3.1.3 Geologic Hazards, Soils, and Paleontological Resources

This section of the Environmental Impact Report (EIR) discusses potential impacts to geologic hazards, geology, soils, and paleontological resources resulting from implementation of the project. The analysis is based on the review of existing resources, technical data, and applicable laws, regulations, and guidelines, as well as the following technical studies prepared for the project:

- *Preliminary Geotechnical Site Evaluation Report* (Bruin Geotechnical Services, Inc. 2022) (Appendix F of this EIR)

Comments received in response to the Notice of Preparation (NOP) include concerns regarding potential erosion impacts on surrounding areas as a result of the project. These concerns are addressed in this section of the EIR where applicable, and within the *Preliminary Geotechnical Site Evaluation Report* (see Appendix F). Copies of the NOP and comment letters received in response to the NOP are included in Appendix A, NOP, Initial Study, and Public Comments, of this EIR.

3.1.3.1 Existing Conditions

Regional Geology

The project site is located in southeast San Diego County, which makes up part of the Peninsular Ranges geomorphic province. This province extends from the Los Angeles Basin south to Baja California and is characterized by mountain ranges as high as 11,000 feet above mean sea level (amsl) and valleys containing coastal plains, rivers, and basins.

The Peninsular Ranges batholith in San Diego County consists of plutonic igneous rocks which formed from the cooling of magma deep below the surface during the Cretaceous to Jurassic age. These plutons also contain small pieces of older metamorphosed rocks which formed under high heat and pressure. The plutonic rocks in the region come in two general groupings: plutons that have undergone ductile deformation (i.e., bending and folding of the rock layers under intense pressure) that have been radiometrically dated to older than 105 million years old (Ma); and a second group that is chiefly undeformed and generally younger than 105 Ma (see Appendix F). The older, deformed plutons underlie the western and central parts of San Diego County and can generally be identified regionally by steeply dipping contacts (i.e., tightly folded layers), foliation (i.e., a structural alignment or layering of minerals), and the axial surfaces of folds (i.e., the overall shape of the folds). An exception to this regional structure occurs in the Tonalite of La Posta which underlies the proposed project site entirely (see Appendix F).

Normal faulting accompanied by a relatively small component of right lateral separation has continued through today in the Elsinore and San Jacinto Fault Zones. San Diego County is seismically active and includes a series of sub-parallel faults that are located to the west of the San Andreas Fault Zone, including the active San Jacinto, Elsinore, and Rose Canyon Fault Zones.

Project Site Geology

The project site can be found on the El Cajon U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle. Elevations on-site range from approximately 3,400 feet amsl in the center along Jewel Valley Road, to approximately 3,700 feet amsl across the site and immediate vicinity. The portion of the project site north of Jewel Valley Road drains to the south (toward Jewel Valley Creek watercourse) and northwest. The portion of the project site south of Jewel Valley Road drains to the north/northwest. The project site, as mapped by the USGS and California Geological Survey, is underlain by mostly crystalline bedrock (see

Appendix F). Alluvial material is described as light brown alluvial gravel, sand and silt and emanates from streambeds, washes, and alluvial fans. The alluvium on-site consists of silty coarse-grained sand and may represent distal portions of older alluvial fan or sheet wash deposits.

Geologic mapping depicts that the region is underlain by soil units of the Peninsular Ranges batholith, which consist of plutonic rocks of Jurassic and Cretaceous age that contain minor inclusions of metamorphosed rocks (Figure 3.1.3-1 and Figure 3.1.3-2) (see Appendix F). The project site is underlain by the early to late Cretaceous Tonalite of La Posta. The La Posta loamy coarse sand is composed of hypersthene-biotite tonalite, quartz diorite, granodiorite, quartz monzodiorite, and quartz norite (see Appendix F). It is medium-grained, has somewhat excessive drainage, and has equigranularity with weak foliation (Natural Resources Conservation Service [NRCS] 2025). The unit is described as dark gray on fresh surfaces, weathers reddish or buff-gray, and typically forms boulder outcrops. The unit is homogeneous and generally inclusion-free.

Seismic Hazards

Earthquake-related geologic hazards pose a significant threat to San Diego County and can impact extensive regions of land (County of San Diego 2011a). Earthquakes can produce fault rupture and strong ground shaking and can trigger landslides, rockfalls, soil liquefaction, tsunamis, and seiches. In turn, these geologic hazards can lead to other hazards such as fires, dam failures, and toxic chemical releases.

Primary effects of earthquakes include violent ground motion and sometimes permanent displacement of land associated with surface rupture. Earthquakes can snap and uproot trees or knock people to the ground. They can also shear or collapse large buildings, bridges, dams, tunnels, pipelines, and other rigid structures, as well as damage transportation systems, such as highways, railroads, and airports. Secondary effects of earthquakes include near-term phenomena such as liquefaction, landslides, fires, tsunamis, seiches, and floods. Long-term effects associated with earthquakes include phenomena such as regional subsidence or emergence of landmasses and regional changes in groundwater levels.

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 past 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 (County of San Diego 2011a).

As shown in Figure 3.1.3-3 of this EIR and in Figure 2.6-1 and Figure 2.6-2 of the *Draft Final Environmental Impact Report for the San Diego County General Plan Update* (General Plan Update EIR) (County of San Diego 2011a), the project site is not within a designated Alquist-Priolo Earthquake Fault Zone. However, the region is seismically active and includes the active San Jacinto and Elsinore Faults, a series of sub-parallel faults that are west of the San Andreas Fault Zone. The nearest known faults to the project site are the Elsinore Fault, approximately 15 miles to the northeast, and the Davies Valley Fault, approximately 16 miles to the east. The project is also within a "near-source shaking zone" or seismic shaking buffer (see Appendix F; USGS 2019). These faults are Quaternary in age and are generally

considered to have little to no potential to generate an earthquake. A specific Fault Rupture Hazards Zone Map from the California Geological Survey (CGS) does not currently exist for the unincorporated Boulevard area (California Department of Conservation [DOC] 2025a).

Ground Shaking

Ground shaking is the earthquake effect that results in the majority of damage. Several factors control how ground motion interacts with structures, making the hazard of ground shaking difficult to predict. Seismic waves propagating through the earth's crust are responsible for the ground vibrations normally felt during an earthquake. Seismic waves can vibrate in any direction and at different frequencies, depending on the frequency content of the earthquake, its rupture mechanism, the distance from the earthquake source (or epicenter) to an affected site, and the path and material through which the waves are moving. The project site is located in a seismically active area typical of Southern California and likely to be subjected to strong ground shaking due to earthquakes on nearby faults (see Appendix F; USGS 2019).

Soil Settlement

Differential soil settlement occurs when supporting soils are not uniform in density or soil type and one portion settles, shrinks, or swells more than the other. Such movement can result in damage to structures, pavement, and subsurface utilities when unaccounted for in design. Based on the subsurface data obtained during the investigation, the on-site soils are relatively uniform and consist of predominantly medium-density soils that are not prone to differential settlement (see Appendix F). Given the sandy soil composition and high drainage, the shrink-swell potential at the project site is low (NRCS 2025). The *County of San Diego Guidelines for Determining Significance – Geologic Hazards* does not identify the project site as having expansive soils (County of San Diego 2007a).

Expansive Soils

Expansive soils can cause soil settlement; certain types of clay soils expand when they are saturated and shrink when dried. Expansive soils can pose a threat to the integrity of structures built on them without proper engineering. The expansion and contraction of the soil varies with the soil moisture content and can be aggravated by the way a property is maintained or irrigated. Human activities can increase the moisture content of the soils and the threat of expansive soil damage. As mapped in Figure 3.1.3-4 of this EIR and in Figure 2.6-5 of the General Plan Update EIR, and as noted in the *Preliminary Geotechnical Site Evaluation Report* (see Appendix F), the potential for expansive soils to be present on the site is low (County of San Diego 2011a). Due to the sandy, granular character of the soils and their low organic content, soils are generally non-plastic and therefore not prone to shrink-swell behavior (NRCS 2025).

Liquefaction

Earthquake-induced ground shaking can be the cause of several significant phenomena, including liquefaction of saturated fine sands and silty sands. Loose soils can transform from a solid to a liquid state because of increased pore pressure during seismic loading. Liquefaction results in a complete loss of strength and can cause structures to settle or even overturn if it occurs in the bearing zone. If liquefaction occurs beneath sloping ground, a phenomenon known as lateral spreading can occur. Due to the poorly sorted and coarse-grained materials that are anticipated to underlie the project site and the absence of a shallow groundwater table, the project site has a low susceptibility to liquefaction (Figure 3.1.3-5) (see Appendix F).

