

4.7 GEOLOGIC HAZARDS

This section evaluates the potential effects of geologic hazards in regard to implementation of the 2040 General Plan including the location of physical development within a State of California–designated Alquist-Priolo Special Fault Study Zone, a County of Ventura–designated Fault Hazard Area, a Seismic Hazards Zone that exposes people or structures to liquefaction hazards, landslide or mudflow hazard areas, expansive soils hazard zones, or where soils with an expansion index greater than 20 are present, and exposing people and structures to risk of loss, injury, or death in these areas. For a discussion of impacts related to soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems, refer to Section 4.10, “Hydrology and Water Quality.” For a discussion of impacts related to landslides as a result of post-fire slope instability or drainage changes, refer to Section 4.9, “Hazards, Hazardous Materials, and Wildfire.” For discussion of impacts on paleontological resources, refer to Section 4.5, “Cultural, Tribal Cultural, and Paleontological Resources.”

As described in the “Approach to the Environmental Analysis” section, above, the following assessment of impacts is based on the characterization of existing environmental conditions and regulatory setting provided in the January 2020 Background Report (Appendix B). Where necessary, each section identifies changes (e.g., new information, regulatory changes) to the environmental and regulatory setting included in the Background Report that are relevant to understanding the 2040 General Plan’s potential impacts. No comments regarding geologic hazards were received in response to the notice of preparation (NOP). The NOP and comments on the NOP are included in Appendix A.

4.7.1 Background Report Setting Updates

REGULATORY SETTING

Chapter 11, “Hazards and Safety,” of the Background Report (Appendix B) accurately describes the regulatory setting for the purpose of this evaluation. Refer to Section 11.1, “Geologic and Seismic Hazards.” There is no additional information necessary to understand the potential geologic hazard impacts of the 2040 General Plan.

ENVIRONMENTAL SETTING

In addition to the information provided in Section 11.1, “Geologic and Seismic Hazards,” of the Background Report, the following information is relevant to understanding the potential geologic hazards impacts of the 2040 General Plan.

4.7.2 Environmental Impacts and Mitigation Measures

METHODOLOGY

This program-level analysis evaluates potential geologic hazards impacts based on the location and type of future development that could be accommodated under the land use designations and policies of the 2040 General Plan in relation to the location of existing

geologic hazards areas, including areas prone to fault rupture, seismic ground shaking or seismic-related ground failure such as liquefaction or lateral spreading, landslides, subsidence, soil erosion or loss of topsoil, expansive soil. The locations of existing geologic hazards areas are based on existing conditions described in the Background Report (Section 11.1 of Appendix B). The analysis in this section is also based on review of existing plans, use of online mapping tools, review of geographic information system (GIS) and other maps, and review of regulatory documents and requirements. Sources reviewed include U.S. Geological Survey, California Geological Survey (CGS), and various Area Plans.

In response to 2019 revisions to the State CEQA Guidelines (Public Resources Code Section 15126.2) and the 2015 California Supreme Court case, *California Building Industry Association v. Bay Area Air Quality Management District* (2015) 62 Cal.4th 369, impacts from exposure of a project to environmental hazards are not considered significant effects unless a project exacerbated the risks from such hazards. However, lead agencies retain the authority, separate and apart from CEQA, to include a review of potential impacts of the environment on a project when a project is undertaken by a lead agency, such as the 2040 General Plan. The 2040 General Plan is a comprehensive document that broadly establishes policy, not only related to the environment, but also related to public health and safety. Therefore, the analysis of geologic hazards in this section considers whether the 2040 General Plan could cause or exacerbate geologic hazards impacts and whether the 2040 General Plan could result in impacts from exposure to geologic hazards. The discussion of potential impacts from exposure to geologic hazards is provided for information purposes only and is neither required by CEQA nor subject to its requirements.

THRESHOLDS OF SIGNIFICANCE

As discussed in the “Approach to the Environmental Analysis” section, the thresholds used to determine the significance of the 2040 General Plan’s impacts are based on Ventura County’s adopted ISAG, which include threshold criteria to assist in the evaluation of significant impacts for individual projects. Appendix G of the State CEQA Guidelines also provides considerations for determining the significance of a project’s impacts, in the form of initial study checklist questions.

To develop thresholds of significance for this section of the draft EIR, the County has deviated from the ISAG threshold criteria, where appropriate, to appropriately consider the programmatic nature of a general plan for the entire unincorporated area and to incorporate the 2019 revisions to the Appendix G checklist.

Specifically, Appendix G question VII(b) was added as a threshold because impacts on soil erosion and the loss of topsoil are not addressed in ISAG. For the purpose of this draft EIR, implementation of the 2040 General Plan would have a significant geologic hazards impact if it would:

- ▶ Result in development within a State of California–designated Earthquake Fault Zone or a County–designated Fault Hazard Area that exposes people or structures to fault rupture hazards or directly or indirectly cause fault rupture.
- ▶ Result in development that conflicts with applicable requirements of the Ventura County Building Code and thus have potential to expose people or other structures to potential significant adverse effects, including the risk of loss, injury, or death involving ground-shaking hazards.

