

3.7 GEOLOGY AND SOILS

This section evaluates the potential geology and soils impacts associated with the adoption and implementation of the proposed Project. This section describes the regulatory framework and existing conditions; identifies criteria used to determine impact significance; provides an analysis of the potential geology and soil impacts; and identifies proposed General Plan 2045 goals and policies that would minimize potentially significant impacts.

This section is based in part on the Livermore General Plan Update Existing Conditions Report prepared in March 2022 (City of Livermore 2022). Where more recent data is available at the time of preparation of this Draft EIR, the analysis provided herein reflects such updated information.

As summarized in Chapter 3, *Environmental Analysis*, concerns related to the potential of fault rupture, ground shaking, liquefaction, and landslides to cause harm to the residents of Livermore were provided during the EIR scoping period.

3.7.1 Regulatory Framework

FEDERAL

Paleontological Resources Preservation Act

The federal Paleontological Resources Preservation Act of 2002 limits the collection of vertebrate fossils and other rare and scientifically significant fossils to qualified researchers who have obtained a permit from the appropriate state or federal agency. Additionally, it specifies these researchers must agree to donate any materials recovered to recognized public institutions, where they will remain accessible to the public and to other researchers. This act incorporates key findings of a report, *Fossils on Federal Land and Indian Lands*, issued by the United States Department of the Interior (USDOI) in 2000, that establishes that most vertebrate fossils and some invertebrate and plant fossils are considered rare resources (USDOI 2000).

STATE

Public Resources Code Section 5097.5 and Section 30244

State requirements for management of paleontological resources are included in by Public Resources Code (PRC) Section 5097.5 and Section 30244. These statutes prohibit the removal of any paleontological site or feature from public lands without permission of the jurisdictional agency, define the removal of paleontological sites or features as a misdemeanor, and require reasonable mitigation of adverse impacts on paleontological resources from developments on public (e.g., State, county, city, or district) lands.

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Paleontological Assessment Standards

CEQA also directs agencies to assess whether a project would have an adverse effect on unique paleontological resources. The Society of Vertebrate Paleontology (SVP) has established guidelines for the identification, assessment, and mitigation of adverse impacts on nonrenewable paleontological resources (SVP 2010). Most practicing paleontologists in the United States adhere closely to the SVP's assessment, mitigation, and monitoring requirements as outlined in these guidelines, which were approved through a consensus of professional paleontologists. The SVP has helped define the value of paleontological resources and, in particular, indicates that geologic units of high paleontological potential are those from which vertebrate or significant invertebrate or plant fossils have been recovered in the past (i.e., are represented in institutional collections). Only invertebrate fossils that provide new information on existing flora or fauna or on the age of a rock unit would be considered significant. Geologic units of low paleontological potential are those that are not known to have produced a substantial body of significant paleontological material. As such, the sensitivity of an area with respect to paleontological resources hinges on its geologic setting and whether significant fossils have been discovered in the area or in similar geologic units.

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act was passed in 1972 to mitigate the hazard of surface fault rupture to structures used for human occupancy. The main purpose of the act is to prevent the construction of buildings used for human occupancy on top of active faults. This act only addresses the hazard of surface fault rupture—not other earthquake hazards such as earthquake-induced liquefaction or landslides. The act requires the State Geologist to establish regulatory zones (known as Earthquake Fault Zones or Alquist-Priolo Zones) around surface traces of active faults and to issue appropriate maps. The maps, which are developed using existing United States Geological Survey's (USGS) 7.5-minute quadrangle map bases, are then distributed to all affected cities, counties, and State agencies for their use in planning and controlling new or renewed construction. Generally, construction within 50 feet of an active fault zone is prohibited.

Seismic Hazard Mapping Act of 1990

The Seismic Hazard Mapping Act was adopted by the State in 1990 to address the potential hazards posed by secondary effects of seismic activity, including strong ground shaking, soil liquefaction, and associated ground failure and seismically induced landslides. The California Geological Survey (CGS) prepares and provides local governments with seismic hazard zone maps that identify areas susceptible to amplified shaking, liquefaction, earthquake-induced landslides, and other ground failures. The seismic hazard zones are referred to as "zones of required investigation" because site-specific geological investigations are required for construction projects within these areas. Before a project can be permitted, a geologic investigation, evaluation, and written report must be prepared by a licensed geologist to demonstrate that the potential hazards can be successfully mitigated.

California Building Code

The State of California provides a minimum standard for building design through Title 24, Part 2, of the California Code of Regulations (CCR), commonly referred to as the California Building Code (CBC). The CBC is updated every three years. It is generally adopted on a jurisdiction-by-jurisdiction basis, subject to further modification based on local conditions. These codes provide minimum standards to protect property and public safety by regulating the design and construction of excavations, foundations, building frames, retaining walls, and other building elements to mitigate the effects of seismic shaking and adverse soil conditions. These codes also regulate grading activities, including erosion control.

California General Plan Law

State law (Government Code Section 65302) requires cities and counties to adopt a comprehensive long-term general plan that includes a safety element. The safety element is intended to provide guidance for protecting 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; other seismic hazards identified PRC Sections 2691 et. seq.; and other geologic hazards known to the legislative body. The safety element must also include mapping of known seismic and geologic hazards from the California Geological Survey and a series of responsive goals, policies, and implementation programs to improve public safety.

REGIONAL

Tri-Valley Local Hazard Mitigation Plan

The purpose of hazard mitigation planning is to reduce the loss of life and property by minimizing the impact of disasters. The Tri-Valley Local Hazard Mitigation Plan (LHMP) was adopted in March 2024 for the purpose of identifying, assessing, and reducing the long-term risk to life and property from hazard events (City of Livermore 2024). The LHMP includes an assessment of hazards and vulnerabilities and a set of mitigation actions for the Tri-Valley area, including the EIR Study Area. In the context of an LHMP, mitigation is an action that reduces or eliminates long-term risk to people and property from hazards, including geologic hazards. The mitigation strategies in this plan related to geologic hazards include creating a comprehensive outreach program to inform the public of seismic hazards and increase resilience; conduct citywide creek embankment studies to determine seismic and flood vulnerabilities; update the Livermore Development Code (LDC) and/or Zoning Map to require that new development consider and reduce impacts of natural hazards, incentivize seismic upgrades, and streamline reconstruction after declared disasters; incorporate all hazard maps into GIS; support retrofitting or relocation of structures in high hazard areas.

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Alameda County Onsite Wastewater Treatment Systems Ordinance

The Onsite Wastewater Treatment Systems (OWTS) Ordinance, as codified in Alameda County General Ordinance Code Chapter 15.18, provides for the safe and sanitary treatment and disposal of wastewater from structures and buildings not served by public sewer systems as allowed by the California State Water Quality Control Policy for Siting, Design, Operation, and Maintenance of Onsite Wastewater Treatment Systems (State OWTS Policy). The purpose is also to establish standards for the approval, installation, and operation of OWTS and Onsite Wastewater Containment Units in Alameda County, consistent with the State OWTS Policy and consistent with the appropriate Regional Water Quality Control Board (RWQCB) standards and basin plans. The standards are adopted to prevent the creation of health hazards and nuisance conditions and to protect surface and groundwater quality. The Alameda County Department of Environmental Health (ACDEH) prepared an OWTS Manual, which provides the procedural and technical details for implementation of the provisions of the OWTS Ordinance and is responsible for enforcement (ACDEH 2018).