Landslide and Slope Instability

Landslides occur when masses of rock, earth, or debris move down a slope, including rock falls, deep failure of slopes, and shallow debris flows. Landslides are influenced by human activities such as grading and other construction activities, irrigation of slopes, mining activity, etc., and by natural factors such as precipitation, geology/soil types, surface/subsurface flow of water, and topography. They may be triggered by other hazards such as floods and earthquakes. Landslides can result from surface movement at rates that vary from a few centimeters per day to tens of meters of instantaneous movement. In contrast, creep is the imperceptibly slow, steady, downward movement of slope-forming soil or rock. Creep can occur seasonally, where movement is within the depth of soil affected by seasonal changes in soil moisture and soil temperature, or can be continuous or progressive. Rock falls or topples are usually sudden and occur on steep slopes. In a rock fall, rocks may fall, bounce, or roll down the slope. A topple occurs when part of a steep slope breaks loose and rotates forward.

The most common cause of a landslide is downslope gravitational stress applied to slope materials (overly steep natural slopes, cliffs, human-made cuts and fills, etc.). Another common cause includes excessive rainfall or irrigation on a cliff or slope. A type of soil failure is slope wash, from the erosion of slopes by surface water runoff. Earthquakes can trigger rockfalls, rock avalanches, debris flows, or other types of potentially damaging landslide movements. Seismic-induced landslides can occur under a broad range of conditions that include (1) steeply sloping to nearly flat land; (2) bedrock, unconsolidated sediments, or fill; and (3) dry to very wet conditions.

As shown in Figure 2.6-4 of the General Plan Update EIR (County of San Diego 2011a) and noted in the *Preliminary Geotechnical Site Evaluation Report* (see Appendix F), the project site is not within an area mapped for landslide hazards.

Seiches and Tsunamis

A seiche is a standing wave in a completely or partially enclosed body of water. A seiche can occur from seismic ground shaking or by the sudden movement of a landslide into a reservoir. A seiche could result in localized flooding or damage to low-lying areas adjacent to large bodies of water. Areas located along the shoreline of lakes or reservoirs are susceptible to inundation by a seiche. The size of a seiche and affected inundation area is dependent on different factors, including the size and depth of the water body, elevation, source, and, if human-made, the structural condition of the body of water in which the seiche occurs. It is an unlikely hazard at the project site because nearby water bodies are not big enough to pose a significant threat to public safety, and because most water bodies are reservoirs located in areas with very low development potential. The nearest water body is Lake Domingo, a reservoir approximately 0.75 mile to the southeast.

A tsunami is a series of large waves that are caused by a sudden disturbance that displaces water. Triggers for a tsunami include earthquakes, submarine landslides, volcanic eruptions, or meteor impacts. San Diego County's coastline is largely within incorporated cities and on Camp Pendleton, and tsunamis would not affect lands in the unincorporated county. The project site is 50 miles inland and is not located within a mapped tsunami hazard area (DOC 2011).

Paleontological Resources and Unique Geology

Paleontological and Unique Geology Resource Potential

Paleontological resources are the remains and/or traces of prehistoric life, exclusive of human remains, and include the localities where fossils were collected and the sedimentary rock formations from which they were obtained/derived. The defining character of fossils is their geologic age. Fossils or fossil deposits are

generally regarded as older than 10,000 years. This generally accepted temporal boundary marks the end of the last Late Pleistocene glacial event and the beginning of the current period of climatic amelioration of the Holocene (County of San Diego 2009).

A unique paleontological resource is any fossil or assemblage of fossils, or paleontological resource site or formation that meets any one of the following criteria (County of San Diego 2009):

- Is the best example of its kind locally or regionally
- Illustrates a paleontological or evolutionary principle (e.g., faunal succession; plant or animal relationships)
- Provides a critical piece of paleobiological data (illustrates a portion of geologic history or provides evolutionary, paleoclimatic, paleoecological, paleoenvironmental, or biochronological data)
- Encompasses any part of a "type locality" of a fossil or formation
- Contains a unique or particularly unusual assemblage of fossils
- Occupies a unique position stratigraphically within a formation
- Occupies a unique position, proximally, distally or laterally within a formation's extent or distribution

Based on rock type and location of previously recorded fossils, areas within San Diego County have been assigned to the following categories for potential paleontological resources: high sensitivity, moderate sensitivity, low sensitivity, marginal sensitivity, and zero sensitivity. The County's California Environmental Quality Act (CEQA) guidelines for paleontological resources use these categories to guide the significance determinations for projects under discretionary review.

Most of the county is underlain by geologic formations with no potential, low sensitivity, or marginal sensitivity for paleontological resources (County of San Diego 2009). No resource potential is assigned to geologic formations that are composed entirely of volcanic or plutonic igneous rock, such as basalt or granite, and therefore they do not have any potential for producing fossil remains. The site is mapped Klp: Tonalite of La Posta (early to late Cretaceous) (Todd et al. 2004), which would have no paleontological sensitivity. Tonalite is a plutonic igneous rock, formed deep below the surface from the cooling of molten rock/magma at high heat and high pressure, where organic life could not exist to be fossilized. There would be no impact for paleontological resources. The soils overlying the tonalite bedrock are eroded tonalite, considered gravel, and coarse, sandy loams that are likely too young (i.e., less than 10,000 years old) to preserve fossils and thus have low paleontological sensitivity.

3.1.3.2 Regulatory Setting

Federal Regulations

U.S. Geological Survey Landslide Hazard Program

The USGS created the Landslide Hazard Program in fulfillment of the requirements of Public Law 106-113. The Federal Emergency Management Agency (FEMA) is the responsible agency for the long-term management of natural hazards. The federal government takes the lead role in funding and conducting research, whereas the reduction of losses due to geologic hazards is primarily a state and local responsibility.

Occupational Safety and Health Administration Regulations

Excavation and trenching are among the most hazardous construction operations. The Occupational Safety and Health Administration (OSHA) Excavation and Trenching Standard (29 Code of Federal Regulations 1926.650) covers requirements for excavation and trenching operations. OSHA requires that all excavations in which employees could potentially be exposed to cave-ins be protected by sloping or benching the sides of the excavation, supporting the sides of the excavation, or placing a shield between the side of the excavation and the work area. In California, the California Occupational Safety and Health Administration (Cal/OSHA) has the responsibility of implementing federal rules relevant to worker safety, including slope protection during construction excavations. Cal/OSHA's requirements are more restrictive and protective than federal OSHA standards.

State Regulations

Alquist-Priolo Earthquake Fault Zoning Act

In 1972, the Alquist-Priolo Act was created with the purpose of providing policies and criteria to assist state agencies, counties, and cities to prohibit development for human occupancy across active faults. The act also aims 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 are defined as faults that have ruptured in the past 11,000 years.

The Alquist-Priolo Fault Zones that the State of California has designated along active faults in the unincorporated portion of the San Diego County are as follows:

- Elsinore Fault: north of Pala, Palomar Mountain, Pauma Valley, Lake Henshaw, Julian, Banner Canyon, Mason Valley, Vallecito Valley, and Carrizo Valley
- Earthquake Valley Fault: San Felipe Valley and Sentenac Canyon
- San Jacinto Zone–Coyote Creek Fault: Borrego Valley and Ocotillo Wells

The project site is not located within an Alquist-Priolo Fault Zone (DOC 2025a).

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act (SHMA) of 1990 (Public Resources Code [PRC] Chapter 7.8, Sections 2690–2699.6) authorizes the DOC and CGS to identify and map areas prone to seismic hazards, including amplified ground shaking, liquefaction, earthquake-induced landslide, surface fault rupture, and tsunami inundation. The purpose of the SHMA is to reduce the threat to public safety and minimize the loss of life and property by identifying and mitigating seismic hazards (DOC 2025a).

The SHMA requires the State Geologist to establish regulatory zones (Zones of Required Investigation) and to issue appropriate maps (Seismic Hazard Zone maps). These maps are distributed to all affected state agencies, counties, and cities for their use in planning and controlling construction and development (DOC 2025b). The project site is not located within a mapped seismic hazards area (DOC 2025a).

