

10

Natural Hazards and Public Safety

Castro Valley's physical setting includes areas of steep topography, creeks, and canyons. These features can pose risks related to soil erosion, landslides, and flooding; and can create difficulties for emergency vehicle access. The presence of several fault lines, including the Hayward Fault, makes Castro Valley particularly susceptible to geologic hazards associated with seismic activity including ground shaking, landslides, and liquefaction. The urbanized area of Castro Valley is also immediately adjacent to East Bay Regional Parks land and permanent open space lands of Alameda County—areas with high fire risk due to the presence of combustible vegetation, the lack of fire breaks, and the limited access. Thus, there are a number of natural hazards that pose public safety risks in Castro Valley. This element describes the risks and includes policies and actions to minimize the risk of damage to property or injury to people.



Castro Valley's physical setting contains steep topography, creeks, and canyons.



Castro Valley has hillside residential areas next to regional parks and large areas of undeveloped land, which can increase the fire hazard risk for residences.



Areas where housing is intermixed with larger open space can be subject to fire hazard risk depending on the presence of combustible vegetation, weather, and topography.

10.1 FIRE HAZARDS

Fire hazard potential is largely dependent on the extent and type of vegetation, known as surface fuels, that exists within a region. Fire hazards are typically highest in wooded, undeveloped areas, because trees are a greater source of fuel than low-lying brush or grasslands. Although suburban or urban areas or rocky barren areas have minimal surface fuels, fires that begin in vegetated wildland areas can spread into adjacent developed areas, called the wildland-urban interface, where they are fueled by structures as well as vegetation.

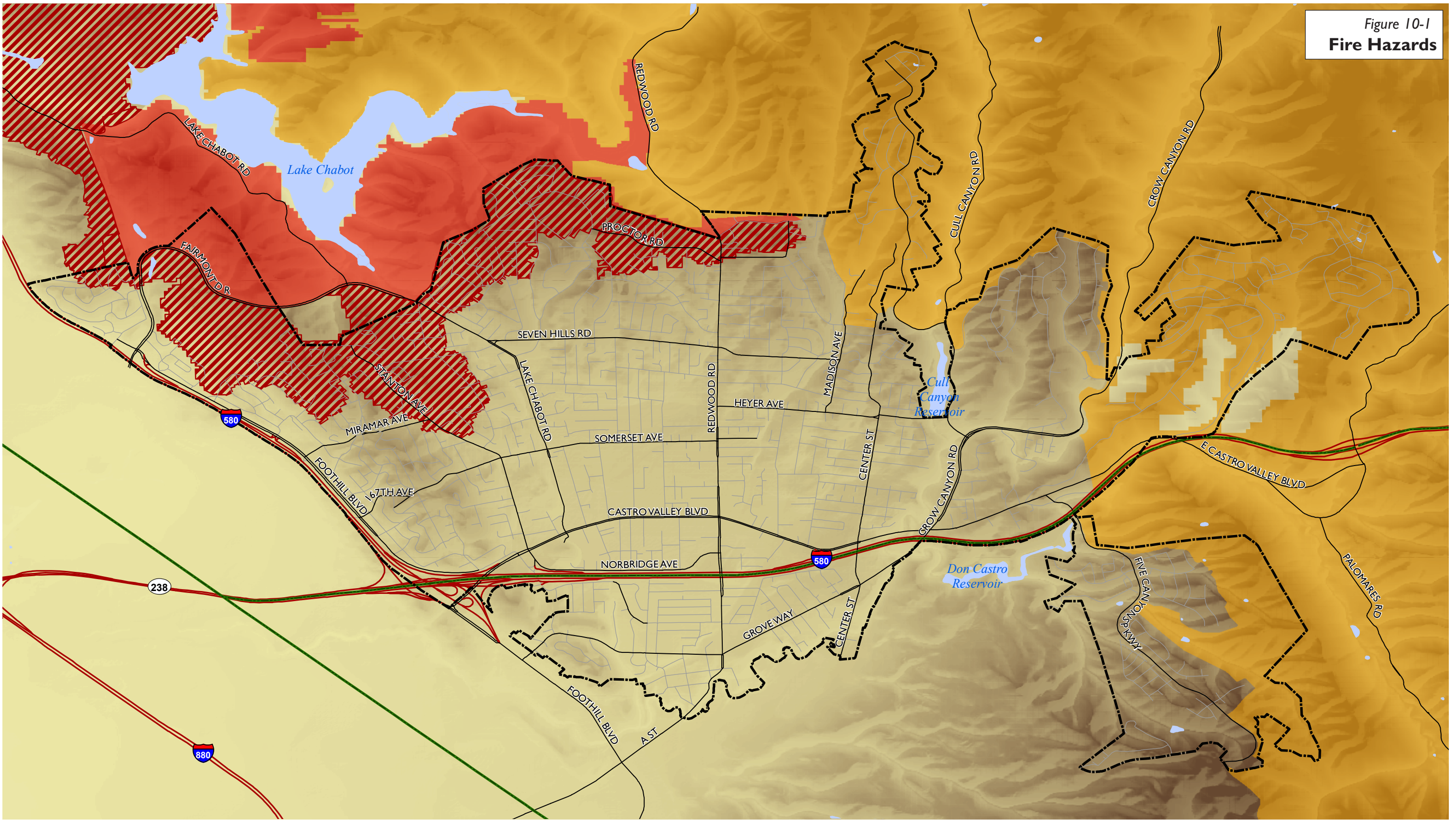
In Castro Valley, the areas with the greatest risk rim the community to the north, east, and south where residential neighborhoods border undeveloped wooded or grassy areas. State law requires the California Department of Forestry and Fire Protection to designate Very High Fire Severity Zones based on the potential threat from wildfire hazards. The zones include areas where the responsibility for preventing and suppressing fires is primarily the responsibility of the State and areas where local agencies are responsible for fire protection. (Figure 10-1) In January 2009, the Alameda County Board of Supervisors adopted an ordinance accepting the State's Very High Fire Severity Zone Maps for two unincorporated areas in which the County Fire Department has responsibility, one of which includes lands in and around Hillcrest Knolls.

Factors contributing to a Very High Fire Severity Zone designation include the following features:

- Availability and type of fuels (presence of highly combustible vegetation, etc.),
- Weather (high velocity winds and high temperatures with low humidity),
- Topography (hill and canyon areas can accentuate the climatic conditions described above), and
- Development density.

In areas of high fire hazard, the risk to structures from fire exposure is based on the materials with which they are built (i.e., a concrete structure would resist fire more than a structure covered with wooden shingles) and proximity to fuel sources, such as trees, shrubs, wooden decks and fences, and woodpiles. The ability of fire protection assistance to access a site is also an important issue when determining fire risk. Fire engines need adequate water sources, roads, and turning radii in order

Figure 10-1
Fire Hazards



Local Responsibility Areas (LRA)

- Very High (Red with diagonal lines)

State Responsibility Areas (SRA)

- Very High (Red)
- High (Orange)
- Moderate (Yellow)

Other Symbols:

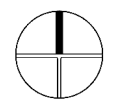
- Planning Boundary (Dashed line)
- BART (Green line)

Source: Fire Responsibility Area, California Department of Forestry and Fire Protection, 2007-8; BART, Metropolitan Transportation Commission, 2001; Digital Elevation Model, United States Geological Survey, 2009; Map base, Alameda County, 2008.

March 16, 2010

0 0.25 0.5 1 Miles

0 1,320 2,640 5,280 Feet



25
5
Acre

to adequately fight fires. Risk is reduced in areas where development meets more stringent design requirements. Fire risk is also reduced in areas with public streets, which are typically better maintained and where parking restrictions are enforced. Both of these conditions are important to maintaining emergency access.

