4.7 GEOLOGY AND SOILS

The following evaluation is based, in part, on the results of the *Geotechnical Feasibility Report for Canada Ranch Property, East of Hetrick Avenue and Cherokee Place, Nipomo Area, San Luis Obispo County, California* (Earth Systems Pacific [ESP] 2017), which evaluates the main parcel of the Specific Plan Area. The purpose of the geotechnical report is to identify existing site conditions, potential hazards, and building design recommendations as it relates to seismic and other geologic factors present at the site. The geotechnical report was prepared based on assumptions regarding proposed structural design of future development at the site and was peer reviewed by the County's contract geologist, LandSet Engineers, Inc, in June ~~and November~~ 2021 (Landset 2021a). As the result of the County's peer review, the *Geotechnical Engineering Report for Dana Reserve, Northwest of North Frontage Road, Nipomo Area of San Luis Obispo County, California* (ESP 2021a) was prepared that further evaluated site conditions within the Specific Plan Area. The supplemental geotechnical report was further peer reviewed by the County in November 2021 and was determined to be adequate for purposes of supporting this EIR (Landset 2021b).

Field and laboratory tests were conducted to determine the site's susceptibility to ground shaking, settlement, liquefaction and seismically induced settlement, soil expansion, soil erosion, soil corrosivity, and overall soil stability. The 2017 Geotechnical Feasibility Report included the results of five test borings conducted at the main parcel of the Specific Plan Area. The 2021 Geotechnical Engineering Report includes the results of nine additional test borings that were conducted at the site. Detailed discussion of the tests conducted may be found in the Geotechnical Engineering Reports included as EIR Appendix G. The following discussion and evaluation include the results and recommendations of the 2021 Geotechnical Engineering Report.

4.7.1 Existing Conditions

4.7.1.1 Regional Geologic Setting

Regionally, the subject site is located within the Coast Ranges geomorphic province of California, which are northwest-trending mountain ranges that reach a maximum elevation of about 6,000 feet and are generally parallel to the San Andreas fault. The ranges are formed by an asymmetrical uplifted block that forms a rugged coastline at the Pacific Ocean and dips eastward towards the Great Valley province. The Coast Ranges are geologically complex with rocks that span from middle Mesozoic to late Quaternary in age (ESP 2021b).

The Nipomo Mesa is primarily an area of late Pleistocene sand dunes that are generally inactive and stabilized by vegetation and locally dissected by ephemeral streams; however, a strip of active sand dunes (Oceano and Pismo Dunes) exists between the Nipomo Mesa and the Pacific Ocean to the west.

The Santa Lucia Range is bounded between the Pacific Ocean to the west and the Salinas River to the east. Structurally, the Santa Lucia Range is bordered on the northeast by the Rinconada fault zone and to the southwest by Hosgri-San Simeon, Oceanic-West Huasna fault zone. Tectonically, the region is dominated by northwest-trending faults, which include the Rinconada, Hosgri-San Simeon, Oceanic-West Huasna, and San Luis Range Faults (ESP 2021b).

4.7.1.2 Specific Plan Area Geologic Setting

Elevations at the Specific Plan Area range from approximately 355 feet above mean sea level (amsl) to 400 feet amsl. Topography of the Specific Plan Area is characterized by relatively flat areas to areas with

moderately sloping hills. Based on aerial imagery, the project site is generally characterized by a gentle downward slope toward the eastern portion of the project site.

The County's LUO identifies a Geologic Study Area (GSA) combining designation for areas where geologic and soil conditions could present new developments and/or their occupants with potential hazards to life and property. Based on the County's Land Use View database, the Specific Plan Area is not located within the County's GSA combining designation.

4.7.1.2.1 SEISMIC HAZARDS

Seismic hazards refer to the potential hazards that result from earthquakes. The frequency and strength of earthquakes are dependent on the activity, number, and style of faults that pass through or can influence a particular region (County of San Luis Obispo 1999). The Central Coast of California is a seismically active region and there is high potential for earthquakes and associated risk to occur.

Fault Rupture

Fault rupture refers to the displacement of the ground surface along a fault trace, which can endanger life and property if structures or lifeline facilities are constructed on, or cross over, a fault. Rupture of the ground surface along a fault trace typically occurs during earthquakes of approximately magnitude 5 or greater. Faults are classified by the State of California based on the likelihood of generating ground motions and surface rupture. The classification system applies to known faults that have been compiled by numerous researchers through various methods of investigation. The state evaluates faults with documented ground rupture during the last 11,700 years and considers them for inclusion in Earthquake Fault Zones requiring investigation (A-P Zones), which encompass traces of Holocene-active faults, as defined by the state's Alquist-Priolo Earthquake Fault Zoning Act (Alquist-Priolo Act) of 1972. The state's guidance is intended to prohibit developments and structures for human occupancy across the trace of active faults.

There are no known Holocene-Active faults on the site that are included in state A-P Zones or County special studies zones. There are three active faults in San Luis Obispo County that are currently zoned under the Alquist-Priolo Act: San Andreas, Hosgri-San Simeon, and Los Osos (County of San Luis Obispo 1999). The nearest active fault is the Los Osos, located approximately 5.6 miles northwest of the Specific Plan Area (Figure 4.7-1).

Other active faults capable of generating strong ground motion are present in the region but are not included in A-P Zones because they do not meet the criteria of "sufficiently active and well-defined." Based on a review of geologic maps, including maps from the California Geological Survey (CGS) and the USGS, there are mapped strands of the San Luis Range Fault system near the northeastern side of the Specific Plan Area, approximately parallel to the Nipomo Valley and US 101. Preliminary geologic maps locate the fault on the northeast side of US 101; however, another fault model locates the San Luis Range Fault system on the southwest side of US 101 within the Dana Reserve Specific Plan Area. ESP determined that the San Luis Range Fault is likely on the northeast side of US 101, aligned with Nipomo Creek, as depicted in the preliminary geologic maps. The San Luis Range Fault is considered active but is not classified as "sufficiently active and well defined" to be included in an Alquist-Priolo Special Studies Zone.

In addition, the County has mapped an inactive-inferred fault trending across the southwest portion of the Specific Plan Area. Because poorly consolidated sand dune deposits, such as those present on-site, are generally highly erodible and form subdued landforms, the location of these faults is difficult to specify. Public domain aerial photographs were reviewed, and no indications of fault scarps or lineaments were observed on-site (ESP 2021b).

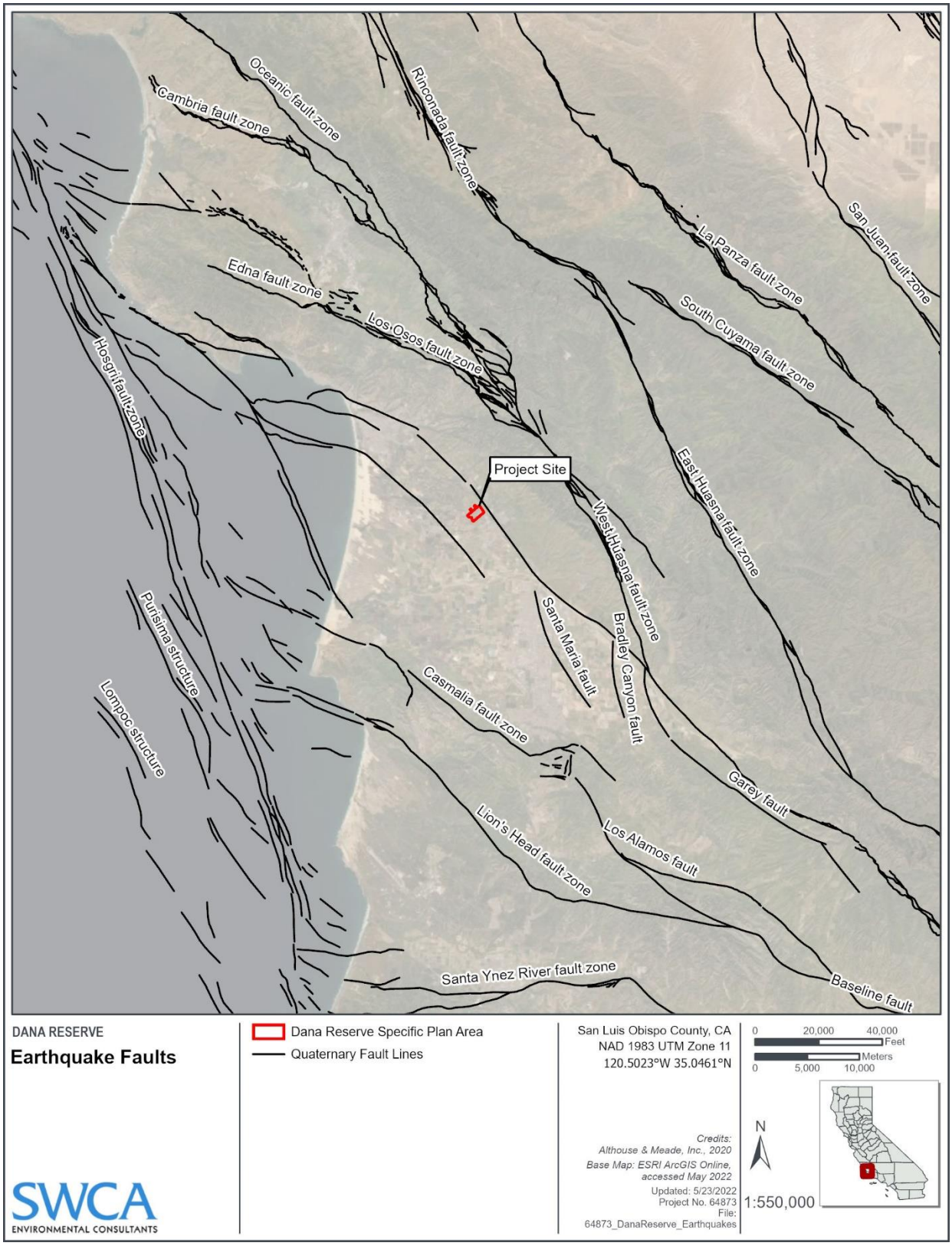

Figure 4.7-1. Earthquake faults map.

Ground Shaking

Ground shaking refers to the motion that occurs in response to local and regional earthquakes, which can endanger life and safety due to damage or collapse of structures or lifeline facilities (County of San Luis Obispo 1999). The project site is located in a seismically active region with the potential for ground shaking to occur.

Settlement and Hydroconsolidation

Settlement can occur when foundations and surface improvements span materials having variable consolidation, moisture, and density characteristics. Such a situation can stress and possibly damage foundations and surface improvements, often resulting in severe cracks and displacement. There is potential for settlement to occur at the site (ESP 2021a). Hydroconsolidation, also referred to as soil collapse, typically occurs when loose, dry, sandy soils become saturated and settle. Based on the results of the test data, soils at the project site are considered to have a slight-to-moderate potential to collapse when saturated (ESP 2021a).

Liquefaction and Settlement Potential

Liquefaction is the loss of soil strength caused by a significant seismic event. It occurs primarily in loose, fine- to medium-grained sands, and in very soft to medium stiff silts that are saturated by groundwater. During a major earthquake, the saturated sands and silts tend to compress and the void spaces between the soil particles that are filled with water decrease in volume. This causes the pore water pressure to build up in the soils. If water in the soils drain rapidly, the soils may lose their strength and transition into a liquefied state (ESP 2021a).

