025 10:33 PM |
| 5 | Insurance | 12/16/2025 2:39 PM |
| 6 | That we are at risk for wildfires, the government is doing nothing to underground electrical lines, and we in Montclair do not have easy ingress/egress routes. This government is putting our community in danger by not asking PGE to underground these electrical lines. | 12/16/2025 1:54 PM |
| 7 | Water. Safe egress. Anarchy. Financial devastation. | 12/16/2025 1:28 PM |
| 8 | In the hills, we are concerned with being able to evacuate a fire safely, and for emergency vehicles to get in and out, particularly with narrow streets with cars parked along them, often leaving one lane open not wide enough for a fire truck. | 12/16/2025 11:49 AM |
| 9 | Emergency response - please reopen the fire stations ASAP Evacuation routes - stop building dense housing and closing traffic lanes to cars when there are too many people and not enough egress | 12/16/2025 9:30 AM |
| 10 | 1. Escape route in the event of a major fire. 2. Public safety | 12/16/2025 8:24 AM |
| 11 | Safety property lose, evacuation | 12/16/2025 8:07 AM |
| 12 | Evacuation during fire | 12/16/2025 7:55 AM |
| 13 | Being able to evaluate. Problems with being emergency vehicles being able to navigate the streets, cars parked where ever is the most convenient for the driver. Could people park where ever it is convenient, say on Broadway and block the street? | 12/16/2025 1:52 AM |
| 14 | Lack of egress from the hills in a wildfire | 12/16/2025 1:41 AM |
| 15 | escape from wildfire. earthquake survival | 12/16/2025 12:59 AM |
| 16 | Winds and trees falling on our homes. Cars parked on the street that prohibit evacuations during fires. | 12/16/2025 12:03 AM |
| 17 | Survival; Loss of Home; Mass casualties; risk to first responders | 12/15/2025 11:16 PM |
| 18 | evacuating from the Oakland hills | 12/15/2025 10:44 PM |
| 19 | Will we be able to drive our vehicle down Thornhill Drive? There are many eucs near the road and other trees leaning toward the road. I bought a small wagon just in case T-hill is obstructed or car-jammed "just in case".... | 12/15/2025 9:27 PM |
| 20 | Evacuation during a wildfire, long-term power outages, access to emergency services. | 12/15/2025 8:50 PM |
| 21 | Evacuation routes and wildfire in Hills | 12/15/2025 8:46 PM |
| 22 | my house on fire | 12/15/2025 8:44 PM |
| 23 | There are no suitable exit routes out of the hills. Roads are frequently blocked or have limited access due to street parking and road conditions. | 12/15/2025 7:08 PM |
| 24 | I'm not confident that the city could manage a wildfire evacuation from the hills, given how few | 12/15/2025 5:33 PM |

| | | |
|---|---|---|
| | routes there are. | |
| 25 | If a fire or earthquake were to occur and we needed to evacuate, I have concerns about our ability to do so with so many cars parked in the street. There are times when only one car can pass at a time on my street - Asilomar Drive - even though this is a two-way street. | 12/15/2025 5:33 PM |
| 26 | Evacuation and communication. Narrow streets and cars blocking the roadway. | 12/15/2025 5:07 PM |
| 27 | Access, damage to house | 12/15/2025 4:45 PM |
| 28 | Replacing houses, affording to restart, air quality long-term affects. | 12/12/2025 5:38 PM |
| 29 | Ability to evacuate efficiently, firestorm (we live in the hills and experienced it in 1991) | 12/10/2025 6:17 PM |
| 30 | Inability to evacuate due to blocked roads | 12/10/2025 6:05 PM |
| 31 | Being trapped in the hills due to an earthquake or worse, not being able to evacuate quickly enough if an UI wildfire/firestorm occurs. | 12/10/2025 4:27 PM |
| 32 | Access to clean water | 12/10/2025 3:34 PM |
| 33 | The City already struggles to provide core services such as community safety under normal conditions. How will we fare if there is a real emergency? And if we are hit with a major disaster, how will we pay to rebuild? While FEMA exists, even under it's current form, it isn't the solution we need to major disasters. | 12/10/2025 2:46 PM |
| 34 | Safety | 12/10/2025 10:57 AM |
| 35 | Kaos, lack of preparedness, hunger, fire, looting. | 12/1/2025 6:29 PM |
| 36 | Access to clean water. | 11/24/2025 4:51 PM |
| 37 | Communication / Transportation to a Meeting Place | 11/24/2025 4:47 PM |
| 38 | Temporary shelter | 11/24/2025 4:31 PM |
| 39 | The obvious exit routes in Montclair will become very quickly congested; I worry about being stuck in traffic. Also, during winter storms, those roads tend to be obstructed by fallen trees. Last, the children's pickup at the schools (Joaquin Miller, Montera) tend to be very hectic on a daily basis. Should some roads be considered exclusively 1 way when disaster happens? | 11/19/2025 10:56 PM |
| 40 | Earthquake and Fire are my biggest fears. I'm concerned that our house might not survive a fire, and that if we had a big earthquake that emergency services might not be available. I also worry about the Oakland Zoo survival for either of these events. | 11/18/2025 1:13 AM |
| 41 | Fires that could burn through my neighborhood | 11/17/2025 8:25 PM |
| 42 | Earthquake and wildfire | 11/8/2025 5:05 PM |
| 43 | Emergency response, community outreach for preparedness. Alameda County OES preparedness. | 11/6/2025 6:52 PM |
| 44 | Where would we go for assistance? There is no resilience center nearby. My brother is a dialysis patient and my Mom is 89 yo. | 11/6/2025 6:39 PM |
| 45 | That we will be on our own | 11/5/2025 8:13 PM |
| 46 | no | 11/4/2025 1:59 PM |
| 47 | Safety | 11/3/2025 2:26 PM |
| 48 | No response from government | 11/1/2025 12:35 AM |
| 49 | A place to convene for help and accurate & timely communications. | 10/31/2025 9:34 PM |
| 50 | How quickly the City is able to respond and provide help | 10/31/2025 9:02 PM |
| 51 | Clean water Safe shelter Information Ration preparedness Medical response | 10/31/2025 7:40 PM |
| 52 | Not having water + power, losing access to reliable information, hospitals being over run | 10/31/2025 1:02 PM |
| 53 | To be prepared | 10/30/2025 3:15 PM |
| 54 | Lights unknown | 10/30/2025 12:47 PM |

| | | |
|---|---|---|
| 55 | My brick building collapsing in an earthquake | 10/28/2025 3:51 PM |
| 56 | Food water safety | 10/20/2025 5:58 PM |
| 57 | Safe place to go to | 10/16/2025 12:35 PM |
| 58 | Keeping family, friends and neighbors safe | 10/16/2025 11:56 AM |
| 59 | Communication about what to do during a natural disaster and afterwards | 10/9/2025 4:10 PM |
| 60 | being able to outrun a fire by evacuating successfully. lack of ability to locate or communicate with loved ones assisting seniors and children who don't know how to respond | 10/9/2025 5:54 AM |
| 61 | Ability to find/reach safe evacuation zone; concern about traffic/mobility. Very concerned about ability to find my family if we weren't together | 10/7/2025 11:57 AM |
| 62 | water coming into the basement | 10/6/2025 10:14 PM |
| 63 | Inability of people to get help quickly. I expect that it will take more than a few days for National Guard and other aide workers to get to us in the event of a major earthquake | 10/6/2025 9:31 PM |
| 64 | How to stay in contact with one another | 10/6/2025 9:02 PM |
| 65 | Communication access | 10/6/2025 5:02 PM |
| 66 | food/water in the immediate (3-10 days) after the event for humans and pets | 10/6/2025 10:45 AM |
| 67 | Route to leave the area, traffic jams, access to clean water. | 10/5/2025 11:37 PM |
| 68 | Liquifaction, access to clean water | 10/5/2025 3:14 PM |
| 69 | Potable water and means to relocate if necessary | 10/4/2025 7:47 PM |
| 70 | Not knowing what our immediate response should be, finding shelter if necessary, connecting with networks to provide help to others if able | 10/3/2025 11:28 PM |
| 71 | Staying safe | 10/3/2025 2:17 PM |
| 72 | Evacuation routes, urban fire plans after earthquake | 10/2/2025 9:01 PM |
| 73 | I am concerned about safety and supplies necessary. | 10/2/2025 2:32 PM |
| 74 | Access to medical facility if needed; safety for my family including pet. | 10/2/2025 12:53 PM |
| 75 | Depends on the disaster probably, but keeping our cats safe feels important | 10/1/2025 5:10 PM |
| 76 | Evacuation plans for schoolchildren during school hours and in after school programs, as well as during extracurricular activities in public parks and recreation facilities | 10/1/2025 2:41 PM |
| 77 | rescue trapped people and pets | 10/1/2025 12:54 PM |
| 78 | Survive | 10/1/2025 12:20 PM |
| 79 | Where to sleep, how to eat, where to use the bathroom... | 10/1/2025 12:18 PM |
| 80 | Supply chains, communication, access to electricity, water, food | 10/1/2025 11:19 AM |
| 81 | Is there a safe place for the homeless to gather. Is the sound alarm working to notify us of a disaster. The trees that was planted by the city of Oakland on sidewalks are not maintained by the city. Why??? Now these trees grow into the wires and Oakland is trying to force Homeowners to pay for maintaining the trees WHY!!!? Maintenance need to be more than in the hills but also in our neighborhood | 10/1/2025 11:05 AM |
| 82 | Oakland needs shade and water in heat waves. People need a way to safely evacuate and get to a safe location. Identification documents are important. A person can get trapped and unable to get help. | 10/1/2025 12:56 AM |
| 83 | Oakland needs water and shade during heat waves. As a community, we have to agree on safe evacuation and location. Having important documents is important. The scariest part is getting trapped and not able to get help. | 10/1/2025 12:44 AM |
| 84 | How to be prepared. Go bag where to meet | 9/30/2025 11:03 PM |

| | | |
|---|---|---|
| 85 | Evacuation refuge points as well as evacuation driving plans posted signage Like Louisiana has on streets and interstate highways. | 9/30/2025 10:01 PM |
| 86 | What to do and where to go for hip | 9/30/2025 9:41 PM |
| 87 | losing housing | 9/30/2025 7:34 PM |
| 88 | Evacuation facility location and routes. Notification methods when emergency evacuation is necessary. | 9/30/2025 6:06 PM |
| 89 | Living shelter | 9/30/2025 3:44 PM |
| 90 | Buildings are not retrofit and code enforcement isn't pushing for property owners, and landlords to bring them up to code | 9/30/2025 1:48 PM |
| 91 | Older adults | 9/30/2025 1:34 PM |
| 92 | Personal safety | 9/30/2025 11:00 AM |
| 93 | In the event of an earthquake, getting to a safe location. In the event of a wildfire, taking a safe evacuation path. In the event of heat wave, getting water and shade. Losing important identification documents. Getting trapped and unable to escape. | 9/30/2025 5:25 AM |
| 94 | That I lose my house | 9/30/2025 3:05 AM |
| 95 | Getting food, water, medical supplies, hospitalization, Impassable roadway, Access to cash, Access to gasoline electric pump, Access to food supply, Access to shelter, communication with family and friends, Access to building supplies, Access to radio communication, contact with government officials, Police force monitoring for theft, Access to gun ammunition. Locating family members. | 9/29/2025 10:41 PM |
| 96 | I feel mostly prepared - one of my concerns is letting people (family/friends) know I am alright or I need help. | 9/29/2025 9:21 PM |
| 97 | Transportation | 9/29/2025 9:08 PM |
| 98 | Food security, information & communication | 9/29/2025 7:39 PM |
| 99 | Shelter, food, resources | 9/29/2025 11:59 AM |
| 100 | Looting and crime. | 9/28/2025 12:29 PM |
| 101 | Being able to turn off gas if necessary, downed powerlines, poor air quality during a wildfire event, general lack of neighborhood rediness, creating personal disaster plan | 9/28/2025 11:48 AM |
| 102 | Seeking higher ground, safety of leaving home/safety of home | 9/27/2025 1:09 PM |
| 103 | power lines and cell signals off, plumbing, water, and public health concerns | 9/27/2025 4:46 AM |
| 104 | Fire from earthquake Clean drinking water, communication | 9/26/2025 9:34 PM |
| 105 | Injury or death. | 9/26/2025 7:29 PM |
| 106 | Evacuation, access to food and water | 9/26/2025 7:13 PM |
| 107 | injury and death with no medical care available. Damage and fire to my house and others. No escape route or safe place to go. | 9/26/2025 1:50 PM |
| 108 | Structure collapse or damage causing people to be trapped, injured or killed. Secondary effects like sewage overflow during a flood. Air quality. Electricity blackouts. | 9/26/2025 12:32 PM |
| 109 | That Prescott, West Oakland, itself, becomes well-organized locally to meet the challenge. | 9/26/2025 11:21 AM |
| 110 | Knowing basics of how to stay safe and allow emergency services to focus on critical needs. | 9/26/2025 1:53 AM |

# Q7 Are there areas in Oakland that are more likely to be a problem in hazards (such as extreme rain, extreme heat, wildfire or earthquake)? As an example, is there a place in your community that floods during winter storms that creates problems? Please describe and provide the exact location (address or nearest street intersection).

Answered: 80 Skipped: 40

| # | RESPONSES | DATE |
|---|---|---|
| 1 | Our entire neighborhood, including Zinn, still has above ground powerlines, even though we're in the high fire severity zone, and there are limited escape routes. We need them to be undergrounded. | 12/17/2025 12:10 PM |
| 2 | Storm drains that are overwhelmed by heavy rains, cars parked on narrow streets impeding passage by fire trucks, fire hydrants that have not been maintained or inspected, public lands with overgrown vegetation that provide fuel for wildfires | 12/17/2025 12:27 AM |
| 3 | The Oakland Hills are in danger of wildfire and earthquakes due to the proximity to the Hayward fault. The flat lands are closer to other fault lines and clearly sea level rising issues. | 12/16/2025 10:33 PM |
| 4 | Montclair hills neighborhood | 12/16/2025 2:39 PM |
| 5 | Yes, fires happen in Montclair and our only route out is Snake Drive and Zinn Drive. Also, Sheppard Canyon floods and is a fire hazard and if a fire were to occur the occupants past Shepard Canyon would be in danger. | 12/16/2025 1:54 PM |
| 6 | My entire neighborhood | 12/16/2025 1:28 PM |
| 7 | Our neighborhood: Colton and Asilomar. | 12/16/2025 11:49 AM |
| 8 | There are potholes everywhere that make our evacuation roads hazardous - all along Saroni and down Colton Ave and Paso Robles. There are very few roads we can use to evacuate and they're in bad shape. | 12/16/2025 9:30 AM |
| 9 | Chelton is the main evacuation route for a large number of people. Cars parked on Chelton cause bottlenecks even in normal times especially where the road narrows and there are blind curves | 12/16/2025 7:55 AM |
| 10 | Yes at the intersection of Longcroft & Chelsea where the city has not cleared the drainage pipe and with heavy rain the street floods. | 12/16/2025 1:52 AM |
| 11 | Many microclimates and geographic peculiarities in Oakland. I'm really not familiar with the areas threatened by flooding. Clearly there is a fire danger in the hills - and egress and access problems for first responders- | 12/16/2025 1:41 AM |
| 12 | Oakland Hills wildfire. Earthquake on freeway 13, Earthquake building collapse, | 12/16/2025 12:59 AM |
| 13 | The hills are subject to landslides- especially with climate change. Things get so dry and then so wet. We also are experiencing unprecedented heat, drought and wetness that is hard on our trees and likely aging them faster. We also can't afford earthquake insurance. Our community needs a lot of help. | 12/16/2025 12:03 AM |
| 14 | Unmaintaned private property for wildfire. Unmaintained city property for wildfire. Eucalyptus trees for wildfire. Everything close to the major faults in earthquake. | 12/15/2025 11:16 PM |
| 15 | My priority is for the City to expeditiously comply with the 2024-25 Grand Jury Final Report recommendations to the City Council to "expand parking restrictions on narrow streets in high fire risk areas and increase parking enforcement in those areas," specifically for my neighborhood to ensure Colton Blvd is a safe evacuation route. | 12/15/2025 10:44 PM |
| 16 | Vegetation in the Montclair Hills is a HUGE hazard for wildfire. We have done very little to | 12/15/2025 8:50 PM |

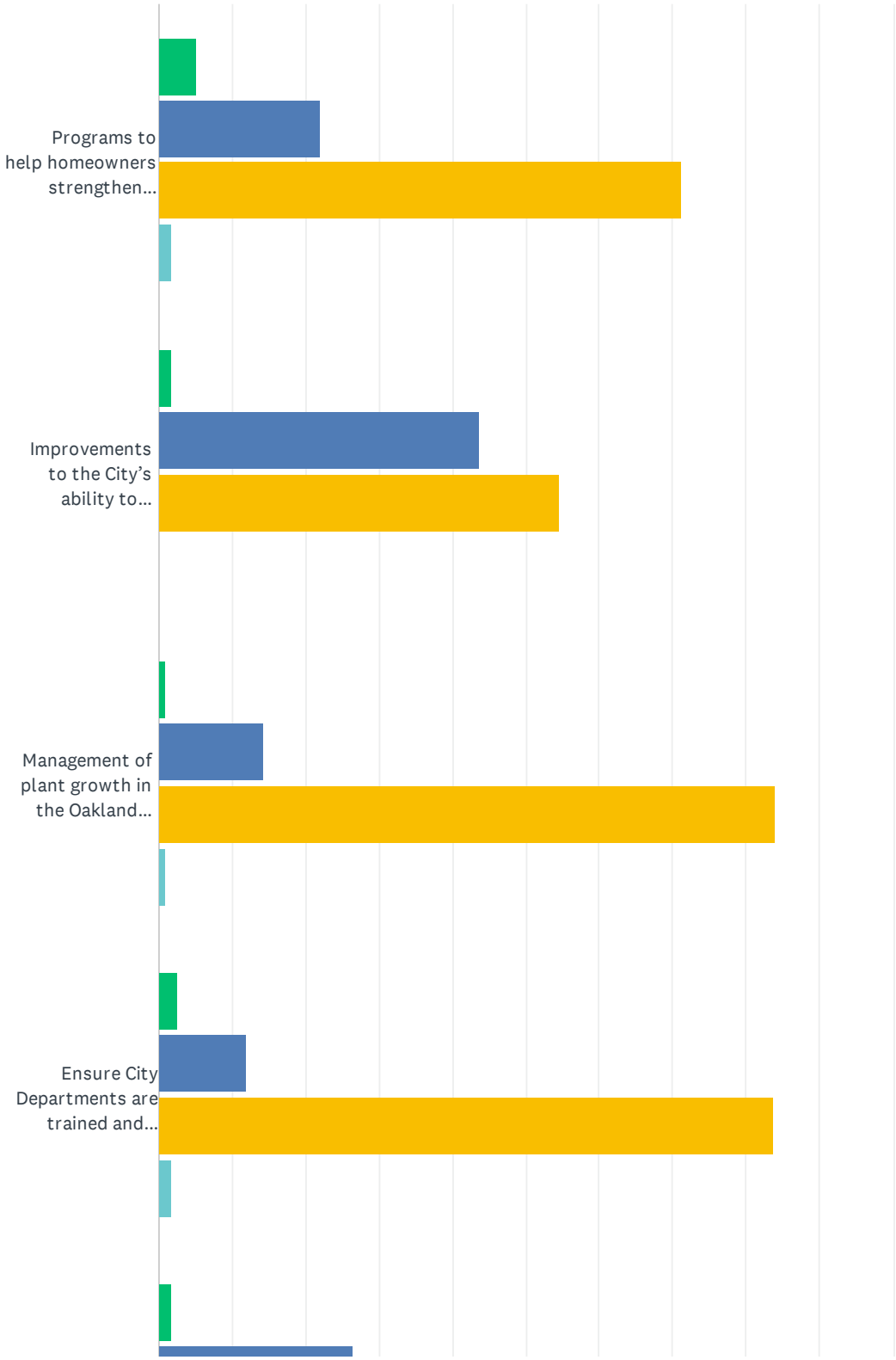
| | | |
|---|---|---|
| | remove vegetation since the 1991 fire despite FEMA's report stating the necessity to do so. PLEASE start mandating the Firewise USA protocols ASAP and clear the few evacuation routes we have out of the hills. | |
| 17 | Hills | 12/15/2025 8:46 PM |
| 18 | Montclair has an extremely high fire hazard danger. Please force PG&E to put their power lines underground | 12/15/2025 8:44 PM |
| 19 | Shepard Canyon frequently floods — almost every year with the winter storms. A wildfire up in the hills will be devastating due to limited access to exit routes. | 12/15/2025 7:08 PM |
| 20 | Every neighborhood faces its unique set of hazards. In the hills, we are vulnerable to extreme rain, wildfire, and earthquake. When it rains heavily, we have water flowing down Thornhill Drive, trying to find its way into Temescal Creek. The storm drains near the Thornhill/Woodhaven/Beauforest intersections get blocked easily and the roadway floods. | 12/15/2025 5:33 PM |
| 21 | In the past, when we have had droughts followed by servers winter storms, our neighborhood has experienced down trees and landslides. We are also in a high fire danger zone. Power lines are above ground, which becomes a fire risk when we have strong wind storms. | 12/15/2025 5:33 PM |
| 22 | The Oakland hills. | 12/15/2025 5:07 PM |
| 23 | Narrow streets in hills hindering escape and fire truck access. Thornhill x Pinehaven/Woodhaven intersection floods and is one big pothole to begin with. Some patching was done, but was never resurfaced when neighboring streets were resurfaced. Uneven surface is a hazard for kids going to school and people walking dogs especially in the dark when it's easy to trip and fall. | 12/15/2025 4:45 PM |
| 24 | Colton Blvd is a major evacuation route and is very dangerous | 12/10/2025 6:05 PM |
| 25 | Wildfire evacuation down Westover Dr (from Thackeray) and/or down Chelton Dr. | 12/10/2025 4:27 PM |
| 26 | At the bottom of every hill in Oakland, storm drains fill with leaves and trash in large storms. Examples include all along Mandana Blvd, Lakeshore Bld, Grand Avenue and on the west side of Lake Merritt along Lakeside Dr. | 12/10/2025 2:46 PM |
| 27 | Oakland Hills | 12/10/2025 10:57 AM |
| 28 | Telegraph at 34th St.- the storm drain floods every time there is rain. | 12/1/2025 6:29 PM |
| 29 | The Hayward Fault, which runs a little east of Macarthur Blvd, is a major problem in earthquakes. Stormdrains all through Eastmont are a huge problem in storms. Water goes under the street and then into people's basements, then into people's houses. | 11/25/2025 2:07 PM |
| 30 | N/A | 11/24/2025 4:51 PM |
| 31 | I'm not yet familiar with the city geography. | 11/24/2025 4:47 PM |
| 32 | Earthquakes in my area. Buildings are old, may not withstand earthquakes. | 11/24/2025 4:31 PM |
| 33 | Montclair during wildfires and heavy rain | 11/19/2025 10:56 PM |
| 34 | We live close to the knowland park. Fire is a very real threat. Also, as mentioned above, the Oakland Zoo, and the animals in it. | 11/18/2025 1:13 AM |
| 35 | Earthquake on the Hayward Fault could cause extreme problems for me as my community, Sequoyah Hills, sits near the fault. Wild fires are another concern as our community is pretty much surrounded by trees and many are eucalyptus. | 11/17/2025 8:25 PM |
| 36 | Golf Links Road floods (flood drain clogs) and landslides (mountain erosion). Wildfire Golf Links Rd, Skyline Blvd, Malcolm Roadway evacuation congestion - Golf Links Road, Malcolm Ave, Mountain Blvd, Skyline Blvd | 11/8/2025 5:05 PM |
| 37 | Wildfires around Oakland hills Chabot Highlands, Overmoor St. | 11/6/2025 6:52 PM |
| 38 | Since where I work has a large park surrounding with very tall and old trees. Extreme rain and wind could be a big problem. | 10/31/2025 9:34 PM |
| 39 | My mind thinks of at least 100 different scenarios at particular points around the city right away. I was born in Oakland and I went to school in Oakland all my life and grew up in Oakland and raised my family in Oakland. All my family is in Oakland I'm just in a neighboring city | 10/31/2025 7:40 PM |

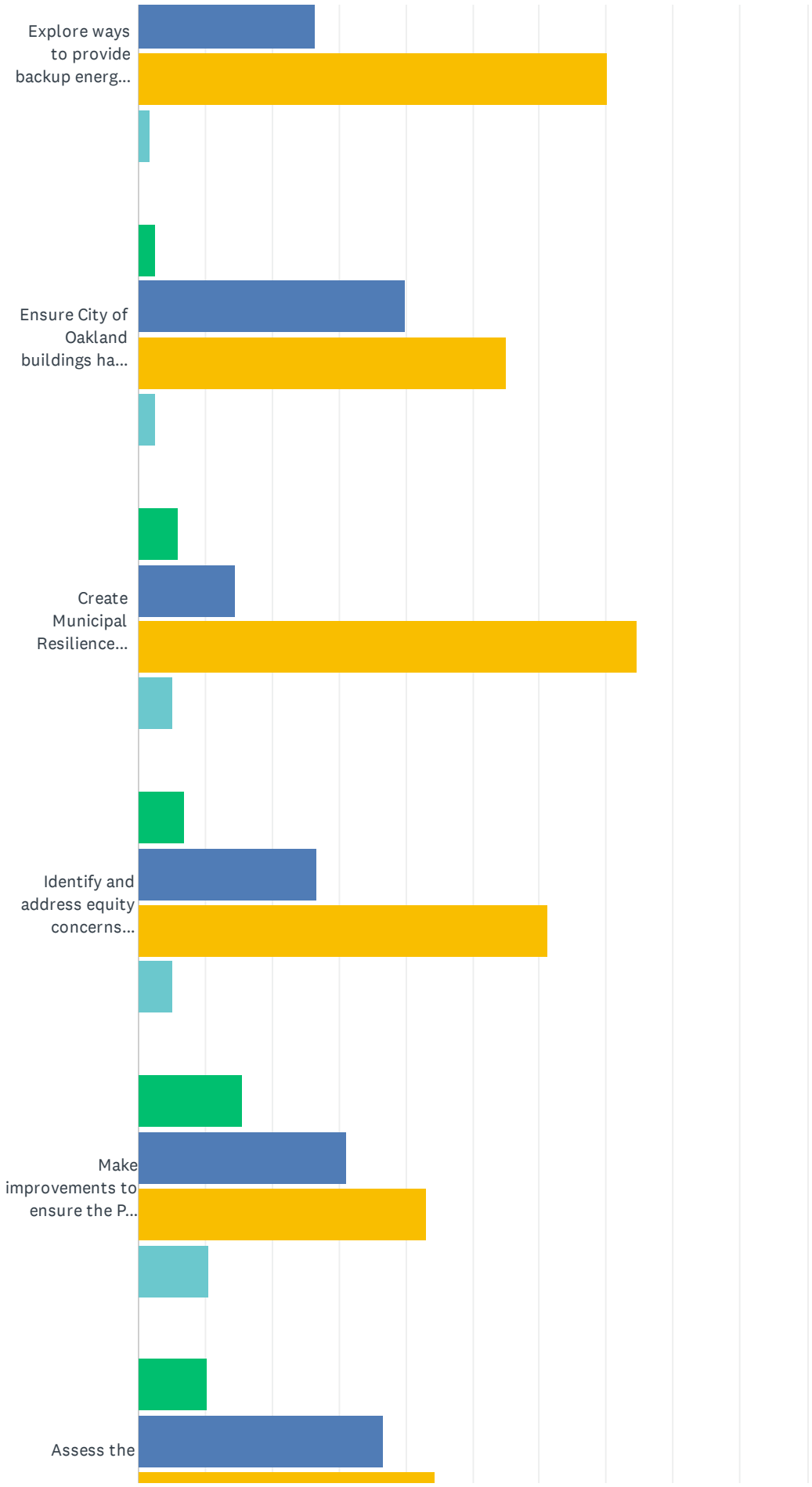
| | | |
|---|---|---|
| | we’re by the water, but also by the hillside and kind of squills in this little space that used to be Marshland it’s a lot to be aware of.. | |
| 40 | My street Terrace St 94611 is at risk for landslides | 10/31/2025 1:02 PM |
| 41 | I would have to do my homework but I know for sure in Berkeley North Oakland area | 10/30/2025 3:15 PM |
| 42 | Unknown | 10/30/2025 12:47 PM |
| 43 | 14th St floods near Harrison | 10/28/2025 3:51 PM |
| 44 | Storm drain | 10/16/2025 12:35 PM |
| 45 | fires in the hills. little seems to have changed since 1991 to streets. garbage cans routinely limit width or roads on garbage days, street parking in narrow streets, erosion and landslides cover fire hydrants routinely on Charing cross and tunnel road. Tunnel Road landslide mitigation project took a very long time to implement after what seemed like years being an issue. | 10/9/2025 5:54 AM |
| 46 | MacArthur & 14th at the light before the highway ramp -- one lane is always flooded with the slightest rain | 10/7/2025 11:57 AM |
| 47 | In Maxwell Park earthquake and extreme rain | 10/6/2025 10:14 PM |
| 48 | heavy rains definitely cause the streets to get pretty flooded. if the storms get worse that sill be bad. there isnt enough drainage for the worst storms today and the drains get clogged easily/quickly. Also, the LA wildfires show how urban areas arent immune to the risk. | 10/6/2025 10:45 AM |
| 49 | We get flooding at the end of 37th where it hits the creek & Cesar Chavez park. | 10/5/2025 3:14 PM |
| 50 | Not sure | 10/3/2025 11:28 PM |
| 51 | Not sure | 10/3/2025 2:17 PM |
| 52 | Hw 13 flooding near foothill in wet season, wildfire and earthquake caused fire danger near Hayward fault which corresponds with wildfire risk area. Deteriorating conditions on park Blvd access to highway 13 during wet weather and potential for landslides that would block access to the hw. | 10/2/2025 9:01 PM |
| 53 | not sure | 10/2/2025 2:32 PM |
| 54 | Earthquake is most concerning. I believe we live near a fault—Maxwell Ave & Birdsall Ave | 10/2/2025 12:53 PM |
| 55 | The off ramp from 580E that goes to MacArthur and San Pablo under the bridge always has standing water and floods easily | 10/1/2025 5:10 PM |
| 56 | Flatlands neighborhoods along the I-880 corridor like Fruitvale and West Oakland are urban heat islands due to heat-retaining materials like asphalt and concrete, lack of green space and less tree cover. They also have older housing stock that lacks air conditioning and adequate ventilation, and have large populations of seniors, unhoused residents, outdoor workers, those with preexisting medical conditions and other heat vulnerable residents. | 10/1/2025 2:41 PM |
| 57 | No | 10/1/2025 12:20 PM |
| 58 | I don’t know | 10/1/2025 11:05 AM |
| 59 | In the 1989 Loma Prieta earthquake, bridges and freeways collapsed. In the 1991 Oakland firestorm, streets were blocked by cars and trash, which stopped people from escaping. Oakland needs street trees and freshwater because we get heat waves. There is a risk of energy utilities getting turned off. | 10/1/2025 12:56 AM |
| 60 | In the Loma Prieta earthquake, freeways and bridges collapsed. In the Oakland firestorm, streets were blocked by cars and trash. Oakland has a lack of street trees and freshwater access in heat waves. Energy utilities can get turned off. | 10/1/2025 12:44 AM |
| 61 | Unaware | 9/30/2025 11:03 PM |
| 62 | 81st Ave and San Leandro... 85th and Edes near FedEx and the DMV | 9/30/2025 10:01 PM |
| 63 | Everywhere | 9/30/2025 9:41 PM |
| 64 | Extreme heat causes rolling power outages, therefore, during these situations, what are | 9/30/2025 6:06 PM |