Some of the areas of Castro Valley with the greatest potential for infill residential development are in the upper hillside areas close to the regional park and open space lands where there is high fire hazard risk. Other areas have fire hazard risk because small water distribution pipes reduce available water pressure. According to the Alameda County Fire Department, the water lines in some of the higher density areas of the community located near the Central Business District are only four inches in diameter when pipes with a six-inch diameter or larger may be necessary to provide adequate water pressure and flows for fire suppression.

Approaches to reducing fire risk in the urban/wildland interface typically include a combination of vegetation management and modification, structural requirements, land use planning, and public education. Different jurisdictions have incorporated provisions to address these issues in hazard mitigation plans, habitat conservation plans, and fire management plans as well as zoning and subdivision ordinances, development review guidelines and wildland-urban interface codes intended to augment building and fire codes in interface areas. In addition, many jurisdictions have established procedures to ensure that fire officials are involved in the development review process to ensure that both the configuration of development and the structures themselves are designed to mitigate fire hazards.

The County Public Works Agency uses an Integrated Vegetation Management Program to control plants that may pose a fire danger, obstruct drainage water, or interfere with maintenance of County facilities. The Integrated Vegetation Management Program does not currently apply to private property owners. In addition, Chapter 6.44 of the County's General Ordinance prohibits vegetation that may increase fire hazards, but the ordinance does not identify specific vegetation management measures for which private property owners are responsible in order to reduce fire hazards on their properties.

The State has amended the Building Code standards that deal with materials and construction methods for exterior wildfire exposure and local agencies must either accept the new provisions or adopt an amended version of the State code. In contrast to the previous code,

which required construction methods intended to limit fires that start in a structure from spreading, the new requirements impose standards designed to limit ignition potential by resisting the intrusion of flame or burning embers from a vegetation fire. Because the State code only applies to new construction, some jurisdictions that have existing developed areas in the Wildland-Urban Interface have exercised the option to amend the State requirements to apply the fire resistive standards to additions and alterations. Other local amendments have made ancillary structures like carports, trellises, arbors, and similar structures subject to requirements and required the installation of automatic sprinklers of work that exceeds a threshold value.

FIRE SAFETY GOAL

GOAL 10.1-1 **Protect lives, property, and the environment by working with Alameda County Fire Department to reduce fire hazards.**

FIRE SAFETY POLICY

Policy 10.1-1 **Wildland Fire Preparedness.** Increase preparedness for and reduce impacts from wildland fires.

FIRE SAFETY ACTIONS

Action 10.1-1 **Hazards Overlay District.** Revise the zoning code and zoning map to include a Hazards Overlay District (using Figure 10-1, Fire Hazards), which establishes regulations for new construction and expansions for areas of Castro Valley that are more susceptible to impacts from Natural Hazards as identified on the map. Place a copy of Figure 10-1, Fire Hazards, at the County's Planning Counter to inform project applicants that the project site is in or adjacent to a Very High Fire Zone Area.

Action 10.1-2 **Fire Department Role in Development Review Process.** Establish clearly in County zoning and other ordinances that the Fire Department has the authority to recommend denial or modification to proposed development projects, particularly for projects proposed within Very High Fire Zone Areas as identified in Figure 10-1, Fire Hazards, to reduce the risk of bodily harm, loss of life, or severe property damage and environmental degradation.



Action 10.1-3 **Fire Department Requirements for New Development.** Establish clearly in County zoning and other ordinances that the Fire Department may require the use of appropriate fire resistant building materials, installation of fire sprinklers, and/or vegetation management, and that such requirements shall be based on a property's access, slope, water pressure, and proximity to wildland areas. Such requirements shall apply particularly to projects proposed within Very High Fire Zone Areas as identified in Figure 10-1, Fire Hazards, but may also apply to other properties where access for emergency vehicles does not fully comply with adopted standards.

Establish Fire Department requirements for new development in County Zoning.

Action 10.1-4 **Interdepartmental Review Process.** Establish an interdepartmental review process for proposed projects where Fire, Public Works, Planning, and other County Departments consult and establish reasonable and consistent requirements for streets, driveways, and emergency access prior to zoning approval.

Action 10.1-5 **Water Pressure/Emergency Vehicle Access Requirements for Increased Densities.** Revise the review process For any project that proposes an increase in density so that any inadequacy of water pressure for fire hydrants and fire flows for fire suppression purposes is identified early in the development review process. Also identify if the roadway serving the project is deficient in terms of access for emergency vehicles. Identify any access improvements that may be required, for example roadway widening along property frontage, or additional off-street parking.



Homeowners' Associations are responsible for vegetation management to minimize fire risk, as here at Palomares Hills.

Action 10.1-6

Standardization of Fire Hydrants. Upgrade and standardize fire hydrants to accept equipment from neighboring fire districts so that the County can accept assistance through a mutual aid request during an emergency.

Action 10.1-7

Fire Suppression Water Services Master Plan. Work with EBMUD to conduct a comprehensive study of water pressure, fire flows, hydrant spacing and type in Castro Valley and create a "Master Plan for Fire Suppression Water Services" in order to identify the need for hydrant upgrades, additional hydrants, and pipeline upgrading or replacement for fire-fighting purposes. The study shall establish a capital improvements program and appropriate development impact fees to help fund replacement of inadequate pipes. The Master Plan should focus on the following areas in Castro Valley that have been identified as areas that may have inadequate water pressure for fire-fighting purposes on some streets:

- Areas designated Residential Mixed Density (RMX) on the General Plan Land Use Map where additional medium density infill residential development is anticipated;
- Subareas in the Central Business District where medium to high-density residential uses are designated and infill development is encouraged;
- Areas where major renovation, expansion or rebuilding of large facilities are occurring such as Eden Medical Center Castro Valley.

Action 10.1-8

Vegetation Management Requirements for HOAs. Enforce the requirement that Home Owners' Associations in Planned Unit Development areas are responsible for vegetation management by establishing a regular review schedule for areas subject to this requirement.

Action 10.1-9

Alameda County’s Integrated Vegetation Management Program. Revise the County’s Integrated Vegetation Management Program to require private property owners to maintain the vegetation on their property in a condition that will not contribute to the spread of a fire. Requirements for private property owners could include, but need not be limited to, the following:

- Maintain a 30-foot defensible space around all buildings and structures;
- Remove all portions of trees within 10 feet of chimneys and stovepipe outlets;
- Remove materials or plants that may act as a fuel or a conveyance of fire (such as dead/dying wood on trees adjacent to/overhanging structures, leaves, pine needles, etc. on rooftops or elsewhere on the property); and
- Install spark arrester in chimney and or stovepipe outlets.



Homes in high fire hazard areas need to maintain a 30-foot defensible space around buildings, remove portions of trees within 10 feet of chimneys, and remove other materials or plants that may act as fuel and transmit fire.

Action 10.1-10

Enforcement Districts for High Fire Hazard Areas. Consider establishing and funding an enforcement district for fire hazard areas and wildland, intermix and interface areas; and establish an inspection period to be conducted annually for properties located in these areas. Mail notices to the residents in these areas notifying them of the inspection period, listing the standards for vegetation management on their properties, and suggesting tips for compliance. Additional funding would be required, such as the formation of an assessment district or other means.

Action 10.1-11

Public Street Requirements for Subdivisions. In coordination with the Fire Department, Public Works Agency and after consultation with the CVMAC, set standards for public streets to address safety and access concerns.



Establish consistent standards for private streets.



Ensure adequate emergency access in hillside areas where street widths are substantially below the minimum required for emergency access.

Action 10.1-12

Standard Requirements for Private Streets. Establish consistent standards for private streets depending on the number of units that the street will serve the number of required parking spaces per unit, and reasonable access requirements and operational needs of emergency access vehicles and garbage trucks. Standards should include:

- Minimum paved roadway width requirements (i.e., 20 feet for roads serving five or more units or when part of required fire apparatus access, and 12 feet for roads serving between two and five units that is not part of required fire apparatus access);
- Turnarounds;
- Landscaping;
- Red curbs and signage for no parking zones;
- Sidewalks; and
- Parking standards.