Seismically induced settlement of dry sand is also caused by a significant seismic event and may occur in lower-density and sand and silt soils that are not saturated by groundwater. During a major earthquake, the void spaces between the unsaturated soil particles that are filled with air tend to compress which translates to a decrease in volume or settlement.

According to *County of San Luis Obispo General Plan Safety Element* Maps, the project site is characterized by moderate liquefaction potential (Figure 4.7-2). A quantitative analysis of liquefaction and seismically induced settlement of dry sand was performed as described in the Geotechnical Engineering Report prepared for the project (ESP 2021a). The analyses indicated that the saturated soils are non-liquefiable and that seismically induced settlement of dry sand is not expected to exceed 0.5 inch.

Landslide and Slope Instability

Landslides and slope instability can occur as a result of wet weather, weak soils, improper grading, improper drainage, steep slopes, adverse geologic structure, earthquakes, or a combination of these factors. Slope instability can occur in the form of creep, slumps, large progressive translation or rotational failures, rockfall, debris flows, or erosion (County of San Luis Obispo 1999). Landslides can result in damage to property and cause buildings to become unsafe due to distress or collapse during sudden or gradual slope movement. Structures constructed in steep terrain, possibly on stable ground, may also experience landslide hazards if they are sited in the path of potential mud flows or rockfall hazards (ESP 2021a). Landslides tend to occur in weak soil and rock on sloping terrain (CDOC 2019). According to the Safety Element maps, the project site is characterized by a low potential for landslide (Figure 4.7-3). The site is gently sloping with subdued landforms. No indications of slope instability were observed in aerial photographs or site reconnaissance conducted by ESP (ESP 2021a).

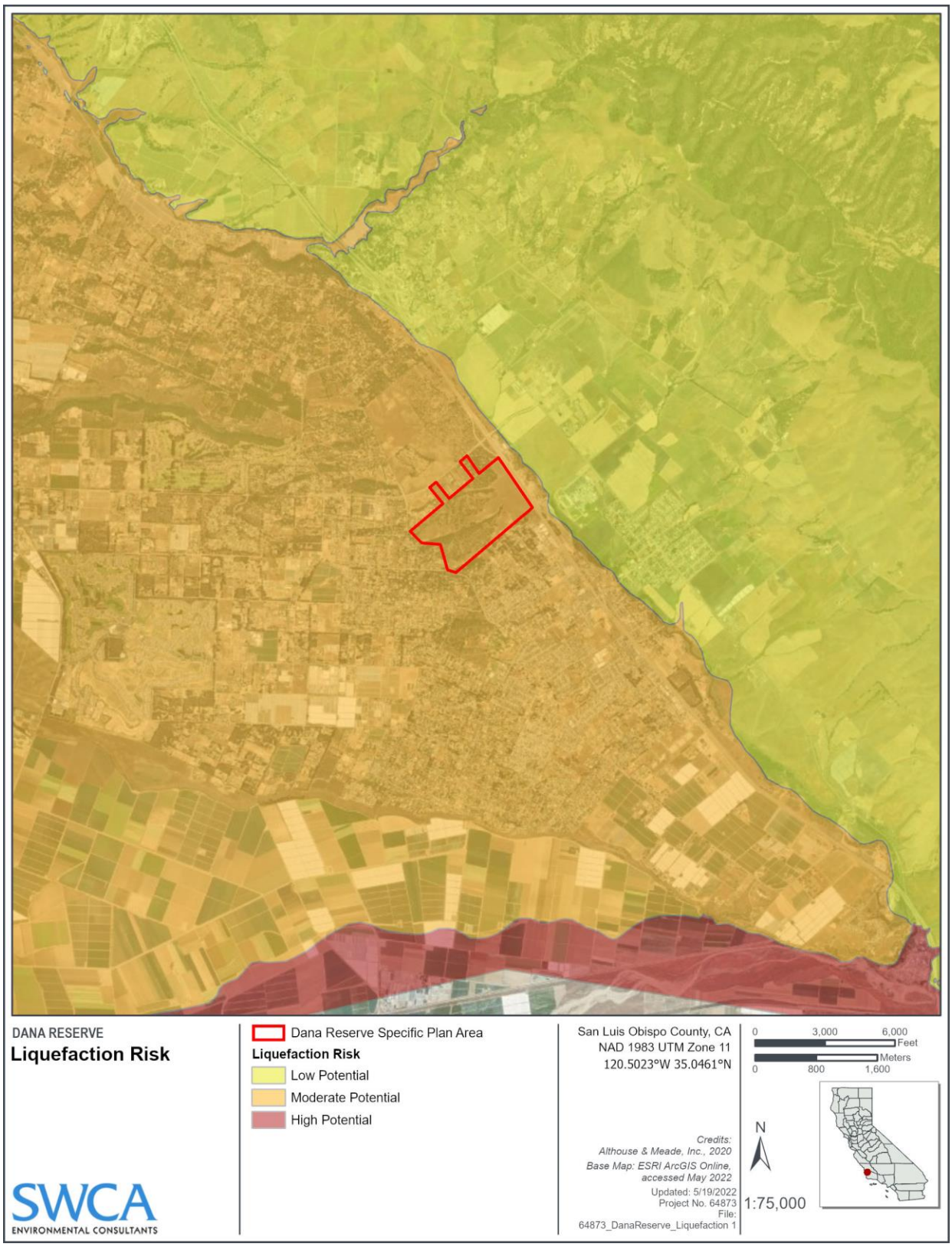

Figure 4.7-2. Liquefaction risk map.

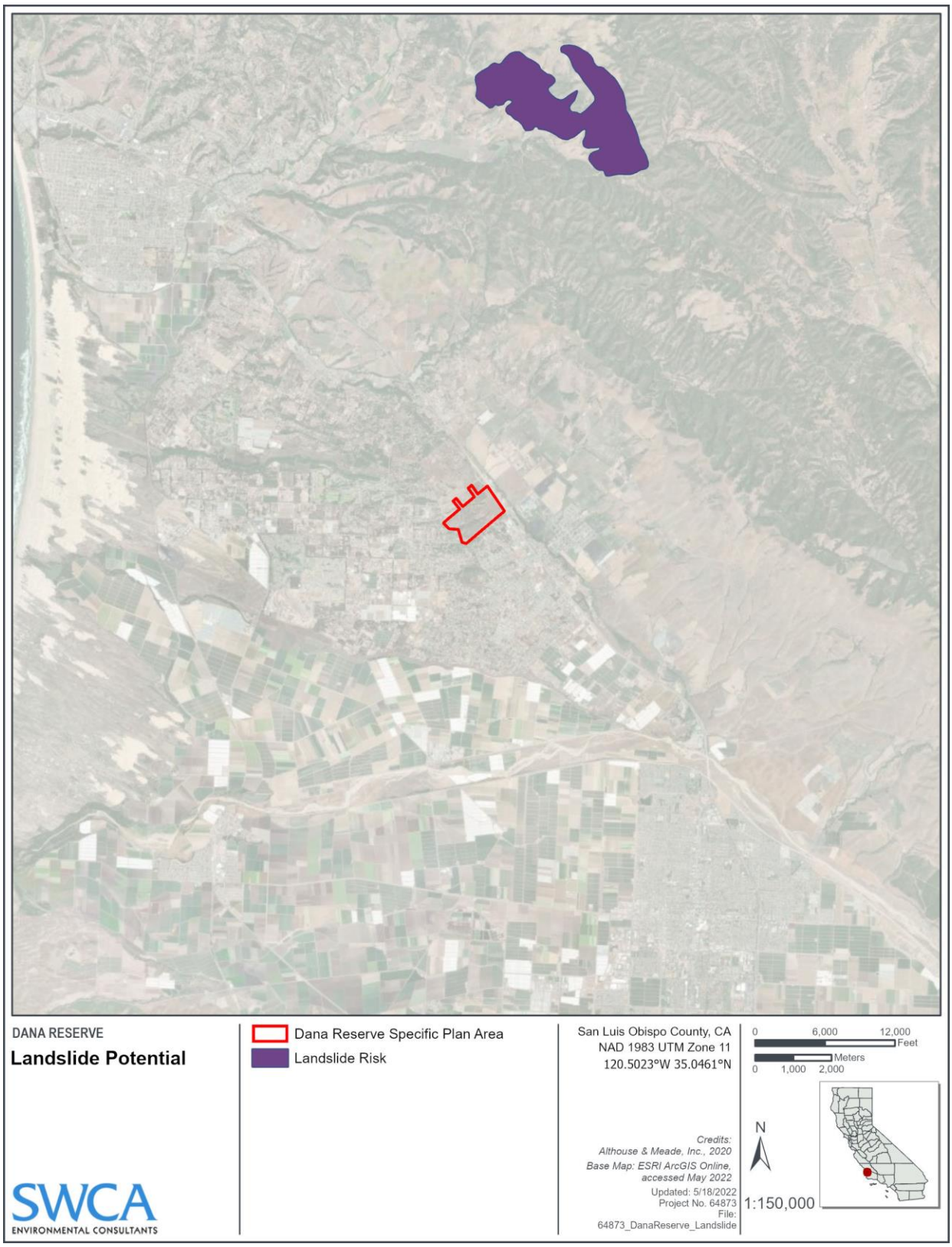

Figure 4.7-3. Landslide potential map.

4.7.1.2.2 SOILS

According to the NRCS Soil Survey, the Dana Reserve project site is underlain by the following two soil types (NRCS 2021):

- **Oceano sand, 0 to 9 percent slopes:** This very deep, excessively drained soil has a depth to restrictive feature of more than 80 inches. The typical soil profile consists of sand. This soil is characterized by rapid permeability, slow to medium surface water runoff, and high potential for soil blowing. Soil erosion can be reduced by maintaining vegetative cover at all times (USDA 1984).
- **Oceano sand, 9 to 30 percent slopes:** This very deep, excessively drained soil has a very low runoff class and a depth to restrictive feature of more than 80 inches (USDA 1984; NRCS 2021). The typical soil profile consists of sand. Erosion of drainage channels is a very common characteristic of this soil during the wet season. Soil erosion can be reduced by always maintaining vegetative cover (USDA 1984).

Soil Erosion

Erosion is defined as the breakdown, detachment, transport, and redistribution of soil particles by natural forces, including water (i.e., rain, concentrated flow, streams, glaciers, etc.), wind, or gravity (USGS 2006). Increased amounts of sediment, which is caused by erosion, may runoff from a site and block drainage and irrigation ditches and canals and navigational channels, degrade wildlife habitat and fisheries, infill water reservoirs, elevate water treatment costs, increase the need for dredging, and may indirectly contribute to flooding (USGS 2006). Potential for erosion to occur at a particular site may depend on, but is not limited to, type of soils present, existing uses, and vegetative cover. Due to the soil profile on-site, which consists entirely of sand, soils at the site are considered to be highly erodible (ESP 2021a; USDA 1984).

Expansive Soil

Soil expansion, also referred to as shrink/swell potential, is the extent to which soil shrinks as it dries out or swells when it gets wet. Typically, soils with high potential for expansion largely consist of clay and clay materials. Shrinking and swelling of soils can cause damage to building foundations, roads, and other structures. A high potential for expansion indicates a hazard to maintenance of structures built in, on, or with material having this rating. Moderate and low ratings lessen the hazard accordingly. Since soils at the project site do not contain any clay materials, there is a very low potential for soil expansion at the project site (ESP 2021a).