- ▶ Result in development within a State of California Seismic Hazards Zone that exposes people or structures to liquefaction hazards or directly or indirectly cause potential adverse effects, including the risk of loss, injury, or death involving liquefaction.
- ▶ Result in development that exposes people or structures to landslide or debris flow hazards as a result of mapped landslides, potential earthquake-induced landslide zones, and geomorphology of hillside terrain or directly or indirectly cause landslides.
- ▶ Result in development that exposes people or structures to the risk of loss, injury, or death involving soil expansion or directly or indirectly cause soil expansion if development is located within an expansive soils hazard zone.
- ▶ Result in development that exposes people or structures to the risk of loss, injury, or death involving subsidence or directly or indirectly cause subsidence if development is located within a subsidence hazard zone.

2040 GENERAL PLAN POLICIES AND IMPLEMENTATION PROGRAMS

Policies and implementation programs in the 2040 General Plan related to geologic hazards and, specifically, the thresholds of significance identified above, include the following:

- ▶ **Policy HAZ-4.1: Discretionary Development in Earthquake Fault-Rupture Hazard Areas.** The County shall prohibit habitable discretionary development in Earthquake Fault-Rupture Hazard Zones unless a geologic investigation is performed and appropriate and sufficient safeguards, based on this investigation, are incorporated into the project design. (RDR) *[Source: Existing Lake Sherwood/Hidden Valley Area Plan Policy 3.1.2.2, Oak Park Area Plan Policy 2.1.2.2, Ojai Valley Area Plan Policy 2.1.2.2, and Piru Area Plan Policy 2.1.2.2, modified]*
- ▶ **Policy HAZ-4.2: Linear Project Intersection with Active Faults.** The County shall require that linear projects, including roads, streets, highways, utility conduits, water transmission facilities, and oil and gas pipelines, avoid intersecting active faults to the extent possible. When such locations are unavoidable, the project design shall include measures to minimize the effects of any fault movement. (RDR) *[Source: Existing GPP Policy 2.2.2.5, modified]*
- ▶ **Policy HAZ-4.3: Structural Design.** The County shall require that all structures designed for human occupancy incorporate engineering measures to reduce the risk of and mitigate against collapse from ground shaking. (RDR) *[Source: Existing GPP Policy 2.3.2.1, modified]*
- ▶ **Policy HAZ-4.6: Vegetative Resource Protection.** The County shall require discretionary development to minimize the removal of vegetation to protect against soil erosion, debris flows, and landslides. (SO) *[Source: New Policy]*
- ▶ **Policy HAZ-4.8: Seismic Hazards.** The County shall not allow development of habitable structures or hazardous materials storage facilities within areas prone to the effects of strong ground shaking, such as liquefaction, landslides, or other ground failures, unless a geotechnical engineering investigation is performed and appropriate and sufficient safeguards, based on this investigation, are incorporated into the project design. (RDR) *[Source: Existing GPP Policy 2.4.2.1]*

- ▶ **Policy HAZ-4.9: Slope Development.** The County shall require geotechnical reports that demonstrate adequate slope stability and construction methods for building and road construction on slopes greater than 50 percent pursuant to the California Building Code Appendix J Section 108.6. (RDR) *[Source: New Policy]*
- ▶ **Policy HAZ-4.10: Development in Landslide/Debris Flow Hazard Areas.** The County shall not allow development in mapped landslide/debris flow hazard areas unless a geologic and geotechnical engineering investigation is performed and appropriate and sufficient safeguards, based on this investigation, are incorporated into the project design. (RDR) *[Source: Existing GPP Policy 2.7.2., modified]*
- ▶ **Policy HAZ-4.11: Alteration of Land in Landslide/Debris Flow Hazard Areas.** The County shall not allow alteration of land in landslide/debris flow hazard areas, including concentration of water through drainage, irrigation or septic systems, removal of vegetative cover, and undercutting of the bases of slopes or other grading activity unless demonstrated by geologic, geotechnical, and civil engineering analysis that the project will not increase the landslide/debris flow hazard. (RDR) *[Source: Existing GPP Policy 2.7.2.2]*
- ▶ **Policy HAZ-4.13: Design for Expansive Soils.** The County shall not allow habitable structures or individual sewage disposal systems to be placed on or in expansive soils unless suitable and appropriate safeguards are incorporated into the project design to prevent adverse effects. (RDR) *[Source: Existing GPP Policy 2.8.2.3, modified]*
- ▶ **Policy HAZ-4.15: Subsidence Hazard – Extraction Wells.** The County shall require that potential ground surface subsidence be evaluated prior to approval of new oil, gas, water or other extraction well drilling permits and appropriate and sufficient safeguards are incorporated into the project design and facility operation. (RDR) *[Source: Existing GPP Policy 2.9.2.1, modified]*
- ▶ **Policy HAZ-4.16: Subsidence and Hydroconsolidation Hazard – Structural Design.** Structural design of buildings and other structures shall recognize the potential for subsidence and hydroconsolidation and provide mitigation recommendations for structures that may be affected. (RDR) *[Source: Existing GPP Policy 2.9.2.2, modified]*
- ▶ **Policy HAZ-4.17: Earthquake Fault Hazard Zones.** The County should, where feasible, require that land in Earthquake Fault Hazard Zones and potentially active fault areas be designated Open Space or Agriculture on the General Land Use Diagram. (RDR) *[Source: Existing GPP Policy 2.2.2.4, modified]*