California Building Code

Chapter 16 of the 2019 California Building Code (CBC) establishes minimum design requirements so that the structural components of buildings are proportioned to resist the loads that are likely to be encountered. 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 1613 also identifies building requirements that new development must meet to withstand earthquake loads, based on a site's Seismic Design Category, Risk Category, and site soil properties.

Section 1803 of the CBC requires geotechnical investigations in accordance with Section 1803.2 and reporting in accordance with Section 1803.6.

California Public Resources Code Section 5097-5097.6

Requirements for paleontological resource management are included in PRC Division 5, Chapter 1.7, Section 5097.5, which states:

> No person shall knowingly and willfully excavate upon, or remove, destroy, injure or deface any historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological site, including fossilized footprints, inscriptions made by human agency, or any other archaeological, paleontological or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over such lands. Violation of this section is a misdemeanor.

These statutes prohibit the removal, without permission, of any paleontological site or feature from land under the jurisdiction of the state or any city, county, district, authority, or public corporation, or any agency thereof. Consequently, local agencies are required to comply with PRC Section 5097.5 for their own activities, including construction and maintenance, as well as for permit actions (e.g., encroachment permits) undertaken by others. PRC Section 5097.5 also establishes the removal of paleontological resources as a misdemeanor and requires reasonable mitigation of adverse impacts to paleontological resources from developments on public (state, county, city, and district) land.

PRC Section 5097–5097.6 identifies that the unauthorized disturbance or removal of archaeological, historical, or paleontological resources located on public lands is a misdemeanor. It prohibits the knowing destruction of objects of antiquity without a permit (expressed permission) on public lands, and it provides for criminal sanctions. This section was amended in 1987 to require consultation with the Native American Heritage Commission whenever Native American graves are found. It is a felony to take or possess remains or artifacts.

Local Regulations

County of San Diego Grading Ordinance

The San Diego County Code of Regulatory Ordinances Title 8, Division 7, Grading, Clearing, and Watercourses (County Grading Ordinance) requires that projects involving grading, clearing, and/or removal of natural vegetation obtain a grading permit, unless the project meets one or more of the exemptions listed in Section 87.202 of the County Grading Ordinance. The grading permit is discretionary and requires compliance with CEQA. Section 87.430 of the County Grading Ordinance provides that the County official (e.g., permit compliance coordinator) may require a paleontological monitor during all or selected grading operations, to monitor for the presence of paleontological resources. If fossils greater than 12 inches in any dimension are encountered, then all grading operations in the area of discovery shall be suspended immediately and not resumed until authorized by the County official. The ordinance also requires immediate notification of the County official regarding the discovery. The County official shall determine the appropriate resource recovery operation, which the permittee shall carry out prior to the County official's authorization to resume normal grading operations.

San Diego County General Plan

The *San Diego County General Plan: A Plan for Growth, Conservation, and Sustainability* (General Plan) (County of San Diego 2011b) guides future growth in the unincorporated areas of the county and considers projected growth anticipated to occur within various communities. The following goals and policies from the Safety and Conservation and Open Space Elements of the General Plan were determined to be applicable to the proposed project.

Safety Element

The purpose of the Safety Element is to provide safety considerations that will help minimize the risk of personal injury, loss of life, property damage, and environmental damage associated with natural and human-made hazards within the county (County of San Diego 2021a).

The following policies are applicable to the proposed project:

- **S-2.5: Existing Development within Hazard Zones.** Implement warning systems and evacuation plans for developed areas located within known hazard areas (i.e., flood, wildfire, earthquake, other hazards).
- **S-8.1: Development Location.** Locate development in areas where the risk to people or resources is minimized. In accordance with the DOC Special Publication 42, require development be located a minimum of 50 feet from active or potentially active faults, unless an alternative setback distance is approved based on geologic analysis and feasible engineering design measures adequate to demonstrate that the fault rupture hazard would be avoided.
- **S-8.2: Engineering Measures to Reduce Risk.** Require all development to include engineering measures to reduce risk in accordance with the CBC, Uniform Building Code (UBC), and other seismic and geologic hazard safety standards, including design and construction standards that regulate land use in areas known to have or potentially have significant seismic and/or other geologic hazards.
- **S-9.1: Landslide Risks.** Direct development away from areas with high landslide, mudslide, or rockfall potential when engineering solutions have been determined by the County to be infeasible.
- **S-9.2: Risk of Slope Instability.** Prohibit development from causing or contributing to slope instability.
- **S-10.2: Floodplain Maps.** Manage development based on federal floodplain maps. County maps shall also be referred to, and in case of conflict(s) between the County floodplain maps and the federal floodplain maps, the more stringent of restrictions shall apply.
- **S-10.3: Development in Floodplains.** Limit development in designated floodplains to decrease the potential for property damage and loss of life from flooding and to avoid the need for engineered channels, channel improvements, and other flood control facilities. Require development to conform to federal floodproofing standards and siting criteria to prevent flow obstruction.
- **S-10.4: Development in Flood Hazard Areas.** Require development within mapped flood hazard areas to be sited and designed to minimize on- and off-site hazards to health, safety, and property due to flooding.

Conservation and Open Space Element

The primary focus of the Conservation and Open Space Element is to provide direction to future growth and development in the county with respect to conservation, management, and use of natural and cultural

resources, protection and preservation of open space, and provision of park and recreation resources (County of San Diego 2011c).

The following policies are applicable to the proposed project:

- **COS-9.1: Preservation.** Require the salvage and preservation of unique paleontological resources when exposed to the elements during excavation or grading activities or other development processes.
- **COS-9.2: Impacts of Development.** Require development to minimize impacts to unique geological features from human-related destruction, damage, or loss.

County Special Study Zones

The Alquist-Priolo Act provides that a city or county may establish more restrictive policies than those within the Alquist-Priolo Act, if desired. The County established Special Study Zones that include late-Quaternary faults mapped by the CGS in San Diego County. Late-Quaternary faults (movement during the past 700,000 years) were mapped based on geomorphic evidence similar to that of Holocene faults except that tectonic features are less distinct. As indicated by the CGS, these faults may be younger, but the lack of younger overlying deposits precludes more accurate age classification. The County treats traces of faults within Special Study Zones as active unless a fault investigation proves otherwise. Before any construction is allowed, a geologic study must be conducted to determine if any active fault lines are located on or within the vicinity of the project site. For areas where active faulting is identified, the County's Fault Displacement Area Regulations apply. These regulate new development in areas subject to potential loss of life and property from earthquake fault displacement in order to mitigate such losses. The project site is not within a County Special Study Zone (County of San Diego 2007a).

San Diego County Grading Ordinance, Design Standards and Performance Requirements

Chapter 4 of the County Grading Ordinance (Sections 87.401 through 87.430) includes requirements for

- the maximum slope allowed for cut and fill slopes,
- the requirement for drainage terraces on cut or fill slopes exceeding 40 feet in height,
- expansive soil requirements for cuts and fills,
- minimum setback requirements for buildings from cut or fill slopes, and
- reporting requirements including a soil engineer's report and a final engineering geology report by an engineering geologist.

This would include specific approval of the grading as affected by geological factors.

San Diego County Zoning Ordinance, Sections 5400–5440, Fault Displacement Area Regulations

The Fault Displacement Area Regulations implement the requirements of the Alquist-Priolo Act. The provisions of Sections 5400–5406 outline the allowable development, the permitting requirements, and the construction limitations within Fault Rupture Zones, as designated by the Alquist-Priolo Act. The County prohibits the following uses within Alquist-Priolo Zones (Section 5404, Zoning Ordinance): uses containing structures with a capacity of 300 persons or more, uses with the potential to severely damage the environment or cause major loss of life, and specific civic uses. Given the location of the project site

outside a Alquist-Priolo Fault Zone, the Fault Displacement Area Regulations are not applicable to the proposed project.

San Diego County Natural Resource Inventory, Section 3 – Geology

The County of San Diego Environmental Development Agency's Natural Resource Inventory discusses geologic provinces and the features that are unique to each of them. The inventory also makes some preliminary recommendations as to the preservation of specific sites for many of the unique geologic features identified by the inventory. This inventory was compiled in the early 1970s and few copies are known to still exist. However, the list of unique geologic features presented in the Conservation Element of the General Plan was copied directly from the inventory.

