4.6 GEOLOGY AND SOILS

SECTION 4.0

4.6 GEOLOGY AND SOILS

This Draft Environmental Impact Report (Draft EIR) section considers the potential for the North Canyon Ranch residential subdivision and Required Island Annexations project to result in impacts with regard to geology and soils, and identifies opportunities to avoid, reduce, or otherwise mitigate potential significant impacts, where warranted.

This analysis consists of a description of the existing conditions at the proposed project site and surrounding area, a summary of the regulatory framework that guides the decision-making process, thresholds for determining if the proposed project would result in significant impacts, anticipated impacts (direct, indirect, and cumulative), mitigation measures, and residual impacts (i.e., level of significance after mitigation). The significance of project impacts has been determined in accordance with Appendix G of the CEQA Guidelines, and additional regulatory agency requirements, where they apply. Sources used in the analysis are cited herein where relevant to the analysis; comprehensive list of references is provided Section 7.0, Organizations and Persons Consulted and References, of this Draft EIR. The key project-related reports and materials to support this geology and soils analysis are provided in **Appendix F, Geotechnical Reports**[1,2,3,4] with additional reports on file with the City.

As shown in **Table 4.6-1, Site-Specific Geology and Soils Reports**, updates, and addenda have been prepared to analyze the geologic and soil composition characteristics of the project site and in some cases document small changes in the project design over time. These multiple evaluations of the project site over the years provide a large body of information on which the City Engineer's review of the project design proposal is based, and later geology evaluations refer to and augment earlier ones. Unless noted otherwise, this Draft EIR Section is based on the Preliminary Geotechnical Investigation dated January 10, 2007 prepared by Geolabs-Westlake Village and the Update Geotechnical Report dated September 14, 2018, prepared by Geolabs-Westlake Village; these documents and the other asterisked ones in Table 4.6-1, are provided in Appendix F.

Table 4.6-1
Site-Specific Geology and Soils Reports

Preparer	Report Title	Date
Construction Testing & Engineering, Inc.	As-Graded Report, Mass Grading of Unocal Project Site, Ventura County, California, CTE Job No. 30-0599	September 26, 2005
Construction Testing & Engineering, Inc.	Addendum 1 to As-Graded Report, Mass Grading of Unocal Project Site, Ventura County, California, CTE Job No. 30-0599	October 15, 2006
Geolabs-Westlake Village	Preliminary Geotechnical Investigation, Tentative Tract 5658, North Canyon Ranch	January 10, 2007
Construction Testing & Engineering, Inc.	Addendum 2 to As-Graded Report, Mass Grading of Unocal Project Site, Ventura County, California, CTE Job No. 30-0599	February 8, 2007

[1] GeoLabs, Update Geotechnical Report, Tentative Tract Map 5658-A, North Canyon Ranch, City of Simi Valley, California, September 14, 2018.
[2] GeoDynamics, Inc., Approval of Geolabs-Westlake Village (2019b) Response #7 to Engineering Geology and Geotechnical Engineering Review, Tentative Tract Map 5658, North Canyon Ranch, City of Simi Valley, County of Ventura, California," W.O.: 8980, dated May 15, 2019, July 26, 2019.
[3] GeoLabs, Offsite Slope South of TT 5658 North Canyon Ranch Project, City of Simi Valley, California, August 11, 2019.
[4] GeoLabs, Draft CEQA Responses, April 8, 2022.

Preparer	Report Title	Date
Geolabs-Westlake Village	Response to Engineering Geology and Geotechnical Engineering Review, Tentative Tract 5658, North Canyon Ranch, City of Simi Valley, County of Ventura, California	June 30, 2008
Geolabs-Westlake Village	Response to Engineering Geology and Geotechnical Engineering Review, Tentative Tract 5658, North Canyon Ranch, City of Simi Valley, County of Ventura, California	January 29, 2010
Geolabs-Westlake Village	Response to Engineering Geology and Geotechnical Engineering Review, Tentative Tract 5658, North Canyon Ranch, City of Simi Valley, County of Ventura, California	March 19, 2010
Geolabs-Westlake Village	Response to Engineering Geology and Geotechnical Engineering Review, Tentative Tract 5658, North Canyon Ranch, City of Simi Valley, County of Ventura, California	November 24, 2010
Geolabs-Westlake Village	Evaluation of Geotechnical Feasibility, Proposed Apartment Construction, Portion TT 5658, City of Simi Valley, California	February 15, 2012
Geolabs-Westlake Village	Estimated Limits of Grading for Geotechnical Mitigation, Tentative Tract Map 5658, City of Simi Valley, California	September 5, 2012
Geolabs-Westlake Village	Update Geotechnical Report, Tentative Tract Map 5658, North Canyon Ranch, City of Simi Valley, California	March 24, 2016
Geolabs-Westlake Village	Response #5 to Engineering Geology and Geotechnical Engineering Review, Tentative Tract 5658, North Canyon Ranch, City of Simi Valley, County of Ventura, California	July 29, 2016
*Geolabs-Westlake Village	Update Geotechnical Report, Tentative Tract Map 5658-A, North Canyon Ranch, Simi Valley, California	September 14, 2018
Geolabs-Westlake Village	Response #6 to Engineering Geology and Geotechnical Engineering Review, Tentative Tract 5658, North Canyon Ranch, City of Simi Valley, County of Ventura, California	January 4, 2019
Geolabs-Westlake Village	Response #7 to Engineering Geology and Geotechnical Engineering Review, Tentative Tract 5658, North Canyon Ranch, City of Simi Valley, County of Ventura, California	May 15, 2019
*GeoDynamics, Inc.	Approval of Geolabs-Westlake Village (2019b) Response #7 to Engineering Geology and Geotechnical Engineering Review, Tentative Tract Map 5658, North Canyon Ranch, City of Simi Valley, County of Ventura, California," W.O.: 8980, dated May 15, 2019.	July 26, 2019
*Geolabs-Westlake Village	Offsite Slope South of TT 5658 North Canyon Ranch Project, City of Simi Valley, California	August 11, 2019
*Geolabs-Westlake Village	GeoLabs Draft CEQA Analysis	April 8, 2022
* Report provided in Appendix F of this Draft EIR.		