Action 10.1-13

Emergency Access Requirements for Hillside Areas. In hillside areas where street widths are substantially below the minimum 20-foot width standard required for emergency access, such as Upper Madison Avenue/ Common Road and Hillcrest Knolls, one or more of the following requirements should be imposed to ensure adequate emergency access:

- Sprinklers;
- Turnouts along the paved roadway;
- Additional on-site parking;
- Increased roadway width along the front of the property; or
- Parking Restrictions.

10.2 HYDROLOGY AND FLOODING HAZARDS

Creeks and Surface Water Drainage

Castro Valley is located in the southern San Francisco Bay hydrologic region. Watersheds within the region are defined by creeks, streams, and other surface water drainages that originate in the upland areas near Mount Diablo and flow down toward the Bay. Drainage patterns within Castro Valley are shaped by the region's topography, which consists of steeper areas located along the foothills of the Diablo Range that gradually flatten out onto an alluvial plain.

The majority of Castro Valley is within the San Lorenzo Watershed, which includes Chabot, Castro Valley, Cull, Crow, and Sulphur Creeks. Several unnamed tributaries flow into these creeks. The western portion of the planning area is within the San Leandro Watershed. San Leandro Creek rises on the east side of the Oakland hills, runs into Upper San Leandro Reservoir and then Lake Chabot before flowing west through San Leandro and into San Francisco Bay near Oakland International Airport. Various creek segments are natural, or managed in concrete-lined or earthen channels, or are contained in a closed conduit (culvert). Figure 10-2 shows floodplains and channel construction types for different creek segments. Chabot Creek and Castro Valley Creek have been improved over the years to convey adequate flows to avoid or reduce flooding. Several ponds that act as detention basins are present along Cull, San Lorenzo and Chabot Creeks. Small, natural ponds may occur within some of the creeks and tributaries.

- Crow Creek is a perennial stream. It has not been dammed but the portion just upstream of its confluence with Cull Creek has been contained with a concrete box culvert.
- Cull Creek has good water quality and excellent wildlife habitat. In 1963, this stream was dammed approximately 0.25 miles upstream of the Crow Creek confluence. The dam has a capacity of 310 acre feet.
- San Lorenzo Creek is controlled by the Don Castro Dam built in 1964. The dam has a capacity of 380 acre feet and is located just downstream of the Palomares Creek confluence.
- Castro Valley Creek flows year round from the hills through the urbanized portion of the community. The creek is primarily contained in incised or concrete channels but a portion flows through earthen channels.
- Chabot Creek is mostly urbanized except along Carlos Bee Park.



Water drains down from the hills through Castro Valley, then through Hayward and San Lorenzo, and into San Francisco Bay.



Some areas of Castro Valley, such as Palomares Road, still get water for domestic purposes from wells.

Surface Water Quality

Pollutants discharged into the creeks in Castro Valley come from both point and nonpoint sources. A point source is any discernible, confined, and discrete conveyance (e.g., a pipe discharge) of pollutants to a water body from sources such as industrial facilities or wastewater treatment plants. Point source pollution in Castro Valley is generally limited to permitted pipeline discharges that are subject to prohibitions by regulatory agencies, water quality requirements, periodic monitoring, annual reporting, and other requirements designed to protect the overall water quality of the creeks and eventually the Bay.

Nonpoint pollutant sources are sources that do not have a single, identifiable discharge point but are rather a combination of many sources. Examples of nonpoint sources include stormwater runoff from parking lots contaminated with petroleum products, pesticides from farming operations, or sediment from soil erosion.

While all the creeks in the planning area have some issues with erosion, siltation, and urban or agriculture runoff, only San Lorenzo Creek is listed as impaired. The pollutant diazinon has been identified in this creek, which indicates agricultural pesticides have entered it through runoff and sewer lines. Even though there are no major discharges to Castro Valley Creek, copper has been found in it.

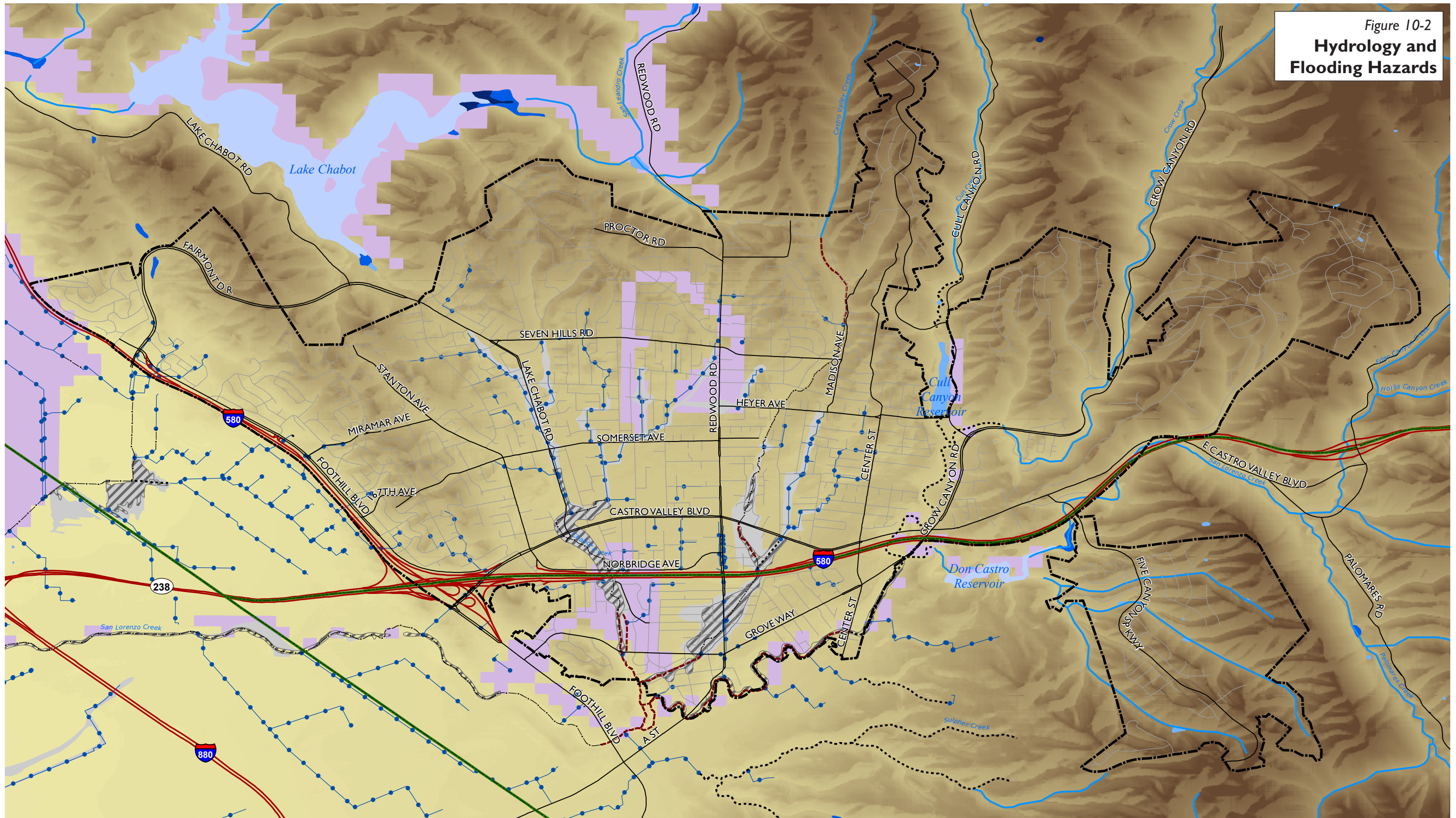
Groundwater

The Castro Valley groundwater basin (No. 2-8) is part of the San Francisco Bay hydrologic region. The basin is three square miles in area bounded on the east by the San Lorenzo Creek and by the Hayward Fault on the west. The principal water bearing units within the basin are Pleistocene alluvial deposits including clays, silts, sands, and gravels.