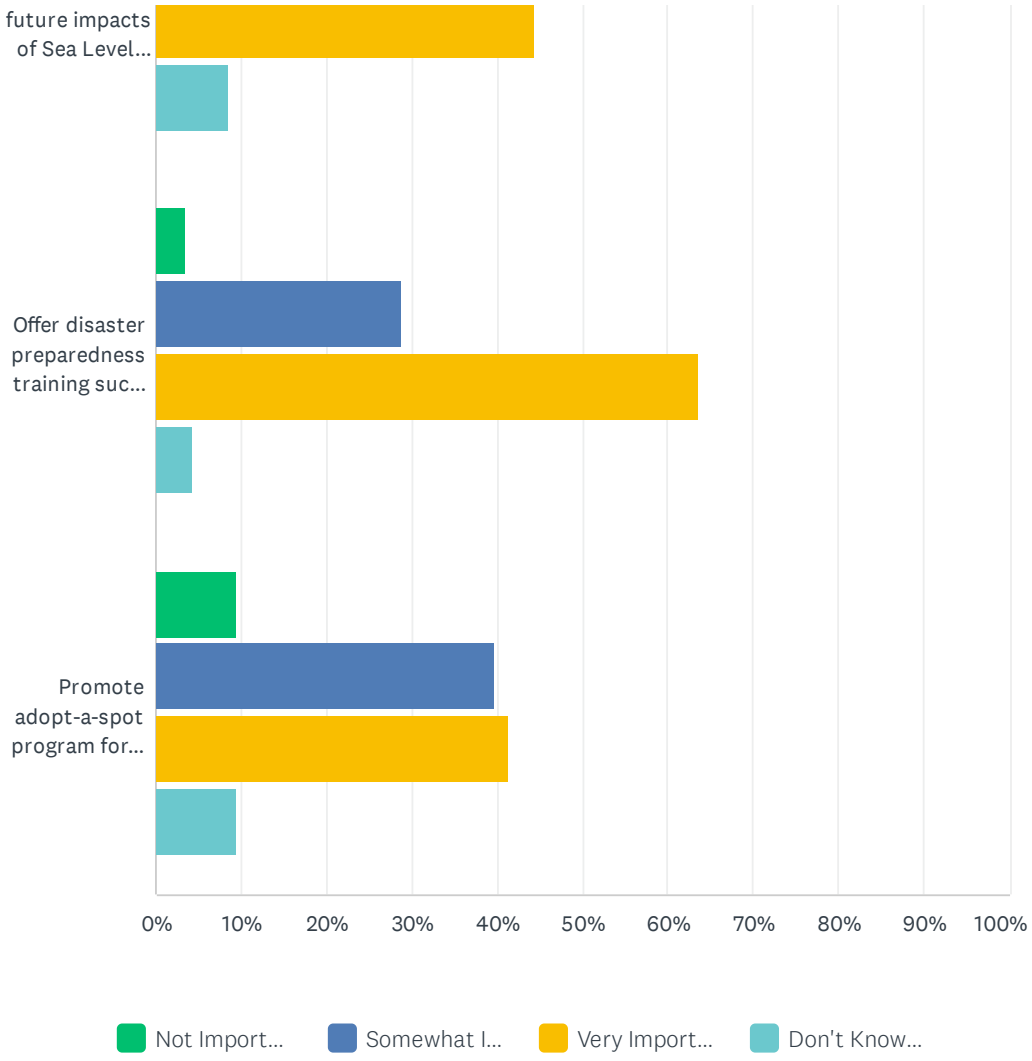
| | | |
|---|---|---|
| | resources available to the community in the area of 19th & Brush Streets, Oakland. | |
| 65 | Storm drains and dips on the freeway become extremely hazardous during the rain season | 9/30/2025 1:48 PM |
| 66 | hayward fault adjacent sites | 9/30/2025 1:34 PM |
| 67 | Of course, District 2 and 4. | 9/30/2025 11:00 AM |
| 68 | Freeways and bridges could collapse like the Cypress viaduct and Bay Bridge did in the 1989 Loma Prieta earthquake. Low-income areas with no street trees or freshwater are deadly in heat waves. Trash and cars could clog streets, causing traffic jams. Energy utilities can be disrupted. | 9/30/2025 5:25 AM |
| 69 | Earthquake for sure, I think I live by an ungrounded Sausal creek but I am not informed enough to know if it will flood | 9/30/2025 3:05 AM |
| 70 | Flooding/overflowing of Indian Creek down Trestle Glen Road, in district 2. Damn break from Tyson lake in Piedmont flooding the Crocker Highlands and Trestle Glen neighborhoods. | 9/29/2025 10:41 PM |
| 71 | Maddox always floods during storms | 9/29/2025 10:29 PM |
| 72 | no | 9/29/2025 9:21 PM |
| 73 | All of West Oakland due to possible liquefaction during a quake. | 9/28/2025 11:48 AM |
| 74 | Flooding along 7th Street where I live and use to commute to work (near 7th street BART station) | 9/27/2025 1:09 PM |
| 75 | Hills during wildfire. | 9/26/2025 7:29 PM |
| 76 | flooding in the 42nd Avenue underpass at I-880 | 9/26/2025 7:13 PM |
| 77 | The corner of 8th St and Chester Street tends to flood during protracted rainy periods. | 9/26/2025 12:32 PM |
| 78 | I am unsure where the worst spots in our neck of the woods would be. | 9/26/2025 11:21 AM |
| 79 | I worry about my own property that bumps up against the college ave businesses and takes on all of their rain water. They all have broken gutters that drain water into my yard. I've put in sump pumps to help but if the power goes out we are in trouble. 334 Clifton st. | 9/26/2025 1:53 AM |
| 80 | The hills for wildfire. The area along the Hayward Fault and land near the Bay for earthquake. Land near the Bay for sea level rise. | 9/23/2025 2:14 PM |

# Q8 Mitigation actions are steps the City of Oakland can take to diminish the impact of disasters. How important is it for the City of Oakland to take the following actions over the next five years?

Answered: 120 Skipped: 0




Explore ways to provide backup energ...
Ensure City of Oakland buildings ha...
Create Municipal Resilience...
Identify and address equity concerns...
Make improvements to ensure the P...
Assess the


future impacts of Sea Level...
Offer disaster preparedness training suc...
Promote adopt-a-spot program for...
0%
10%
20%
30%
40%
50%
60%
70%
80%
90%
100%
Not Import...
Somewhat I...
Very Import...
Don't Know...

| | NOT IMPORTANT | SOMEWHAT IMPORTANT | VERY IMPORTANT | DON'T KNOW / NO OPINION | TOTAL | WEIGHTED AVERAGE |
|---|---|---|---|---|---|---|
| Programs to help homeowners strengthen their homes in case of Earthquake. | 5.08% 6 | 22.03% 26 | 71.19% 84 | 1.69% 2 | 118 | 2.69 |
| Improvements to the City's ability to manage water from winter storms and reduce flooding. | 1.68% 2 | 43.70% 52 | 54.62% 65 | 0.00% 0 | 119 | 2.53 |
| Management of plant growth in the Oakland Hills to reduce risk from Wildfire. | 0.84% 1 | 14.29% 17 | 84.03% 100 | 0.84% 1 | 119 | 2.85 |
| Ensure City Departments are trained and able to continue to function in case of a disaster. | 2.54% 3 | 11.86% 14 | 83.90% 99 | 1.69% 2 | 118 | 2.85 |
| Explore ways to provide backup energy sources to City facilities and provide community electrical charging stations in case of emergency. | 1.71% 2 | 26.50% 31 | 70.09% 82 | 1.71% 2 | 117 | 2.72 |
| Ensure City of Oakland buildings have greater safety in case of an earthquake. | 2.54% 3 | 39.83% 47 | 55.08% 65 | 2.54% 3 | 118 | 2.58 |
| Create Municipal Resilience Hubs, city facilities that act as a community resource in times of disaster and which build strong communities through regular programming. | 5.93% 7 | 14.41% 17 | 74.58% 88 | 5.08% 6 | 118 | 2.79 |
| Identify and address equity concerns (determining which individuals and/or communities may have greater impacts from disasters) when planning for disasters. | 6.90% 8 | 26.72% 31 | 61.21% 71 | 5.17% 6 | 116 | 2.65 |
| Make improvements to ensure the Port of Oakland can function after an earthquake or other disaster. | 15.52% 18 | 31.03% 36 | 43.10% 50 | 10.34% 12 | 116 | 2.48 |
| Assess the future impacts of Sea Level Rise in the City of Oakland. | 10.26% 12 | 36.75% 43 | 44.44% 52 | 8.55% 10 | 117 | 2.51 |
| Offer disaster preparedness training such as Personal Emergency Preparedness (PEP) workshops or Community Emergency Responders Training (CERT). | 3.39% 4 | 28.81% 34 | 63.56% 75 | 4.24% 5 | 118 | 2.69 |
| Promote adopt-a-spot program for neighbors to clear drains to address flooding. | 9.48% 11 | 39.66% 46 | 41.38% 48 | 9.48% 11 | 116 | 2.51 |

# Q9 Do you have other suggestions for actions the City of Oakland could take to reduce the damage caused by disasters?

Answered: 55 Skipped: 65

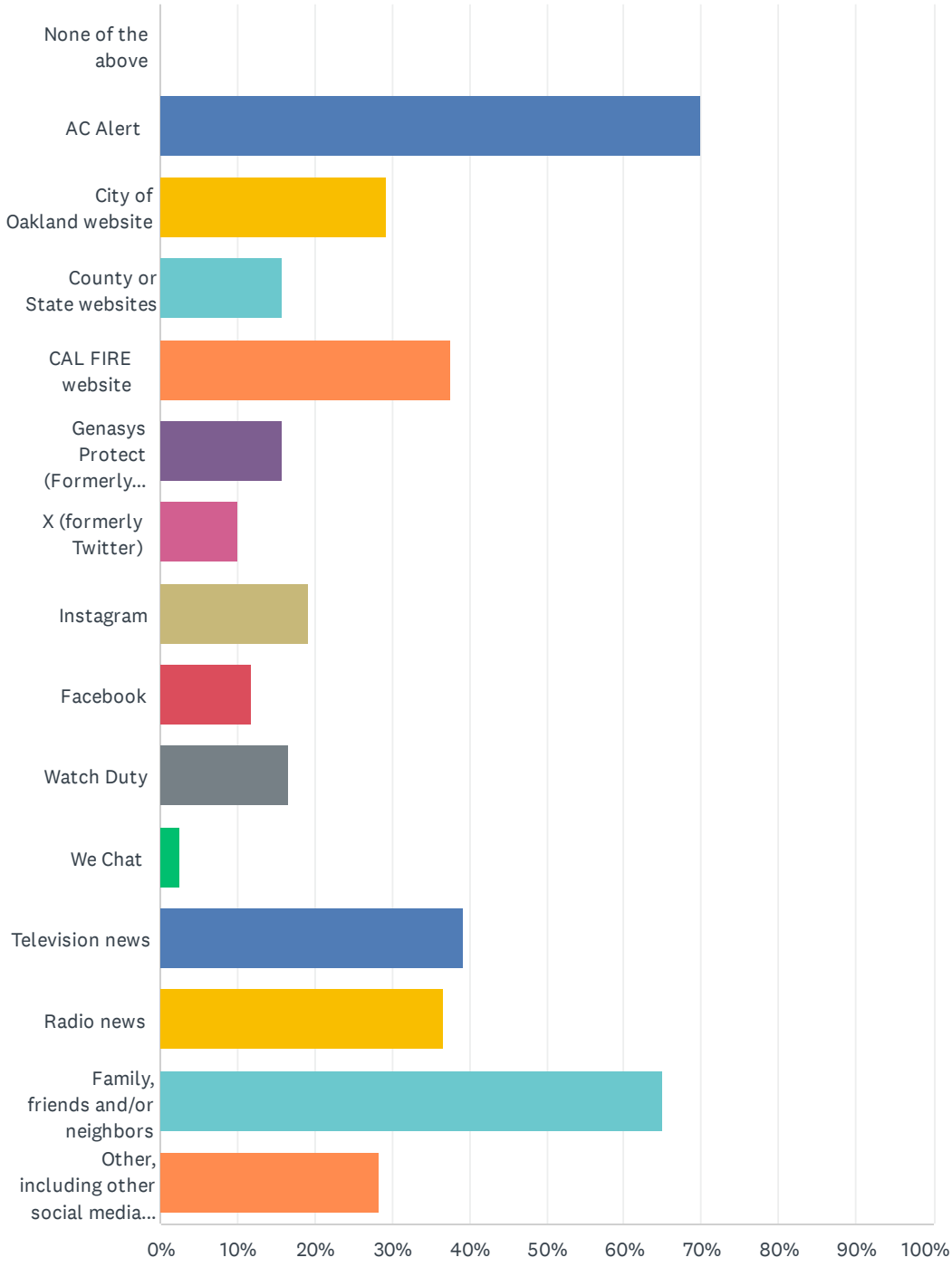
| # | RESPONSES | DATE |
|---|---|---|
| 1 | Get rid of the eucalyptus trees. Also, we don't need zone zero, we need incentives for people to harden their roofs. | 12/17/2025 12:10 PM |
| 2 | Fix the roads which are already a disaster and would make evacuating difficult | 12/17/2025 10:23 AM |
| 3 | It is one thing to worry about growth around houses. However in Dimond Canyon there is a lot of dry brush and downed trees that are all ripe for being fuel for a wild fire. | 12/16/2025 9:09 PM |
| 4 | Make PG&E put their electrical wires underground. Piedmont has done it. But Oakland has been ignored by PG&E because our government has not lobbied for the residents of Montclair —a tree-heavy area on a hill with few egress points. | 12/16/2025 1:54 PM |
| 5 | Underground the PG&E lines in the hills. Enforce parking rules for emergency vehicles to be able to reach emergencies. | 12/16/2025 1:28 PM |
| 6 | Burying power lines | 12/16/2025 11:49 AM |
| 7 | Reopen fire stations, answer 911 calls, fix the roads, reopen blocked-off traffic lanes - we need to focus on the basics first. Removing trees makes us more vulnerable to landslides and extreme heat - deforesting our city is not the answer. | 12/16/2025 9:30 AM |
| 8 | Training and mock disaster drills | 12/16/2025 7:55 AM |
| 9 | Disaster escape routes from hills and parking areas for cars trying to escape. | 12/16/2025 12:59 AM |
| 10 | Be sure all fire hydrants are accessible and not blocked by landslide, vegetation, etc. | 12/15/2025 11:16 PM |
| 11 | make sure evacuation routes from oakland hills in are clear in the event of a fire. | 12/15/2025 10:44 PM |
| 12 | MAINTAIN INFRASTRUCTURE!! Less hand-wringing about bike lanes, and more attention to clearing brush, clearing storm drains, removing road-side (including gutters) brush/trash and other gunk that too often blocks drain grates. | 12/15/2025 9:27 PM |
| 13 | My priority is for the City to expeditiously comply with the 2024-25 Grand Jury Final Report recommendations to the City Council to "expand parking restrictions on narrow streets in high fire risk areas and increase parking enforcement in those areas," | 12/15/2025 8:50 PM |
| 14 | There is hardly any road areas in the Oakland Hills that have been properly paved and will support current or emergency traffic. Some have not be maintained for over 20 years. Remove or heavily thin out existing Eucalyptus trees and other highly flammable plants. Reinforce failing road sides and maintain or repair to allow 2-way traffic. | 12/15/2025 7:08 PM |
| 15 | The wildfire inspections are great, but there are so many eucalyptus trees in the hills, which are extremely flammable and dangerous in a wildfire. I think there needs to be more done to remove those trees from private properties. The cost of taking down a whole tree is prohibitive for many, if not most, people and there is a public good that comes from hazardous tree removal. | 12/15/2025 5:33 PM |
| 16 | Remove eucalyptus and other fire prone trees. | 12/15/2025 4:45 PM |
| 17 | Provide materials and information for homeowners to address Zone 0 | 12/12/2025 5:38 PM |
| 18 | Enforce safety provisions currently ignored by the DOT in Montclair | 12/10/2025 6:05 PM |
| 19 | Pave the streets to allow for emergency evacuation and or timely emergency response. | 12/10/2025 4:27 PM |
| 20 | Be proactive and opportunistic when building and rebuilding now, before a disaster. Create economic incentives to take this on--consider property tax exemptions for improvements on property, and consider how to provide exemptions or even pay for projects that support | 12/10/2025 2:46 PM |

| | | |
|---|---|---|
| | disaster resilience at the community level proactively. This sort of work can also be used to improve the City's bond rating (see how New Orleans did this). This can and should be seen as a cost saving measure--just because we don't properly account for disaster risk now doesn't mean that it's not a real cost. | |
| 21 | Build better stormdrains! | 11/25/2025 2:07 PM |
| 22 | Water access communication placed throuout the city at stratigic locations. | 11/24/2025 4:51 PM |
| 23 | Spend the tax money already collected to address these issues about wildland migration. Let taxpayers know where/what the taxes collected are being spent on. | 11/6/2025 6:52 PM |
| 24 | Employ more public works employees to keep the city functioning and keep up with the vandalism and decay present at all city sites. Stop saving money buy gutting the agency we depend on to keep things running. Stop outsourcing labor. OPW should be maintaining our city, not contractors. | 11/5/2025 8:13 PM |
| 25 | Our Recreation Centers are now on internet based phones. In a disaster this could proof to problem since the first communication to get bogged down is cell/internet. There should be an operational line land in every center specifically for emergencies. | 10/31/2025 9:34 PM |
| 26 | Perhaps the community alert system Via text | 10/31/2025 7:40 PM |
| 27 | Volunteer programs for high schoolers (instead of volunteering at food bank they volunteer to help with mitigation efforts), enlist established communities like congregations and co-living communities in place-based mitigation, create more family friendly activities that promote preparedness, teach preparedness in schools | 10/31/2025 1:02 PM |
| 28 | Not at this moment | 10/30/2025 3:15 PM |
| 29 | No | 10/30/2025 12:47 PM |
| 30 | Address hoarding and blight which make rescues harder, and increase the risk of fires. | 10/28/2025 3:51 PM |
| 31 | homeowner Insurance education. Firesafe landscaping can affect insurance. Grow adopt a storm drain program make it easier to replace dead street trees for shade more red-flag warning signs around close strategic streets during fourth of July and other hot and windy weatherevents (currently done on skyline) | 10/9/2025 5:54 AM |
| 32 | I think drains should be cleared by staffed workers from the city and not neighbors having to adopt a drain. | 10/6/2025 5:02 PM |
| 33 | Start advertising these programs on social media. Relying on email and government websites create class and age barriers. | 10/5/2025 3:14 PM |
| 34 | Incentives to reinforce buildings & houses, community centers to go in care of emergency | 10/3/2025 2:17 PM |
| 35 | Building resilience hubs and community led teams prepared to respond to disasters seems very important. In these emergencies, relying solely of FD and city resources won't be sufficient. We need to build infrastructure and training in our populace and disperse resources so they can be accessed via hubs in emergencies. | 10/2/2025 9:01 PM |
| 36 | Distribute clean drinking water to unhoused residents and outdoor workers (including street vendors) during extreme heat events. Fix and retrofit drinking fountains at public parks with filters and replace lead service lines at Oakland schools to ensure that residents have access to safe clean drinking water sources during extreme heat events. Retrofit schools and recreation centers and other public cooling centers with HVAC systems to ensure access to air conditioning and adequate ventilation during heat waves. | 10/1/2025 2:41 PM |
| 37 | No | 10/1/2025 12:20 PM |
| 38 | Clear all of the homeless encampments like other cities Why does Oakland seem like the dumping ground. Where people from other cities come, drop there trash with no repercussions. Are those cameras working to cite these folks? | 10/1/2025 11:05 AM |
| 39 | People will need food, water, and shelter. We need to consider equitable access for children, seniors, and disabled people. | 10/1/2025 12:56 AM |
| 40 | People will need access to food, water, and shelter. | 10/1/2025 12:44 AM |
| 41 | Not at this time | 9/30/2025 9:41 PM |

| | | |
|---|---|---|
| 42 | Prior Preparation Prevents Poor Performance | 9/30/2025 6:06 PM |
| 43 | Do the actual work, enough with the paper pushing | 9/30/2025 1:48 PM |
| 44 | Yes, not enough space to enumerate each of my ideas. | 9/30/2025 11:00 AM |
| 45 | People will require access to food and freshwater. Everyone should have healthcare. We should practice public health and preventative medicine. Equitable accessibility for children, seniors, and disabled people. Emergency public transit could be a way to avoid car use and traffic jams. | 9/30/2025 5:25 AM |
| 46 | Has to be multilingual and center the low income neighborhoods | 9/30/2025 3:05 AM |
| 47 | Repair the roadways and potholes so that there is good access to transportation. Place emergency bins and first aid kits in neighborhoods for quick access. Set up a battery powered CB radio response Center if there is no electrical power available. If there's no electricity, develop a way to use ATM services to get cash. Designate areas for food and water distribution sites. | 9/29/2025 10:41 PM |
| 48 | have a practice drill | 9/29/2025 9:21 PM |
| 49 | Engage with the unhoused and vulnerable communities | 9/29/2025 9:08 PM |
| 50 | ++ on resilience hubs for centralized support | 9/27/2025 4:46 AM |
| 51 | Give financial aid to help folks install small gas shut off valves at their house. They cost about $200.00 a piece but require a plumber to install. With a screw driver they can reset the gas to their house after a earthquake of 5.0 or greater shuts off the flow of gas , diminishing house fires. | 9/26/2025 9:34 PM |
| 52 | Regular scenario training in the EOC. | 9/26/2025 7:29 PM |
| 53 | When repaving of streets occurs consider designs with fewer impermiable surfaces. Such as adding traffic circles and buffers for sidewalks and bike lanes with plants or stones in them and a general reduction of motor vehicle lanes where possible. Emergency evacuation for those who don't have a car is important. Me and many of my neighbors don't have cars. An emergency evacuation plan that involves buses that don't get stuck in traffic would be a huge plus in case of an evacuation. | 9/26/2025 12:32 PM |
| 54 | I'm unsure how best to strategize. I know that organizing ourselves locally is the best jumping off point, but apart from that, I'm not sure what other pieces would most need priority at the City level. That would probably depend on best practices combined with Oakland's particular weak spots and needs both as a city and also regionally (what we need and also can provide). | 9/26/2025 11:21 AM |
| 55 | Tell people what an emergency really is during an actual disaster so they know when not to call for help. | 9/26/2025 1:53 AM |

# Q10 Where do you go to get information related to emergencies and evacuations? (Check all that apply)

Answered: 120 Skipped: 0



| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| None of the above | 0.00% | 0 |
| AC Alert | 70.00% | 84 |
| City of Oakland website | 29.17% | 35 |
| County or State websites | 15.83% | 19 |
| CAL FIRE website | 37.50% | 45 |
| Genasys Protect (Formerly Zonehaven) | 15.83% | 19 |
| X (formerly Twitter) | 10.00% | 12 |
| Instagram | 19.17% | 23 |
| Facebook | 11.67% | 14 |
| Watch Duty | 16.67% | 20 |
| We Chat | 2.50% | 3 |
| Television news | 39.17% | 47 |
| Radio news | 36.67% | 44 |
| Family, friends and/or neighbors | 65.00% | 78 |
| Other, including other social media or other websites (please specify) | 28.33% | 34 |
| Total Respondents: 120 | | |

| # | OTHER, INCLUDING OTHER SOCIAL MEDIA OR OTHER WEBSITES (PLEASE SPECIFY) | DATE |
|---|---|---|
| 1 | Next Door | 12/17/2025 10:23 AM |
| 2 | iPhone alerts, PG & E | 12/16/2025 9:30 AM |
| 3 | NextDoor | 12/16/2025 1:41 AM |
| 4 | We have created a What's App group for our street due to high crime. | 12/16/2025 12:03 AM |
| 5 | Neighborhood Association Alert System (phone and text) | 12/15/2025 11:16 PM |
| 6 | Neighborhood WhatsApp, Citizen | 12/15/2025 8:50 PM |
| 7 | Bluesky | 12/15/2025 5:33 PM |
| 8 | Neighborhood group called CABS that send out emergency alerts and provides emergency preparedness resources via text and email. | 12/15/2025 5:33 PM |
| 9 | Neighborhood groups. | 12/15/2025 5:07 PM |
| 10 | Nextdoor | 12/15/2025 4:45 PM |
| 11 | Public Safety, nixle, Lab Alerts (LBNL) | 12/12/2025 5:38 PM |
| 12 | Internet news | 12/10/2025 6:05 PM |
| 13 | Google | 11/25/2025 5:11 PM |
| 14 | GENOAK, ORCA | 11/19/2025 10:56 PM |
| 15 | I use to receive Nixle alerts | 11/8/2025 5:05 PM |
| 16 | Weather apps, citizen, NOAA alerts and NIXIE | 11/5/2025 8:13 PM |
| 17 | My job, because I am a disaster worker. | 10/31/2025 9:34 PM |

| | | |
|---|---|---|
| 18 | Bluesky | 10/16/2025 11:56 AM |
| 19 | Blue Sky | 10/9/2025 5:54 AM |
| 20 | Google | 10/3/2025 11:28 PM |
| 21 | Npr | 10/2/2025 9:01 PM |
| 22 | Websites of local news sources; push notifications via my phone (not sure where the earthquake alerts come from actually) | 10/1/2025 5:10 PM |
| 23 | AirNow (for air quality updates); National Tsunami Warning Center website (I live near the shoreline) | 10/1/2025 2:41 PM |
| 24 | Emergency Alert System | 10/1/2025 12:44 AM |
| 25 | Google | 9/30/2025 10:01 PM |
| 26 | Information received from my senior center, West Oakland or North Oakland Senior Centers. | 9/30/2025 6:06 PM |
| 27 | Bluesky | 9/30/2025 5:25 AM |
| 28 | Reddit | 9/30/2025 3:05 AM |
| 29 | earthquake.usgs.gov | 9/29/2025 7:39 PM |
| 30 | Slack (via a network of friends) | 9/28/2025 11:48 AM |
| 31 | Cell Phone Alerts | 9/26/2025 7:29 PM |
| 32 | Online news | 9/26/2025 12:32 PM |
| 33 | Block captains and similar local networks and meetings. | 9/26/2025 11:21 AM |
| 34 | What app | 9/26/2025 1:53 AM |

# Q11 What would make it easier for you to receive emergency information quickly?

Answered: 67 Skipped: 53

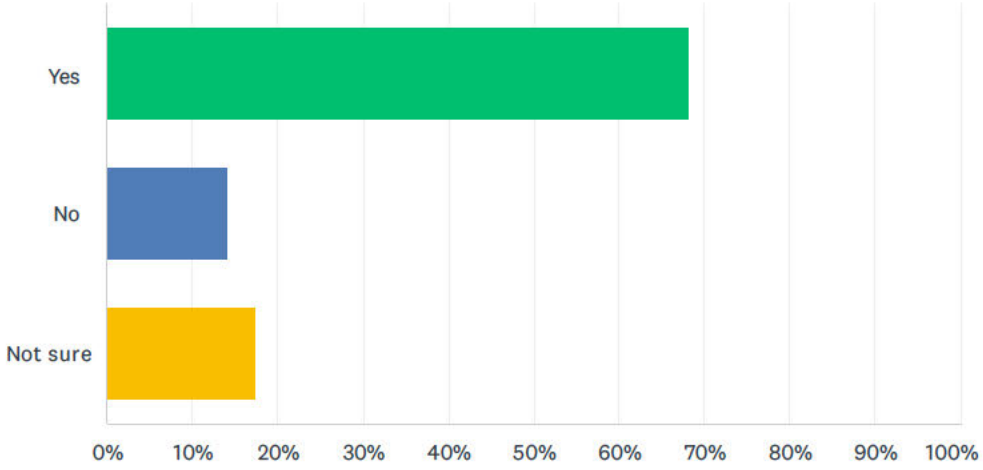
| # | RESPONSES | DATE |
|---|---|---|
| 1 | I think the difficult part of receiving any information will be if cell towers or power line or cables for internet are out of commission it won't matter where we try to find information. | 12/16/2025 10:33 PM |
| 2 | Texting | 12/16/2025 2:39 PM |
| 3 | Ham radio training | 12/16/2025 1:28 PM |
| 4 | Not sure, need a way to receive alerts that doesn't rely on power or internet - when power gets shut off, our Verizon internet is shut off with it so websites are useless | 12/16/2025 9:30 AM |
| 5 | Receive alerts | 12/16/2025 7:55 AM |
| 6 | Nothing, get plenty of info, except valid escape routes by car or foot | 12/16/2025 12:59 AM |
| 7 | Confidence that somebody will turn on the Siren if there is a major wildfire in the middle of the night. | 12/15/2025 11:16 PM |
| 8 | If it was timely and accurate | 12/15/2025 8:50 PM |
| 9 | City wide alerts. | 12/15/2025 5:07 PM |
| 10 | Texts | 12/12/2025 5:38 PM |
| 11 | home, landline phone | 12/10/2025 6:17 PM |
| 12 | Better ATT WiFi coverage in the hills | 12/10/2025 6:05 PM |
| 13 | A one stop shop that gets updated regularly--often not clear where to go generally, and when the last update was. | 12/10/2025 2:46 PM |
| 14 | Alerting System and Nextel | 12/10/2025 10:57 AM |
| 15 | Text alerts | 11/24/2025 4:51 PM |
| 16 | Text message blast to all City of Oakland employees with Emergency Information. | 11/24/2025 4:47 PM |
| 17 | Phone alerts | 11/24/2025 4:31 PM |
| 18 | Alameda County wide alert systems via text, internet or social media. | 11/6/2025 6:52 PM |
| 19 | Robo calls or instant emails. | 11/6/2025 6:39 PM |
| 20 | its not receiving info i'm worried about. | 11/5/2025 8:13 PM |
| 21 | N/A | 10/31/2025 9:34 PM |
| 22 | Text message alerts | 10/31/2025 9:02 PM |
| 23 | Text messaging Real time, social media updates And lives | 10/31/2025 7:40 PM |
| 24 | A centralized source for reliable emergency info | 10/31/2025 1:02 PM |
| 25 | Email or phone call | 10/30/2025 3:15 PM |
| 26 | Phone | 10/30/2025 12:47 PM |
| 27 | Texts | 10/20/2025 5:58 PM |
| 28 | Yes | 10/16/2025 12:35 PM |
| 29 | One place to go that has access to all the other places Direct to mobile phone alerts | 10/9/2025 5:54 AM |

| | | |
|---|---|---|
| 30 | SMS notifications | 10/7/2025 11:57 AM |
| 31 | text | 10/6/2025 10:14 PM |
| 32 | City alert text is fine | 10/6/2025 5:02 PM |
| 33 | direct text message communication | 10/6/2025 10:45 AM |
| 34 | Text alerts | 10/4/2025 7:47 PM |
| 35 | Phone alerts, either from an app or via text (AC Alert does this) | 10/3/2025 11:28 PM |
| 36 | Phone | 10/3/2025 2:17 PM |
| 37 | Reverse 911 texts- ensuring alerts include live maps to clarify impacted locations | 10/2/2025 9:01 PM |
| 38 | alerts | 10/2/2025 2:32 PM |
| 39 | Alerts via texts & email | 10/2/2025 12:53 PM |
| 40 | Multilingual audio-based emergency alert system (see example of Ventura County Air Pollution Control District's emergency alerts system for wildfire smoke in multiple languages) | 10/1/2025 2:41 PM |
| 41 | text (sms) alerts | 10/1/2025 12:54 PM |
| 42 | Text | 10/1/2025 12:20 PM |
| 43 | Text | 10/1/2025 12:18 PM |
| 44 | Mail bullet points to everyone to explain what to do in case of emergency and provide informational meetings at all of the Senior Centers | 10/1/2025 11:05 AM |
| 45 | Oakland has a diverse population and will need translation services for multiple languages. | 10/1/2025 12:56 AM |
| 46 | There should be translation services in multiple languages. My first language is Spanish. | 10/1/2025 12:44 AM |
| 47 | Text audio alarms sirens | 9/30/2025 10:01 PM |
| 48 | I wouldn't worry so much I would feel more secure as to what to do and where to go. | 9/30/2025 9:41 PM |
| 49 | text | 9/30/2025 7:34 PM |
| 50 | I'm not sure of all the resources that are currently available to me. | 9/30/2025 6:06 PM |
| 51 | Text alerts | 9/30/2025 1:48 PM |
| 52 | Phone notification | 9/30/2025 1:34 PM |
| 53 | Universal and common language shared among all platforms. | 9/30/2025 11:00 AM |
| 54 | Please provide translation services because we live in a diverse population, where people may not communicate in English. | 9/30/2025 5:25 AM |
| 55 | Automated text | 9/30/2025 3:05 AM |
| 56 | Good AM radio reception. Access to CB Radio transmission site. Cell phone charging stations. | 9/29/2025 10:41 PM |
| 57 | Text notifications | 9/29/2025 10:29 PM |
| 58 | A user friendly site to navigate, city billboards, bus fliers etc | 9/29/2025 9:08 PM |
| 59 | Text alert | 9/29/2025 7:39 PM |
| 60 | Toll-free number | 9/29/2025 11:59 AM |
| 61 | Text alerts. | 9/28/2025 12:29 PM |
| 62 | Immediate phone, TV, and radio alerts. | 9/28/2025 11:48 AM |
| 63 | Nothing comes to mind. | 9/26/2025 7:29 PM |
| 64 | I don't know | 9/26/2025 1:50 PM |
| 65 | Google alerts | 9/26/2025 12:32 PM |
| 66 | Work through already established local channels like our NCPC (Marcus Johnson) and | 9/26/2025 11:21 AM |

| | | |
|---|---|---|
| | Resilient Neighborhoods (Shirah Wagner). Don't recreate the wheel. We have some good, trusted local leadership to move through where communications are concerned. Keep it simple and Streamlined. I am also on Veoci, which is great. | |
| 67 | Maybe call out who is specifically impacted when an AC alert is sent and if we need to avoid the area. | 9/26/2025 1:53 AM |