The issue of paleontological resources, listed under Geology and Soils in the current CEQA Checklist, is addressed in the project Cultural Resources reports (Appendix E), beginning when the topic of paleontological resources was included in the Cultural Resources portion of the Checklist. As the impacts and mitigation measures of those reports collectively address both issues, the issue of paleontological resources is addressed in Draft EIR Section 4.5, Cultural and Tribal Cultural Resources.

4.6.1 Existing Conditions

The environmental setting and regulatory setting, below, establish existing conditions relevant to the project. The analysis of project impacts is based upon these baseline conditions.

Environmental Setting

The environmental setting of the vicinity is the Transverse Ranges geomorphic province of southern California. The Transverse Ranges are east-west trending elongate mountain ranges and valleys that are geologically complex. Structurally, the province reflects the north-south compressional forces resulting from a bend in the San Andreas Fault. As the Pacific Plate on the westerly side of the San Andreas Fault and the North American Plate on the easterly side of the fault move past one another along the fault line, the bend creates a deflection which allows for large accumulations of compressional energy. Some of these forces are spent in deforming the crust into roughly east-west trending folds and secondary faults. Typically, reverse or thrust faults are the most significant of these faults, which allow for the crustal shortening taking place regionally.

Various regional mapping identifies the bedrock at the subject site as late Eocene (56 million - 33.9 million years) to Oligocene (33.9 million to 23 million years) Sespe Formation. Based on field mapping and boring sample observations, the bedrock underlying the project site is likely the middle member of the Sespe formation as defined by Irvine, consisting predominately of non-marine sandstone and claystone. Sediments at the surface are late Holocene (the last 11,700 years of Earth's history) deposits consisting of alluvium, earth material deposited by flowing water, and colluvium, debris that accumulate at the base of a slope by mass wasting or sheet erosion, collectively labeled "Qal" on geologic maps.

Project Site

The project applicant has proposed Tentative Map (TM) 5658-A on a 160-acre site located north of State Highway 118 in Simi Valley, California. The site is bordered to the south by the existing Simi Valley Town Center Mall development to the south, vacant hillside property to the north, vacant hillside property to the west, First Street to the southwest, and the existing Big Sky Residential development to the east and northeast approximately 1,000 feet west of Erringer Road. The environmental setting of the project site consists of four prominent south-draining canyons with intervening ridgelines generally trending north-northwest. These canyons merge into two primary south-flowing drainages in the southern reaches of the site.

Previous disturbance of the site consists of compacted fill placed to construct large sheet-graded areas in the southernmost reaches of the canyons including areas adjacent to the Simi Valley Town Center, construction of two storm water basins for the two primary drainages abutting the Simi Valley Town Center site, grading of several cut slopes, and partial removal and re-compaction of a large landslide (Qls 1). All previous grading is related to development of the Simi Valley Town Center adjacent to the proposed project site. The proposed project site was used for the disposal of excess fill material generated by grading for the Simi Valley Town Center site. At the time of the grading, Geolabs-Westlake Village understands the fill was placed to approximate the future "planned" grade elevation anticipated at that time. The remainder of the proposed project site is predominately undisturbed with native plant cover. Natural slope gradients on the site generally range from 5:1 to 2:1 (horizontal to vertical) with local areas steeper than 1-1/2 to 1.

The United States Department of Agriculture (USDA), Natural Resources Conservation Service National Cooperative Soil Survey identifies the site soils as Calleguas very channery loam, Los Osos clay loam, Nacimiento silty clay loam, Pico sandy loam, Rincon silty clay loam, Riverwash, San Andreas sandy loam,

Soper loam, and Soper gravelly loam.[5] The North Canyon Ranch site is not located within a State of California Alquist-Priolo Earthquake Fault Zone.[6,7] Annexation Area 3 and portions of Annexation Areas 1, 2, 4, 5, 6 are within a State of California Alquist-Priolo Earthquake Fault Zone, while Annexation Areas 7, 8, and 9 are not within a State of California Alquist-Priolo Earthquake Fault Zone.[8,9]

The site is underlain by non-marine sandstone rocks covered by surficial earth materials. The geologic units present on the site are Sespe bedrock, quaternary alluvium deposits, native soils derived from the bedrock consisting of sandy loam to silty clay loam, fill from past grading for the Simi Valley Town Center, and quaternary landslide debris. The geologic units are described as follows:

Fill (af)

Past extensive grading on site during construction of the Simi Town Center resulted in the presence of artificial fill.

Quaternary Alluvium Deposits

Alluvial deposits occupy the canyon bottoms on the site. Alluvium is weathered bedrock material that has eroded from natural ascending slopes and has accumulated in the generally flat lying areas. Alluvium primarily consists of sandy loam to silty clay loam.