LOCAL

Livermore Municipal Code

The Livermore Municipal Code (LMC) includes various directives to minimize adverse impacts with respect to geology and soils. The LMC is organized by title, chapter, section, and, in some cases, articles. Most provisions related to geology and soils are in Title 13, *Public Services*; Title 15, *Buildings and Construction*; and Title 16, *Environment*, as follows:

- **Section 13.32.040, *Private disposal of sewage***, states that It is unlawful to construct any privy, privy vault, septic tank, cesspool, or other facility intended or used for the disposal of sewage except when special permit is granted by the City Council.
- **Chapter 15.02, *Building Code***, adopts the International Building Code, 2021 Edition, as amended and set forth in the California Building Standards Code, CCR Title 24.
- **Section 15.14.160, *CRC Section R403.1.3 amended – Seismic reinforcing***, amends provisions related to seismic reinforcing in the City-adopted International Residential Code, 2021 Edition, as amended and set forth in the California Building Standards Code, Title 24 of the CCR.
- **Chapter 15.24, *Unreinforced Masonry Building Hazard Reduction Program***, promotes public safety by establishing a set of structural repair standards to be used to strengthen unreinforced masonry buildings and require owners to make their buildings conform to those standards within a reasonable period of time. The provisions of this chapter are minimum standards for structural seismic resistance established primarily to reduce the risk of life loss or injury but will not necessarily prevent loss of life or injury or prevent earthquake damage to an existing building which complies with these standards.

- **Chapter 16.12, Flood Control Regulations**, outlines regulations to minimize public and private losses due to flood conditions in specific areas, including those to control filling, grading, dredging and other development which may increase erosion.

Livermore Development Code

The City of Livermore regulates land use and design through the LDC, an alternative approach to zoning that reinforces walkable, sustainable mixed-use environments and development, and builds on community character. Section 10.20.030, *Tentative Map and Vesting Tentative Map Filing and Processing*, sets the requirements for preliminary soil and engineering geology reports to be included as part of the submittal of tentative and vesting tentative maps. The reports shall include any information appropriate for the site, including any information required by the City Engineer. If the preliminary soil report or the preliminary engineering geology report indicates, or the City Engineer has knowledge of, the presence of soil or geologic conditions, which, if corrective measures are not taken, could lead to structural defects, then a soil or engineering geology investigation of each proposed parcel shall be submitted with the final map.

3.7.2 Existing Conditions

GEOLOGIC SETTING

The EIR Study Area is in the Livermore Valley within the Coast Ranges Geomorphic Province. The Coast Ranges Geomorphic Province is a long region of moderate relief containing many elongate ridges and narrow valleys that are approximately parallel to the coast. In the San Francisco Bay Area, the Coast Ranges Geomorphic Province is characterized by a series of northwest-to-southeast-trending ridges and valleys associated with faulting and folding. Livermore Valley is an east to west-trending valley, unique to the East Bay, and is a deep alluvial depression containing sediments deposited as part of the Livermore Gravel Formation. The Greenville Fault forms the eastern border of the valley, separating it from the Altamont Hills. The valley ranges in elevation from 400 to 500 feet above mean sea level. The Livermore Valley is structurally controlled by faulting from the Greenville and Las Positas Faults. Both faults are in the EIR Study Area, and both have been designated as Alquist-Priolo Earthquake Fault Zones.

The predominant geologic units in the EIR Study Area are Qa, Qg, Qoa, and QTlg, which are discussed in more detail below.

- **Qa (Holocene Alluvium)**: This unit consists of sediments that have been transported and deposited by streams. Alluvium can be vulnerable to seismically induced instability.
- **Qg (Holocene Stream Gravel)**: This unit consists of coarser grained sediments that have been transported and deposited by streams. Stream gravel deposits may be vulnerable to erosion on slopes.

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- **Qls (Holocene Landslide Deposits):** The landslide unit contains deposits of unconsolidated solid material and weathered rock fragments that have been transported downslope as a landslide. These deposits may be susceptible to continued flow failures.
- **Qoa (Pleistocene Alluvium):** This unit consists of older sediments that have been transported and deposited by streams. This unit is partially consolidated and is less vulnerable to seismically induced instability but may contain paleontological resources.
- **QTlg (Pliocene to Pleistocene Livermore Gravel):** This unit is made up of light reddish-gray cobble-pebble gravel containing debris from Franciscan rocks and minor to major amounts of gray claystone. This unit is weakly cemented and is vulnerable to seismically induced landslides and may contain paleontological resources.
- **Tps (Pliocene nonmarine sedimentary rocks):** This unit consists of weakly indurated pebble conglomerate, sandstone, and greenish gray claystone. Within the EIR Study Area, this unit is limited to the hills south of Interstate 580 and east of Greenville Road. This unit is not vulnerable to seismically induced instability but may contain paleontological resources.
- **Tbr (Miocene Cierbo Sandstone):** This unit consists of tan arkosic marine sandstone that is pebbly and locally fossiliferous. Within the EIR Study Area, this unit is limited to hills near the Greenville Fault. This unit is not vulnerable to seismically induced instability but is likely to contain paleontological resources.
- **Kp/Kps (Upper Cretaceous Panoche Formation):** The Kp unit contains micaceous clay shale with a few thin sandstone beds. The Kps unit contains tan arkosic sandstone with large concretions and some micaceous shale. Within the EIR Study Area, these units are limited to the hills east of the Greenville Fault. These units are not vulnerable to seismically induced instability but may contain paleontological resources.

SEISMICITY

The Earth's crust includes tectonic plates that locally collide with or slide past one another along plate boundaries. California is particularly susceptible to such plate movements, notably the largely horizontal or "strike-slip" movements of the Pacific Plate, as it impinges on the North American Plate. In general, earthquakes occur when the accumulated stress along a plate boundary or fault is suddenly released, resulting in seismic slippage. This slippage can vary widely in magnitude, ranging in scale from a few millimeters or centimeters, to tens of feet. The performance of human-made structures during a major seismic event varies widely due to several factors, including:

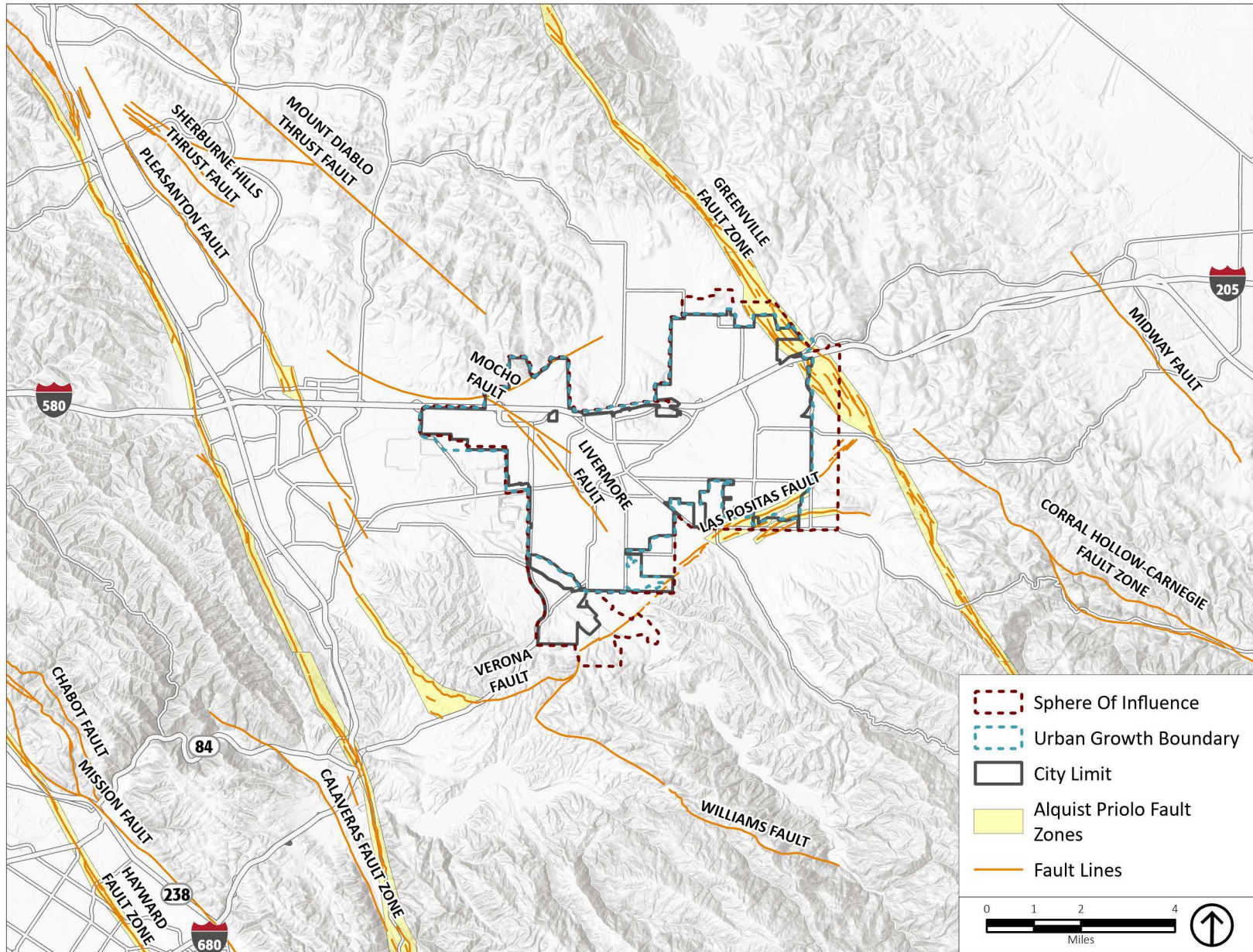
- Location, with respect to active fault traces or areas prone to liquefaction or seismically induced landslides;
- Type of building construction (i.e., wood frame, unreinforced masonry, non-ductile concrete frame);
- Proximity, magnitude, depth, and intensity of the seismic event itself as well as many other factors.

In general, evidence from past earthquakes shows that wood frame structures tend to perform well during a seismic event, especially when their foundations are properly designed and anchored. Conversely, older, unreinforced masonry structures and non-ductile reinforced concrete buildings (especially those built in the 1960s and early 1970s), do not perform as well, especially if they have not undergone appropriate seismic retrofitting. Applicable building code requirements, such as those found in the CBC, include seismic requirements that are designed to ensure the satisfactory performance of building materials under prescribed seismic conditions.

Seismic activity in the Coast Ranges is generally associated with active faults of the San Andreas system, which includes major active faults within and surrounding the EIR Study Area. Over the width of the San Francisco Bay region, approximately 1.5 inches per year of relative horizontal movement occurs between the North American and Pacific Plates. This movement is partially accommodated by earthquakes and creep along several active faults.

As shown on Figure 3.7-1, *Regional Fault Zones*, there are five major fault zones in the EIR Study Area: Greenville, Las Positas, Pleasanton, Calaveras, and Hayward Faults. The Greenville Fault zone runs in a northwest to southeast orientation through the northeastern portion of the EIR Study Area and can generate an earthquake of up to maximum magnitude (M) 6.9. The Las Positas Fault zone runs in a northeast to southwest orientation through the southeastern portion of the EIR Study Area. The Livermore Earthquake sequence of 1980, of which the two notable earthquakes were M 5.6 and M 5.4, have been attributed to the Greenville and Las Positas Faults. Only the Greenville Fault exhibited fault rupture in the 1980 earthquakes. The Pleasanton Fault zone, a minor off-shoot of the Calaveras Fault zone, runs in an approximately north to south orientation on the western part of the Livermore Valley, about six miles west of the EIR Study Area, and has been inferred through aerial photography and the presence of a groundwater barrier. The Calaveras Fault zone marks the eastern margin of the East Bay Hills on a north to south axis and has the capacity to generate an earthquake of up to approximately M 7. Lastly, the Hayward Fault zone is a northwest to southeast-trending fault approximately 17 miles southwest of the EIR Study Area and is capable of a maximum earthquake of M 7.4. The Mocho Fault and Livermore Fault also cross through the western portion of the EIR Study Area.

When earthquake faults within the San Francisco Bay Area's nine-county area were considered, the USGS estimated that the probability of an M 6.7 or greater earthquake prior to year 2032 is 62 percent, or roughly a two-thirds probability. The forecast probability for each individual fault to produce an M 6.7 or greater seismic event by the year 2032 is 27 percent for the Hayward Fault, 21 percent for the San Andreas Fault, and 11 percent for the Calaveras Fault. Earthquakes of this magnitude can create ground accelerations severe enough to cause major damage to structures and foundations not designed to resist earthquakes.



Source: California Geological Survey 2019; United States Geological Survey 2020; City of Livermore, 2022.

Figure 3.7-1
Regional Fault Zones

Underground utility lines are also susceptible where they lack sufficient flexibility to accommodate the seismic ground motion. In the event of an M 7.8 earthquake on the San Andreas Fault, the seismic forecasts from the Metropolitan Transportation Commission/Association of Bay Area Governments (MTC/ABAG) suggest that the EIR Study Area is expected to experience “severe” shaking (MTC/ABAG 2020). Due to the active fault lines within and surrounding it, the EIR Study Area is historically susceptible to all earthquake-related hazards, which include ground rupture, ground shaking, and liquefaction (City of Livermore 2022).

Ground Shaking and Rupture

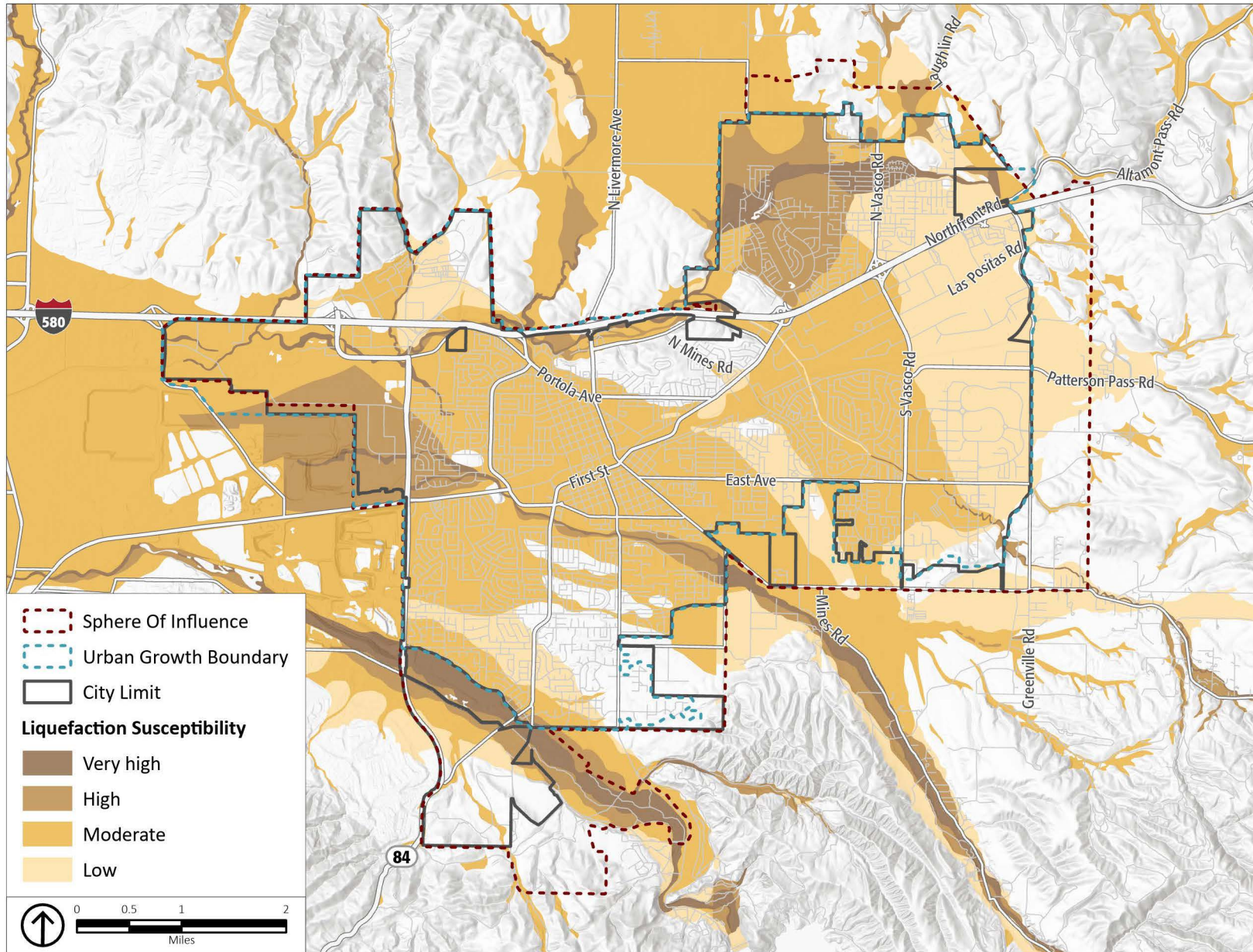
The most common hazard from a seismic event is ground shaking. While ground shaking due to an earthquake may be experienced many miles from the source of an earthquake, ground rupture is localized in the immediate vicinity of any fault line that experiences a significant seismic event. Because the Greenville and Las Positas Faults lie beneath the EIR Study Area, these areas have the potential to experience ground rupture in the event of a strong seismic event (City of Livermore 2022).