# Q12 Are you registered for AC Alerts, the mass notification system used by Alameda County and the City of Oakland?

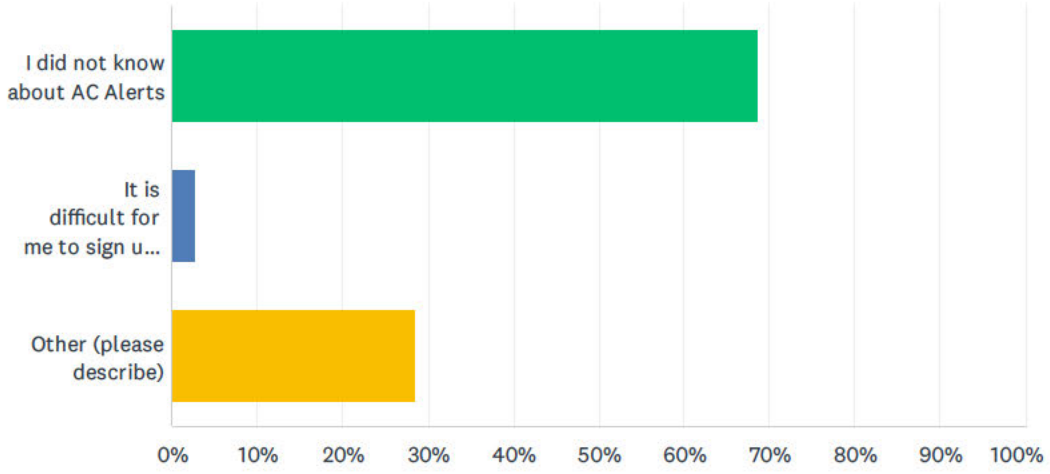
Answered: 120 Skipped: 0




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Yes | 68.33% | 82 |
| No | 14.17% | 17 |
| Not sure | 17.50% | 21 |
| TOTAL | | 120 |

# Q13 If you are not signed up for AC Alerts, why not?

Answered: 35 Skipped: 85

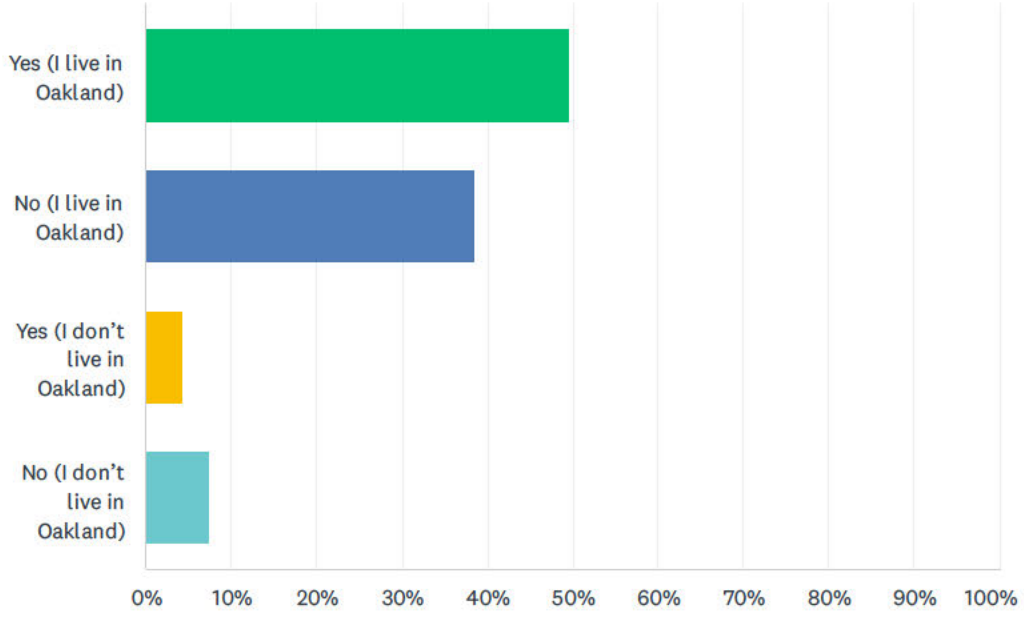



| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| I did not know about AC Alerts | 68.57% | 24 |
| It is difficult for me to sign up for things like this / I don't have easy access to the internet | 2.86% | 1 |
| Other (please describe) | 28.57% | 10 |
| TOTAL | | 35 |

| # | OTHER (PLEASE DESCRIBE) | DATE |
|---|---|---|
| 1 | Unsure | 10/31/2025 7:40 PM |
| 2 | I am signed up | 10/16/2025 12:35 PM |
| 3 | Sometimes my phone doesn't play nice with these apps, I am not sure it has worked for me in the past. | 10/2/2025 9:01 PM |
| 4 | I don't want to download an app | 10/1/2025 5:10 PM |
| 5 | I live in Contra Costa County, and did not know if I could sign up for AC alerts though I work in Oakland and my child goes to school there | 10/1/2025 2:41 PM |
| 6 | I prefer the Emergency Alert System. | 10/1/2025 12:56 AM |
| 7 | I prefer Emergency Alert System. | 10/1/2025 12:44 AM |
| 8 | I'll check to see if I'm signed up, if not, I will. | 9/30/2025 6:06 PM |
| 9 | We prefer the Emergency Alert System on TV/Radio. We check social media channels through our local cities. | 9/30/2025 5:25 AM |
| 10 | N/A | 9/26/2025 7:29 PM |

# Q14 Do you have a specific evacuation route you would take if asked to evacuate / leave quickly from your home?

Answered: 119 Skipped: 1




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Yes (I live in Oakland) | 49.58% | 59 |
| No (I live in Oakland) | 38.66% | 46 |
| Yes (I don't live in Oakland) | 4.20% | 5 |
| No (I don't live in Oakland) | 7.56% | 9 |
| TOTAL | | 119 |

# Q15 Name the major roads and/or freeways that you would you use to evacuate / leave your neighborhood quickly in the event of a disaster:

Answered: 108 Skipped: 12

| # | RESPONSES | DATE |
|---|---|---|
| 1 | Snake, Mountain/Moraga, 13. | 12/17/2025 12:10 PM |
| 2 | Broadway Terrace, Hwys 13 & 24 | 12/17/2025 10:23 AM |
| 3 | Colton, Skyline, highway 13 | 12/17/2025 12:27 AM |
| 4 | Highway 13, Skyline Blvd, possibly Pinehurst Rd, Grizzly Peak, Park Blvd | 12/16/2025 10:33 PM |
| 5 | Park Blvd | 12/16/2025 9:09 PM |
| 6 | Colton blvd down to Montclair village | 12/16/2025 2:39 PM |
| 7 | Snake Road past Zinn Drive. | 12/16/2025 1:54 PM |
| 8 | Snake, moraga, 13, 24 | 12/16/2025 1:28 PM |
| 9 | Colton, Skyline, Grizzly Peak, Hwy 13, Hwy 24 | 12/16/2025 11:49 AM |
| 10 | Saroni Drive, Colton Ave, Mountain Ave, Thornhill Rd, highway 13, highway 24 | 12/16/2025 9:30 AM |
| 11 | It depends on the emergency, but we'd probably be coming down the hill on Snake | 12/16/2025 8:24 AM |
| 12 | Snake road | 12/16/2025 8:07 AM |
| 13 | Chelton Drive Mountain Blvd Park Blvd | 12/16/2025 7:55 AM |
| 14 | Saroni to Shepherd Canyon to 13 | 12/16/2025 1:41 AM |
| 15 | freeway 13 north and south, moraga blvd, park avenue to the lake merritt, freeway 24 east and west, | 12/16/2025 12:59 AM |
| 16 | HIghway 13 or Skyline to Grizzly Peak, or Sheperd's Canyon | 12/16/2025 12:03 AM |
| 17 | Colton, Mountain, Highway 13 | 12/15/2025 11:16 PM |
| 18 | Colton Blvd or Snake Rd. | 12/15/2025 10:44 PM |
| 19 | Thornhill Drive to Moraga | 12/15/2025 9:27 PM |
| 20 | Colton Blvd., Snake Rd., Skyline Blvd. | 12/15/2025 8:50 PM |
| 21 | Snake Rd., Mountain Blvd., Park Blvd | 12/15/2025 8:46 PM |
| 22 | snake road, highway 13, highway 24 | 12/15/2025 8:44 PM |
| 23 | Colton Ave to Mountain Blvd. Paso Robles to Shepard Canyon's | 12/15/2025 7:08 PM |
| 24 | Thornhill Drive to Highway 13 in any direction that is moving | 12/15/2025 5:33 PM |
| 25 | Snake to Mountain to the 13 | 12/15/2025 5:33 PM |
| 26 | Snake Road and Highway 13, | 12/15/2025 5:07 PM |
| 27 | Thornhill uphill to Skyline as less congested than going downhill to 13. | 12/15/2025 4:45 PM |
| 28 | Adeline or Hwy 24 | 12/12/2025 5:38 PM |
| 29 | Hwy 13, Pinewood St | 12/10/2025 6:17 PM |
| 30 | Colton Blvd, Snake Rd, Skyline Blvd, Fish Ranch Rd, Highway 13, Highway 24, 580 | 12/10/2025 6:09 PM |
| 31 | Colton Blvd to Moraga, then Hwy 13, 24, 580 | 12/10/2025 6:05 PM |

| | | |
|---|---|---|
| 32 | Westover Dr; Shepherd Canyon Rd; Chelton Dr. | 12/10/2025 4:27 PM |
| 33 | Mandana Blvd, Lakeshore Ave, Park Ave, 580, 13 | 12/10/2025 2:46 PM |
| 34 | Hwy 13, Carson, and Redwood Road | 12/10/2025 10:57 AM |
| 35 | Highway 24 and drive inland, depending on the natural disaster I am avoiding. | 12/1/2025 6:29 PM |
| 36 | 880, 84 (Dumbarton Bridge) | 11/25/2025 5:11 PM |
| 37 | 580, Bancroft Ave, Macarthur Blvd, Hegenburger Rd, Havenscourt Rd, 880, Hwy 13, Hwy 24 | 11/25/2025 2:07 PM |
| 38 | Webster to I-880 | 11/24/2025 4:51 PM |
| 39 | Interstate 580, Richmond-San Rafael Bridge, Highway 101 | 11/24/2025 4:47 PM |
| 40 | Broadway | 11/24/2025 4:31 PM |
| 41 | Ascot, either down to Park (to avoid 13) or up to Skyline, depending upon the disaster | 11/19/2025 10:56 PM |
| 42 | Malcolm Hill, Skyline, Golf Links Road, Freeway 580. | 11/18/2025 1:13 AM |
| 43 | Keller Ave to I-580 | 11/17/2025 8:25 PM |
| 44 | It depends either Malcolm Ave, Golf Links Road, or Skyline to Keller Ave. Nearest freeway 580. | 11/8/2025 5:05 PM |
| 45 | Malcolm or Golf Links Road to 580 east or west. | 11/6/2025 6:52 PM |
| 46 | Streets: Genoa, Adeline, Market, MLK Jr Way. Highway 50, I980, and I880 | 11/6/2025 6:39 PM |
| 47 | The bay (I am part of a boating community), 880, 580 | 11/5/2025 8:13 PM |
| 48 | Edes, 105th, international | 11/1/2025 12:35 AM |
| 49 | If work, Kruse Avenue and 73rd Avenue. | 10/31/2025 9:34 PM |
| 50 | 880/580/I-80 | 10/31/2025 9:02 PM |
| 51 | Broadway, I-580, I-5 | 10/31/2025 1:02 PM |
| 52 | 580 880 | 10/20/2025 5:58 PM |
| 53 | 580 and park blvd | 10/16/2025 2:01 PM |
| 54 | 880 and 580 | 10/16/2025 12:35 PM |
| 55 | 14th, park Ave, 880, 580 | 10/16/2025 11:56 AM |
| 56 | Hiller Drive to Hwy 24 | 10/9/2025 5:54 AM |
| 57 | Grosvenor to Park Ave to 580 | 10/7/2025 11:57 AM |
| 58 | Birdsall and 580 | 10/6/2025 10:14 PM |
| 59 | Broadway to Macarthur to Hwy 80 if functional if not surface streets like San Pablo to work our way out of town. We have an airstream stored in Winters if we can get to it to stay if Oakland is not liveable for a time | 10/6/2025 9:31 PM |
| 60 | 880 or 580 but most likely take 35th or foothill | 10/6/2025 5:02 PM |
| 61 | it depends on the disaster and location. tsunami we are taking local routes into the hills. earthquake staying put. fire would be a highway the opposite direction, etc | 10/6/2025 10:45 AM |
| 62 | 880 or 580. 35th, 38th, or international or Foothill. | 10/5/2025 11:37 PM |
| 63 | 35th or International and 880 or 580 (depending on the disaster) | 10/5/2025 3:14 PM |
| 64 | 580, 880 or 24 depending on what happened | 10/4/2025 7:47 PM |
| 65 | San Pablo, Ashby, 580 | 10/3/2025 11:28 PM |
| 66 | International | 10/3/2025 2:17 PM |
| 67 | Leimert bridge, Park St, hw 13, 880, 580, 680 or Shepard canyon Rd, MacArthur, depending | 10/2/2025 9:01 PM |

| | | |
|---|---|---|
| | emergency | |
| 68 | not sure | 10/2/2025 2:32 PM |
| 69 | Hwy 580 & 13 are closest | 10/2/2025 12:53 PM |
| 70 | Market to 35th to 580E or 43rd to MLK to 980/880/80 | 10/1/2025 5:10 PM |
| 71 | San Pablo Avenue and the I-80 are the main thoroughfares near my home and child's school - however, these get routinely backed up during rush hour traffic so I don't think they would make for a good evacuation route during an emergency. | 10/1/2025 2:41 PM |
| 72 | alameda webster tube, 24, 880 | 10/1/2025 12:54 PM |
| 73 | 580:Freeway | 10/1/2025 12:20 PM |
| 74 | 55th av, 580 freeway | 10/1/2025 12:18 PM |
| 75 | 880 | 10/1/2025 11:19 AM |
| 76 | Interstate 880 and 73rd Avenue | 10/1/2025 11:05 AM |
| 77 | Peralta Hacienda Historical Park, International Blvd/E 14th St., Foothill Blvd, 35th Ave, or San Leandro St. | 10/1/2025 12:56 AM |
| 78 | Peralta Hacienda Historical Park, International Blvd/E 14th St., Foothill Blvd, 35th Ave, or San Leandro St. | 10/1/2025 12:44 AM |
| 79 | 580 Hwy 13 | 9/30/2025 11:03 PM |
| 80 | San Leandro and Hegenberger. Or Edes Ave and 880fwy Hegenberger | 9/30/2025 10:01 PM |
| 81 | East 14 st.. no freeway to First United Methodist Church on Bancroft in San Leandro. | 9/30/2025 9:41 PM |
| 82 | broadway, macarthur, san pablo. Not sure I'd go on freeways | 9/30/2025 7:34 PM |
| 83 | 980 connector to 880, 580, and/or Hwy. 24. | 9/30/2025 6:06 PM |
| 84 | 980 580 880 | 9/30/2025 3:44 PM |
| 85 | 580 | 9/30/2025 1:48 PM |
| 86 | Highway 24 to orinda | 9/30/2025 1:34 PM |
| 87 | Yes, major thoroughfares throughout Oakland. | 9/30/2025 11:00 AM |
| 88 | Peralta Hacienda Historical Park, International Blvd/E 14th St, Foothill Blvd, 35th Ave, or San Leandro St. | 9/30/2025 5:25 AM |
| 89 | Fruitvale Ave., 880 or 580 | 9/30/2025 3:05 AM |
| 90 | I-880, I-580, Hwy-29, I-101, | 9/29/2025 10:41 PM |
| 91 | 880 | 9/29/2025 10:29 PM |
| 92 | The 580 over to the 5 and go north | 9/29/2025 9:21 PM |
| 93 | Webster tunnel | 9/29/2025 9:08 PM |
| 94 | 580 | 9/29/2025 7:39 PM |
| 95 | 880, 580, san leandro blvd, Doolittle dr | 9/29/2025 11:59 AM |
| 96 | 980 | 9/28/2025 12:29 PM |
| 97 | From Willow Street, I would either walk or bike to Peralta and make my way from there. | 9/28/2025 11:48 AM |
| 98 | 580/880 | 9/27/2025 1:09 PM |
| 99 | 580 or 880 | 9/27/2025 11:31 AM |
| 100 | Shattuck and highway 24 | 9/27/2025 4:46 AM |
| 101 | Hwy 24, Or hwy 980 to 80 or 580 | 9/26/2025 9:34 PM |

| | | |
|---|---|---|
| 102 | MLK to Waterfront or to Fire House 1. | 9/26/2025 7:29 PM |
| 103 | 35th Avenue, I-580 | 9/26/2025 7:13 PM |
| 104 | I don't know. I need guidance with this. It depends on where a fire or earthquake or flooding is occurring... | 9/26/2025 1:50 PM |
| 105 | Bike on 8th Street to 3rd Street if evacuating South. Bike up Mandela Parkway to the Doyle Greenway, then 9th Street (Berkeley) if evacuating north | 9/26/2025 12:32 PM |
| 106 | I don't have a car. I'm on bike. I'd need to establish something with some other folks. | 9/26/2025 11:21 AM |
| 107 | Clifton to 24 or Broadway to the 24 or 13 | 9/26/2025 1:53 AM |
| 108 | 14th Street | 9/23/2025 2:14 PM |

# Q16 Zip Code of your residence:

Answered: 117 Skipped: 3

| # | RESPONSES | DATE |
|---|---|---|
| 1 | 94611 | 12/17/2025 12:10 PM |
| 2 | 94611 | 12/17/2025 10:23 AM |
| 3 | 94611 | 12/17/2025 12:27 AM |
| 4 | 94611 | 12/16/2025 10:33 PM |
| 5 | 94602 | 12/16/2025 9:09 PM |
| 6 | 94611 | 12/16/2025 2:39 PM |
| 7 | 94611 | 12/16/2025 1:54 PM |
| 8 | 94611 | 12/16/2025 1:28 PM |
| 9 | 94611 | 12/16/2025 11:49 AM |
| 10 | 94611 | 12/16/2025 9:30 AM |
| 11 | 94611 | 12/16/2025 8:24 AM |
| 12 | 94611 | 12/16/2025 8:07 AM |
| 13 | 94611 | 12/16/2025 7:55 AM |
| 14 | 94611 | 12/16/2025 1:52 AM |
| 15 | 94611 | 12/16/2025 1:41 AM |
| 16 | 94611 | 12/16/2025 12:59 AM |
| 17 | 94611 | 12/16/2025 12:03 AM |
| 18 | 94611 | 12/15/2025 11:16 PM |
| 19 | 94611 | 12/15/2025 10:44 PM |
| 20 | 94611 | 12/15/2025 9:27 PM |
| 21 | 94611 | 12/15/2025 8:50 PM |
| 22 | 94611 | 12/15/2025 8:46 PM |
| 23 | 94611 | 12/15/2025 8:44 PM |
| 24 | 94611 ( Oakland not Piedmont) | 12/15/2025 7:08 PM |
| 25 | 94611 | 12/15/2025 5:33 PM |
| 26 | 94611 | 12/15/2025 5:33 PM |
| 27 | 94611 | 12/15/2025 5:07 PM |
| 28 | 94611 | 12/15/2025 4:45 PM |
| 29 | 94607 | 12/12/2025 5:38 PM |
| 30 | 94611 | 12/10/2025 6:17 PM |
| 31 | 94611 | 12/10/2025 6:09 PM |
| 32 | 94611 | 12/10/2025 6:05 PM |
| 33 | 94611 | 12/10/2025 4:27 PM |

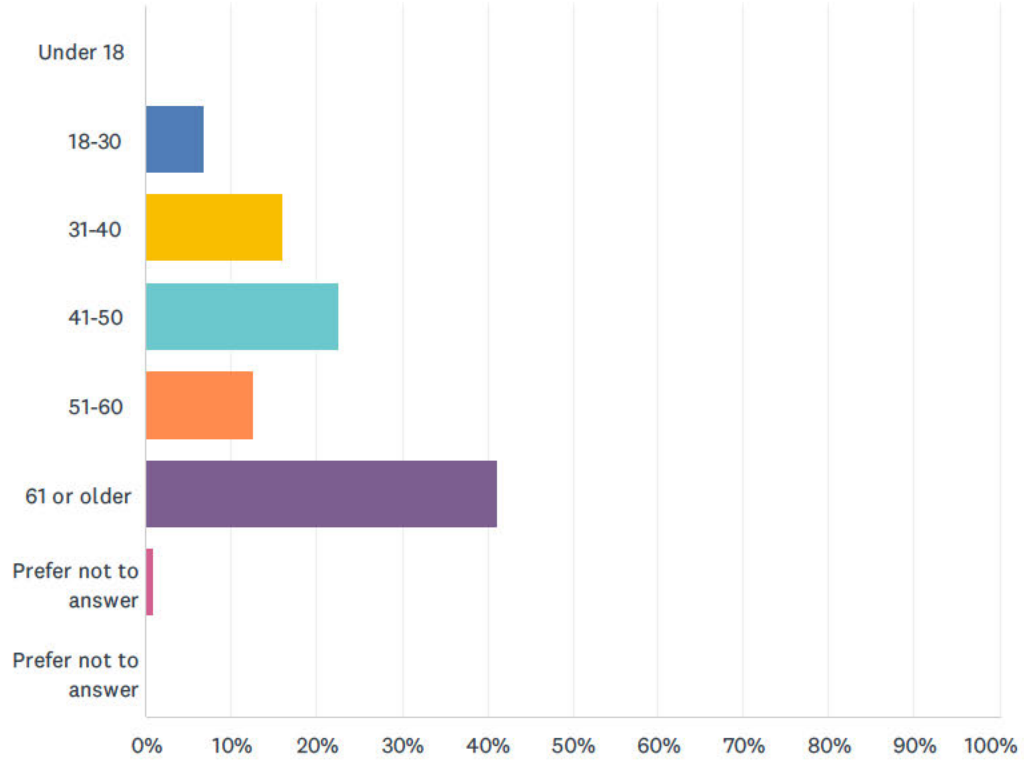
| | | |
|---|---|---|
| 34 | 94618 | 12/10/2025 3:34 PM |
| 35 | 94610 | 12/10/2025 2:46 PM |
| 36 | 94619 | 12/10/2025 10:57 AM |
| 37 | 94609 | 12/1/2025 6:29 PM |
| 38 | 94303 | 11/25/2025 5:11 PM |
| 39 | 94605 | 11/25/2025 2:07 PM |
| 40 | 94501 | 11/24/2025 4:51 PM |
| 41 | 94903 | 11/24/2025 4:47 PM |
| 42 | 94612 | 11/24/2025 4:31 PM |
| 43 | 94611 | 11/19/2025 10:56 PM |
| 44 | 94605 | 11/18/2025 1:13 AM |
| 45 | 94605 | 11/17/2025 8:25 PM |
| 46 | 94605 | 11/8/2025 5:05 PM |
| 47 | 94605 | 11/6/2025 6:52 PM |
| 48 | 94608 | 11/6/2025 6:39 PM |
| 49 | 94606 | 11/5/2025 8:13 PM |
| 50 | 94601 | 11/4/2025 1:59 PM |
| 51 | 94606 | 11/3/2025 2:26 PM |
| 52 | 94603 | 11/1/2025 12:35 AM |
| 53 | 94533 | 10/31/2025 9:34 PM |
| 54 | 94606 | 10/31/2025 9:02 PM |
| 55 | 94804 | 10/31/2025 7:40 PM |
| 56 | 94611 | 10/31/2025 1:02 PM |
| 57 | 94609 | 10/30/2025 3:15 PM |
| 58 | 94605 | 10/30/2025 12:47 PM |
| 59 | 94612 | 10/28/2025 3:51 PM |
| 60 | 94611 | 10/20/2025 5:58 PM |
| 61 | 94610 | 10/16/2025 2:01 PM |
| 62 | 94612 | 10/16/2025 12:53 PM |
| 63 | 94603 | 10/16/2025 12:35 PM |
| 64 | 94606 | 10/16/2025 11:56 AM |
| 65 | 94612 | 10/9/2025 4:10 PM |
| 66 | 94618 | 10/9/2025 5:54 AM |
| 67 | 94610 | 10/7/2025 11:57 AM |
| 68 | 94610 | 10/6/2025 10:14 PM |
| 69 | 94611 | 10/6/2025 9:31 PM |
| 70 | 94610 | 10/6/2025 9:02 PM |
| 71 | 94601 | 10/6/2025 5:02 PM |

| | | |
|---|---|---|
| 72 | 94608 | 10/6/2025 10:45 AM |
| 73 | 94601 | 10/5/2025 11:37 PM |
| 74 | 94601 | 10/5/2025 3:14 PM |
| 75 | 94606 | 10/4/2025 7:47 PM |
| 76 | 94608 | 10/3/2025 11:28 PM |
| 77 | 94621 | 10/3/2025 2:17 PM |
| 78 | 94602 | 10/2/2025 9:01 PM |
| 79 | 94610 | 10/2/2025 2:32 PM |
| 80 | 94619 | 10/2/2025 12:53 PM |
| 81 | 94608 | 10/1/2025 5:10 PM |
| 82 | 94547 | 10/1/2025 2:41 PM |
| 83 | 94501 | 10/1/2025 12:54 PM |
| 84 | 94605 | 10/1/2025 12:20 PM |
| 85 | 94619 | 10/1/2025 12:18 PM |
| 86 | 94609 | 10/1/2025 11:19 AM |
| 87 | 94621 | 10/1/2025 11:05 AM |
| 88 | 94601 | 10/1/2025 12:56 AM |
| 89 | 94601 | 10/1/2025 12:44 AM |
| 90 | 94619 | 9/30/2025 11:03 PM |
| 91 | 94621 | 9/30/2025 10:01 PM |
| 92 | 94577 | 9/30/2025 9:41 PM |
| 93 | 94611 | 9/30/2025 7:34 PM |
| 94 | 94612 | 9/30/2025 6:06 PM |
| 95 | 94612 | 9/30/2025 3:44 PM |
| 96 | 94610 | 9/30/2025 1:48 PM |
| 97 | 94568 | 9/30/2025 1:34 PM |
| 98 | 94619 | 9/30/2025 11:00 AM |
| 99 | 94601 | 9/30/2025 5:25 AM |
| 100 | 94601 | 9/30/2025 3:05 AM |
| 101 | 94610 | 9/29/2025 10:41 PM |
| 102 | 94603 | 9/29/2025 10:29 PM |
| 103 | 94602 | 9/29/2025 9:21 PM |
| 104 | 94158 | 9/29/2025 7:39 PM |
| 105 | 94603 | 9/29/2025 11:59 AM |
| 106 | 94618 | 9/28/2025 12:29 PM |
| 107 | 94607 | 9/28/2025 11:48 AM |
| 108 | 94607 | 9/27/2025 1:09 PM |
| 109 | 94609 | 9/27/2025 4:46 AM |

| | | |
|---|---|---|
| 110 | 94618 | 9/26/2025 9:34 PM |
| 111 | 94612 | 9/26/2025 7:29 PM |
| 112 | 94602 | 9/26/2025 7:13 PM |
| 113 | 94618 | 9/26/2025 1:50 PM |
| 114 | 94607 | 9/26/2025 12:32 PM |
| 115 | 94607 | 9/26/2025 11:21 AM |
| 116 | 94618 | 9/26/2025 1:53 AM |
| 117 | 94612 | 9/23/2025 2:14 PM |

# Q17 What is your age?

Answered: 119 Skipped: 1

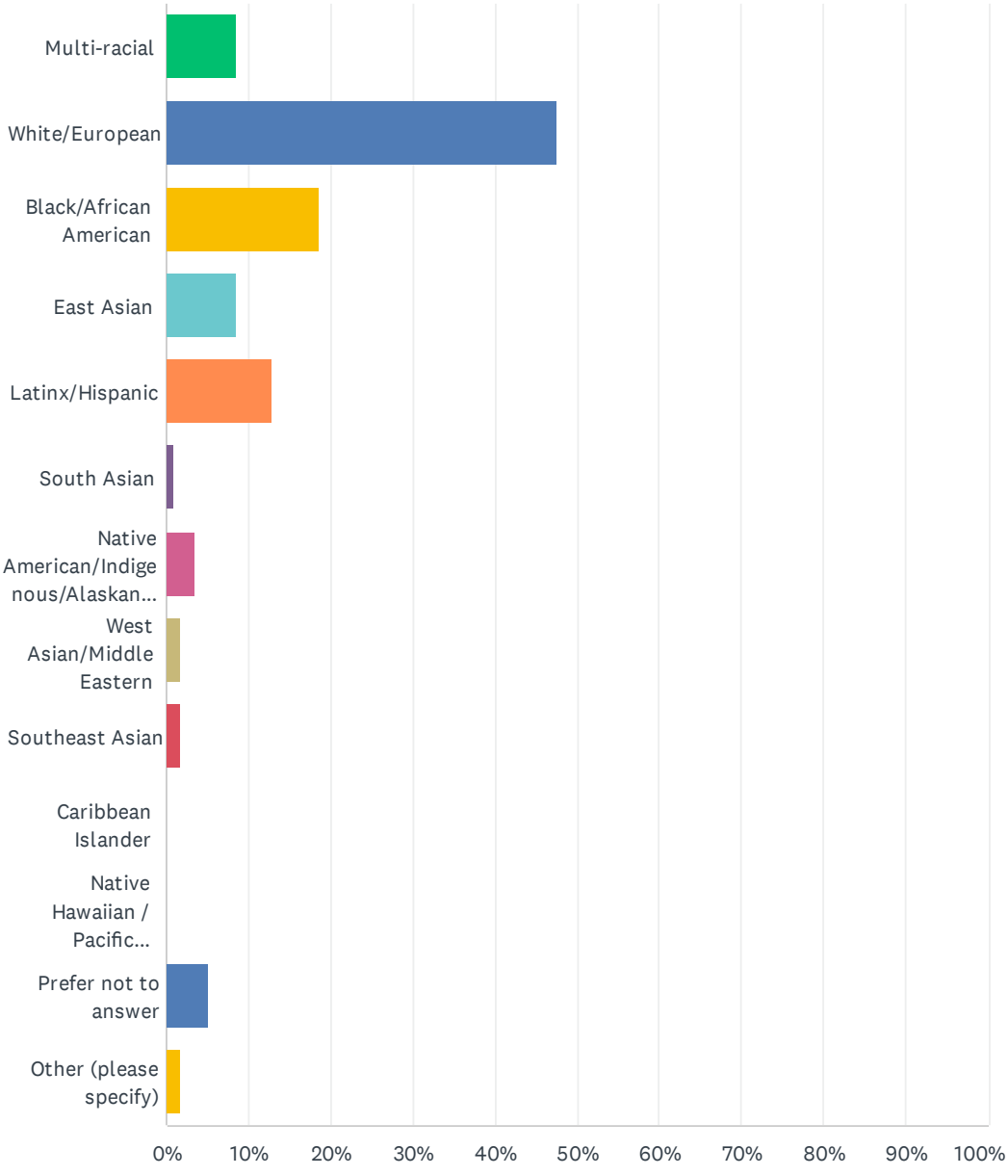



| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Under 18 | 0.00% | 0 |
| 18-30 | 6.72% | 8 |
| 31-40 | 15.97% | 19 |
| 41-50 | 22.69% | 27 |
| 51-60 | 12.61% | 15 |
| 61 or older | 41.18% | 49 |
| Prefer not to answer | 0.84% | 1 |
| Prefer not to answer | 0.00% | 0 |
| TOTAL | | 119 |

| # | PREFER NOT TO ANSWER | DATE |
|---|---|---|
| | There are no responses. | |