Quaternary Landslide Debris (Qls)

The site contains existing landslides that were mapped by Geolabs-Westlake Village.

Tertiary Sespe Formation (Ts)

Bedrock exposed onsite and underlying the Holocene deposits is assigned to the Sespe Formation of the Late Eocene (56 million - 33.9 million years) to Oligocene (33.9 million to 23 million years). It consists of a non-marine sandstone rock.

Required Island Annexations

Island Annexation Areas 1, 4, 5, 6, 7, and 8 are located on the valley floor and are relatively flat. Annexation Area 2 contains hillsides at the northern edge of the valley and some relatively flat areas of the valley floor. Annexation Areas 3 and 9 are located on hillsides at the northern and eastern edges of the valley, respectively.

Island Annexation Area 6 contains designated important farmland, as discussed in Section 4.2, Agricultural Resources and Open Space. Annexation Area 8 includes Sinaloa Lake, an artificial reservoir with an earthen dam. The majority of Annexation Area 9 (7.90 acres) is owned by the Rancho Simi Recreation and Park District and designated Community Park in the County General Plan, and the remainder (1.14 acres) is in private ownership and is pre-zoned as Residential Estate Density (RE). As Annexation Area 9 consists of

[5] The United States Department of Agriculture, Natural Resources Conservation Service, National Cooperative Soil Survey Accessed on February 6, 2024 at: https://websoilsurvey.sc.egov.usda.gov/WssProduct/2aoelc0si20cenfrs55lytte/2aoelc0si20cenfrs55lytte/20240206_12564812240_32_Soil_Map.pdf

[6] California Geological Survey, April 7, 1997 & May 1, 1999; Earthquake Zones of Required Investigation Simi Valley West Quadrangle, 1:24,000.

[7] Ventura County, County View, Accessed on February 28 at: https://maps.ventura.org/countyview/

[8] California Geological Survey, April 7, 1997 & May 1, 1999; Earthquake Zones of Required Investigation Simi Valley West Quadrangle, 1:24,000.

[9] Ventura County, County View, Accessed on February 28 at: https://maps.ventura.org/countyview/

hillside open space with prominent rock outcroppings and boulders, it is reasonable to assume that Annexation Area 9 could not likely be developed in the foreseeable future. No development of any of the parcels in the Islands is proposed at this time.

As depicted in the Ventura County Geographic Information Systems (GIS) viewer, the entirety of Island Annexation Area 3 and portions of Annexation Areas 1, 2, 4, 5, and 6 are within the Simi/Santa Rosa Fault Zone.[10,11] The two potentially developable parcels within Annexation Area 3 are within the Simi/Santa Rosa Fault Hazard Zone.[12] Portions of Annexation Areas 1, 2, 3, 5, 6 are within a liquefaction zone. Portions of Island Annexation Areas 1 and 6 are within known or potential landslide zones, as shown in the County GIS viewer.[13,14] A portion of Annexation Area 8 generally corresponding to Sinaloa Lake, portions of Area 7, and portions of Area 9 are depicted within a liquefaction zone.[15,16]

Regulatory Setting

Federal

There are no federal regulations that are applicable to the analysis of project geologic resources; impacts pertaining to geology and soils are reduced through compliance with the following state and local statutes and policies.

State

Geological Survey

The California Geological Survey (CGS) is a state agency within the Department of Conservation responsible for enforcing the Alquist-Priolo Earthquake Fault Zoning Act and the Seismic Hazards Mapping Act described below.[17]

Alquist-Priolo Earthquake Fault Zoning Act

The Alquist-Priolo Earthquake Fault Zoning Act, (formerly called the Alquist-Priolo Special Studies Zones Act)[18] is administered by the CGS, was enacted in 1972 to mitigate the hazard of surface faulting to structures for human occupancy, which are defined as any structure used or intended for supporting or sheltering any use of occupancy that is expected to have a human occupancy rate of more 2,000 person-hours per year. The main purpose of the Act is to prevent the construction of buildings used for human occupancy on the surface trace of active state faults. The law requires the State Geologist to establish regulatory zones (known as Earthquake Fault Zones or Special Studies Zones) around the surface traces of active faults and to issue appropriate maps. The maps are distributed to all affected cities, counties, and state agencies for their use in planning and controlling new or renewed construction. Local agencies must regulate most development projects within the zones. Projects include all land divisions and most structures

[10] City of Simi Valley, General Plan Safety and Noise Chapter, Updated 2021, Figure S-2: Seismic and Geological Hazards.
[11] County of Ventura, GIS Viewer, Hazards, Earthquake Fault Hazard, Accessed February 27, 2024. Viewer available at: https://maps.ventura.org/countyview/
[12] Ibid.
[13] Ibid.
[14] California Geological Survey, April 7, 1997 & May 1, 1999; Earthquake Zones of Required Investigation Simi Valley East Quadrangle, 1:24,000.
[15] City of Simi Valley, General Plan Safety and Noise Chapter, Updated 2021, Figure S-2: Seismic and Geological Hazards.
[16] California Geological Survey, April 7, 1997 & May 1, 1999; Earthquake Zones of Required Investigation Simi Valley West Quadrangle, 1:24,000.
[17] California Geological Survey (CGS) was previously known as the California Division of Mines and Geology (CDMG). The change in the agency name took place in January 2002.
[18] Public Resources Code Section 2621, *et seq*. The Alquist-Priolo Special Studies Zones Act became effective in 1972. In 1994, it was renamed the Alquist-Priolo Earthquake Fault Zoning Act.

for human occupancy. Single-family wood-frame and steel-frame dwellings up to two stories not part of a development of four units or more are exempt. In compliance with the California Building Standards Code (CBSC) (see below), before a project can be permitted, cities and counties must require a geologic investigation to demonstrate that proposed buildings will not be constructed across active faults. An evaluation and written report of a specific site must be prepared by a licensed geologist. If an active fault is found, a structure for human occupancy cannot be placed over the trace of the fault and must be set back from the fault (generally 50 feet).

