

10

NATURAL HAZARDS AND PUBLIC SAFETY

10.1 FIRE HAZARDS

BACKGROUND

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 heavily wooded, undeveloped area, because trees are a greater source of fuel than low-lying brush or grasslands. Suburban or urban areas or rocky barren areas have minimal surface fuels and, therefore, typically have the lowest fire hazard.

In Castro Valley, the areas of most risk rim the city to the north, east, and south where residential areas border undeveloped wooded areas, often described as the Wildland-Urban Interface. These areas have been designated by the California Department of Forestry and Fire Protection as Very High Fire Zone Areas, as shown on Figure 10-1. Factors contributing to a Very High Fire Zone Area designation depend on the occurrence of a number of features, including:

- Availability 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
- Structural density.

GOAL 10-1:

Protect and enhance the natural setting of hillsides, canyons, and creeks which establish Castro Valley’s visual character. Protect views to these natural resources from public streets, parks, trails, and community facilities.

POLICIES

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

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, Natural 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, Natural 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, Natural Hazards, but may also apply to other properties where access for emergency vehicles does not fully comply with adopted standards.

- 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.** For any proposed projects that increase density, identify early in the development review process whether or not they are served by adequate water pressure for fire hydrants and fire flows for fire suppression purposes. 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.
- 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 **Creation of “Master Plan for Fire Suppression Water Services” with EBMUD.** 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 Hospital

According to the Alameda County Fire Department, some streets have water pipes with a four inch diameter, and six inch diameter or larger pipes are often necessary to provide adequate water pressure and flows for fire suppression.

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.

The County’s Integrated Vegetation Management Program is used by the Public Works Agency to control plants that may pose a fire danger, obstruct drainage water, or interfere with facility maintenance. 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 that private property owners are responsible for in order to reduce fire hazards on their properties.

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.** Require public streets for subdivisions with greater than 10 lots.

The maintenance of and parking enforcement for a public street can be more reliable than for private streets which could in return result in better maintained 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, 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
- Parking Restrictions

10.2 HYDROLOGY AND FLOODING

BACKGROUND

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 downslope 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.

Castro Valley lies in the San Lorenzo Watershed, which includes Chabot, Castro Valley, Cull, Crow, and Sulphur Creeks. Several unnamed tributaries flow into these creeks. Portions of the creek segments are natural, concrete-lined, earthen, and/or within a closed conduit (culvert). See Figure 10-2, Flooding and Drainage Sharing floodplain area, and creekside construction types for different creek segments. San Lorenzo Creek, Chabot Creek, and Castro Valley Creek have been improved over the years to convey adequate flows to avoid or reduce flooding. Several ponds are present at Cull, San Lorenzo and Chabot Creeks as a result of dams. Natural ponds may occur within some of the creeks, such as the unnamed tributaries to San Lorenzo Creek.

Surface Water Quality

Pollutant sources discharging into the creeks in Castro Valley include both point and nonpoint discharges. A point source is any discernible, confined, and discrete conveyance (e.g., a pipe discharge) of pollutants to a water body from such sources as industrial facilities or wastewater treatment plants. Nonpoint pollutant sources are sources that do not have a single, identifiable discharge point but are rather a combination of many sources.

Point sources in the Urban Area include discharges through pipelines and other discharges that drain into creeks. These are permitted 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.

A nonpoint source can be stormwater runoff from land that contains, for example, petroleum from parking lots, pesticides from farming operations, or sediment from soil erosion. San Lorenzo Creek is listed as impaired for the pollutant diazinon from urban runoff and storm sewers, which indicates the flow of pollutants such as pesticides from agricultural lands into the creek through runoff and sewer lines.