Oak Park Area Plan

- ▶ **Policy OP-65.2 Grading and Maintenance of Slopes Standards.** The County shall require all discretionary grading to be in accordance with the Grading and Maintenance of Slopes standards contained. *[Source: Existing Oak Park Policy 2.1.2.3]*

Ojai Valley Area Plan

- ▶ **Policy OJ-52.1 Seismic and Geologic Hazards.** The County shall require developers to provide all necessary information relative to seismic and geologic hazards which may affect their project. The County shall require the developer to specify how they intend to alleviate any and all identified hazards. *[Source: Existing Ojai Valley Policy 2.1.2.1]*

- ▶ **Policy P-60.2 Seismic and Geologic Hazard Mitigation.** The County shall prohibit development in seismic and geologic hazard areas where hazards cannot be mitigated without significant adverse environmental effects or where public expenditures for mitigating would not be cost-effective. *[Source: Existing Piru Policy 2.1.2.2]*
- ▶ **Policy P-60.3 Geologic-seismic Investigation Requirement.** The County shall require a geologic-seismic investigation be performed and reports submitted for the following types of projects located within the Piru Area of Interest:
 - (a) Essential facilities (e.g., hospitals, schools, major utility facilities, trunk lines, and storage facilities, etc.)
 - (b) High occupancy buildings (e.g., theaters, churches, etc.)
 - (c) Major projects (e.g., multi-story residential buildings, large commercial and industrial buildings and facilities, etc.) *[Source: Existing Piru Policy 2.1.2.3]*
- ▶ **Policy P-60.4 County Building Code Compliance.** The County shall require all development to the geologic and seismic requirements of the County's Building Code. *[Source: Existing Piru Policy 2.1.2.4]*

Lake Sherwood/Hidden Valley Area Plan

- ▶ **Policy LS-51.1 Seismic and Geologic Hazards Developers.** The County shall require developers to provide all necessary information relative to seismic and geologic hazards which may affect their project. The County shall require developers to specify how they intend to alleviate identified hazards. *[Source: Existing Lake Sherwood/Hidden Valley Policy 3.1.2.1]*

ENVIRONMENTAL IMPACTS AND MITIGATION MEASURES

Impact 4.7-1: Result in Development within a State of California-Earthquake Fault Zone designated by the Alquist-Priolo Earthquake Fault Zoning Act or a County-Designated Fault Hazard Area that Exposes People or Structures to Fault Rupture Hazards or Directly or Indirectly Causes Fault Rupture

As described Section 11.1, "Geologic and Seismic Hazards," of the Background Report, several earthquake faults in the county are classified as active or potentially active according to CGS's Regional Geologic Hazards and Mapping Program. The major faults and fault systems located in the county are the Malibu Coast Fault System, Oak Ridge Fault System, Pine Mountain Thrust Fault and Big Pine Fault, San Cayetano-Red Mountain-Santa Susana Fault System, Semi-Santa Rosa Fault System, and Ventura-Pitas Point Fault. (See Figure 11-1 of the Background Report for the location of these faults and fault systems.) Although it does not run through the county, the San Andreas Fault is located just north of the county's boundary, in some areas less than 1 mile away (Appendix B). Of the faults located within or just outside the county, the Oak Ridge Fault System, the San Andreas Fault System, the Ventura Pitas Point Fault are mapped by the Alquist-Priolo Earthquake Fault Zoning Act (California Department of Conservation 2019). The Malibu Coast Fault System, Oak Ridge Fault System, Pine Mountain Thrust Fault, Big Pine Fault, San Andreas Fault, San Cayetano-Red Mountain-Santa Susana Fault System, Simi-Santa Rose Fault System, and Ventura-Pitas Point Fault are designed in the County's Multi-Hazard Mitigation Plan.

The land use diagram of the 2040 General Plan would accommodate future development of relatively higher intensity residential, commercial, mixed use, and industrial land uses within the Existing Community area designation (boundary) and the Urban area designation (boundary). These are areas with existing residential, commercial, and/or industrial uses developed with urban building intensities generally located adjacent to the boundaries of incorporated cities or along highway corridors such as SR 33, SR 118, SR 126, and Highway 101. The residential, commercial, mixed use, and industrial land use designations of the 2040 General Plan would apply to approximately 1.2 percent of land in the unincorporated county. Potential uses within these designations include small- and large-lot detached single-family homes, one- to three-story attached single-family dwellings and lower density multifamily developments, mixes of commercial, office, residential, civic, and/or recreational uses, one- to two-story structures for retail and commercial services, and industrial employment-generating uses, such as production, assembly, warehousing, and distribution.

