

# **SAFETY ELEMENT**

**APPROVED BY THE CITY COUNCIL  
SEPTEMBER 22, 1998**

VI-1

Amended April 14, 2015 – Reso. 15-025, GPA #15-01

## **VI. SAFETY ELEMENT**

### **I. INTRODUCTION**

#### **A. PURPOSE**

The Safety Element is the primary document for linking land use decisions to local safety planning. The main focus of the element is to address the public safety concerns of the community. One of its ultimate purposes is to reduce harm to people and property resulting from natural hazards such as fire, flooding, geologic and seismic hazards. Safety issues outside of natural hazards may also be addressed.

The Safety Element addresses public safety through analysis of conditions and hazards that have the potential to cause loss of life, injury, property damage, economic loss, and social dislocation. For Hercules, these constraints include seismic and other geologic hazards, flooding, urban and wildland fires, and hazardous materials. (Hazardous materials are addressed in the Hazardous Waste Management Plan Element.) The city cannot be made hazard free, but the planning process can be used to minimize exposure to dangerous conditions. This is the concept of acceptable risk and it is an inherent part of the environmental planning process.

Every community must decide what public safety standards are acceptable and the actions needed to maintain those standards. For planning purposes, an acceptable level of risk is one at which a hazard is deemed to be a tolerable exposure to danger, given the expected benefits to be gained. For some types of risk, numerical measures have been defined to identify the threshold of acceptable risk. In the case of seismic or flooding hazards, for example, specific locations may be identified unacceptable based on their distance from known faults or location within a designated flood zone.

Environmental impact review is frequently used to assist in the decision-making process. Each identifiable risk must be addressed with mitigation measures that eliminate or minimize potential hazards. The measures include limitation of use in locations which are prone to hazard, special construction techniques, and site planning programs to respond to hazardous conditions.

#### **B. AUTHORITY**

##### **1. Safety**

###### **Government Code Section 65302:**

- (1) A safety element for the protection of the community from any unreasonable risks associated with the effects of seismically induced surface rupture, ground shaking, ground failure, tsunami, seiche, and dam failure; slope instability leading to mudslides and landslides; subsidence;

liquefaction; and other seismic hazards identified pursuant to Chapter 7.8 (commencing with Section 2690) of Division 2 of the Public Resources Code, and other geologic hazards known to the legislative body; flooding; and wildland and urban fires. The safety element shall include mapping of known seismic and other geologic hazards. It shall also address evacuation routes, military installations, peakload water supply requirements, and minimum road widths and clearances around structures, as those items relate to identified fire and geologic hazards.

(2) The safety element, upon the next revision of the housing element on or after January 1, 2009, shall also do the following:

- (A) Identify information regarding flood hazards, including, but not limited to, the following:
- (i) Flood hazard zones. As used in this subdivision, "flood hazard zone" means an area subject to flooding that is delineated as either a special hazard area or an area of moderate or minimal hazard on an official flood insurance rate map issued by the Federal Emergency Management Agency (FEMA). The identification of a flood hazard zone does not imply that areas outside the flood hazard zones or uses permitted within flood hazard zones will be free from flooding or flood damage.
  - (ii) National Flood Insurance Program maps published by FEMA.
  - (iii) Information about flood hazards that is available from the United States Army Corps of Engineers.
  - (iv) Designated floodway maps that are available from the Central Valley Flood Protection Board.
  - (v) Dam failure inundation maps prepared pursuant to Section 8589.5 that are available from the Office of Emergency Services.
  - (vi) Awareness Floodplain Mapping Program maps and 200-year flood plain maps that are or may be available from, or accepted by, the Department of Water Resources.
  - (vii) Maps of levee protection zones.
  - (viii) Areas subject to inundation in the event of the failure of project or non-project levees or floodwalls.
  - (ix) Historical data on flooding, including locally prepared maps of areas that are subject to flooding, areas that are vulnerable to flooding after wildfires, and sites that have been repeatedly damaged by flooding.
  - (x) Existing and planned development in flood hazard zones, including structures, roads, utilities, and essential public facilities.
  - (xi) Local, state, and federal agencies with responsibility for flood protection, including special districts and local offices of emergency services.
- (B) Establish a set of comprehensive goals, policies, and objectives based on the information identified pursuant to subparagraph (A), for the protection of the community from the unreasonable risks of flooding, including, but not limited to:
- (i) Avoiding or minimizing the risks of flooding to new development.
  - (ii) Evaluating whether new development should be located in flood hazard zones, and identifying construction methods or other methods to minimize damage if new development is located in flood hazard zones.
  - (iii) Maintaining the structural and operational integrity of essential public facilities during flooding.
  - (iv) Locating, when feasible, new essential public facilities outside of flood hazard zones, including hospitals and health care facilities, emergency shelters, fire stations, emergency command centers, and emergency communications facilities

or identifying construction methods or other methods to minimize damage if these facilities are located in flood hazard zones.

- (v) Establishing cooperative working relationships among public agencies with responsibility for flood protection.

(C) Establish a set of feasible implementation measures designed to carry out the goals, policies, and objectives established pursuant to subparagraph (B).

(3) Upon the next revision of the housing element on or after January 1, 2014, the safety element shall be reviewed and updated as necessary to address the risk of fire for land classified as state responsibility areas, as defined in Section 4102 of the Public Resources Code, and land classified as very high fire hazard severity zones, as defined in Section 51177. This review shall consider the advice included in the Office of Planning and Research's most recent publication of "Fire Hazard Planning, General Technical Advice Series" and shall also include all of the following:

(A) Information regarding fire hazards, including, but not limited to, all of the following:

- (i) Fire hazard severity zone maps available from the Department of Forestry and Fire Protection.
- (ii) Any historical data on wildfires available from local agencies or a reference to where the data can be found.
- (iii) Information about wildfire hazard areas that may be available from the United States Geological Survey.
- (iv) General location and distribution of existing and planned uses of land in very high fire hazard severity zones and in state responsibility areas, including structures, roads, utilities, and essential public facilities. The location and distribution of planned uses of land shall not require defensible space compliance measures required by state law or local ordinance to occur on publicly owned lands or open space designations of homeowner associations.
- (v) Local, state, and federal agencies with responsibility for fire protection, including special districts and local offices of emergency services.

(B) A set of goals, policies, and objectives based on the information identified pursuant to subparagraph (A) for the protection of the community from the unreasonable risk of wildfire.

