3.8 Geology and Soils

This section provides an evaluation of the project in relation to existing geologic and soils conditions within the project site. The geotechnical information provided herein was gathered from available online resources and summarized from the *Geotechnical Site Assessment* prepared by Catalyst Environmental Solutions (Appendix H of this EIR).

3.8.1 Existing Conditions

Regional Geology

The project site is located in Imperial County which is underlain by three geomorphic provinces: the Peninsular Ranges; the Colorado Desert; and the Mojave Desert. The Colorado Desert geomorphic province spans the majority of central Imperial County, including the project site, and is dominated by the Salton Sea and the Imperial Valley; the province is composed of a low-lying barren desert basin situated between alluvium-covered, active branches of the San Andreas Fault (Appendix H of this EIR).

The project site is situated within the Salton Trough, which is a structural depression resulting from large scale, regional faulting. The trough represents the northward extension of the Gulf of California and is bounded by the San Andreas Fault and Chocolate Mountains to the northeast and by the Peninsular Range and the faults of the San Jacinto Fault Zone to the southwest. The Imperial Valley is underlain by lacustrine deposits consisting of interbedded lenticular and tabular silt, sand, and clay (Appendix H of this EIR). The Late Pleistocene to Holocene Lake deposits are estimated at less than 100 feet thick and derived from periodic flooding of the Colorado River which intermittently formed a fresh water lake, Lake Cahuilla. Older deposits consist of Miocene to Pleistocene non-marine and marine sediments deposited during intrusions of the Gulf of California. Basement rock consisting of Mesozoic granite and Paleozoic metamorphic rocks are estimated to exist at depths between 15,000 to 20,000 feet below the surface (Appendix H of this EIR). The primary seismic hazard at the project site is the potential for strong ground shaking.

Local Geology and Surface Conditions

The project site consists of surficial dry, very stiff lean silty clays to a depth of 4 to 5 feet below ground surface (bgs), stiff clays from approximately 6 to 40 feet bgs, and silty clay to clayey silt from 40 to 50 feet bgs, the maximum depth of exploration. Soils at the project site are classified as Site Class D, which is characterized by a stiff soil profile (Appendix H of this EIR). The USDA Natural Resources Conservation Service (NRCS) has mapped the following soils at the project site:

- Holtville silty clay, wet
- Imperial silty clay, wet
- Imperial-Glenbar silty clay loams, wet, 0 to 2 percent slopes

Groundwater

The project site is located within the Imperial Valley Groundwater Basin which is bounded on the east by the Sand Hills, on the west by the impermeable rocks of the Fish Creek and Coyote Mountains, the California-Mexico border to the south, and the Salton Sea (the discharge point for groundwater in the

basin) to the north. Groundwater was encountered at approximately 8 to 10 feet bgs at the project site (Appendix H of this EIR).

Faulting and Seismicity

The Imperial Valley is a seismically active area that is traversed by numerous mapped faults including the Brawley Fault Zone, San Jacinto Fault Zone (contains the Coyote Creek Fault, the Elmore Ranch Fault, and the Wienert Fault), the Elsinore Fault (contains the Laguna Salada Fault), the Imperial Fault, the San Andreas Fault Zone, and the Superstitions Hills Fault (Appendix H of this EIR).

Several active and potentially active faults are situated in the vicinity of the project site as shown in Figure 3 of the *Geotechnical Site Assessment* (Appendix H of this EIR). Active faults are defined by the California Geological Survey as faults that have ruptured during Holocene time (within the last approximately 11,000 years). Potentially active faults are those that have ruptured during the last 1.8 million years (Quaternary time), but with no direct evidence of a movement within Holocene time. The Imperial Fault Zone is the nearest active fault zone to the project site and is located approximately 9.4 miles to the southwest (Appendix H of this EIR).

Several significant earthquakes have occurred in the vicinity of the project site with corresponding surface fault ruptures and liquefaction events. Four earthquakes greater than magnitude 5 were recorded near Heber between 1915 and 1979. A magnitude 7.2 earthquake, the El Mayor-Cucapah earthquake, occurred throughout southern Imperial valley in 2010 (Appendix H of this EIR).

The project site is not located within a currently mapped Alquist-Priolo Special Studies Fault Zone. Surface fault rupture is considered to be unlikely at the project site due to the well-delineated fault lines through the Imperial Valley; however, because of the high tectonic activity and deep alluvium of the region, a potential exists for a surface rupture on undiscovered or new faults that may underlie the site (Appendix H of this EIR).

Ground Shaking

Ground shaking can occur during an earthquake, and its intensity is related to the proximity of the area to the fault, the focal depth, soil types, the location of the epicenter, and the size (magnitude) of the earthquake. Soils formed from alluvial deposits are more prone to ground shaking than dense materials such as bedrock. The project site is considered likely to be subjected to moderate to strong ground motion from earthquakes in the region (Appendix H of this EIR).

Expansive Soil

The native surface clays exhibit moderate swell potential. The clay is expansive when wet and can shrink with moisture loss (drying). Soils on-site are prone to expansion and shrinkage; development of building foundations, concrete flatwork, and asphaltic concrete pavements should include provisions for mitigating potential swelling forces and reduction in soil strength which can occur from saturation of the soil (Appendix H of this EIR).