4.7.1.2.3 PALEONTOLOGICAL SETTING

Paleontological resources are the evidence of once-living organisms as preserved in the rock record. They include both the fossilized remains of ancient plants and animals and the traces thereof (e.g., trackways, imprints, burrows, etc.). In general, fossils are considered to be older than recorded human history or greater than 5,000 years old and are typically preserved in sedimentary rocks. Although rare, fossils can also be preserved in volcanic rocks and low-grade metamorphic rocks under certain conditions (Society of Vertebrate Paleontology [SVP] 2010).

The SVP has established standard guidelines that outline professional protocols and practices for conducting paleontological resource assessments and surveys, monitoring and mitigation, data and fossil recovery, sampling procedures, and specimen preparation, identification, analysis, and curation (SVP 1995, 2010).

Paleontological potential is defined as the potential for a geologic unit to produce scientifically significant fossils. This is determined by rock type, history of the geologic unit in producing significant fossils, and fossil localities recorded from that unit. Paleontological potential is derived from the known fossil data collected from the entire geologic unit, not just from a specific survey or study. A geologic unit known to contain significant fossils is considered sensitive to adverse impacts if there is a high probability that earth-moving or ground-disturbing activities in that rock unit would either disturb or destroy fossil remains, directly or indirectly.

The SVP (2010) guidelines were used for the assessment of potential for paleontological resources to occur within the Specific Plan Area. According to CEQA, the threshold of significance for impacts to paleontological resources is reached when a project would disturb or destroy scientifically important fossil remains, as defined by the SVP. Significant paleontological resources are defined as "identifiable" vertebrate fossils, uncommon invertebrate, plant, and trace fossils that provide taphonomic (i.e., the study of what happens to an organism after its death and until its discovery as a fossil), taxonomic, phylogenetic, paleoecologic, stratigraphic, or biochronological data. These data are important because they are used to examine evolutionary relationships, provide insight on the development of and interaction between biological communities, establish time scales for geologic studies, and for many other scientific purposes (Scott and Springer 2003; SVP 2010).

The geologic setting is key to understanding the potential for important paleontological resources to be located in the project site (see Section 4.7.1.1, *Regional Geologic Setting*, for the broad-scale geological setting). Unconsolidated, well-sorted red to brown wind-blown sand with weak soil development that forms extensive dune deposits underlie the Specific Plan Area and are depicted on the local geologic maps as Pleistocene old eolian deposits (Qoe) (Delattre and Wiegers 2014; Holland 2013). When assessing paleontological resource potential, subsurface geologic units are important to consider, especially if they differ from surficial units and may occur at an unknown depth that could be impacted during construction activities. Less than 0.25 mile from the project area are mapped areas of Pleistocene-aged older alluvial deposits (Qoa) composed of poorly sorted sand, silt, and gravel, moderately consolidated, with some cemented horizons present locally (Delattre and Wiegers 2014; Holland 2013). Based on geologic mapping of the project site and adjacent areas, the contact between Qoe and Qoa is along US 101, and it is possible that Qoa occurs at an unknown depth beneath the project site. Table 4.7-1 summarizes the geologic units that are mapped within or may occur at depth within the project site (Figure 4.7-4).

Table 4.7-1. Geologic Units and Paleontological Potential Underlying Project Site

Geologic Unit Label	Geologic Unit Name	Age	Paleontological Potential
Qoe	Old Eolian Deposits	Late Pleistocene	Low
Qoa	Older Alluvial Deposits	Late to Middle Pleistocene	Low to High, increasing with depth (and age)

Source: Delattre and Wiegers (2014); Holland (2013)

The paleontological resources previously documented within the County include marine invertebrates, vertebrates, and terrestrial vertebrates from rocks of Cretaceous to Recent age, along the Pacific Coast, to the central and eastern part of the county (Jefferson 1991; Jefferson et al. 1992; Palaeobiological Database [PBDB] 2022). Reviews of published literature, the PBDB (2022), and museum previously recorded locality search results (Natural History Museum of Los Angeles [NHMLA] 2021) were conducted to identify information on paleontological resources known from the project site or nearby within similar geologic units that may be impacted by the project.

Figure 4.7-4. Geologic units map.

Based on these reviews 21 paleontological localities from San Luis Obispo County occur within Pleistocene-aged geologic units, but no previously recorded localities are recorded within the Specific Plan Area (Guthrie 1998; Jefferson 1991; Jefferson et al. 1992; PBDB 2022; NHMLA 2021). A Columbian mammoth (*Mammuthus columbi*) left dentary with tooth was recovered from indeterminate Quaternary-aged units near Nipomo and is understood to be the closest known locality (LACM 4089) to the project site. The next closest locality (LACM 5790) occurs approximately 9.5 miles northeast of the project site; from older Plio-Pleistocene deposits. At this location, paleontologists recovered *Mammuthus* sp. bone fragments from a distal humerus and possibly a scapula (Jefferson et al. 1992). Tables 4.7-2 and 4.7-3 contain lists of other Pleistocene-aged vertebrate localities from the San Luis Obispo County region.

Table 4.7-2. Overview of Pleistocene Localities of San Luis Obispo County

Locality Name	Recovered Fauna
Arborgast Ranch, Salinas River Valley	Mammoth, horse, antique bison
Carizzo Plains School	Mastodon, mammoth, camel, long-horned bison
Cayucos	Squirrel
Chorro Creek, Morro Bay	Mammoth
Creston	Mammoth
Crowbar Canyon (Montana del Oro State Park)	Cod
Irish Canyon, Point San Luis area	Horse, antique bison
Mankin, Ranchita Cattle Company (LACM 5790)	Mammoth
Nipomo (LACM 4089)	Mammoth
Pecho Creek, Diablo Canyon area	Horse, giant ground sloth, camel, dolphin, extinct sea cow
Point San Luis	Whale
Salinas River Sand Site	Mammoth
San Miguel, Salinas River Valley	California condor, puffin, auklet, flightless sea duck, bald eagle, barn owl, vole, mammoth, camel, sea otter

Source: Delattre and Wiegers (2014); Holland (2013)

Table 4.7-3. NHMLA Records Search Localities

Locality Number	Approximate miles from the project site based on NHMLA Location Descriptions	Formation	Taxa	Depth
LACM VP 7860	14.0	Paso Robles Formation	Mammoth (*Mammuthus*); horse (*Equus*); artiodactyl (Artiodactyla)	Unknown
LACM VP 6165	17.3	Unknown formation (Pleistocene-landslide or colluvial fan deposit. Mud; silt; gravel; cobbles)	Elephant family (Elephantidae)	Surface - shallow subsurface
LACM VP 3518	22.5	Unknown formation (Pleistocene)	Horse (*Equus*), turtle (Testudinidae)	Unknown
LACM VP 3517	25.8	Unknown formation (Pleistocene)	Ground sloth (*Paramylodon*)	Unknown
LACM VP 5799	31.5	Paso Robles Formation	Gomphothere family (Gomphotheriidae)	Unknown

Source: NHMLA 2021

4.7.1.3 Off-Site Improvements Geologic Setting

The exact location of proposed off-site transportation and NCSD water system and wastewater system improvements is currently not known; however, proposed off-site transportation improvements would be required at DRSP roadway connections to Willow Road, North Frontage Road, Pomeroy Road, Hetrick Avenue, and Cory Way. Proposed water system improvements are anticipated to be located within previously developed roadways and other disturbed road shoulder areas along North Oakglen Avenue and Tefft Street, and proposed wastewater system improvements are anticipated to occur along North Frontage Road and within existing NCSD facilities (see Figures 2-4 through 2-7 in Chapter 2, *Project Description*).

Elevations of off-site transportation improvements range from approximately 355 to 400 feet amsl. Elevations at off-site wastewater system improvement areas range from approximately 300 to 360 feet amsl, and elevations at off-site water system improvement areas range from 340 to 520 feet amsl. Topography of off-site improvement areas is characterized by relatively flat to moderately sloping areas. Based on the County's Land Use View database, off-site improvement areas are not located within the County's GSA combining designation.

4.7.1.3.1 SEISMIC HAZARDS

Fault Rupture

There are no known Holocene-Active faults within the proposed improvement areas that are included in state A-P Zones or County special studies zones. As discussed above, there are three active faults in San Luis Obispo County that are currently zoned under the Alquist-Priolo Act: San Andreas, Hosgri-San Simeon, and Los Osos (County of San Luis Obispo 1999). The nearest active fault is the Los Osos, located approximately 4 to 7 miles northwest of proposed off-site improvement areas. Based on the Geotechnical Engineering Report, the San Luis Range Fault is likely located on the northeast side of US 101, aligned with Nipomo Creek, near proposed water system improvement areas (ESP 2021b). The San Luis Range Fault is considered active but is not classified as "sufficiently active and well defined" to be included in an Alquist-Priolo Special Studies Zone.

Ground Shaking

Ground shaking refers to the motion that occurs in response to regional and local earthquakes (County of San Luis Obispo 1999). Off-site improvement areas are located in a seismically active region with the potential for ground shaking to occur.

Liquefaction

Liquefaction is the loss of soil strength caused by a significant seismic event and occurs primarily in loose, fine- to medium-grained sands, and in very soft to medium stiff silts that are saturated by groundwater. Additionally, seismically induced settlement of dry sand is also caused by significant seismic events and may occur in lower-density and sand and silt soils that are not saturated by groundwater. According to the Safety Element maps, off-site improvement areas are characterized by low to moderate liquefaction potential (see Figure 4.7-2).

Landslide and Slope Instability

Landslides and slope instability can occur as a result of wet weather, weak soils, improper grading, improper drainage, steep slopes, adverse geologic structure, earthquakes, or a combination of these factors (County of San Luis Obispo 1999). Landslides typically occur in weak soils and rocks on sloping

terrain (CDOC 2019). Off-site improvement areas include previously developed areas and consist of relatively flat to moderately sloping topography. According to the Safety Element maps, off-site improvement areas are characterized by a low potential for landslide (see Figure 4.7-3).

4.7.1.3.2 SOILS

According to the NRCS Soil Survey, off-site improvement areas are primarily underlain by the following soil types (NRCS 2021):

- **Oceano sand, 0 to 9 percent slopes:** This very deep, excessively drained soil has a depth to restrictive feature of more than 80 inches. The typical soil profile consists of sand. This soil is characterized by rapid permeability, slow to medium surface water runoff, and high potential for soil blowing. Soil erosion can be reduced by maintaining vegetative cover at all times (USDA 1984).
- **Oceano sand, 9 to 30 percent slopes:** This very deep, excessively drained soil has a very low runoff class and a depth to restrictive feature of more than 80 inches (USDA 1984; NRCS 2021). The typical soil profile consists of sand. Erosion of drainage channels is a very common characteristic of this soil during the wet season. Soil erosion can be reduced by always maintaining vegetative cover (USDA 1984).
- **Cropley clay, 2 to 9 percent slopes, Major Land Resource Area (MLRA) 14:** This soil type is moderately well drained and has a medium runoff class. The typical soil profile consists of clay and sandy clay loam and the depth to restrictive feature is more than 80 inches. Due to the high clay content, this soil has a high shrink/swell potential (USDA 1984).
- **Diablo clay, 5 to 9 percent slopes, MRLA 15:** This soil type is well drained and has a very high runoff class. The typical soil profile consists of clay and bedrock and the depth to restrictive feature is 40 to 59 inches to lithic bedrock. Due to the high clay content, this soil has a high shrink/swell potential (USDA 1984).
- **Diablo and Cibo clays, 9 to 15 percent slopes:** This soil type is well drained and has a very high runoff class. The typical soil profile consists of clay and weathered bedrock and the depth to restrictive feature is 45 to 58 inches to lithic bedrock. This soil has a high shrink/swell potential and is subject to slippage when wet (USDA 1984).
- **Marimel silty clay loam, drained:** This soil is well drained and has a medium runoff class. The typical soil profile consists of silty clay loam, stratified loam, and clay loam. The depth to restrictive feature is more than 80 inches. This soil has a slight water erosion hazard (USDA 1984).
- **Santa Lucia very shaly clay loam, 9 to 15 percent slopes:** This soil type is well drained and has a high runoff class and depth to restrictive feature of 20 to 40 inches. The typical soil profile consists of very channery clay loam and unweathered bedrock. This soil has a slight to moderate water erosion hazard. This soil type is not well suited to support septic systems due to its limited depth to lithic bedrock (USDA 1984).