The State of California designated the Simi–Santa Rosa fault as an active fault in 1999 with the establishment of an Earthquake Fault Zone following completion of a Fault Evaluation Report prepared by the CGS. Simi Valley recognizes this with a local "Fault Hazard Zone" designation along the Simi–Santa Rosa Fault; no structures are permissible on fault traces in this zone.[19,20]

Seismic Hazards Mapping Act

The CGS's Seismic Hazards Mapping Act[21] directs the CGS, an agency within the California Department of Conservation, to identify and map areas prone to earthquake hazards of liquefaction, earthquake-induced landslides and amplified ground shaking. The purpose of the Seismic Hazards Mapping Act is to reduce the threat to public safety and minimize the loss of life and property by identifying and mitigating seismic hazards. In accordance with the California Seismic Hazard Mapping Act, all development within the State-designated liquefaction hazard zones must perform site-specific geotechnical investigations before construction to assess the potential for liquefaction under strong earthquake conditions and provide mitigation measures as necessary.

The Seismic Hazards Mapping Act governs the exercise of city, county, and state agency responsibilities to identify and map seismic hazard zones and to mitigate seismic hazards to protect public health and safety in accordance with the provisions of Public Resources Code (PRC) Sections 2690, et seq. The intent of these regulations is to protect the public from the effects of strong ground shaking, liquefaction, landslides, ground failure, or other hazards caused by earthquakes. In addition, the California Geological Survey's Special Publications 117, "Guidelines for Evaluating and Mitigating Seismic Hazards in California," provides guidance for the evaluation and mitigation of earthquake-related hazards for projects within designated zones of required investigations, including seismic hazard zones within the Simi Valley Planning Area.

California Building Standards Code

The State of California provides a minimum standard for building design through the CBSC. The 2022 CBSC is the latest version, and it is periodically updated. Proposed projects within the City must comply with the building code in effect at the time of review. The various CBSC requirements are based on the International Building Code (IBC), with some modifications. Construction activities are subject to occupational safety standards for excavation, shoring, and trenching as specified in California Occupational Safety and Health Administration (Cal-OSHA) regulations.[22] Standard residential, commercial, and light industrial construction is governed by the CBSC, to which cities and counties may add amendments.

[19] City of Simi Valley, General Plan Safety and Noise Chapter, Updated 2021, Figure S-2: Seismic and Geological Hazards.
[20] The fault trace is the location where a fault reaches the surface, and the term also refers to the line representing a fault that is shown on geological maps, as defined in United States Geological Survey, Earthquake Hazards Program, Earthquake Glossary, Accessed on April 18, 2022 at https://earthquake.usgs.gov/learn/glossary/?term=fault%20trace
[21] Public Resources Code Section 2690, *et seq*.
[22] California Code of Regulations, Title 24, Part 8, "California Historical Building Code."

In addition, the CBSC regulates excavation, foundations, and retaining walls; contains specific requirements pertaining to site demolition, excavation, and construction to protect people and property from hazards associated with excavation cave-ins and falling debris or construction materials; and regulates grading activities, including drainage and erosion control. Construction activities are subject to occupational safety standards for excavation, shoring, and trenching as specified in the Cal-OSHA regulations.

Regional and Local

Simi Valley General Plan

The City's General Plan is comprised of nine elements, including a Safety and Noise Chapter (which fulfills the state requirements for General Plan Safety and Noise Elements), which includes the following policies for seismic and geotechnical hazards to reduce risk from natural and man-made hazards that would be applicable to the project:[23] Policy S 1-4.3 of the Safety and Noise Chapter requires geotechnical investigation for residential and commercial properties to identify construction methods to protect them from known seismic hazards. Ventura County's General Plan Safety Chapter identifies zones of earthquake induced liquefaction hazard within the project development area and zones of earthquake induced landslide hazard on the project site, but outside the project development area.[24]

4.6.2 Thresholds of Significance

The potential for the proposed project to result in impacts related to geology and soils has been analyzed in relation to the thresholds below, as established in the CEQA Guidelines Appendix G Checklist. The proposed project would be considered to have a significant impact related to geology and soils when the proposed project has potential to:

- Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:
    - 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 active fault trace. (***Fault Rupture Risk***)
    - Strong seismic ground shaking. (***Seismic Ground Shaking Risk***)
    - Seismic-related ground failure, including liquefaction and lateral spreading. (***Seismic Ground Failure Risk***)
    - Landslides. (***Landslide Risk***)
- Result in substantial soil erosion or the loss of topsoil. (***Erosion***)
- 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. (***Geologic Stability***)
- Be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating substantial direct or indirect risks to life or property. (***Expansive Soil***)
- Have soils incapable of adequately supporting the use of onsite wastewater treatment systems where sewers are not available for the disposal of wastewater. (***Septic Tanks or Wastewater Disposal Systems***)

[23] City of Simi Valley, Safety and Noise Chapter, Updated 2021.
[24] City of Simi Valley, General Plan Safety and Noise Chapter, Updated 2021, Figure S-2: Seismic and Geological Hazards

As noted in the introduction to this section, please see Section 4.5, Cultural and Tribal Cultural Resources, for a discussion of the issue of paleontological resources.