# Q18 Which racial groups do you identify with (check all that apply)?

Answered: 118 Skipped: 2

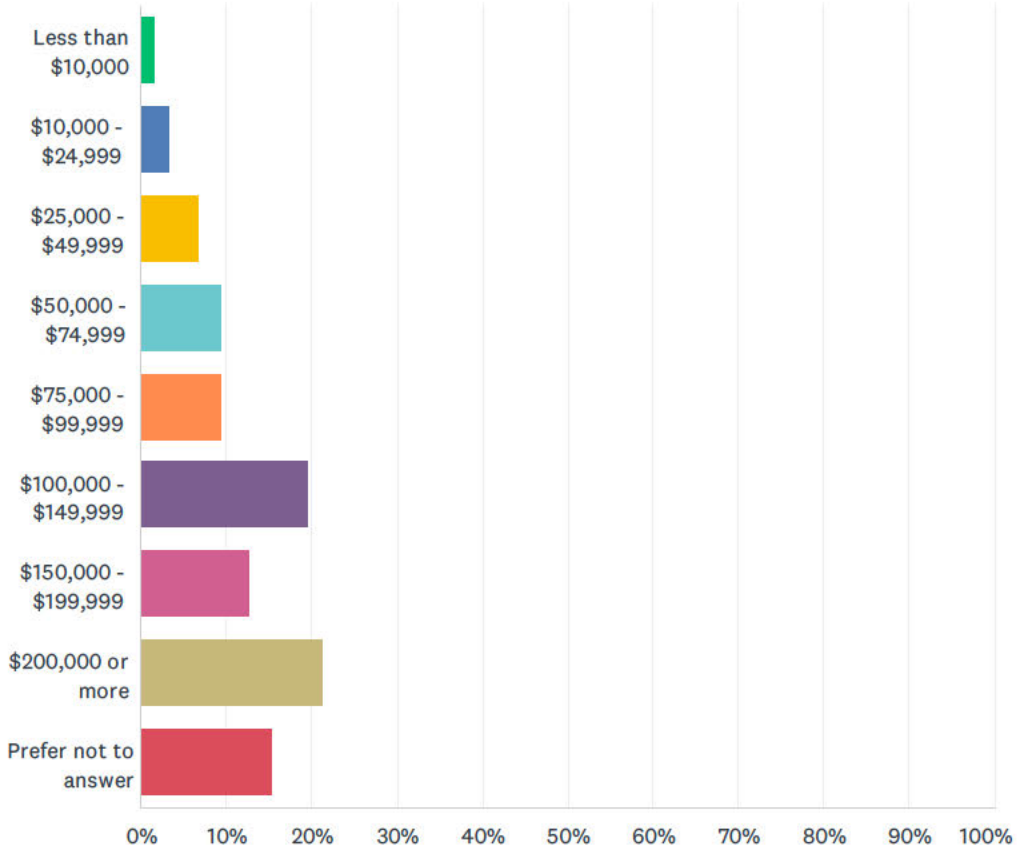


| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Multi-racial | 8.47% | 10 |
| White/European | 47.46% | 56 |
| Black/African American | 18.64% | 22 |
| East Asian | 8.47% | 10 |
| Latinx/Hispanic | 12.71% | 15 |
| South Asian | 0.85% | 1 |
| Native American/Indigenous/Alaskan Native | 3.39% | 4 |
| West Asian/Middle Eastern | 1.69% | 2 |
| Southeast Asian | 1.69% | 2 |
| Caribbean Islander | 0.00% | 0 |
| Native Hawaiian / Pacific Islander | 0.00% | 0 |
| Prefer not to answer | 5.08% | 6 |
| Other (please specify) | 1.69% | 2 |
| Total Respondents: 118 | | |

| # | OTHER (PLEASE SPECIFY) | DATE |
|---|---|---|
| 1 | Jewish | 12/17/2025 12:10 PM |
| 2 | Japanese | 12/15/2025 5:07 PM |

# Q19 What is your annual household income?

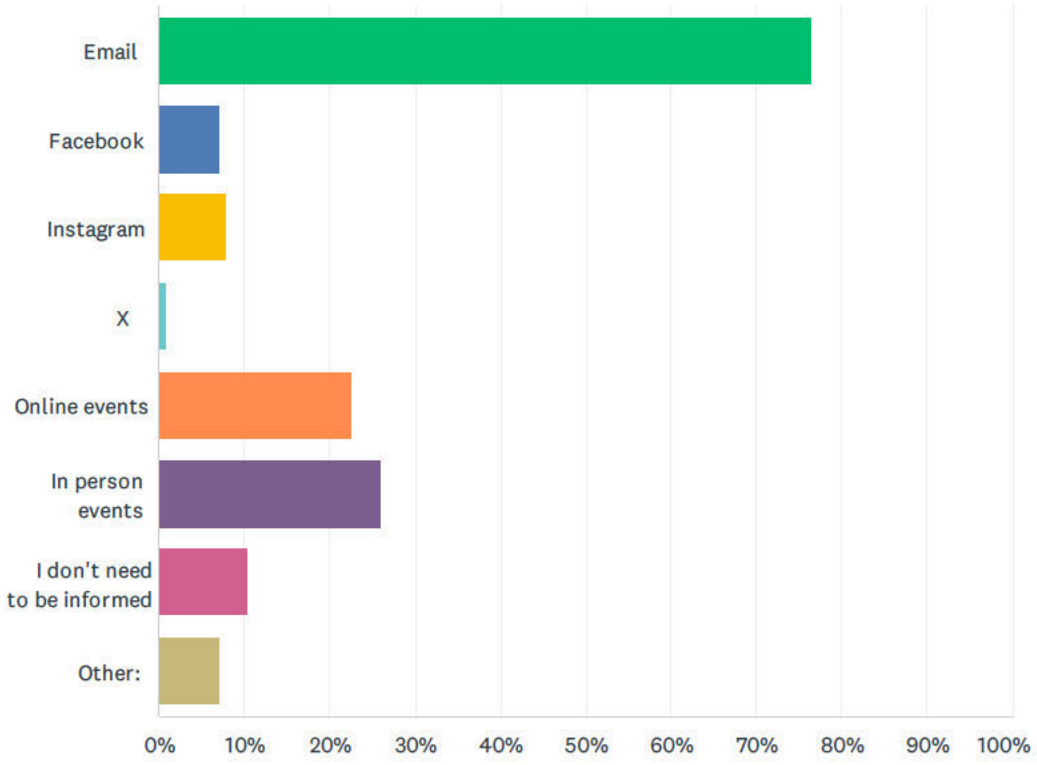
Answered: 117 Skipped: 3




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Less than $10,000 | 1.71% | 2 |
| $10,000 - $24,999 | 3.42% | 4 |
| $25,000 - $49,999 | 6.84% | 8 |
| $50,000 - $74,999 | 9.40% | 11 |
| $75,000 - $99,999 | 9.40% | 11 |
| $100,000 - $149,999 | 19.66% | 23 |
| $150,000 - $199,999 | 12.82% | 15 |
| $200,000 or more | 21.37% | 25 |
| Prefer not to answer | 15.38% | 18 |
| TOTAL | | 117 |

# Q20 How would you like to be informed about future opportunities to provide feedback to Oakland's Hazard Planning (check all that apply):

Answered: 115 Skipped: 5



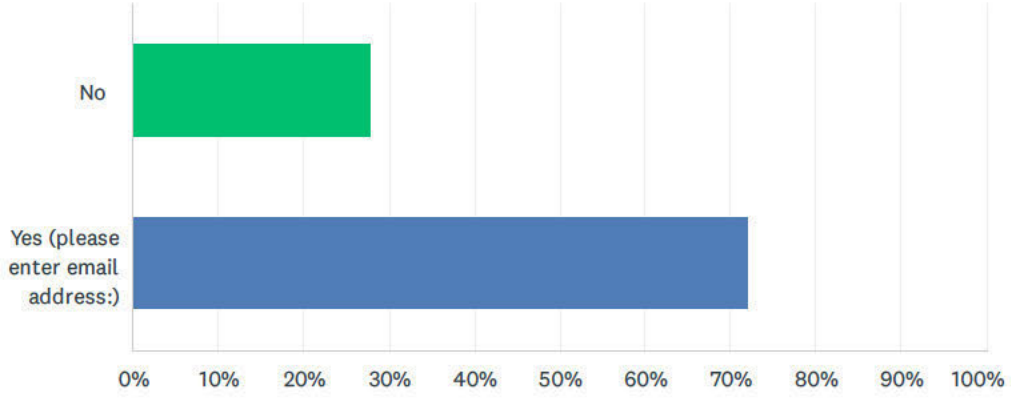

| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| Email | 76.52% | 88 |
| Facebook | 6.96% | 8 |
| Instagram | 7.83% | 9 |
| X | 0.87% | 1 |
| Online events | 22.61% | 26 |
| In person events | 26.09% | 30 |
| I don't need to be informed | 10.43% | 12 |
| Other: | 6.96% | 8 |
| Total Respondents: 115 | | |

| # | OTHER: | DATE |
|---|---|---|
| 1 | NextDoor | 12/17/2025 10:23 AM |
| 2 | [redacted] | 12/16/2025 10:33 PM |
| 3 | Text message | 10/1/2025 2:41 PM |

| | | |
|---|---|---|
| 4 | Text | 9/30/2025 10:01 PM |
| 5 | text | 9/30/2025 1:48 PM |
| 6 | Bluesky | 9/30/2025 5:25 AM |
| 7 | text | 9/29/2025 7:39 PM |
| 8 | Neighborhood watch or neighborhood resilience group | 9/26/2025 1:53 AM |

# Q21 Would you like to be contacted by email in the future with periodic updates on Oakland's Local Hazard Mitigation Plan?

Answered: 115 Skipped: 5




| ANSWER CHOICES | RESPONSES | |
|---|---|---|
| No | 27.83% | 32 |
| Yes (please enter email address:) | 72.17% | 83 |
| TOTAL | | 115 |

| # | YES (PLEASE ENTER EMAIL ADDRESS:) | DATE |
|---|---|---|
| 1 | [redacted] | 12/17/2025 10:23 AM |
| 2 | | 12/17/2025 12:27 AM |
| 3 | | 12/16/2025 10:33 PM |
| 4 | | 12/16/2025 9:09 PM |
| 5 | | 12/16/2025 1:28 PM |
| 6 | | 12/16/2025 11:49 AM |
| 7 | | 12/16/2025 8:24 AM |
| 8 | | 12/16/2025 8:07 AM |
| 9 | | 12/16/2025 1:52 AM |
| 10 | | 12/16/2025 1:41 AM |
| 11 | | 12/16/2025 12:59 AM |
| 12 | | 12/16/2025 12:03 AM |
| 13 | | 12/15/2025 11:16 PM |
| 14 | | 12/15/2025 10:44 PM |
| 15 | | 12/15/2025 9:27 PM |
| 16 | | 12/15/2025 8:50 PM |
| 17 | | 12/15/2025 8:46 PM |

| | | | |
|---|---|---|---|
| 18 | [redacted] | | 12/15/2025 8:44 PM |
| 19 | | | 12/15/2025 7:08 PM |
| 20 | | | 12/15/2025 5:33 PM |
| 21 | | | 12/15/2025 5:07 PM |
| 22 | | | 12/12/2025 5:38 PM |
| 23 | | | 12/10/2025 6:17 PM |
| 24 | | | 12/10/2025 6:09 PM |
| 25 | | | 12/10/2025 6:05 PM |
| 26 | | | 12/10/2025 4:27 PM |
| 27 | | | 12/10/2025 10:57 AM |
| 28 | | | 11/25/2025 2:07 PM |
| 29 | | | 11/24/2025 4:31 PM |
| 30 | | | 11/19/2025 10:56 PM |
| 31 | | | 11/18/2025 1:13 AM |
| 32 | | | 11/17/2025 8:25 PM |
| 33 | | | 11/8/2025 5:05 PM |
| 34 | | | 11/6/2025 6:52 PM |
| 35 | | | 11/6/2025 6:39 PM |
| 36 | | | 11/4/2025 1:59 PM |
| 37 | | | 10/31/2025 9:34 PM |
| 38 | | | 10/31/2025 1:02 PM |
| 39 | | | 10/30/2025 3:15 PM |
| 40 | | | 10/28/2025 3:51 PM |
| 41 | | | 10/20/2025 5:58 PM |
| 42 | | | 10/16/2025 2:01 PM |
| 43 | | | 10/16/2025 12:53 PM |
| 44 | | | 10/16/2025 12:35 PM |
| 45 | | | 10/16/2025 11:56 AM |
| 46 | | | 10/9/2025 5:54 AM |
| 47 | | | 10/7/2025 11:57 AM |
| 48 | | | 10/6/2025 10:14 PM |
| 49 | | | 10/6/2025 9:31 PM |
| 50 | | | 10/6/2025 9:02 PM |
| 51 | | | 10/6/2025 5:02 PM |
| 52 | | | 10/6/2025 10:45 AM |
| 53 | | | 10/5/2025 11:37 PM |
| 54 | | | 10/5/2025 3:14 PM |
| 55 | | | 10/4/2025 7:47 PM |

| | | |
|---|---|---|
| 56 | [redacted] | 10/3/2025 11:28 PM |
| 57 | | 10/3/2025 2:17 PM |
| 58 | | 10/2/2025 9:01 PM |
| 59 | | 10/2/2025 2:32 PM |
| 60 | | 10/2/2025 12:53 PM |
| 61 | | 10/1/2025 2:41 PM |
| 62 | | 10/1/2025 12:54 PM |
| 63 | | 10/1/2025 12:20 PM |
| 64 | | 10/1/2025 12:18 PM |
| 65 | | 10/1/2025 11:19 AM |
| 66 | | 9/30/2025 10:01 PM |
| 67 | | 9/30/2025 6:06 PM |
| 68 | | 9/30/2025 3:44 PM |
| 69 | | 9/30/2025 1:48 PM |
| 70 | | 9/30/2025 1:34 PM |
| 71 | | 9/30/2025 11:00 AM |
| 72 | | 9/30/2025 3:05 AM |
| 73 | | 9/29/2025 10:41 PM |
| 74 | | 9/29/2025 9:21 PM |
| 75 | | 9/29/2025 9:08 PM |
| 76 | | 9/29/2025 11:59 AM |
| 77 | | 9/28/2025 11:48 AM |
| 78 | | 9/27/2025 11:31 AM |
| 79 | | 9/26/2025 9:34 PM |
| 80 | | 9/26/2025 1:50 PM |
| 81 | | 9/26/2025 12:32 PM |
| 82 | | 9/26/2025 11:21 AM |
| 83 | | 9/26/2025 1:53 AM |

# Additional Public Comment

# PUBLIC & STAKEHOLDER OUTREACH SUMMARY

## OCTOBER & NOVEMBER PUBLIC MEETING TAKEAWAYS

| Date | Event and Location | Number Present | Key Takeaways |
|---|---|---|---|
| October 1, 2025 | Personal Emergency Preparedness & Hazard Mitigation Plan Workshop<br><br>West Oakland Branch Library<br>1801 Adeline Street | 47 | • Tree trimming for low-income community members<br>• More multi-lingual outreach needed<br>• Remove trash/abandoned vehicles that can clog storm drains or hinder evacuation access<br>• Summarize hazard maps for easy understanding |
| October 2, 2025 | Personal Emergency Preparedness & Hazard Mitigation Plan Workshop<br><br>César E. Chávez Branch Library<br>3301 East 12th Street | 7 | • Clear storm drains<br>• Remove/trim trees on Cleveland that can damage utility lines<br>• Improve communication with those who don't have email or social media access<br>• Engage trusted neighborhood partners for better outreach to Spanish-speaking community members |
| October 9, 2025 | Personal Emergency Preparedness & Hazard Mitigation Plan Workshop<br><br>Main Library<br>125 14th Street | 29 | • Coordinate with landlords of large apartment buildings to provide emergency preparedness information<br>• Protect the unhoused from hazards<br>• Train the trainers to focus on supporting local resiliency in the local neighborhoods<br>• Increase awareness and understanding of the "Know Your Zone" program |
| October 10, 2025 | Personal Emergency Preparedness & Hazard Mitigation Plan Workshop<br><br>81st Avenue Library<br>1021 81st Avenue | 24 | • Add more siren locations to better cover the community<br>• Support creek management in low-income areas to remove invasive plants<br>• Remove fire-prone eucalyptus in the hills<br>• Fund resilience hubs in trusted community locations<br>• Remediate illegal dumping that blocks storm drains |
| November 6, 2025 | Personal Emergency Preparedness & Hazard Mitigation Plan Workshop<br><br>East Oakland Collective<br>7800 MacArthur Boulevard | 47 | • Educate community members on hazardous household materials that could present extra dangers during a wildfire<br>• Trim trees or promote community member activities to trim trees on private property to reduce damage during high-wind events<br>• Clean the trash from the streets that clogs storm drains |

# COMMUNITY SURVEY SUMMARY

## Key Takeaways

**Respondents**

- 126 English, 3 Spanish, 2 Chinese, 0 Vietnamese
- 115 live in Oakland
- 44 work in Oakland
- 21 are City Employees
- 42% are 61 or Older
- 23% are 41-50
- 48% are White/European
- 18% are Black
- 13% are Latinx/Hispanic
- 91 signed up to receive emails about Hazard Mitigation Planning

**Experiences**

- 97% experienced an earthquake
- 65% experienced severe weather - extreme heat
- 55% experienced severe weather – storms
- 49% experienced wildfire

**Hazard Concerns**

- Damage from trees falling in windstorms
- Above ground power lines susceptible to power outages and wildfire risk
- Disease outbreaks
- Wildfire smoke/air quality
- Liquefaction/sinkholes
- “Very important” for Oakland to prepare for Wildfire Smoke/Air Quality Events (77%), Wildfire (85%), and Earthquake (95%)

**Disaster Concerns for Household and Community**

- Being without housing or food
- Need information on a safe place to go for people and pets
- Notification of hazard and safe place for unhoused to go
- Evacuation difficulties/congested streets
- Getting trapped in the Oakland Hills
- Loss of services, including phone and internet for communication
- Community members not prepared with basic survival items
- Access to clean water
- Chaos, looting

**Problem Areas (see detailed survey results for specific locations)**
- Numerous concerns about wildfire and evacuation in the Oakland Hills
- Overwhelmed/blocked storm drains during heavy rains – flooded streets
- Old buildings may not withstand earthquakes
- Landslides block roads

**Suggested Mitigation Actions**
- Keep drains clean to reduce flooding
- Underground utilities (PG&E)
- Training and disaster drills
- Tree trimming/fuels removal (eucalyptus)
- Economic incentives (property tax) for residents to improve property
- Build resilience hubs
- Multilingual support in low-income communities
- Community members to take responsibility for keeping neighborhood clean/prevent clogged drains

**Sources of Emergency and Evacuation Information**
- AC Alert (71%)
- Family, friends, neighbors (65%)

# PUBLIC COMMENT PERIOD OUTREACH SUMMARY

## January 23 Technical Forum Takeaway

- Concerns about the urban heat island effect in vulnerable communities

## January 27 Community Town Hall Takeaways

- Accessibility and ADA compliance across communications, evacuations, and facilities.
- Long-standing accessibility issues with Everbridge.
- Desire for decentralized community driven resilience strategies such as resilience hubs and City support for neighborhood networks (neighbors meeting neighbors). Provide resources that can be accessed quickly in the community.
- Support provision of backup energy.
- Improved evacuation planning for mobility-impaired residents and non-vehicle travel.
- Environmental equity in parks, tree canopy, and heat mitigation. Consider the impacts of extreme heat on children.
- Better access to hazard maps and more digestible plan summaries. Include information on actions the City is taking.
- Requests for extended and more accessible public comment processes.
- There is a report that sirens cannot be heard at the Coliseum.

LHMP Presentation to the Mayor's Commission on Persons with Disabilities

Public Comment Notes 9/15/25

Veronika Cole Presented to the Mayor's Commission on Persons with Disabilities on 9/15/25.

Notes on comments and questions are below, in a paraphrased format:

- What was the involvement of persons with disabilities in 2021?
- How much is carried forward between plans?
- OFD doesn't stock evacuation chairs. I need to know where the closest chair so I can instruct others on how to assist. I've been referred to County Public Health [to discuss this topic]. The evacuation chair should not be in the hands of private contractor.
- What % of Bay Area residents carry earthquake insurance? Earthquake insurance is expensive, I can't afford. Many insurance companies don't let renters get insurance.
- Alameda Emergency Managers Association and Alameda County VOAD are resources.
- It is difficult to train a property manager in using an evacuation chair – they may are may not be there when an evacuation occurs – then what? Once evacuated, you can't get anywhere without your wheelchair. You need to get people out with their equipment. This also happens with ambulances.

Olga Crowe offered to work with MCPD to find someone who could present to the group about insurance.

LHMP Outreach to Firesafe Council 9/18/25

Public Comment Notes

LHMP Presentation by Veronika Cole, Emergency Planning Coordinator

Notes on Comments below (paraphrased):

- We do not have safe evacuation routes. Vehicles are parking in the way. We need parking restrictions in the municipal code. Where there are restrictions, they are not posted, and restrictions aren't enforced. In an evacuation, Snake and Colton was blocked. We both need more restrictions and enforcement of the restrictions we have.
- When DOT examines accidents and deaths on streets, this should include the tunnel fire and evacuation issues. Include evacuation safety with road safety analysis.
- We have a vegetation management plan. A key factor is evacuation, which should be paired with the vegetation management plan. There is no enforcement of warning about things. Simple things to improve – roadside clearance beyond major streets. Many side streets with lots of vegetation and it needs to be cleared. This hasn't been done.
- Is where people evacuate described in the LHMP? You need to have a plan for how to evacuate 100,000 people from the hills.
- We need a lot of response due to fire issues, which can be City or Cal Trans. Some spots are state property. Some areas have no activity on vegetation management. Vegetation on the roadside is a concern. There is no response when these issues are raised on websites.
- Fire hydrants need to be checked, I understand there is a conversation with EBMUD and OFD and may be an issue with pumps. There needs to be accountability for partners. Need power for facilities, backup power to run water pumps. Is there a power issue with the pumps?
- I know we have evacuation routes, harden the routes with vegetation management. Trees are hazards.
- Smart and Connected communities had a project to work with OFD. Two years ago, asked Chief Covington and Jessica Feil for problem areas. UC Berkeley did traffic modeling for these areas. This complements the City's work. It allows seeing a wider

profile of risks. It was good to work with the California Climate Action Fellows at the City on these project.

LHMP Presentation to Oakland Firesafe Council 1/21/26

Community Comments (Paraphrased key points)

- Wildfire can be a problem for equity priority communities; embers can be a problem. Safe spaces with air filtration are needed. A lot of housing has poor air filtration.
- Let Public Works know fuel remediation is a priority, and let the Oakland Firesafe Council and Claremont Canyon Conservancy work on City property. It took hours of volunteer work to get permission to work on City property. More collaboration would be helpful.
- Be mindful of commercial development and map it to evacuation capacity.
- Raise awareness and prioritize where the highest fire hazards are. Conduct mitigation along evacuation routes.
- Improve wildfire detection in parks. Allows for a quick response. Install heat and smoke sensors and ensure they are maintained.
- There are 1,300 acres of eucalyptus, pine and cypress forest in residential areas. How will high risk forests be made safe? The State program only addressed mountains. This is an issue an privately owned land. We need wildfire objectives for forest lands on residential land.
- Consider the impact to cell phones in a public safety power shutoff.

**City of Oakland Hazard Mitigation Plan Public Meeting – Community Town Hall**

**January 27th, 2026**

[redacted]

- Asked whether Oakland Tech is a designated resilience hub; she was previously told it would be.
- Asked how backup power and energy resilience initiatives are funded.
    - Response noted FEMA funding for backup power and energy resilience.
- Emphasized the need to replant trees and vegetation after disasters.
- Expressed concern that the public comment period is too short.

[redacted]

- Stressed that ADA compliance is essential across all emergency planning.
- Highlighted that mobility challenges make wildfire evacuations difficult; residents must be able to evacuate with their mobility equipment.
- Criticized the Everbridge alert system for being inaccessible for over 10 years:
    - Not compliant with Section 508 of the Telecommunications Act (1996).
    - Online forms are not accessible for blind residents, violating web accessibility standards.
- Stated these accessibility gaps are long-standing and unlawful.
- Noted that the Center for Independent Living (CIL) and volunteers play key roles in disaster support.
- Added that multi-story buildings need specific evacuation plans for people who cannot leave mobility devices behind.

[redacted]

- Asked if there are better links to hazard maps and hazard information.
- Requested summaries of plan sections due to the document's length.

**Jessica Feil**

- Stated that access and functional needs residents are a priority.
- Noted that outreach is happening (e.g., flyers) but questioned whether the City should do more.

[redacted]

- Urged more community organizing programs to help neighbors support one another during extreme heat and disaster events.
- Stated that many residents are not being reached by existing programs.
- Advocated for a decentralized, community-based approach rather than relying on citywide workshops alone.

**Comments from the chat:**

[redacted]

- Reported that editing formats (strikethroughs, redlines) do not translate correctly in the LHMP survey.
- Asked for a way to submit recommendations via Google Doc or PDF.

**Additional Community Input**

- Importance of block-by-block decentralized organizing to implement resilience goals.
- Need for workshops held in community spaces, not only centralized city locations.

[redacted]

- Stated that cars are not a viable evacuation strategy due to traffic congestion.
- Requested public transit evacuation options for wildfire scenarios.

[redacted]

- Noted disparities in Oakland parks:
    - Low-income areas have fewer trees, poorer maintenance, and broken water features.
- Expressed concern that these inequities worsen extreme heat impacts and limit park usability.

**Key Takeaways**

- Accessibility and ADA compliance across communications, evacuations, and facilities.
- Long-standing accessibility issues with Everbridge.
- Desire for decentralized community driven resilience strategies such as resilience hubs and City support for neighborhood networks (neighbors meeting neighbors). Provide resources that can be accessed quickly in the community.

- Support provision of backup energy.
- Improved evacuation planning for mobility-impaired residents and non-vehicle travel.
- Environmental equity in parks, tree canopy, and heat mitigation. Consider the impacts of extreme heat on children.
- Better access to hazard maps and more digestible plan summaries. Include information on actions the City is taking.
- Requests for extended and more accessible public comment processes.

There is a report that sirens can not be heard at the Coliseum.

**Notes Collected from Veronika Cole**

- Very concerned – what is happening to downtown? The Road diet is very dangerous. There are blind islands, I don't feel safe. Plans were brought to the Mayor's Commision on Persons with Disabilities, but they do it anyway. The ramps don't work for wheelchair users.
- Sea level rise is not a natural hazard.
- Resilience hubs – have a place to meet and have resources ready to go.
- Sirens aren't heard throughout Oakland, you can't hear them near the Coliseum.
- Public transportation is a concern as well.
- Ensure community members are able to receive resources swiftly.
- Backup energy – is this something that can be funded?
- Winter storms and fires have gotten worse in last few years.
- Will the [Federal Government] continue to fund things like backup energy?
- Kids in schools suffer in extreme heat.
- Concern – multi-story buildings without elevators or elevators not maintained. Elevator ordinance exists but how enforced when City doesn't have a budget?
- People have mobility equipment but if evacuated they are evacuated without their equipment. Don't just leave it behind, it is often custom made. The equipment has not been given priority.
- Mapping: include actions taken by the City in addition to the story map?
- Everbridge is not accessible, has not been for ten years. Not Section 508 compliant. WWW3 guidelines. ArcGis – need other ways to get information. I'm talking with Cal OES to get a solution. They do a course on how to make an acessible website. Also title 6 – equality and justice. Provide alerts in other languages.
- Vulnerable populations include unhoused and seniors.

- Need – community organizing programs. Neighbors get to meet each other. The City doesn't support these programs and you are missing a lot of people. How can we prioritize these neighborhood programs?

**From:** [redacted]
**To:** Emergency Planning
**Subject:** Public comments on 2026 Local Hazard Mitigation Plan for Oakland
**Date:** Thursday, January 29, 2026 5:27:21 PM

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Hello,

On behalf of Communities United for Restorative Youth Justice (CURYJ), I would like to submit the following public comments on Oakland's 2026 Local Hazard Mitigation Plan for Oakland. I would appreciate acknowledgment that you received these comments as well as a response from you as to whether these comments will be addressed in Oakland's final 2026 LHMP. Thank you!

-[redacted]

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According to data from the Alameda County Public Health Department (ACPHD), low tree canopy percentage and high percentage impervious surfaces are both concentrated in Oakland neighborhoods along the I-880 corridor, such as Fruitvale and West Oakland. The combination of low tree canopy and high impervious surface concentration has been shown to exacerbate the Urban Heat Island effect, indicating that these neighborhoods should be prioritized for heat mitigation actions and related green infrastructure improvements. Eight of the ten census tracts classified as "High" vulnerability to extreme heat in Alameda County are within the city of Oakland. For example, high levels of asthma prevalence are shown in both West Oakland and Fruitvale. High levels of poverty are shown in both Fruitvale and West Oakland. In these areas, more than 50% of households are earning less than 400% of the federal poverty level. Census tracts in Fruitvale and West Oakland are shown to have more than 50% of the population classified as people of color.

We are concerned that extreme heat impacts and concerns are not addressed by the proposed Mitigation Actions in the draft 2026 LHMP (Table 19-3), despite extreme heat being the primary weather-related cause of death in the US (page 13-2). Only 7 out of 75 listed Mitigation Actions (Table 19-6) are classified under Climate Resiliency (incorporating methods to adapt to climate change). The tree planting focus for mitigation actions is currently on stormwater runoff reduction, but these actions should also address how tree planting can mitigate stormwater runoff in conjunction with mitigating extreme heat. For example, neighborhoods in Oakland that are Urban Heat Islands with less tree canopy and green space could be prioritized for LHMP heat mitigation actions, like additional tree planting and replacing concrete with native vegetation, as well as other kinds of public green infrastructure and health equity investments.

Increased awareness of and access to cooling centers and emergency shelters could also be prioritized to support community resilience to extreme heat events, particularly in neighborhoods with older housing stock that lacks adequate cooling and ventilation systems. For example, the City of Oakland's Park User Survey found that most Oakland residents would like recreation centers to be made available as cooling centers during extreme heat events. However, CURYJ youth researchers conducting an observational park conditions survey in summer 2025 found that some recreation centers in Oakland parks did not visibly post their hours, were closed or

otherwise not accessible to the general public due to programming taking place at these facilities. In addition, CURYJ youth researchers found that many of the city parks they surveyed in Urban Heat Islands along Oakland's I-880 corridor lacked tree cover, were poorly maintained and had water features that did not work, making these parks less likely to serve as a resource for residents without access to cooling spaces during heat waves.