Soil Erosion

Potential for erosion to occur at a particular site may depend on, but is not limited to, type of soils present, existing uses, and vegetative cover. Soils that consist of loose materials, such as sand, are generally considered highly erodible. Soils that contain more compact materials, such as clay, would be less erodible. Off-site transportation and wastewater system improvement areas occur in sandy soils and would be considered highly erodible. Off-site water system improvements primarily occur in sandy soil

west of Nipomo Creek; however, they would also extend through clay soil types along Tefft Street east of Nipomo Creek, which have lower potential for erosion.

Expansive Soil

Typically, soils with high potential for expansion largely consist of clay and clay materials. Shrinking and swelling of soils can cause damage to building foundations, roads, and other structures. Off-site transportation and wastewater system improvements would primarily occur in sandy soils with low potential for expansion. Off-site water system improvements would occur in sandy soils west of Nipomo Creek; however, they would also extend through clay soils types along Tefft Street east of Nipomo Creek with high potential for expansion.

4.7.1.3.3 PALEONTOLOGICAL SETTING

According to previous geologic mapping, off-site areas are underlain by six geologic units: Holocene to Late Pleistocene alluvium (Qya), Pleistocene old eolian deposits (Qoe) and older alluvial deposits (Qoa), Tertiary (=Paleogene) siliceous shales of the Monterey Formation (Tmc), and multiple units of the Obispo Formation, including tuff and tuffaceous alluvium (Tot) and mafic volcanics interlayered with rhyolitic tuffs (Tob) (Delattre and Wieger 2014). Table 4.7-4 provides a summary of these units and their paleontological potential. The off-site transportation and wastewater improvement areas are underlain by the same geologic unit as the Specific Plan Area. Since the off-site areas are concentrated along existing roads and infrastructure, some of the immediately underlying deposits are possibly previously disturbed and may lack scientifically significant paleontological resources, as they would not be in their original stratigraphic or geographic position.

Table 4.7-4. Geologic Units and Paleontological Potential Underlying Off-Site Improvement Areas

Geologic Unit Label	Geologic Unit Name	Age	Paleontological Potential
Qya	Younger Alluvial Deposits	Holocene to Late Pleistocene	Low to High, increasing with depth (and age)
Qoe	Old Eolian Deposits	Late Pleistocene	Low
Qoa	Older Alluvial Deposits	Late to Middle Pleistocene	Low to High, increasing with depth (and age)
Tmc	Monterey Formation, siliceous shale	Upper to Middle Miocene	High
Tob	Obispo Formation, mafic volcanic rocks	Lower Miocene	None to Low, primarily in rhyolitic tuffs
Tot	Obispo Formation, tuff	Lower Miocene	Low

Source: Delattre and Wiegers (2014); Holland (2013)

Section 4.7.1.2.3, *Soils*, describes Pleistocene paleontological resources of San Obispo County and the general project location in detail and are similar for the Quaternary units underlying the off-site areas. The Monterey Formation (not mapped within the Specific Plan Area), which may be crossed by the off-site infrastructure, has a long history of paleontological research. Numerous invertebrate, fish, and marine mammal fossils have been recovered (Eisentraut and Cooper 2002). Paleontological resources are rare in volcanic rocks except under certain conditions; for instance, there are documented fossils of marine pelecypods (bivalves) from Obispo Formation rhyolitic tuffs and breccias (Hall et al. 1966). Based on the results of the literature, previous locality data, and geologic map reviews, no known fossil localities are present within the off-site areas (NHMLA 2021; PBDB 2022; Jefferson 1991; Jefferson et al. 1992).

4.7.2 Regulatory Setting

4.7.2.1 Federal

There are no federal regulations related to geology and soils applicable to the project.

4.7.2.2 State

4.7.2.2.1 ALQUIST-PRIOLO EARTHQUAKE FAULT ZONING ACT

Chapter 7.5 of Division 2, Geology, Mines and Mining, of the PRC, also known as the Alquist-Priolo Act of 1972, was created with the purpose of providing policies and criteria to assist state agencies, counties, and cities in prohibiting development for human occupancy across active faults. It is also the intent of the act to increase public safety by minimizing the loss of life due to earthquakes by facilitating seismic retrofitting to strengthen buildings against ground shaking. The Alquist-Priolo Act delineated active faults, which is defined as a fault that has ruptured in the past 11,000 years.

4.7.2.2.2 SEISMIC HAZARDS MAPPING ACT

The Seismic Hazards Mapping Act (SHMA) of 1990 (PRC Chapter 7.8, Sections 2690–2699.6) authorizes the CDOC and CGS to identify and map areas prone to seismic hazards, including amplified ground-shaking, liquefaction, and earthquake-induced landslide. The purpose of SHMA is to reduce the threat to public safety and minimize the loss of life and property by identifying and mitigating seismic hazards (CDOC 2019).

The SHMA requires the State Geologist to establish regulatory zones (Zones of Required Investigation) and to issue appropriate maps (Seismic Hazard Zone maps). Following creation of the maps, they are distributed to all affected state agencies, counties, and cities for their use in planning and controlling construction and development (CDOC 2019).

4.7.2.2.3 CALIFORNIA BUILDING CODE

Section 1613 of the CBC identifies building requirements that new development must meet to withstand earthquake loads, including liquefaction. According to Section 1613 of the CBC, all structures, including nonstructural components that are permanently attached to structures and their supports and attachments, shall be designed and constructed to resist the effects of earthquake motions in accordance with this section.

Section 1803 of the CBC requires geotechnical investigations in accordance with Section 1803.2 and reporting in accordance with Section 1803.6. Section 1803 of the CBC states that geotechnical investigations shall be conducted in accordance with the following requirements:

> **1803.2 Investigations Required.** Geotechnical investigations shall be conducted in accordance with Sections 1803.3 through 1803.5.
>
> **1803.3 Basis of Investigation.** Soil classification shall be based on observation and any necessary tests of the materials disclosed by borings, test pits or other subsurface exploration made in appropriate locations. Additional studies shall be made as necessary to evaluate slope stability, soil strength, position and adequacy of load-bearing soils, the effect of moisture variation on soil-bearing capacity, compressibility, liquefaction and expansiveness.

1803.3.1 Scope of Investigation. The scope of the geotechnical investigation including the number and types of borings or soundings, the equipment used to drill or sample, the in-situ testing equipment and the laboratory testing program shall be determined by a registered design professional.

1803.4 Qualified Representative. The investigation procedure and apparatus shall be in accordance with generally accepted engineering practice. The registered design professional shall have a fully qualified representative on site during all boring or sampling operations.

1803.5.2 Questionable Soil. Where the classification, strength or compressibility of the soil is in doubt or where a load-bearing value superior to that specified in this code is claimed, the building official shall be permitted to require that a geotechnical investigation be conducted.

1803.5.3 Expansive Soil. In areas likely to have expansive soil, the building official shall require soil tests to determine where such soils do exist.

1803.5.4 Ground-Water Table. A subsurface soil investigation shall be performed to determine whether the existing ground-water table is above or within 5 feet (1524 mm) below the elevation of the lowest floor level where such floor is located below the finished ground level adjacent to the foundation.

1803.5.5 Deep Foundations. Where deep foundations will be used, a geotechnical investigation shall be conducted and shall include all of the following, unless sufficient data upon which to base the design and installation is otherwise available:

1. Recommended deep foundation types and installed capacities
2. Recommended center-to-center spacing of deep foundation elements
3. Driving criteria
4. Installation procedures
5. Field inspection and reporting procedures (to include procedures for verification of the installed bearing capacity where required)
6. Load test requirements
7. Suitability of deep foundation materials for the intended environment
8. Designation of bearing stratum or strata
9. Reductions for group action, where necessary

1803.6 Reporting. Where geotechnical investigations are required, a written report of the investigations shall be submitted to the building official by the permit applicant at the time of permit application. This geotechnical report shall include, but need not be limited to, the following information:

1. A plot showing the location of the soil investigations.
2. A complete record of the soil boring and penetration test logs and soil samples.
3. A record of the soil profile.
4. Elevation of the water table, if encountered.

5. Recommendations for foundation type and design criteria, including but not limited to: bearing capacity of natural or compacted soil; provisions to mitigate the effects of expansive soils; mitigation of the effects of liquefaction, differential settlement and varying soil strength; and the effects of adjacent loads.
6. Expected total and differential settlement.
7. Deep foundation information in accordance with Section 1803.5.5.
8. Special design and construction provisions for foundations of structures founded on expansive soils, as necessary.
9. Compacted fill material properties and testing in accordance with Section 1803.5.8.
10. Controlled low-strength material properties and testing in accordance with Section 1803.5.9.
11. The report shall consider the effects of seismic hazard in accordance with Section 1803.7.

4.7.2.2.4 CALIFORNIA PUBLIC RESOURCES CODE SECTION 5097.5

PRC Section 5097.5 prohibits any persons from knowingly or willfully excavating upon, removing, destroying, injuring, or defacing any historic or prehistoric ruins, including a vertebrate paleontological site, fossilized footprints, inscriptions made by human agency, rock art, or any other archaeological, paleontological, or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over the lands. Anyone who violates this section of the PRC would be subject to the payment of fines or imprisonment.

4.7.2.3 Local

4.7.2.3.1 COUNTY OF SAN LUIS OBISPO GENERAL PLAN

Safety Element

The County's Safety Element has two basic principles: to be ready for disaster, and to manage development to reduce risk. The Safety Element provides goals, policies, and programs to reduce the risk of loss due to potential natural hazards, including seismic hazards, within the county, with the purpose of providing standards for reducing the risk of exposure to hazards.

Conservation and Open Space Element

The County's COSE identifies goals, policies, and implementation strategies aimed at preserving and protecting natural resources throughout the county. The COSE includes goals, policies, and implementation strategies for the protection of soil and paleontological resources. COSE Chapter 8, *Soil Resources*, identifies resource management goals, policies, and strategies that preserve and protect soil resources from degradation or loss by wind and water erosion, preserve and protect watershed function and ecological health through soil conservation, and protect agricultural soils from conversion to non-agricultural uses.

4.7.2.3.2 COUNTY OF SAN LUIS OBISPO INLAND LAND USE ORDINANCE (TITLE 22)

The County's LUO, Title 22 of the County Code, includes regulations that have been adopted by the County to implement the General Plan and to guide and manage the future growth of the county in compliance with the General Plan; to regulate land use in a manner that will encourage and support the orderly development and beneficial use of lands within the county; to minimize adverse effects on the public resulting from the inappropriate creation, location, use, or design of building sites, buildings, land uses, parking areas, or other forms of land development by providing appropriate standards for development; to protect and enhance the significant natural, historic, archaeological, and scenic resources within the county as identified by the General Plan; and to assist the public in identifying and understanding regulations affecting the development and use of land.