4.6.3 Project Impacts and Mitigation Measures

The proposed project grading would disturb, displace, cover, remove, and compact the site's natural rock and soils and previously placed artificial fill materials to create stable pads for construction of the proposed residences, streets, and other improvements. The geological studies prepared for the property (Appendix F), include technical analysis of the soil materials and conditions of the site and provide recommendations for remediation actions with respect to ensuring stability and safety for residential occupation of the site, including under anticipated seismic activity.

4.6.3.1 Fault Rupture Risk

North Canyon Ranch

A significant impact may occur if the proposed project were to directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving 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.

Alquist-Priolo Earthquake zones have been established throughout California by the CGS. These zones identify areas where potential surface rupture along an active fault could prove hazardous and identify where special studies are required to characterize the fault rupture hazard potential to habitable structures.[25] Known active faults near the subject site include the Simi-Santa Rosa fault system whose main trace[26] is approximately 1,200 feet south of the site. This fault is considered active, and a special studies zone has been established around the fault trace.[27] North of the main trace, eight subsidiary faults were defined during an investigation for the mall site,[28] located south of and adjacent to the subject site. Of these, two faults trend across the subject site. These faults were conclusively proven to be inactive faults on the mall site[29] and are therefore not a constraint to development of the project. Impacts would be less than significant.

Required Island Annexations

As previously discussed, the entirety of Annexation Area 3 and portions of Annexation Areas 1, 2, 4, 5, and 6 are within the Simi/Santa Rosa Fault Zone. The two potentially developable parcels within Annexation Area 3 are within the Simi/Santa Rosa Fault Hazard Zone. No development of the Annexation Areas is proposed at this time. Any new development in these areas would be subject to the provisions of the Alquist-Priolo Earthquake Fault Zoning Act, such as setbacks. Geotechnical investigation would be required when and if development is proposed. As development of these areas is speculative and is not a part of this project, there would be no impacts as a result of the project.

[25] California Geological Survey, April 7, 1997 & May 1, 1999; Earthquake Zones of Required Investigation Simi Valley West Quadrangle, 1:24,000.

[26] A fault trace is where a fault reaches the surface; the term also refers to the line representing the fault on geologic maps, as defined in U.S. Geological Survey – Earthquake Hazards Program: Earthquake Glossary: "fault trace", accessed on April 18, 2022, at https://earthquake.usgs.gov/learn/glossary/?term=fault trace

[27] California Geological Survey, 2018; Special Publication 42, Earthquake Fault Zones, A Guide for Government Agencies, Property Owners / Developers, and Geoscience Practitioners for Assessing Fault Rupture Hazards in California and Geolabs-Westlake Village, April 8, 2022, CEQA Geology and Soils Responses.

[28] Bing Yen & Associates, Inc., February 21, 2003; Report of Feasibility-Level, Geotechnical Study, Proposed Simi Valley Town Center, Simi Valley, California, Vol. I and II, Project No. 49.25035.0074 and Geolabs-Westlake Village, April 8, 2022, CEQA Geology and Soils Responses.

[29] Ibid.

Residual Impacts

Impacts would be less than significant before mitigation.

4.6.3.2 Seismic Ground Shaking Risk

North Canyon Ranch

A significant impact may occur if the proposed project were to directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking.

The Simi-Santa Rosa fault could create substantial ground shaking if a seismic event occurred along the fault. Similarly, a strong seismic event on any other fault system in southern California has the potential to create considerable levels of ground shaking throughout the region. However, all new structures would be required to comply with all applicable provisions of the current CBSC. As a result, the exposure of people or structures to significant adverse effects resulting from strong seismic ground shaking would be less than significant for CEQA purposes.

Required Island Annexations

No development of the Annexation Areas is proposed at this time. Any potential new structures proposed in the Annexation Areas would be required to comply with all applicable provisions of the current CBSC. As development of these areas is speculative and not a part of this project, no impact would occur with regard to the exposure of people or structures to significant adverse effects resulting from strong seismic ground shaking.

Residual Impacts

Impacts would be less than significant without the need for mitigation.

4.6.3.3 Seismic Ground Failure Risk

North Canyon Ranch

A significant impact may occur if the proposed project were to directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving seismic-related ground failure, including liquefaction.

Liquefaction is a condition where the soil undergoes continued deformation at a constant low residual stress due to the build-up of high porewater pressures. The possibility of liquefaction occurring at a given site is dependent upon the occurrence of a significant earthquake in the vicinity; sufficient groundwater to cause high pore pressures; and on the grain size, relative density, and confining pressures of the soil at the site.

Subsurface studies conducted at the site indicate groundwater is not present within the upper fifty feet of the soil profile in the alluvium.[30] As a result, the exposure of people or structures to significant adverse effects resulting from liquefaction would be less than significant.