CURYJ is presently conducting a community heat survey with vulnerable residents in Fruitvale and West Oakland to inform a community heat resilience plan for these neighborhoods with a small planning grant from the CA Governor's Office of Land Use and Climate Innovation. From August through December 2025, CURYJ staff and youth researchers collected more than 150 surveys at community events and gatherings ranging from school supply giveaways and cultural festivals to youth summits and food distribution events. Preliminary CURYJ heat survey results show that nearly one out of three respondents reported that lack of trees or shade makes areas near their homes feel hotter, while over half of respondents reported that concrete walls and pavement make areas near their homes feel hotter. Two out of every three respondents do not have access to air conditioning or fans, while 45% of those surveyed cannot afford to use air conditioning. Three out of every four of respondents feel that heat affects safety in their neighborhood, while 73% do not know of any cooling centers or emergency shelters nearby. Two out of three respondents said they either do not trust public services (police, EMS, and shelters) to help in a heat emergency, or "It depends." 44% of respondents reported that someone in their home has health issues that worsen in heat, while 14% of respondents were not sure if someone in their home has health issues that worsen in heat.

These preliminary survey results underscore a need to improve access to emergency services and expand communication of heat safety information in multiple audiovisual formats and languages spoken in Urban Heat Island neighborhoods. Heat mitigation actions could include strengthening mutual aid networks and other community-based service and social supports infrastructure that can share information on heat safety and connect vulnerable residents to essential services and resources such as cooling centers. For example, siting of hydration stations and coordination of drinking water distribution efforts during heat waves could engage local merchants associations or labor and community-based organizations that serve unhoused residents as well as day laborers, street vendors and other outdoor workers. Community centers that are not city operated but rather nonprofit-run could also be included in the creation of cooling centers and community resilience hubs, so that residents who distrust first responders or government entities could still access essential services and information during heat waves and other emergencies. Community-based violence interruption programs run by nonprofits could be resourced and mobilized to serve as "next responders" and "trusted messengers" during heat waves and other emergencies to distribute resources and information as well as conduct wellness checks on vulnerable residents such as seniors, emancipated foster youth, those with preexisting medical conditions, and those reentering the community after incarceration. Lastly, the City of Oakland could consider advancing a local maximum indoor temperature ordinance to further educate tenants and landlords about actions they can take to mitigate heat inside homes, particularly in older housing or multifamily buildings that lack air conditioning and adequate ventilation.

[redacted]

*she/her/ella*

Climate Resilience Director

#DreamBeyondBars

Confederated Villages of Lisjan Nation
(510) 947-5935 ♦ PO Box 6487 Oakland CA 94603

To whom it may concern,

When reading through the 2026 Local Hazard Mitigation Plan for Oakland, we noticed that section 4.1.2 Historical Overview could use edits. We have written the following suggestions as well as general feedback when writing about Lisjan people. Please let us know how you plan to incorporate this feedback:

Oakland was founded on unceded land of the Chochenyo-speaking Ohlone ~~il~~ndigenous group, the Lisjan, who ~~were~~ are the original stewards of ~~the~~ this land. ~~for at least 3,500 years~~. After the arrival of Spanish missionaries in the 1760s, ~~Ohlone~~ many (adding a qualifier here because we can't assume this happened to all people) Lisjan peoples were forced into labor camps at missions and baptized into the Catholic faith. By the late 1840s, many other Ohlone ~~had been~~ were forced into remote reservations or killed, ~~leaving less than 1,000 Ohlone remaining by the 1850s~~ (because many people's survival strategy included deliberate misidentification of themselves - for instance as Mexican - in order to receive less harsh treatment, these metrics are likely inaccurate and therefore are not very useful. Perhaps a more meaningful story to tell is the story of survival - which can be illustrated through the active work of Lisjan people today ). ~~Ohlone people in Oakland lived mainly along the creeks and shorelines, where today's names Temescal (sweathouse) and Shellmound recall their presence.~~ (This perpetuates a past-tense narrative about Lisjan peoples that is not accurate). Please refer to this history that Lisjan people have written about themselves for content ideas.

Some key takeaways / suggested feedback:

- Change Ohlone -> Lisjan people : Ohlone is a term which encompasses a much wider geographical range than Oakland. If one is referring to the original peoples of Oakland (belonging to the larger area of Huichin), you are referring to Lisjan people. While many do self-identify as Ohlone, when speaking in specific geographic terms, there are often specific peoples associated with those places.
- Speak about Lisjan people (and all living Indigenous peoples) in the present tense. The Lisjan nation has an active presence in Huichin (including being named in this same document as stakeholders. See page

3-12).

- Highlight the continued work of Lisjan people to steward their ancestral land, protect sacred sites, continue their culture, and engage in community emergency preparedness.

**From:** [redacted]
**To:** Emergency Planning
**Cc:** [redacted]
**Subject:** So what are you going to do? Re: Thank you + more EBMUD history... Re: REQUEST - Please add me to your LHMP email Interest List
**Date:** Friday, May 23, 2025 6:42:48 PM

You don't often get email from kimgerly@outthinkthebox.net. Learn why this is important

Ms. Cole,

I was hoping I would have heard back from you, since it's been a week since I last correspondence. Let me try another way…

I would like you to cogitate on the following:

**Location:** East SF Bay Area

**Scenario One:** Imagine a major earthquake just hit your house. Thankfully you have prepared. You have a garden. You have drinking water stored up. You have everything in your residence locked down. But there is one thing you did not anticipate—the plumbing has been completely knocked out. You have two flushes, and that's it. Flushing your toilet anymore than that, your toilet will be clogged up. You can't flush toilets anywhere anymore, because they will be out of commission for weeks, at best, because EBMUD is not prepared to handle private residences' sanitation needs.

So what are you going to do?

**Scenario Two:** Imagine your neighborhood is not accessible to receive porta-potty services after this big earthquake, because the transportation infrastructure has been rendered inaccessible for an indefinite, protracted period of time.

So what are you going to do?

I hope to hear from you.

Best,

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[redacted]

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On May 16, 2025, at 15:21, [redacted] wrote:

Thank you for your email Veronica Cole. Yes, please add me to your LHMP list.

I searched on the operative 'sanitation' in the Base Plan, Emergency Operations Plan and Hazard Specific Annexes of your *FINAL 2023 Emergency Operations Plan [EOP]*. I could not locate any concrete directives or plans of action on how the City of Oakland is going to specifically address and execute contingency sanitation concerns when EBMUD's infrastructure is rendered inoperable for an extended period of time. Troubling to say the least. NOW, is the time to prepare.

Some history of consequence...

You should know, in the past, former [redacted] invited me to EBMUD Annual Briefings. In 2019, this was the first time I presented my container-based eco-sanitary dry compost toilet processor system offering to EBMUD. After the session, Former EBMUD GM [redacted] came up to me without solicitation, and offered up, "What you propose is a very good idea."

It is my understanding that after all these years, no one at EBMUD has addressed providing a contingency sanitation plan offering outside of EBMUD's primary service infrastructure.

I also attended the EBMUD Water Wednesday Webinar on 16 Oct 2024, *Bracing for Impact: Will our water system withstand THE BIG ONE?* **All that was discussed was water, <u>not sanitation</u>.** I still have yet to receive from EBMUD Community Affairs agent Joseph Voelker a concrete response to my enquiry during and after the webinar:

> **I would still like to know what is the EBMUD backup/contingency plan for citizens being able to flush toilets 72 hours post earthquake, since it is my understanding EBMUD is not responsible for private sewer laterals.**

I look forward to future correspondence.

Best,

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[redacted]

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On May 16, 2025, at 14:53, Emergency Planning <emergencyplanning@oaklandca.gov> wrote:

Hello,

Thank you for getting in touch around our Local Hazard Mitigation Plan, we like to hear from the community! Sewers would be considered as critical infrastructure when we assess how hazards may impact the City. We are currently updating our 2021 LHMP and will be conducting community engagement as our 2026 LHMP is developed. I have noted your feedback, and we will include it as a part of input we've received about the plan. Would you like to join our LHMP mailing list? If so, I will include your email for updates on the plan.

In a section listing the City's legal and regulatory capabilities related to hazard mitigation, our 2021 LHMP includes a reference to the City's Sanitary Sewer Master Plan. This plan seeks to reduce stormwater intrusion and overflows to protect public health. I have heard from Public Works that the Sewer Master Plan is near completion. Sewers are also considered in the 2021 LHMP as a part of a portion of the hazard profiles.

Some of the concerns you raise would be addressed in our emergency response. The Emergency Management Services Division prepares for disasters by working with partners, such as East Bay Municipal Utilities District, to ensure the public is informed on sanitary practices. The City of Oakland will work with its local, county, State and Federal partners to secure resources to keep the public safe and recover from disaster as soon as possible. The City's response framework is available in our Emergency Operations Plan, which you can find here: Oakland Emergency Operations Plan

Thank you,

Veronika Cole

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**From:** [redacted]
**Sent:** Friday, May 9, 2025 12:15 PM
**To:** Emergency Planning <emergencyplanning@oaklandca.gov>
**Cc:** [redacted]
**Subject:** REQUEST - Please add me to your LHMP email Interest List

You don't often get email from [redacted] Learn why this is important
Hello,

**Preface:** Terri Fashing in Public Works suggested I reach out to you.

**I would like to be included on your LHMP Interest email list.**

I think it is VERY important for the City of Oakland to have a contingency plan available when the EBMUD sanitation infrastructure is compromised and rendered completely inoperable for a protracted period of time after the earthquake 'drought' ends—let alone at present due to the explosion of curbside communities.

Yes, I have been trying to enlighten EBMUD on this need since 2019; see: Community Dry Toilet and Urine Diversion System Using IAPMO WE•Stand © 2018

**Question 1:** Why isn't sanitation included in the the hazards that the LHMP addresses? Asked another way, what will the citizenry do when they can't flush their toilets 72- hours after the next BIG earthquake?

Not to mention, there are only two instances of 'sanitation' and one instance of 'sewage' mentioned in the FEMA 2013 Local Mitigation Planning Handbook listed on your web site here. None of these instances address any specific contingencies or strategies on how to hand sewage or sanitation needs post-disaster.

**Question 2:** I had a quick look at your OAKLAND LOCAL HAZARD MITIGATION PLAN PROGRESS REPORT2023-2024. Why is there no mention of sanitation or sewage in this report?

I look forward to future correspondence.

Best,

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[redacted]

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sender by reply e-mail and delete the message and any attachments. This communication may be monitored and collected without consent, in secret, by the NSA. Thank you.

SAVE THE BAY

February 12, 2026

Oakland Fire Department
150 Frank H. Ogawa Plaza, Suite #3354
Oakland, CA 94612

**Subject: Comments on the Oakland 2026 Local Hazard Mitigation Plan Risk Assessment Draft**

Dear Local Hazard Mitigation Plan Update Team,

Thank you for the opportunity to provide comments on the Oakland 2026 Local Hazard Mitigation Plan (LHMP) Update on behalf of Save The Bay. We are pleased to see that the draft addresses climate impacts like extreme storms, sea level rise, groundwater rise, and contaminated sites. We recommend that the updated LHMP include projections for future climate-driven precipitation conditions, higher sea level rise scenarios, and mapping of contaminated sites at risk of groundwater rise.

Future Precipitation Projections

Section 10, "Flooding", describes various sources of flooding including riverine flooding, stormwater flooding, and coastal flooding. It also includes maps of the FEMA flood zones for a 100-yr storm and 500-yr storm and acknowledges that with climate change, Oakland will experience more intense, episodic rainfall (Pg. 10-12). We recommend that the city update the risk assessment to include mapping of where increased precipitation due to climate change will cause additional flood risk. (An example of a study that does this is the City of Newark's Flood Modeling Report.) The city should use this analysis to ensure that the storm drain system and riverine and coastal flood protections are built to withstand future storms as they become more frequent and severe.

Sea Level Rise Projections

Section 12, "Sea Level Rise", includes a vulnerability assessment for two sea level rise scenarios – 0.8 feet of sea level rise and 4.9 feet of sea level rise. We're glad to see that the compounding effects of a 100-year storm and groundwater rise were also included in this projection. We recommend that the city add an additional sea level rise scenario to the assessment – 6.6 feet of sea level rise by 2100. According to the latest CA Ocean Protection Council (OPC) Sea Level Rise Guidance, this amount of sea level rise is possible under a high emissions and high warming scenario. This also aligns with state-mandated sea level rise planning requirements as described in the Bay Conservation and Development Commission's (BCDC) Regional Shoreline Adaptation Plan (RSAP) Guidelines. Oakland should be prepared to address this extreme level of flooding.

Groundwater Rise Vulnerabilities

We support Mitigation Action 7-1 which commits to "study the compounding impacts of sea level rise in groundwater threats in areas with hazardous facilities and equity priority communities." We also support Mitigation Action 9-1, which commits to creating a Shallow Groundwater Rise Vulnerability

Assessment “to establish a detailed understanding of the effects of rising shallow groundwater on people, the built environment, and water supply.” To the extent possible, we recommend that the city incorporate existing contaminated site data into the LHMP risk assessment. This should include mapping and identifying which opened and closed contaminated sites are potentially at risk of inundation by groundwater rise under various sea level rise scenarios (0.8 feet, 4.9 feet, and 6.6 feet), along with which of these sites are in disadvantaged communities. This data is available in BCDC’s Regional Shoreline Adaptation Plan Atlas data portal. As part of the Groundwater Rise Vulnerability Assessment in Mitigation Action 9-1, we recommend working closely with frontline communities and regulatory agencies to prioritize sites for cleanup and pursue funding to clean up the most dangerous sites.

It’s important for Oakland to be prepared for the full range of possible climate-driven flooding, including the compounding effects of increased precipitation, 6.6 feet of sea level rise, and groundwater rise. In order to best understand and prepare for these risks, we hope Oakland will incorporate our recommendations into the final LHMP draft.

Thank you for considering our recommendations!

Sincerely,

[redacted]
Executive Director
Save The Bay

**From:** [redacted]
**To:** Cole, Veronika
**Subject:** 2026 Local Hazard Mitigation Plan - Ensure Safe Evacuation on Colton Blvd. -
**Date:** Monday, September 22, 2025 5:12:10 PM

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[redacted]

Dear Veronika,

I am responding to the request you made during the Oakland Firesafe Council zoom meeting, for input from residents regarding their priorities for hazard mitigation.

I have resided at 1965 Asilomar Drive since 2016. My house is in the Montclair District, much of which is in a severe high fire hazard area. The closest and shortest evacuation route for me, and countless others between Skyline, Thornhill and Shepherd Canyon - is down Colton Blvd. (I used that route during a late night evacuation for a fire on Snake Blvd. several years ago.)

Colton Blvd. has a single lane in each direction, with a faded double yellow line in the center. The street is steep, curvy, narrow, deeply rutted - with some overhead vegetation. There are NO posted parking restrictions once the street narrows near the bottom at Magellan. There is no PGE undergrounding in this area, so the fire risk is exacerbated by the aging and antiquated overhead utility infrastructure.

The situation is currently horrible. Each day there are between 1 and 12 cars parked in the driving lanes on Colton Blvd. (Photos available.) This is especially scary on curves, where people often speed and make wide turns - not expecting to find oncoming traffic in their lane, e.g., 6027 Colton, and across from 5835 and 5849 Colton Blvd. There is also a full years' use by residents of Colton to accommodate vehicles belonging to their employees - despite having a 2-car driveway and garage, e.g., 6481 Colton Blvd.

1. Post and enforce parking restrictions on Colton Blvd. in accord with Section 10.28.080, et seq. Oakland, CA Code of Ordinances

2. Paint the outside of each lane on Colton Blvd. with white paint, (as they are on Snake Blvd.) to mark where the road ends

3. Post highly visible signs about fire danger, e.g., sign on Thorhnill at Pinehaven

4. Post directions for Red Flag days, e.g., face cars out, fill gas tank, no power tools, etc.

5. Repair the potholes

6. Prune back overhanging growth

7. Evaluate and locate locally accessible natural shelters in case roads are blocked.

8. Underground the overhead utility wires.

Given the absolute absence of parking enforcement, the already challenging evacuation route is rapidly shrinking. The City's failure to address the issue enables and encourages the problem to grow.

Please let me know if I can be of further assistance.

Kind regards,

# Appendix B – Selected Meeting Documentation

1

## Today's Agenda

1. Overview
2. Risk Assessment Summary
3. Community Feedback
4. Mitigation Strategy
5. Next Steps
6. Questions

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CITY OF OAKLAND

2

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# Overview

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# LHMP Mission Statement

*To reduce risk and increase resilience equitably, the mission of the City of Oakland Local Hazard Mitigation Plan is to establish and promote a comprehensive mitigation strategy and efforts to protect the whole community and environment from identified natural and human-caused hazards.*

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# 2026 LHMP Goals

**Goal 1:** Advance equity, reduce racial disparities, and ensure ADA accessibility for people with disabilities and individuals with access and functional needs in all phases of preparing for, responding to, and recovering from natural hazards.

**Goal 2:** Protect life, property, the environment, and natural and cultural resources equitably.

**Goal 3:** Advance community-driven outreach efforts to equip Oaklanders with the knowledge, resources, and support needed to prepare for, respond to, and recover from natural hazards.

**Goal 4:** Implement strategies to enable departments of the City of Oakland to equitably respond to and mitigate hazards in accordance with the Emergency Operations Plan in an integrated manner.

**Goal 5:** Pursue feasible, cost-effective, and environmentally appropriate hazard mitigation measures including adaptive capacity to reduce risk from a changing climate, incorporating targeted strategies to advance equitable outcomes.

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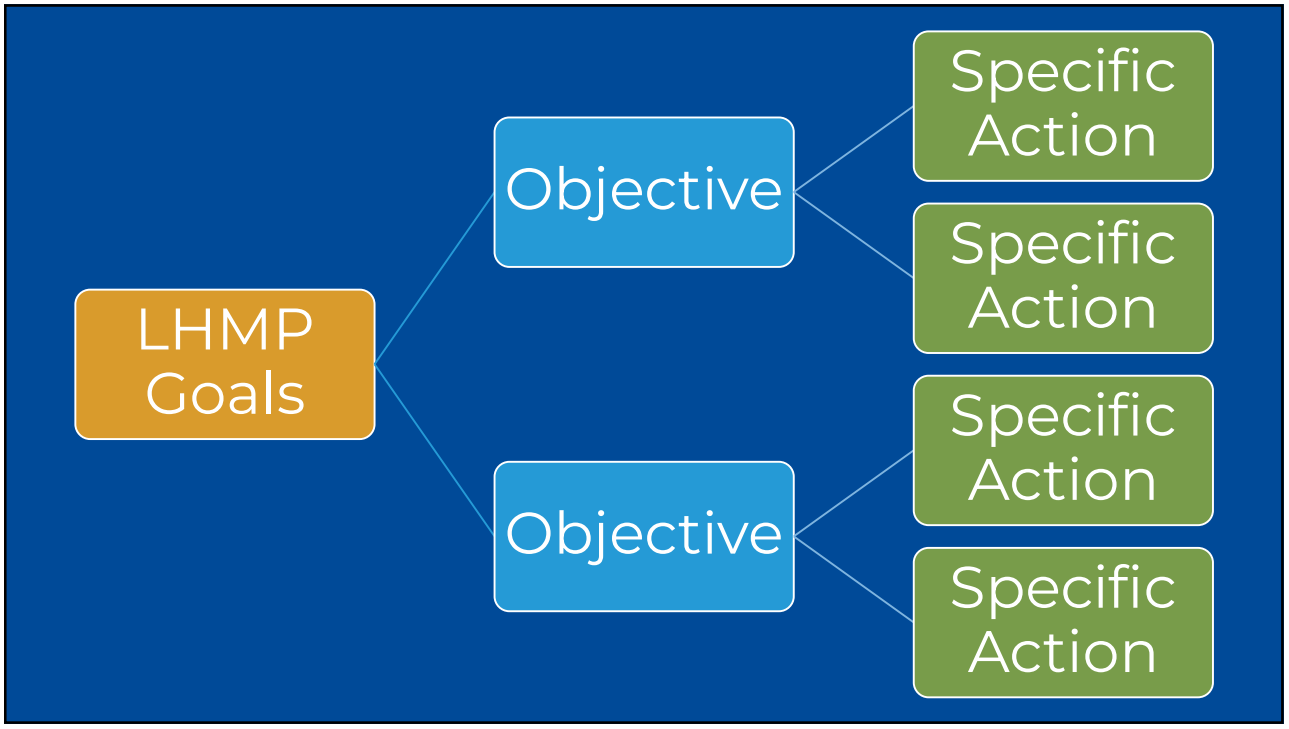


6

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# Risk Assessment Summary

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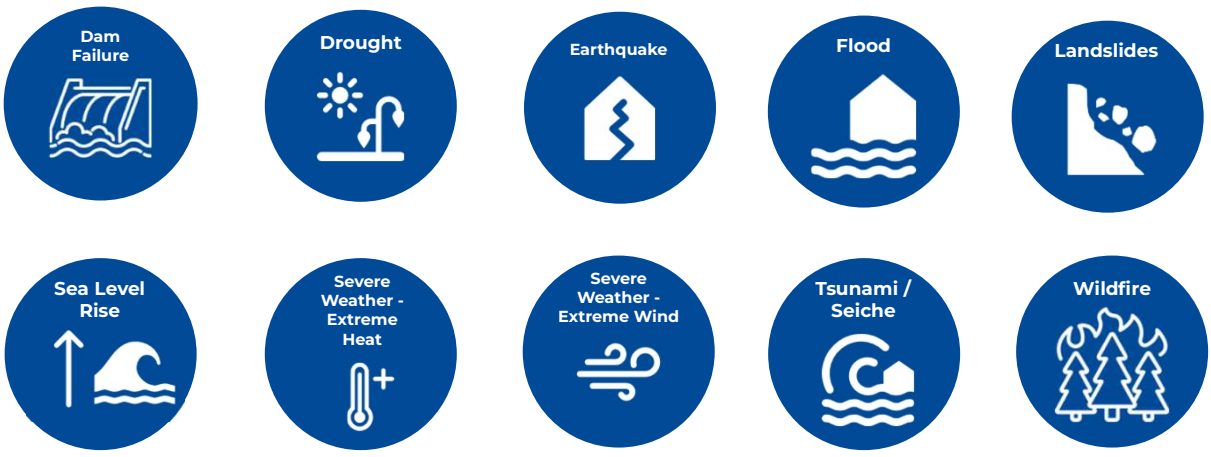
## Hazards of Concern

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# Risk Assessment Results

| Hazard | # Population Exposed | % Total Population Exposed | # Buildings Exposed | % Total Buildings Exposed | Value Exposed (Structure and Contents $) | % Total Value Exposed |
|---|---|---|---|---|---|---|
| Dam Failure | 61,415 | 13.9% | 13,780 | 13/.1% | $17,213,821,280 | 13.3% |
| Drought | 440,637 | 100% | 105,543 | 100% | $128,971,332,346 | 100% |
| Earthquake - Calaveras (No) M6.86 | 440,637 | 100% | 105,543 | 100% | $5,339,514,348 | 4.1% |
| Earthquake - Hayward M7.05 | 440,637 | 100% | 105,543 | 100% | $17,171,966,379 | 13.3% |
| Earthquake - San Andreas (Peninsula) M7.38 | 440,637 | 100% | 105,543 | 100% | $3,942,758,169 | 3.1% |
| Flood (100-yr) | 2,059 | 0.5% | 532 | 0.5% | $1,671,521,003 | 1.3% |
| Landslide (High Susceptibility) | 112,971 | 25.6% | 27,998 | 26.5% | $25,180,414,966 | 19.5% |
| SLR 2050 - 0.8 ft. | 11,476 | 2.6% | 2,712 | 2.6% | $11,802,105,142 | 9.2% |
| SLR 2100 – 4.9 ft. | 31,338 | 7.1% | 7,028 | 6.7% | $23,054,285,189 | 17.9% |
| Severe Weather | 440,637 | 100% | 105,543 | 100% | $128,971,332,346 | 100% |
| Tsunami | 22,730 | 5.2% | 5,071 | 4.8% | $16,965,465,804 | 13.2% |
| Wildfire (Very High Severity Zone) | 64,518 | 14.6% | 23,336 | 22.1% | $19,255,494,290 | 14.9% |

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# Hazard Ranking

| | |
|---|---|
| Dam Failure | Low |
| Drought | Medium |
| Earthquake | High |
| Flood | Medium |
| Landslide | Medium |
| Sea Level Rise | Medium |
| Severe Weather (Wind/Heat) | High |
| Tsunami/Seiche | Low |
| Wildfire | High |

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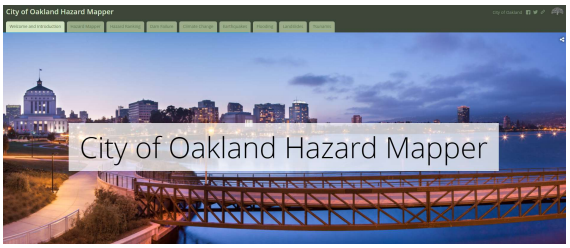
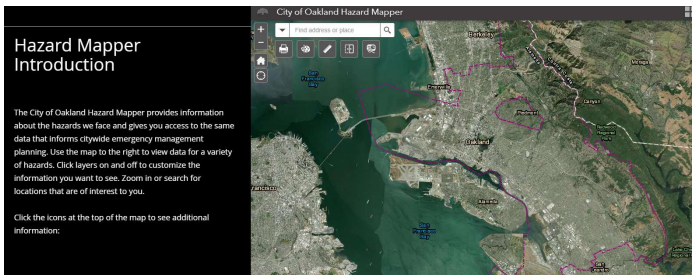
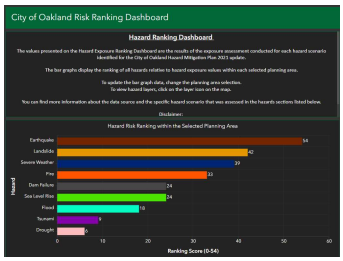
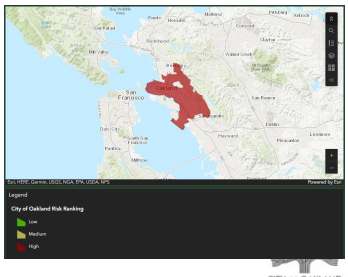
# 2021 LHMP and Hazard Mapper

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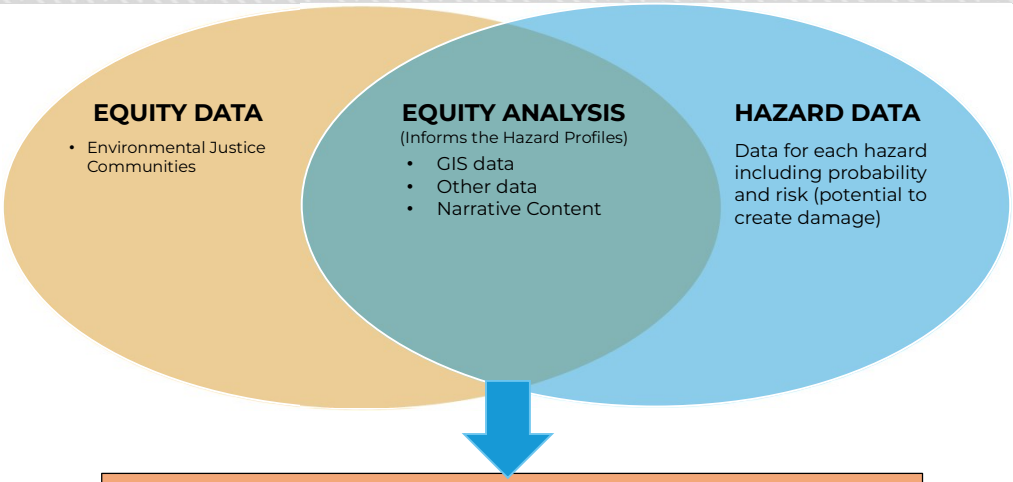
# Equity Analysis




SUMMARY OF EQUITY BURDENS AND BARRIERS
(Discussed w/ staff)
DATA ON RISK (POTENTIAL FOR HAZARDS TO CAUSE HARM)

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# Community Feedback Received

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## Key Takeaways – Community Survey

- **Earthquake readiness** and **wildfire smoke/wildfire risk** are the clearest priorities—both in lived experience and perceived importance.
- **Resilience hubs, continuity of City operations, and community training** are widely supported, indicating interest in **accessible, neighborhood-level supports** and **skills-building**.
- **Awareness gaps** remain (e.g., AC Alerts), and **more than half lack a specific evacuation route**, highlighting opportunities for targeted outreach and route planning.
- **Email** is the most effective channel for engagement; consider pairing with **in-person** events to reach older adults and communities less active online.

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# Key Takeaways – Community Meetings

**Vegetation & Tree Management**

- Requests for tree trimming assistance for those unable to afford it.
- Remove trees threatening power lines (e.g., Cleveland Blvd).
- Address invasive plants in creeks and eucalyptus in hills.
- Concerns about large trees near homes and property lines.

**Drainage & Flooding**

- Clean storm drains and streets to prevent flooding.
- Adopt-a-Drain program mentioned; need better follow-up and engagement.
- Lakes and creeks (e.g., near Edwards Ave, Seminary) cited as flood risks.

**Communication & Outreach**

- Clear, multilingual alerts and evacuation instructions.
- Improve Spanish and other language outreach; include printed materials.
- Provide interpretation services at meetings.
- More education on "Know Your Zone" and hazard maps.
- Outreach for residents with limited internet/social media access.

**Preparedness & Training**

- Train-the-trainer programs tailored for specific communities (AFN, monolingual).
- Youth engagement in hazard evaluation and mitigation activities.
- Promote resilience hubs at trusted community locations.

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# Key Takeaways – Community Meetings

**Infrastructure & Safety**

- Remove abandoned vehicles and illegal dumping (blocks drains, impacts mobility).
- Label curbs with addresses for emergency identification.
- Address soft-story buildings; coordinate with HUD and Building Department.
- Concerns about earthen dam at Tyson Lake and potential flooding from Piedmont.

**Alerts & Sirens**

- Sirens not audible in some areas (e.g., High Street, Foothill); need better coverage.
- Residents unaware of siren system despite long-term residency.

**Equity & Vulnerable Populations**

- Protect unhoused individuals during disasters.
- Ensure libraries and community centers receive emergency information.

**Hazard-Specific Concerns**

- Household chemical hazards during fires.
- Evacuation route planning for dead-end streets and multi-unit buildings.

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# Mitigation Strategy

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## How Do You Reduce Risk?

- **Manipulate the Hazard**
  - Structural flood control (e.g., flood walls, levees)
- **Reduce/Eliminate Exposure**
  - Acquire floodprone properties
- **Reduce Vulnerability**
  - Retrofit (e.g., floodproofing structures)
- **Increase Capability**
  - $, preparation, technical assistance, planning enforcement

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# Connecting to the Mitigation Strategy

- Need a clear connection between vulnerabilities identified in the risk assessment and proposed mitigation actions.
- The capability assessment can provide insight into challenges and opportunities for the mitigation strategy.
- All actions proposed in the mitigation strategy must have a factual basis tied to hazards *(this shouldn't be a wish list!)*

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# WHERE DO YOU NEED TO FOCUS?

- **Quality not quantity** each action needs detailed information on the why, who, what, and when of the action.
- **Stronger connection** between the risk assessment, goals, objectives, and mitigation strategy
- **More specific, achievable actions**
  - What is needed to complete the identified objectives?
  - Focus on SMARTE, KPI, equity, and AFN
- **2021 Projects**
  - If a project is not finished and still a priority, include in 2026 LHMP
  - Remove general projects or make more specific
  - Remove ongoing capabilities like maintenance or annual outreach
- **Diverse actions**
  - Actions need to be tied to the objectives identified
  - You need at least one action per hazard of concern. Think about actions that can cover multiple hazards.
  - If you have RL/SRL properties, need an action to mitigate those properties
  - Include a variety of action types (e.g., plans, floodproof critical facilities, outreach programs, etc.)