A study conducted in 1984 by EBMUD showed that the annual recharge for the central Castro Valley area was estimated to be 250 acre feet per year. It was also estimated that the maximum well yield was 0.14 million gallons per day. Groundwater outside the central sub-basin area is replenished by direct infiltration and percolation of rainfall (approximately 18 to 24 inches annually); excess applied irrigation water and subsurface inflow from adjacent foothills.

Groundwater quality in the basin is characterized by bicarbonates with calcium and sodium as the predominant cations or combination of

Figure 10-2
Hydrology and
Flooding Hazards



- | | |
|-----------------------------------|-------------------|
| Freshwater Emergent Wetland | Concrete Channel |
| Freshwater Forested/Shrub Wetland | Earth Channel |
| Freshwater Pond | Improved Channel |
| Lake | Natural Creeks |
| FIRM 100 Year Floodplain | Storm Sewer |
| FIRM 500 Year Floodplain | Planning Boundary |
| Inundation Areas | BART |

Source: Dam Failure, Metropolitan Transportation Commission, 2001; Hydrology, Alameda County, 2008; BART, Metropolitan Transportation Commission, 2001; Digital Elevation Model, United States Geological Survey, 2009; Map base, Alameda County, 2008.

March 16, 2010

25
5

Acres

chemical elements. The central Castro Valley sub-basin was also rated high on the potential contamination list due to shallow groundwater contamination from underground storage tanks at various locations. Therefore, groundwater use within the central Castro Valley area should generally be restricted to non-potable purposes.

There are approximately 150 domestic well users and approximately 100 known irrigation wells in use in the planning area. The wells are generally located in rural areas near Crow Canyon Road, Norris Canyon Road, Cull Canyon Road, Sunny Slope Avenue, Eden Canyon Road, Hollis Canyon Road, Palomares Road, and Dublin Canyon Road.

Flooding Hazards

Flood-prone areas are generally located in topographic lows and in close proximity to streams and creeks. Flooding could result from storm runoff or dam failure. During larger storms, flooding could occur primarily as sheet flow in streets and along stream channels. Flood hazards resulting from stormwater runoff have been largely addressed through flood control projects by the ACFCWCD. Castro Valley lies in the Flood Zone 2 of the Alameda County Flood Control and Water Conservation District (ACFCWCD).

Flood zone mapping by the Flood Insurance Rate Maps (FIRMs) published by Federal Emergency Management Authority (FEMA) indicate that the Castro Valley area is most prone to flooding along Chabot and Castro Valley Creeks. As shown on Figure 10-2, approximately 132 acres near the concrete and improved channels in the southern portion of Castro Valley are designated as 100-year flood plains, and approximately 250 acres spread around the creeks and closed channels in the northern portion of Castro Valley are designated as 500-year flood plains. However, there are other creeks and culverts in the area that could experience localized flooding during large storm events. Most drainage systems within Castro Valley are adequate to carry runoff from a 10-year storm and a 15-year storm.

The policies in Chapter 7: Biological Resources will have co-benefits for protecting water resources in Castro Valley. The proposed Overlay Zone will limit development and require special permit review that would minimize changes in runoff patterns by retaining natural drainage patterns, contribute to improved water quality, and potentially reduce water pollutant sources.



Storm drainage channels and creeks in Castro Valley are part of the flood control system for Alameda County.

HYDROLOGY AND FLOODING SAFETY GOALS

- GOAL 10.2-1** **Protect and improve surface and groundwater quality.**
- GOAL 10.2-2** **Protect the community from risks to life and property posed by flooding and stormwater runoff.**

HYDROLOGY AND FLOODING SAFETY POLICIES

- Policy 10.2-1** **Groundwater.** Reduce the use of groundwater and facilitate additional recharge opportunities.
- Policy 10.2-2** **Water Quality Regulations.** Ensure compliance with all federal, state, regional, and local regulations related to protecting and improving water quality.
- Policy 10.2-3** **Flooding.** Lower the risk for flooding by protecting and improving existing drainage patterns.
- Policy 10.2-4** **Reduce Pollution.** Protect surface water quality by reducing the release of non-point source pollutants into storm drain system and waterways.

HYDROLOGY AND FLOODING SAFETY ACTIONS

Groundwater

- Action 10.2-1** **Limit Wells.** Restrict domestic, irrigation, municipal, and industrial wells in the central Castro Valley area to only limited or monitored use.
- Action 10.2-2** **Recharge Areas.** Develop site design review criteria or zoning requirements that maximize pervious surface areas and vegetation in order to facilitate groundwater recharge and slow stormwater runoff.

Water Quality

Action 10.2-3

San Francisco Bay Regional Water Quality Control Board. Continue to ensure that all construction and development activities comply with all applicable San Francisco Bay Regional Water Quality Control Board (RWQCB) stormwater and water quality requirements, including the NPDES C.3 requirements related to post-construction stormwater runoff. These requirements may include but not be limited to:

- Preparation and implementation of a stormwater pollution prevention plan (SWPPP); and
- Adoption and implementation of effective best management practices (BMPs).

Action 10.2-4

Alameda Countywide Clean Water Program Stormwater Quality Management Plan.

- Ensure compliance with the Alameda Countywide Clean Water Program (ACCWP) Stormwater Quality Management Plan.
- Require development and redevelopment projects to prepare and implement site-specific plans that control and manage stormwater runoff and quality through the incorporation of appropriate source controls, site design strategies, and post-construction stormwater treatment.

Action 10.2-5

Public Sector Compliance. Ensure that public-sector construction and maintenance projects conform to the same water quality and stormwater management standards as private projects. Ensure that stormwater quality requirements are included in plans and contract specifications for public construction projects.

Action 10.2-6

Inspections. Dedicate adequate resources to ensure effective and timely inspection and monitoring for compliance with all water quality requirements, permits and ordinances throughout construction activities and, where necessary, after completion of construction, especially for activities in hillside areas, large sites, creekside properties, and within the proposed Biological Resources Overlay Zone.



Incorporate water quality protection and erosion control measures into construction requirements, and ensure compliance during inspections.

Action 10.2-7 **Grading and Construction Activities.** Restrict grading and construction activities to dry periods, whenever feasible. Require additional erosion prevention measures during the wet weather period from mid-October through mid-March, unless emergency and maintenance action is necessary to protect life and property is required.

Action 10.2-8 **Dewatering.** Ensure that all construction and development dewatering activities adhere to all permitting and regulatory requirements. Specifically, all activities shall comply with state requirements for stormwater pollution prevention and control and obtain a construction dewatering permit or waiver from the RWQCB prior to disposal of dewatering discharge for discharge to surface creeks and groundwater.

Action 10.2-9 **Surface Runoff.** Publish and make available to the public the best practices for controlling water quality and surface runoff from urban development.

Flooding

Action 10.2-10 **Flood Control Requirements.** Ensure that all construction and development activities obtain all applicable federal, state, regional, and County permits and approvals related to grading and erosion control, stormwater management and discharge control, and watercourse protection.

Action 10.2-11 **Alameda Countywide Clean Water Program's C.3 Stormwater Technical Guidance.** Require compliance with the Alameda Countywide Clean Water Program's C.3 Stormwater Technical Guidance handbook for development less than 10,000 square feet in size, and projects that exceed the maximum lot coverage allowance per existing zoning regulations. Stormwater control measures should include, but not be limited to: maximizing pervious surface areas with use of riprap; flow-through permanent planter boxes; pervious pavement with subsurface treatment; detention basins; and drains and downspouts flowing to landscaped areas and splash blocks.