(C) A set of feasible implementation measures designed to carry out the goals, policies, and objectives based on the information identified pursuant to subparagraph (B) including, but not limited to, all of the following:

- (i) Avoiding or minimizing the wildfire hazards associated with new uses of land.
- (ii) Locating, when feasible, new essential public facilities outside of high fire risk areas, including, but not limited to, hospitals and health care facilities, emergency shelters, emergency command centers, and emergency communications facilities, or identifying construction methods or other methods to minimize damage if these facilities are located in a state responsibility area or very high fire hazard severity zone.
- (iii) Designing adequate infrastructure if a new development is located in a state responsibility area or in a very high fire hazard severity zone, including safe access for emergency response vehicles, visible street signs, and water supplies for structural fire suppression.
- (iv) Working cooperatively with public agencies with responsibility for fire protection.

(D) If a city or county has adopted a fire safety plan or document separate from the general plan, an attachment of, or reference to, a city or county's adopted fire safety plan or document that fulfills commensurate goals and objectives and contains information required pursuant to this paragraph.

- (4) After the initial revision of the safety element pursuant to paragraphs (2) and (3), upon each revision of the housing element, the planning agency shall review and, if necessary, revise the safety element to identify new information that was not available during the previous revision of the safety element.
- (5) Cities and counties that have flood plain management ordinances that have been approved by FEMA that substantially comply with this section, or have substantially equivalent provisions to this subdivision in their general plans, may use that information in the safety element to comply with this subdivision, and shall summarize and incorporate by reference into the safety element the other general plan provisions or the flood plain ordinance, specifically showing how each requirement of this subdivision has been met.
- (6) Prior to the periodic review of its general plan and prior to preparing or revising its safety element, each city and county shall consult the California Geological Survey of the Department of Conservation, the Central Valley Flood Protection Board, if the city or county is located within the boundaries of the Sacramento and San Joaquin Drainage District, as set forth in Section 8501 of the Water Code, and the Office of Emergency Services for the purpose of including information known by and available to the department, the agency, and the board required by this subdivision.

To the extent that a county's safety element is sufficiently detailed and contains appropriate policies and programs for adoption by a city, a city may adopt that portion of the county's safety element that pertains to the city's planning area in satisfaction of the requirement imposed by this subdivision.

## 2. Seismic Safety

Public Resources Code Sections 2697 and 2699 require that seismic safety be addressed in the General Plan and through geotechnical reports.

### Public Resources Code Section 2697:

(a) Cities and counties shall require, prior to the approval of a project located in a seismic hazard zone, a geotechnical report defining and delineating any seismic hazard. If the city or county finds that no undue hazard of this kind exists, based on information resulting from studies conducted on sites in the immediate vicinity of the project and of similar soil composition to the project site, the geotechnical report may be waived. After a report has been approved or a waiver granted, subsequent geotechnical reports shall not be required, provided that new geologic datum, or data, warranting further investigation is not recorded. Each city and county shall submit one copy of each approved geotechnical report, including the mitigation measures, if any, that are to be taken, to the State Geologist within 30 days of its approval of the report.

(b) In meeting the requirements of this section, cities and counties shall consider the policies and criteria established pursuant to this chapter. If a project's approval is not in accordance with the policies and criteria, the city or county shall explain the reasons for the differences in writing to the State Geologist, within 30 days of the project's approval.

### Public Resources Code Section 2699:

Each city and county, in preparing the safety element to its general plan pursuant to subdivision (g) of Section 65302 of the Government Code, and in adopting or revising land use planning and permitting ordinances, shall take into account the information provided in available seismic hazard maps.

## **II. EXISTING CONDITIONS AND HAZARDS**

### **A. GEOLOGY**

Regional geology in the City of Hercules consists of alluvial (stream-related) deposits of Quaternary age (less than two million years old) on the floor of the Refugio Valley, surrounded by marine sedimentary rocks of Miocene age (between five and 23 million years old) in the adjacent uplands. The bedrock units exposed on the hills above the valley floor consist of Rodeo Shale and Hambre Sandstone to the south, and Briones Sandstone and Cierbo Sandstone to the north. In many places, the bedrock is overlain by colluvium (loose soil and rock fragments that have moved downslope).

Alluvium in the Refugio Valley varies from about 12 feet in thickness in the southeast portion of the valley to about 80 feet in thickness near the valley floor. Near San Pablo Bay, a few feet of fine-grained flood plain alluvium cap weak and highly compressible bay mud deposits. The bay mud has an estimated thickness of 35 to 40 feet along the western edge of the valley, thinning out in an upvalley direction.

Much of the older valley floor deposits are covered by loose, artificial fill. Fill materials were placed during operation of the Hercules Powder Company, and consist of soils and bedrock excavated from adjacent hillside areas; in some places the fill includes rubble consisting of bricks, asphalt, concrete, glass, and wood.

Most of Hercules lies within the lower portion of the Refugio Valley, adjacent to San Pablo Bay. The valley floor is fairly level. Most slopes on the uplands surrounding the valley floor are fairly gentle (less than 15 percent), although some slopes are between 15 and 30 percent, and exceed 30 percent in very limited areas. Landslides and soil creep have occurred in the past in the steeper portions of areas with unstable soils.

Clear Lake Clay lies on top of the alluvial deposits on the valley floor. The clay is a poorly drained soil with low erosion potential, low strength, high shrink-swell potential, and high corrosivity. Soils in the upland areas primarily consist of Tierra Loam, a moderately-well drained soil with moderate to high erosion potential, low strength, high shrink-swell potential and high corrosivity. Other soils in the upland areas consist of Los Osos Clay Loam and Sehorn Clay, both of which are well-drained soils with moderate to high erosion potential, low strength, high shrinkswell potential, and high corrosivity.

### **B. SEISMIC HAZARDS**

On the basis of past history, all of the San Francisco Bay Area is considered seismically active. There is no method by which the location, magnitude or time of future seismic occurrences can

be predicted. However, it is possible to identify certain types of seismic hazards and foretell which areas of the City will be particularly subject to damage by earthquakes. The following discussion summarizes the potential damaging effects of earthquakes in the City including ground shaking, ground failure, surface ruptures and tsunamis.