3.1.3.3 Analysis of Project Effects and Determination as to Significance

The following significance thresholds for geologic hazards are taken from the *Guidelines for Determining Significance – Geologic Hazards* (County of San Diego 2007a). A significant impact would occur if the project would result in any of the following:

- The project proposes any building or structure to be used for human occupancy over or within 50 feet of the trace of an Alquist-Priolo fault or County Special Study Zone fault.
- The project proposes the following uses within an Alquist-Priolo Zone, which are prohibited by the County:
    - Uses containing structures with a capacity of 300 people or more;
    - Uses with the potential to severely damage the environment or cause major loss of life;
    - Specific civic uses, including police and fire stations, schools, hospitals, rest homes, nursing homes, and emergency communication facilities.
- The project would be located within a County Near-Source Shaking Zone or within Seismic Zone 4 and the project does not conform to the UBC.
- The project site has potential to directly or indirectly cause potential substantial adverse effects because:
    - the project site has potentially liquefiable soils; and
    - the potentially liquefiable soils are saturated or have the potential to become saturated; and
    - in-situ soil densities are not sufficiently high to preclude liquefaction.
- The project would directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving landslides.
- The project is located on a geologic unit or soil that is unstable or would become unstable as a result of the project, potentially resulting in an on-site or off-site landslide.
- The project site lies directly below or on a known area subject to rockfall, which could result in collapse of structures.
- The project would be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), and does not conform with the Uniform Building Code, creating direct or indirect risks to life or property.

The County's *Guidelines for Determining Significance – Geologic Hazards* (County of San Diego 2007a) do not contain a significance criterion that addresses adequate soils for septic systems or other on-site wastewater systems. However, the following analysis is provided to address Issue VII.e in the State CEQA Guidelines, Appendix G (14 California Code of Regulations 15000 et seq.), which states that a significant impact would result if:

- The project would have soils incapable of supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater.

The following significance thresholds for unique geology are taken from the *Guidelines for Determining Significance – Unique Geology* (County of San Diego 2007b). A significant impact would result if the project would result in any of the following:

- The project, as designed, will materially impair a unique geologic feature by destroying or altering those physical characteristics that convey the uniqueness of the resource. A geologic feature is unique if it meets one of the following criteria:
    - Is the best example of its kind locally or regionally;
    - Embodies the distinctive characteristics of a geologic principle that is exclusive locally or regionally;
    - Provides a key piece of geologic information important in geology or geologic history;
    - Is a "type locality" of a formation;
    - Is a geologic formation that is exclusive locally or regionally;
    - Contains a mineral that is not known to occur elsewhere in the County; or
    - Is used repeatedly as a teaching tool.

The following significance threshold for paleontological resources is taken from the *Guidelines for Determining Significance – Paleontological Resources* (County of San Diego 2009). A significant impact would result if the project would result in any of the following:

- The project proposes activities directly or indirectly damaging to a unique paleontological resource or site. A significant impact to paleontological resources may occur as a result of the project, if project-related grading or excavation will disturb the substratum or parent material below the major soil horizons in any paleontologically sensitive area of the County.

Fault Rupture

Guidelines for the Determination of Significance

The *Guidelines for Determining Significance – Geologic Hazards* (County of San Diego 2007a) specifies that a significant impact would result if:

- The project proposes any building or structure to be used for human occupancy over or within 50 feet of the trace of an Alquist-Priolo fault or County Special Study Zone fault.
- The project proposes the following uses within an Alquist-Priolo Zone, which are prohibited by the County:

- Uses containing structures with a capacity of 300 people or more;
- Uses with the potential to severely damage the environment or cause major loss of life;
- Specific civic uses, including police and fire stations, schools, hospitals, rest homes, nursing homes, and emergency communication facilities.

Analysis

As discussed in Section 3.1.3.1, Existing Conditions, the proposed project would not be located in a County Special Study Zone (County of San Diego 2007a), a fault rupture hazard zone identified by the Alquist-Priolo Act, or within any other area with substantial evidence of an active or potentially active fault. As mapped in Figure 3.1.3-3, the nearest known faults to the project site are the Elsinore Fault, approximately 15 miles to the northeast, and the Davies Valley Fault, approximately 16 miles to the east. In addition, the proposed project does not include any building or structure to be used for human occupancy (the project would be remotely operated), uses with the potential to severely damage the environment or cause major loss of life, or specific civic uses. Therefore, the project would have **a less than significant** impact from the exposure of people or structures to adverse effects from a known fault rupture hazard zone.

Ground Shaking

Guidelines for the Determination of Significance

For the purposes of this EIR, the *County of San Diego Guidelines for Determining Significance – Geologic Hazards* (County of San Diego 2007a) applies to both the direct impact analysis and the cumulative impact analysis. The County has developed Significance Guideline 4.2, Ground Shaking, to address Issue VII.a.ii in the State CEQA Guidelines, Appendix G. A significant impact would result if:

- The project would be located within a County Near-Source Shaking Zone or within Seismic Zone 4 and the project does not conform to the UBC.

Analysis

All of San Diego County is located within Seismic Zone 4 (Section 1629.4.1 of the CBC), which is the highest seismic zone and, like most of Southern California, is subject to ground shaking (County of San Diego 2007a). However, as discussed in Section 3.1.3.1, Existing Conditions, the project site is not within a near-source shaking zone identified on a County geologic hazard map, a County Special Study Zone fault, or within mapped seismic hazards area (County of San Diego 2007a: Figures 2 and 3; DOC 2025a). However, the project site could be subject to strong ground shaking in the event of a large earthquake on any of the active or potentially active faults in the greater Southern California region. The nearest known fault to the project site is the Elsinore Fault, located approximately 15 miles to the northeast.

The primary tool that seismologists use to describe potential for future ground shaking hazards is a probabilistic seismic hazard assessment. The probabilistic seismic hazard assessment for California takes into consideration the range of possible earthquake sources (including worst-case scenarios) and estimates their characteristic magnitudes to generate a probability map for ground shaking (USGS 2019), expressed as a percentage of g, with g being the acceleration of a falling object due to gravity. The peak ground acceleration (PGA), which represents the shaking or ground motion from an earthquake, is estimated to be approximately 0.522 g (see Appendix F) (USGS 2019).[1] This represents a 2% chance of occurring in the

[1] The PGA for a given component of motion is the largest value of horizontal acceleration obtained from a seismograph. PGA is expressed as a percentage of g, the constant value of acceleration due to gravity (approximately 980 centimeters per second squared). Unlike measures of magnitude, which provide a single measure of earthquake energy, PGA resulting from an

next 50 years (i.e., equivalent to a 1 in 2,475 annual chance). Such levels of ground shaking have in the past been associated with Modified Mercalli Intensity of VI (strong), which can cause damage in old brick and unreinforced-masonry-type structures but only minor damage to newer buildings constructed in accordance with modern building standards. Building codes currently in effect are intended to prevent substantial damage and structural collapse of buildings in "design earthquakes," which are usually equivalent to earthquakes with a 10% chance of occurring in the next 50 years (USGS 2019).

As the project would consist of a solar energy generation and storage facility and would not be used for human occupancy, the public safety implications of damage or collapse of these structures would be negligible. The project site would be off limits to the public and would have security fencing approximately 7 feet high surrounding the entire facility. The surrounding properties are beyond the range of any impact from structural toppling of the panel arrays.

To ensure the structural integrity of the project features, the project would conform to the seismic design requirements as outlined within the CBC, which contains universal standards for proper site preparation and grading practices, adequate design of foundation, and guidelines for the appropriate selection and use of construction materials. The agency that enforces the CBC is the County Department of Planning and Development Services, which reviews applications for building permits for compliance with the CBC, local amendments to the CBC, and development regulations of the County Zoning Ordinance.

In accordance with the County Grading Ordinance (County Code Section 87.209), as part of the development review process, the County may require a soil investigation report. The report would include (1) data regarding the nature, distribution, and strength of existing soils and rock on the site; (2) the soil engineer's conclusions and recommendations for grading requirements, including the correction of weak or unstable soil conditions and treatment of any expansive soils that may be present; and (3) their opinions as to the adequacy of building sites to be developed by the proposed grading operations. A preliminary version of such a report has been prepared (see Appendix F); the recommendations contained therein will be refined as necessary based on final designs and incorporated into the project's plans and specifications as a condition of final project approval. Further details regarding soils would be included in the final soils report, which would be prepared as site and facility design advances, and which must be approved by a County Official as part of the grading permit process (County Grading Ordinance Section 87.102).