Chapter 22.52 of the LUO includes specific regulations pertaining to grading and drainage within the county. The purpose of Chapter 22.52 is to establish standards to safeguard the public health, safety and general welfare; minimize erosion and sedimentation; minimize fugitive dust emissions; prevent the loss of agricultural soils; reduce the harmful effects of stormwater runoff; encourage groundwater recharge; protect fish and wildlife; reduce hazards to life and property; reduce drainage problems from new development; enhance slope stability; protect natural, scenic, and cultural resources; prevent environmental damage to public and private property; and to otherwise protect the natural environment.

Section 22.14.070 of the LUO contains specific regulations related to the GSA combining designation. The GSA is applied to areas where geologic and soil conditions could present new developments and their users with potential hazards to life and property. Potential geologic hazards include seismic hazards, landslide hazards, and liquefaction hazards.

4.7.2.4 Applicable State, Regional, and Local Land Use Plans and Policies Relevant to Geology and Soils

Table 4.7-5 lists applicable state, regional, and local land use policies and regulations pertaining to geology and soils that were adopted for the purpose of avoiding or mitigating an environmental effect and that are relevant to the proposed project. A general overview of these policy documents is presented in Section 4.7.2, *Regulatory Setting*, and Chapter 3, *Environmental Setting*. Also included in Table 4.7-5 is an analysis of project consistency with identified policies and regulations. Where the analysis concludes the proposed project would potentially conflict with the applicable policy or regulation, the reader is referred to Section 4.7.5, *Project-Specific Impacts and Mitigation Measures*, and Section 4.11, *Land Use and Planning*, for additional discussion.

Table 4.7-5. Preliminary Policy Consistency Evaluation

Goals, Policies, Plans, Programs and Standards	Intent of the Policy in Relation to Avoiding or Mitigating Significant Environmental Impacts	Preliminary Consistency Determination
County of San Luis Obispo General Plan		
Safety Element		
Policy S-18 Fault Rupture Hazards. Locate new development away from active and potentially active faults to reduce damage from fault rupture. Fault studies may need to include mapping and exploration beyond project limits to provide a relatively accurate assessment of a fault's activity. The County will enforce applicable regulations of the Alquist-Priolo Earthquake Fault Zoning Act pertaining to fault zones to avoid development on active faults.	The intent of this policy is to avoid hazards associated with rupture of an active fault.	**Potentially Consistent**. There are no known active or potentially active faults located under the Specific Plan Area or immediately adjacent to the Specific Plan Area. Therefore, future buildout of residential and mixed-use development on-site would not be at risk of loss, injury, or death involving rupture of an active fault.
Policy S-19 Reduce Seismic Hazards. The County will enforce applicable building codes relating to the seismic design of structures to reduce the potential for loss of life and reduce the amount of property damage.	The intent of this policy is to reduce hazards associated with seismic events.	**Potentially Consistent.** The project is located within a seismically active region. A Geotechnical Engineering Report and Geology Report were prepared for the project (ESP 2021a, 2021b). The project would have the potential to result in substantial adverse effects in the event of strong seismic ground shaking. Mitigation has been identified to ensure future development is designed and constructed with foundations that would reduce risk of loss, injury, or death involving strong seismic shaking or seismic-related ground failure.
Policy S-20 Liquefaction and Seismic Settlement. The County will require design professionals to evaluate the potential for liquefaction or seismic settlement to impact structures in accordance with the currently adopted Uniform Building Code.	The intent of this policy is to reduce risk associated with liquefaction and seismic settlement.	**Potentially Consistent.** The project is located in a seismically active area with low to moderate liquefaction potential. The project would be subject to Chapter 1613 of the 2019 CBC, which requires buildings, building foundations, and any other associated structures to be constructed to withstand earthquake loads, including liquefaction. According to the Geotechnical Engineering Report prepared for the project, based on a project-specific analysis, project soils are non-liquefiable; therefore, the potential for liquefaction to cause dynamic settlement, lateral spreading, or loss of soil bearing is negligible (ESP 2021a). In addition, the project area has not been identified as an area of concern for known land subsidence (USGS 2021; ESP 2021a).
Policy S-21 Slope Instability. The County acknowledges that areas of known landslide activity are generally not suitable for residential development. The County will avoid development in areas of known slope instability or high landslide risk when possible and continue to encourage that developments on sloping ground use design and construction techniques appropriate for those areas.	The intent of this policy is to reduce risk associated with slope instability.	**Potentially Consistent.** The project is not located in an area identified as having landslide or slope stability risk. Future development would be required to construct foundations and other surface improvements on relatively uniform material, which may be accomplished by overexcavation, scarification, moisture conditioning, and compaction of upper soils (ESP 2021a). Mitigation Measures GEO/mm-5.1 and GEO/mm-5.2 have been included to require future site preparation and grading to incorporate recommendations identified in the Geotechnical Engineering Report prepared

Goals, Policies, Plans, Programs and Standards	Intent of the Policy in Relation to Avoiding or Mitigating Significant Environmental Impacts	Preliminary Consistency Determination
		for the project (ESP 2021a, 2021b). Implementation of the recommendations would minimize the potential for settlement and hydroconsolidation. In addition, future buildout of the project would be required to comply with all applicable CBC standards.
Policy S-22 Readiness and Response. Fire and law enforcement agencies will maintain and improve their ability to respond to seismic emergencies throughout the County	The intent of this policy is to improve emergency response following seismic emergencies.	**Potentially Consistent.** As described in Section 4.15, *Public Services*, the project would result in an increased need for fire and police protection services, which would be offset through payment of Public Facilities Fees. Further, increased demand on fire protection services would be offset through implementation of identified mitigation to provide land for future development of a new fire station. Transportation improvements proposed as part of development of the Specific Plan Area would improve emergency access in the event of an emergency.
Conservation and Open Space Element		
Policy CR 4.5 Paleontological resources. Protect paleontological resources from the effects of development by avoiding disturbance where feasible. **Implementation Strategy CR 4.5.1 Paleontological Studies.** Require a paleontological resource assessment and mitigation plan to 1) identify the extent and potential significance of the resources that may exist within the proposed development and 2) provide mitigation measures to reduce potential impacts when existing information indicates that a site proposed for development may contain biological, paleontological, or other scientific resources. **Implementation Strategy CR 4.5.2 Paleontological Monitoring.** Require a paleontologist and/or registered geologist to monitor site-grading activities when paleontological resources are known or likely to occur. The monitor will have the authority to halt grading to determine the appropriate protection or mitigation measures. Measures may include collection of paleontological resources, curation of any resources collected with an appropriate repository, and documentation with the County.	The intent of this policy is to protect paleontological resources.	**Potentially Consistent.** The project includes ground-disturbing activities, which has limited but some potential to disturb paleontological resources if present on-site. Therefore, the project includes mitigation to reduce the potential to disturb paleontological resources during project construction, consistent with this policy.
Policy SL 1.1 Prevent loss of topsoil in all land uses. Minimize the loss of topsoil by encouraging broad-based cooperation between property owners, agricultural operators, agencies, and organizations that will lead to effective soil conservation practices on all lands, including County-controlled properties.	The intent of this policy is to minimize the loss of topsoil.	**Potentially Consistent.** The project would be required to comply with LUO Section 22.52.120, which requires all construction and grading permit projects to prepare and implement an Erosion and Sedimentation Control Plan (ESCP) to address pre-, during, and post-construction measures for erosion and sedimentation control. The ESCP would include erosion control measures, such as the installation of silt fencing and sediment rolls, hydroseeding and application of straw following seeding to stabilize soils, and storm drain inlet protection including filter fabric or silt sacks installed around the inlet and on top

Goals, Policies, Plans, Programs and Standards	Intent of the Policy in Relation to Avoiding or Mitigating Significant Environmental Impacts	Preliminary Consistency Determination
		of the storm drain grate and catch basin to minimize risks of loss of topsoil.
Policy SL 1.2 Promote soil conservation practices in all land uses. Require erosion and sediment control practices during development or other soil-disturbing activities on steep slopes and ridgelines. These practices should disperse stormwater so that it infiltrates the soil rather than running off and protect downslope areas from erosion.	The intent of this policy is to utilize erosion and sediment control practices and encourage stormwater infiltration.	**Potentially Consistent.** The project would be required to comply with LUO Section 22.52.120, which requires all construction and grading permit projects to prepare and implement an ESCP to address pre-, during, and post-construction measures for erosion and sedimentation control. The ESCP would include erosion control measures, such as the installation of silt fencing and sediment rolls, hydroseeding and application of straw following seeding to stabilize soils, and storm drain inlet protection including filter fabric or silt sacks installed around the inlet and on top of the storm drain grate and catch basin to minimize risks of loss of topsoil. The project site does not include steep slopes or ridgelines.
Policy SL 1.3 Minimize erosion associated with new development. Avoid development, including roads and driveways, on the steeper portions of a site except when necessary to avoid flood hazards, protect prime soils, and protect sensitive biological and other resources. Avoid grading and site disturbance activities on slopes over 30%. Minimize site disturbance and protect existing vegetation as much as possible.	The intent of this policy is to minimize erosion during construction activities.	**Potentially Consistent.** The project would be required to comply with LUO Section 22.52.120, which requires all construction and grading permit projects to prepare and implement an ESCP to address pre-, during, and post-construction measures for erosion and sedimentation control. The ESCP would include erosion control measures, such as the installation of silt fencing and sediment rolls, hydroseeding and application of straw following seeding to stabilize soils, and storm drain inlet protection including filter fabric or silt sacks installed around the inlet and on top of the storm drain grate and catch basin to minimize risks of loss of topsoil. The project area does not include steep slopes or prime soils and measures have been identified to protect biological and other resources.
San Luis Obispo County Multi-Jurisdictional Hazard Mitigation Plan		
Goal 2. Mitigate hazard impacts to existing and future development.	The intent of this policy is to mitigate potential hazards to existing and future development.	**Potentially Consistent.** The project is located within a seismically active region. A Geotechnical Engineering Report and Geology Report were prepared for the project (ESP 2021a, 2021b). The project would have the potential to result in substantial adverse effects in the event of strong seismic ground shaking. Mitigation has been identified to ensure future development is designed and constructed with foundations that would reduce risk of loss, injury, or death.
Objective 2.1. Limit new development in hazard areas, and as permissible, build to standards that will prevent or reduce damage.	The intent of this policy is to mitigate potential hazards to new development.	**Potentially Consistent.** The project would have the potential to result in substantial adverse effects in the event of strong seismic ground shaking. Future development would be required to construct foundations and other surface improvements on relatively uniform material, which may be accomplished by overexcavation, scarification, moisture conditioning, and compaction of upper soils (ESP 2021a). Mitigation Measures GEO/mm-5.1 and GEO/mm-5.2 have been

Goals, Policies, Plans, Programs and Standards	Intent of the Policy in Relation to Avoiding or Mitigating Significant Environmental Impacts	Preliminary Consistency Determination
		included to require future site preparation and grading to incorporate recommendations identified in the Geotechnical Engineering Report and Geology Report prepared for the project (ESP 2021a, 2021b). Implementation of the recommendations would minimize the potential for potential ground-failure events, including seismically induced ground failure. In addition, future buildout of the project would be required to comply with all applicable CBC standards.
Goal 4. Minimize the level of injury and loss of life and damage to existing and future critical facilities, property and infrastructure due to natural hazards.	The intent of this policy is to minimize risk as a result of natural hazards.	**Potentially Consistent.** The project is located within a seismically active region. The project would have the potential to result in substantial adverse effects in the event of strong seismic ground shaking. Mitigation has been identified to ensure future development is designed and constructed with foundations that would reduce risk of loss, injury, or death. In addition, future buildout of the project would be required to comply with all applicable CBC standards.