## 1. Faults

The Hercules area, as part of the San Francisco Bay Area, is in one of the most seismically active regions in the United States. The study area could be affected by ground shaking due to movement along any one of a number of active faults in the region. The San Andreas Fault lies about 21 miles to the southwest of the City, the Hayward Fault lies about two and a half miles southwest of the city, and the Concord-Green Valley Fault lies about 11 miles to the east. The Calaveras Fault lies approximately 40 miles to the southeast. The Rodgers Creek Fault, which connects with the Hayward Fault beneath San Pablo Bay, is another major fault only about 10 miles away to the west. The area within Hercules would be subject to strong ground motion in the event of a moderate to severe earthquake in the Bay Area. The U.S. Geological Survey has estimated that there is a 67 percent probability that there will be one or more earthquakes of magnitude 7.0 or greater (comparable to the 1989 Lorna Prieta earthquake) in the Bay Area in the next 30 years. Ground shaking, rather than surface fault rupture, is the cause of the most damage during earthquakes.

In addition to the active faults noted above, two inactive faults are located in the Hercules vicinity. Two traces of the Pinole Fault pass immediately southwest of Hercules and the Franklin Fault lies about three miles to the northeast. Neither of these two faults shows evidence of surface displacement in Quaternary time (the last two million years), and future movement along them is much more unlikely than along the active faults associated with the Pinole fault.

The Alquist-Priolo Special Studies Zones Act requires the state to identify zones around "active" faults (those having evidence of surface displacement within about the last 11,000 years) in order to manage development near possible surface rupture sites. There are no Special Studies Zones within Hercules (the closest Special Studies Zone is along the Hayward Fault, about two and one half to four miles to the southwest). The northern end of the Pinole Fault was originally included in a Special Studies Zone, but was removed from the active category after further analysis.

## 2. Earthquake Hazards

There are four major hazards associated with earthquakes. These are fault surface rupture, ground shaking, ground failure, and flooding due to earthquake-generated waves or dam failures.

Fault Surface Rupture. In major earthquakes, fault displacement can cause rupture along the surface trace of the fault, leading to severe damage to any structures or other improvements located on the fault trace.

Ground Shaking. Because it affects a much broader area, ground shaking, rather than fault surface rupture, is the cause of the most damage during earthquakes. Three major factors affect the severity (intensity) of ground shaking at a site in an earthquake: the size

(magnitude) of the earthquake, the distance to the fault that generated the earthquake, and the geologic materials that underlie the site. Larger magnitude earthquakes cause the ground to shake harder and longer, and affect larger areas. Given similar subsurface conditions, the intensity of ground shaking decreases with distance from the causative fault. Thick, loose soils, such as uncompacted alluvium and artificial fill, tend to amplify and prolong the ground shaking, while bedrock is less susceptible to ground shaking.

The Association of Bay Area Governments (ABAG) has mapped portions of the City area's susceptibility to ground shaking as "extremely high" (the highest rating). These areas generally coincide with the bay mud underlying a portion of the valley floor and the bayfront. This map is on file at the City offices. The bay muds are generally located along the bay shore with larger extending inland from the bay at the mouths of creeks. The risk of ground shaking damage in the areas underlain by bay mud is rated as "extremely high" (6.1 percent expected damage and above) for tilt-up concrete buildings, "high" (4.1-5.0 percent damage) for concrete and steel buildings, and "moderate" (2.1-3.0 percent damage) to "moderately high" (3-4 percent damage) for wood frame dwellings (ABAG, 1987). The risk of ground shaking damage is much lower for areas not underlain by bay mud, although areas underlain largely by alluvium are expected to endure strong ground shaking as well. See Figure 1.

Ground Failure. Earthquakes can cause secondary ground failures, such as landslides, liquefaction, lurch, and settlement. All of these involve a displacement of the ground surface due to loss of strength, failure, or compaction of the underlying materials due to ground shaking. An earthquake could trigger landslides, particularly upon steeper slopes where slide activity has already occurred. The amount of sliding would be intensified if an earthquake were to occur during wet winter months when the slopes were in a saturated, weakened condition.

Liquefaction is the sudden loss of strength in loose, saturated materials (predominantly sands) during an earthquake, which results in the temporary fluid-like behavior of those materials (much like quicksand). Liquefaction typically occurs in areas where groundwater is shallow, and materials consist of clean, poorly consolidated, fine sands. The upland areas surrounding the valley floor are underlain by bedrock and would not be subject to liquefaction. Bay mud underlying the western portion of the valley floor is not likely to liquefy, although sand seams occasionally contained within the bay mud or fine-grained alluvium or artificial fill on top of the bay mud could be susceptible to liquefaction. The liquefaction potential in the area of the rest of the valley floor generally is not known, although there is no indication that materials susceptible to liquefaction are present.

Lurch, or lurch cracking, is the cracking of the ground surface in soft, saturated material as a result of earthquake-induced ground shaking. Lurch cracking is likely to occur in areas of bay mud and fill in moderate to large earthquakes. Lurch cracking can occur in water-saturated sediments, soils, and alluvium at distances of up to 75 miles from the earthquake epicenter. The probability of lurching in the valley floor areas is unknown, but its occurrence is possible.

Differential settlement (where adjoining areas settle different amounts) most commonly occurs in loose, uncompacted materials of variable density and strength. Artificial fills are likely to be most susceptible to differential settlement. Transition areas between bedrock and alluvial deposits would also be subject to differential settlement.

Earthquake-Induced Inundation. Seismic activity off the coast of California could induce a tsunami, commonly but incorrectly referred to as a "tidal wave," that could enter San Francisco Bay through the Golden Gate. Tsunamis are waves that increase in size with distance traveled, and can cause destruction when they pile up at shallow shoreline areas. There is no evidence that any portion of Contra Costa County that is exposed to potential tsunami inundation has experienced significant damage from this phenomenon, and the likelihood of damage to the City of Hercules from one is small.

A major earthquake could theoretically create a seiche, a type of oscillating wave that sloshes around in an enclosed basin and can cause severe damage at the shoreline. No such wave has ever been recorded in San Francisco Bay or San Pablo Bay within historic time, however. A large earthquake could induce a landslide adjacent to a nearby reservoir, creating the geologic hazard known as landslide splash, an overtopping of water resulting from earth sliding into the reservoir. Additionally, failure of reservoir dams themselves could directly result from a major earthquake. However, the City of Hercules does not lie in the path of inundation from any reservoirs.