Liquefaction

Liquefaction is a hazard that occurs during prolonged periods of ground shaking in areas with alluvial or granular soils, which are less cohesive than soil types such as clay. Liquefaction is a result of prolonged ground shaking from a seismic event, which causes a sudden rise of an underground water table. When a water table rises in areas with alluvial and granular soils, the water infiltrates the soil bed and compromises the strength and stability of the soil, which can therefore compromise structures in such areas. Although liquefaction is most often triggered by seismic shaking, it can also be caused by improper grading, landslides, or other factors. In dry soils, seismic shaking may cause soil to consolidate rather than flow, a process known as densification. The EIR Study Area is largely located atop alluvial soils. These alluvial soils, in addition to a perched water table, mean that there is a high risk of liquefaction in the low-lying parts of the EIR Study Area (City of Livermore 2022). Liquefaction susceptibility is shown on Figure 3.7-2, *Liquefaction Susceptibility*.

Landslides

Landslides are gravity-driven movements of earth materials that can include rock, soil, unconsolidated sediment, or combinations of such materials. The rate of landslide movement can vary considerably; some move rapidly, as in a soil or rock avalanche, and others “creep,” or move slowly for long periods of time. The susceptibility of a given area to landslides depends on many variables, although the general characteristics that influence landslide hazards are widely acknowledged.



Source: United States Geological Survey, 2022; City of Livermore, 2022.

Figure 3.7-2
Liquefaction Susceptibility

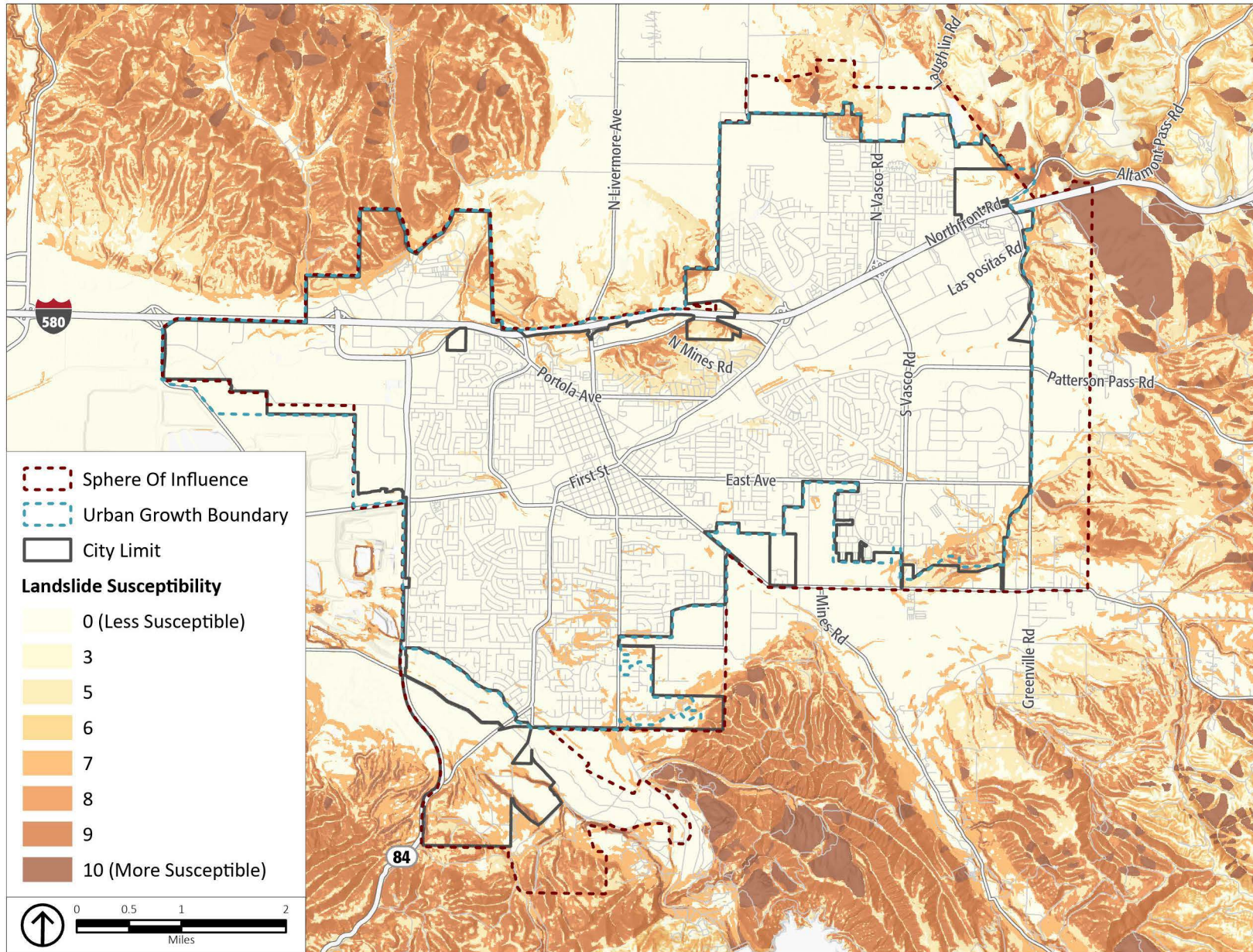
Some of the more important contributing factors for landslides are:

- **Slope Material.** Loose, unconsolidated soils and soft, weak rocks are more hazardous than firm, consolidated soils or hard bedrock.
- **Slope Steepness.** Most landslides occur on moderate to steep slopes.
- **Structure and Physical Properties of Materials.** This includes the orientation of layering and zones of weakness relative to slope direction.
- **Water Content.** Increased water content increases landslide hazard by decreasing friction and adding weight to the materials on a slope.
- **Vegetation Coverage.** Abundant vegetation with deep roots promotes slope stability.
- **Proximity to Areas of Erosion or Human-Made Cuts.** Undercutting slopes can greatly increase landslide potential.
- **Earthquake Ground Motions.** Strong seismic ground motion can trigger landslides in marginally stable slopes or loosen slope materials, which increases the risk of future landslides.