4.7.3 Thresholds of Significance

The determinations of significance of project impacts are based on applicable policies, regulations, goals, and guidelines defined by CEQA and the County. Specifically, the project would be considered to have a significant effect on geology and soils if the effects exceed the significance criteria described below:

a. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:
    i. Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault? Refer to Division of Mines and Geology Special Publication 42.
    ii. Strong seismic ground shaking.
    iii. Seismic-related ground failure, including liquefaction.

b. Result in substantial soil erosion or the loss of topsoil.

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

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

f. Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.

Each of these thresholds is discussed under Section 4.7.5, *Project-Specific Impacts and Mitigation Measures*, below.

As discussed in the IS/NOP, the County has determined that the proposed project would not have significant impacts related to landslide hazard because the project site is located in an area with low

potential for landslides to occur. In addition, the project does not require the installation of septic tanks; therefore, there would be no potential impacts related to installation of septic tanks. Therefore, issues related to the following thresholds of significance are not discussed further in the EIR:

a. Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:
    iv. Landslides.

e. Have soils incapable of adequately supporting the use of septic tanks or alternative waste water disposal systems where sewers are not available for the disposal of waste water.

See EIR Appendix B, *Notice of Preparation for the Draft Environmental Impact Report and Comment Letters*, for more information.

4.7.4 Impact Assessment and Methodology

The following evaluation is based, in part, on the results of the 2021 Geotechnical Engineering Report and Geology Report prepared for the proposed project (ESP 2021a, 2021b; see EIR Appendix G). The Geotechnical Engineering Report includes findings based on field and laboratory tests conducted on soils at the site. Existing site conditions, potential hazards, and building design recommendations are included and incorporated into the evaluation below to identify the appropriate engineering solutions to minimize or avoid any potential geologic hazards or other soil-related factors that would inhibit development of the project area.

4.7.5 Project-Specific Impacts and Mitigation Measures

WOULD THE PROJECT RESULT IN SUBSTANTIAL ADVERSE EFFECTS, INCLUDING THE RISK OF LOSS, INJURY, OR DEATH INVOLVING:

I. RUPTURE OF A KNOWN EARTHQUAKE FAULT, AS DELINEATED ON THE MOST RECENT ALQUIST-PRIOLO EARTHQUAKE FAULT ZONING MAP ISSUED BY THE STATE GEOLOGIST FOR THE AREA OR BASED ON OTHER SUBSTANTIAL EVIDENCE OF A KNOWN FAULT? REFER TO DIVISION OF MINES AND GEOLOGY SPECIAL PUBLICATION 42?

II. STRONG SEISMIC GROUND SHAKING?

III. SEISMIC-RELATED GROUND FAILURE, INCLUDING LIQUEFACTION?

Specific Plan Area

GEO Impact 1: The project could directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, seismic ground shaking, or seismic-related ground failure. Impacts would be less than significant with mitigation (Class II).

The County's Safety Element describes fault rupture as the displacement of the ground surface along a fault trace, which would result in risk to life and property if buildings, structures, or lifeline facilities are constructed on, or cross over, a fault (County of San Luis Obispo 1999). The proposed project would have a potentially significant impact related to risk of loss, injury, or death involving fault rupture, if future development were to be constructed on a fault. Based on the Geotechnical Engineering Report prepared for the project (ESP 2021a) and the CDOC Fault Activity Map of California, the Specific Plan Area is not located on or near an Alquist-Priolo fault. Because there are no active or potentially active

faults located under the Specific Plan Area, future buildout of residential and mixed-use development would not be at risk of loss, injury, or death involving rupture of an active fault.

According to the Safety Element, ground shaking refers to the motion that occurs in response to regional and local earthquakes and can endanger life and safety by causing damage or collapse of buildings, structures, or lifeline facilities. The proposed project would have a significant impact if future development would result in risk of loss, injury, or death due to building and/or structure collapse caused by seismic ground shaking. The project site is located in a seismically active region; therefore, there is always potential for ground shaking to occur. Future buildout would result in the development of up to 1,291 potential residential units and 110,000 to 203,000 potential square feet of commercial and nonresidential development. It is anticipated that future residential and commercial and other nonresidential development would be at risk of seismic ground shaking at some point(s) during the lifetime of the project.

Based on the Safety Element maps, the project site has moderate potential for liquefaction. As identified in the Safety Element, areas with moderate or high liquefaction potential are required to perform geotechnical studies for habitable or important structures. A Geotechnical Engineering Report and Geology Report were prepared for the project (ESP 2021a, 2021b). Based on the Geotechnical Engineering Report, soils at the project site are non-liquefiable; therefore, the potential for liquefaction to cause dynamic settlement, lateral spreading, or loss of soil bearing is negligible (ESP 2021a).

The project would be subject to Chapter 1613 of the 2019 CBC, which requires buildings, building foundations, and any other associated structures to be constructed to withstand earthquake loads, including liquefaction. In addition, future buildout of the project would be required to comply with the building and design recommendations included in the Geotechnical Engineering Report and associated reports prepared for the project (ESP 2021a, 2021b). Mitigation Measure GEO/mm-1.1 requires recommendations provided for foundational design be implemented into the future project design criteria to reduce the risk of collapse or other damage due to seismic activity and would further reduce the risk of damage caused by potential liquefaction at the site. Therefore, with required adherence to Section 1613 of the CBC and implementation of Mitigation Measure GEO/mm-1.1, future development associated with the DRSP would be compliant with relevant seismic design standards, which would reduce the risk of loss, injury, or death involving seismic ground shaking or seismic-related ground failure. Therefore, impacts would be *less than significant with mitigation*.

GEO Impact 1 (Class II)	
The project could directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, seismic ground shaking, or seismic-related ground failure.	
Mitigation Measures	
GEO/mm-1.1	***Foundations.*** *The following recommendations shall be incorporated into the design criteria for future development of the Specific Plan Area:* *1. Conventional continuous and spread footings bearing on compacted soils may be used to support the new structures. Grade beams shall also be placed across all large entrances into the buildings. Footings and grade beams shall have a minimum depth of 12 inches below lowest adjacent grade; however, footings and grade beams for commercial buildings and residential buildings two stories or greater shall have a minimum depth of 18 inches below lowest adjacent grade. All spread footings shall be a minimum of 2 square feet. Footing and grade beam dimensions shall also conform to the applicable requirements of Section 1809 of the 2019 California Building Code. Footing reinforcement shall be in accordance with the requirements of the architect/engineer; minimum continuous footing and grade beam reinforcement shall consist of two No. 4 rebar, one near the top and one near the bottom of the footing.*

GEO Impact 1 (Class II)

2. *Footings shall be designed using a maximum allowable bearing capacity of 2,000 pounds per square foot (psf) dead plus live load. The allowable bearing capacity may be increased by 200 psf for each additional 6 inches of embedment below a depth of 12 inches below lowest adjacent grade. The allowable bearing capacity shall not exceed 3,000 psf dead plus live loads. Using these criteria, maximum total and differential settlement under static conditions are expected to be on the order of 3/4-inch and 1/4-inch in 25 feet, respectively. Footings shall also be designed to withstand total and differential dynamic settlement of 1/2-inch and 1/4-inch across the largest building dimension, respectively.*
3. *Lateral loads may be resisted by soil friction and by passive resistance of the soil acting on foundations. Lateral capacity is based on the assumption that backfill adjacent to foundations is properly compacted. A passive equivalent fluid pressure of 375 pounds per cubic foot (pcf) and a coefficient of friction of 0.39 may be used in design. No safety, load, and/or other factors have been applied to any of the values.*
4. *The allowable bearing capacity may be increased by one-third when transient loads, such as wind or seismicity, are included if the structural engineer determines they are allowed per Sections 1605.3.1 and 1605.3.2 of the 2019 California Building Code. The following seismic parameters are presented for use in structural design.*

2019 Mapped CBC Values		Site Class "D" Adjusted Values				Design Values	
Seismic Parameters	**Values (g)**	**Site Coefficients**	**Values (g)**	**Seismic Parameters**	**Values (g)**	**Seismic Parameters**	**Values (g)**
S_S	1.056	F_a	1.078*	S_{MS}	1.138	S_{DS}	0.759*
S_1	0.386	F_V	1.914	S_{M1}	0.739	S_{D1}	0.493

Peak Mean Ground Acceleration (PGA_M) = 0.527g

Seismic Design Criteria = D

*F_a should be taken as 1.4 and S_{DS} as 0.996 if the Simplified Lateral Force Analysis Procedure in Section 12.14.8 of the American Society of Civil Engineers Publications is used in structural design

5. *Foundation excavations shall be observed by the geotechnical engineer prior to placement of reinforcing steel or any formwork. Foundation excavations shall be thoroughly moistened prior to Portland cement concrete placement and no desiccation cracks shall be present.*

Residual Impacts

With implementation of Mitigation Measure GEO/mm-1.1, residual impacts would be considered less than significant (Class II).

Off-Site Improvements

GEO Impact 2: Off-site improvements could directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, seismic ground shaking, or seismic-related ground failure. Impacts would be less than significant with mitigation (Class III).

Proposed off-site improvements would be located in a seismically active region with the potential for earthquakes and associated risk to occur, such as fault rupture, ground shaking, and liquefaction. Off-site improvement areas are not underlain by an Alquist-Priolo fault; therefore, proposed improvements would not result in the risk of loss, injury, or death as a result of rupture of a known Alquist-Priolo fault. Proposed off-site improvements would primarily be limited to installation of minor transportation improvements (e.g., blending of roadway connections, minor road widening, installation of stop- and

signal-control facilities) and installation of underground water and wastewater infrastructure. Additional proposed aboveground development for off-site improvements includes development of an additional water storage tank at the Joshua Road pump station, near the intersection of Tefft Street and North Dana Foothill Road. Proposed improvements would not result in any occupiable buildings or structures that would result in the risk of loss, injury, or death to any project occupants. Proposed off-site infrastructure improvements would be subject to Section 1613 of the CBC in effect at the time of development and relevant County requirements to adequately withstand risks associated with earthquakes, including ground shaking and liquefaction. Required compliance with the CBC and County requirements would reduce the risk of loss, injury, and/or death associated with installation of proposed improvements; therefore, potential impacts would be *less than significant*.

GEO Impact 2 (Class III)
Off-site improvements could directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, seismic ground shaking, or seismic-related ground failure.
Mitigation Measures
Mitigation is not necessary.
Residual Impacts
Based on required compliance with seismic design standards, residual impacts would be considered less than significant (Class III).

WOULD THE PROJECT RESULT IN SUBSTANTIAL SOIL EROSION OR THE LOSS OF TOPSOIL?

Specific Plan Area

GEO Impact 3: The project could result in substantial soil erosion or the loss of topsoil during future construction activities. Impacts would be less than significant (Class III).