The project site is not within a near-source shaking zone and would be required to comply with state and local building and grading standards. Substantial adverse effects from strong seismic ground shaking would be avoided or reduced to acceptable levels. Potential adverse effects from strong seismic ground shaking would therefore be **less than significant.**

Liquefaction

Guidelines for the Determination of Significance

For the purposes of this EIR, the *County of San Diego Guidelines for Determining Significance – Geologic Hazards* (County of San Diego 2007a) applies to both the proposed project impact analysis and the cumulative impact analysis. The County has developed Significance Guideline 4.3, Liquefaction, to address the State CEQA Guidelines, Appendix G, Issue VII.a.iii and the portion of Issue VII.c that addresses on-site and off-site lateral spreading or liquefaction. A significant impact would result if:

- The project site has potential to directly or indirectly cause potential substantial adverse effects because:

earthquake varies from place to place, depending on distance from the earthquake epicenter and character of the underlying geology (e.g., hard bedrock, soft sediments, or artificial fills).

- the project site has potentially liquefiable soils; and
- the potentially liquefiable soils are saturated or have the potential to become saturated; and
- in-situ soil densities are not sufficiently high to preclude liquefaction.

Analysis

As discussed above in the analysis of ground shaking, the project vicinity could be subject to strong levels of seismic shaking in the future. As indicated in the significance criteria, an area that has low in situ soil densities (which typically include loose sandy soils) and a shallow or perched groundwater table has the potential to liquefy if subject to a strong earthquake. The most severe liquefaction effects occur when the thickness of loose sandy soils is high and when those soils are saturated close to the ground surface; however, the potential for liquefaction to occur in any given area is highly dependent on site-specific conditions. Typical effects of liquefaction include sinking foundations, tilting structures, and rupture and/or substantial damage to underground utility lines.

As stated in Section 3.1.3.1, Existing Conditions, the concern for liquefaction is low due to the soil composition found during geotechnical studies (very dense silty sands) and historical findings for groundwater depths (approximately 25 feet below ground surface) (see Appendix F). As shown in the General Plan Update EIR, the project site is not within a mapped liquefaction area (County of San Diego 2011a: Figure 2.6-3).

To ensure the structural integrity of the project features, the project would conform to the seismic design requirements as outlined within the CBC, which contains universal standards for proper site preparation and grading practices, adequate design of foundation, and guidelines for the appropriate selection and use of construction materials. The agency that enforces the CBC is the County Department of Planning and Development Services, which reviews applications for building permits for compliance with the CBC, local amendments to the CBC, and development regulations of the County Zoning Ordinance. Therefore, the impact associated with liquefaction is considered **less than significant.**

Landslides

Guidelines for the Determination of Significance

For the purposes of this EIR, the *County of San Diego Guidelines for Determining Significance – Geologic Hazards* (County of San Diego 2007a) applies to both the direct impact analysis and the cumulative impact analysis. The County has developed Significance Guideline 4.4, Landslides, to address the State CEQA Guidelines, Appendix G, Issue VII.a.iv and the portion of Issue VII.c that relates to on-site or off-site landslide or collapse. A significant impact would result if:

- The project would directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving landslides.
- The project is located on a geologic unit or soil that is unstable or would become unstable as a result of the project, potentially resulting in an on-site or off-site landslide.
- The project site lies directly below or on a known area subject to rockfall, which could result in collapse of structures.

Analysis

As discussed in Section 3.1.3.1, Existing Conditions, the project site is not within a landslide susceptibility area. The topography of the site has rolling hillsides and is underlain by crystalline bedrock, which is not typically prone to substantial slope failure in areas that are not steeply sloped. The project is not located within an identified landslide susceptibility area, and the geologic environment has a low probability of becoming unstable.

The project involves site grading for installation of a solar energy generation and storage facility that would result in the creation of areas of cut and areas underlain by fill. To ensure that any proposed structures (including those proposed on the project site) are adequately supported (whether on native soils, cut, or fill), a soils investigation report is required as part of the building permit process. The soils investigation report must make recommendations on the design of building foundation systems and demonstrate that a proposed building meets the structural stability standards required by the CBC and the local grading ordinance. As previously noted, a preliminary version of such a report has been prepared (see Appendix F); the geotechnical recommendations contained therein will be refined as necessary based on final designs and incorporated into the project's plans and specifications as a condition of final project approval.

Grading plans must be compliant with standards in the County Grading Ordinance addressing the stability, incline, and compaction of cuts and fills. Additionally, during trenching and excavation, the proposed project would be required to comply with OSHA standards to protect slopes and prevent cave-ins and other hazards related to soil stability, such as landslides and rock falls. The County must approve the soils investigation report before issuing a building permit. With this standard requirement, the project would have a **less than significant** impact from the exposure of people or structures to potential adverse effects from landslides.

Expansive Soils

Guidelines for the Determination of Significance

For the purposes of this EIR, the *County of San Diego Guidelines for Determining Significance – Geologic Hazards* (County of San Diego 2007a) applies to both the direct impact analysis and the cumulative impact analysis. The County has developed Significance Guideline 4.5, Expansive Soils, to address Issue VII.d in the State CEQA Guidelines, Appendix G. A significant impact would result if:

- The project would be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), and does not conform with the Uniform Building Code, creating direct or indirect risks to life or property.

Analysis

As discussed in Section 3.1.3.1, Existing Conditions, the project site is not located in an area identified as having expansive soils as determined by the County guidelines for geologic hazards (County of San Diego 2007a). However, the project would be designed in accordance with the seismic design requirements of the CBC, which contains universal standards for seismically sound site preparation and grading practices, foundation design, and guidelines for the appropriate selection and use of construction materials. As recommended in the *Preliminary Geotechnical Site Evaluation Report*, on-site soils would be removed, compacted, and leveled prior to placing foundations, structures, utilities, or roadbeds (see Appendix F). If encountered, consistent with standard practices required by the CBC, potentially expansive soils can be treated or mixed with other materials to reduce their expansive potential to acceptable levels. Implementation of these standard practices, as required by the CBC and local ordinances, would ensure that potential impacts on the project due to expansive soils would be **less than significant.**

Adequate Soils for Septic Systems or Other On-Site Wastewater Systems

Guidelines for the Determination of Significance

The *County of San Diego Guidelines for Determining Significance – Geologic Hazards* (County of San Diego 2007a) and the *County of San Diego Guidelines for Determining Significance – Hydrology and Water Quality* (County of San Diego 2021b) do not contain a significance criterion that addresses adequate soils for septic systems or other on-site wastewater systems. Therefore, for the purpose of this EIR, Appendix G of the State CEQA Guidelines applies to the direct and indirect impact analysis, as well as the cumulative impact analysis. A significant impact would result if:

- The project would have soils incapable of supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater.

Analysis

The project does not include any septic or on-site wastewater systems. During construction, portable sanitary facilities would be located in the project area and maintained by a local contractor. The project would be unoccupied and would have no permanent employees on-site; therefore, these facilities are not required. As such, there would be **no impact**.

Paleontological Resources and Unique Geology

Guidelines for the Determination of Significance

The *County of San Diego Guidelines for Determining Significance – Geologic Hazards* (County of San Diego 2007a), *County of San Diego Guidelines for Determining Significance – Paleontological Resources* (County of San Diego 2009), and *County of San Diego Guidelines for Determining Significance – Unique Geology* (County of San Diego 2007b) contain a significance criterion that addresses paleontological resources and unique geology. The following analysis is provided to address Issue VII.f in the State CEQA Guidelines, Appendix G. A significant impact would result if:

- The project proposes activities directly or indirectly damaging to a unique paleontological resource or site.
- The project, as designed, will materially impair a unique geologic feature by destroying or altering those physical characteristics that convey the uniqueness of the resource.