Due to the flat terrain over most of the EIR Study Area, landslides are only an environmental concern in localized portions of the EIR Study Area, as shown on Figure 3.7-3, *Landslide Susceptibility*. The EIR Study Area does not have massive gravel extraction operations, such as that to the south and west, that would be particularly vulnerable to earthquake-induced landslides. In the event of a severe earthquake, landslides could possibly be triggered in the hills at the periphery of the northern, southern, and eastern areas of the EIR Study Area (City of Livermore 2022). Due to the differences in the physical characteristics of slope materials, which markedly influence landslide potential, some superficially similar areas may differ widely in terms of landslide hazards.

SOILS

The Livermore Valley floodplain supports very gravelly soils assigned with the Yolo-Pleasanton association, interspersed with loams and clays of the Rincon-San Ysidro association. Soils in the EIR Study Area primarily consist of alluvial soils. Alluvial soils are characterized by complex layering of gravel, silty sands, sand, and clayey soils. These soils in the EIR Study Area have been deposited into the Livermore Valley over thousands of years by Arroyo del Valle, Arroyo Las Positas, and Arroyo Mocho waterways. Northeast of the EIR Study Area is the Springtown Alkali Sink, a large expanse of alkali soils that support unique wetland and grassland habitat (City of Livermore 2022).



Source: United States Geological Survey, 2020; City of Livermore, 2022.

Figure 3.7-3
Landslide Susceptibility

Erosion

Erosion occurs when the upper layers of soil are displaced by erosive agents such as water, ice, snow, air, plants, animals, or human causes. Sandy soils on moderate slopes, or clayey soils on steep slopes are susceptible to erosion when exposed to these forces. Erosion can become more frequent when established vegetation is disturbed or removed due to grading, wildfires, or other factors. The EIR Study Area is largely flat, and significant erosion is not a common occurrence. Erosion can occur around agricultural lands. However, soils associated with Prime Farmland are classified as having only a slight or moderate erosion potential. The areas most subject to erosion within the EIR Study Area are hillsides and exposed areas adjacent to waterways (City of Livermore 2022).

Expansive Soils

Soils classified as expansive are those that change dramatically in volume depending on moisture content. When wet, these soils expand; conversely, when dry, these soils contract. Sources of moisture that trigger an expansion include rainfall, landscape irrigation, utility leakage, and perched groundwater. Expansive soils are typically very fine-grained with a high to very high percentage of clay. Soil tests are often used to identify expansive soils to test changes in response to reduced moisture content. A change of 3 percent or greater indicates a moderate to high shrink-swell potential. Such soils are known to cause damage to concrete slabs, structure foundations, and pavement. Areas with expansive soil must often implement special building and structure design that can withstand such a fluctuation in soil. There are clay deposits dispersed in alluvial materials throughout the EIR Study Area, which are known to swell and contract during moisture events (City of Livermore 2022).

Land Subsidence

Land subsidence is a human-induced hazard in which the over-extraction of groundwater or oil causes the depression and caving in of soil deposits. The over-extraction of groundwater or oil causes these soils to shrink, which results in sinkholes that may compromise building foundations, pavement, and infrastructure.

Land subsidence has not been well documented within Alameda County, although valley deposits within the county are at risk of subsidence if groundwater over-extraction occurs. However, no cases of groundwater over-extraction have been documented in the EIR Study Area or the greater Alameda County. In addition, the Livermore Valley groundwater basin is currently monitored by Zone 7 of the Alameda County Flood Control and Water Conservation District (Zone 7 Water Agency) for subsidence and no significant subsidence has been documented (Zone 7 Water Agency 2025).

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There are two documented oil extraction sites in the EIR Study Area. The Livermore Oil Field is in the eastern portion of the EIR Study Area and oil production historically has not been excessive. The abandoned Hospital Nose Gas Field is in the southern portion of the EIR Study Area and does not have any producing wells. Based on historical evidence, significant subsidence-related effects from these oil extraction activities have a low likelihood of occurring (City of Livermore 2022).

PALEONTOLOGICAL RESOURCES

Paleontological resources are the fossilized remains of organisms from prehistoric environments found in geologic strata. They are valued for the information they yield about the history of the earth and its past ecological settings. Paleontological resources include vertebrates (i.e., animals with backbones), invertebrates (e.g., starfish, clams, ammonites, and marine coral), microscopic plants and animals (microfossils), and trace fossils (e.g., footprints, burrows). These resources are found in geologic strata conducive to their preservation, typically sedimentary formations. Paleontological sites are areas that show evidence of prehuman activity. Often, they are simply small outcrops visible on the surface or sites encountered during grading. While the sites are important indications, it is the geologic formations that are the most important since they may contain important fossils. The Society of Vertebrate Paleontology defines a significant fossil resource as, “identifiable vertebrate fossils, large or small, uncommon invertebrate, plant, and trace fossils, and other data that provide taphonomic, taxonomic, phylogenetic, paleoecologic, stratigraphic, and/or biochronologic information. Paleontological resources are older than recorded human history and/or older than middle Holocene (i.e., older than about 5,000 radiocarbon years).”

The Livermore Valley is underlain with a thick layer of alluvial sediments that are drained from other locations in the surrounding region and deposited into low-lying lands. The alluvial deposits in the Livermore Valley have been recorded to contain several megafauna vertebrate fossils, extracted from Pleistocene-age alluvium. Discoveries specifically from the Pleistocene alluvium include the remains of camels (*Camelops hesternus*), mammoths (*Mammuthus columbi*), ancient bison (*Bison antiquus*), horses (*Equus occidentalis*), and ground sloths (*Glossotherium harlani*), along with various invertebrate fossils, such as teeth and large vertebrate bones. In addition, there are other formations in the Livermore Valley in which fossils have been discovered, including the Pliocene to Pleistocene-age Livermore Gravel, the late Miocene to Pliocene Lower Livermore Formation, the late Miocene to Pliocene Sycamore Formation, the late Miocene Neroly Formation and Briones Formation, the Great Valley Complex, and the Franciscan Complex. It is anticipated that due to the rich geologic past within the Livermore Valley, there may be significant paleontological resources that have not been unearthed (City of Livermore 2022).

3.7.3 Standards for Analysis

SIGNIFICANCE CRITERIA

Appendix G, *Environmental Checklist Form*, of the CEQA Guidelines states that the proposed Project would result in a significant impact related to geology and soils if it would:

- a) Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:
 - i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault. (Refer to Division of Mines and Geology Special Publication 42.)
 - ii. Strong seismic ground shaking.
 - iii. Seismic-related ground failure, including liquefaction.
 - iv. Landslides.
- b) Result in substantial soil erosion or the loss of topsoil.
- c) Be located on a geologic unit or soil that is unstable, or that would become unstable as a result of the project and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse.
- d) Be located on expansive soil, as defined in Table 18-1B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property.
- e) Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater.
- f) Directly or indirectly destroy a unique paleontological resource, site, or unique geologic feature.

3.7.4 Project Impact Analysis

- a) **Would the project subject residents or occupants, visitors, etc. to potential seismic-related hazards, including the risk of loss, injury, or death involving: (i) Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault; (ii) Strong seismic ground shaking; (iii) Seismic-related ground failure, including liquefaction; or (iv) Landslides.**
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Less than significant.