The project site is characterized by topography that ranges from nearly level to gently rolling hills and supports coast live oak woodland, chapparal, and grassland communities. The Specific Plan Area is underlain by sandy soils, which are highly susceptible to erosion (ESP 2021a). Grading, vegetation removal, and other ground-disturbing activities on the approximately 288-acre Specific Plan Area would result in the temporary disturbance of project soils, which would likely increase soil erosion at the project site.

The project would be required to comply with County LUO Section 22.52.120, which requires all construction and grading permit projects to prepare and implement an Erosion and Sedimentation Control Plan (ESCP) to address pre-, during, and post-construction measures for erosion and sedimentation control. The project would also be required to comply with LUO Section 22.52.130 and prepare and implement a Stormwater Pollution Prevention Plan (SWPPP) in accordance with the State Water Resources Control Board (SWRCB) General Construction Permit. The SWPPP would be required to include Best Management Practices (BMPs) for erosion control during and following construction activities. Per LUO Section 22.52.130(F)(2), the SWPPP shall include a copy of the ESCP required by LUO Section 22.52.120. Based on required compliance with existing regulations, construction of the project is not anticipated to result in substantial soil erosion. Following preliminary infrastructure and construction activities, the Specific Plan Area would be constructed with buildings, landscaping, roads,

sidewalks, and other hardscapes that would significantly reduce the potential for long-term soil erosion to occur at the project site. Therefore, based on required compliance with existing regulations, temporary ground-disturbing activities would not result in substantial erosion or loss of topsoil, and impacts would be *less than significant*.

GEO Impact 3 (Class III)
The project could result in substantial soil erosion or the loss of topsoil during future construction activities.
Mitigation Measures
Mitigation is not necessary.
Residual Impacts
Potential impacts related to erosion or the loss of topsoil would be less than significant through compliance with existing regulations, and residual impacts would be less than significant (Class III).

Off-Site Improvements

GEO Impact 4: Off-site improvements could result in substantial soil erosion or the loss of topsoil during future construction activities. Impacts would be less than significant (Class III).

Off-site improvement areas are characterized by previously developed or otherwise disturbed areas on nearly level to gently sloping land. Construction for proposed improvements would require temporary construction activities that have the potential to result in increased erosion or loss of topsoil at proposed improvement areas. Further, proposed water system improvements would require work adjacent to Nipomo Creek, which has the potential to result in increased erosion that may runoff into the creek.

Proposed off-site improvements would be required to comply with County LUO Section 22.52.120, which requires all construction and grading permit projects to prepare and implement an ESCP to address pre-, during, and post-construction measures for erosion and sedimentation control. Proposed improvements that require more than 1 acre of ground disturbance would be required to comply with LUO Section 22.52.130, which requires preparation and implementation of a SWPPP with BMPs in accordance with the SWRCB General Construction Permit. Following temporary construction activities, proposed off-site improvement areas would be returned to preconstruction conditions to the extent feasible to avoid and/or minimize the potential for long-term erosion to occur at off-site improvement areas. Therefore, based on required compliance with the County's LUO, off-site NCSD improvements are not anticipated to result in substantial erosion or the loss of topsoil, and impacts would be *less than significant*.

GEO Impact 4 (Class III)
Off-site improvements could result in substantial soil erosion or the loss of topsoil during future construction activities.
Mitigation Measures
Mitigation is not necessary.

GEO Impact 4 (Class III)
Residual Impacts
Potential impacts related to erosion or the loss of topsoil would be less than significant through compliance with existing regulations, and residual impacts would be less than significant (Class III).

WOULD THE PROJECT 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?

Specific Plan Area

GEO Impact 5: The project may 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. Impacts would be less than significant with mitigation (Class II).

According to the Geotechnical Engineering Report prepared for the project (ESP 2021a), based on the type of soils and conditions present, the Specific Plan Area is at risk for liquefaction, settlement, hydroconsolidation, and seismically induced settlement. However, based on a project-specific analysis, project soils are non-liquefiable; therefore, the potential for liquefaction to cause dynamic settlement, lateral spreading, or loss of soil bearing is negligible (ESP 2021a). In addition, the project area has not been identified as an area of concern for known land subsidence (USGS 2021; ESP 2021a).

Future development would be required to construct foundations and other surface improvements on relatively uniform material, which may be accomplished by overexcavation, scarification, moisture conditioning, and compaction of upper soils (ESP 2021a). Mitigation Measures GEO/mm-5.1 and GEO/mm-5.2 have been included to require future site preparation and grading to incorporate recommendations included in the Geotechnical Engineering Report. Implementation of the recommendations would minimize the potential for settlement and hydroconsolidation. Mitigation Measure GEO/mm-5.3 requires the applicant to retain a qualified geotechnical engineer to provide consultation during the design phase, aid in incorporating recommendations of this report in future project design, review final plans once they are available, interpret this report during construction, and provide construction monitoring in the form of testing and observation. In addition, future buildout of the project would be required to comply with all applicable CBC standards, including Section 1613 of the CBC to reduce or avoid risk associated with development on potentially unstable soils, including liquefaction. The project would also be required to implement Mitigation Measure GEO/mm-1.1, which requires recommendations for building foundations to be implemented into future project design criteria to reduce the risk of collapse or other damage due to liquefaction or settlement.

Therefore, with required adherence to the CBC and implementation of Mitigation Measures GEO/mm-1.1 and GEO/mm-5.1 through GEO/mm-5.3, future development associated with the Specific Plan Area would not be at risk due to potential ground failure. Therefore, impacts would be *less than significant with mitigation*.

GEO Impact 5 (Class II)

The project may 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.

Mitigation Measures

Implement Mitigation Measure GEO/mm-1.1.

GEO/mm-5.1 ***Site Preparation.***

1. *The existing ground surface in the building and surface improvements areas shall be prepared for construction by removing existing improvements, vegetation, large roots, debris, and other deleterious material. Any existing fill soils shall be completely removed and replaced as compacted fill. Any existing utilities that will not remain in service shall be removed or properly abandoned; the appropriate method of utility abandonment will depend upon the type and depth of the utility. Recommendations for abandonment can be made as necessary.*
2. *Voids created by the removal of materials or utilities, and extending below the recommended overexcavation depth, shall be immediately called to the attention of the geotechnical engineer. No fill shall be placed unless the geotechnical engineer has observed the underlying soil.*

GEO/mm-5.2 ***Grading.***

1. *Following site preparation, the soils in the building area for one- and two-story buildings shall be removed to a level plane at a minimum depth of 3 feet below the bottom of the deepest footing or 4 feet below existing grade, whichever is deeper. The soils in the building area for three- and four-story buildings shall be removed to a level plane at a minimum depth of 4 feet below the bottom of the deepest footing or 5 feet below existing grade, whichever is deeper. During construction, locally deeper removals may be recommended based on field conditions. The resulting soil surface shall then be scarified, moisture conditioned, and compacted prior to placing any fill soil.*
2. *In addition to the recommendations of measure 1, all cut or cut/fill transition areas shall be overexcavated such that a minimum of 5 feet of compacted fill is provided within all the building areas. Also, the minimum depth of the fill below the building area shall not be less than half of the maximum depth of fill below the building area. For example, if the maximum depth of fill below the building area is 20 feet, then the minimum depth of fill below the same building area grades shall be no less than 10 feet. In no case shall the depth of fill be less than 5 feet on the building areas.*
3. *Following site preparation, the soils in the surface improvement area shall be removed to a level plane at a minimum depth of 1 foot below the proposed subgrade elevation or 2 feet below the existing ground surface, whichever is deeper. During construction, locally deeper removals may be recommended based on field conditions. The resulting soil surface shall then be scarified, moisture conditioned, and compacted prior to placing any fill soil.*
4. *Following site preparation, the soils in fill areas beyond the building and surface improvement areas shall be removed to a depth of 2 feet below existing grade. During construction, locally deeper removals may be recommended based on field conditions. The resulting soil surface shall then be scarified, moisture conditioned, and compacted prior to placing any fill soil.*
5. *Voids created by dislodging cobbles and/or debris during scarification shall be backfilled and compacted, and the dislodged materials shall be removed from the area of work.*
6. *On-site material and approved import materials evaluated and approved by the geotechnical engineer pursuant to the Department of Toxic Substance Control's (DTSC's)* 2001 Information Advisory Clean Imported Fill Material *may be used as general fill. All imported soil shall be free of contamination and non-expansive. The*

GEO Impact 5 (Class II)

proposed imported soils shall be evaluated by the geotechnical engineer before being used, and on an intermittent basis during placement on the site.

7. *All materials used as fill shall be cleaned of any debris and rocks larger than 6 inches in diameter. No rocks larger than 3 inches in diameter shall be used within the upper 3 feet of finish grade. When fill material includes rocks, the rocks shall be placed in a sufficient soil matrix to ensure that voids caused by nesting of the rocks will not occur and that the fill can be properly compacted.*

   Soils are estimated to shrink by approximately 15% to 20% when prepared and graded as recommended above.

GEO/mm-5.3 ***Project Design, Construction Observation, and Testing.***

1. *A geotechnical engineer shall be retained to provide consultation during the design phase, aid in incorporating recommendations of this report in future project design, review final plans once they are available, interpret this report during construction, and provide construction monitoring in the form of testing and observation.*
2. *At a minimum, the geotechnical engineer shall be retained to provide:*
   a. *Review of final grading, utility, and foundation plans;*
   b. *Professional observation during grading, foundation excavations, and trench backfill;*
   c. *Oversight of compaction testing during grading; and*
   d. *Oversight of special inspection during grading;*
3. *Special inspection of grading shall be provided as per California Building Code Section 1705.6 and Table 1705.6. The special inspector shall be under the direction of the geotechnical engineer. Special inspection of the following items shall be provided by the special inspector:*
   a. *Stripping and clearing of vegetation*
   b. *Overexcavation to the recommended depths*
   c. *Scarification, moisture conditioning, and compaction of the soil*
   d. *Fill quality, placement, and compaction*
   e. *Utility trench backfill*
   f. *Retaining wall drains and backfill*
   g. *Foundation excavations*
   h. *Subgrade and aggregate base compaction and proof rolling*
4. *A program of quality control shall be developed prior to beginning grading. The contractor or project manager shall determine any additional inspection items required by the architect/engineer or the governing jurisdiction.*
5. *Locations and frequency of compaction tests shall be as per the recommendation of the geotechnical engineer at the time of construction. The recommended test location and frequency may be subject to modification by the geotechnical engineer, based on soil and moisture conditions encountered, size and type of equipment used by the contractor, the general trend of the results of compaction tests, or other factors.*
6. *The geotechnical engineer shall be notified at least 48 hours prior to beginning construction operations.*

Residual Impacts

With implementation of Mitigation Measures GEO/mm-1.1 and GEO/mm-5.1 through GEO/mm-5.3, residual impacts would be considered less than significant (Class II).

Off-Site Improvements

GEO Impact 6: The project may 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. Impacts would be less than significant with mitigation (Class II).

According to the Safety Element maps, off-site improvement areas are located in areas with a low to moderate risk of liquefaction and a low risk of landslide. In addition, the project area has not been identified as an area of concern for known land subsidence (USGS 2021). Proposed improvement areas would be located in previously developed or otherwise disturbed areas, which reduces the potential for liquefaction, landslide, or other ground failure to occur due to previously constructed foundations. Proposed off-site improvements would not result in the development of any occupiable buildings or structures that could result in direct risk to project occupants. Proposed off-site improvements would be subject to relevant CBC and County Public Works Department requirements to avoid indirect hazards associated with liquefaction, landslide, or other ground failure events. Based on required compliance with the CBC and County Public Works Department requirements, potential impacts related to ground failure would be *less than significant*.