## **C. GEOLOGICAL HAZARDS**

Potential geological hazards in the City include:

- a. Landslides and soil creep
- b. Valley Alluvium
- c. Existing fills
- d. Ground water, seepage and ponding
- e. Erosion

The City has recently adopted a Grading Ordinance establishing standards for grading operations, requiring the issuance of grading permits, providing for the approval of grading plans, and inspection of grading construction. The Grading Ordinance provides for testing where there are potential geologic hazards.

### 1. Landslides and Soil Creep

Numerous shallow landslides of various sizes are present, particularly in the southeastern part of the City.

In addition to the landslides, soil creep movements are occurring on certain slopes within the City. Creep movement is generally most active and widespread on the steeper slopes. Rates and depths of creep movement are much slower and shallower than those associated with active

landslides.

## 2. Valley Alluvium

The depth of alluvium in Refugio Valley varies from 11.5 feet in the southeast portion of the valley to about 80 feet near the valley mouth. Most of the upper valley is blanketed with an expansive, adobe-type soil. The adobe-like topsoil is generally underlain to the bedrock formation with firm to still alluvial soils. However, in some locations, compressible fresh water marsh deposits are present, which become thicker and closer to the ground surface in the lower portions of Refugio Valley. Near the mouth of Refugio Valley, in the vicinity of the site of the former Hercules Incorporated dynamite plant, very weak and compressible younger bay muds are present. The depth of the younger bay muds near the valley mouth ranges from about 45 feet to about 70 feet. Older bay muds and/or residential soils of variable depths underlie the younger bay muds.

## 3. Existing Fills

Overlying the valley alluvium and some overburden soil deposits are several generally small and shallow embankment fills. Most of these fills are in Refugio Valley and vary in depth from the few feet up to ten feet. One large fill, in the Lower Refugio Valley, consists of approximately 100,000 cubic yards and averages about four feet in depth.

## 4. Ground Water, Seepage and Ponding

A generally shallow, thin zone of ground water will be encountered in most of Refugio Valley at depths ranging between three and five feet. Somewhat deeper ground water levels exist in the upper portions of the valley. Shallow ground water levels are also expected adjacent to Pinole and Rodeo Creeks. Several small springs and areas of surface seepage are present in the City, usually located in the foot or toe areas of landslides or at the base of sharp breaks in slope. During the wet winter months, numerous, generally small areas of water ponding are observed throughout the confines of Refugio Valley. Most ponds were the result of site grading for plant facilities over the years.

## 5. Erosion

Unprotected soils and highly weathered bedrock will be subject to erosion. Protective measures are especially needed for construction on highly erosive soils (Tierra Loam, Los Osos Clay Loam, and Sehon Clay).

## **D. FIRE HAZARDS**

The major fire hazard areas within Hercules are the open space areas directly adjacent to homes. The open spaces include brush and grass covered hills and forested areas. The blue gum Eucalyptus trees are particularly flammable. The City works with the local Hercules-Rodeo Fire District to assist with annual maintenance to reduce local fire hazards.

The California Department of Forestry and Fire Protection (CAL FIRE) maps areas of significant fire hazards in the state. These areas are identified based on weather, topography, fuels, and other factors. Fire hazards are greatest in areas with steep slopes, volatile vegetation, and windy conditions.

Figure S-2 (Fire Hazard Areas) shows fire hazard severity zones in the vicinity of Hercules. Land adjacent to the City limits and some land located within the City's Sphere of Influence are designated with a high fire hazard severity zone in the State Responsibility Area (SRA). No land within the incorporated areas of the City has been identified within Local or State Responsibility Areas for fire hazards.

Limited active uses are located within these designated areas. Most of the area is preserved as open space used for cattle grazing. A small portion of the area contains limited industrial uses associated with a carbon factory.

1. Fire Service

Fire protection services to the City of Hercules are provided by the Rodeo-Hercules Fire Protection District. The District provides 24-hour protection to the City of Hercules and the unincorporated areas of Rodeo. A 24-hour dispatch service is provided to the District under contract with the City of Pinole. The District has an automatic response agreement with the Pinole Fire Department.

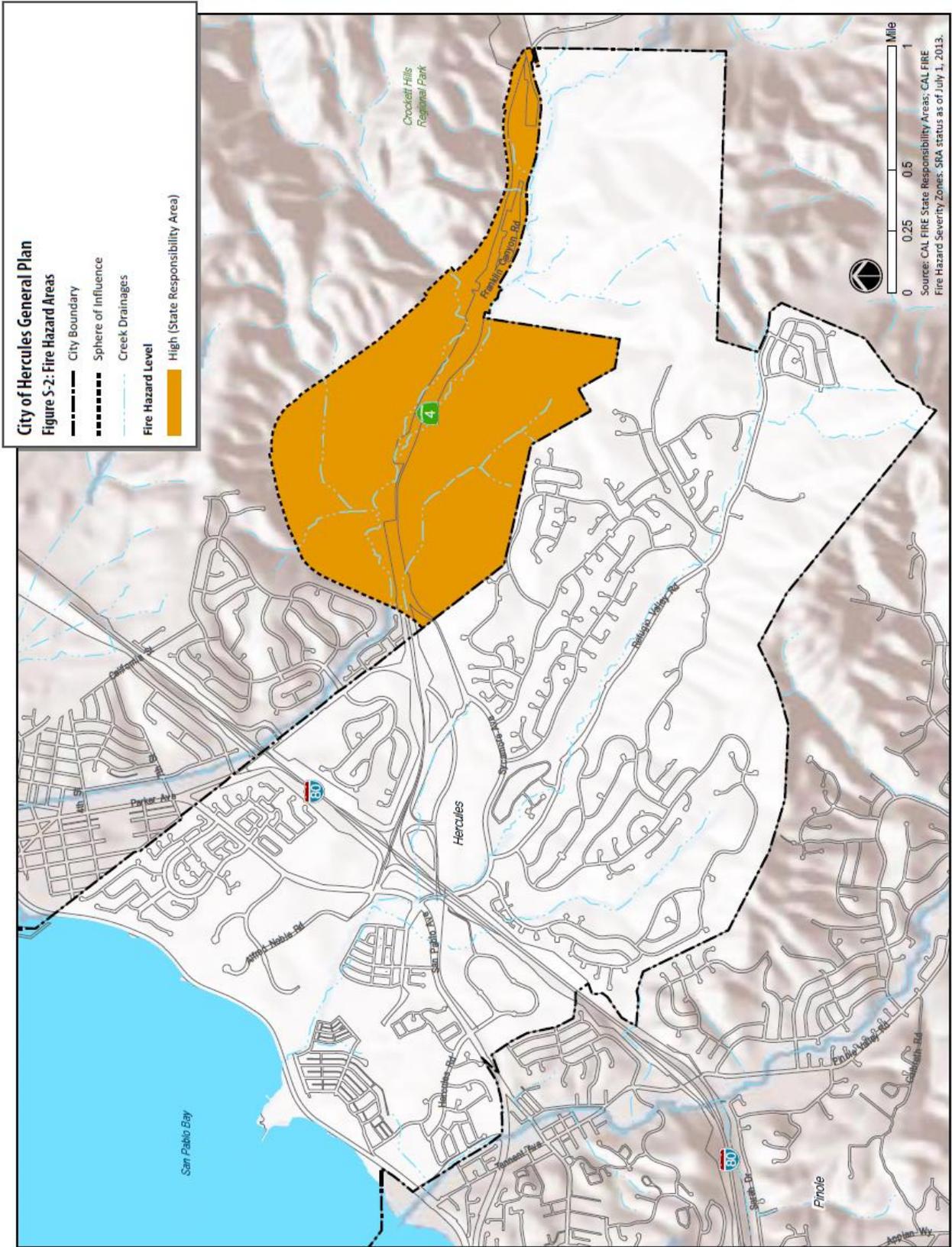
The District has two fire stations; a four-bay station at 326 Third Street in Rodeo and a three-bay station at 1680 Refugio Valley Road in Hercules. District equipment includes: one 1500-gpm pumper, one 1,250-gpm pumper, two 1,000-gpm pumpers, two 500-gpm Wildland units, two 200-gpm Wildland units, one rescue truck, one utility truck and four staff vehicles.