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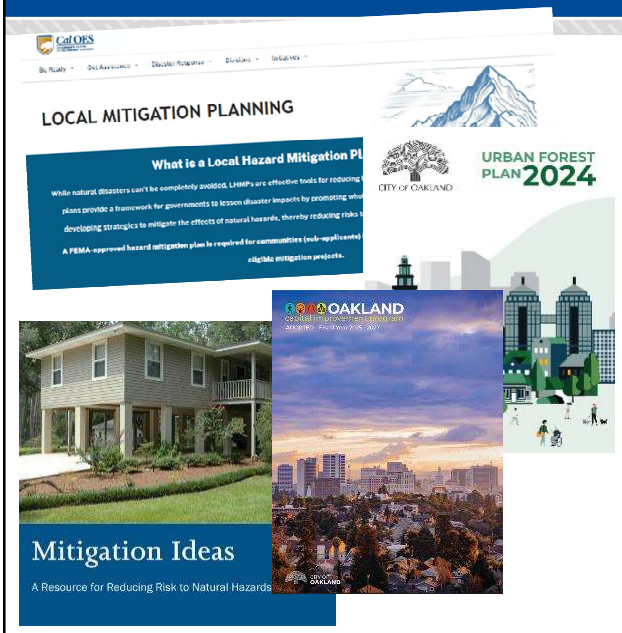
# MITIGATION ACTIONS TO CONSIDER




- Mitigation projects included in current plans/programs
  - Urban Forest Plan
  - Capital Improvement Program
- Grant applications previously submitted but not awarded (e.g., BRIC)
- Mitigate hazard-prone properties (e.g., property acquisitions or elevations)
- Backup generators for community lifelines/critical facilities
- Citywide Debris Management Plan
- Substantial Damage Response Plan
- Tree trimming and maintenance plan and procedures

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# Objectives and Action Items

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# Goals and Objectives

**Goals**

- Broad, long-term vision of what the City wants to accomplish to protect life, property, and infrastructure from natural hazards

**Objectives**

- Specific, measurable steps that outline how to achieve the goals

**Actions**

- Specific tasks that are implemented to meet objectives

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# 2026 LHMP Goals

**Goal 1:** Advance equity, reduce racial disparities, and ensure ADA accessibility for people with disabilities and individuals with access and functional needs in all phases of preparing for, responding to, and recovering from natural hazards.

**Goal 2:** Protect life, property, the environment, and natural and cultural resources equitably.

**Goal 3:** Advance community-driven outreach efforts to equip Oaklanders with the knowledge, resources, and support needed to prepare for, respond to, and recover from natural hazards.

**Goal 4:** Implement strategies to enable departments of the City of Oakland to equitably respond to and mitigate hazards in accordance with the Emergency Operations Plan in an integrated manner.

**Goal 5:** Pursue feasible, cost-effective, and environmentally appropriate hazard mitigation measures including adaptive capacity to reduce risk from a changing climate, incorporating targeted strategies to advance equitable outcomes.

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# Updating Objectives for the 2026 LHMP

- **Review the list of 2021 objectives**
  - How can these be improved?
  - What new ones can be added?
- **For the 2026 LHMP, the objectives should be…**
  - SMARTE (Specific, Measurable, Actionable, Reasonable, Timebound, and Equitable)
  - Incorporate key performance indicators (KPIs) where possible
  - Each objective needs to address equity concerns
  - You will be using each objective to identify mitigation actions to accomplish the objective
- The LHMP Steering Committee will review and approve the objectives to include in the 2026 LHMP

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# 2021 LHMP Objectives

1. Reduce repetitive losses due to flood, fire, and earthquake by informing land use, design, and construction policies.
2. Identify natural and manmade hazards that threaten life and property in the City.
3. Use best available hazard data while reviewing proposed development opportunities.
4. Encourage the incorporation of hazard mitigation measures into repairs, major alterations, new development, and redevelopment practices, especially in areas subject to substantial hazard risk.
5. Encourage and support leadership within the private sector, non-profit agencies and community-based organizations to promote and implement local hazard mitigation activities.
6. Incorporate risk reduction considerations in new and updated infrastructure and development plans to reduce the impacts of hazards.
7. Continue providing City emergency services staff with training and equipment to address all identified hazards.
8. Develop and provide updated information about threats, hazards, vulnerabilities, and mitigation strategies to state, regional, and local agencies, as well as private sector and nonprofit groups.
9. Establish and maintain partnerships among all levels of government, private sector, community groups, and institutions of higher learning that improve and implement methods to protect life and property.
10. Create financial and regulatory incentives to motivate stakeholders such as homeowners, private sector businesses, and nonprofit community organizations to mitigate hazards and risk.
11. Continue developing and strengthening inter-jurisdictional coordination and cooperation in the area of emergency services.
12. Support the protection of vital records, and strengthen or replace buildings, infrastructure, and lifelines to minimize post-disaster disruption and facilitate short-term and long-term recovery.
13. Coordinate state and local efforts to reduce greenhouse gas emissions and implement climate action strategies through hazard mitigation plans and actions.
14. Implement hazard mitigation programs and projects that protect life, property, and the environment.
15. Promote and implement hazard mitigation plans and projects that are consistent with state, regional and local climate adaptation goals, policies, and programs.
16. Advance community resilience through preparation, adoption, and implementation of state, regional, and local multi-hazard mitigation plans and projects.
17. Prioritize vulnerable populations in policy responses, including but not limited to, low-income individuals and families; people of color; the young; the elderly; people with disabilities; people with existing health issues; and people with limited English proficiency.

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# Draft Objectives - Equity

- To support implementation of and future updates to the City's LHMP, Safety Element, and Environmental Justice Element, utilize the best available data to identify racial disparities in the City of Oakland that can be used by the City to rank risk and prioritize mitigation strategies that incorporate a racial equity lens.
- All aspects of the plan will be revisited when the City possesses more data about barriers and access services that need to be addresses

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# Draft Objectives - HCD

- Safer Housing for Oakland Program (SHOP): Soft Story Apartment Retrofit Program—Under this action, the City will invest in and seek Hazard Mitigation Grant Program (HMGP) funding from FEMA and CalOES to support property owners with buildings subject to Oakland's Mandatory Soft Story Retrofit Program, which the Department of Planning and Building developed to enforce 2019 municipal ordinance No. 13516.

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# Draft Objectives - Planning

- Support and strengthen or replace property and infrastructure to minimize post disaster disruption and facilitate short-term recovery (1-5 years) in equity priority communities impacted by a hazard event.
- Encourage the incorporation of hazard mitigation measures into repairs, major alterations, new development, and redevelopment practices, and prioritize equity priority communities that are subject to substantial hazard risk.
- Use the best available data on groundwater rise and its potential impacts on equity priority communities while reviewing proposed development opportunities in areas vulnerable to contaminated groundwater rise.
- Evaluate densities where slopes are at the greatest risk for landslides and consider reducing current permitted development densities and intensities by 2028.
- Use best available hazard data while reviewing proposed development opportunities
- Encourage the incorporation of hazard mitigation measures into repairs, major alterations, new development, and redevelopment practices, especially in areas subject to substantial hazard risk.
- Support the protection of vital records, and strengthen or replace buildings, infrastructure, and lifelines to minimize post disaster disruption and facilitate short-term and long-term recovery.

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# Draft Objectives - Planning

- In high hazard areas, identify State and/or federal programs or develop local programs to offer financial incentives to equity priority communities for defensible space maintenance, home hardening, and training for evacuation procedures to reduce risk to people and property.
- Improve access to better indoor air quality to protect against smoke and wildfire through methods such as requiring installation of MERV filters in new developments and identifying additional clean air centers and resilience spaces within residential areas. Additionally, the City will explore funding mechanisms such as available grants, to assist residents of EJ communities in purchasing indoor air filters.

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# Draft Objectives - NFIP

- Minimize repetitive and potential losses due to flood by maintaining compliance with the NFIP and improving floodplain operations.
- Explore resources and steps needed to participate in CRS program.

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# Draft Objectives - Infrastructure

- Prevent discharge of wastewater contamination into waterways as a result of natural hazards. Enhance social equity by implementing sewer system improvement project with high CIP scores focusing on underserved communities.
- Complete the City's Sewer Master Plan
- Complete the City's Storm Drainage Master Plan
- Identify, integrate, and implement green infrastructure practices into streetscape improvement
- Monitor and measure number of miles of sewer main rehabilitation annually. Complete sanitary sewer masterplan by end of 2025. Obtain priority of work with risk and equity components.
- Prioritize green stormwater infrastructure investment in frontline communities, particularly in residential neighborhoods dominated by concrete and asphalt with limited green space and elevated air pollution, in Priority Conservation Areas, and in areas where green infrastructure, including trees and other types of vegetated buffers, can effectively address stormwater management issues and reduce air pollution exposure among sensitive populations.

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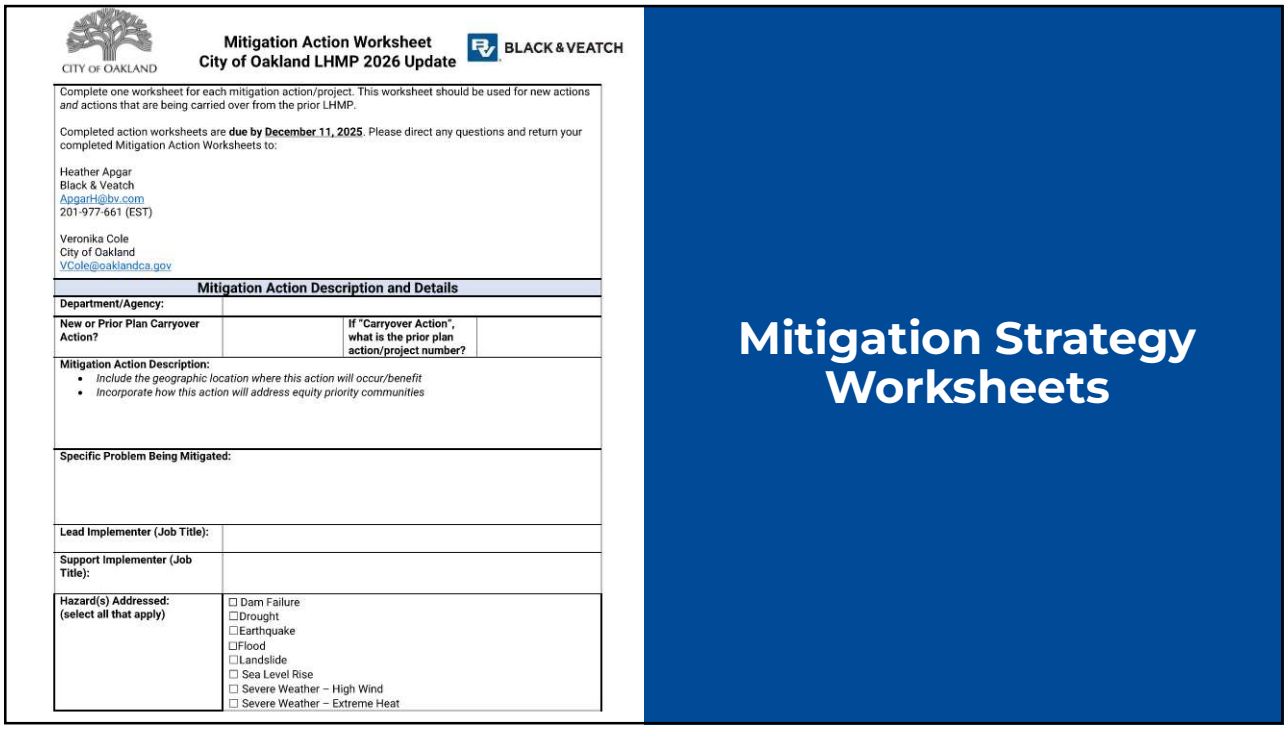

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**Mitigation Action Worksheet**
**City of Oakland LHMP 2026 Update**

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Complete one worksheet for each mitigation action/project. This worksheet should be used for new actions *and* actions that are being carried over from the prior LHMP.

Completed action worksheets are **due by December 11, 2025**. Please direct any questions and return your completed Mitigation Action Worksheets to:

Heather Apgar
Black & Veatch
ApgarH@bv.com
201-977-661 (EST)

Veronika Cole
City of Oakland
VCole@oaklandca.gov

**Mitigation Action Description and Details**

| | | | |
|---|---|---|---|
| **Department/Agency:** | | | |
| **New or Prior Plan Carryover Action?** | | **If "Carryover Action", what is the prior plan action/project number?** | |
| **Mitigation Action Description:**<br>• *Include the geographic location where this action will occur/benefit*<br>• *Incorporate how this action will address equity priority communities* | | | |
| **Specific Problem Being Mitigated:** | | | |
| **Lead Implementer (Job Title):** | | | |
| **Support Implementer (Job Title):** | | | |
| **Hazard(s) Addressed: (select all that apply)** | ☐ Dam Failure<br>☐Drought<br>☐Earthquake<br>☐Flood<br>☐Landslide<br>☐ Sea Level Rise<br>☐ Severe Weather – High Wind<br>☐ Severe Weather – Extreme Heat | | |

# Mitigation Strategy Worksheets

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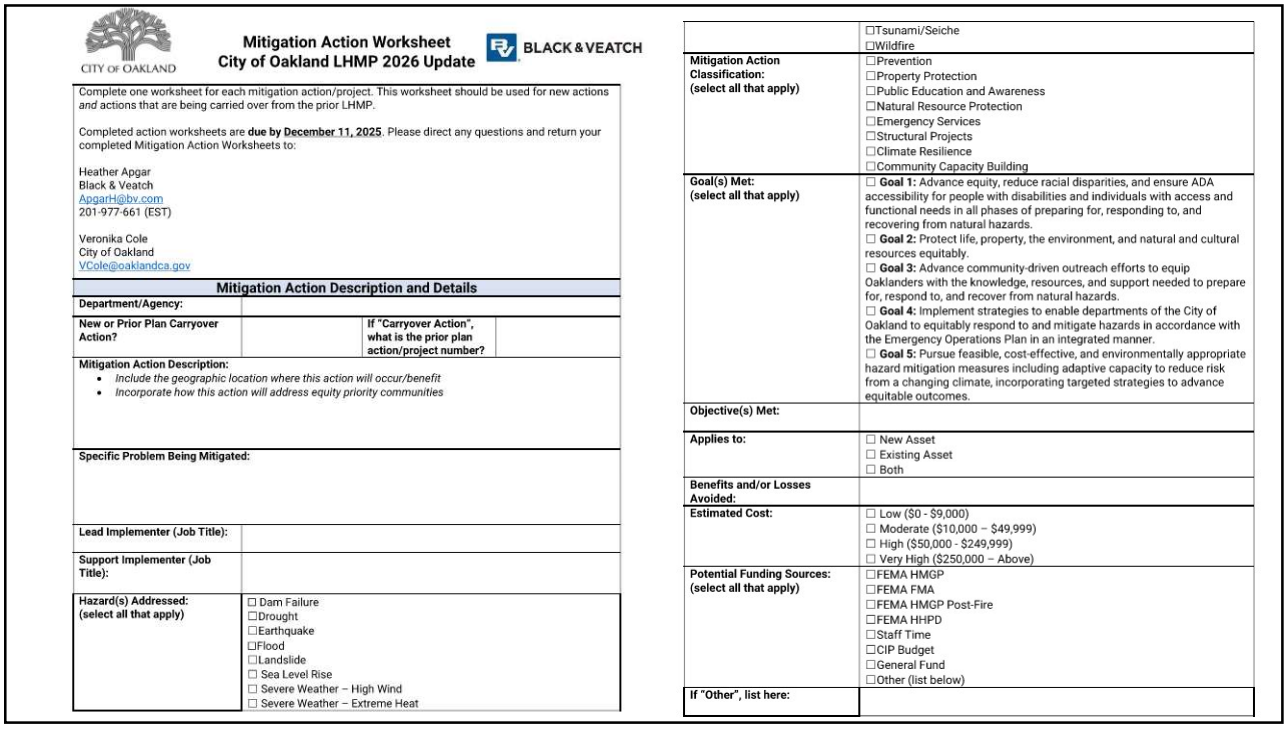

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| **Lead Implementer (Job Title):** | | | |
| **Support Implementer (Job Title):** | | | |
| **Hazard(s) Addressed: (select all that apply)** | ☐ Dam Failure<br>☐Drought<br>☐Earthquake<br>☐Flood<br>☐Landslide<br>☐ Sea Level Rise<br>☐ Severe Weather – High Wind<br>☐ Severe Weather – Extreme Heat | | |

| | |
|---|---|
| | ☐Tsunami/Seiche<br>☐Wildfire |
| **Mitigation Action Classification: (select all that apply)** | ☐Prevention<br>☐Property Protection<br>☐Public Education and Awareness<br>☐Natural Resource Protection<br>☐Emergency Services<br>☐Structural Projects<br>☐Climate Resilience<br>☐Community Capacity Building |
| **Goal(s) Met: (select all that apply)** | ☐ **Goal 1:** Advance equity, reduce racial disparities, and ensure ADA accessibility for people with disabilities and individuals with access and functional needs in all phases of preparing for, responding to, and recovering from natural hazards.<br>☐ **Goal 2:** Protect life, property, the environment, and natural and cultural resources equitably.<br>☐ **Goal 3:** Advance community-driven outreach efforts to equip Oaklanders with the knowledge, resources, and support needed to prepare for, respond to, and recover from natural hazards.<br>☐ **Goal 4:** Implement strategies to enable departments of the City of Oakland to equitably respond to and mitigate hazards in accordance with the Emergency Operations Plan in an integrated manner.<br>☐ **Goal 5:** Pursue feasible, cost-effective, and environmentally appropriate hazard mitigation measures including adaptive capacity to reduce risk from a changing climate, incorporating targeted strategies to advance equitable outcomes. |
| **Objective(s) Met:** | |
| **Applies to:** | ☐ New Asset<br>☐ Existing Asset<br>☐ Both |
| **Benefits and/or Losses Avoided:** | |
| **Estimated Cost:** | ☐ Low ($0 - $9,000)<br>☐ Moderate ($10,000 – $49,999)<br>☐ High ($50,000 - $249,999)<br>☐ Very High ($250,000 – Above) |
| **Potential Funding Sources: (select all that apply)** | ☐FEMA HMGP<br>☐FEMA FMA<br>☐FEMA HMGP Post-Fire<br>☐FEMA HHPD<br>☐Staff Time<br>☐CIP Budget<br>☐General Fund<br>☐Other (list below) |
| **If "Other", list here:** | |

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| | |
|---|---|
| **Timeline for Completion:** | ☐ Short Term (less than 5 years)<br>☐ Long Term ( more than 5 years) |
| **Community Lifelines Addressed: (select all that apply)** | ☐Safety and Security<br>☐Food, Hydration, Shelter<br>☐Health and Medical<br>☐Energy<br>☐Communications<br>☐Transportation<br>☐Hazardous Materials<br>☐Water Systems |
| **Indicate whether this action increases or supports the jurisdiction's core capabilities: (select all that apply)** | ☐Plans, Programs, Ordinances and Authorities<br>☐Administrative and Technical Capabilities<br>☐Fiscal Capabilities<br>☐NFIP Capabilities<br>☐Adaptive Capacity to Climate Change Capabilities<br>☐Public Education and Outreach<br>☐Does not increase or support the core capabilities listed above |
| **Equity Priority Community (EPC) Considerations** | |
| **Does this action benefit an equity priority community?** | ☐ Yes<br>☐ No |
| **If "Yes", how does the action provide benefits and/or reduce risk from natural hazards to the EPCs?**<br><br>*Include the following:*<br>• *Are there any front-line communities of concern in these areas?*<br>• *What barriers to benefitting from this mitigation action might this/these communities experience?*<br>• *What targeted strategies have been incorporated in the mitigation action to address barriers and advance equitable outcomes for this/these groups?* | |
| **Will any EPC groups/organizations be involved in the design or implementation of this action?** | |
| **If "Yes", list community groups/organizations.** | |

| Mitigation Action Prioritization | | | |
|---|---|---|---|
| **1. Will the action result in life safety?** | ☐ Yes | ☐ No | ☐ Maybe |
| **2. Will the action result in property protection?** | ☐ Yes | ☐ No | ☐ Maybe |
| **3. Will the action be cost-effective (future benefits exceed cost)?** | ☐ Yes | ☐ No | ☐ Maybe |
| **4. Is the action technically feasible?** | ☐ Yes | ☐ No | ☐ Maybe |
| **5. Does the jurisdiction have the legal authority to implement?** | ☐ Yes | ☐ No | ☐ Maybe |
| **6. Is funding currently available for the action?** | ☐ Yes | ☐ No | ☐ Maybe |
| **7. Is the project eligible for grant funding?** | ☐ Yes | ☐ No | ☐ Maybe |
| **8. Will implementation of the action use nature-based solutions?** | ☐ Yes | ☐ No | ☐ Maybe |
| **9. Will the action mitigate impacts from climate change?** | ☐ Yes | ☐ No | ☐ Maybe |
| **10. Does the action benefit equity priority communities?** | ☐ Yes | ☐ No | ☐ Maybe |
| **11. Does the jurisdiction have the administrative capability to execute the action?** | ☐ Yes | ☐ No | ☐ Maybe |
| **12. Will the action reduce risk to more than one hazard?** | ☐ Yes | ☐ No | ☐ Maybe |
| **13. Can the action be completed in less than 5 years?** | ☐ Yes | ☐ No | ☐ Maybe |
| **14. Does the action support the policies and objectives of other plans and programs?** | ☐ Yes | ☐ No | ☐ Maybe |
| **15. Would project implementation be supported by the community?** | ☐ Yes | ☐ No | ☐ Maybe |

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| Mitigation Action Description and Details | | | |
|---|---|---|---|
| **Department/Agency:** | Department of Planning & Building | | |
| **New or Prior Plan Carryover Action?** | New | **If "Carryover Action", what is the prior plan action/project number?** | N/A |
| **Mitigation Action Description:**<br>• *Include the geographic location where this action will occur/benefit*<br>• *Incorporate how this action will address equity priority communities*<br>This project expands tree canopy and reflective roofing throughout the City, focusing on heat-vulnerable and equity priority neighborhoods. This project will help boost canopy coverage by 20% through planting native, heat/drought tolerant trees and retrofit approximately 500 rooftops with cool roofs (i.e., high albedo roofs) that will help reduce internal building temperatures. Prior to the project beginning, the City will hold public meetings to educate residents on the project and its benefits, and provide opportunities for public input. | | | |
| **Specific Problem Being Mitigated:**<br>There are areas of urban heat islands located throughout the City, many of which are impacting equity priority neighborhoods. Areas of limited green space, aging structures and infrastructure, and high energy burdens increase heat-related health risks. These communities often lack cooling resources, increasing vulnerability to extreme heat. | | | |
| **Lead Implementer (Job Title):** | Planning Director | | |
| **Support Implementer (Job Title):** | Planners, Public Works | | |
| **Hazard(s) Addressed: (select all that apply)** | ☐ Dam Failure<br>☒Drought<br>☐Earthquake<br>☐Flood<br>☐Landslide<br>☐ Sea Level Rise<br>☐ Severe Weather – High Wind<br>☒ Severe Weather – Extreme Heat<br>☐Tsunami/Seiche<br>☐Wildfire | | |

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| | |
|---|---|
| **Mitigation Action Classification: (select all that apply)** | ☒Prevention<br>☒Property Protection<br>☒Public Education and Awareness<br>☒Natural Resource Protection<br>☐Emergency Services<br>☐Structural Projects<br>☒Climate Resilience<br>☒Community Capacity Building |
| **Goal(s) Met: (select all that apply)** | ☒ **Goal 1:** Advance equity, reduce racial disparities, and ensure ADA accessibility for people with disabilities and individuals with access and functional needs in all phases of preparing for, responding to, and recovering from natural hazards.<br>☒ **Goal 2:** Protect life, property, the environment, and natural and cultural resources equitably.<br>☒ **Goal 3:** Advance community-driven outreach efforts to equip Oaklanders with the knowledge, resources, and support needed to prepare for, respond to, and recover from natural hazards.<br>☒ **Goal 4:** Implement strategies to enable departments of the City of Oakland to equitably respond to and mitigate hazards in accordance with the Emergency Operations Plan in an integrated manner.<br>☒ **Goal 5:** Pursue feasible, cost-effective, and environmentally appropriate hazard mitigation measures including adaptive capacity to reduce risk from a changing climate, incorporating targeted strategies to advance equitable outcomes. |
| **Objective(s) Met:** | |
| **Applies to:** | ☐ New Asset<br>☐ Existing Asset<br>☒ Both |
| **Benefits and/or Losses Avoided:** | Heat reduction, energy savings, air quality improvement, prioritizes equity priority neighborhoods |
| **Estimated Cost:** | ☐ Low ($0 - $9,000)<br>☐ Moderate ($10,000 – $49,999)<br>☒ High ($50,000 - $249,999)<br>☒ Very High ($250,000 – Above) |
| **Potential Funding Sources: (select all that apply)** | ☐FEMA HMGP<br>☐FEMA FMA<br>☐FEMA HMGP Post-Fire<br>☐FEMA HHPD<br>☒Staff Time<br>☒CIP Budget<br>☒General Fund<br>☐Other (list below) |

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| **If "Other", list here:** | |
| **Timeline for Completion:** | ☒ Short Term (less than 5 years)<br>☐ Long Term ( more than 5 years) |
| **Community Lifelines Addressed: (select all that apply)** | ☒Safety and Security<br>☒Food, Hydration, Shelter<br>☐Health and Medical<br>☐Energy<br>☐Communications<br>☐Transportation<br>☐Hazardous Materials<br>☐Water Systems |
| **Indicate whether this action increases or supports the jurisdiction's core capabilities: (select all that apply)** | ☐Plans, Programs, Ordinances and Authorities<br>☐Administrative and Technical Capabilities<br>☐Fiscal Capabilities<br>☐NFIP Capabilities<br>☒Adaptive Capacity to Climate Change Capabilities<br>☒Public Education and Outreach<br>☐Does not increase or support the core capabilities listed above |
| **Equity Priority Community (EPC) Considerations** | |
| **Does this action benefit an equity priority community?** | ☒ Yes<br>☐ No |
| **If "Yes", how does the action provide benefits and/or reduce risk from natural hazards to the EPCs?**<br><br>*Include the following:*<br>• *Are there any front-line communities of concern in these areas?*<br>• *What barriers to benefitting from this mitigation action might this/these communities experience?*<br>• *What targeted strategies have been incorporated in the mitigation action to address barriers and advance equitable outcomes for this/these groups?* | The proposed project focuses on expanding tree canopies and installing cool roofs in equity priority neighborhoods. This will help reducing internal building temperatures, reduce utility bills, and reduce the risk of heat-related illnesses. |
| **Will any EPC groups/organizations be involved in the design or implementation of this action?** | Yes |

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| If "Yes", list community groups/organizations. | TBD | | |
|---|---|---|---|
| **Mitigation Action Prioritization** | | | |
| 1. Will the action result in life safety? | ☒ Yes | ☐ No | ☐ Maybe |
| 2. Will the action result in property protection? | ☒ Yes | ☐ No | ☐ Maybe |
| 3. Will the action be cost-effective (future benefits exceed cost)? | ☒ Yes | ☐ No | ☐ Maybe |
| 4. Is the action technically feasible? | ☒ Yes | ☐ No | ☐ Maybe |
| 5. Does the jurisdiction have the legal authority to implement? | ☐ Yes | ☐ No | ☒ Maybe |
| 6. Is funding currently available for the action? | ☐ Yes | ☐ No | ☒ Maybe |
| 7. Is the project eligible for grant funding? | ☒ Yes | ☐ No | ☐ Maybe |
| 8. Will implementation of the action use nature-based solutions? | ☒ Yes | ☐ No | ☐ Maybe |
| 9. Will the action mitigate impacts from climate change? | ☒ Yes | ☐ No | ☐ Maybe |
| 10. Does the action benefit equity priority communities? | ☒ Yes | ☐ No | ☐ Maybe |
| 11. Does the jurisdiction have the administrative capability to execute the action? | ☐ Yes | ☐ No | ☒ Maybe |
| 12. Will the action reduce risk to more than one hazard? | ☒ Yes | ☐ No | ☐ Maybe |
| 13. Can the action be completed in less than 5 years? | ☒ Yes | ☐ No | ☐ Maybe |
| 14. Does the action support the policies and objectives of other plans and programs? | ☐ Yes | ☐ No | ☒ Maybe |
| 15. Would project implementation be supported by the community? | ☐ Yes | ☐ No | ☒ Maybe |

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# Next Steps

- **Mitigation Actions**
  - Complete one worksheet for each action identified in the objective worksheet (Reach out to Veronika Cole with any questions).
  - Return to Veronika Cole with a CC to Heather Apgar by **December 11, 2025**
  - A staff committee is performing an equity review of all items on December 12 and may have questions or requested edits.

**Important!** Only **completed** mitigation action worksheets will be included in the LHMP

- **Full Plan Draft by <u>December 15, 2025</u>**

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# Questions

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# City of Oakland
# Local Hazard Mitigation Plan

## Steering Committee Meeting

December 17, 2025

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## Today's Agenda

- LHMP Updates
- Hazard Profiles
- Mitigation Strategy
- LHMP Public Comment Draft

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# LHMP Updates

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## Steering Committee Schedule & Milestones 2025 - 2026

WE ARE HERE

Technical Forum January 20

Community Town Hall January 27

**SC Meetings prior to Black & Veatch Contract**

- Previous Mitigation Actions
- LHMP Goals
- Objectives
- Plan Maintenance Strategy

**November 5 SC Meeting**

**November 17 SC Meeting**

- Risk Assessment
- Risk Ranking
- Mitigation Action Workshop

**December 17 SC Meeting**

- Risk Assessment
- Risk Ranking
- Goals
- Objectives
- Mitigation Actions
- Draft LHMP Review

**December 22 – January 5 SC Draft LHMP Review**

- SC Draft LHMP Comment Period

**February 9 SC Public Comment Review**

- Public Comment Review
- Approve Draft to send to Cal OES

**February 15 LHMP Submittal to Cal OES**

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* Key decision points in red

* Public meetings in orange

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# Hazard Profiles

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## Natural Hazard Risk Ranking Methodology

(Probability x .30) +
(Impact x .30) +
(Spatial Extent x .20) +
(Warning Time x .10) +
(Climate Change x .10)
+ Qualitative Adjustment Factor =
**Priority Risk Index (PRI) Value**

Each degree of risk has been assigned a value (1 to 4), a weighting factor, and a qualitative adjustment factor.

Qualitative Adjustment Factor(s) added :

Resident Displacement (.5 point)
Economic Impacts (.5 point)
Environmental Impacts (.5 point)
Transportation Impacts (.5 point)

- PRI Value 1 to 1.9 = **Low** Hazard Risk Ranking
- PRI Value 2.0 to 2.9 = **Medium** Hazard Risk Ranking
- PRI Value 3.0 and up = **High** Hazard Risk Ranking

Note: Risk ranking *does not* impact project grant eligibility.

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# Natural Hazard Risk Ranking Results

| Hazard | Weighted Risk Factors: Probability (1-4 index value with 30% weighting factor) | Impact (1-4 index value with 30% weighting factor) | Spatial Extent (1-4 index value with 20% weighting factor) | Warning Time (1-4 index value with 10% weighting factor) | Climate Change (1-4 index value with 10% weighting factor) | QAF | PRI | Risk Ranking |
|---|---|---|---|---|---|---|---|---|
| Dam Failure | .30 | .30 | .20 | .40 | .40 | | 1.6 | Low |
| Drought | 1.2 | .30 | .80 | .10 | .40 | | 2.8 | Medium |
| Earthquake | 1.2 | .60 | .80 | .40 | .20 | 2.0 | 5.2 | High |
| Flood | 1.2 | .60 | .60 | .10 | .40 | | 2.9 | Medium |
| Landslide | .60 | .60 | .60 | .40 | .40 | | 2.6 | Medium |
| Sea Level Rise | TBD | TBD | TBD | TBD | TBD | | TBD | TBD |
| Severe Weather (High Wind & Extreme Heat) | 1.2 | .90 | .80 | .20 | .40 | | 3.5 | High |
| Tsunami/Seiche | .60 | .30 | .60 | .20 | .20 | | 1.9 | Low |
| Wildfire | .90 | .60 | .60 | .30 | .40 | 2.0 | 4.8 | High |

Note: Risk ranking *does not* impact project grant eligibility.