GEO Impact 6 (Class III)
Off-site improvements may 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.
Mitigation Measures
Mitigation is not necessary.
Residual Impacts
Based on required compliance with state and local requirements and standard building regulations, residual impacts would be considered less than significant (Class III).

WOULD THE PROJECT 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?

Specific Plan Area

The project site is underlain by Oceano sand, 0 to 9 percent slopes, and Oceano sand, 9 to 30 percent slopes (NRCS 2021). Typically, soils with a high clay content display expansive property. Soils at the project site consist solely of sand and have been identified by the Geotechnical Engineering Report to be non-expansive (ESP 2021a). Since future development would not be located on expansive soils, there would be *no impact* related to indirect risks to life or property.

Off-Site Improvements

GEO Impact 7: Off-site improvements may 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. Impacts would be less than significant (Class III).

Proposed transportation and NCSD wastewater improvements would be located within Oceano sand, which has a soil profile that consists entirely of sand; therefore, off-site transportation and wastewater improvements would not be located on expansive soils. Proposed water system improvements would be located on multiple different soil types, some of which consist of clay and clay materials (these soils are generally located east of Nipomo Creek). Therefore, there is potential for water system improvements to be located on expansive soils. However, proposed off-site NCSD water system improvements do not include the development of any occupiable buildings or structures that would result in the direct risk of life or property due to development on expansive soils. Proposed NCSD improvements would be subject to CBC requirements for utility installation to adequately withstand and minimize risk associated with development on expansive soils. Based on required compliance with the CBC requirements, potential impacts would be *less than significant*.

GEO Impact 7 (Class III)
Off-site improvements may 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.
Mitigation Measures
Mitigation is not necessary.
Residual Impacts
Through compliance with existing regulations and standard building requirements, residual impacts related to development within expansive soils would be considered less than significant (Class III).

WOULD THE PROJECT DIRECTLY OR INDIRECTLY DESTROY A UNIQUE PALEONTOLOGICAL RESOURCE OR SITE OR UNIQUE GEOLOGIC FEATURE?

Specific Plan Area

GEO Impact 8: Paleontological resources could be present in geological units that underlay the Specific Plan Area, and ground-disturbing activities could damage paleontological resources that may be present below the surface. Impacts would be less than significant with mitigation (Class II).

As documented in Section 4.7.1.3, *Off-Site Improvements Geologic Setting*, the geologic deposits underlying the project site and immediately surrounding areas include Pleistocene-aged eolian sand dune deposits (Qoe) and Pleistocene-aged alluvial deposits (Qoa) at unknown depths. In accordance with criteria set forth by the SVP (2010), Pleistocene eolian sand dune deposits (Qoe) typically have low paleontological potential because they are unlikely to preserve and fossilize remains, while Pleistocene-aged alluvial deposits (Qoa) have a low to high potential to preserve and fossilize remains. While there are documented fossils preserved at localities with similarly aged but differently mapped alluvial sediments, no localities occur directly within or immediately adjacent to the project within documented Pleistocene-aged alluvial deposits (Qoa). Since Pleistocene-aged alluvial deposits (Qoa) occur at an

unknown depth from the surface, it may not be impacted if the depth it occurs at is not surpassed by ground disturbance; therefore, the unit qualifies as having low paleontological potential at shallow depths but increases with depth (and geologic age).

Based on the paleontological resource assessment of the geological units expected to be impacted, a low paleontological potential is recommended for the project. This assessment could be altered if unanticipated paleontological resources are uncovered during ground-disturbing activities, resulting in the implementation of additional mitigation steps to reduce the impact. However, higher sensitivity formations (Qoa) are located in close proximity to the project site, and it is possible that deposits also underlie the Specific Plan Area. Therefore, based on required compliance with existing regulations, ground-disturbing activities could uncover paleontological resources in previously undisturbed geologic deposits, and, if improperly handled, such resources could be damaged or destroyed, a potentially significant impact. Therefore, mitigation has been identified requiring compliance with COSE Policy CR 4.5, and potential impacts to paleontological resources would be *less than significant with mitigation*.

GEO Impact 8 (Class II)	
Paleontological resources could be present in geological units that underlay the Specific Plan Area, and ground-disturbing activities could damage paleontological resources that may be present below the surface.	
Mitigation Measures	
GEO/mm-8.1	***Preparation of a Paleontological Resources Monitoring and Mitigation Plan.*** *A qualified paleontologist, meeting the standards of the Society of Vertebrate Paleontology (2010), shall be retained by the applicant prior to the approval of grading permits. The qualified paleontologist shall develop a Paleontological Resources Monitoring and Mitigation Plan for all ground-disturbing activities, provide mitigation measures to reduce potential impacts when existing information indicates that a site proposed for development may contain paleontological resources, and report to the site in the event potential paleontological resources are encountered.*
GEO/mm-8.2	***Worker Environmental Awareness Program.*** *The qualified paleontologist shall conduct a Worker Environmental Awareness Program for all construction workers prior to the start of ground-disturbing activities (including vegetation removal, pavement removal, etc.). In the event construction crews are phased, additional trainings shall be conducted for new construction personnel. The training session shall focus on the recognition of the types of paleontological resources that could be encountered within the project site and the procedures to be followed if they are found. This information may be presented to contractors and their staff through the use of in-person "tailgate" meetings or other mechanisms (e.g., handouts). Documentation shall be retained demonstrating that all construction personnel attended the training.*
GEO/mm-8.3	***Paleontological Monitoring and Handling of Resources Inadvertently Discovered during Ground-Disturbing Activities.*** *Part-time/on-call paleontological resources monitoring shall be conducted by a qualified paleontologist who meets the standards of the Society of Vertebrate Paleontology (2010), for all ground-disturbing activities that occur in previously undisturbed sediments, as outlined in the Paleontological Resources Monitoring and Mitigation Plan prepared to satisfy Mitigation Measure GEO/mm-8.1. If required per the requirements of the Paleontological Resources Monitoring and Mitigation Plan, the qualified paleontologist shall spot check the excavation on an intermittent basis and recommend whether the depth of required monitoring shall be revised based on his/her observations. Monitors shall have the authority to temporarily halt or divert work away from exposed fossils in order to recover the fossil specimens. Any significant fossils collected during project-related excavations shall be prepared to the point of identification and curated into an accredited repository with retrievable storage as designated in the Paleontological Resources Monitoring and Mitigation Plan. Monitors shall prepare daily logs detailing the types of activities and soils observed and any discoveries. The qualified paleontologist shall prepare a final monitoring and mitigation report to document the results of the monitoring effort.*

GEO Impact 8 (Class II)
If construction or other project personnel discover any potential fossils during construction, regardless of the depth of work or location, work at the discovery location shall cease in a 50-foot radius of the discovery until the qualified paleontologist has assessed the discovery and made recommendations as to the appropriate treatment. If the find is deemed significant, it shall be salvaged following the standards of the Society of Vertebrate Paleontology (2010) and curated with a certified repository.
Residual Impacts
With implementation of Mitigation Measures GEO/mm-8.1, GEO/mm-8.2, and GEO/mm-8.3, residual impacts would be considered less than significant (Class II).

Off-Site Improvements

GEO Impact 9: Paleontological resources could be present in geological units that underlay the area of off-site improvements, and ground-disturbing activities could damage paleontological resources that may be present below the surface. Impacts would be less than significant with mitigation (Class II).

Proposed off-site transportation, water, and wastewater system improvements would be mostly located along previously developed or otherwise disturbed areas (existing roads) and would pass through multiple geologic units, including those found within the Specific Plan Area (Qoe and Qoa), as well as younger alluvium (Qya), Monterey Formation (Tmc) and the Obispo Formation (Tot and Tob) (Delattre and Wieger 2014). Utilizing the SVP (2010) standards and guidelines, these geologic units have high (Tmc), low to high (Qya), low (Tot), and none to low (Tob) paleontological resource potential, based on sedimentological descriptions (Delattre and Wieger 2014) and the results of previous locality searches (NHMLA 2021; PBDB 2022; Jefferson 1991; Jefferson et al. 1992). In areas of previous ground disturbance, paleontological resource potential is low to none do to the altered stratigraphic and geologic context of any paleontological resource which may be present. However, if construction activities during installation of off-site improvements impact previously undisturbed geologic deposits containing scientifically important fossils, and these resources are improperly handled, such resources could be damaged or destroyed, a potentially significant impact. Therefore, mitigation has been identified requiring compliance with COSE Policy CR 4.5; based on required compliance with existing regulations, impacts would be *less than significant with mitigation*.

GEO Impact 9 (Class II)
Paleontological resources could be present in geological units that underlay the area of off-site improvements, and ground-disturbing activities could damage paleontological resources that may be present below the surface.
Mitigation Measures
Implement Mitigation Measures GEO/mm-8.1 through GEO/mm-8.3.
Residual Impacts
With implementation of Mitigation Measures GEO/mm-8.1 through GEO/mm-8.3 by the applicant, in coordination with the NCSD, residual impacts would be considered less than significant (Class II).

4.7.6 Cumulative Impacts

GEO Impact 10: The project would not result in a cumulatively considerable impact to geology and soils. Impacts would be less than cumulatively considerable and less than significant (Class III).

Cumulative impacts related to geology and soils would result if project-related impacts, when combined with other projects identified in Chapter 3, *Environmental Setting*, would cumulatively increase the potential for geologic hazards, such as ground shaking; increase soil impacts, such as erosion; or cumulatively increase the risk of impacts to paleontological resources. Any structure built in the seismically active region of the Central Coast is naturally at risk to damage during major seismic events, though requirements in the CBC are intended to protect life, ensure safety, and prevent building collapse. All discretionary future development within the Specific Plan Area would be subject to the CBC, which requires buildings, building foundations, and any other associated structures to be constructed to withstand earthquake loads, including liquefaction. In addition, future buildout of the project would be required to comply with the building and design recommendations included in the Geotechnical Engineering Report and associated reports prepared for the project (ESP 2021a, 2021b), as required by Mitigation Measures GEO/mm-1.1, GEO/mm-5.1, GEO/mm-5.2, and GEO/mm-5.3. The project would be required to comply with County LUO Section 22.52.120, which requires all construction and grading permit projects to prepare and implement an ESCP to address pre-, during, and post-construction measures for erosion and sedimentation control. Future development within the Specific Plan Area would also be required to comply with LUO requirements for preparation of a SWPPP, when required by the SWRCB General Construction Permit. Compliance with these existing regulations and implementation of mitigation measures identified above would ensure the project's potential impacts were not cumulatively considerable when considered in combination with other similar projects. The low potential for impacts to paleontological resources would be avoided through implementation of identified mitigation measures; therefore, project impacts would not be cumulatively considerable. Therefore, cumulative impacts related to the DRSP would be *less than significant with mitigation* and *less than cumulatively considerable*.

GEO Impact 10 (Class II)
The project would potentially result in a cumulatively considerable impact to geology and soils.
Mitigation Measures
Implement Mitigation Measures GEO/mm-1.1, GEO/mm-5.1, GEO/mm-5.2, and GEO/mm-5.3, GEO/mm-8.1, GEO/mm-8.2, and GEO/mm-8.3.
Residual Impacts
Cumulative impacts would be avoided through compliance with identified project-specific mitigation; no additional mitigation is needed to avoid or minimize potential cumulative impacts. Therefore, residual impacts would be less than significant (Class II).