10 PUBLIC SAFETY ELEMENT

The Public Safety Element provides information about risks in Livermore due to natural and created hazards. Its policies are designed to protect the community as much as possible from seismic, flood, geologic and wildfire hazards.

As required by State law, the Public Safety Element addresses the protection of the community from any unreasonable risks associated with the effects of:

- Geologic hazards, including earthquakes, ground failure and subsidence and slope instability.
- Flooding, dam failure, tsunami and seiche.
- Wildland fires.
- Hazardous materials.

This element also contains information and policies regarding airport safety and general emergency preparedness.

The Public Safety Element establishes mechanisms to reduce death, injuries, damage to property and to address the negative results from public safety hazards like flooding, fires and seismic events. Hazards are an unavoidable aspect of life, and the Public Safety Element cannot eliminate risk completely. Instead, the Element contains policies to create an acceptable level of risk.

Under the federal Disaster Management Act of 2000, state and local governments are required to develop hazard mitigation plans and update them every five years as a condition for federal disaster grant assistance. The purpose of the plans is to avoid or reduce the effects of natural hazards on people and property in the community. The Tri-Valley Hazard Mitigation Plan (TVHMP), adopted in 2018, is a multi-jurisdictional plan covering the cities of Livermore, Dublin, and Pleasanton and the Dublin San Ramon Services District. The Plan identifies the natural hazards within the Tri-Valley area, provides a risk assessment of the effects of the hazards, and recommends actions to mitigate risks to people and property. The TVHMP is incorporated herein by reference.

I. GEOLOGIC HAZARDS

A. Background Information

Setting

The Livermore Valley is located at the northern end of the Diablo Range, which is a part of the northwest trending coastal range. The Valley is a structural depression formed by an east-to-west downfold, or syncline, along the Calaveras Fault. The Valley is bounded on the east by the Greenville fault.

Livermore consists of two general topographic areas: the lowland area and the upland area. The lowland area is generally located in central Livermore, including the Downtown. The lowland area of Livermore is underlain by alluvium that is younger than two million years old, and consists mainly of unconsolidated gravel, sand, silt, and clay deposits subject to redistribution by fluvial (stream) processes. The upland areas include the hills to the northwest, northeast and the south of Livermore. The upland area consists primarily of tilted sedimentary rocks of Tertiary age, between 2 million and 65 million years old. The Green Valley and Tassajara formations and the nonmarine sedimentary rock form the prominent portions of the uplands. Recent alluvial deposits mantle the canyon bottoms and fringes of the uplands.

Seismic Activity and Faulting

As is the case for most of California, people and property in Livermore are subject to risks from seismic activity. The Planning Area is located in the San Andreas Fault Zone, one of the most seismically-active regions in the United States. The San Andreas Fault Zone has generated numerous moderate to strong historic earthquakes in northern California and in the San Francisco Bay Area. Earthquakes have the potential to threaten humans, wildlife and infrastructure. As a result, it is crucial to identify the risks associated with seismic activity and related phenomena.

Earthquakes can give rise to various seismic hazards including ground shaking, liquefaction, ground rupture and the generation of large waves in bodies of water. These seismic hazards can cause damage to structures and risk the health and safety of citizens, particularly in unreinforced masonry buildings. Seismic hazards vary widely from area to area, and the level of

hazard depends on both geologic conditions and the extent and type of land use. There are two common measurements of earthquakes:

- The strength of an earthquake is measured using the Richter Scale, a numerical scale for quantifying earthquake magnitude. The Richter Scale is a logarithmic scale that measures the amount of energy released during an earthquake based on the amplitude of the highest peak recorded on a seismogram.
- The force of an earthquake at a particular place is measured on the Modified Mercalli Scale, which is a subjective ranking of earthquakes' effects on persons and structures. Lower numbers on the scale indicate less severe shaking.

Table 10-1 summarizes the Modified Mercalli Scale in relation to the Richter Scale.

The Greenville Fault, an active fault that is the easternmost strand of the San Andreas fault system in the San Francisco Bay region, is located approximately four miles to the east of the Downtown, and crosses the eastern part of the Planning Area, as shown in Figure 10-1. Each of the three segments of the Greenville fault is considered capable of generating earthquakes in the range of Richter magnitude 6.6 to 6.9. If all segments were to rupture in a single seismic event, a 7.2 magnitude earthquake would be expected. The United States Geologic Survey (USGS) estimates a six percent probability of a 6.7 magnitude or greater earthquake on the Greenville fault during the period 2000 to 2030.

The Las Positas Fault, which is considered to be active, trends northeast to southwest approximately 2.5 miles to the southeast of the Downtown, and is located almost completely within the Planning Area. The Las Positas fault could potentially generate an earthquake of Richter magnitude 6.3. The probability of an earthquake on the fault has not been determined. In addition, several other major active faults are located in the vicinity of Livermore, including the Calaveras and Hayward faults. Because of the high level of seismic activity in and around Livermore, the area has been classified as seismic risk Zone 4 (the highest risk category) by the California Building Code.

In addition to these faults, the Livermore fault is also located within the urbanized Planning Area. The Livermore fault is considered to be potentially active. It is approximately five miles

in length and is considered capable of generating an earthquake with a moment magnitude of 6.2.

TABLE 10-1 **MODIFIED MERCALLI AND RICHTER SCALES**

Richter Magnitude	Modified Mercalli Category	Expected Modified Mercalli Maximum Intensity at Epicenter
2	I-II	Usually detected only by instruments
3	III	Felt indoors
4	IV-V	Felt by most people; slight damage
5	II	Felt by all; many frightened and run outdoors; Damage minor to moderate
6	VII-VIII	Everybody runs outdoors; Damage moderate to major
7	IX-X	Major damage
8+	X-XII	Total and major damages

Major earthquakes have occurred in the vicinity of Livermore in the past, and can be expected to occur again in the near future. The 1999 Working Group on California Earthquake Probabilities estimated that there is a 70 percent probability of at least one earthquake with a magnitude of 6.7 or greater to occur on one of the major faults within the San Francisco Bay region before 2030. Furthermore, they determined that there is a 30 percent chance of one or more earthquakes with a magnitude of 6.7 or greater occurring somewhere along the Calaveras, Concord-Green Valley, Mount Diablo Thrust, and Greenville faults before 2030.

In accordance with the Alquist-Priolo Geologic Hazard Zone Act of 1972, the State Geologist is required to delineate wide special study zones to encompass all active and potentially active traces of the San Andreas, Calaveras, Hayward and San Jacinto Faults, and such other faults

or segments of faults as he deems necessary. The hazard zones will be a minimum of one-quarter mile wide, but somewhat wider where multiple traces occur. The hazard zones for active faults in Livermore's vicinity are shown in Figure 10-1. The State Board of Mines and Geology is charged with establishing policies and criteria for future land use in those zones.