The Rural land use designation would allow for low-density and low-intensity land uses such as residential estates and other rural uses which are maintained in conjunction with agricultural and horticultural uses or in conjunction with the keeping of farm animals for recreational purposes, such as greenhouses, principal and accessory structures related to agriculture, and also oil and gas wells, and would apply to approximately 0.9 percent of land in the unincorporated county.

Approximately 97.1 percent of the unincorporated county would remain designated as either Open Space (approximately 88 percent) or Agriculture (approximately 9 percent) under the 2040 General Plan. The Open Space land use designation would allow low intensity development with a minimum parcel size of 10 acres and 1 dwelling unit per parcel. Other uses could include composting operations, greenhouses, correctional institutions, fire stations, and oil and gas wells. The Agriculture land use designation would allow for development of one dwelling unit per parcel and a minimum parcel size of 40 acres. Other uses could include greenhouses, principal and accessory structures related to agriculture, and composting operations. Proposed policies of the 2040 General Plan addressing flaring and trucking associated with new discretionary oil and gas wells could result in the construction and operation of new pipelines for the conveyance of oil, gas, or produced water.

Adverse effects that could occur from future development within active fault areas include introduction of people or structures to areas where ground shaking, and ground failure could occur as a result of an earthquake. Implementation of the 2040 General Plan would accommodate future development, including habitable structures and non-residential development, within the vicinity of active faults. Under the 2040 General Plan, land within fault areas would largely be designated as Open Space or Agricultural. The Open Space land use designation allows for a maximum of five percent building lot coverage on a legal lot, intensity of one dwelling unit per parcel, while the Agricultural land use designation allows for one dwelling unit per 40 acres as well as five percent building lot coverage on a legal lot. Additional designations for lands that may intersect with fault lines in the county are Very Low Density Residential, Low Density Residential, and Rural, as well as very limited Industrial land use designations which allow for 50 percent building lot coverage for a legal lot. Maximum density allowed under the above residential land use designations ranges from six dwelling units per acre to one dwelling unit per 2 acres.

Damage and injury resulting from ground shaking, fault rupture, and ground failure, would be substantially lessened through zoning and following building permit construction standards and

review procedures. New construction conforming to the standards of the Ventura County Building Code (Ventura County 2016), which includes the California Building Code (CBC), would provide adequate protection from seismic events through following structural design guidelines for the prevention of seismic hazards. Future development under the 2040 General Plan would be required by law to conform to the Ventura County Building Code, and thus the CBC. The building and safety division of the County ensures that all new construction complies with State and local codes and ordinances through issuing permits and conducting field inspections of construction work for compliance with codes (Ventura County 2019a). Proper engineering, including compliance with the Ventura County Building Code and CBC, would minimize the risk to life and property. Future development within the Coastal Area Plan zone would be required to comply with Hazards Goal 1 of the County's Coastal Area Plan, which requires all new development to evaluate and mitigate impacts from geologic hazards. Oil and gas development in these areas would be required to comply with Section 30262 of the California Coastal Act, which is referenced in the Coastal Area Plan and requires that oil and gas development is performed consistent with the geological conditions of the site (Ventura County 2017). Future development that would fall within the Oak Park Area Plan, Ojai Valley Area Plan, Piru Area Plan, and Lake Sherwood/Hidden Valley Area Plan would also be subject to additional requirements to reduce potential geotechnical hazards such as restricting development in areas where seismic and geologic hazards cannot be mitigated, and requiring mitigation to reduce all seismic and geotechnical hazards. More specifically, Policy OP-65.1 of the Oak Area Plan, Policy OJ-52.1 of the Ojai Valley Area Plan, Policy P-60.1 of the Piru Area Plan, and Policy LS-51.1 of the Lake Sherwood/Hidden Valley Area Plan require developers to provide all necessary information relative to seismic and geologic hazards which may affect their project and identify how to alleviate these hazards. Further, Policy P-60.2 of the Piru Area Plan restricts development in seismic and geologic hazard areas where hazards cannot be mitigated without significant adverse environmental effects or where public expenditures for mitigation would not be cost-effective, while Policy P-60.2 requires geologic-seismic investigation to be performed for certain types of projects like hospitals, schools, high-occupancy buildings, and major projects such as multi-story residential buildings, large commercial and industrial buildings, and facilities.