Seismic compression is a condition where loose soils are rearranged into a denser packing by seismic ground shaking. The possibility of seismic compression occurring at a given site is dependent upon the

[30] Geolabs-Westlake Village, January 10, 2007; Preliminary Geotechnical Investigation, Tentative Tract 5658, North Canyon Ranch, City of Simi Valley, County of Ventura, California and Geolabs-Westlake Village, April 8, 2022, CEQA Geology and Soils Responses.

occurrence of a significant earthquake in the vicinity; and on the grain size and relative density of the soil at the site. This condition can occur with or without liquefaction.

As discussed above, adverse effects resulting from liquefaction would be less than significant. Site specific studies have indicated the potential for significant seismic compression.[31]

To address these issues, the developers of the project would need to abide by the geologist's recommendations for various corrective measures, including, undocumented stockpile and fill removal, soil removal at prior grading area for a previously anticipated but not completed development project, and landslide removal (also discussed in Section 4.6.3.4). These recommendations, as may be modified in the final Geotechnical Study to be reviewed and approved by the City Engineer prior to project construction, are reflected in mitigation measures **GEO-1** and **GEO-2**. These mitigation measures that ensure compliance with the final Geotechnical Study will reduce the potential for significant adverse effects resulting seismic compression to less than significant.

Required Island Annexations

Portions of Island Annexation Areas 1, 2, 3, 5, and 6 are within a liquefaction zone. A portion of Annexation Area 8 generally corresponding to Sinaloa Lake, portions of Area 7, and portions of Area 9 are within a liquefaction zone. One of the developable parcels within Area 3 is partially within a liquefaction zone. No development of the Annexation Areas is proposed at this time. When and if development is proposed, geotechnical investigation would be required where determined necessary by the Building Officer. As development of these areas is speculative and is not a part of this project, there would be no impacts as a result of the project.

Mitigation Measures

MM GEO-1: Removal and Recompaction Recommendation of Final Geotechnical Study

Recommendations presented in the final Geotechnical Study must be incorporated at the project site, as needed to the satisfaction of the City Engineer. These recommendations include removal of alluvial deposits extending to bedrock in the west and central valleys and to depths of 20 feet below ground surface in the east valley. This material must be replaced with compacted fill in accordance with the compaction standards and grading criteria for placement of engineered fill contained in the Geotechnical Study, and compliant with California Department of Toxic Substance Control's October 2001 Clean Imported Fill Material Information Advisory Guidelines.

MM GEO-2: Seismic Compression Recommendation of Final Geotechnical Study

Additional exploration and analyses must be conducted before a grading plan is submitted to the City Engineer for consideration to further characterize seismic compression potential. The City Engineer will identify recommendations from additional analysis and exploration that must be incorporated into the proposed project to mitigate geological hazards to a less than significant level.

[31] Ibid.

Residual Impacts

Potential North Canyon Ranch impacts due to seismic-related ground failure, including liquefaction, would be mitigated to a less than significant level once all recommendations contained in the final geotechnical study. Mitigation measures would reduce impacts to a less than significant impact based on the preliminary project engineering geotechnic analysis reviewed by the City thus far. No impact would occur in the Required Island Annexation Areas and thus no residual impact would occur.

4.6.3.4 Landslide Risk

A significant impact may occur if the proposed project were to directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving landslides.

North Canyon Ranch

During an earthquake event, the seismic shaking forces applied to native hillside areas can result in "seismically induced landslides." These typically occur in areas of steeper hillsides, near the tops of ridges, where weathered surficial and bedrock materials are exposed on slopes, and in areas of prior landslides.

The Earthquake Zones of Required Investigation Map for the Simi Valley West quadrangle includes portions of the onsite slopes in areas with a potential for earthquake induced landslides.[32] Geolabs-Westlake Village conducted several geotechnical studies between 2005 and 2019 for the subject site that present findings, conclusions, and recommendations concerning the geotechnical conditions at the subject site, as shown in Table 4.6-1. These studies concluded that the natural slopes identified as areas with a potential for earthquake induced landslides have a potential to adversely impact the project that is less than significant. However, these studies identified two landslides and one queried landslide in the development area near the central valley that could potentially adversely affect the proposed project.[33] The studies also identified three landslides in the east valley that are onsite but outside the development area, and whose impact on the proposed project is less than significant.[34]

To address these issues, the developers of the project would need to abide by the geologist's recommendations for various corrective measures, including, landslide removal, undocumented stockpile and fill removal, and soil removal at prior grading area for a previously anticipated but not completed development project. These recommendations, as may be modified in the final Geology study to be reviewed and approved by the City Engineer prior to project construction, are reflected in mitigation measures **GEO-3**. The geologist recommendations reflected in mitigation measure GEO-1, GEO-2 are also assumed, to assure soil and manufactured slope stability. These mitigation measures reflect recommendations in these studies to reduce the potential for significant adverse effects resulting from landsliding to less than significant.

Required Island Annexations

The Island Annexation Areas are not proposed for further development at this time. As no change in development would occur, no changes related to landslide hazard area would occur. Based upon this

[32] California Geological Survey, April 7, 1997 & May 1, 1999, Earthquake Zones of Required Investigation Simi Valley West Quadrangle, 1:24,000 and Geolabs-Westlake Village, April 8, 2022, CEQA Geology and Soils Responses.

[33] Geolabs-Westlake Village, January 10, 2007, Preliminary Geotechnical Investigation, Tentative Tract 5658, North Canyon Ranch, City of Simi Valley, County of Ventura, California; and Geolabs-Westlake Village June 30, 2008, Response #1 to Engineering Geology and Geotechnical Engineering Review, Tentative Tract 5658, North Canyon Ranch, City of Simi Valley, County of Ventura, California; and Geolabs-Westlake Village, April 8, 2022, CEQA Geology and Soils Responses.