In addition to the known active faults in the Planning Area, recent research regarding the structural geology and tectonics of the Mount Diablo-Livermore region indicate that there is another potential source of large magnitude earthquakes in the region. A structural trend of folds and thrust faults has been mapped in the hills north of the Livermore Valley. The largest of these features is the Mount Diablo anticline. Recent research has interpreted this feature to be a large fold developed above a buried, or "blind," thrust fault. The accumulation of strain on the blind Mount Diablo Thrust presents the potential for an earthquake along this structure. The USGS considers the fault capable of generating a magnitude 6.7 earthquake with a 4 percent probability of occurring during the period 2000 to 2030. An earthquake on the fault would not be expected to cause fault rupture at the surface. However, strong ground-shaking would be expected within the Livermore area during such an earthquake. Recent earthquakes on similar faults have occurred in California at Coalinga in 1983 and Northridge in 1994.

Earthquakes can cause a series of specific hazards, each of which is described below:

Ground Rupture

Ground rupture due to earthquakes occurs along fault lines. Based on the location of the City and the proximity to nearby active faults, the only ground rupture in the Planning Area would be expected to occur in the northeast portion of the Planning Area during a major earthquake on the Greenville Fault.

Ground Shaking

Earthquake ground shaking is the source of the most widespread earthquake damage. The intensity of ground shaking can be several times greater on sites underlain by thick deposits

Shaded Zones Are Within 2 Kilometers (1.15 miles) Of Known Seismic Source

A Fault

B Fault

Contours of Closest Horizontal Distance To Known Seismic Sources

5 Kilometers (3.1 miles)

10 Kilometers (6.2 miles)

15 Kilometers (9.3 miles)

FIGURE 10 - 1

VICINITY ACTIVE FAULTS

Source: California Department of Conservation, Division of Mines and Geology, 1998.

of saturated sediments than on bedrock. The amount of ground shaking at a particular site depends on:

- Characteristics of the earthquake source (magnitude, location, and area of causative fault surface).
- Distance from the fault.
- Amplification effects of local geologic deposits.

As a rule, the greater the earthquake magnitude and the closer the fault rupture to the site, the greater the intensity of ground shaking. Based on the location of the City and the proximity to nearby active faults, the entire City could experience ground shaking during an earthquake on one of several faults. The USGS and the Association of Bay Area Governments project that a large earthquake on the Greenville fault would produce the maximum ground shaking intensities in Livermore, with Modified Mercalli (MM) intensity ranging from strong (MM VII) to very violent (MM X). MM IX is associated with damage to buried pipelines and partial collapse of poorly-built structures.

Ground shaking intensity is highly variable from one site to another. In addition, the effect of ground shaking on structures is related to their form, structural design, materials, construction quality, and location. Since the 1970s, the Uniform Building Code in California has incorporated data on the response of structures to earthquakes as a basis for structural design. The objective of the Uniform Building Code is to protect the life and safety of building occupants and the public.

Significant seismic design enhancements were incorporated into the California Building Code in the mid-1970's. Additional moderate enhancements were incorporated in 1998. Buildings constructed prior to these dates, particularly those constructed prior to the mid-1970's, generally would not meet current design provisions for earthquake forces identified in the California Building Code. Of these older buildings, unreinforced masonry buildings constructed of brick or concrete block would experience the most extensive damage in the event of a seismic event. Light wood frame structures (i.e., most residential structures) would experience moderate damage, while steel-frame structures designed to resist earthquake vibrations would generally withstand most earthquakes.

Liquefaction

Liquefaction is the rapid transformation of saturated, loose, fine-grained sediment to a fluid-like state because of earthquake ground shaking. Liquefaction can result in substantial loss of life, injury, and damage to property. In addition, liquefaction increases the hazard of fires because of explosions induced when underground gas lines break, and because the breakage of water mains substantially reduces fire suppression capability.

As shown on Figure 10-2, most of the planning area is underlain by materials that have very low to moderate liquefaction potential. Upland areas have a very low potential for liquefaction. Liquefaction potential increases in the vicinity of major drainage channels where loose granular sediments have accumulated as a result of stream processes. Specifically, the liquefaction potential for sediments in the vicinity of Arroyo las Positas, Arroyo Mocho, and Arroyo del Valle increases from high to very high. The potential for liquefaction also depends on soil conditions and groundwater levels, which may fluctuate.

Building Collapse

Ground shaking presents the most widespread hazard to structures and infrastructure within the Planning Area. The effect of ground shaking on structures is related to the form, structural design, materials, construction quality, and location. Since the 1970s, the Uniform Building Code in California has incorporated minimum standards to protect the life and safety of building occupants and the public. However, buildings constructed prior to code revisions in the 1970s generally would not meet current design provisions for earthquake forces identified in the Uniform Building Code.