Furthermore, 2040 General Plan Policies HAZ-4.1, HAZ-4.2, HAZ-4.3, HAZ-4.8, and HAZ-4.17 minimize primary hazards associated with ground shaking, fault rupture, and ground failure by identifying areas subject to these hazards or risks and directing development away from high-risk areas or requiring structural design that addresses these potential risks. For instance, Policy HAZ-4.1 prohibits habitable structures in Earthquake Fault-Rupture Hazard Zones unless a geologic investigation is performed and appropriate and sufficient safeguards, based on this investigation, are incorporated into the project design. Policy HAZ-4.2 is specific to linear projects and requires these projects, such as water, oil, and gas pipelines, to avoid intersecting active faults to the extent possible and, if avoidance is not possible, implement project design that would minimize the effects of any fault movement. Policy HAZ-4.3 requires all structures for human occupancy to incorporate engineering measures to reduce the risk of and mitigate against collapse from ground shaking. Policy HAZ-4.8 restricts development of habitable structures in areas prone to the effects of ground shaking, unless a geotechnical engineering investigation is performed and appropriate and sufficient safeguards, based on this investigation, are incorporated into the project design. Lastly, Policy HAZ-4.17 requires that the County shall designate land in Earthquake Fault Hazard Zones and potentially active fault areas as Open Space or Agriculture land uses on the land use diagram of the 2040 General Plan. With implementation of these policies, adverse effects that could occur from future development

within active fault areas would be substantially lessened. Adherence to existing regulations would safeguard future development under the 2040 General Plan from seismic activity and require that development is sited away from State of California– Earthquake Fault Zone designated by the Alquist-Priolo Earthquake Fault Zoning Act County–Designated Fault Hazard Areas. The policies of the 2040 General Plan would further reduce the likelihood of impacts related to fault rupture, including ground shaking and ground failure. Implementation of the 2040 General Plan would not expose people or structure to fault rupture hazards, or directly or indirectly cause fault rupture. This impact would be **less than significant**.

Mitigation Measures

No mitigation is required for this impact.

Impact 4.7-2: Have Potential to Expose People or Structures to the Risk of Loss, Injury, or Death involving Ground-Shaking Hazards

As discussed in Impact 4.7-1, the 2040 General Plan would allow future development which could expose people or structures to potential risk of loss, injury, or death from ground-shaking hazards. However, as discussed for Impact 4.7-1, damage and injury resulting from future development within areas subject to ground-shaking hazards would be substantially lessened through building permit review procedures and construction standards. For instance, future development would be required to conform to the standards of the Ventura County Building Code, which includes the CBC, which would provide adequate protection from seismic events, including ground-shaking hazards. The building and safety division of the County ensures that future development complies with State and local codes and ordinances (Ventura County 2019a). Future development within the Coastal Area Plan zone would be required to comply with Hazards Goal 1 of the County’s Coastal Area Plan, which requires all new development to evaluate and mitigate impacts from geologic hazards. Oil and gas development in these areas would be required to comply with Section 30262 of California Coastal Act, also included in the County’s Coastal Area Plan, which requires that oil and gas development is performed consistent with the geological conditions of the site (Ventura County 2017). Development that would fall within the Oak Park Area Plan, Ojai Valley Area Plan, Piru Area Plan, and Lake Sherwood/Hidden Valley Area Plan would also be subject to additional requirements to reduce potential geotechnical hazards such as restricting development in areas where seismic and geologic hazards cannot be mitigated requiring mitigation to reduce all seismic and geotechnical hazards (Ventura County 2015; Ventura County 2011). To specifically address potential hazards resulting from ground shaking, Policies HAZ-4.3 and HAZ-4.8 require structural design measures and incorporation of other safeguards into project design to protect people and property from impacts related to seismic ground shaking. Adherence to existing regulations and implementation of 2040 General Plan policies would safeguard that future development does not result in risk of loss, injury or death involving ground-shaking hazards. This discussion of potential exposure to risk involving ground-shaking hazards is provided for information purposes only and is neither required by CEQA nor subject to its requirements.

Mitigation Measures

No mitigation is required for this impact.

Impact 4.7-3: Result In Development Within a State of California Seismic Hazards Zone that Exposes People or Structures to Liquefaction Hazards or Directly or Indirectly Cause the Risk of Loss, Injury, or Death Involving Liquefaction

Under the Seismic Hazards Mapping Act, the State of California has prepared Seismic Hazards Zone maps, which identify areas of liquefaction hazards, where landslides may occur during a strong earthquake. Areas with liquefaction potential have been identified throughout the county, particularly along the coast and associated with the Ventura River, the Santa Clara River and tributaries, and Calleguas Creek and tributaries (California Department of Conservation 2019). However, the most vulnerable locations are along the Santa Clara River and in the Oxnard Plain, especially the Preble and Olivas communities and Channel Island Harbor. Areas most prone to liquefaction are outlined in Figure 11-2 of the Background Report, in the County's Seismic Hazards Zone map for liquefaction, and the County's Multi-Hazard Mitigation Plan, and include areas surrounding Port Hueneme and Oxnard, and areas south of Ventura, as well as some areas north of Thousand Oaks and west of Moorpark (see Appendix B). Similarly, areas of the county are located within Seismic Hazard Zones for liquefaction hazards include unincorporated areas surrounding the Cities of Oxnard and Point Hueneme, as well as various areas surrounding the City of Thousand Oaks (CGS 2019).