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# Risk Assessment Results

| Hazard | # Population Exposed | % Total Population Exposed | # Buildings Exposed | % Total Buildings Exposed | Value Exposed (Structure and Contents $) | % Total Value Exposed |
|---|---|---|---|---|---|---|
| Dam Failure | 61,415 | 13.9% | 13,780 | 13/.1% | $17,213,821,280 | 13.3% |
| Drought | 440,637 | 100% | 105,543 | 100% | $128,971,332,346 | 100% |
| Earthquake - Calaveras (No) M6.86 | 440,637 | 100% | 105,543 | 100% | $5,339,514,348 | 4.1% |
| Earthquake - Hayward M7.05 | 440,637 | 100% | 105,543 | 100% | $17,171,966,379 | 13.3% |
| Earthquake - San Andreas (Peninsula) M7.38 | 440,637 | 100% | 105,543 | 100% | $3,942,758,169 | 3.1% |
| Flood (100-yr) | 2,059 | 0.5% | 532 | 0.5% | $1,671,521,003 | 1.3% |
| Landslide (High Susceptibility) | 112,971 | 25.6% | 27,998 | 26.5% | $25,180,414,966 | 19.5% |
| SLR 2050 - 0.8 ft. | 11,476 | 2.6% | 2,712 | 2.6% | $11,802,105,142 | 9.2% |
| SLR 2100 – 4.9 ft. | 31,338 | 7.1% | 7,028 | 6.7% | $23,054,285,189 | 17.9% |
| Severe Weather | 440,637 | 100% | 105,543 | 100% | $128,971,332,346 | 100% |
| Tsunami | 22,730 | 5.2% | 5,071 | 4.8% | $16,965,465,804 | 13.2% |
| Wildfire (Very High Severity Zone) | 64,518 | 14.6% | 23,336 | 22.1% | $19,255,494,290 | 14.9% |

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# Hazard Ranking

| | |
|---|---|
| Dam Failure | Low |
| Drought | Medium |
| Earthquake | High |
| Flood | Medium |
| Landslide | Medium |
| Sea Level Rise | Medium |
| Severe Weather (Wind/Heat) | High |
| Tsunami/Seiche | Low |
| Wildfire | High |

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# Mitigation Strategy

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## Connecting to the Mitigation Strategy

- Need a clear connection between vulnerabilities identified in the risk assessment and proposed mitigation actions.
- The capability assessment can provide insight into challenges and opportunities for the mitigation strategy.
- All actions proposed in the mitigation strategy must have a factual basis tied to hazards

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## Key Takeaways – Community Survey

- **Earthquake readiness** and **wildfire smoke/wildfire risk** are the clearest priorities—both in lived experience and perceived importance.
- **Resilience hubs, continuity of City operations, and community training** are widely supported, indicating interest in **accessible, neighborhood-level supports** and **skills-building**.
- **Awareness gaps** remain (e.g., AC Alerts), and **more than half lack a specific evacuation route**, highlighting opportunities for targeted outreach and route planning.
- **Email** is the most effective channel for engagement; consider pairing with **in-person** events to reach older adults and communities less active online.

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# Key Takeaways – Community Meetings

**Vegetation & Tree Management**

- Requests for tree trimming assistance for those unable to afford it.
- Remove trees threatening power lines (e.g., Cleveland Blvd).
- Address invasive plants in creeks and eucalyptus in hills.
- Concerns about large trees near homes and property lines.

**Drainage & Flooding**

- Clean storm drains and streets to prevent flooding.
- Adopt-a-Drain program mentioned; need better follow-up and engagement.
- Lakes and creeks (e.g., near Edwards Ave, Seminary) cited as flood risks.

**Communication & Outreach**

- Clear, multilingual alerts and evacuation instructions.
- Improve Spanish and other language outreach; include printed materials.
- Provide interpretation services at meetings.
- More education on "Know Your Zone" and hazard maps.
- Outreach for residents with limited internet/social media access.

**Preparedness & Training**

- Train-the-trainer programs tailored for specific communities (AFN, monolingual).
- Youth engagement in hazard evaluation and mitigation activities.
- Promote resilience hubs at trusted community locations.

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# Key Takeaways – Community Meetings

**Infrastructure & Safety**

- Remove abandoned vehicles and illegal dumping (blocks drains, impacts mobility).
- Label curbs with addresses for emergency identification.
- Address soft-story buildings; coordinate with HUD and Building Department.
- Concerns about earthen dam at Tyson Lake and potential flooding from Piedmont.

**Alerts & Sirens**

- Sirens not audible in some areas (e.g., High Street, Foothill); need better coverage.
- Residents unaware of siren system despite long-term residency.

**Equity & Vulnerable Populations**

- Protect unhoused individuals during disasters.
- Ensure libraries and community centers receive emergency information.

**Hazard-Specific Concerns**

- Household chemical hazards during fires.
- Evacuation route planning for dead-end streets and multi-unit buildings.

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## 2026 Mitigation Goals

**Goal 1:** Advance equity, reduce racial disparities, and ensure ADA accessibility for people with disabilities and individuals with access and functional needs in all phases of preparing for, responding to, and recovering from natural hazards.

**Goal 2:** Protect life, property, the environment, and natural and cultural resources equitably.

**Goal 3:** Advance community-driven outreach efforts to equip Oaklanders with the knowledge, resources, and support needed to prepare for, respond to, and recover from natural hazards.

**Goal 4:** Implement strategies to enable departments of the City of Oakland to equitably respond to and mitigate hazards in accordance with the Emergency Operations Plan in an integrated manner.

**Goal 5:** Pursue feasible, cost-effective, and environmentally appropriate hazard mitigation measures including adaptive capacity to reduce risk from a changing climate, incorporating targeted strategies to advance equitable outcomes.

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# LHMP Public Comment Draft

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## Next Steps

- **Review**
  - Draft LHMP December 22 – January 5
- **Attend**
  - 1/20 Technical Forum (Virtual)
  - 2/9 Steering Committee Meeting (Virtual)

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# Appendix C – Federal & State Agencies, Programs & Regulations

# C. SUMMARY OF FEDERAL AND STATE AGENCIES, PROGRAMS, AND REGULATIONS

Existing laws, ordinances, plans and programs at the federal and state level can support or impact hazard mitigation actions identified in this plan. Hazard mitigation plans are required to include a review and incorporation, if appropriate, of existing plans, studies, reports, and technical information as part of the planning process (44 CFR, Section 201.6(b)(3)). The following federal and state programs have been identified as programs that may interface with the actions identified in this plan. Each program enhances capabilities to implement mitigation actions or has a nexus with a mitigation action in this plan. Information presented in this section can be used to review local capabilities to implement the actions found in the action plan.

Table C-1. Federal Capabilities

| Capability | Department/Agency | Description |
|---|---|---|
| ADA | U.S. Department of Justice Civil Rights Division | The Americans with Disabilities Act (ADA) seeks to prevent discrimination against people with disabilities in employment, transportation, public accommodation, communications, and government activities. Title II of the ADA deals with compliance with the Act in emergency management and disaster-related programs, services, and activities. It applies to state and local governments as well as third parties, including religious entities and private nonprofit organizations.<br><br>The ADA has implications for sheltering requirements and public notifications. During an emergency alert, officials must use a combination of warning methods to ensure that all residents have all necessary information. Those with hearing impairments may not hear radio, television, sirens, or other audible alerts, while those with visual impairments may not see flashing lights or other visual alerts. Two technical documents for shelter operators address physical |

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| | | accessibility needs of people with disabilities, as well as medical needs and service animals.<br><br>The ADA intersects with disaster preparedness programs in regards to transportation, social services, temporary housing, and rebuilding. Persons with disabilities may require additional assistance in evacuation and transit (e.g., vehicles with wheelchair lifts or paratransit buses). Evacuation and other response plans should address the unique needs of residents. Local governments may be interested in implementing a special-needs registry to identify the home addresses, contact information, and needs for residents who may require more assistance.<br><br>FEMA hazard mitigation project grant applications require full compliance with applicable federal acts. Any action identified in this plan that falls within the scope of this act will need to meet its requirements. |
| Civil Rights Act | U.S. Department of Justice Civil Rights Division | The Civil Rights Act of 1964 prohibits discrimination based on race, color, religion, sex or nation origin and requires equal access to public places and employment. The Act is relevant to emergency management and hazard mitigation in that it prohibits local governments from favoring the needs of one population group over another. Local government and emergency response must ensure the continued safety and well-being of all residents equally, to the |

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| | | extent possible. FEMA hazard mitigation project grant applications require full compliance with applicable federal acts. Any action identified in this plan that falls within the scope of this act will need to meet its requirements. |
| Clean Water Act | U.S. Environmental Protection Agency | The federal Clean Water Act (CWA) employs regulatory and non-regulatory tools to reduce direct pollutant discharges into waterways, finance municipal wastewater treatment facilities, and manage polluted runoff. These tools are employed to achieve the broader goal of restoring and maintaining the chemical, physical, and biological integrity of the nation's surface waters so that they can support "the protection and propagation of fish, shellfish, and wildlife and recreation in and on the water."<br><br>Evolution of CWA programs over the last decade has included a shift from a program-by-program, source-by-source, and pollutant-by-pollutant approach to more holistic watershed-based strategies. Under the watershed approach, equal emphasis is placed on protecting healthy waters and restoring impaired ones. Numerous issues are addressed, not just those subject to CWA regulatory authority. Involvement of stakeholder groups in the development and implementation of strategies for achieving and maintaining water quality and other environmental goals is a hallmark of this approach.<br><br>The CWA is important to hazard mitigation in several ways. There are often permitting requirements for any construction within 200 feet of water of the United States, which may have implications for mitigation projects identified by a local jurisdiction. |

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| | | Additionally, CWA requirements apply to wetlands, which serve important functions related to preserving and protecting the natural and beneficial functions of floodplains and are linked with a community's floodplain management program. Finally, the National Pollutant Discharge Elimination System is part of the CWA and addresses local stormwater management programs. Stormwater management plays a critical role in hazard mitigation by addressing urban drainage or localized flooding issues within jurisdictions.<br><br>FEMA hazard mitigation project grant applications require full compliance with applicable federal acts. Any action identified in this plan that falls within the scope of this act will need to meet its requirements. |
| Community Development Block Grant Disaster Resilience Program | U.S. Department of Housing and Urban Development | In response to disasters, Congress may appropriate additional funding for the U.S. Department of Housing and Urban Development Community Development Block Grant programs to be distributed as Disaster Recovery grants (CDBG-DR). These grants can be used to rebuild affected areas and provide seed money to start the recovery process. CDBG-DR assistance may fund a broad range of recovery activities, helping communities and neighborhoods that otherwise might not recover due to limited resources. CDBG-DR grants often supplement disaster programs of FEMA, the Small Business Administration, and the U.S. Army Corps of Engineers. Housing and Urban Development generally awards noncompetitive, nonrecurring CDBG-DR grants by a formula that considers disaster recovery needs unmet by other federal disaster assistance programs. To be eligible for CDBG-DR funds, projects must meet the following criteria: |

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| | | • Address a disaster-related impact (direct or indirect) in a presidentially declared county for the covered disaster<br>• Be a CDBG-eligible activity (according to regulations and waivers)<br>• Meet a national objective.<br><br>Incorporating preparedness and mitigation into these actions is encouraged, as the goal is to rebuild in ways that are safer and stronger. CDBG-DR funding is a potential alternative source of funding for actions identified in this plan. |
| Community Rating System | Federal Emergency Management Agency | The CRS is a voluntary program within the NFIP that encourages floodplain management activities that exceed the minimum NFIP requirements. Flood insurance premiums are discounted to reflect the reduced flood risk resulting from community actions meeting the following three goals of the CRS:<br>• Reduce flood losses.<br>• Facilitate accurate insurance rating.<br>• Promote awareness of flood insurance.<br><br>For participating communities, flood insurance premium rates are discounted in increments of 5 percent. For example, a Class 1 community would receive a 45 percent premium discount, and a Class 9 community would receive a 5 percent discount. (Class 10 communities are those that do not participate in the CRS; they receive no discount.) The discount partially depends on location of the property. Properties outside the special flood hazard area receive smaller discounts: a 10-percent discount if the community is at Class 1 to 6 and a 5-percent discount if the community is at Class 7 to 9. The CRS classes for local |

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| | | communities are based on 18 creditable activities in the following categories:<br>• Public information<br>• Mapping and regulations<br>• Flood damage reduction<br>• Flood preparedness.<br>CRS activities can help to save lives and reduce property damage. Communities participating in the CRS represent a significant portion of the nation's flood risk; over 66 percent of the NFIP's policy base is located in these communities. Communities receiving premium discounts through the CRS range from small to large and represent a broad mixture of flood risks, including both coastal and riverine flood risks. |
| Disaster Mitigation Act | Federal Emergency Management Agency | The DMA is the current federal legislation addressing hazard mitigation planning. It emphasizes planning for disasters before they occur. It specifically addresses planning at the local level, requiring plans to be in place before Hazard Mitigation Assistance grant funds are available to communities. This plan is designed to meet the requirements of DMA, improving eligibility for future hazard mitigation funds. |
| Emergency Relief for Federally Owned Roads Program | U.S. Department of Transportation Federal Highway Administration | The U.S. Forest Service's Emergency Relief for Federally Owned Roads Program was established to assist federal agencies with repair or reconstruction of tribal transportation facilities, federal lands transportation facilities, and other federally owned roads that are open to public travel and have suffered serious damage by a natural disaster over a wide area or by a catastrophic failure. The program funds both emergency and permanent repairs. Eligible activities under this program meet some of the goals and objectives for this plan and the |

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| | | program is a possible funding source for actions identified in this plan. |
| Emergency Watershed Program | U.S. Department of Agriculture | The USDA Natural Resources Conservation Service (NRCS) administers the Emergency Watershed Protection (EWP) Program, which responds to emergencies created by natural disasters. Eligibility for assistance is not dependent on a national emergency declaration. The program is designed to help people and conserve natural resources by relieving imminent hazards to life and property caused by floods, fires, windstorms, and other natural occurrences. EWP is an emergency recovery program. Financial and technical assistance are available for the following activities:<br>• Remove debris from stream channels, road culverts, and bridges<br>• Reshape and protect eroded banks<br>• Correct damaged drainage facilities<br>• Establish cover on critically eroding lands<br>• Repair levees and structures<br>• Repair conservation practices.<br>This federal program could be a possible funding source for actions identified in this plan. |
| Endangered Species Act | Department of the Interior U.S. Fish & Wildlife Service | The federal Endangered Species Act (ESA) was enacted in 1973 to conserve species facing depletion or extinction and the ecosystems that support them. The act sets forth a process for determining which species are threatened and endangered and requires the conservation of the critical habitat in which those species live. The ESA provides broad protection for species of fish, wildlife and plants that are listed as threatened or endangered. Provisions are made for listing species, as well as for recovery plans and the designation of critical habitat for listed |

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| | | species. The ESA outlines procedures for federal agencies to follow when taking actions that may jeopardize listed species and contains exceptions and exemptions. It is the enabling legislation for the Convention on International Trade in Endangered Species of Wild Fauna and Flora. Criminal and civil penalties are provided for violations of the ESA and the Convention.<br><br>Federal agencies must seek to conserve endangered and threatened species and use their authorities in furtherance of the ESA's purposes. The ESA defines three fundamental terms:<br><br>• Endangered means that a species of fish, animal or plant is "in danger of extinction throughout all or a significant portion of its range." (For salmon and other vertebrate species, this may include subspecies and distinct population segments.)<br>• Threatened means that a species "is likely to become endangered within the foreseeable future." Regulations may be less restrictive for threatened species than for endangered species.<br>• Critical habitat means "specific geographical areas that are…essential for the conservation and management of a listed species, whether occupied by the species or not."<br>• Five sections of the ESA are of critical importance to understanding it:<br>• Section 4: Listing of a Species—The National Oceanic and Atmospheric Administration Fisheries Service (NOAA Fisheries) is responsible for listing marine species; the U.S. Fish and Wildlife Service is responsible for listing terrestrial and freshwater aquatic species. The agencies may initiate reviews for listings, or residents may petition for them. A listing must be made "solely on the basis of the best scientific and commercial data available." After a |

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| | | listing has been proposed, agencies receive comment and conduct further scientific reviews for 12 to 18 months, after which they must decide if the listing is warranted. Economic impacts cannot be considered in this decision, but it may include an evaluation of the adequacy of local and state protections. Critical habitat for the species may be designated at the time of listing.<br>• Section 7: Consultation—Federal agencies must ensure that any action they authorize, fund, or carry out is not likely to jeopardize the continued existence of a listed or proposed species or adversely modify its critical habitat. This includes private and public actions that require a federal permit. Once a final listing is made, non-federal actions are subject to the same review, termed a "consultation." If the listing agency finds that an action will "take" a species, it must propose mitigations or "reasonable and prudent" alternatives to the action; if the proponent rejects these, the action cannot proceed.<br>• Section 9: Prohibition of Take—It is unlawful to "take" an endangered species, including killing or injuring it or modifying its habitat in a way that interferes with essential behavioral patterns, including breeding, feeding or sheltering.<br>  • Section 10: Permitted Take—Through voluntary agreements with the federal government that provide protections to an endangered species, a non-federal applicant may commit a take that would otherwise be prohibited as long as it is incidental to an otherwise lawful activity (such as developing land or building a road). These |

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| | | agreements often take the form of a "Habitat Conservation Plan."<br>• Section 11: Citizen Lawsuits—Civil actions initiated by any citizen can require the listing agency to enforce the ESA's prohibition of taking or to meet the requirements of the consultation process.<br>FEMA hazard mitigation project grant applications require full compliance with applicable federal acts. Any action identified in this plan that falls within the scope of this act will need to meet its requirements. |
| Federal Energy Regulatory Commission Dam Safety Program | Federal Energy Regulatory Commission Division of Dam Safety and Inspections | The Federal Energy Regulatory Commission (FERC) cooperates with a large number of federal and state agencies to ensure and promote dam safety. More than 3,000 dams are part of regulated hydroelectric projects in the FERC program. Two-thirds of these are more than 50 years old. As dams age, concern about their safety and integrity grows, so oversight and regular inspection are important. FERC inspects hydroelectric projects on an unscheduled basis to investigate the following:<br>• Potential dam safety problems<br>• Complaints about constructing and operating a project<br>• Safety concerns related to natural disasters<br>• Issues concerning compliance with the terms and conditions of a license.<br>Every five years, an independent engineer approved by the FERC must inspect and evaluate projects with dams higher than 32.8 feet (10 meters), or with a total storage capacity of more than 2,000 acre-feet.<br>FERC monitors seismic research and applies it in performing structural analyses of hydroelectric projects. FERC |

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| | | also evaluates the effects of potential and actual large floods on the safety of dams. During and following floods, FERC visits dams and licensed projects, determines the extent of damage, if any, and directs any necessary studies or remedial measures the licensee must undertake. The FERC publication Engineering Guidelines for the Evaluation of Hydropower Projects guides the FERC engineering staff and licensees in evaluating dam safety. The publication is frequently revised to reflect current information and methodologies.<br><br>FERC requires licensees to prepare emergency action plans and conducts training sessions on how to develop and test these plans. The plans outline an early warning system if there is an actual or potential sudden release of water from a dam due to failure. The plans include operational procedures that may be used, such as reducing reservoir levels and reducing downstream flows, as well as procedures for notifying affected residents and agencies responsible for emergency management. These plans are frequently updated and tested to ensure that everyone knows what to do in emergency situations. |
| National Dam Safety Act | Federal Emergency Management Agency | Potential for catastrophic flooding due to dam failures led to passage of the National Dam Inspection Act in 1972, creation of the National Dam Safety Program in 1996, and reauthorization of the program through the Dam Safety Act in 2006. National Dam Safety Program, administered by FEMA requires a periodic engineering analysis of the majority of dams in the country; exceptions include the following:<br><br>• Dams under jurisdiction of the Bureau of Reclamation, Tennessee Valley Authority, or International Boundary and Water Commission |

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| | | • Dams constructed pursuant to licenses issued under the Federal Power Act<br>• Dams that the Secretary of the Army determines do not pose any threat to human life or property.<br><br>The goal of this FEMA-monitored effort is to identify and mitigate the risk of dam failure so as to protect lives and property of the public. The National Dam Safety Program is a partnership among the states, federal agencies, and other stakeholders that encourages individual and community responsibility for dam safety. Under FEMA's leadership, state assistance funds have allowed all participating states to improve their programs through increased inspections, emergency action planning, and purchases of needed equipment. FEMA has also expanded existing and initiated new training programs. Grant assistance from FEMA provides support for improvement of dam safety programs that regulate most of the dams in the United States. |
| National Environmental Policy Act | U.S. Environmental Protection Agency | The National Environmental Policy Act requires federal agencies to consider the environmental impacts of proposed actions and reasonable alternatives to those actions, alongside technical and economic considerations. The National Environmental Policy Act established the Council on Environmental Quality, whose regulations (40 CFR Parts 1500-1508) set standards for compliance. Consideration and decision-making regarding environmental impacts must be documented in an environmental impact statement or environmental assessment. Environmental impact assessment requires the evaluation of reasonable alternatives to a proposed action, solicitation of input from organizations and individuals that could be affected, and an unbiased presentation of direct, |

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| | | indirect, and cumulative environmental impacts. FEMA hazard mitigation project grant applications require full compliance with applicable federal acts. Any action identified in this plan that falls within the scope of this act will need to meet its requirements. |
| National Flood Insurance Program | Federal Emergency Management Agency | The National Flood Insurance Program (NFIP) makes federally backed flood insurance available to homeowners, renters, and business owners in participating communities that enact floodplain regulations. Participation and good standing under NFIP are prerequisites to grant funding eligibility under the Robert T. Stafford Act.<br><br>For most participating communities, FEMA has prepared a detailed Flood Insurance Study. The study presents water surface elevations for floods of various magnitudes, including the 1-percent-annual-chance flood and the 0.2-percent-annual-chance flood. Base flood elevations and the boundaries of the flood hazard areas are shown on Flood Insurance Rate Maps, which are the principle tool for identifying the extent and location of the flood hazard. Flood Insurance Rate Maps are the most detailed and consistent data source available, and for many communities they represent the minimum area of oversight under the local floodplain management program. In recent years, Flood Insurance Rate Maps have been digitized as Digital Flood Insurance Rate Maps, which are more accessible to residents, local governments and stakeholders.<br><br>NFIP participants must, at a minimum, regulate development in floodplain areas in accordance with NFIP criteria. Before issuing a permit to build in a floodplain, |

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| | | participating jurisdictions must ensure that three criteria are met:<br><br>• New buildings and those undergoing substantial improvements must, at a minimum, be elevated to protect against damage by the 1-percent-annual-chance flood.<br>• New floodplain development must not aggravate existing flood problems or increase damage to other properties.<br>• New floodplain development must exercise a reasonable and prudent effort to reduce its adverse impacts on threatened salmonid species.<br><br>NFIP participation is limited to local governments that possess permit authority and have the ability to adopt and enforce regulations that govern land use. This does not typically apply to special purpose districts. None of the special purpose district planning partners covered by this plan are eligible to participate in the NFIP, so their action plans do not address NFIP participation. |
| National Incident Management System | Federal Emergency Management Agency | The National Incident Management System (NIMS) is a systematic approach for government, nongovernmental organizations, and the private sector to work together to manage incidents involving hazards. The NIMS provides a flexible but standardized set of incident management practices. Incidents typically begin and end locally, and they are managed at the lowest possible geographical, organizational, and jurisdictional level. In some cases, success depends on the involvement of multiple jurisdictions, levels of government, functional agencies, and emergency responder disciplines. These cases necessitate coordination across a spectrum of organizations. Communities using NIMS follow a comprehensive national approach that improves the effectiveness of emergency |

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| | | management and response personnel across the full spectrum of potential hazards (including natural hazards, technological hazards, and human-caused hazards) regardless of size or complexity.<br><br>Although participation is voluntary, federal departments and agencies are required to make adoption of NIMS by local and state jurisdictions a condition to receive federal preparedness grants and awards. The content of this plan is considered to be a viable support tool for any phase of emergency management. The NIMS program is considered as a response function, and information in this hazard mitigation plan can support the implementation and update of all NIMS-compliant plans within the planning area. |
| National Landslide Preparedness Act | Department of the Interior U.S. Geological Survey | The 2021 National Landslide Preparedness Act authorized a national landslide hazards reduction program and a 3D elevation program within the USGS. This broadened the existing Landslide Hazards Program (under the Natural Hazards Mission Area) and the 3D Elevation Program (under the National Geospatial Program). The act required coordination among federal agencies through an Interagency Coordinating Committee on Landslide Hazards representing USGS and other agencies. The act calls for development of a national strategy for landslide loss reduction and a publicly accessible national landslide database of landslide hazard and risk. |
| Presidential Executive Order 11988, Floodplain Management | Federal Emergency Management Agency | Executive Order 11988 requires federal agencies to avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a |

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| | | practicable alternative. It requires federal agencies to provide leadership and take action to reduce the risk of flood loss, minimize the impact of floods on human safety, health, and welfare, and restore and preserve the natural and beneficial values of floodplains. The requirements apply to the following activities:<br>• Acquiring, managing, and disposing of federal lands and facilities<br>• Providing federally undertaken, financed, or assisted construction and improvements<br>• Conducting federal activities and programs affecting land use, including but not limited to water and related land resources planning, regulation, and licensing. |
| U.S. Army Corps of Engineers Dam Safety Program | U.S. Army Corps of Engineers | The U.S. Army Corps of Engineers operates and maintains approximately 700 dams nationwide. It is also responsible for safety inspections of some federal and non-federal dams in the United States that meet the size and storage limitations specified in the National Dam Safety Act. The Corps has inventoried dams; surveyed each state and federal agency's capabilities, practices and regulations regarding design, construction, operation and maintenance of the dams; and developed guidelines for inspection and evaluation of dam safety. The Corps maintains the National Inventory of Dams, which contains information about a dam's location, size, purpose, type, last inspection and regulatory status. |
| U.S. Army Corps of Engineers Flood Hazard Management | U.S. Army Corps of Engineers | • The following U.S. Army Corps of Engineers authorities and programs related to flood hazard management:<br>The Floodplain Management Services program offers 100-percent federally funded technical services such as development and interpretation of site- |

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| | | specific data related to the extent, duration and frequency of flooding. Special studies may be conducted to help a community understand and respond to flood risk. These may include flood hazard evaluation, flood warning and preparedness, or flood modeling.<br>○ For more extensive studies, the Corps of Engineers offers a cost-shared program called Planning Assistance to States and Tribes. Studies under this program generally range from $25,000 to $100,000 with the local jurisdiction providing 50 percent of the cost.<br>○ The Corps of Engineers has several cost-shared programs (typically 65 percent federal and 35 percent non-federal) aimed at developing, evaluating and implementing structural and non-structural capital projects to address flood risks at specific locations or within a specific watershed:<br>• The Continuing Authorities Program for smaller-scale projects includes Section 205 for Flood Control, with a $7 million federal limit and Section 14 for Emergency Streambank Protection with a $1.5 million federal limit. These can be implemented without specific authorization from Congress.<br>• Larger scale studies, referred to as General Investigations, and projects for flood risk management, for ecosystem restoration or to address other water resource issues, can be pursued through a specific authorization from Congress and are cost-shared, typically at 65 |

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| | | percent federal and 35 percent non-federal.<br>• Watershed management planning studies can be specifically authorized and are cost-shared at 50 percent federal and 50 percent non-federal.<br>  ○ The Corps of Engineers provides emergency response assistance during and following natural disasters. Public Law 84-99 enables the Corps to assist state and local authorities in flood fight activities and cost share in the repair of flood protective structures. Assistance is provided in the flowing categories:<br>• Preparedness—The Flood Control and Coastal Emergency Act establishes an emergency fund for preparedness for emergency response to natural disasters; for flood fighting and rescue operations; for rehabilitation of flood control and hurricane protection structures. Funding for Corps of Engineers emergency response under this authority is provided by Congress through the annual Energy and Water Development Appropriation Act. Disaster preparedness activities include coordination, planning, training and conduct of response exercises with local, state and federal agencies.<br>• Response Activities—Public Law 84-99 allows the Corps of Engineers to supplement state and local entities in flood fighting urban and other non-agricultural areas under certain conditions (Engineering Regulation 500-1-1 provides specific details). All flood fight efforts require a project cooperation agreement signed by |

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| | | the public sponsor and the sponsor must remove all flood fight material after the flood has receded. Public Law 84-99 also authorizes emergency water support and drought assistance in certain situations and allows for "advance measures" assistance to prevent or reduce flood damage conditions of imminent threat of unusual flooding.<br>• Rehabilitation—Under Public Law 84-99, an eligible flood protection system can be rehabilitated if damaged by a flood event. The flood system would be restored to its pre-disaster status at no cost to the federal system owner, and at 20-percent cost to the eligible non-federal system owner. All systems considered eligible for Public Law 84-99 rehabilitation assistance have to be in the Rehabilitation and Inspection Program prior to the flood event. Acceptable operation and maintenance by the public levee sponsor are verified by levee inspections conducted by the Corps on a regular basis. The Corps has the responsibility to coordinate levee repair issues with interested federal, state, and local agencies following natural disaster events where flood control works are damaged.<br>These authorities and programs are all available to the planning partners to support any related mitigation actions. |
| U.S. Bureau of Reclamation Safety Evaluation of Existing Dams Program | U.S. Department of the Interior Bureau Reclamation | The U.S. Bureau of Reclamation's Safety Evaluation of Existing Dams Program was officially implemented in 1978 with passage of the Reclamation Safety of Dams Act (Public Law 95-578). This act was amended in 1984 under Public Law 98-404, in 2000 under Public Law 106-377, in 2002 under Public Law 107-117, and in 2004 under Public Law 108-439. |

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| | | Program development and administration of dam safety activities is the responsibility of the Bureau of Reclamation's Dam Safety Office located in Denver, Colorado.<br><br>Dams must be operated and maintained in a safe manner, ensured through inspections for safety deficiencies, analyses utilizing current technologies and designs, and corrective actions if needed based on current engineering practices. In addition, future evaluations should include assessments of benefits foregone with the loss of a dam. For example, a failed dam can no longer provide needed fish and wildlife benefits.<br><br>The primary emphasis of the Safety Evaluation of Existing Dams program is to perform site evaluations and to identify potential safety deficiencies on Bureau of Reclamation and other Interior Department dams. The basic objective is to quickly identify dams which pose an increased threat to the public, and to quickly complete the related analyses in order to expedite corrective action decisions and safeguard the public and associated resources. The selected course of action relies on assessments of risks and liabilities with environmental and public involvement input to the decision-making process. |
| U.S. Fire Administration | Federal Emergency Management Agency | There are federal agencies that provide technical support to fire agencies/organizations. For example, the U.S. Fire Administration, which is a part of FEMA, provides leadership, advocacy, coordination, and support for fire agencies and organizations. |