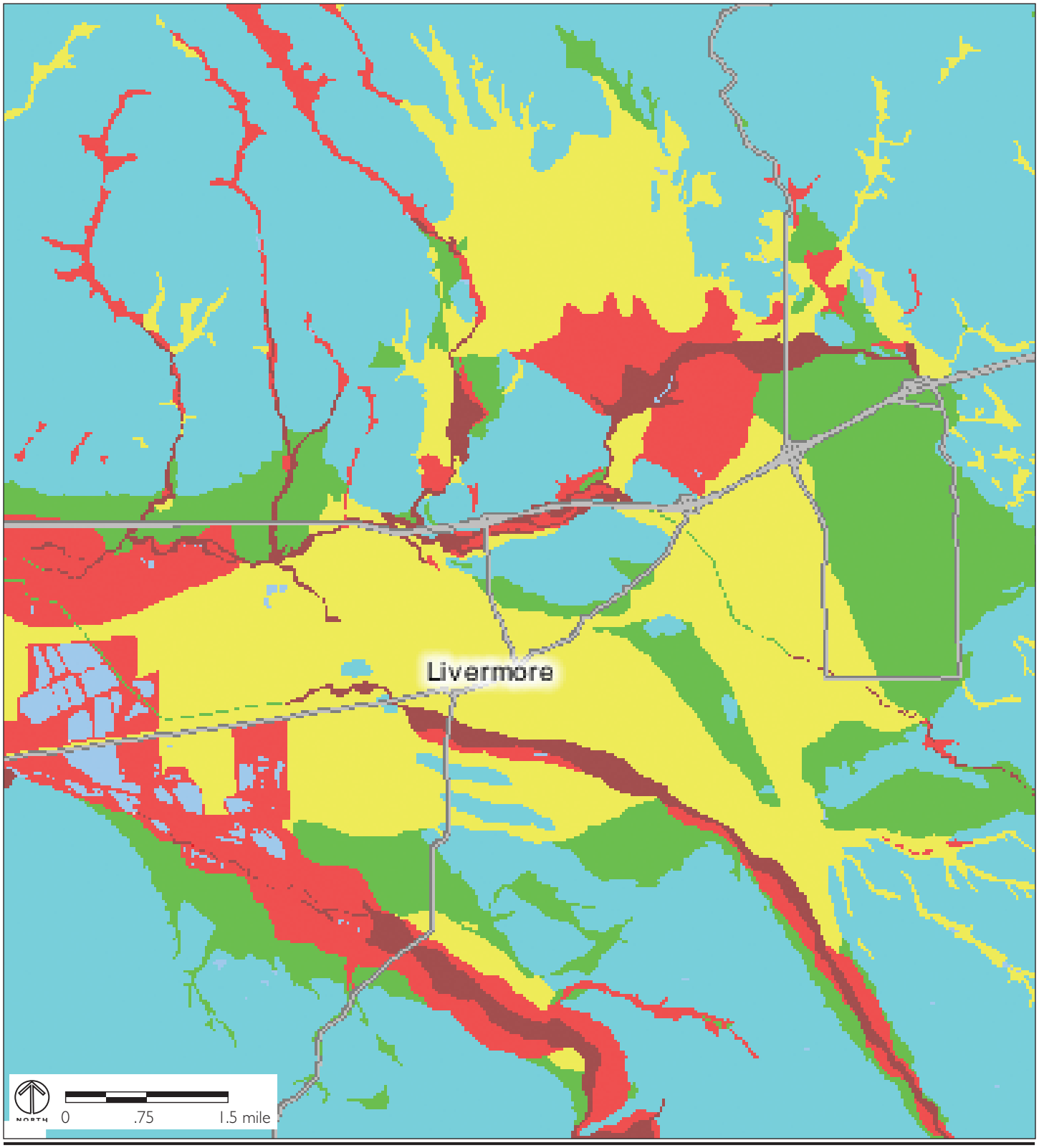


FIGURE 10 - 2

LIQUEFACTION SUSCEPTIBILITY MAP

Source: ABAG (2002), LSA Associates, Inc.

Expected damage to different types of buildings is described below:

- The most severe hazards are presented by unreinforced masonry (URM) buildings constructed of brick or concrete block. Under strong intensity ground shaking, many of these structures may be expected to collapse or require demolition.
- Other types of buildings that may also be severely damaged are older buildings of steel and concrete framing that were not designed to resist earthquake vibrations and older reinforced brick and masonry structures.
- Light wood-frame, such as most residential structures, and sheet metal buildings would be expected to have moderate damage in most conditions.
- Steel-frame structures designed to resist earthquake vibrations have an excellent record in earthquakes.

New construction in Livermore is required to meet the requirements of the California Building Code. Special occupancy buildings, including hospitals, schools, and other structures important to protecting health and safety in the community, are required by the State to meet more stringent design requirements contained in the Code.

Landslides

Landsliding is a natural process of relatively rapid downslope movement of soil, rock and rock debris as a mass. The rate of landsliding is affected by the type and extent of vegetation, the slope angle, the degree of water saturation, the strength of the rocks, and the mass and thickness of the deposit. Some of the natural causes of this instability are earthquakes, weak materials, stream and coastal erosion, and heavy rainfall. In addition, certain human activities tend to make the earth materials less stable and increase the chance of ground failure. Activities contributing to instability include extensive irrigation, poor drainage or ground-water withdrawal, removal of stabilizing vegetation and over-steepening of slopes by undercutting them or overloading them with artificial fill. These causes of failure, which normally produce landslides and differential settlement, are augmented during earthquakes by strong ground motion.

The California Geological Survey prepared a landslide hazard identification map for the Livermore Valley to be used, at least in part, as a planning tool for new development. As shown

on Figure 10-3, the mapping indicates those areas that are considered "least susceptible," "marginally susceptible," "generally susceptible," and "most susceptible" to slope failure. The criteria used to delineate the relative hazard areas included the nature of the geologic materials underlying the surface, the steepness of slopes, the presence or absence of visible slope failures, and the presence or absence of active forces that could cause failures, such as stream processes or shrink-swell potential soils.

Most of the northwest corner of the Planning Area is susceptible to landslides, with the majority of slopes considered "marginally susceptible" to "most susceptible" to slope failure. In addition, isolated upland areas in the northeast, central, and southeast portions of the Planning Area are considered prone to slope failure.

Most of the lowland area, with its relatively gentle slopes, is not prone to landslides. This general overview of slope stability and landslide potential in the City of Livermore is not intended as a substitute for detailed site investigations, which should precede any final planning decisions and/or specific development proposals.

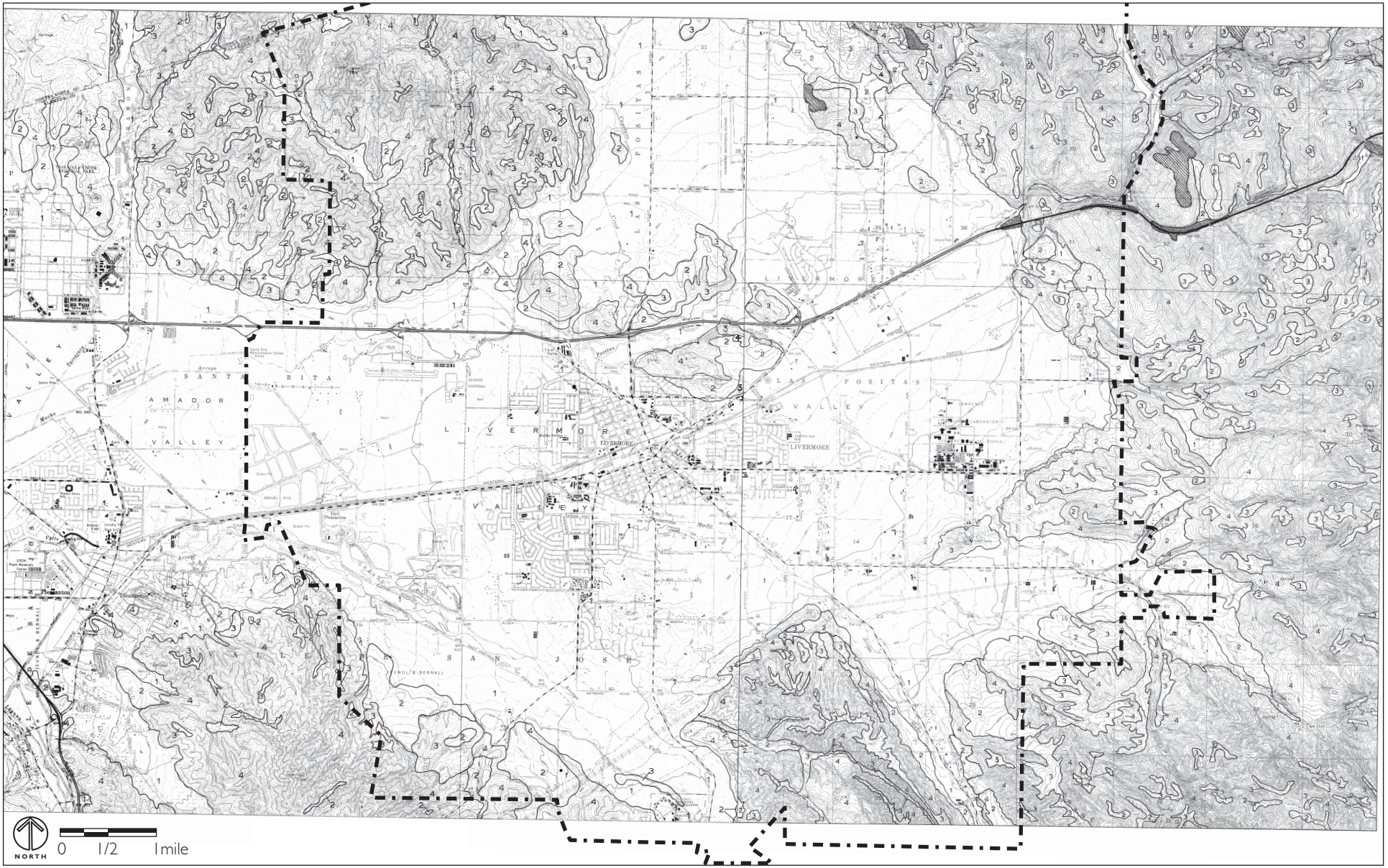
B. Goals, Objectives, Policies, and Actions

Goal PS-1 Reduce risk to the community from earthquakes and other geologic hazards.