Future development under the 2040 General Plan is described in Impact 4.7-1. Land use designations under the 2040 General Plan would largely be Open Space and Agricultural, with Residential, Mixed Use, Commercial, and Industrial land use designations concentrated within the Existing Community area designation and the Urban area designation. Land in the vicinity of the Santa Clara River and in the Oxnard Plain, where potential liquefaction hazards are most likely, and within areas mapped as Seismic Hazard Zones for landslide and liquefaction hazards would largely be designated Agricultural. However, there are some lands designated for other uses including Industrial, Commercial, Residential Beach, Rural, Very Low Density Residential, Low Density Residential, Medium Density Residential, and High Density Residential located within areas known to be prone to liquefaction and within Seismic Hazard Zone areas.

Nonetheless, the potential hazards associated with liquefaction and landslide in seismic hazard zones would be substantially lessened with building permit review procedures and construction standards, such as Ventura County Building Code and CBC requirements and CGS Special Publication 117A (CGS 2008). Measures such as soil improvement methods or removal or densification of liquefiable soils would be required for the design of individual future projects to reduce potential hazards from liquefaction. The Ventura County Building Code also requires a study of liquefaction potential for development within areas prone to liquefaction, and recommendations of this study shall be incorporated into project plans (Ventura County 2016). Furthermore, the 2040 General Plan includes policies intended to minimize the risks associated with seismic hazards, including liquefaction. More specifically, Policy HAZ-4.8 restricts development in liquefaction areas unless a geotechnical investigation is performed and appropriate and sufficient safeguards, based on this investigation, are incorporated into the project design. These policies would ensure that development is properly engineered to protect against potential liquefaction hazards.

Through adherence to requirements in the Ventura County Building Code, Special Publication 117A, and the Ventura County Building Code, all improvements and development would be designed to minimize potential risks related to liquefaction. Existing regulatory requirements specify mandatory and relatively prescriptive actions that must occur during project development and that would effectively reduce the inherent hazard. Adherence to existing

regulations and implementation of 2040 General Plan policies would ensure the risk of loss, injury or death from future development involving liquefaction would be reduced. This impact would be **less than significant**.

Mitigation Measures

No mitigation is required for this impact.

Impact 4.7-4: Result in Development that Exposes People or Structures to Landslide or Debris flow Hazards as a Result of Mapped Landslides, Potential Earthquake-Induced Landslide Zones, and Geomorphology of Hillside Terrain or Directly or Indirectly Cause Landslides

The County's Hazards GIS database incorporates maps that depict locations of past landslide events and potential landslides, as well as areas where landslides may occur during a strong earthquake (Potential Earthquake-Induced Landslide Zones). The term landslide is used for varying phenomenon, including debris flow. Thus, debris flow could occur in the same areas where landslide potential exists. As shown in these maps, areas of actual, potential, and earthquake-induced landslides are scattered throughout the county (Ventura County 2019b). According to the Background Report, landslides have occurred in areas along the Rincon Fault, hillsides south of the Santa Clara River, and the east side of the Ventura River. The community of La Conchita, located just southeast of the Santa Barbara County line, has historically and more recently experienced large landslides. Further, several areas of the County are mapped as landslide hazard zones, as classified by CGS and shown in Figure 11-3 of the Background Report. Overall, a large majority of land in the county is located in a Very High Landslide Susceptibility area, as mapped by CGS (Appendix B).

Future development under the 2040 General Plan is described in Impact 4.7-1. Because areas prone to landslides are located throughout the county, it is likely that future development under the 2040 General Plan could be located within areas with landslide hazard potential. Land use designations that would allow future development within Very High Landslide Susceptibility areas include Open Space, Agricultural, Rural, Very Low Density Residential, and Low Density Residential.

Landslides result from a wide range of combinations of natural rock, soil, or artificial fill and may occur because of indiscriminate development of sloping ground or the creation of cut-or-fill slopes in areas of unstable geologic conditions. Future development under the 2040 General Plan that could occur within relatively steep slopes could also provide additional loading, causing landslides or slope failure from unstable soils or geologic units. The potential risks of landslides would be addressed largely through the integration of geotechnical information in the planning and design process to determine the local soil suitability for specific projects in accordance with standard industry practices and State requirements, such as Ventura County Building Code and thus CBC requirements and CGS Special Publication 117A for liquefaction and landslide hazards in seismic hazard zones. For instance, measures such as special grading techniques can be used to prepare stable building lots by providing a means of removing and replacing weak soils, stabilize landslides, improve drainage, minimize ground shaking hazards such as lateral spreading and liquefaction, and reduce differential settlement in order to reduce potential landslide hazards (CGS 2008). Further, the Hazards and Safety Element includes various policies that further reduce potential landslide hazards. For instance, Policy HAZ-4.6 requires development to minimize removal of vegetation to protect against soil erosion, rock slides, and landslides. Policy HAZ-4.8 and Policy HAZ-4.10 would direct development away from areas