Action 10.2-12 **Hydrology and Hydraulics Criteria Summary Requirements.** Require new development to comply with the requirements and criteria for stormwater quantity controls established in the Alameda County Hydrology and Hydraulics Criteria Summary (HHCS) to control surface runoff from new development.

- Action 10.2-13** **Drainage Facility Design.** Design drainage facilities to meet the County and/or the ACFCWCD’s established design criteria and with consideration of existing facilities downstream.

- Action 10.2-14** **County Resources.** Dedicate adequate resources to ensure effective and timely monitoring and maintenance of public drainage facilities, including storm drains, to maintain adequate capacity for peak flows in the area.

- Action 10.2-15** **Flood Plain Management.** Use the Alameda County Flood Plain Management Ordinance when assessing flood risk in Castro Valley, as well as ongoing risk after flood control and improvement projects are implemented.

- Action 10.2-16** **Flood Control Improvement Projects.** Work with ACFCWCD, and other agencies and jurisdictions to conduct feasibility studies, and implement flood control improvement projects, including, but not limited to: creek restoration, regional detention facilities in existing or proposed open space areas and/or parks, dredging; existing area dams that are silted-up, dredging existing facilities for increased capacity and recreation.

- Action 10.2-17** **Bioengineering Technologies.** Prioritize the use of bioengineering technologies aimed at using plants and natural materials to stabilize and reinforce open waterways and creeks to minimize erosion and siltation downstream.

- Action 10.2-18** **Design Standards and Guidelines for Properties Adjacent to Waterways.** Establish design standards, guidelines and setback requirements for development on properties that abut creeks and waterways, and require the replanting and restoration of riparian vegetation as part of any discretionary permit. Implement and enforce creek setback requirements for development for properties that abut creeks.

- Action 10.2-19** **100-Year Flood Plains.** Do not permit new development in the 100-year flood plain with the exception of development that has been determined to have no impact as identified in the Alameda County General Ordinance Code.

- Action 10.2-20** **Requirements for Development Adjacent to 100-Year Flood Plains.** Require that new structures located near a 100-year flood plain be sited and designed to be flood resistant and not inhibit flood flows.



Establish design standards, guidelines and setback requirements for development on properties that abut creeks and waterways.



Castro Valley is located in an area with steep topography that is very near the Hayward Fault, which creates risks of ground shaking, liquefaction, and landslides.

10.3 SOILS AND SEISMIC HAZARDS

Geology, Topology and Soils

Elevations in Castro Valley range from approximately 100 feet above mean sea level (msl) to the west to over 700 feet on Fairmont Ridge to the west and 500 feet above msl to the north and northeast. Located on the western flanks of the Diablo Range, Castro Valley lies within the physiographic region of California referred to as the Coast Ranges geomorphic province, which is composed of northwestern trending mountain ranges, ridges, and valleys. Much of the Coast Range province contains marine sedimentary and volcanic rocks that form the Franciscan Complex. Castro Valley is largely underlain by Quaternary-age (1.6 million years old to the present) alluvial fan deposits originating from the Diablo Range, while upland parts of the planning area are underlain by bedrock deposits consisting mainly of sandstones and shales of Cretaceous/Jurassic age (65 to 190 million years old).

Seismicity and Seismic Hazards

Castro Valley is subject to risks from seismic activity. Castro Valley is located in the San Andreas Fault Zone, one of the most seismically active regions in the United States. The San Andreas Fault Zone has generated numerous moderate to strong earthquakes in northern California and the San Francisco Bay Area. The region experienced large and destructive earthquakes in 1838, 1868, 1906 and 1989. Earthquakes of equally destructive force are a certainty in the San Francisco Bay region according to the Working Group on California Earthquake Probabilities (Working Group on California Earthquake Probabilities, 2003), established by the United States Geological Survey (USGS).¹

The Hayward Fault, one of ten major faults that make up the San Andreas Fault Zone, runs through the western part of Castro Valley crossing Highway 238 west of the I-580 interchange. According to the USGS, the fault system that includes the Hayward and Rodgers Creek faults has a 27 percent probability of generating an earthquake with a magnitude greater or equal to 6.7 on the Mercalli Richter Scale in the next 30 years. It is also the most likely fault in the Bay Area to be the site of a major earthquake in this time period. A large earthquake on

¹ California Department of Conservation, California Geological Survey, "Seismic Hazard Zone Report for the Hayward 7.5-Minute Quadrangle," Alameda County, California, 2003.

the Hayward Fault would, in all probability, cause extensive damage in Castro Valley.

In addition to the Hayward Fault, several others, including the west and east Chabot Faults and the so-called Carlos Bee Fault, cross the western part of the planning area to the east of the Hayward zone. Other regional faults, including the San Andreas, Calaveras or Rodgers Creek, could also affect Castro Valley. A moderate to major earthquake on any of these faults could topple buildings, disrupt infrastructure, cripple the transportation system, and trigger landslides. Geologists consider the Chabot and Carlos Bee faults inactive because there is no evidence of movement within the past 35,000 years.

This is accomplished by preventing the construction of buildings used for human occupancy on surface traces of active faults. Before approving a project within a designated Alquist-Priolo Fault Zone, the county must require a geologic investigation to demonstrate that the proposed buildings would not be constructed across an active or potentially active fault.

Besides fault rupture, however, earthquakes can also give rise to various secondary seismic hazards including ground shaking, liquefaction and subsidence, ground rupture and slope instability. These seismic hazards and their aftermath can cause structural damage, bodily harm and loss of human life. The California Seismic Hazards Mapping Act of 1990 (California Public Resources Code Section 2690 et seq.) was adopted to address seismic hazards other than surface rupture, such as liquefaction and seismically induced landslides. The Act specifies that the lead agency for a project may withhold development permits until the applicant conducts geologic or soils investigations to identify potential hazards and recommend measures intended to reduce hazards associated with seismic activity and unstable soils.

Ground Shaking Susceptibility

Ground movement during an earthquake can vary depending on the overall magnitude, distance to the fault, focus of earthquake energy, and type of geologic material. The composition of underlying soils, even those relatively distant from faults, can intensify ground shaking. Areas that are underlain by bedrock tend to experience less ground shaking than those underlain by unconsolidated sediments such as artificial fill or unconsolidated alluvial fill. The strongest ground shaking in Castro Valley is anticipated to occur as a result of



Older “soft-story” buildings with habitable space above garages are some of the more vulnerable building types in the event of an earthquake.

an earthquake on the Hayward fault, due to its immediate proximity.

Ground shaking typically causes over 90 percent of all earthquake damage. California has two shaking zones 4 and 3. Castro Valley is within Zone 4, which applies to areas located nearest to active earthquake faults and where ground shaking poses greater hazards than Zone 3. State law requires local governments in Seismic Zone 4 to have an earthquake loss reduction program for unreinforced masonry buildings.² This includes buildings constructed of brick and hollow clay tile, which are not as common in Castro Valley as they are in older parts of Oakland, San Leandro, and Hayward. Castro Valley does, however, have many Multi-story buildings and “soft-story” buildings with habitable space above garages, which are among the most vulnerable building types. These building types are concentrated in the central Castro Valley neighborhoods north of Castro Valley Boulevard.