Objective PS-1.1 Regulate new land development to prevent the creation of new geologic hazards.

Policies

P1. Urban development within earthquake fault zones and areas of high landslide susceptibility, shown in Figure 10-3, shall be conditioned upon the preparation of site-specific geotechnical investigations.



Planning Area Boundary

Unmapped Area

Relative Landslide Susceptibility Areas

1 Least	2 Marginally	3 Generally	

Increasing Landslide Susceptibility

FIGURE 10 - 3

LANDSLIDE HAZARD SUSCEPTIBILITY MAP OF THE PLANNING AREA

Source: California Department of Conservation, Division of Mines and Geology, 1991.

P2. The City shall rely on the most current and comprehensive geologic hazard mapping available to assist in the evaluation of potential seismic hazards associated with proposed new development. Projects proposed in areas identified as being subject to moderate or high geologic hazard shall be required to conduct site-specific geotechnical investigation.

P3. No structure proposed for human occupancy shall be placed across the trace of any active or potentially active fault within the Planning Area. The Greenville fault and Las Positas fault shall be assumed active, and the Livermore fault shall be assumed potentially active, unless and until proven otherwise.

P4. Geologic and engineering studies shall be required for all proposed building projects, per State law, and all critical facilities (schools, hospitals, fire and police stations) within the City so that these facilities can be constructed in a manner that mitigates site-specific geotechnical challenges and will minimize the risk to the public from seismic hazards.

P5. Construction shall be prohibited in areas with severe erosion (slopes over 10 percent), as mapped by the USDA's Natural Resources Conservation Service, unless it can be clearly demonstrated through geotechnical engineering analysis that the project will not contribute to increased erosion, sedimentation or runoff.

P6. Development shall be prohibited in areas susceptible to slope failure (defined as landslide susceptibility areas 3 and 4 on Figure 10-3 or current hazard mapping), per State law, unless site-specific geotechnical investigation indicates that landslide hazards can be effectively mitigated.

P7. Prohibit development on expansive soils which are subject to a high probability of sliding; developments proposed below areas of expansive soils in foothill areas shall be conditioned to avoid damage from potential slide areas.

P8. *No building site or greenhouse, in whole or in part, may be located on a pre-development slope of more than 20 percent. No building may be located on a site that requires an access road over a natural slope of more than 25 percent. Cultivated agriculture may not be conducted on a slope, prior to topographical alteration, of more than 20 percent. (NLUGBI)*

Actions

A1. Retain a geologist registered in the State of California to evaluate the geologic reports required under Policies P2 and P3 (above) and advise the City regarding them.

A2. Adopt appropriate setbacks for development or perform detailed fault shear zone studies to define building setback requirements within earthquake fault zones. The ultimate setback required will be determined as geologic studies are made as a condition of processing development proposals.

Objective PS-1.2 Enforce measures related to site preparation and building construction that protect life and property from seismic hazards.

Policies

P1. Major utility lines shall be carefully planned where they cross a fault. They shall cross at right angles, or nearly so, be accessible for rapid repair, and be provided with safety features such as automatic shutoff valves, switches and expansion joints. Other equipment shall be provided to ensure minimal adverse impact on adjacent and surrounding areas and to facilitate restoration of service in the event of fault displacement.

P2. Areas of high shrink-swell potential soils shall incorporate suitable mitigation measures. If development is allowed in areas of high shrink-swell potential, special measures must be undertaken in site grading, foundation design and construction to alleviate potential movements.

P3. The City shall control site preparation procedures and construction phasing to reduce erosion and exposure of soils to the maximum extent possible.

Actions

A1. Promote programs that identify unreinforced masonry buildings and other buildings that would be at risk during seismic events and continue to promote strengthening of these buildings.

A2. Promote programs that encourage residents to make their homes more seismically resistant and resilient.

II. FLOODING AND INUNDATION

A. Background Information

Most flooding within the City of Livermore is caused by heavy rainfall and subsequent runoff volumes that cannot be adequately conveyed by the existing storm drainage system combined with surface water bodies. Flooding could also result from the catastrophic failure of nearby Del Valle Dam which would result in the release of a large volume of water in a relatively short period of time. The Planning Area is not susceptible to inundation by coastal hazards, such as tsunamis, extreme high tides, or sea level rise, due to the elevation of the area and the distance from the margin of the San Francisco Bay and Pacific Ocean.

Climate

Although Livermore generally experiences a Mediterranean climate with moderate rainfall (an average of 14.5 inches of rain per year), analysis of long-term precipitation records indicates that wetter and drier cycles lasting several years are common in the region. Potentially damaging rainfalls occur at a frequency of about once every 3 years. Hazards often result when the City experiences above-normal rainfalls over a short duration, resulting in increased runoff and flooding along area creeks, such as the Arroyo Las Positas, Arroyo Mocho, and Altamont Creek, and in areas with poor drainage.

Flood Hazard Zones

The Federal Emergency Management Agency (FEMA) maps flood hazards throughout the country, including Livermore. These flood hazard maps, known as Flood Insurance Rate Maps, or FIRMS, are used to identify flood-prone areas, with the most susceptible areas designated as special flood hazard zones.

A number of specialized terms are used to describe flood hazards. The "base flood elevation" is the water surface level of a water course or waterbody that corresponds to a flood event that has a 1.0 percent chance of being equaled or exceeded in any given year (i.e., the 100-year flood). The "floodway" is the channel of a river or other watercourse that must be reserved in order to discharge the base flood without increasing the water surface elevation more than one foot. The "flood zone" is the designated area where flooding could occur during the "base flood" or 100-year flood. "Floodproofing" means any combination of structural and nonstructural additions, changes, or adjustments to structures which reduce or eliminate flood damage.

According to the FIRMs, the majority of Livermore is designated as subject to minimal flooding, as shown in Figure 10-4. However, 100-year flood zones are located along Arroyo Del Valle in the extreme southwestern portion of Livermore, along Altamont Creek between Broadmoor to Springtown Road, along Las Positas Creek from I-580 to El Charro Road, along Arroyo Mocho from Wente Street to Stanly Boulevard, and from 0.5 miles west of Isabel Parkway to El Charro Road. Areas of minimum flooding also occur along Arroyo Seco and within a triangular area that is generally bounded by Arroyo Seco to the east, Highway 84 to the north, and a line extending approximately 0.5 mile to the north of East Avenue on the south.