Table C-2. State Capabilities

| Capability | Department/Agency | Description |
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| AB 32: The California Global Warming Solutions Act | California Environmental Protection Agency<br>California Air Resources Board | This bill identifies the following potential adverse impacts of global warming:<br>"… the exacerbation of air quality problems, a reduction in the quality and supply of water to the state from the Sierra snowpack, a rise in sea levels resulting in the displacement of thousands of coastal businesses and residences, damage to marine ecosystems and the natural environment, and an increase in the incidences of infectious diseases, asthma, and other human health-related problems."<br>AB 32 establishes a state goal of reducing greenhouse gas emissions to 1990 levels by 2020 (a reduction of approximately 25 percent from forecast emission levels), with further reductions to follow. The law requires the state Air Resources Board to do the following:<br>• Establish a program to track and report greenhouse gas emissions.<br>• Approve a scoping plan for achieving the maximum technologically feasible and cost-effective reductions from sources of greenhouse gas emissions.<br>• Adopt early reduction measures to begin moving forward.<br>• Adopt, implement, and enforce regulations—including market mechanisms such as "cap and-trade" programs—to ensure that the required reductions occur.<br>The Air Resources Board has adopted a statewide greenhouse gas emissions limit and an emissions inventory, along with requirements to measure, track, |

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| | | and report greenhouse gas emissions by the industries it determined to be significant sources of greenhouse gas emissions. |
| AB 38: Fire safety: Low-Cost Retrofits: Regional Capacity Review: Wildfire Mitigation | California Wildfire and Forest Resilience Task Force | Requires the seller of any real property located in a high or very fire hazard severity zone to provide a disclosure notice, as specified, to the buyer with information relating to fire hardening improvements on the property.<br>Requires the California Natural Resources Agency, in consultation with the State Fire Marshal and the Forest Management Task Force, to review the regional capacity of each county that contains a very high fire hazard severity zone to improve forest health, fire resilience, and safety.<br>Requires the California Office of Emergency Services to enter into a joint powers agreement with the Department of Forestry and Fire Protection to administer a comprehensive wildfire mitigation and assistance program to encourage cost-effective structure hardening and facilitate vegetation management, contingent upon appropriation by the Legislature. |
| AB 70: Flood Planning | California Department of Water Resources | This bill provides that a city or county may be required to contribute a fair and reasonable share to compensate for property damage caused by a flood to the extent that it has increased the state's exposure to liability for property damage by unreasonably approving new development in a previously undeveloped area that is protected by a state flood control project, unless the city or county meets specified requirements. |
| AB 162: Flood Planning | California Department of Water Resources | This California State Assembly Bill passed in 2007 requires cities and counties to address flood-related matters in the land use, conservation, and safety and housing elements of |

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| | | their general plans. The land use element must identify and annually review the areas covered by the general plan that are subject to flooding as identified in floodplain mapping by either FEMA or the state Department of Water Resources (DWR). During the next revision of the housing element on or after January 1, 2009, the conservation element of the general plan must identify rivers, creeks, streams, flood corridors, riparian habitat, and land that may accommodate floodwater for the purpose of groundwater recharge and stormwater management. The safety element must identify information regarding flood hazards, including:<br>• Flood hazard zones<br>• Maps published by FEMA, DWR, the U.S. Army Corps of Engineers, the Central Valley Flood Protection Board, and the Governor's Office of Emergency Services (Cal OES)<br>• Historical data on flooding<br>• Existing and planned development in flood hazard zones.<br>• The general plan must establish goals, policies and objectives related to flooding risks, including:<br>• Avoiding or minimizing the risks of flooding new development<br>• Evaluating whether new development should be located in flood hazard zones<br>• Identifying construction methods to minimize damage.<br>AB 162 establishes goals, policies and objectives related to flooding risks. It establishes procedures for the |

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| | | determination of available land suitable for urban development, which may exclude lands where FEMA or DWR has concluded that the flood management infrastructure is not adequate to avoid the risk of flooding. |
| AB 642: Wildfires | California Environmental Protection Agency California Air Resources Board | This omnibus fire prevention bill makes changes to support cultural and prescribed fire, including the creation of a Cultural Burning Liaison at the Department of Forestry and Fire Protection, and requires a proposal for creating a prescribed fire training center in California. The Act requires the Director of Forestry and Fire Protection to identify areas in the state as moderate and high fire hazard severity zones and to classify areas into fire hazard severity zones based on additional factors including possible lightning caused ignition. The bill requires a local agency, within 30 days of receiving a transmittal from the director that identifies fire hazard severity zones, to make the information available for public comment. |
| AB 747: Required Information for General Plan Safety Elements | Governor's Office of Land Use and Climate Innovation | This bill requires California communities with general plans to address evacuation routes in the safety element of the general plan. Information on the evacuation routes and their capacity, safety and viability under a range of emergency scenarios must be provided. For communities that have not adopted a local hazard mitigation plan, the safety element must be updated with this information by January 1, 2022. For those with a local hazard mitigation plan, the requirement applies upon the next revision of the hazard mitigation plan on or after January 1, 2022. Communities that have adopted a local hazard mitigation plan, emergency operations plan, or other document that fulfills the goals and objectives of this law may comply with |

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| | | this requirement by summarizing and incorporating by reference the other plan or document in the safety element.<br><br>In subsequent revisions to the safety element, communities also will be required to identify new information relating to flood and fire hazards and climate adaptation and resiliency strategies applicable to the city or county that was not available during the previous revision of the safety element. These subsequent updates must occur upon each revision of the general plan housing element or local hazard mitigation plan and not less than once every eight years. |
| AB 800: Wildfires: Local General Plans: Safety Elements: Fire Hazard Severity Zones | California Department of Forestry and Fire Protection Office of the Fire Marshal | Existing law requires the Director of Forestry and Fire Protection to identify areas of the state as very high fire hazard severity zones, and requires each planning agency to prepare, and the legislative body of each county and city to adopt, a comprehensive, long-term general plan, including a safety element, for the physical development of the county or city. Existing law requires each city or county that contains a very high fire hazard severity zone to submit the draft element of, or draft amendment to the safety element its general plan to the State Board of Forestry and Fire Protection and to every local agency that provides fire protection to territory in the city or county at least 90 days before adoption or amendment.<br><br>This requires the director to also identify areas of the state as moderate and high fire hazard severity zones. It requires the draft element of, or draft amendment to, the safety element of a county or city's general plan to be submitted to the state board and to every local agency that provides fire protection to territory in the city or |

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| | | county at least 90 days before the adoption or amendment to the safety element of its general plan for each city or county that contains a moderate or high fire hazard severity zone.<br><br>Existing law requires the state board and authorizes a local agency to review the draft or an existing safety element and recommend changes to the planning agency regarding uses of land and policies in state responsibility areas and very high fire hazard severity zones and regarding methods and strategies for wildland fire risk reduction and prevention within state responsibility areas and very high fire hazard severity zones.<br><br>This bill also requires the state board and authorizes a local agency to review the draft or an existing safety element and recommend changes to the planning agency regarding uses of land and policies in moderate and high fire hazard severity zones and regarding methods and strategies for wildland fire risk reduction and prevention within moderate and high fire hazard severity zones.<br><br>The existing Subdivision Map Act vests the authority to regulate and control the design and improvement of subdivisions in the legislative body of a local agency, and sets forth procedures governing the local agency's processing, approval, conditional approval, or disapproval, and filing of tentative, final, and parcel maps, and the modification thereof. The act generally requires a subdivider to file a tentative map or vesting tentative map with the local agency, and requires the local agency to approve, conditionally approve, or disapprove the map within a specified time period. Before approving a tentative map, or a parcel map for |

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| | | which a tentative map was not required, for an area located in a state responsibility area or a very high fire hazard severity zone, existing law requires a legislative body of a county to make specified findings. Existing law requires a legislative body of a county to transmit these findings to the State Board of Forestry and Fire Protection.<br><br>This requires a legislative body of a county to make specified findings before approving a tentative map, or a parcel map for which a tentative map was not required, for areas located in moderate and high fire hazard severity zones, and requires these findings to be transmitted to the state board.<br><br>By requiring new duties on a county, the bill imposes a state-mandated local program. The California Constitution requires the state to reimburse local agencies and school districts for certain costs mandated by the state. Statutory provisions establish procedures for making that reimbursement. This bill provides that, if the Commission on State Mandates determines that the bill contains costs mandated by the state, reimbursement for those costs shall be made pursuant to statutory provisions. |
| AB 2140: General Plans—Safety Element | California Governor's Office of Emergency Services | This bill provides that the state may allow for more than 75 percent of public assistance funding under the California Disaster Assistance Act only if the local agency is in a jurisdiction that has adopted a local hazard mitigation plan as part of the safety element of its general plan. The local hazard mitigation plan needs to include elements specified in this legislation. In addition, this bill requires Cal OES to give preference for federal mitigation funding to cities |

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| | | and counties that have adopted local hazard mitigation plans. The intent of the bill is to encourage cities and counties to create and adopt hazard mitigation plans. |
| AB 2800: Climate Change—Infrastructure Planning | California Natural Resources Agency | This California State Assembly bill passed in 2016 and until July 1, 2020, requires state agencies to take into account the current and future impacts of climate change when planning, designing, building, operating, maintaining, and investing in state infrastructure. The bill, by July 1, 2017, and until July 1, 2020, requires an agency to establish a Climate-Safe Infrastructure Working Group to examine how to integrate scientific data concerning projected climate change impacts into state infrastructure engineering. |
| Alquist-Priolo Earthquake Fault Zoning Act | California Department of Conservation | The Alquist-Priolo Earthquake Fault Zoning Act was enacted in 1972 to mitigate the hazard of surface faulting to structures for human occupancy. The Alquist-Priolo Earthquake Fault Zoning Act's main purpose is to prevent construction of buildings used for human occupancy on the surface trace of active faults. Before a new project is permitted, cities and counties require a geologic investigation to demonstrate that proposed buildings will not be constructed on active faults. The act addresses only the hazard of surface fault rupture and is not directed toward other earthquake hazards, such as liquefaction or seismically induced landslides. The law requires the State of California Geologist to establish regulatory zones around the surface traces of active faults and to issue appropriate maps. The maps are distributed to all affected cities, counties, and state agencies for their use in planning and controlling new or renewed construction. Local agencies must regulate most |

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| | | development projects within the zones. Projects include all land divisions and most structures for human occupancy. All seismic hazard mitigation actions identified in this plan will seek full compliance with the Alquist-Priolo Earthquake Fault Zoning Act. |
| California Department of Forestry and Fire Protection | California Department of Forestry and Fire Protection | CAL FIRE has responsibility for wildfires in areas of the county that are not under the jurisdiction of the Forest Service or a local fire organization, including lands designated as State Responsibility Areas. CAL FIRE also has fire protection responsibilities by contract and mutual aid agreements. For example, CAL FIRE provides year-round fire protection under Amador Plan agreements with certain local government agencies (Public Resources Code §4144). Through these agreements, CAL FIRE provides local structural and wildfire protection or dispatch services to a community and maintains a staffing level that otherwise would be available only during the fire season. The local entity pays the additional cost of the service. |
| California Department of Parks and Recreation | California Department of Parks and Recreation | State Parks manages portions of the California coastline including coastal wetlands, estuaries, beaches, and dune systems. The State Parks Resources Management Division has limited wildfire protection resources available to suppress fires on State Park lands. |
| California Department of Water Resources | California Department of Water Resources | In California, the DWR is the coordinating agency for floodplain management. The DWR works with FEMA and local governments by providing grants and technical assistance, evaluating community floodplain management programs, reviewing local floodplain ordinances, participating in statewide flood hazard mitigation planning, and |

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| | | facilitating annual statewide workshops. Compliance is monitored by FEMA regional staff and by the DWR. |
| California Division of Safety of Dams | California Department of Water Resources | California's Division of Safety of Dams (a division of the DWR) monitors the dam safety program at the state level and maintains a working list of dams in the state. When a new dam is proposed, Division engineers and geologists inspect the site and the subsurface. Upon submittal of an application, the Division reviews the plans and specifications prepared by the owner to ensure that the dam is designed to meet minimum requirements and that the design is appropriate for the known geologic conditions. After approval of the application, the Division inspects all aspects of the construction to ensure that the work is done in accordance with the approved plans and specifications. After construction, the Division inspects each dam to ensure that it is performing as intended and is not developing problems. The Division periodically reviews the stability of dams and their major appurtenances in light of improved design approaches and requirements, as well as new findings regarding earthquake hazards and hydrologic estimates in California. Over 1,200 dams are inspected by Division engineers on a yearly schedule to ensure performance and maintenance of dams. |
| California Environmental Quality Act | Governor's Office of Land Use and Climate Innovation | The California Environmental Quality Act (CEQA) was passed in 1970, shortly after the federal government enacted the National Environmental Policy Act, to institute a statewide policy of environmental protection. CEQA requires state and local agencies in California to follow a protocol of analysis and public disclosure of the potential environmental impacts of |

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| | | development projects. CEQA makes environmental protection a mandatory part of every California state and local agency's decision-making process.<br><br>CEQA establishes a statewide environmental policy and mandates actions all state and local agencies must take to advance the policy. Jurisdictions conduct analysis of the project to determine if there are potentially significant environmental impacts, identify mitigation measures, and possible project alternatives by preparing environmental reports for projects that requires CEQA review. This environmental review is required before an agency takes action on any policy, program, or project. Any project action identified in this plan will seek full CEQA compliance upon implementation. |
| California Fire Safe Council | California Fire Safe Council | In 1993, the statewide Fire Safe Council, consisting of private and public membership, was formed to educate and encourage Californians to plan and prepare for wildfires by reducing the risk of fire to property, communities, and natural/structural resources. In 2002, this group created a nonprofit organization and board of directors, called the California Fire Safe Council. The Council works with the California Fire Alliance to facilitate the distribution of National Fire Plan grants for wildfire risk reduction and education (www.grants.firesafecouncil.org). The Council also provides assistance to local Fire Safe Councils through its website (www.firesafecouncil.org), the distribution of educational materials, and technical assistance, primarily through regional representatives. More than 130 local Fire Safe Councils have formed in California to plan, |

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| | | coordinate, and implement fire prevention activities. |
| California Fire Service and Rescue Emergency Mutual Aid Plan | California Governor's Office of Emergency Services Fire Rescue Emergency Mutual Aid System | The Governor's Office of Emergency Services Fire and Rescue Branch administers the California Fire Service and Rescue Emergency Mutual Aid Plan. The agency provides guidance and procedures for agencies developing emergency operations plans, as well as training and technical support, primarily to overall emergency service organizations and urban search and rescue teams. |
| California General Planning Law | Governor's Office of Land Use and Climate Innovation | California state law requires that every county and city prepare and adopt a comprehensive long-range plan to serve as a guide for community development. The general plan expresses the community's goals, visions, and policies relative to future land uses, both public and private. The general plan is mandated and prescribed by state law (Cal. Gov. Code §65300 et seq.), and forms the basis for most local government land use decision-making.<br><br>The plan must consist of an integrated, internally consistent set of goals, policies, and implementation measures. In addition, the plan must focus on issues of the greatest concern to the community and be written in a clear and concise manner. City and county actions, such as those relating to land use allocations, annexations, zoning, subdivision and design review, redevelopment, and capital improvements, must be consistent with the plan. |
| California Hazard Mitigation Plan | California Governor's Office of Emergency Services | Under the DMA, California must adopt a federally approved state multi-hazard mitigation plan to be eligible for certain disaster assistance and mitigation funding. The intent of the State of California Multi-Hazard Mitigation Plan is to reduce or prevent |

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| | | injury and damage from hazards in the state through the following:<br>• Documenting statewide hazard mitigation planning in California<br>• Describing strategies and priorities for future mitigation activities<br>• Facilitating the integration of local and tribal hazard mitigation planning activities into statewide efforts<br>• Meeting state and federal statutory and regulatory requirements.<br>The plan is an annex to the State Emergency Plan, and it identifies past and present mitigation activities, current policies and programs, and mitigation strategies for the future. It also establishes hazard mitigation goals and objectives. The plan will be reviewed and updated annually to reflect changing conditions and new information, especially information on local planning activities.<br>Under 44 CFR Section 201.6, local hazard mitigation plans must be consistent with their state's hazard mitigation plan. In updating this plan, the Steering Committee reviewed the California State Hazard Mitigation Plan to identify key relevant state plan elements (see Section 3.7). |
| California Residential Mitigation Program | California Residential Mitigation Program | The California Residential Mitigation Program was established in 2011 to help Californians strengthen their homes against damage from earthquakes. The program is a joint powers authority created by Cal OES and the California Earthquake Authority, which is a not-for-profit, publicly managed, privately funded provider of home earthquake insurance to California homeowners and renters. |

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| | | Earthquake Brace + Bolt was developed to help homeowners lessen the potential for damage to their houses during an earthquake. A residential seismic retrofit strengthens an existing older house, making it more resistant to earthquake activity such as ground shaking and soil failure. The seismic retrofitting involves bolting the house to its foundation and adding bracing around the perimeter of the crawl space. Most homeowners hire a contractor to do the retrofit work, and owners of houses in ZIP Codes with house characteristics suitable for this type of retrofit are eligible for up to $3,000 toward the cost. A typical retrofit by a contractor may cost between $3,000 and $7,000, depending on the location and size of the house, contractor fees, and the amount of materials and work involved. If the homeowner is an experienced do-it-yourselfer, a retrofit can cost less than $3,000. |
| California State Building Code | California Department of General Services | California Code of Regulations Title 24 (CCR Title 24), also known as the California Building Standards Code, is a compilation of building standards from three sources:<br>• Building standards that have been adopted by state agencies without change from building standards contained in national model codes<br>• Building standards that have been adopted and adapted from the national model code standards to meet California conditions<br>• Building standards authorized by the California legislature that constitute extensive additions not covered by the model codes |

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| | | adopted to address particular California concerns.<br><br>The state Building Standards Commission is authorized by California Building Standards Law (Health and Safety Code Sections 18901 through 18949.6) to administer the processes related to the adoption, approval, publication, and implementation of California's building codes. These building codes serve as the basis for the design and construction of buildings in California. The national model code standards adopted into Title 24 apply to all occupancies in California, except for modifications adopted by state agencies and local governing bodies. Since 1989, the Building Standards Commission has published new editions of Title 24 every three years.<br><br>On January 1, 2014, California Building Code Accessibility Standards found in Chapter 11B incorporated the 2010 Americans with Disabilities Act (ADA) Standards as the model accessibility code for California. The purpose was to ensure consistency with federal guidelines. As a result of this incorporation, the California standards will fully implement and include 2010 ADA Standards within the California Building Code while maintaining enhanced levels of accessibility already provided by existing California accessibility regulations. |
| Disadvantaged and Low-income Communities Investments | State of California Office of Environmental Health Hazard Assessment | Senate Bill (SB) 535 directs state and local agencies to make investments that benefit California's disadvantaged communities. It also directs the California Environmental Protection Agency to identify disadvantaged communities for the purposes of these investments based on geographic, socio-economic, public |

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| | | health, and environmental hazard criteria. Assembly Bill (AB) 1550 increased the percent of funds for projects located in disadvantaged communities from 10 to 25 percent and added a focus on investments in low-income communities and households. This program is a potential alternative source of funding for actions identified in this plan. |
| Division of the State Architect's AB 300 List of Seismically At-Risk Schools | California Department of General Services | In 2002, California's Division of the State Architect completed an inventory of public school buildings built before 1978 that identifies buildings with characteristics that might make them unsafe in future earthquakes. This inventory provides a list of potentially at-risk schools known as the AB 300 list (the inventory was authorized by Assembly Bill 300 in 1999). Using available information on school buildings' dates of construction, seismic retrofits, and structural systems (wood-frame, concrete shear wall, or steel moment frame, etc.), the inventory categorized California public school buildings into one of two categories: those expected to perform well in future earthquakes; and those that are not expected to perform well and require more detailed seismic evaluation.<br><br>The Division of the State Architect recommends that public schools on this list undergo detailed seismic evaluations to determine if they pose life safety risks, but the state has neither required nor funded school districts to do this. |
| Governor's Executive Order S-13-08 | Office of the Governor | Governor's Executive Order S-13-08 enhances the state's management of climate impacts from sea-level rise, increased temperatures, shifting precipitation and extreme weather events. There are four key actions in the executive order: |

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| | | • Initiate California's first statewide climate change adaptation strategy to assess expected climate change impacts, identify where California is most vulnerable, and recommend adaptation policies. This effort will improve coordination within state government so that better planning can more effectively address climate impacts on human health, the environment, the state's water supply and the economy.<br>• Request that the National Academy of Science establish an expert panel to report on sea-level rise impacts in California, to inform state planning and development efforts.<br>• Issue interim guidance to state agencies for how to plan for sea-level rise in designated coastal and floodplain areas for new projects.<br>• · Initiate a report on critical infrastructure projects vulnerable to sea-level rise. |
| Office of the State Fire Marshal | Office of the State Fire Marshal | The Office of the State Fire Marshal is a division of CAL FIRE that has a wide variety of fire safety and training responsibilities and provides technical support to fire agencies/organizations. |
| Senate Bill 12: Local Government: Planning and Zoning: Wildfires | California Department of Forestry and Fire Protection | This bill imposes new planning requirements on local governments, as follows:<br>• Defines "very high fire risk areas" to be the VHFHSZ in both the SRA and the Local Responsibility Area.<br>• Requires each city or county, upon the next revision of the housing element or local hazard mitigation plan on or after July 1, 2024, whichever |

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| | | occurs first, to review and update its safety element to include a comprehensive retrofit strategy that includes specified contents.<br>• Requires a city or county with VHFHSZ within its jurisdiction to amend the land use element of its general plan upon the next revision of the housing element on or after July 1, 2024. This amendment of the land use element must include the locations of all VHFHSZ within the city or county, the data and analysis described in the Office of Planning and Research's publication Fire Hazard Planning–General Plan Technical Advice Series, and other specified goals, objectives, and implementation measures.<br>• Requires, after the initial amendment to the land use element, that a city or county review upon each revision of the housing element the implementation of the wildfire risk reduction standards within the jurisdiction and the designation of VHFHSZ.<br>• Provides for review and comment on draft findings by the Board and local fire agencies on whether the city or county has implemented the standards or made adequate progress, as defined.<br>• Requires, on or before January 1, 2023, to develop and post on its web site a clearinghouse of local |

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| | | ordinances, policies, and best practices relating to land use planning in VHFHSZ, wildfire risk reduction, and wildfire preparedness. The Office of Planning and Research must also regularly update the clearinghouse. |
| Senate Bill 99: Evacuation Route Planning | California Department of Transportation | Senate Bill 99, enacted in 2019, requires that cities' and counties' general plans address evacuation routes from any hazard area identified in the safety element. Under this law, the safety element must include information to identify residential developments in hazard areas that do not have at least two emergency evacuation routes. Each city or county must update its safety element with the new information upon the next revision of its housing element on or after January 1, 2020. |
| Senate Bill 182 Local Government: Planning and Zoning: Wildfires | California Environmental Protection Agency California Air Resources Board | California Senate Bill 182 made a number of changes to state law regarding planning for and permitting development in areas designated as very high fire risk areas. The bill requires a local jurisdiction to do the following:<br>• Include a comprehensive retrofit strategy in its safety element to reduce the risk of property loss and damage during wildfires.<br>• Amend its land use element to identify all very high fire risk areas and to establish measures to protect lives and property from unreasonable risk of wildfire.<br>• Adopt a very high fire risk overlay zone for its zoning ordinance.<br>• Allocate a lower portion of projected future housing to |

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| | | very high fire hazard severity zones<br>This bill prohibits local governments from entering into a development agreement for property in a very high fire risk area, approving a permit for a project in a very high fire risk area, or approving a tentative map for a subdivision in a very high fire risk area, unless the jurisdiction makes specified findings based on substantial evidence. |
| Senate Bill 379: General Plans: Safety Element—Climate Adaptation | Governor's Office of Planning and Resources | Senate Bill 379 builds upon the flood planning inclusions into the safety and housing elements and the hazard mitigation planning safety element inclusions in general plans outlined in AB 162 and AB 2140, respectively. SB 379 focuses on a new requirement that cities and counties include climate adaptation and resiliency strategies in the safety element of their general plans beginning January 1, 2017. In addition, this bill requires general plans to include a set of goals, policies and objectives, and specified implementation measures based on the conclusions drawn from climate adaptation research and recommendations. |
| Senate Bill 1000: General Plan Amendments—Safety and Environmental Justice Elements | California Department of Justice Office of the Attorney General | In 2016, Senate Bill 1000 amended California's Planning and Zoning Law in two ways:<br>• The original law established requirements for initial revisions of general plan safety elements to address flooding, fire, and climate adaptation and resilience. It also required subsequent review and revision as necessary based on new information. Senate Bill 1000 specifies that the subsequent reviews and revision based on new information are required to address only flooding and fires |

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| | | (not climate adaptation and resilience).<br>• Senate Bill 1000 adds a requirement that, upon adoption or revision of any two other general plan elements on or after January 1, 2018, an environmental justice element be adopted for the general plan or environmental justice goals, policies and objectives be incorporated into other elements of the plan. |
| Senate Bill 1035: Fire, Flood, and Adaptation Safety Element Updates | Governor's Office of Land Use and Climate Innovation | Senate Bill 1035 clarifies that revisions to a community's General Plan Safety Element—to address fire hazards, flood hazards, and climate adaptation and resilience strategies—must occur upon each revision to a Housing Element or Local Hazard Mitigation Program. |
| Senate Bill 1241: General Plans: Safety Element—Fire Hazard Impacts | Governor's Office of Land Use and Climate Innovation | In 2012, Senate Bill 1241 passed requiring that the safety elements of all future general plans address fire risk in state responsibility areas and very high fire hazard severity zones. The bill requires cities and counties to make findings regarding available fire protection and suppression services before approving a tentative map or parcel map. |
| Standardized Emergency Management System | California Governor's Office of Emergency Services | CCR Title 19 establishes the Standardized Emergency Management System (SEMS) to standardize the response to emergencies involving multiple jurisdictions. SEMS is intended to be flexible and adaptable to the needs of all emergency responders in California. It requires emergency response agencies to use basic principles and components of emergency management. Local governments must use SEMS by December 1, 1996, to be eligible for state funding of response-related personnel costs under CCR Title 19 |

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| | | (Sections 2920, 2925 and 2930). The roles and responsibilities of Individual agencies contained in existing laws or the state emergency plan are not superseded by these regulations. This hazard mitigation plan is considered to be a support document for all phases of emergency management, including those associated with SEMS. |

# Appendix D – Plan Maintenance Agendas

# City of Oakland 2026 Local Hazard Mitigation Plan Progress Report

**Reporting Period:** (Date Range, 1 year)

## BACKGROUND

The City of Oakland developed its Local Hazard Mitigation Plan to reduce risk from hazards by identifying resources, information, and strategies for risk reduction. The federal Disaster Mitigation Act requires state and local governments to develop hazard mitigation plans as a condition for federal disaster grant assistance. To prepare the plan, the City organized resources, assessed risks from hazards, developed planning goals and objectives, reviewed mitigation alternatives, and developed an action plan to address probable impacts from hazards. By completing this process, the City maintained compliance with the Disaster Mitigation Act, achieving eligibility for mitigation grant funding opportunities afforded under the Robert T. Stafford Act. The plan can be viewed on-line at:

INSERT WEB LINK

The purpose of this report is to provide an annual update on the implementation of the Mitigation Action Plan identified in the Local Hazard Mitigation Plan. The objective is to ensure that there is a continuing and responsive planning process that will keep the local hazard mitigation plan dynamic and responsive to the needs and capabilities of the City of Oakland. This report discusses the following:

- Hazard events that have occurred within the last year.
- Changes in risk exposure within the planning area.
- Mitigation success stories.
- Review of the action plan.
- Changes in capabilities that could impact plan implementation.
- Recommendations for changes/enhancement

## SUMMARY OF THE PLAN'S PROGRESS

The purpose of this report is to provide an annual update on the implementation of the action plan identified in the 2026 Local Hazard Mitigation Plan. The objective is to ensure that there is a continuing and responsive planning process that will keep the 2026 Local Hazard Mitigation Plan dynamic and responsive to the needs and capabilities of the City and stakeholders.

The performance period for the Local Hazard Mitigation Plan became effective in DATE with the final approval of the plan by FEMA. The performance period for this plan will be five years. At the end of the five years, an updated plan will be issued, anticipated before DATE. As of this reporting period, the performance period for this

plan is considered to be PERCENT complete. The Local Hazard Mitigation Plan has targeted NUMBER OF ACTIONS hazard mitigation actions to be pursued during the 5-year performance period, and NUMBER OF NEW ACTIONS were added in YEAR(S) for a total of UPDATED NUMBER OF ACTIONS.

As of the reporting period, the following overall progress can be reported:

- __ out of __ actions (__%) were reported as being in progress toward completion.
- __ out of __ actions (__%) were reported as being complete.
- __ out of __ actions (___%) reported no action taken.

## PLAN MAINTENANCE OVERSIGHT COMMITTEE

It was determined through the plan's development process that a designated committee, made up of City staff, would oversee maintenance of the plan. At a minimum, the Plan Maintenance Oversight Committee is to provide technical review and oversight on the development of the annual progress report. The Committee will review and approve this progress report at its annual meeting held on DATE. For this reporting period, the Plan Maintenance Oversight Committee membership is as indicated in Table 1.

Table 1 Plan Maintenance Oversight Committee

| Name | Title | Department/Agency |
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## HAZARD EVENTS

During the reporting period, hazard events in the planning area had a measurable impact on people or property. A summary of these events is as follows:

*(Insert bulleted list and description of hazard events that impacted the area during the reporting period)*

- EVENT TYPE, DATE: Event description

## MITIGATION SUCCESS STORIES

*(Insert brief overview of mitigation accomplishments during the reporting period)*

## REVIEW OF THE MITIGATION ACTION PLAN

Table 2 reviews the 2026 LHMP Mitigation Action Plan, reporting the status of each action. Reviewers of this report should refer to the 2026 LHMP for more detailed descriptions of each action and the prioritization process.

*Address the following in the "comment" column of the following table:*

- *What elements of the action carried out during the reporting period?*
- *If no progress occurred, why?*
- *Do any of the action details require update (timeline, funding, lead implementers, etc.)?*
- *If the action was completed, does it need to be changed or removed from the mitigation action plan?*

Table 2 Mitigation Action Plan Review Matrix

| Lead Agency | Timeline | Priority | Status (No Progress, In Progress, Complete) | Comment |
|---|---|---|---|---|
| **Action #__—_____[description]** | | | | |
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| **Action #__—_____[description]** | | | | |
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## NEW ACTIONS TO INCLUDE IN THE PLAN

Table 3 describes new actions that have been identified by the Plan Maintenance Oversight Committee for this reporting period.

*(List any new actions added to the action plan; see Chapter 19 of the LHMP for description of the information to be provided. Add or remove rows as necessary).*

Table 3 New Mitigation Actions

| Community Lifeline Addressed | Benefits New or Existing Assets | Goals and Objectives Met | Lead and Support Implementers | Benefits Equity Priority Communities? | Estimated Cost | Potential Funding Sources | Timeline |
|---|---|---|---|---|---|---|---|
| **Action #__—_____[description]** | | | | | | | |
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| **Action #__—_____[description]** | | | | | | | |
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| **Action #__—_____[description]** | | | | | | | |
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| **Action #__—_____[description]** | | | | | | | |
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## CHANGES IN CAPABILITIES THAT MAY IMPACT IMPLEMENTATION OF THE PLAN

Implementation of the Mitigation Action Plan is supported by identified capabilities such as staffing, funding, and other support. The Plan Maintenance Oversight Committee identified the following changes in capabilities which may impact implementation:

*(List any changes that may positively or negatively impact implementation such as changes in staffing, funding, regulations, programs, etc.).*

## RECOMMENDATIONS FOR CHANGES OR ENHANCEMENTS

Based on the review of this report by the Plan Maintenance Oversight Committee, the following recommendations will be noted for changes or enhancements to future updates or revisions to the plan:

*(List any recommended changes or enhancements to the LHMP that can be implemented during the next LHMP update. Examples include changes to the hazards of concern, organization of the plan sections, etc.)*

## PUBLIC REVIEW NOTICE

The contents of this report are considered to be public knowledge and have been prepared for total public disclosure. Copies of the report have been provided to the City of Oakland City Council and to local media outlets. The report is posted on the City of Oakland Hazard Mitigation Plan website. Any questions or comments regarding the contents of this report should be directed to:

Local Hazard Mitigation Planners
emergencyplanning@oaklandca.go

# Appendix E – FEMA Approval & Adoption