The District responds to all fire and rescue-related emergencies within the District's boundaries. In 1992. The response time goal of the District is to reach an emergency scene in built-up areas of the District within five minutes 90 percent of the time.

The District receives revenue from property taxes, fire impact fees levied on new development (developer fees), and benefit assessment fees levied pursuant to a District ordinance. Assessment fees are recurring annual fees collected according to a sliding scale based on risk factors according to the land use on the parcel. All parcels are assigned risk units based on the size and type of development; the number of risk units is multiplied by the unit fee to determine the assessment fee. The benefit assessment fees are used by the District for the purchase of new and replacement equipment and to support personnel costs.

Fire impact fees are levied on all new development within the District, both in the City of Hercules and in the unincorporated community of Rodeo. The total square footage of a project, whether industrial, commercial or residential, is multiplied by the fire impact fee rate to arrive at the total fee. Impact fees are used for the purpose of buying new and replacement capital equipment required to meet the demand that new development places on the District's fire suppression capabilities. Development fees may not be used to fund ongoing operations.

The District implements the weed abatement program within Hercules by clearing vegetation on undeveloped land for 40 feet from fencelines with developed areas. The weed abatement is scheduled to be completed prior to the July 4th weekend.



Peakload water supply requirements: The domestic water supply for Hercules is provided by the East Bay Municipal Utility District (EBMUD). EBMUD has several reservoirs within the Bay Area to serve its distribution network. In the event of an emergency, the District is dependent upon the EBMUD system to supply water. The District has a standard for emergency water supply for firefighting of 1000 gpm for residential uses and 1500 gpm for commercial uses.

The District uses a variety of criteria to determine the service impacts associated with new development. The criteria include:

- Size of structure(s), fire flow demands;
- Classification of occupancy (Hazard type);
- Type of building construction and materials;
- Daytime population density;
- Increase in calls for service;
- Code enforcement issues;
- Fire protection features (automatic sprinkler system); and
- Travel time and distance from nearest fire station.

Fire protection services to the City of Hercules are provided by the Rodeo-Hercules Fire Protection District. The District provides 24-hour protection to the City of Hercules and the unincorporated areas of Rodeo. A 24-hour dispatch service is provided to the District under contract with the City of Pinole. The District has an automatic response agreement with the Pinole Fire Department.

## **E. LAND USE AND CIRCULATION**

The Land Use and Circulation Elements were reviewed in terms of safety considerations. The Circulation Plan provides a framework of arterials and local streets that will provide alternate routes to or from any portion of the City in case of emergency. Long cul-de-sacs present safety problems because of the possibility of blockage preventing access of emergency equipment or evacuation of residents. The current maximum cul-de-sac length allowed by the Rodeo Hercules Fire District is 450 feet.

The blockage of Interstate 80 within the City would have a major impact on the circulation system. The only alternate route for traffic would be San Pablo Avenue. Willow Avenue would be the alternate route in the case of a blockage on Highway 4 freeway.

The Emergency Operations Plan of the City designates primary and secondary evacuation routes along with emergency equipment routes and shelters. The primary emergency equipment and evacuation routes are San Pablo Avenue, Highway 4 freeway, I-80 Freeway, Sycamore Ave., Refugio Valley Road, Falcon Way, Turquoise Ave., and Pheasant Drive. The minimum emergency road width clearance to be maintained along the evacuation routes is 20 feet. The clearance widths exclude parking and other impediments to traffic flow.

Approved Red Cross emergency shelters are designated within the Community Center at 2001 Refugio Valley Road, Ohlone Community Center at 1616 Pheasant Drive, Hercules School at 1919 Lupine Road, and Lupine Child Care Center at 1905 Lupine Road.

## **F. FLOOD HAZARDS**

Potential causes of flooding in the City include:

- High tides and storm waves
- Creek overflows
- Standing water from excess rainfall

### 1. High Tides and Storm Waves

The City's northwest land area is adjacent to San Pablo Bay. Potential flood hazards associated with high tides and storm waves are concentrated at the confluence of the Bay and two creeks, Pinole Creek and Refugio Creek.

Pinole Creek, between San Pablo Avenue and the Bay is a tidal waterway that was channelized and realigned by the U.S. Army Corps of Engineers in 1965. The Pinole Creek Watershed Vision Plan was prepared in 2014 to document the vision for restoration of the creek to a more natural state. A portion of the Vision Plan was implemented in 2010, with the Pinole Creek Habitat Restoration demonstration project, located between the Pinole Creek mouth and Interstate-80. The City of Hercules also plans to restore the Chelsea Wetlands, adjacent to Pinole Creek comprised of five acres of degraded seasonal wetlands, into functioning tidal wetlands. These improvement projects are intended to both restore wetland aquatic and transitional habitat while preserving and expanding flood conveyance and water storage capacity.