100 Year Flood
500 Year Flood
Water Bodies

FIGURE 10 - 4

FLOODING HAZARDS

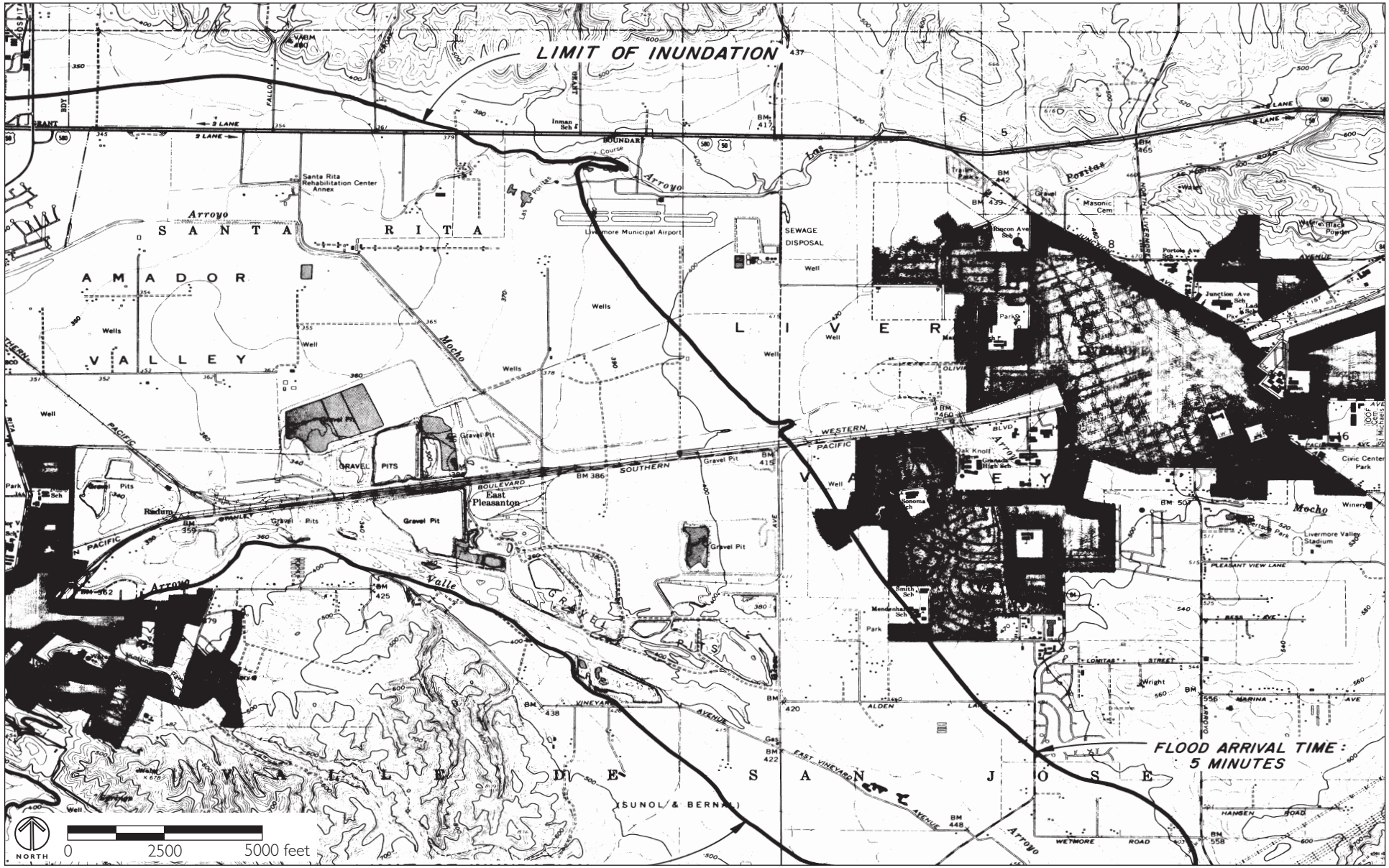
Source: ESRI/FEMA (www.esri.com/hazards/makemap.html), 2003.

Flood Control Efforts

In 2002, the Alameda County Flood Control and Water Conservation District, Zone 7 embarked on a watershed-wide Stream Management Master Plan. Zone 7 owns and maintains approximately 40 miles of flood control channels, including creeks and concrete-lined channels, in the watershed area. Most of these channels are in the Pleasanton area. However, Zone 7 owns portions of Arroyo Las Positas, Arroyo Seco, and Altamont Creek in the Livermore Planning Area. Zone 7 maintains an ongoing program of channel acquisition funded by developer fees. Under this program, the agency enters into an agreement with a developer or another agency to take ownership, including maintenance responsibilities, of facilities that are constructed to Zone 7 standards. The developer or agency is reimbursed a predetermined amount for channel improvements and right-of-way. When the flood control system is completed, Zone 7 will own and maintain approximately 120 miles of creeks and channels, including the primary drainage features, in the City of Livermore.

Dam Failure Inundation

As shown in Figures 10-5 and 10-6, portions of the City are located within the dam failure inundation hazard areas for Lake Del Valle and Patterson Reservoir. Patterson Dam is located east of Greenville Road and north of Patterson Pass Road, and impounds the 100-acre foot Patterson Reservoir. The Del Valle Dam is located at the northern end of Lake Del Valle, and impounds an average of 44,000 acre-feet in the reservoir. The depth of inundation would vary from near zero at topographic highs or uplands to many feet in low-lying areas and in creek channels. Both of these dams are under the jurisdiction of the California Department of Water Resources (DWR), Division of Safety of Dams. Existing dams under DWR jurisdiction are periodically inspected to ensure adequate maintenance and to direct the owner to correct any deficiencies found. Regular inspections and required maintenance of the dams substantially reduce the potential for catastrophic failure.



Note: Map does not imply that failure of the dam or resulting flooding is a probable occurrence. The inundation limits shown are approximate. They are based on the face topography and a severe, hypothetical dam failure mode. The limits include all potential flooded areas.

FIGURE 10 - 5

DAM FAILURE INUNDATION AREAS
DEL VALLE DAM

Source: California Department of Conservation, Division of Mines and Geology, 1996.