Analysis

Paleontological resource impacts occur through the destruction or alteration of a paleontological resource or site by grading, excavation, trenching, boring, tunneling or other activity that disturbs the subsurface geologic formation. Excavation operations are the most common ways for paleontological resources to be adversely impacted and can result in the permanent loss of resources and valuable information. The most extensive excavation impacts are usually associated with mass grading, where earthmovers are used in combination with bulldozers to rip and transport soil and bedrock. Front-end loaders, track hoes, and trucks can also be used in mass excavation operations. Smaller amounts of earth are moved during boring, trenching, and tunneling, and typically the impacts are less extensive. Indirect impacts to paleontological resources could include destruction or loss of surface fossils from increased erosion, increased human access to the area, and non-scientific or unauthorized surface collection or subsurface excavation of a fossil or paleontological site. The analysis of potential impacts to paleontological resources resulting from implementation of the project is based on a review of the County's paleontological resources maps (County of San Diego 2007a) and the underlying geologic unit at the project site. The site is mapped Klp: Tonalite

of La Posta (early to late Cretaceous) (Todd et al. 2004), which would have no paleontological sensitivity. The soils overlying the tonalite bedrock consist of eroded tonalite, considered gravel, and coarse, sandy loams that are likely too young (i.e., less than 10,000 years old) to preserve fossils and thus have low potential for producing fossils.

Construction of the project would involve clearing and grubbing of the existing vegetation within the project site. Approximately 561 acres throughout the site would be disturbed. Grading would also be required throughout some portions of the project site. Grading is expected to be balanced on-site, with approximately 350,000 cubic yards of cut redistributed across the site. Clearing and grubbing would be required for construction and access to the project site. Approximately 5,000 cubic yards of rock would be blasted during the early stages of excavation and mass grading for Phase I and Phase II. Clearing and grubbing activities are unlikely to disturb paleontological resources, if present, because they would affect young surface soil horizons only, which have low potential to contain significant paleontological resources.

Based on the results of this assessment and the paleontological sensitivities of the geologic units in the project site, ground-disturbing activities associated with the project are expected to remain in deposits with no or low paleontological sensitivity. Therefore, impacts to scientifically significant paleontological resources or unique geology from project activities would be **less than significant**.

3.1.3.4 Cumulative Impact Analysis

Fault Rupture

Due to the site-specific nature of geological conditions (i.e., soils, geological features, subsurface features, seismic features, etc.), geological impacts are typically assessed on a project-by-project basis. The projects listed in Table 1-4 in Chapter 1.0, Project Description, Location, and Environmental Setting, and other future development projects would be subject to established guidelines and regulations pertaining to building design and seismic safety. These include those set forth in the CBC, the County Building Code, and the County Grading Ordinance, which applies to the properties adjacent to and surrounding the project site, as well as site-specific geotechnical evaluations that would identify potential effects related to the underlying geologic and soil conditions for a particular related project site.

With the adherence to the applicable regulations of County Building Code (and future updates to the building code, when they occur) as discussed above and any site-specific recommendations included in Appendix J, the project and related projects would not result in significant impacts related to geological and soil conditions. As such, the project in combination with cumulative projects, **would not result in a cumulatively considerable impact** to geotechnical or soils-related hazards.

Ground Shaking, Liquefaction, Landslides, and Expansive Soils

Potential geologic and soils impacts associated with the project are restricted to potential facility damage from earthquake-related ground shaking, liquefaction, landslides, and expansive soils. In all cases, the impacts were determined to be **less than significant** because the existing regulatory framework controlling the design and construction of structures in California, as well as actions required to obtain a grading and/or development permits at the local level, are sufficient to avoid or substantially reduce the potential impacts. All other projects in the cumulative scenario would be required to comply with the same or similar sets of laws, regulations, and ordinances.

Other projects, that in combination with the project could result in a greater severity or extent of liquefaction (during an earthquake) than would have been anticipated in the project-specific analysis, would be those that (1) permanently saturate previously dry soils, (2) result in a sustained rise of the local groundwater

table, and/or (3) perform grading or earthmoving operations that would use liquefiable soils as fill. For effects to compound, other projects in the cumulative scenario would have to be overlapping or in the immediate vicinity of the project. In accordance with the CBC, as well as state and local building and grading regulations, use of liquefiable soil for fill material is prohibited where the material would be saturated. Further, none of the other projects in the cumulative scenario (Table 1-4 in Chapter 1.0, Project Description, Location, and Environmental Setting) would result in substantial changes in the local or regional groundwater table. Therefore, the project in combination with cumulative projects **would not result in a cumulatively considerable impact** related to seismic hazards.

As all projects in the cumulative scenario would be designed in accordance with seismic design criteria as required by the CBC and with other specific design criteria from state and local building and grading regulations, the project **would not result in a cumulatively considerable impact** related to ground shaking, liquefaction, landslides, and expansive soils.

Adequate Soils for Septic Systems or Other On-Site Wastewater Systems

The project does not include any septic or on-site wastewater systems. Therefore, the project **would not result in a cumulatively considerable impact** related to adequate soils for septic tanks or on-site wastewater systems.

Paleontological Resources and Unique Geology

Cumulative projects would have the potential to result in a cumulative impact associated with paleontological resources from extensive grading, excavation, or other ground-disturbing activities that are performed in an area of high or moderate sensitivity. Cumulative projects on state or public lands would be required to comply with PRC Sections 5097–5097.6 pertaining to impacts to paleontological resources. As discussed in Section 3.1.3.1, Existing Conditions, the project site is located in an area that has no or low potential for the presence of paleontological resources. Therefore, the proposed project **would not result in a cumulatively considerable impact** related to paleontological resources.

3.1.3.5 Conclusion

Fault Rupture

The project's impacts associated with fault rupture are **less than significant**.

Ground Shaking

The project's impacts associated with ground shaking are **less than significant**.

Liquefaction

The project's impacts associated liquefaction are **less than significant**.

Landslides

The project's impacts associated with landslides are **less than significant**.

Expansive Soils

The project's impacts associated with expansive soils are **less than significant**.

Adequate Soils for Septic Systems or Other On-Site Wastewater Systems

The project would have **no impact** related to septic systems or other wastewater systems.

Paleontological Resources and Unique Geology

The project's impacts associated with paleontological resources and unique geology are **less than significant.**