A large portion of Refugio Creek nearest San Pablo Bay has not been improved, thus remaining susceptible to flooding. High tides and storm-driven waves occurring together could overtop embankments and flood low-lying coastal areas. To address this issue, restoration of Refugio Creek from its confluence with San Pablo Bay to approximately 1,500 feet upstream is anticipated to begin in 2015. As part of the work associated with construction of the Bayfront Bridge/Intermodal Transit Center, Refugio Creek is being realigned and the creek channel into San Pablo Bay will be dredged to improve flow during heavy rain events and high tides.

### 2. Creek Overflows

When the surface runoff exceeds the capacity of the creek channel to carry the flow, creek overflows result. Pinole and Rodeo Creeks drain relatively small portions of the City while the drainage basin of Refugio Creek covers most of the City and extends well beyond the City boundary to the east. Pinole and Rodeo Creeks are adjacent to the northern and southern City boundaries and drain the neighboring communities of Pinole and Rodeo.

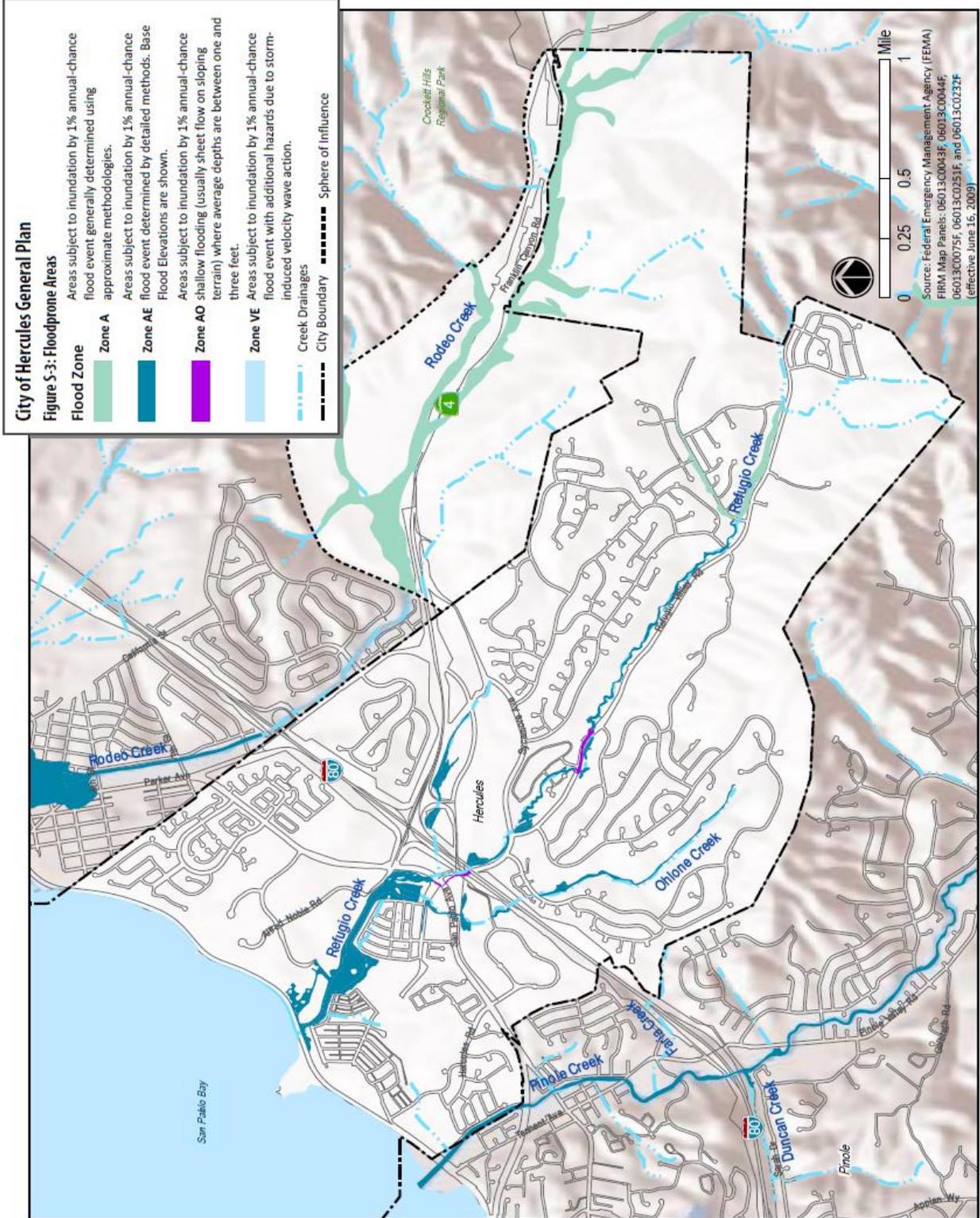
Flood Insurance Rate Maps (FIRMs), which are prepared by the Federal Emergency Management Agency (FEMA), identify potential flood zones (Figure S-3). Flood hazards related to storm events generally are described in terms of a 100-year or 500-year flood. A 100-year flood is defined as a major flood event that has a one percent or greater chance of occurring during any one year. Flood hazard planning practices address such storms, as well as 500-year events. These floods are considered severe; however, such flood events can be reasonably predicted and therefore reasonably mitigated. No areas with the City or Sphere of Influence have been identified within 500-year flood hazard areas. However, certain areas of the city (generally adjacent to creeks) have been identified to be within the 100-year

flood zones. These areas have a one-percent chance of inundation at varying depths.

The lower channel of Refugio Creek has had a history of overflowing. The upper channel is on a slumping of slide slopes. Improvements to the lower channel in recent years have reduced the potential for flooding both upstream and downstream. Approximately 2,500 linear feet of Refugio Creek adjacent the Bayside subdivision was realigned and restored in 2004. As part of the restoration, the creek was relocated to a new 180-foot wide channel to convey flood flows. For specific elevations of flooding, please see the Flood Insurance Rate map (Community Panel Number 0604340008B and 0604340009B) on file with the City of Hercules or the Official Flood Insurance Rate Maps online at FEMA's mapping website: <https://msc.fema.gov/>

### 3. Standing Water from Excess Rainfall

Standing water from excess rainfall could occur in low-lying and level areas if the natural drainage channels were interrupted or modified by grading or impervious soils prevented the rapid infiltration of rainfall into the ground. Protection and improvement of drainage channels should be provided.