Earthquake Faults

As stated in Section 3.7.2, *Existing Conditions*, active faults, including the Greenville and Las Positas Faults, are located within and near the EIR Study Area. Because portions of these faults are designated within Alquist-Priolo Earthquake Fault Zones, there is a potential for surface fault rupture along their active traces. Pursuant to the Alquist-Priolo Earthquake Fault Zoning Act, construction within 50 feet of an active fault zone is generally prohibited, especially for structures intended for human occupancy. Future development would be required to comply with the provisions of the CBC, which the City has adopted in LMC Chapter 15.02. Potential structural damage and exposure of people to risk of injury or death from structural failure associated with surface fault rupture would be reduced by compliance with CBC engineering design and construction measures. Foundations and other structural support features would be designed to resist or absorb damaging forces from strong ground shaking and surface fault rupture. Pursuant to LDC Section 10.20.030, future development requiring a tentative map would be required to submit preliminary soil and engineering geology reports as part of the application, to identify soil or geologic conditions that could require corrective action. In addition, the Safety (S) Element of the proposed General Plan 2045 contains the following goal and policies that are designed to minimize potential adverse impacts related to fault rupture:

- **Goal S-6:** Reduce impacts from geologic and seismic hazards.
 - **Policy S-6.1: Geologic Hazard Mapping.** Use the most current and comprehensive geologic hazard mapping available to evaluate potential seismic hazards where new development is proposed.
 - **Policy S-6.2: Geotechnical Investigations for Development Projects.** Require a site-specific geotechnical investigation for new urban development approval in Alquist-Priolo Earthquake Fault Zones, areas of high landslides susceptibility, and other areas subject to high or moderate geologic hazard, as shown on Figures S-5 and S-7 (of the General Plan), so that projects are constructed in a manner that mitigates site-specific geotechnical challenges and minimizes the risk from seismic hazards.

- **Policy S-6.3: New Construction on Faults.** Prohibit new structures proposed for human occupancy across the trace of any active or potentially active fault. The Greenville Fault and Las Positas Fault shall be assumed active, and the Livermore Fault shall be assumed potentially active, unless and until demonstrably shown otherwise by the U.S. Geological Survey (USGS) or the California Geological Survey (CGS) or similar credible authority.
- **Policy S-6.4: Unreinforced Masonry Buildings.** Continue to enforce and implement programs that identify unreinforced masonry buildings and other buildings that would be at risk during seismic events and strengthen these buildings.
- **Policy S-6.5: Geotechnical Investigations for Critical Facilities.** Require a site-specific geotechnical investigation for all municipal and critical facilities in the city (schools, hospitals, fire stations, and police stations) so that these facilities are constructed in a manner that mitigates site-specific geotechnical challenges and minimizes the risk to the public from seismic hazards.
- **Policy S-6.6: Utility Lines Across Faults.** Require that major utility lines be accessible for rapid repair, include safety features such as automatic shutoff valves, switches and expansion joints, and cross faults at right angles or as close to a right angle as physically feasible. Require utility line operators to provide additional equipment to ensure minimal adverse impact on adjacent and surrounding areas and to facilitate restoration of service in the event of fault displacement.

Specifically, proposed Policy S-6.2 would require a site-specific geotechnical investigation for new urban development approval in Alquist-Priolo Earthquake Fault Zones. Proposed Policy S-6.3 would prohibit new structures proposed for human occupancy across the trace of any active or potentially active fault. Proposed Policy S-6.5 would require a site-specific geotechnical investigation for all critical facilities that would mitigate site-specific challenges, including fault rupture. Compliance with these requirements would minimize structural damage and the exposure of people to risk of injury or death from structural failure in the event of surface fault rupture during an earthquake. Proposed Action S-A-6.1 would further support these policies by requiring detailed fault shear zone studies to define building setback requirements.

Strong Seismic Ground Shaking

Greenville and Las Positas Faults are the most likely faults potentially capable of producing the most intense ground accelerations within the EIR Study Area. In northern California, there is no method to completely avoid earthquake hazards. However, appropriate measures to minimize the effects of earthquakes are included in the CBC, with specific provisions for seismic design. Potential structural damage and exposure of people to risk of injury or death from structural failure associated with strong seismic ground shaking would be reduced by compliance with CBC engineering design and construction measures. Foundations and other structural support features would be designed to resist or absorb damaging forces from strong ground shaking. Future development would be required to comply with the provisions of the CBC, which the City has adopted in LMC Chapter 15.02. Future development requiring a tentative map would be

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required to submit preliminary soil and engineering geology reports as part of the application, pursuant to LDC Section 10.20.030, to identify soil or geologic conditions that could require corrective action.

In addition, the same proposed General Plan 2045 goal and policies from the Safety (S) Element identified previously in this impact discussion under the “Earthquake Faults” subheading would also serve to minimize the effects of ground shaking. Specifically, proposed Policies S-6.2 and S-6.5 would require a site-specific geotechnical investigation for new urban development approval in areas subject to high or moderate geologic hazard, as well as critical facilities, so that structures are constructed in a manner that mitigates site-specific geotechnical challenges and minimizes the risk from seismic hazards, including ground shaking. Proposed Policy S-6.4 would require the City to continue to enforce and identify unreinforced masonry buildings and other buildings that would be at risk during seismic events and strengthen these buildings.

Compliance with mandatory CBC requirements and implementation of proposed General Plan 2045 policies and programs would ensure that future development projects are appropriately investigated in terms of potential seismic hazards and that any new buildings and structures are constructed to withstand strong seismic ground shaking.

Seismic-Related Ground Failure

As shown on Figure 3.7-2, much of the EIR Study Area is within an area of high liquefaction susceptibility. Future development would be required to be designed in accordance with current seismic design standards as found in the CBC, which the City has adopted in LMC Chapter 15.02. Design measures would be implemented according to the most recent CBC, which would reduce the impact of secondary effects of earthquake shaking, such as liquefaction and seismic settlement. CBC requires that foundations and other structural support features would be designed to resist or absorb damaging forces from strong ground shaking, such as liquefaction. Future development requiring a tentative map would be required to submit preliminary soil and engineering geology reports as part of the application, pursuant to LDC Section 10.20.030, to identify soil or geologic conditions that could require corrective action. In addition, the same proposed General Plan 2045 goal and policies from the Safety (S) Element identified previously in this impact discussion under the “Earthquake Faults” subheading would also serve to minimize the effects of seismic-related ground failure, including liquefaction. Specifically, proposed Policies S-6.2 and S-6.5 would require a site-specific geotechnical investigation for new urban development approval in areas subject to high or moderate geologic hazard, as well as critical facilities, so that structures are constructed in a manner that mitigates site-specific geotechnical challenges and minimizes the risk from seismic hazards.

Landslides

Landslides are an environmental concern in the portions of the EIR Study Area shown on Figure 3.7-3. The proposed Project would not directly result in new development; however, it is a regulatory document that includes proposed changes in land use designation that would allow

for redevelopment and increased density on certain parcels within the EIR Study Area. The proposed Project promotes infill development and encourages higher density in already-developed areas, where the topography is generally flat. The areas of high landslide susceptibility are not in the highly urbanized portions of the EIR Study Area where future development is generally anticipated to occur.

New development or redevelopment in any of the portions of the EIR Study Area within landslide-susceptible areas would be required to comply with grading, erosion, and sediment-control regulations in the CBC, adopted by the City in LMC Chapter 15.02. Future development requiring a tentative map would be required to submit preliminary soil and engineering geology reports as part of the application, pursuant to LDC Section 10.20.030, to identify soil or geologic conditions that could require corrective action. In addition, the same proposed General Plan 2045 goal and policies from the Safety (S) Element identified previously in this impact discussion under the “Earthquake Faults” subheading would also serve to minimize the effects of seismic-related ground failure, including liquefaction. Specifically, proposed Policies S-6.2 and S-6.5 would require a site-specific geotechnical investigation for new urban development approval in areas of high landslides susceptibility, as well as critical facilities, so that structures are constructed in a manner that mitigates site-specific geotechnical challenges and minimizes the risk from seismic hazards.