The Modified Mercalli (MM) intensity scale is commonly used to measure earthquake effects due to ground shaking. The MM values for intensity range from I (earthquake not felt) to XII (damage nearly total), and intensities ranging from IV to X could cause moderate to significant structural damage (see Table 10.3-1). Maximum anticipated ground shaking intensities within the Castro Valley area are illustrated in Figure 10-3. Ground shaking could be Category X, Very Violent, in the westernmost areas of Castro Valley closest to the Hayward Fault; and Category IX, Violent, in the entire western half of Castro Valley. In the eastern half of Castro Valley, ground shaking is predicted to be Category VIII, Very Strong. Based upon the MM intensity scale, damage in areas immediately bordering the fault could be significant.

² California Seismic Safety Commission, 2004 Report to the Legislature, Status of the Unreinforced Masonry Building Law, June 9, 2005

Table 10.3-1: Modified Mercalli Earthquake Intensity Scale

Intensity Value	Intensity Description	Average Peak Acceleration ¹
I	Felt by very few people, barely noticeable.	< 0.0017 g
II	Felt by persons at rest, on upper floors, or favorably placed.	< 0.014 g
III	Felt indoors. Hanging objects swing. Vibration like passing of light trucks. Duration estimated. May not be recognized as an earthquake.	< 0.014 g
IV	Hanging objects swing. Vibration like passing of heavy trucks; or sensation of a jolt like a heavy ball striking the walls. Standing motor cars rock. Windows, dishes, doors rattle. Glasses clink. Crockery clashes. In the upper range of IV, wooden walls and frames creak.	0.014–0.04 g
V	Felt outdoors; direction estimated. Sleepers wakened. Liquids disturbed, some spilled. Small unstable objects displaced or upset. Doors swing, close, open. Shutters, pictures move. Pendulum clocks stop, start, change rate.	0.04–0.09 g
VI	Felt by all. Many frightened and run outdoors. Persons walk unsteadily. Windows, dishes, glassware broken. Knick-knacks, books, etc., off shelves. Pictures off walls. Furniture moved or overturned. Weak plaster and masonry D cracked. Small bells ring (church, school). Trees, bushes shaken (visibly, or heard to rustle).	0.09–0.18 g
VII	Difficult to stand. Noticed by drivers of motor cars. Hanging objects quiver. Furniture broken. Damage to masonry D, including cracks. Weak chimneys broken at roofline. Fall of plaster, loose bricks, stones, tiles, cornices (also unbraced parapets and architectural ornaments). Some cracks in masonry C. Waves on ponds; water turbid with mud. Small slides and caving in along sand or gravel banks. Large bells ring. Concrete irrigation ditches damaged.	0.18–0.34 g
VIII	Steering of motor cars affected. Damage to masonry C; partial collapse. Some damage to masonry B; none to masonry A. Stucco and some masonry walls fall. Twisting, fall of chimneys, factory stacks, monuments, towers, elevated tanks. Frame houses moved on foundations if not bolted down; loose panel walls thrown out. Decayed piling broken off. Branches broken from trees. Changes in flow or temperature of springs and wells. Cracks in wet ground and on steep slopes.	0.34–0.65 g
IX	General panic. Masonry D destroyed; masonry C heavily damaged, sometimes with complete collapse; masonry B seriously damaged. (General damage to foundations.) Frame structures, if not bolted, shifted off foundations. Frames cracked. Serious damage to reservoirs. Underground pipes broken. Conspicuous cracks in ground. In alluvial areas sand and mud ejected, earthquake fountains, sand craters.	0.65–1.24 g
X	Most masonry and frame structures destroyed with their foundations. Some well-built wooden structures and bridges destroyed. Serious damage to dams, dikes, embankments. Large landslides. Water thrown on banks of canals, rivers, lakes, etc. Sand and mud shifted horizontally on beaches and flat land. Rails bent slightly.	> 1.24 g

Table 10.3-1: Modified Mercalli Earthquake Intensity Scale

Intensity Value	Intensity Description	Average Peak Acceleration ¹
XI	Rails bent greatly. Underground pipelines completely out of service.	> 1.24 g
XII	Damage nearly total. Large rock masses displaced. Lines of sight and level distorted. Objects thrown into the air.	> 1.24 g

NOTES:

¹ g (gravity) = 980 centimeters per second squared. 1.0 g of acceleration is a rate of increase in speed equivalent to a car traveling 328 feet from rest in 4.5 seconds.

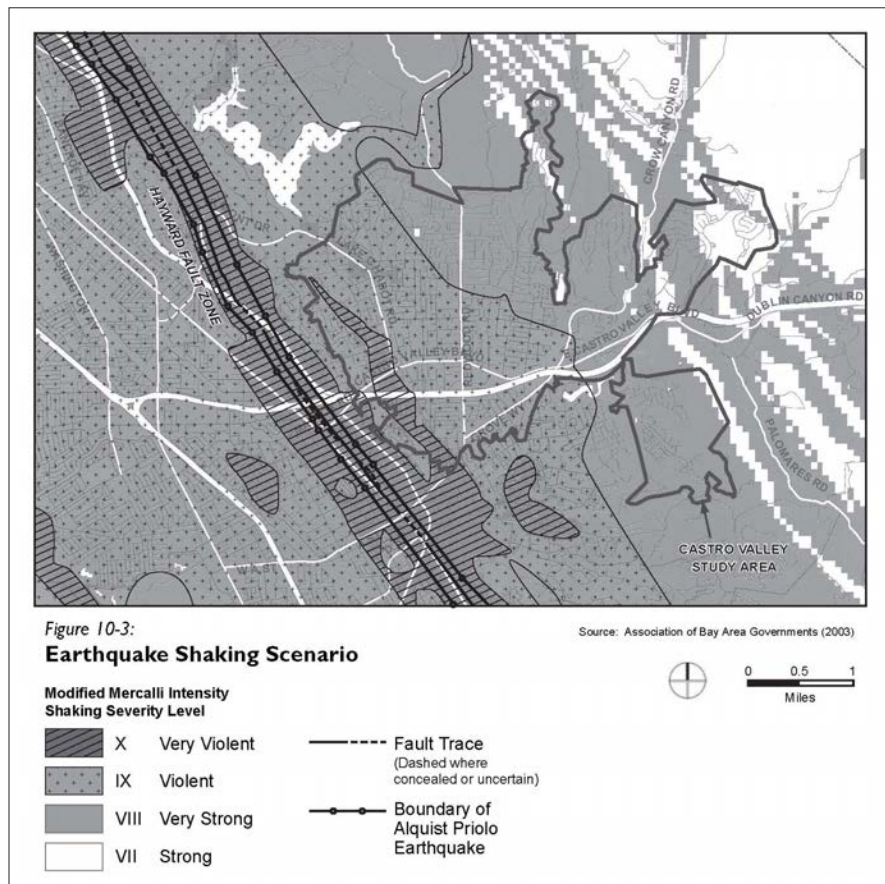
Masonry A: Good workmanship, mortar, and design; reinforced, especially laterally, and bound together by using steel, concrete, etc.; designed to resist lateral forces.

Masonry B: Good workmanship and mortar; reinforced, but not designed in detail to resist lateral forces.

Masonry C: Ordinary workmanship and mortar; no extreme weaknesses like failing to tie in at corners, but neither reinforced nor designed against horizontal forces.

Masonry D: Weak materials, such as adobe; poor mortar; low standards of workmanship; weak horizontally.

Source: ABAG, 2003.



Source: Association of Bay Area Governments, 2003

Liquefaction

Liquefaction is a phenomenon whereby unconsolidated and/or near-saturated soils lose cohesion and are converted to a fluid state as a result of severe vibratory motion. The relatively rapid loss of soil shear strength during strong earthquake shaking results in temporary, fluid-like behavior of the soil. Soil liquefaction causes ground failure that can damage roads, pipelines, underground cables, and buildings with shallow foundations. Liquefaction more commonly occurs in looser, saturated unconsolidated or artificial fill sediments located in reclaimed areas along the margin of San Francisco Bay but liquefaction can also occur in creek channels.