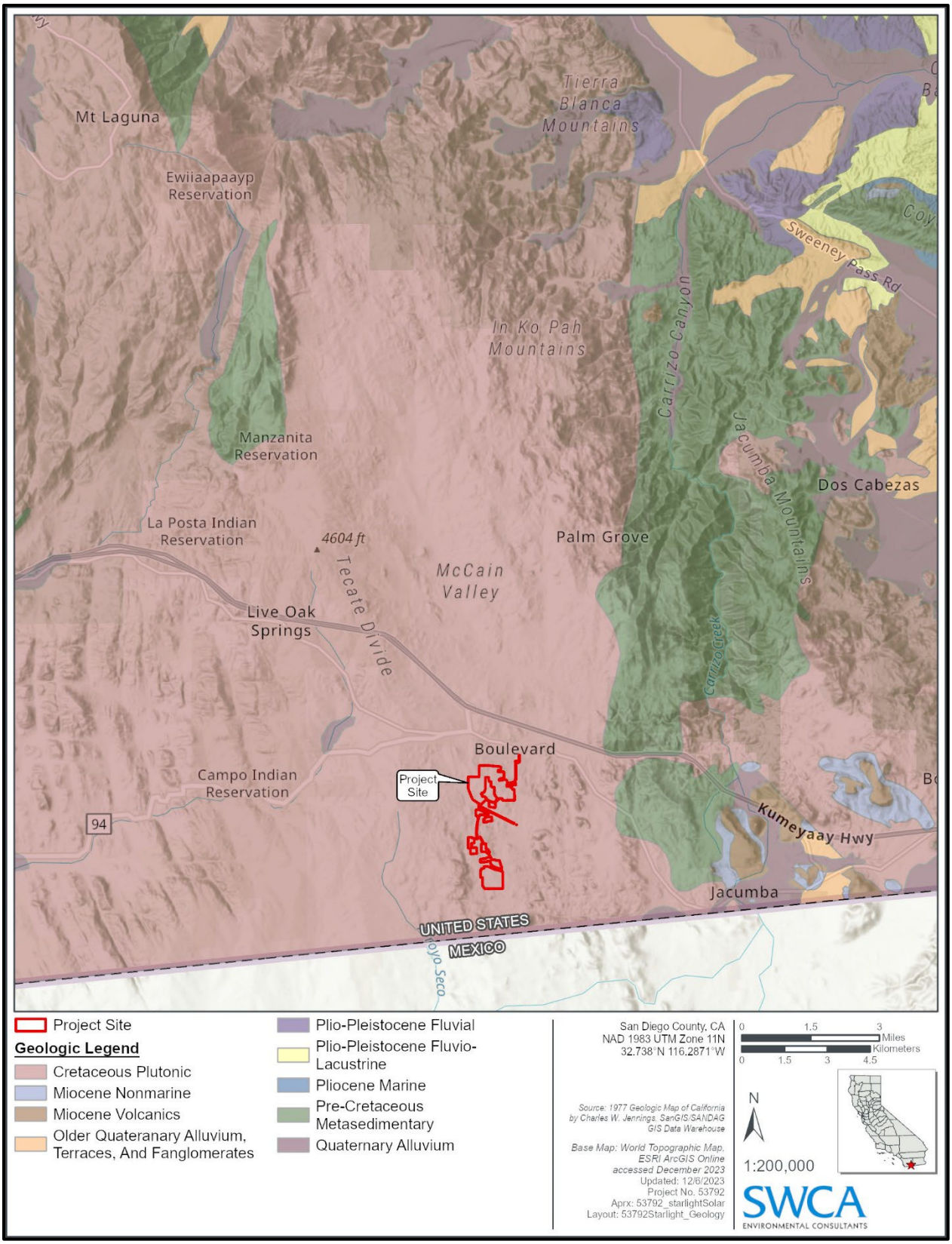

Figure 3.1.3-1. Regional Geology

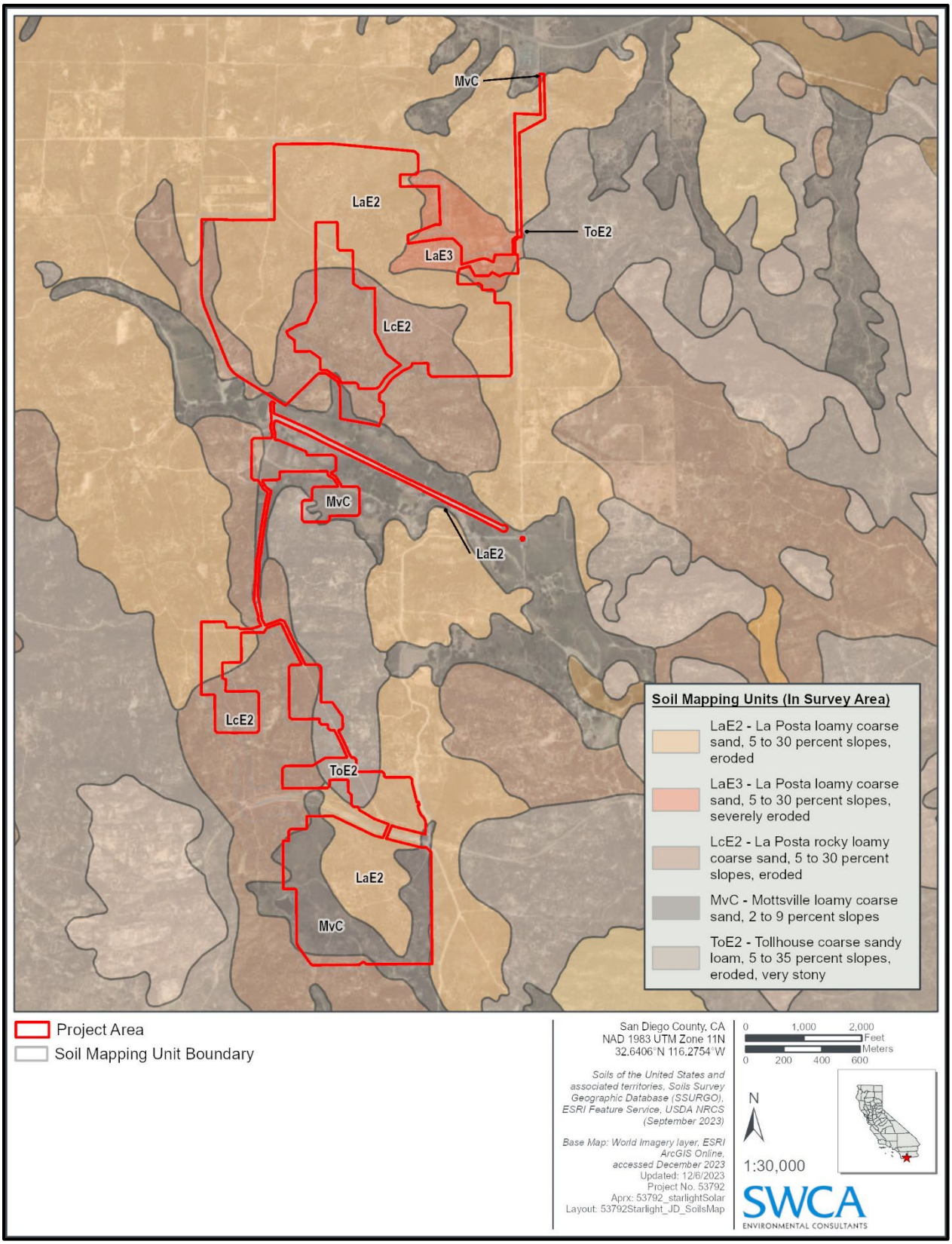

Figure 3.1.3-2. Regional Soil Mapping

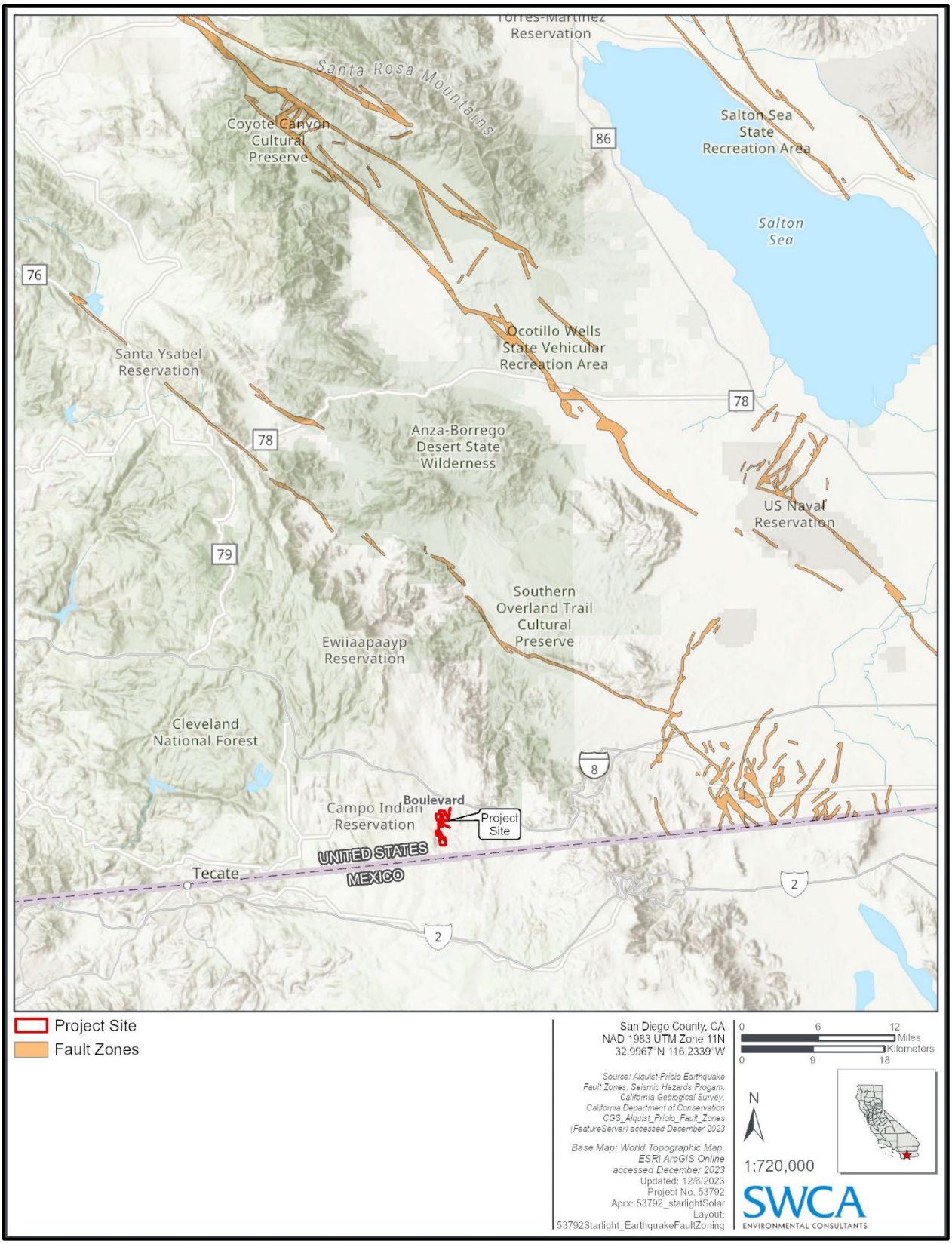