Summary

Compliance with State, regional, and local regulations, as well as implementation of the proposed General Plan 2045 goals and policies, pertaining to structural safety regarding fault rupture, ground shaking, liquefaction, and landslides would ensure that future development would not directly or indirectly cause or worsen the likelihood of or substantial adverse effects from seismic hazards related to earthquakes, including the risk of loss, injury, or death. Therefore, impacts would be **less than significant**.

b) Would the project result in substantial soil erosion or the loss of topsoil?

Less than significant. The CBC, adopted by the City in LMC Chapter 15.02, provides regulations for construction to provide proper grading, drainage, and erosion and sediment control. As described in further detail in Section 3.10, *Hydrology and Water Quality*, to minimize potential impacts related to erosion, future development would require compliance with the Construction General Permit (CGP) Water Quality Order WQ 2022-0057-DWQ, which includes the preparation and implementation of a Stormwater Pollution Prevention Plan (SWPPP). A SWPPP requires an erosion-control plan with the incorporation of best management practices to control erosion during construction. Typical construction best management practices include silt fences, fiber rolls, catch basin inlet protection, water trucks, street sweeping, and stabilization of truck entrance/exits. While this regulation is primarily aimed at water quality, it is a mechanism that would help minimize the risk of erosion.

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In addition, the Safety (S) Element of the proposed General Plan 2045 contains the following goal and policies that are designed to minimize potential adverse impacts related to erosion and loss of topsoil:

- **Goal S-6:** Reduce impacts from geological and seismic hazards.
 - **Policy S-6.7: Erosion and Slope Failure.** Prohibit construction in areas with severe erosion (slopes over 10 percent), as mapped by the US Department of Agriculture’s Natural Resources Conservation Service, and in areas susceptible to slope failure, unless it can be clearly demonstrated through geotechnical engineering analysis that the project will not contribute to increased erosion, sedimentation, or runoff.
 - **Policy S-6.8: Erosion Prevention.** Require developers to implement control site preparation procedures and construction phasing to reduce erosion and exposure of soils to the maximum extent possible.

Specifically, proposed Policy S-6.8 would require applicants to implement control site preparation procedures and construction phasing to reduce erosion and exposure of soils to the maximum extent possible. Proposed Policy S-6.7 would prohibit construction in areas with severe erosion unless a geotechnical engineering analysis can demonstrate that the project will not contribute to increased erosion.

Implementation of the proposed General Plan 2045 goals and policies, as well as adherence to existing regulatory requirements that include, but are not limited to, the CBC and LMC grading and drainage requirements for new developments, would reduce potential soil erosion and loss of topsoil from soil disturbance, and impacts would be **less than significant**.

c) Would the project be on a geologic unit or soil that is unstable, or that would become unstable as a result of the project and potentially result in on- or off-site landslide, lateral spreading, subsidence, liquefaction, or collapse?

Less than significant.

Landslides

As stated under impact discussion (a), while much of the EIR Study Area is flat, it also includes landslide-prone areas. The proposed Project would not directly result in new development; however, it is a regulatory document that includes proposed changes in land use designation that would allow for redevelopment and increased density on certain parcels within the EIR Study Area. The proposed Project promotes infill development and encourages higher density in already-developed areas, where the topography is generally flat. The areas of high landslide susceptibility are not in the highly urbanized portions of the EIR Study Area where future development is generally anticipated to occur.

As described in impact discussion (a), new development or redevelopment in any of the portions of the EIR Study Area deemed to be within landslide-susceptible areas would be required to comply with grading, erosion, and sediment-control regulations in the CBC, adopted by the City in LMC Chapter 15.02. Future development requiring a tentative map would be required to submit preliminary soil and engineering geology reports as part of the application, pursuant to LDC Section 10.20.030, to identify soil or geologic conditions that could require corrective action. In addition to protections afforded by State and local regulations, the Safety (S) Element and the Implementation Plan of the proposed General Plan 2045 contain goals, policies, and actions that require local planning and development decisions to consider impacts to geology and soils. The same proposed General Plan 2045 goal and policies from the Safety (S) Element identified previously in this impact discussion under the “Earthquake Faults” subheading would also serve to minimize the effects of unstable soils, resulting in landslides. Specifically, proposed Policies S-6.2 and S-6.5 would require a site-specific geotechnical investigation for new urban development approval in areas of high landslides susceptibility, as well as critical facilities, so that structures are constructed in a manner that mitigates site-specific geotechnical challenges and minimizes the risk from unstable soils.

Subsidence

Subsidence has not been observed in the EIR Study Area and groundwater levels have not declined significantly. The probability of subsidence impacts is generally low in the EIR Study Area, due to the lack of significant groundwater overdraft conditions in the EIR Study Area. As described in further detail in Section 3.10, *Hydrology and Water Quality*, under the Sustainable Groundwater Management Act (SGMA), in groundwater basins that are designated as medium and high priority, local public agencies and groundwater sustainability agencies must assess conditions in their local groundwater basins and then prepare groundwater sustainability plans. The SGMA encourages sustainable groundwater management practices to reduce the potential for future land subsidence, and ongoing surveying of the ground surface by the California Department of Water Resources (DWR) and the USGS provides a way to verify that efforts in preventing subsidence are effective. The groundwater management plans continue to prevent long-term groundwater overdraft conditions and reduce the impact of subsidence. DWR has determined that the Livermore Valley groundwater basin continues to be managed sustainably.

Liquefaction and Lateral Spreading

As stated in impact discussion (a), much of the EIR Study Area is in an area susceptible to liquefaction. All structures constructed in the EIR Study Area would be designed in accordance with current seismic design standards as found in the CBC. Design measures would be implemented according to the most recent CBC, as adopted in LMC Chapter 15.02, which would reduce the impact of liquefaction and seismic settlement. Future development requiring a tentative map would be required to submit preliminary soil and engineering geology reports as part of the application, pursuant to LDC Section 10.20.030, to identify soil or geologic conditions that could require corrective action. In addition, the same proposed General Plan 2045 goal and

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policies from the Safety (S) Element identified previously in this impact discussion under the “Earthquake Faults” subheading would also serve to minimize the effects of unstable soils, including liquefaction and lateral spreading. Specifically, proposed Policies S-6.2 and S-6.5 would require a site-specific geotechnical investigation for new urban development approval in areas subject to high or moderate geologic hazard, as well as critical facilities, so that structures are constructed in a manner that mitigates site-specific geotechnical challenges and minimizes the risk from unstable soils.

Settlement and Collapse

Settlement and collapse are likely to exist in areas with alluvial soil. The CBC, adopted by the City in LMC Chapter 15.02, requires that structures be designed to mitigate compressible soils. Methods that could be used to reduce the impact of compressible soils include in-situ densification, transferring the load to underlying non-compressible layers with piles, and over excavation of compressible soil and re-compaction with engineered fill. Future development requiring a tentative map would be required to submit preliminary soil and engineering geology reports as part of the application, pursuant to LDC Section 10.20.030, to identify soil or geologic conditions that could require corrective action. In addition, same proposed General Plan 2045 goal and policies from the Safety (S) Element identified previously in this impact discussion under the “Earthquake Faults” subheading would also serve to minimize the effects of unstable soils, including settlement and collapse. Specifically, proposed Policies S-6.2 and S-6.5 would require a site-specific geotechnical investigation for new urban development approval in areas subject to high or moderate geologic hazard, as well as critical facilities, so that structures are constructed in a manner that mitigates site-specific geotechnical challenges and minimizes the risk from unstable soils.