The areas susceptible to liquefaction in Castro Valley are, for the most part, low-lying lands along the creeks that flow into San Lorenzo Creek. These include lands within areas that are also in the FEMA-mapped flood plains along Chabot, Castro Valley, Cull, and Crow Creeks and in Eden and Hollis Canyon in the eastern part of the planning area.³

Dam Failure Inundation

Based on maps that dam owners are required to file with the State Office of Emergency Services, several Castro Valley neighborhoods are susceptible to flooding that could occur as a result of dam failure. Such failures are typically associated with seismic activity. The Upper San Leandro and Chabot Reservoirs are the largest facilities that could affect the planning area but most of the areas subject to inundation are undeveloped lands outside the County's Urban Growth Boundary. Two other reservoirs, Almond and South, pose a more substantial threat to residential neighborhoods.⁴

Copies of these maps are also provided to the appropriate public safety agency of any city and/or county likely to be affected. Most local agencies overlay these inundation maps onto their parcel map systems.



EBMUD has replaced the original dam at Upper San Leandro Reservoir.

³ California Division of Mines and Geology, Seismic Hazard Zones, Hayward Quadrangle. July 2003.

⁴ Association of Bay Area Governments, Dam Failure Inundation Hazard Map for Castro Valley, <http://www.abag.ca.gov/cgi-bin/pickdamx.pl>

Landslides

A landslide is a mass of rock, soil and debris displaced down slope by sliding, flowing, or falling. Ground failure is dependent on topography and underlying geologic materials, as well as factors such as rainfall, excavation, or seismic activities that can precipitate slope instability. Steep slopes and downslope creep of surface materials characterize areas most susceptible to landsliding. Landslides are least likely in topographically low alluvial fans and at the margin of the San Francisco Bay.

The areas with the highest susceptibility to landslides in Castro Valley are in the upland areas in the northern and eastern parts of the planning area and in steep hillside areas above Foothill Boulevard and Hillcrest Knolls in the El Portal and Fairmont Ridge neighborhoods as illustrated in Figure 10-4. The State Division of Mines and Geology's maps identify the area to the south of the County Justice Center and to the north east of Alameda County Medical Center as particularly susceptible to earthquake based on previous occurrence of landslide movement, geologic conditions and proximity to the Hayward Fault.

SOILS AND SEISMIC SAFETY GOAL

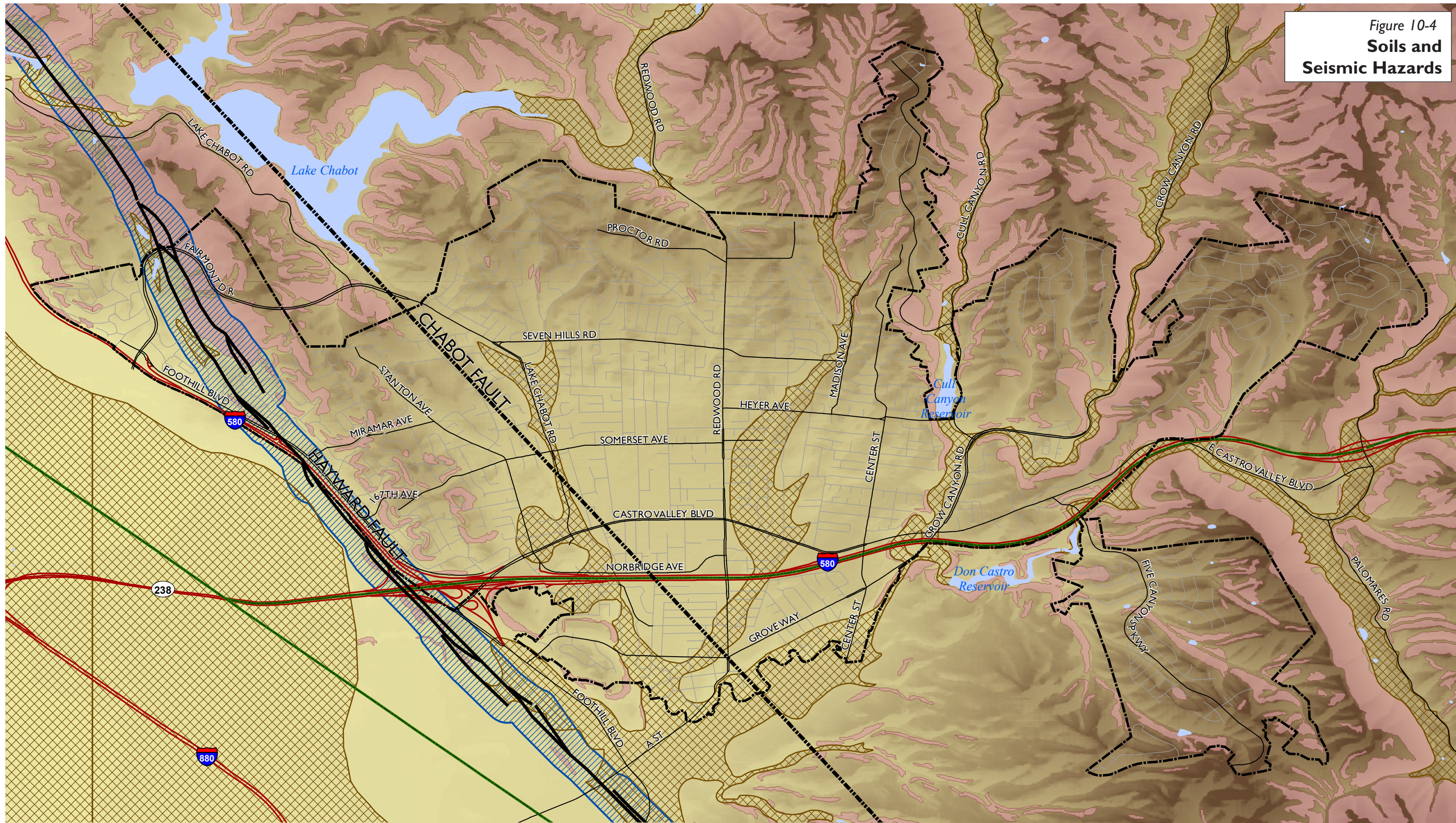
GOAL 10.3-1 **Minimize risks of property damage and personal injury posed by geologic and seismic hazards.**

SOILS AND SEISMIC SAFETY POLICIES

Policy 10.3-1 **Consideration of Ground Shaking Forces During Design Process.** Design and construct structures to withstand ground shaking forces of a minor earthquake without damage, of a moderate earthquake without structural damage, and of a major earthquake without collapse. Design and construct critical and essential structures and facilities to remain standing and functional following a major earthquake.

Policy 10.3-2 **Erosion and Landslides.** Reduce damage to properties caused by erosion and landslides.

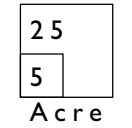
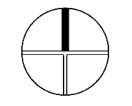
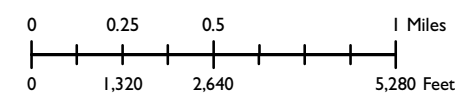
Figure 10-4
Soils and
Seismic Hazards



- Active Fault
- Inactive Fault - Location Approximated
- Alquist Priolo Zone
- Liquefaction Zone
- Earthquake-Induced Landslide Zone
- Planning Boundary
- BART

Source: Seismic Hazard Zones, California Department of Conservation, California Geological Survey, 2003; Hayward Fault, United States Geological Survey, 2005; Alquist Priolo and Chabot Fault, Dyett and Bhatia, 2010; Digital Elevation Model, United States Geological Survey, 2009; Map base, Alameda County, 2008.