Groundwater

Castro Valley is underlain by the Castro Valley groundwater basin (No. 2-8) within the San Francisco Bay hydrologic region. The basin is three square miles in area bound on the east by the San Lorenzo Creek and by the Hayward Fault on the west. San Lorenzo Creek and its tributaries principally drain the basin and discharge to San Francisco Bay. The principal water bearing units within the basin are Pleistocene alluvial deposits including clays, silts, sands, and gravels. Groundwater quality in the basin is characterized by bicarbonates with calcium and sodium as the predominant cations. Uses of the groundwater should generally be restricted to non-potable purposes, within the central Castro Valley area. The areas in Castro Valley that the majority of well users get their water for domestic purposes are: Crow Canyon Road, Norris Canyon Road, Cull Canyon Road, Sunny Slope Avenue, Eden Canyon Road, Hollis Canyon Road, Palomares Road, and Dublin Canyon Road.

Castro Valley, Crow Canyon Road, Norris Canyon Road, Cull Canyon Road, Sunny Slope Avenue, Eden Canyon Road, Hollis Canyon Road, Palomares Road, and Dublin Canyon Road are free groundwater areas that are replenished by direct infiltration and percolation of rainfall (approximately 18 to 24 inches annually (approximately 20 inches by many reports)) and stream flow excesses of applied irrigation water and by subsurface inflow from adjacent foothills. These groundwater areas form the principal sources of recharge for the confined groundwater area of the East Bay Plain. Data on the number and yield of wells in the Castro Valley area is limited; the very few existing wells are principally domestic use.

There are approximately 150 domestic well users in the above-mentioned area of Castro Valley. There are approximately 100 known irrigation wells in use with in the same area. A study conducted in 1984 by EBMUD showed that for the central Castro Valley sub-basin (which did not include the major well users listed above) that it estimated the annual recharge for the central Castro Valley area at 250 AF/YR. It was also estimated that the maximum well yield (mgd) at 0.14 mgd. The central Castro Valley sub-basin was also rated high on the potential contamination list due to the various shallow groundwater contamination by underground storage tanks in the area.

Flooding

Flood-prone areas are generally located in topographic lows and in close proximity to shorelines, streams and creeks. Castro Valley lies in the Flood Zone 2 of the Alameda County Flood Control and Water Conservation District (ACFCWCD). Flooding could result from dam or reservoir failure and/or storm runoff from upstream watersheds or local areas. Dams and reservoirs in Castro Valley (on Cull and San Lorenzo Creeks) are relatively small and pose less extensive safety hazards (due to potential failure) than larger dams in the County. The dam failure inundation hazard map for Castro Valley shows inundation areas for Cull and San Lorenzo Creeks. Flood hazards resulting from stormwater runoff have been largely addressed through flood control projects by the ACFCWCD. Most drainage systems are adequate to carry runoff from a 10-year storm and a 15-year storm. During larger storms, flooding could occur primarily as sheet flow in streets and along stream channels.

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. Areas around the concrete and improved channels of the creeks in the southern portion of Castro Valley are designated as 100-year flood plains, and areas farther from the creeks and around the 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.

GOAL 10-2:

Provide surface drainage and flood protection facilities to protect the public safety and maintain and improve water quality to comply with all applicable requirements and protect the natural environment.

POLICIES

Policy 10.2-1 ***Protection of Water Quality.*** Protect water quality, including groundwater recharge and surface water surfaces, from contamination.

Policy 10.2-2 ***Restrictions on Wells in Central Castro Valley Area.*** Domestic, irrigation, municipal, and industrial wells in the central Castro Valley area should be restricted to limited or monitored uses only.

Policy 10.2-3 ***Downstream Flooding Risks.*** Lower the risk for downstream flooding by reducing impervious surfaces on new development and protecting existing drainage patterns.

ACTIONS

- Action 10.2-1 **Compliance with the 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) and RWQCB Water Quality Certification stormwater and water quality requirements, which may include but not be limited to, preparation and implementation of a stormwater pollution prevention plan (SWPPP) and implementation of effective best management practices (BMPs) for applicable construction and development activities.
- Action 10.2-2 **Federal, State and Alameda County Flood Control and Water Conservation District Requirements.** Ensure that all construction and development activities obtain all applicable Federal and State permits and approvals from the County and the Alameda County Flood Control and Water Conservation District (ACFCWD), as required through adherence to existing ordinances regarding grading and erosion control, stormwater management and discharge control, and watercourse protection.
- Action 10.2-3 **Water Quality Requirement 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.
- Action 10.2-4 **Public Sector Compliance with Stormwater Quality Requirements.** Ensure that public-sector construction and maintenance projects conform to the same standards as private projects. Ensure that stormwater quality requirements are included in plans and contract specifications for public construction projects.
- This requirement is established in the Alameda County Stormwater Quality Master Plan: New Development and Construction Controls, Component Objective #3.*
- Action 10.2-5 **Restrictions on Timing of Grading and Construction Activities.** Restrict grading and construction activities to dry periods, to the extent feasible. During the wet weather period from mid-October through mid-March, require additional erosion prevention measures when issuing