Summary

Future development would be required to comply with State, regional, and local regulations, including the provisions of the CBC, LMC, and LDC, and the proposed General Plan 2045 goals and policies, to ensure that future development would not cause substantial hazards associated with development on unstable geologic units or unstable soils, such as landslides, subsidence, liquefaction, lateral spreading, settlement, or collapse. Therefore, impacts would be **less than significant**.

d) Would the project be located on expansive soil, as defined in Table 18-1B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property?

Less than significant. Based on the presence of alluvial materials, there is some potential for expansive/shrink-swell soils throughout the EIR Study Area. Future development would be required to comply with the provisions of the CBC, as adopted by the City in LMC Chapter 15.02. Specific engineering methods are required to reduce the impact of expansive soils, and can

include drainage-control devices to limit water infiltration near foundations, over-excavation and re-compaction of engineered fill method, and support of the foundation with piles. Future development requiring a tentative map would be required to submit preliminary soil and engineering geology reports as part of the application, pursuant to LDC Section 10.20.030, to identify soil or geologic conditions that could require corrective action.

Additionally, the proposed General Plan 2045 goal and policies identified under impact discussion (a), in addition to the following goal and policy from the Safety (S) Element, are designed to minimize impacts related to expansive soils:

- **Goal S-6:** Reduce impacts from geologic and seismic hazards.
 - **Policy S-6.9: Development on Expansive Soils.** Require geotechnical evaluations for development in areas with expansive soils. Where such soils are present, require appropriate mitigation measures, such as specialized site grading, foundation design, and construction techniques (erosion and sediment-control best management practices [BMPs]) to minimize risk of structural damage. In foothill areas, require additional site-specific design measures to address topographic and soil movement concerns.

Proposed Policy S-6.9 would require geotechnical evaluations to confirm that for development on expansive soils would not pose risks of structural damage and to propose any additional design measures in foothill areas required to address topographic and soil movement concerns.

Implementation of the proposed General Plan 2045 goals and policies, as well as compliance with existing State, regional, and local regulations, would ensure that future development would not directly or indirectly cause substantial adverse effects, including the risks to life or property, from expansive soils. Therefore, impacts would be **less than significant**.

e) Would the project have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?

Less than significant. Proposed General Plan 2045 Policy INF-3.1 would require structures with plumbing in the City Limit to connect to the public wastewater collection system area, which is coterminous with the Urban Growth Boundary. Therefore, future development in the EIR Study Area is not anticipated to result in the use of septic tanks or alternative wastewater disposal systems. In the event septic tanks or alternative wastewater disposal systems are required, LMC Chapter 13-32 would allow for the construction of septic tanks or alternative wastewater disposal systems provided that a special permit is granted by the City Council. The approval, installation, and operation of a septic system or alternative wastewater disposal system would be subject to the standards of the Alameda County OWTS Ordinance, consistent with the State OWTS Policy and appropriate RWQCB standards and basin plans. As outlined in the OWTS Manual, a site evaluation would be required and shall take into consideration soil texture, soil

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percolation rate, depth to groundwater and horizontal setback distances from natural land features and structures to the OWTS and site topography.

Compliance with State, regional, and local regulations would ensure that new septic tanks or alternative wastewater disposal systems are constructed on soils that can support such systems; impacts would be **less than significant**.

f) Would the project directly or indirectly destroy a unique paleontological resource, site, or unique geologic feature?

Less than significant. Future development would be required to comply with the federal Paleontological Resources Preservation Act that limits the collection of vertebrate fossils and other rare and scientifically significant fossils to qualified researchers who have obtained a permit from the appropriate state or federal agency and PRC Section 5097 that prohibits the removal of any paleontological site or feature from public lands without the permission of the jurisdictional agency. Ground-disturbing construction activities (e.g., grading and excavation) associated with future development in the EIR Study Area could uncover fossilized remains of organisms from prehistoric environments that have not been recorded. Implementation protocols and adherence to the SVP standards, when and if required, would ensure the protection of unique paleontological resources during construction of future development. Some protocols include, but are not limited to:

- Excavations within a 50-foot radius of the find shall be temporarily halted or diverted.
- Ground-disturbance work shall cease until a City-approved, qualified paleontologist determines whether the resource requires further study.
- The paleontologist shall document the discovery as needed, in accordance with SVP standards as appropriate, evaluate the potential resource, and assess the significance of the finding under the criteria set forth in CEQA Guidelines Section 15064.5.
- The paleontologist shall notify the appropriate agencies to determine procedures that would be followed before construction activities are allowed to resume at the location of the find.
- If is not feasible, the paleontologist shall prepare an excavation plan for mitigating the effect of construction activities on the discovery. The excavation plan shall be submitted to the lead agency for review and approval prior to implementation.
- All construction activities shall adhere to the recommendations in the excavation plan.

Additionally, the Community Identity (CI) Element of the proposed General Plan 2045 contains the following goal and policies that are designed to minimize impacts related to paleontological resources:

- **Goal CI-5:** Protect cultural resources (archaeological and/or Tribal) and paleontological resources that enrich our understanding of early Livermore and the surrounding region.
 - **Policy CI-5.1: Resource Sensitivity and Evaluation.** Require appropriate investigations, such as site surveys, subsurface testing, and monitoring by qualified professionals as part of the environmental review process when development is proposed in identified areas of cultural, tribal cultural, and paleontological sensitivity.
 - **Policy CI-5.2: Discovery and Mitigation.** If cultural, tribal cultural, including human remains, or paleontological resources are discovered during construction, require immediate suspension of work in the area and evaluation by a qualified professional. If the resource is significant, prioritize preservation in place; if not feasible, implement appropriate mitigation such as data recovery.

Specifically, proposed Policy CI-5.2 requires that if resources, including paleontological resources, are discovered during construction, the immediate suspension of work in the area and a qualified professional shall evaluate the resource.

Compliance with federal, State, regional, and local regulations and implementation of the proposed General Plan 2045 goal and policies pertaining to paleontological resources would ensure that future development would not directly or indirectly cause substantial adverse effects to paleontological resources. Therefore, the impact would be **less than significant**.

3.7.5 Cumulative Impact Analysis

The geographic context for impacts resulting from geologic hazards is site specific rather than cumulative in nature, because each project site has a different set of geologic considerations that would be subject to uniform site development and construction standards and unique standards depending on the outcome of a project-specific geotechnical study.

Would the project have a cumulative effect related to geological resources?

Less than significant. Cumulative projects within eastern Alameda County would be exposed to similar geologic and seismic hazards during seismic events, but development of individual projects would not increase the potential for impacts to occur. Individual development proposals would be reviewed separately by the appropriate public agency depending on location and undergo environmental review, if appropriate. If future cumulative development would result in impacts related to geologic or seismic impacts, those potential project or site-specific impacts would be addressed in accordance with the requirements of CEQA. New buildings would be constructed utilizing current design and construction methodologies for earthquake resistant design as required by relevant regulations, including those as discussed in impact discussions (a) through (f), such as the CBC, in addition to any local requirements, including the applicable policies and programs included in the applicable general plans and the applicable municipal codes. They would also be required to comply with SVP standards, when

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and if required, which would ensure the protection of unique paleontological resources. Compliance with these requirements would reduce cumulative, development-related impacts that pertain to seismic events, erosion and loss of topsoil, unstable geologic units, expansive soils, use of septic tanks or other alternative wastewater disposal systems, or destruction of a unique paleontological unit and ensure that cumulative development would have **less than significant** impacts associated with geology and soils.

3.7.6 References

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