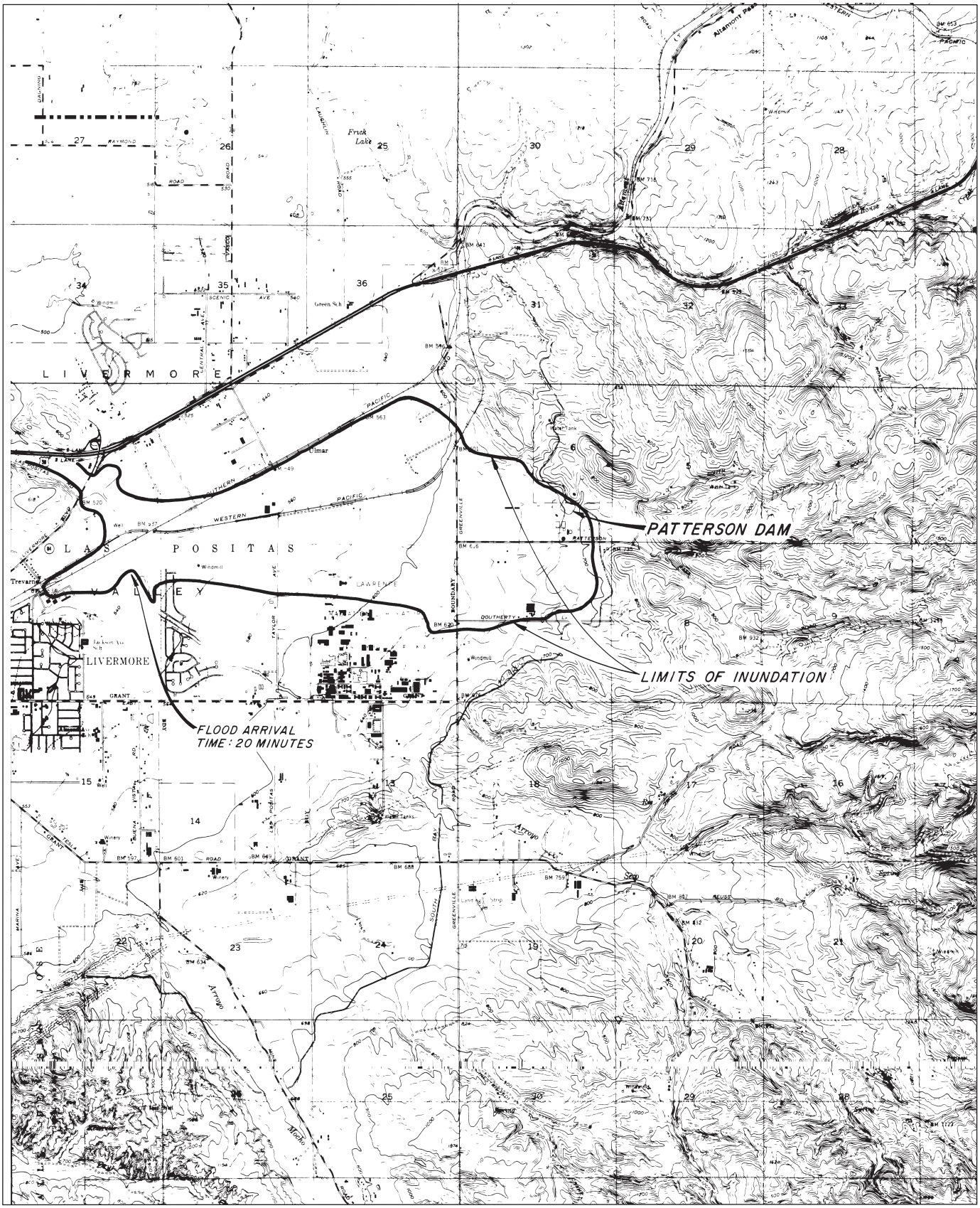


FIGURE 10 - 6

Note:
Map does not imply that failure of the dam or resulting flooding is a probable occurrence. The inundation limits shown are approximate. They are based on the face topography and a severe, hypothetical dam failure mode. The limits include all potential flooded areas.

DAM FAILURE INUNDATION AREA PATTERSON DAM

Source: California Department of Conservation, Division of Mines and Geology, 1996.

There are no State or local restrictions for development within dam failure inundation areas. The Emergency Services Act requires that cities and counties prepare emergency evacuation plans for areas that could be inundated in the event of a dam failure. In 2002, the City adopted an evacuation plan for the Del Valle and Patterson dam failure inundation areas as an annex to the Comprehensive Emergency Management Plan.

B. Goals, Objectives, Policies, and Actions

Goal PS-2 Reduce hazards related to flooding or inundation.

Objective PS-2.1 Minimize flood risks to development.

Policies

P1. Modification to the floodway will not be permitted in order to accommodate new adjacent development but will be permitted to restore creek capacity, stabilize creek banks, and restore habitat or water quality. However, modification of the land within the 100-year flood zone, but located outside of the floodway, will be permitted to protect the health and safety of existing development.

P2. When feasible, arroyos and creeks shall be preserved in their natural state, and shall not be channelized or otherwise altered. Floodways should remain undeveloped and be allowed to function as natural flood protection features where flood waters are temporarily stored and conveyed during intense storms.

P3. The City shall require new development and significant redevelopment projects to prepare drainage studies to assess storm runoff impacts on the local and regional storm drain and flood control system, and to develop recommended detention and drainage facilities to ensure that increased risks of flooding do not result from development. The drainage study shall include an analysis and recommended mitigations for projects that would increase peak runoff flows and increase runoff volume and for all projects where such increased flow and/or volume is likely to cause

increased erosion of creek beds and banks, silt pollutant generation, or other impacts to beneficial uses.

P4. Only uses which have low flood damage potential and do not threaten other lands during times of flooding shall be permitted in the 100-year flood zone.

P5. *Subject to the North Livermore Urban Growth Boundary Initiative, the City shall permit development in a flood-prone area when it is demonstrated that such development will not (NLUGBI):*

(a) Interfere with the existing waterflow capacity of the floodway or substantially increase the erosion, siltation or chemical nutrients.

(b) Contribute to the deterioration of any watercourse or the quality of water in any body of water.

(c) Require storage of material, construction of any substantial grading or placement of fill.

P6. Development shall only be allowed on lands within the 100-year flood zone, if it will not:

(a) Create danger to life and property due to increased flood heights or velocities caused by excavation, fill, roads and intended use.

(b) Create difficult emergency vehicle access in times of flood.

(c) Create a safety hazard due to the expected heights, velocity, duration, rate of rise and sediment transport of the flood waters expected at the site.

(d) Create excessive costs in providing governmental services during and after flood conditions, including maintenance and repair of public utilities and facilities.

(e) Interfere with the existing waterflow capacity of the floodway.

(f) Substantially increase erosion and/or sedimentation.

(g) Contribute to the deterioration of any watercourse or the quality of water in any body of water.

(h) Require storage of material, or any substantial grading or placement of fill.

P7. Both public and private service facilities and utilities in existing 100-year flood zones shall be floodproofed to a point at or above the base flood elevation.

P8. The City shall prevent the construction of flood barriers within the 100-year flood zone which will divert flood water or increase flooding in other areas.

P9. Coordinate with Zone 7 and other appropriate agencies to construct creek improvements to protect public health and safety and to de-silt existing creeks while maintaining creeks in their natural state, whenever possible.

Objective PS-2.2 Minimize risks associated with potential failure of Del Valle and Patterson Dams.