grading permits; except where Public Works Agency and Flood Control District emergency and maintenance action necessary to protect life and property is required.

- Action 10.2-6 **Requirements for Dewatering Activities.** Where applicable, ensure that all construction and development activities adhere to all permitting and regulatory requirements regarding dewatering activities. 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 10.2-7 **Nonpoint Source Pollutants.** Protect surface water quality by reducing the release of nonpoint source pollutants into storm drain system and waterways.
- Action 10.2-8 **Alameda Countywide Clean Water Program Stormwater Quality Management Plan.** Continue to protect surface water quality by complying with the Alameda Countywide Clean Water Program (ACCWP) Stormwater Quality Management Plan and require individual projects to prepare site-specific plans to demonstrate incorporation of appropriate source controls, site design strategies, and post-construction stormwater treatments to control and manage stormwater runoff and quality.
- Action 10.2-9 **Surface Runoff.** Incorporate into all site development review materials to the public, information regarding model and recommended approaches to controlling the quality of surface runoff from urban development.
- Action 10.2-10 **Compliance with San Francisco Bay RWQCB.** Continue to ensure that all new development and redevelopment projects comply, to the maximum extent practicable, with all applicable San Francisco Bay RWQCB stormwater and water quality requirements, specifically requirements and recommendations of Provision C.3 regarding post-construction stormwater runoff.
- Action 10.2-11 **Alameda Countywide Clean Water Program's C.3 Stormwater Technical Guidance.** Follow the Alameda Countywide Clean Water Program's C.3 Stormwater Technical Guidance handbook to ensure that criteria or requirements are met for stormwater control for development less than 10,000 square feet in size, and particular 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 (where appropriate), drains and downspouts flowing to landscaped areas and splash blocks, and any appropriate provisions recommended by ACCWP.

Action 10.2-12 **Alameda County Hydrology and Hydraulics Criteria Summary (HHCS) 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. 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 10.2-14 **Biological Resources Overlay Zone.** Adopt a Biological Resources Overlay Zone that identifies priority areas where development should be limited or restricted due to proximity to existing waterways, drainages, large open spaces, and certain riparian habitats and vegetated areas near creeks, and any other sensitive areas, such as steep slopes and endangered species and their habitats.

Development limitations and special permit review within the Zone would minimize changes in runoff patterns by retaining natural drainage patterns and contribute to improved water quality and reduced pollutant sources in storm drains and waterways.

Action 10.2-15 **ACFCWCD's Floodplain Controls.** Use the ACFCWCD's floodplain controls for Castro Valley when assessing flood risk, as well as ongoing risk after flood control and improvement projects are implemented.

Action 10.2-16 **Flood Control Improvement Projects.** ACFCWCD, along with other agencies and jurisdictions shall identify, 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 **Use of Bioengineering Technologies to Minimize Siltation and Erosion.** 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 Guidelines for Properties Adjacent to Waterways.** Establish design 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 **Pervious Surface Areas on Low-Density Residential Lots.** Develop site design review criteria or zoning requirements that increase maximum lot coverage limitations in lower density residential zones to maximize pervious surface areas and vegetation within individual residential lots.
- Action 10.2-20 **Restriction of New Development in 100-Year Flood Plains.** Do not permit new development in the floodway of a 100-year flood with the exception of development that has been determined to have no impact as identified in the Alameda County development code.
- Action 10.2-21 **Requirements for Development Adjacent to 100-Year Flood Plains.** Require that new structures located within the fringe of a 100-year flood plain be sited and designed to be flood resistant. Prohibit or discourage flood protection measures that inhibit flood flows.