[34] Geolabs-Westlake Village, January 10, 2007, Preliminary Geotechnical Investigation, Tentative Tract 5658, North Canyon Ranch, City of Simi Valley, County of Ventura, California and Geolabs-Westlake Village, April 8, 2022, CEQA Geology and Soils Responses.

information, landslide hazards would remain unchanged as a result of the annexations. While five of the vacant lots may be potentially developed in the future, and none contain landslide areas and no development of these lots is proposed at this time. Any future development would be regulated by the Alquist-Priolo Earthquake Fault Zoning Act, Seismic Hazards Mapping Act, and the CBSC. When and if development is proposed, geotechnical investigation would be required where determined necessary by the Building Officer. As development of these areas is speculative and is not a part of this project, there would be no impacts as a result of the project.

Mitigation Measures

In addition to mitigation measures GEO-1 and GEO-2, the following mitigation applies:

MM GEO-3: Slope Stability Recommendations of Final Geotechnical Study

Recommendations presented in the final geotechnical study as reviewed and approved by the City Engineer that address landslide potential and slope stability must be incorporated at the project site. These recommendations must include removal of landslide deposits extending to bedrock. Landslide deposits must be replaced with compacted fill in accordance with the compaction standards and grading criteria for placement of engineered fill acceptable to the Building Officer.

Residual Impacts

Potential North Canyon Ranch impacts due to landsliding would be mitigated to a less than significant level once all recommendations contained in the final Geotechnical Study. No physical changes are proposed in the Required Island Annexation Areas, and therefore no impacts and no residual impacts would occur.

4.6.3.5 Erosion

A significant impact may occur if the proposed project were to result in substantial soil erosion or the loss of topsoil.

North Canyon Ranch

Erosion is a normal and inevitable geologic process whereby earth materials are loosened, worn away, decomposed, or dissolved and are then removed from one place and transported to another. Preparing land for construction can remove ground cover, exposing soils to wind erosion.

Site topography is hilly with total vertical elevation change from the low point to the high point of approximately 380 feet. Natural slope gradients on the site generally range from 5:1 to 2:1 (horizontal: vertical) with local areas steeper than 1.5:1. Removal of ground cover in preparation for construction in could result in erosion within the disturbed area. The proposed project would be required to comply with the California State Construction General Permit (Order No. 2009-2009-DWQ as amended by 2010-0014-DWQ and 2012-0006-DWQ) and implement a Stormwater Pollution Prevention Plan (SWPPP), which would include best management practices (BMP) for erosion and sediment control during construction. Compliance with and adopted construction SWPPP and included BMPs would reduce impacts associated with soil erosion and the loss of topsoil to less than significant levels.

Required Island Annexations

Required Island Annexation Areas 1, 4, 5, 6, 7, and 8 are located on the valley floor and are relatively flat. Annexation Area 2 contains hillsides at the northern edge of the valley and relatively flat areas of the valley floor. Annexation Areas 3 and 9 are located on hillsides at the northern and eastern edges of the valley,

respectively. No development of the Annexation Areas is proposed at this time. When and if development is proposed, geotechnical investigation would be required where determined necessary by the Building Officer. However, as development of these areas is speculative and is not a part of this project, there would be no impacts as a result of the project.

Residual Impacts

Impacts would be less than significant before mitigation for both the North Canyon Ranch Development and the Required Island Annexation Areas.

4.6.3.6 Geologic Stability

A significant impact may occur if the proposed project were to 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.

North Canyon Ranch

Subsidence refers to broad scale lowering of the elevation of the land surface with little or no horizontal movement. Subsidence is caused by a variety of events that include, without limitation, withdrawal of groundwater, pumping of oil and gas from underground, dissolution of limestone aquifers (sinkholes), collapse of underground mines, and initial wetting of dry soils (hydroconsolidation).[35]

The Ventura County General Plan Subsidence Zones Map does not identify the project site as being located in an area where subsidence is probable.[36] There are no underground mines or limestone-bearing geological formations beneath the subject site. Geolabs-Westlake Village conducted a geotechnical study in 2007 evaluating the potential for hydroconsolidation to affect the subject site.[37] The study found that portions of the onsite alluvial soils are subject to hydroconsolidation. Mitigation measure GEO-1 discussed in Section 4.6.3.3, Seismically Ground Failure Risk, will reduce the potential for significant adverse effects resulting from subsidence to less than significant.

Lateral spreading is the horizontal movement or spread of soil toward an open face. The potential for failure from lateral spreading is highest in areas where the groundwater table is high and where relatively soft and recent alluvial deposits exist. Lateral spreading hazards may also be present in areas with liquefaction risks.

The project site is located on geologic units with low risk for liquefaction. The subject site would include slopes; however, they would be constructed in geologic units with a low potential for lateral spreading. Additionally, shallow groundwater is not present on the site.[38] Considering these factors, the exposure of people or structures to significant adverse effects resulting from liquefaction and lateral spreading would be less than significant for purposes of CEQA analysis.

The preliminary geotechnical studies, which will be finalized in the final Geotechnical Study, recommended mitigation of several proposed cut slopes to reduce the potential for significant adverse effects resulting from landsliding to less than significant. These include the use of appropriate factors of safety in designing

[35] Soil collapse, or hydroconsolidation, occurs when a loose clayey sand is exposed to water and the clay bonds break causing significant volume reduction.