Figure 3.1.3-3. Earthquake Fault Zones

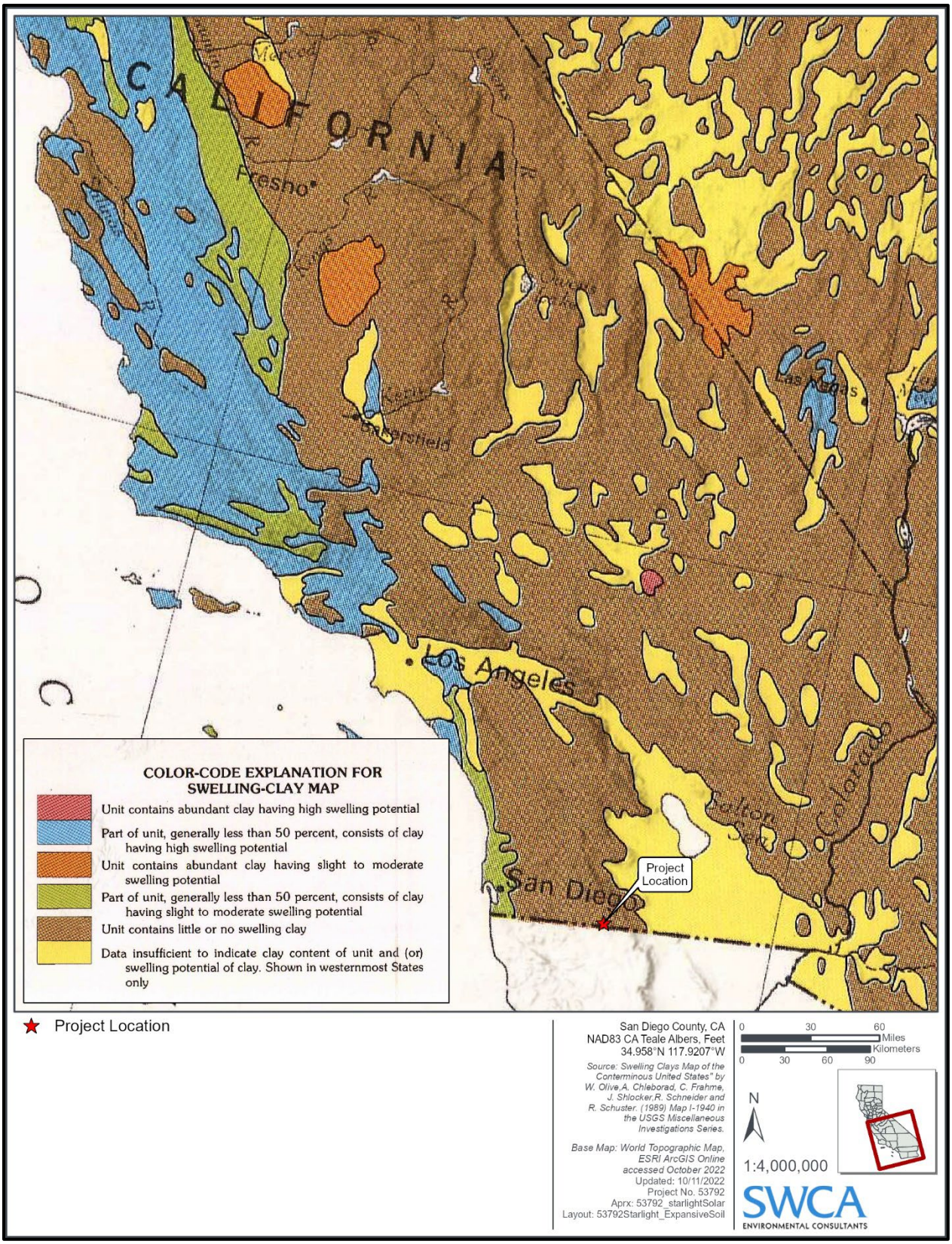

Figure 3.1.3-4. Expansive Soils

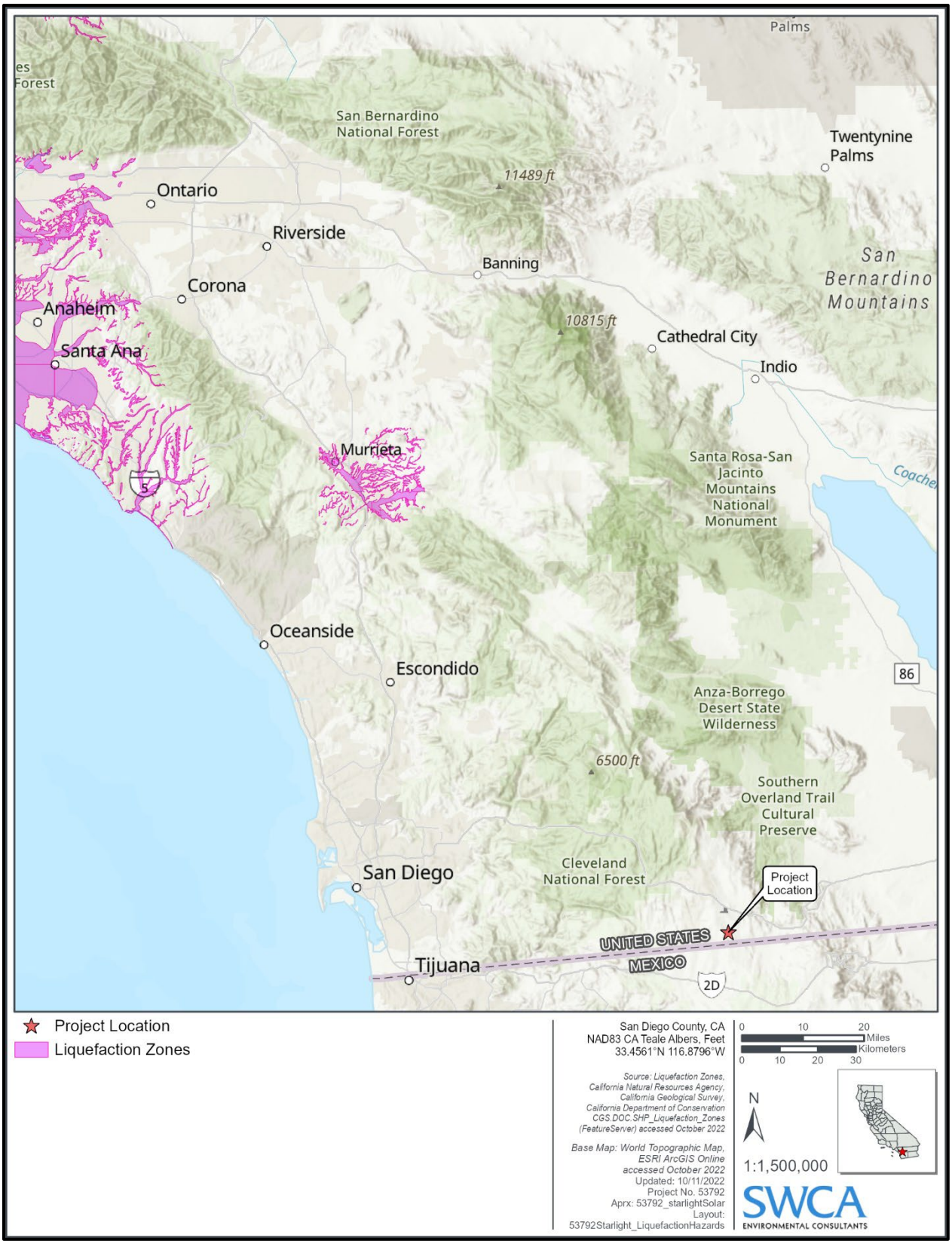

Figure 3.1.3-5. Liquefaction Zones