10.3 SOILS AND SEISMIC HAZARDS

BACKGROUND

Geology, Topology and Soils

Elevations in Castro Valley range from approximately 100 feet above mean sea level (msl) to the west and approximately 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 areas of Castro Valley are underlain by bedrock deposits consisting mainly of sandstones and shales of Cretaceous/Jurassic age (65 to 190 million years old).

The San Francisco Bay Area contains both active and potentially active faults. Earthquakes pose especially high risks to Castro Valley because of its proximity to active faults with relatively frequent past movements. The Hayward Fault runs along the southwestern edge of the area, and the San Andreas Fault is located approximately 20 miles southwest. The Hayward and San Andreas Faults are the two principally active faults in the Bay Area. The San Andreas Fault is a major structural feature in the region and forms a boundary between the North American and Pacific Tectonic plates. Other principally active faults in the region include the Calaveras, Concord, and Marsh Creek-Greenville Faults.

Seismicity and Seismic Hazards

Fault rupture is displacement at the earth's surface resulting from fault movement associated with an earthquake. Surface fault rupture is typically observed close to or on the trace of an active fault. Castro Valley is adjacent to the active Hayward Fault. Areas that are most likely to experience fault rupture from movement on the Hayward Fault are incorporated within the Alquist-Priolo Earthquake Fault Zone; the Alquist-Priolo Zone is located to the west of the Castro Valley area.

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 is anticipated to occur as a result of an earthquake on

the Hayward fault, due to immediate proximity. 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 10-1).

Based upon the MM intensity scale, damage in Castro Valley related to groundshaking could be significant because of the close proximity to the Hayward fault. Multi-story buildings and “soft-story” buildings with habitable space above garages are some of the most vulnerable building types. These building types are concentrated in the central Castro Valley neighborhoods north of Castro Valley Boulevard.

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.

Regions within Castro Valley that have high to very high levels of liquefaction susceptibility include the western edge of the city and other areas underlain by alluvial deposits, as shown in Figure 10-1.

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 highest susceptibility to landsliding in Castro Valley exists in the upland areas surrounding the city to the north, east and south, as illustrated in Figure 10-3.

Table 10-1: Modified Mercalli Intensity Scale

| <i>Intensity Value</i> | <i>Intensity Description</i> | <i>Average Peak Acceleration¹</i> |
|------------------------|---|--|
| 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 |
| 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 |

SOURCE: ABAG, 2003.

NOTES: ¹g (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.

GOAL 10-3:

Minimize risks of property damage and personal injury posed by geologic and seismic hazards.

POLICIES

Policy 10.3-1 ***Consideration of Groundshaking Forces During Design Process.*** Design and construct structures to withstand groundshaking 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.

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 10-3, 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 updated versions of the California Building Code (CBC) so that optimal earthquake-protection standards are used in construction and renovation projects.

Earthquake-resistant design and materials must 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 10-3, 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.

10.4 HAZARDOUS MATERIALS

BACKGROUND

Castro Valley, while primarily residential, is also composed of a variety of uses including commercial and medical services, where current or historical activities may pose potential environmental and health and safety risks. These risks include accidents involving vehicles transporting hazardous materials or hazardous wastes (particularly along Castro Valley Boulevard and Interstate 580), accidental spills or leaks associated with seismic events, 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.

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.

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.

GOAL 10-4:

Minimize the risk to 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.

POLICIES

Policy 10.4-1 ***Hazardous Materials Exposure Risks.*** Ensure that risks of exposure to hazardous materials are minimized by educating the public, establishing special zoning regulations for uses that involve hazardous materials, and evaluating soil and/or groundwater contamination as part of development project review.

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 **Uses Involving 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 regulate these uses to minimize the risk of on-site or off-site personal injury and property damage. These uses should be located where they will not be adversely affected by disasters such as major fires, floods, or earthquakes.

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 **Comprehensive Soil and Groundwater Assessment Requirements.** 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.