April 1, 2010



SOILS AND SEISMIC SAFETY ACTIONS

- Action 10.3-1** **Geotechnical Study Requirements.** Require geotechnical studies prior to development approval in geologic and/or seismic hazard areas identified in Figure 10-4, Soils and Seismic Hazards, or as identified by future studies by federal, state, and regional agencies. Require or undertake comprehensive geologic and engineering studies for critical structures regardless of location. Critical structures are those most needed following a disaster or those that could pose hazards of their own if damaged. They include utility centers and substations, water reservoirs, hospitals, fire stations, police and emergency communications facilities, and bridges and overpasses.
- Action 10.3-2** **Adoption of and Amendments to California Building Code.** Adopt and amend as needed the most current version of the California Building Code (CBC) to ensure that new construction and renovation projects incorporate Earthquake-resistant design and materials that meet or exceed the current seismic engineering standards of the CBC Seismic Zone 4 requirements.
- Action 10.3-3** **Seismic Retrofit Program.** Establish a seismic retrofit program that would encourage property owners to, on a voluntary basis, seismically retrofit residential properties containing four or more units by waiving building permit fees.
- Action 10.3-4** **Use of Soils and Seismic Hazards Map at County's Planning Counter.** Place a copy of Figure 10-4, Soils and Seismic Hazards, at the County's Planning Counter to advise project applicants in Castro Valley that the property is in an area at risk for liquefaction, landslides or ground-shaking.
- Action 10.3-5** **Adoption of Natural Hazards Mitigation Plan.** Adopt and amend as needed a Natural Hazards Mitigation Plan in order to maintain eligibility for full federal assistance in the event of a natural disaster, per the requirements of the federal Disaster Mitigation Act of 2000.
- Action 10.3-6** **Steep Slopes.** On sites with slopes with an existing grade greater than 30 percent, require all development to be located outside of the 30 percent slope area.



Establish a seismic retrofit program that would encourage property owners, on a voluntary basis, to seismically retrofit residential properties containing four or more units by waiving building permit fees.

- Action 10.3-7** **Re-vegetation.** Aspects of all development in hill-side areas, including grading, vegetation removal and drainage, should be carefully controlled in order to minimize erosion, disruption to natural slope stability, and landslide hazards:
- Ensure immediate revegetation of cut-and-fill slopes to control erosion.
 - Plant materials for revegetation should not be limited to hydro-seeding and mulching with annual grasses. Trees add structure to the soil and take up moisture while adding color and diversity.
 - Ensure blending of cut-and-fill slopes within existing contours, and provision of horizontal variation, in order to mitigate the artificial appearance of engineered slopes.
 - Ensure structural integrity of sites previously filled before approving redevelopment.

Action 10.3-8 **Alquist-Priolo.** Require all development within the Alquist-Priolo areas to conform to retrofitting requirements.

10.4 HAZARDOUS MATERIALS

Risks Associated with Hazardous Materials

Castro Valley, while primarily a residential community, includes variety of land uses where current or historical activities may pose potential environmental and health and safety risks. Releases, leaks, or disposal of chemical compounds, such as petroleum hydrocarbons, on or below the ground surface can lead to contamination of underlying soil and groundwater. Disturbance of a previously contaminated area through grading or excavation operations could expose the public to health hazards from physical contact with contaminated materials or hazardous vapors.

Risks related to hazardous materials also include accidents involving vehicles transporting hazardous materials or hazardous wastes, accidental spills or leaks, and improper use, handling, storage, transport, and disposal of hazardous materials. In addition, improper disposal of household-generated hazardous waste, such as used motor oil, paints, and solvents can also impact water quality in local

waterways. Response to hazardous materials spills is provided by the Alameda County Fire District, which provides emergency response services for Castro Valley.

Sites with Soil or Groundwater Contamination

Areas where historic or on-going activities have resulted in the known or suspected release of hazardous materials to soil and groundwater or to the air are identified by the San Francisco Bay Regional Water Quality Control Board and U.S. Environmental Protection Agency (U.S. EPA.) These sites are designated as either Leaking Underground Fuel Tanks (LUFT) sites or SLIC (Spills, Leaks, Investigations, and Cleanups) sites, which are non-fuel contamination sites, or air emission sites. Many of these sites are former industrial facilities and dry cleaners, where chlorinated solvents were spilled, or have leaked into the soil or groundwater.

Within Castro Valley, the majority of the sites with contamination are clustered around the commercial area of Castro Valley Boulevard. This contamination may be the result of underground storage tank (UST) releases, spills, accidental releases or other activities involving the use of hazardous materials. Contamination can be cleaned up using a variety of soil and groundwater remediation techniques. Site clean up is required under Federal, State, and local regulations whenever a site with contamination is proposed to be redeveloped.

Overall a Low Level of Risk

Because Castro Valley is primarily residential, has no areas zoned for industrial uses, and because hazardous materials use and disposal is heavily regulated, the likelihood of conflicting uses, or potential exposure to hazardous materials or conditions, would be limited. Impacts related to routine transport, use, or disposal of hazardous materials; or accidental release of hazardous materials in Castro Valley would also be less than significant because existing federal, State, and City regulations require that these hazards be investigated during the project planning process and measures to eliminate them be incorporated in the project design prior to completing the project approval process. There are no Castro Valley sites on the State Department of Toxic Substances Control's Hazardous Waste and Substances Site List - Site Cleanup (Cortese List).

Prior to approval of final maps and improvement plans for any development project within Castro Valley, plan review and approval

by the Alameda County Fire District is required. Internal roadways and ingress/egress for each site would be required to meet State and local standards regarding turning radius, road width, and emergency vehicle access, thereby preventing potential impacts to emergency evacuation or response. Castro Valley is not located within two miles of a private or public airstrip or within an area covered by an airport land use plan.

HAZARDOUS MATERIALS GOAL

- GOAL 10.4-1** **Minimize the risk of life and property from the production, use, storage, and transportation of hazardous materials and waste by complying with all applicable Federal, State, and local requirements.**

HAZARDOUS MATERIALS POLICY

- Policy 10.4-1** **Hazardous Materials Exposure Risks.** Minimize risks of exposure to or contamination by hazardous materials by educating the public, establishing performance standards for uses that involve hazardous materials, and evaluating soil and groundwater contamination as part of development project review.

HAZARDOUS MATERIALS ACTIONS

- Action 10.4-1** **Proper Use, Storage and Disposal of Hazardous Materials.** Educate businesses and residents (for example through information on the County's website, etc.) about the proper use, storage, and disposal of hazardous materials, but also ways to reduce or eliminate the use of hazardous materials, including the use of non-toxic or less-toxic alternatives.

- Action 10.4-2** **Highly Flammable, Toxic and Water-Reactive Materials.** Amend County zoning regulations and project review processes to ensure that uses involving the use, storage, or transport of highly flammable, toxic, and/or highly water-reactive materials are located at an adequate distance from other uses and where they will not be adversely affected by disasters such as major fires, floods, or earthquakes. Regulate these uses to minimize the risk of on-site or off-site personal injury and property damage.
- Action 10.4-3** **Review Process for Proposals Using Hazardous Materials.** Coordinate with the Alameda County Department of Environmental Health, Hazardous Materials Division and other appropriate regulatory agencies during the review process of all proposals for the use of hazardous materials or those involving properties that may have toxic contamination such as petroleum hydrocarbons, asbestos, and lead.
- Action 10.4-4** **Soil and Groundwater Assessment.** Require applicants of projects in areas of known hazardous materials occurrences such as petroleum hydrocarbon contamination, USTs, location of asbestos rocks and other such contamination to perform comprehensive soil and groundwater contamination assessments in accordance with regulatory agency testing standards, and if contamination exceeds regulatory action levels, require the project applicant to undertake remediation procedures prior to grading and development under the supervision of appropriate agencies such as Alameda County Department of Environmental Health, Department of Toxic Substances Control, or Regional Water Quality Control Board.