away from areas prone to landslides or mapped landslide/debris flow hazard areas, or require geotechnical engineering investigations and sufficient safeguards if development in these areas does occur. Policy HAZ-4.9 requires geotechnical reports that demonstrate adequate slope stability and construction methods for building and road construction on slopes greater than 50 percent. Lastly, Policy HAZ-4.11 would restrict the alteration of land in landslide/debris flow hazard areas, including concentration of water through drainage, irrigation or septic systems, removal of vegetative cover, and undercutting of the bases of slopes or other grading activity unless demonstrated by geologic, geotechnical, and civil engineering analysis that the project will not increase the landslide/debris flow hazard. These 2040 General Plan policies would substantially lessen the potential for adverse impacts from landslide hazards.

Therefore, although implementation of the 2040 General Plan could accommodate future development in areas of high landslide susceptibility, with adherence to regulations such as the Ventura County Building Code, including the CBC, Special Publication 117A, Ventura County Building Code requirements, and 2040 General Plan policies, future development would be designed to minimize potential risks related to landslide and debris flow hazards, and would not directly or indirectly cause landslides. This impact would be **less than significant**.

Mitigation Measures

No mitigation is required for this impact.

Impact 4.7-5: Result in Development that Exposes People or Structures to the Risk of Loss, Injury, or Death Involving Soil Expansion or Directly or Indirectly Cause Soil Expansion If Development Is Located within an Expansive Soils Hazard Zone or Where Soils with an Expansion Index Greater Than 20 is Present

The County's Hazards GIS database incorporates maps that show expansive soils hazard zones are present throughout the county. Most of the county is located within zones of medium expansive soil potential while areas with high expansive soil potential are scattered throughout the county, including areas surrounding Thousand Oaks and Simi Valley, Camarillo, Ojai, and areas south of Thousand Oaks and southeast of Port Hueneme (Ventura County 2019b).

Future development under the 2040 General Plan could occur within known expansive soils areas. Future development under the 2040 General Plan is described in Impact 4.7-1. Land use designations under the 2040 General Plan located in areas of high expansive soil potential include Rural, Very Low Density Residential, Low Density Residential, Medium Density, and Commercial.

Soils that exhibit expansive properties when exposed to varying moisture content over time could cause damage to foundations, walls, or other improvements located on those soils. Structures, including residential units and commercial buildings, could be damaged as a result of settlement where structures are underlain by expansive soils. However, future development under the 2040 General Plan would be required to comply with standard industry practices and State requirements, such as the CBC, also included in the Ventura County Building Code. Further, the Ventura County Building Code requires design standards such as special foundation design for development proposed within areas known to host critically expansive soils. Furthermore, the 2040 General Plan includes Policy HAZ-4.13, which would minimize risks associated with expansive soils by requiring geotechnical engineering investigations and incorporation of appropriate safeguards into the project design to prevent adverse effects from soil expansion. Future development under the 2040 General Plan could occur in areas where the expansion index is greater than 20. However, per Section 1803 of the Ventura County

Building Code, the classification and engineering properties of the soil at each building site shall be determined when required by the Building Official. When required by the Building Official, the expansive characteristics of soil shall be determined by procedures in accordance with Section 1803.3 of this Code and the soils shall be classified according to Table 1809.7 of the Ventura County Building Code. If expansive soils have been identified at a project site, foundations of structures shall require special design considerations in accordance with Section 1808.6 of the Ventura County Building Code. Thus, with compliance with existing regulations, impacts would be **less than significant**.

Mitigation Measures

No mitigation is required for this impact.

Impact 4.7-6: Result in Development that Expose People or Structures to the Risk of Loss, Injury, or Death Involving Subsidence or Directly or Indirectly Cause Subsidence If Development Is Located within a Subsidence Hazard Zone