Policies

P1. The City shall, in cooperation with the County of Alameda, prepare and maintain a disaster relief plan that addresses potential flood inundation in the areas below the Del Valle Reservoir and the Patterson Dam, as a result of dam failure (shown on Figure 10-6 and 10-7).

Actions

A1. Review the evacuation plan in the City's emergency management plan, as periodically amended, for the inundation areas regularly to ensure it is accurate and up-to-date.

A2. Work with the California Department of Water Resources to ensure that adequate funding is being allocated for inspections of Del Valle and Patterson Dams, and that inspections and required maintenance are being carried out.

III. WILDLAND FIRES

A. Background Information

Livermore and its Planning Area experience long, dry summers with high wildland fire hazards. The risk of wildfire hazard is related to a combination of factors including winds, temperatures, humidity levels, and fuel moisture content. Of these four factors, wind is the most critical. Steep slopes also contribute to fire hazard by intensifying the effects of wind, and making fire suppression difficult. Features in some parts of the Planning Area, including highly flammable vegetation, warm and dry summers, rugged topography and occasional human presence create a situation that results in potential wildland fires.

To quantify this potential risk, the California Department of Forestry (CDF) has developed a Fire Hazard Severity Scale which utilizes three criteria in order to evaluate and designate potential fire hazards in wildland areas. The criteria are fuel loading (vegetation), fire weather (winds, temperatures, humidity levels and fuel moisture contents) and topography (degree of slope). According to CDF maps, wildland fire hazard is moderate throughout the Planning Area.

B. Goals, Objectives, Policies, and Actions

Goal PS-3 Protect lives and property from wildland fire hazard.

Objective PS-3.1 Plan new development with wildland fire hazards in mind.

Policies

P1. Areas in which the elimination of fire hazard would require the following measures shall not be developed:

(a) major modification of existing land forms.

(b) significant removal of, or potential damage to, established trees and other vegetation.

(c) exposure of slopes which cannot be suitably re-vegetated.

P2. In order to ensure fire safety, development shall be restricted in areas with steep terrain.

Action

A1. Review all proposed development in wildland-urban interface areas for conformity with the Wildland-Urban Interface Code (WUIC), as periodically amended, utilizing specialists in WUIC review and implementation. All development in wildland-urban interface areas shall utilize the best development and site design practices identified by the Fire Department, as required in the WIUC, as periodically amended.

IV. HAZARDOUS WASTE MANAGEMENT

A. Background Information

Products as diverse as gasoline, paint, solvents, film processing chemicals, household cleaning products, refrigerants and radioactive substances are categorized as hazardous materials. What remains of a hazardous material after use, or processing, is considered to be a hazardous waste. The handling, transportation, and disposal of such wastes is of concern to all communities. Improper handling of hazardous materials or wastes may result in significant effects to human health and the environment.

Nearly all businesses and residences in Livermore generate some amount of hazardous wastes. The most common industrial hazardous wastes in Livermore are generated from gasoline service stations, dry cleaners, automotive mechanics, auto body repair shops, machine shops, printers and photo processors. Most of these wastes are petroleum based or hydrocarbon hazardous waste and include cleaning and paint solvents, lubricants, and oils. However,

medical wastes, defined as potentially infectious waste from sources such as laboratories, clinics and hospitals, are also included among the hazardous wastes found in Livermore.

Regulatory Agencies

Hazardous materials in Livermore are heavily regulated by a range of federal, State, and local agencies. One of the primary hazardous materials regulatory agencies is the California Environmental Protection Agency, Department of Toxic Substances Control (DTSC). DTSC is authorized by the U.S. Environmental Protection Agency (EPA) to enforce and implement Federal hazardous materials laws and regulations, which are equally stringent or less stringent then State hazardous materials laws and regulations. DTSC has responsibility for oversight of Annual Work Plan sites (commonly known as State Superfund sites), sites designated as having the greatest potential to affect human health and the environment. Six sites in Livermore have been evaluated by DTSC. However, only one site, the Lawrence National Laboratory, is listed on the Annual Work Plan database.

The Hazardous Materials Division of the Livermore-Pleasanton Fire Department (LPFD) has primary responsibility for enforcing most regulations pertaining to hazardous materials in the City of Livermore. The LPFD also acts as first responder to hazardous materials incidents within the City.

Alameda County Hazardous Waste Management Plan

Hazardous waste programs in Livermore are also governed by the Alameda County Hazardous Waste Management Plan. The purpose of the Alameda County Hazardous Waste Management Plan is to forecast the potential future waste generation in the County, to encourage an aggressive waste reduction strategy, and to establish acceptable siting criteria.

B. Goals, Objectives, Policies, and Actions

Goal PS-4 Protect the community from the harmful effects of hazardous materials.

Objective PS-4.1 Minimize Livermore residents' exposure to the harmful effects of hazardous materials and waste.

Policies

P1. Residual repositories shall be prohibited within the City limits.

P2. Areas with a land use designation of High Intensity Industrial are appropriate for hazardous waste management facilities if other siting criteria can be met and potential environmental impacts are mitigated as part of conditional approval.

P3. The City shall promote the safe transport of hazardous materials through Livermore through implementation of the following measures:

(a) Maintain formally-designated hazardous material carrier routes to direct hazardous materials away from populated and other sensitive areas;

(b) Prohibit the parking of vehicles transporting hazardous materials on City streets;

(c) Require that new pipelines and other channels carrying hazardous materials avoid residential areas and other immobile populations to the greatest extent possible.

P4. Require emergency response plans for all large generators of hazardous waste to be submitted as part of use applications.

P5. When reviewing applications for new development in areas historically used for commercial or industrial uses, the City shall require environmental investigation as necessary to ensure that soils, groundwater, and buildings affected by hazardous material releases from prior land uses, and lead and asbestos potentially present in building materials, would not have the potential to affect the environment or the health and safety of future property owners or users.

P6. Continue to encourage the reduction of solid and hazardous wastes generated within the City, in accordance with Countywide plans.

P7. The City shall ensure that new development and redevelopment shall protect the public health and safety through environmental investigations, as required by State

and Alameda County regulations, relating to potential hazardous material releases from prior uses and lead and asbestos present in building materials.

P8. The City shall encourage the reuse and/or recycling of debris following a disaster, in accordance with all applicable regulations.

Actions

A1. Continue to implement processing procedures and local siting criteria in order to implement relevant and applicable provisions consistent with the hazardous materials and waste management plans for Alameda County.

A2. Ensure convenient access for Livermore citizens for the disposal of household hazardous wastes.

V. AIRPORT SAFETY

A. Background Information

Airport operators recognize that uses that encroach upon and conflict with airports can reduce the ability of an airport to serve its function and can, over time, reduce the safety of aircraft operations, as well as the airport's viability to the region's economy. Land use safety compatibility in the vicinity of the airport is regulated by the City of Livermore, Alameda County, and the State of California. These regulations protect the public health, safety , and welfare by promoting the orderly expansion of airports and adoption of land use measures by local public agencies to minimize exposure to excessive noise and safety hazards near airports.