## **II. SAFETY GOALS, OBJECTIVES, AND POLICIES**

### **A. GOALS**

The basic goal of the Safety Element is to reduce loss of life, injuries, damage to property and economic and social dislocations resulting from seismic, geological, flood and fire hazards. Subgoals are to:

1. Identify hazards and minimize exposure to hazards from either natural or human-related causes.
2. Establish adequate design and safety standards to reduce risks.
3. Incorporate safety considerations into the planning process
4. Provide adequate fire protection throughout the city.
5. Anticipate the potential for disasters; maintain continuity of life-support functions during an emergency; and maximize efforts for post-emergency recovery.

### **B. OBJECTIVES, POLICIES AND PROGRAMS**

#### **OBJECTIVE 1**

Consider potential seismic, geologic, flood and fire hazards and introduce adequate safety measures in development plans and proposals.

#### **Policy 1A**

Seismic, geologic, flood and fire safety policies will be integrated into other mandatory elements of the General Plan. Administration and enforcement of municipal regulations provide positive measures for implementing safety policies.

##### Program 1A.1 Planning Review

1. Planned development plans must be prepared and adopted for all new development projects. Safety measures will be incorporated into these planned development plans to provide adequate protection from seismic, geologic, flood and fire hazards.
2. The review and approval of zoning applications, tentative maps and planned development plans shall include consideration of safety policies and standards contained in the General Plan and other area plans.

##### Program 1A.2 Subdivision, Zoning and Grading Regulations

1. The subdivision, zoning and grading regulations govern the subdivision of land, and the design and construction of site improvements. Minimum road widths and clearances around structures for emergency access shall be specified. Seismic,

geologic, flood and fire hazards shall be considered in the review and approval of tract maps, grading and improvement plans .

#### Program 1A.3 Building and Fire Codes

The City Council has adopted the Uniform Building Code and the Uniform Fire Code. Fire zones have also been designated in the City.

1. The Uniform Building Code provides minimum safety standards by regulating the design, construction, materials use and occupancy of buildings and structures within the City.
2. The Fire Code governs the maintenance of buildings by regulating the storage and handling of dangerous materials and by requiring adequate egress facilities.
3. Fire Zones limit the potential fire size, thereby preventing major conflagrations. All commercially zoned land in the City is designated Fire Zone 2 and the remainder is in Fire Zone 3. Fire Zone restrictions involve building construction and the division of large building areas by fire walls.

#### Program 1A.4 Emergency Operations Plan

An Emergency Operations Plan has been prepared and should be maintained to provide responsibilities and procedures in the event of a major disaster or emergency in the City. This plan is compatible with the State of California and the Office of Emergency Services. The Emergency Operations Plan designates emergency evacuation routes.

#### Program 1A.5 Capital Improvements Plan

The Capital Improvements Program is a five-year program for municipal capital expenditures which is evaluated annually. Capital improvements which promote safety in the City, such as a fire station, will be evaluated and ranked with the other needs in the community.

#### Program 1A.6 Geologic and Seismic Hazard Mapping Update.

The geologic and seismic hazard maps relating to the Safety Element of the General Plan shall be updated and incorporated through amendment of the Safety Element. If hazards are discovered that are not currently addressed, the Safety Element shall be revised and amended to include policies and programs related to these hazards.

#### Program 1A.7 Location of New Essential Public Facilities

Locate, when feasible, new essential public facilities outside of flood and fire hazard zones, including hospitals and health care facilities, emergency shelters, fire stations, emergency command centers, and emergency communications facilities. When such location is necessary, identify construction methods or other methods to minimize damage to such facilities.

## OBJECTIVE 2

Minimize exposure of public facilities and development to seismic hazards.

### Policy 2A

No critical facility or school shall be permitted in areas subject to very strong ground shaking or ground failure until an evaluation of alternative sites with reduced seismic hazards are completed.

#### Program 2A.1

For each proposal, require a feasibility study to determine whether any proposed critical facilities (emergency response centers, police stations, and hospitals) and schools could be sited in areas with lesser seismic hazards. An alternative site feasibility assessment shall include a consideration of sites in areas with lesser seismic hazards in addition to evaluations of service area, accessibility, and economic considerations. (Geology-1a)

### Policy 2B

Projects proposed for all critical facilities including schools, high population facilities (such as shopping malls) and industries using or generating significant amounts of hazardous materials within areas subject to very strong earthquake ground shaking or ground failure shall conduct geotechnical studies and structural design evaluations.

#### Program 2B.1

If the alternative site feasibility study for a critical facility or school were to indicate that other less hazardous sites are not available, then geotechnical studies and structural design analyses for the facility shall be conducted in compliance with State of California requirements and recommendations of the Seismic Safety Commission. These should include detailed studies of the geologic materials at the site, seismic event response evaluations to identify design criteria, foundation design criteria and dynamic method analyses of proposed structures.

#### Program 2B.2

For development excluding critical facilities and schools, the alternative site feasibility assessment will be an optional requirement of the City (an alternatives site evaluation may be required under CEQA). A rigorous geotechnical evaluation and structural design analyses will be required to ensure that the proposed structures perform adequately in major earthquakes without creating a safety hazard to occupants or people in surrounding areas.

### Policy 2C

The City will update the Earthquake Preparedness and Emergency Response Plan as necessary

to establish emergency access points to evaluate the comprehensiveness of the City's evacuation routes in relation to the specific effects of seismic-induced ground shaking, liquefaction, and lurching within the community.

#### Program 2C.1

The City Manager will coordinate the relevant departments within the City during any update of the Earthquake Preparedness and Emergency Response Plan.

#### Program 2C.2

Implement an emergency water supply program to provide potable water to the City population in the event that normal water supplies are disrupted due to seismic events or other causes. The emergency water supply should be sufficient to supply the City population with a minimum designated potable water allowance to be determined by the program.

### Policy 2D

The administration of subdivision and grading ordinances should allow for flexibility in the review and approval of construction plans to permit sound engineering design in the solution of specific geological problems. Site-specific geotechnical investigations shall be required for every new development.