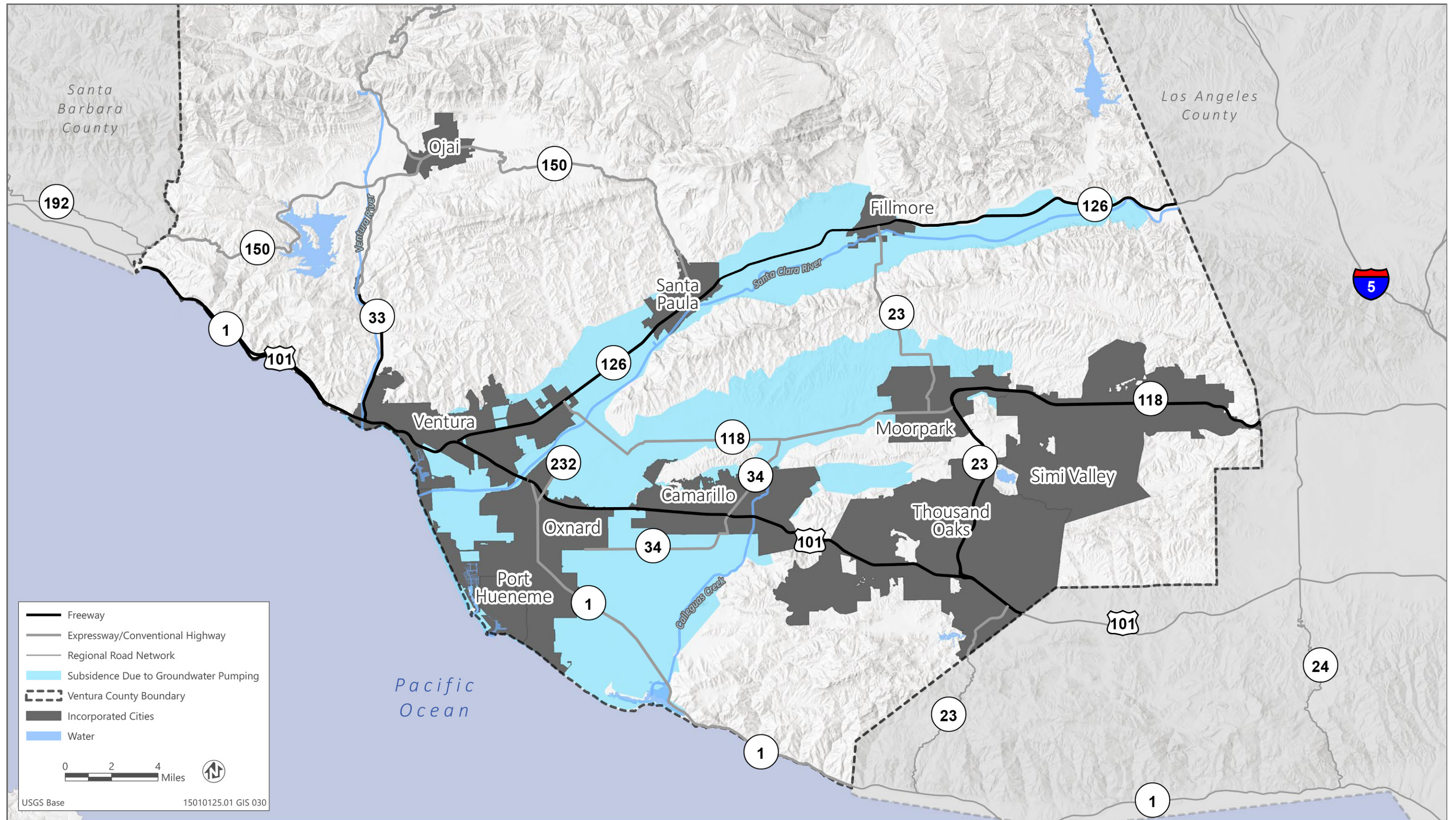
Subsidence is any settling or sinking of the ground surface over a regional area arising from surface or subsurface causes, such as earthquakes or fluid or gas extraction. The most common type of subsidence occurs involves the extraction of a large quantity of water from an unconsolidated aquifer. Subsidence can result in structural damage to buildings if they are not properly designed. As shown on Figure 4.7-1, subsidence hazard zones include the Santa Clara River Valley, Oxnard Plain, and Las Posas Valley. These areas experience subsidence because of groundwater extraction. Future development under the 2040 General Plan could occur within these subsidence areas. Future development under the 2040 General Plan is described in Impact 4.7-1.

Land prone to subsidence in the vicinity of the Santa Clara River and in the Oxnard Plain would be designated primarily Agricultural under the 2040 General Plan. However, areas known to be prone to subsidence located in subsidence hazard zones, including along the Santa Clara River, Ventura River, and surrounding Port Hueneme, Oxnard, and the southwestern portion of Camarillo include Agricultural, Open Space, Rural, Industrial, Commercial, Residential Beach, Very Low Density Residential, Low Density Residential, Medium Density Residential, and High Density Residential land use designations.

The risk of damage and injury resulting from future development within areas prone to subsidence or areas related to oil, gas, or groundwater withdrawal would be substantially lessened through building permit review procedures and construction standards. Future development must conform to the standards of the Ventura County Building Code, which includes the CBC. Policy HAZ-4.15 requires that potential ground surface subsidence be evaluated for new oil, gas, water or other extraction well drilling permits and that appropriate and sufficient safeguards are incorporated into project design and facility operation. Policy HAZ-4.16 requires that structural design of buildings and other structures shall recognize the potential for subsidence and hydroconsolidation and provides mitigation recommendations for structures that may be affected. Compliance with the CBC, the Ventura County Building Code, and 2040 General Plan policies would substantially lessen the risk of loss, injury, or death associated with future development located within a subsidence hazard zone, and safeguard future development from direct or indirect cause subsidence. This impact would be **less than significant**.

Mitigation Measures

No mitigation is required for this impact.



Source: Data adapted from USGS in 2019

Figure 4.7-1 Subsidence Due to Groundwater Pumping