The Federal Aviation Administration (FAA) regulates uses at the airport, via an approved Airport Layout Plan (ALP), and airspace protection via guidelines that are implemented by the State and County. FAA guidelines establish ground clearances for take-off and landing safety based on the type of aircraft that use airports. The California Department of Transportation (Caltrans), Division of Aeronautics, implements the federal airspace protection regulations and

establishes land use compatibility guidelines through the *California Airport Land Use Planning Handbook*.

The Alameda County Airport Land Use Commission (ALUC) implements the Federal regulations and State guidelines, contained in the *California Airport Land Use Planning Handbook*, through an Airport Land Use Compatibility Plan (ALUCP). The ALUC is an appointed body that operates pursuant to the State ALUC law (Public Utilities Code Article 3.5, State of Aeronautics Act, Section 21661.5, Section 21670 et seq., and Government Code Section 65302.3 et seq.). The ALUC has the authority to coordinate planning at the state, regional, and local levels to provide for the orderly development of air transportation, while at the same time protecting the public health, safety, and welfare. In July 2012, the ALUC adopted a comprehensive update to its ALUCP, replacing the *Alameda County Airport Land Use Policy Plan*, which the ALUC adopted in 1986.

The ALUCP incorporates the land use planning guidelines set forth in the 2002 Division of Aeronautics *Airport Land Use Planning Handbook*. The ALUCP is the primary document used by the Alameda County ALUC to help promote compatibility between the Livermore Municipal Airport and its environs. The ALUCP is to be used when reviewing land use plans and development proposals within the Airport Influence Area (AIA). The AIA is a geographic area in which current or future airport-related noise, overflight, safety, and/or airspace protection factors may significantly affect land uses or necessitate restrictions on those uses. Figure 3-5.1 (Chapter 3, Land Use Element) illustrates the boundaries of the AIA.

The ALUCP establishes basic land use compatibility criteria (see ALUCP Table 2-3) that the City shall use in assessing whether a land use plan, ordinance, or development proposal is compatible with airport operations. The ALUCP also establishes seven geographic safety zones (see Figure 3-2, Chapter 3, Land Use Element) that assess the compatibility of a variety of land uses based their proximity to the airport and typical flight patterns. In 1991, the City of Livermore established an Airport Protection Area (APA) as an additional protection area beyond the minimum required by the FAA and Caltrans.

The APA, shown in Figure 3-5 (Chapter 3, Land Use Element), extends 5,000-feet beyond the runways to the north, south, and east, and 7,100-feet to the west (the typical take-off direction).

The APA prohibits the construction of new, or expansion of existing, residential areas within its boundaries. (Reso. 2013-113), except residential is permitted within the Isabel Neighborhood overlay (see Figure 3-5.2) and with implementation of airport-awareness measures set forth in the Isabel Neighborhood Specific Plan, its 2018 Environmental Impact Report, and its 2020 Supplemental Environmental Impact Report.

B. Goals, Objectives, Policies, and Actions

Goal PS-5	**Minimize risks associated with aircraft operations at the Livermore Municipal Airport.**

Objective PS-5.1 Regulate land use within the vicinity of the Livermore Municipal Airport.

Policy

P1. All construction in Livermore shall be consistent with the required setbacks and height restrictions for the Airport Protection Area, General Plan Policy LU-4.4, the ALUCP, and the requirements of an Airport zoning district adopted to plan for future Airport operations. (Reso. 2013-113)

VI. EMERGENCY AND DISASTER PREPAREDNESS

A. Background Information

As required by State law, Livermore has established emergency preparedness procedures to respond to a variety of natural and man-made disasters that could confront the community.

These procedures are outlined in the Comprehensive Emergency Management Plan adopted in 2002. The Emergency Plan establishes the Standardized Emergency Management System (SEMS) required by State law, and includes information on mutual aid agreements, hierarchies of command, and different levels of response in emergency situation. The Emergency Plan also explains the function of the Emergency Operations Center (EOC), which is a designated location for centralized management of coordinated emergency response.

B. Goals, Objectives, Policies, and Actions

Goal PS-6 Prepare Livermore for emergencies.

Objective PS-6.1 Prepare and keep current City emergency procedures in the event of potential natural or man-made disaster.

Policy

P1. The City shall complete regularly-scheduled reviews and updates of its emergency management plans.

Action

A1. Conduct periodic mock exercises using emergency response systems to test the effectiveness of City procedures included in the emergency management plans.

Objective PS-6.2 Promote public safety through public education programs.

Action

A1. Support earthquake preparedness activities such as strapping water heaters, promoting seismic retrofit, organizing periodic Citywide earthquake drills, providing first aid training and disaster preparedness classes to neighborhood groups, encouraging residents and businesses to stockpile emergency food, water and medical supplies.

Goal PS-7	**Through community partnerships, adopt and periodically update a local hazard mitigation plan consistent with the federal Disaster Management Act of 2000 to reduce the vulnerability to hazards in order to protect the health, safety, welfare, environment, and economy of Livermore and the Tri-Valley area.**

Objective PS-7.1 Ensure that hazards are identified and considered in land use decisions.

Policies

P1. Develop and provide information to improve the understanding of the locations, potential impacts, and linkages among threats, hazards, vulnerability, and measures needed to protect life, safety, health, property, and the environment.

P2. Use general plan policies, zoning and subdivision requirements to help establish resilient and sustainable neighborhoods.

P3. Reduce repetitive property losses due to all hazards by updating land use, design, and construction policies.

Objective PS-7.2 Improve local emergency management capability.

Policy

P1. Improve systems that provide warning and emergency communications.

Objective PS-7.3 Promote community awareness, understanding and interest in hazard mitigation policies and programs.

Policies

P1. Continually build linkages and promote dialog about emergency management within the public and private sectors.

P2. Inform the public, including underrepresented community groups, on the risk exposure to natural hazards and ways to increase the public's capability to prepare, recover, and mitigate the impacts of natural hazards.

Objective PS-7.4 Incorporate hazard mitigation as an integrated public policy and standard practice.

Policies

P1. Consider programs that incentivize risk reduction.

P2. Identify and prioritize projects that simultaneously reduce risk while increasing community resilience and sustainability.

Objective PS-7.5 Reduce community exposure and vulnerability to hazards where the greatest risk exists.

Policy

P1. Identify and prioritize the retrofit of vulnerable structures and infrastructure (e.g., flood control facilities) in the community.

Objective PS-7.6 Increase resilience of infrastructure and critical facilities.

Policy

P1. Incorporate risk reduction considerations in new and updated infrastructure and development plans to reduce the impacts of natural hazards.

Objective PS-7.7 Promote an adaptive and resilient community that responds proactively to future conditions.

Policy

P1. Encourage hazard mitigation measures that promote and enhance natural processes and minimize adverse impacts on the ecosystem and promote social equity.

Objective PS-7.8 Develop and implement mitigation strategies that identify the best alternative to protect natural resources, promote equity and use public funds in an efficient and cost effective manner.

Policy

P1. Where feasible and cost-effective, research, develop, and promote adoption of building and development laws, regulations, and ordinances exceeding the minimum levels needed for life safety.