[36] Ventura County, September 15, 2020; Ventura County 2040 General Plan and Geolabs-Westlake Village, April 8, 2022, CEQA Geology and Soils Responses.

[37] Geolabs-Westlake Village, January 10, 2007, Preliminary Geotechnical Investigation, Tentative Tract 5658, North Canyon Ranch, City of Simi Valley, County of Ventura, California and Geolabs-Westlake Village, April 8, 2022, CEQA Geology and Soils Responses.

[38] Ibid.

the cut slopes. All slopes that would affect the proposed development, natural and manufactured, are required to maintain the required factors of safety under both static and pseudo static loading conditions.[39] Mitigation measures GEO-1 through GEO-3 will address soil and slope stability as well as landsliding.

Required Island Annexations

Portions of Required Island Annexation Areas 1, 2, 3, and 6 are within a liquefaction zone, while parts of Annexation Areas 1 and 3 are within landslide zones. A portion of Annexation Area 8 generally corresponding to Sinaloa Lake is within a liquefaction zone. No development of the Annexation Areas is proposed at this time. However, When and if development is proposed, geotechnical investigation would be required where determined necessary by the Building Officer. As development of these areas is speculative and is not a part of this project, there would be no impacts as a result of the project.

Mitigation Measures

Mitigation measures GEO-1 through GEO-3 are required.

Residual Impacts

Impacts concerning on**-** or off-site landslide, lateral spreading, subsidence, liquefaction or collapse would be less than significant after mitigation for the North Canyon Ranch project, based on project engineering studies reviewed and measures approved by the City. The Required Island Annexations would have no impact and thus no residual impact with regard to this issue.

4.6.3.7 Expansive Soil

A significant impact may occur if the proposed project were to be located on expansive soil, , creating substantial direct or indirect risks to life or property.

North Canyon Ranch

Expansive soils generally contain high percentages of clay. The Geotechnical Study identified the presence of onsite soils that range from non-expansive to highly expansive.[40] All development would be required to comply with relevant aspects of the Uniform Building Code (UBC) and the CBSC. Furthermore, the study provided recommendations for mitigating the expansiveness of soils at the project site. Compliance with building standards and incorporation of mitigation measures discussed below would reduce the potential for significant adverse effects resulting from expansive soils to less than significant.

Required Island Annexations

No development of the Annexation Areas is proposed and no future building plans are known at this time. However, the proponents of any potential new structures proposed in the Annexation Areas would be required to investigate the soil stability of the subject site and potential seismic-related ground failure issues and be subject to the requirements of the UBC and CBC. When and if development is proposed, geotechnical investigation would be required where determined necessary by the Building Officer. As development of these areas is speculative and is not a part of this project, there would be no impacts as a result of the project.

[39] Geolabs-Westlake Village, Foundation and Engineering Geology, Response #7 to Engineering and Geotechnical Engineering Review, Tentative Tract Map 5658, May 15, 2019.

[40] Geolabs-Westlake Village, January 10, 2007, Preliminary Geotechnical Investigation, Tentative Tract 5658, North Canyon Ranch, City of Simi Valley, County of Ventura, California and Geolabs-Westlake Village, April 8, 2022, CEQA Geology and Soils Responses.

Mitigation Measures

Mitigation measure GEO-1, Removal and Recompaction Recommendation of Final Geotechnical Study, is required.

Residual Impacts

North Canyon Ranch development impacts related to expansive soils would be less than significant after mitigation, as the final Geotechnical Study, prepared to the satisfaction of the Building Official, will provide project-specific design requirements to avoid impacts. The Required Island Annexations would have no impact and thus no residual impact with regard to this issue.

4.6.3.8 Septic Tanks or Wastewater Disposal Systems

North Canyon Ranch

A significant impact may occur if the proposed project were to 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. The proposed project would be serviced by the public sewer system and would not utilize septic tanks or alternative wastewater disposal systems.

Required Island Annexations

No development of the Annexation Areas is proposed at this time. Any potential septic tanks or alternative wastewater disposal systems proposed in the Annexation Areas would require investigation of the soil stability of the site and the proposed system; however, development of these areas is speculative and is not a part of this project. Therefore, no impact would occur with regard to this issue.

Residual Impacts

No impacts would occur from any aspect of the project, and thus no residual impacts would occur.

4.6.4 Cumulative Impacts

There are no projects adjacent to, uphill from, or, downhill from both the project and a related project that could be potentially impacted by the geological and soils-related effects of both projects. The proposed project and any other proposed projects would be subject to seismic standards contained in the CBSC and any applicable geotechnical measures (mitigation measures GEO-1 through GEO-3). Therefore, the project's geology and soils impacts would not be cumulatively considerable, and no cumulative impacts related to geology and soils would occur.

No development of the Required Island Annexation Areas is proposed at this time and any proposed development in the Annexation Areas would also be subject to seismic standards contained in the CBC and any applicable geotechnical measures. When and if development is proposed, geotechnical investigation would be required where determined necessary by the Building Officer. Thus, the Island Annexation impacts related to geology and soils would not be cumulatively considerable and no cumulative impacts related to geology and soils would occur.

Combined the project components with mitigation would have less than significant impacts. Impacts of future project cannot be known at this time, but the potential for impacts would be considered upon submittal of project applications as part of the project and CEQA review process. No cumulatively significant impacts are known at this time.