#### Program 2D.1

Applications for subdivision and development projects shall include site specific geotechnical investigations prepared by a California certified engineering geologist documenting the geotechnical suitability of the site for the proposed development based on soil and underlying substrate conditions; and the measures required to ensure public safety and the protection of property. The following shall be implemented through adoption as conditions of approval for the project.

- 1) Loose or improperly compacted existing fills and backfills should be excavated from areas to be filled.
- 2) All areas to be graded should be stripped of vegetation and the top few inches of highly organic topsoil.
- 3) Organic topsoil should be stripped and stockpiled and used for landscaping.
- 4) Lower valley areas where bay mud deposits are exposed or are blanketed by shallow thicknesses of poorly compacted fill will require detailed studies prior to site grading.
- 5) Sidehill "sliver" cuts and fills should be avoided.
- 6) Special consideration should be given to slope stability in the steep hillside areas. Site new structures away from steep hillsides and the toes of existing landslide surfaces, reducing the potential for damage from landslide movement or burial.
- 7) Steep sideslopes should be left in their natural condition where possible.

- 8) Minimize the potential for creating new landslides or reactivating old ones. Setbacks should be determined based on detailed soils investigations in individual cases opposite landslide prone slopes to reduce the potential for slide damage to improvements.
- 9) Expansive soils should be considered in the design of road pavement sections.
- 10) Site planning should consider the potential of differential settlement where compressible soils exist, and employ appropriate approaches to reducing the hazard to an acceptable level of risk.
- 11) Areas underlain by soft bay mud will require further detailed soils investigations.
- 12) Slopes should be planted as soon as possible after completion of construction to develop a protective organic mat.
- 13) Dense pockets of brush and trees located on steep slopes should be left intact where possible to prevent potential landslides.
- 14) The sides of the stream channel in portions of Refugio Valley should be improved to protect erosion - induced slumping. Care should be taken to maintain the natural appearance of the water-course in the open space areas.
- 15) Development of the site shall minimize the amount of native soils compacted by construction vehicles and structures, as well as the amount of soil disturbed through grading and excavation. As much as possible, native soils shall be left undisturbed and used for open space and landscaping purposes.
- 16) Development of the sites shall also maximize the use of pervious materials, including fill, and incorporate proper drainage structures capable of handling anticipated increases in surface runoff.
- 17) Minimize amount of grading when building on hill sides. No grading shall occur on slopes steeper than 30 percent, and cut slope angles no greater than 33 percent shall be maintained.

### Program 2D.2

Applications for subdivision and development projects shall include site specific erosion control and hillside drainage plans, which shall address the following standards. These standards shall be implemented through adoption as conditions of approval for the project.

- 1) The use of silt fencing, sediment trapping basins, runoff diversion devices and hydroseeding of barren slopes shall be required to minimize or prevent erosion impacts.
- 2) Grading in the City shall occur with no increase in discharge of sediments to wetlands, Refugio Creek, or San Pablo Bay.

### Program 2D.3

Further investigations of possible fault traces should be made in the vicinity of the Pinole Traces and Pinole Ridge. Setbacks from located fault traces should be based on geological engineering recommendations.

## OBJECTIVE 3

Ensure that adequate fire protection is provided throughout the city and that all new structures conform to current fire safety standards.

### Policy 3A

The City should continually evaluate the alternatives for providing adequate fire service to meet the changing needs of the City in the most efficient manner.

#### Program 3A.1

The City shall assist the Rodeo-Hercules Fire Protection District in processing the collection of fire impact fees from all new development within the City.

#### Program 3A.2

The City shall work with the Rodeo-Hercules Fire Protection District to determine specific needs for fire protection when a particular development proposal is reviewed and ensure that these needs are met.

Fire Station(s) shall be located in the *City* so that five minutes emergency response time may be achieved by first response units for 90% of all emergency calls. Fire Stations shall be sized to accommodate a minimum of two (2) engines/trucks and three-person, 24-hour crews.

### Policy 3B

New development shall be designed to minimize exposure to fire hazards.

#### Program 3B.1

Subdivision and planned development plan applications shall include measures to promote fire safety. These measures shall be evaluated during application review and implemented through adoption as conditions of approval for the project including:

- 1) Road circulation for fire and emergency vehicle access.
- 2) Access to structures and open spaces
- 3) Fire flow needs and other peakload water flow needs for emergencies
- 4) Landscape design
- 5) Visible street signs

#### Program 3B.2

Subdivision and planned development plan applications shall include open spaces measures to promote fire safety. These measures shall be evaluated during application review and implemented through adoption as conditions of approval for the project including:

- 1) A buffer of irrigated landscaping and/or plowed area maintained between

- open spaces and developed areas.
- 2) Fire access trails in major open spaces to allow fire equipment to penetrate. These trails could be part of the City-wide system of trails.
  - 3) The use of fire resistant plant materials in open space landscaping.
  - 4) Containment of potential fires where natural vegetation exists in open spaces.
  - 5) Responsibilities for maintenance of fire trails, cleaning vegetated areas and maintaining fire breaks should be clearly defined in planned development plans and conditions of approval.

#### OBJECTIVE 4

Reduce flood hazards through flood channel improvements and development standards.

##### Policy 4A

Refugio Creek Channel should be improved to provide adequate capacity for expected flood flows.

##### Program 4A.1

Development projects along the stream channel shall include plans to improve drainage flows consistent with protection of riparian habitats and wetlands as approved by California Department of Fish and Game and the US Army Corps of Engineers.

(Note: see Open Space and Conservation Element)

##### Policy 4B

New Development shall be located and designed to minimize generation of and exposure to flood hazards.

##### Program 4B.1

Subdivision and planned development plan applications shall include measures to promote flood safety. These measures shall be evaluated during application review and implemented through adoption as conditions of approval for the project.

1. Review of any significant project proposals for areas which are not presently in flood zones should include an evaluation of increased downstream flows resulting from the project.
2. Finished floor elevation of all developments must be one foot above the 100 year flood elevations prescribed on the Flood Insurance Rate Map. (See also Growth Management Element standard III.E.7)
3. In order to protect lives and property, intensive development should not be permitted in reclaimed areas unless flood protection in such areas is constructed to the standards of the Flood Disaster Protection Act of 1973.