Corrosive Soil

Native soil on-site has moderate to very severe levels of chloride ion concentrations. Chloride ions can cause corrosion of reinforced steel, anchor bolts, and other buried metallic conduits. Resistivity determinations on the soil indicate very severe potential for metal loss because of electrochemical corrosion processes (Appendix H of this EIR).

Liquefaction

Liquefaction occurs when loosely packed, saturated soil or sediment at or near the ground surface loses its strength, which can lead to excessive settlement, ground rupture, lateral spreading, or failure of shallow bearing foundations.

Liquefaction zones have not been mapped in the project area; however, the Colorado River Delta region of southern Imperial County (including Heber) is a seismically active area. Due to the cohesive nature of the subsurface soils, liquefaction is not anticipated at the project site (Appendix H of this EIR).

Lateral Spreading

Lateral spreading typically occurs as a form of horizontal displacement of relatively flat-lying alluvial material toward an open or “free” face such as an open body of water, channel, or excavation. This movement is generally due to failure along a weak plane, and may often be associated with liquefaction. As cracks develop within the weakened material, blocks of soil displace laterally toward the open face. Cracking and lateral movement may gradually propagate away from the face as blocks continue to break free.

Due to the low potential for liquefaction and the fact that the project site is not located near free faces or bodies of water, the potential for lateral spreading is considered low.

Subsidence

The project site is not located within a mapped area of known land subsidence (Appendix H of this EIR). Due to the depth of groundwater and the fact that the site is not located in a mapped subsidence area, the potential for subsidence is considered low (Appendix H of this EIR). However, a study published in collaboration with the California Energy Commission in 2019 found surface deformation at the Heber Geothermal Field (HGF) connected to geothermal production and injection. The HGF is the area containing and surrounding the HGEC. Subsidence was occurring at the HGF up to -45 mm/year (-1.77 in/year). Furthermore, it was reported that an increase in injection resulted in ground uplift in the northwestern portion of the HGF, however over time this uplift transitioned to subsidence with an increase in geothermal production (Eneva et al 2019).

Landslides

The project site is relatively flat, and the hazard of landslides is unlikely due to the planar topography of the site and the region. Furthermore, no ancient landslides are identified on geologic maps of the region (Appendix H of this EIR).

Paleontological Resources

Paleontological resources (fossils) are the remains of prehistoric plant and animal life. Fossil remains, such as bones teeth, shell, and wood, are found in geologic deposits (rock formations) within which they were originally buried. Many paleontological fossil sites are recorded in Imperial County and have been discovered during construction activities. Paleontological resources are typically impacted when earthwork activities, such as mass excavation cut into geological deposits (formations) with buried fossils.

The project site is in the Salton Basin near the shoreline of ancient Lake Cahuilla. The lake covered much of the Imperial Valley and created an extensive lacustrine environment. Lake Cahuilla

experienced several fill recession episodes before it finally dried up about 300 years ago. In 1905, the Colorado River overflowed into the Salton Basin creating the present-day Salton Sea. As previously mentioned above, the project site is generally underlain by deposits from periodic flooding of the Colorado River and Lake Cahuilla (Appendix H of this EIR). Sediments from this formation have yielded fossilized remains of continental vertebrates, invertebrates, and plants at numerous previously recorded fossil sites in the Imperial Valley. Therefore, the project site is considered paleontologically sensitive.

3.8.2 Regulatory Setting

This section identifies and summarizes laws, policies, and regulations that are applicable to the project.

Federal

Earthquake Hazards Reduction Act

The Earthquake Hazards Reduction Act was enacted in 1977 to "reduce the risks to life and property from future earthquakes in the United States through the establishment and maintenance of an effective earthquake hazards and reduction program." To accomplish this, the Act established the National Earthquake Hazards Reduction Program (NEHRP). This program was significantly amended in November 1990 by NEHRP, which refined the description of agency responsibilities, program goals, and objectives.

NEHRP's mission includes improved understanding, characterization, and prediction of hazards and vulnerabilities; improvement of building codes and land use practices; risk reduction through post-earthquake investigations and education; development and improvement of design and construction techniques; improvement of mitigation capacity; and accelerated application of research results. The NEHRP designates the Federal Emergency Management Agency as the lead agency of the program and assigns it several planning, coordinating, and reporting responsibilities. Programs under NEHRP help inform and guide planning and building code requirements such as emergency evacuation responsibilities and seismic code standards such as those to which the project would be required to adhere.

State

Alquist-Priolo Special Studies Earthquake Hazards Act (APEHA)

The APEHA was passed into law following the destructive February 9, 1971, San Fernando earthquake. The APEHA provides a mechanism for reducing losses from surface fault rupture on a statewide basis. The intent of the APEHA is to ensure public safety by prohibiting the siting of most structures for human occupancy across traces of active faults that constitute a potential hazard to structures from surface faulting or fault creep. The state geologist (Chief of the California Division of Mines and Geology) is required to identify "earthquake fault zones" along known active faults in California. Counties and cities must withhold development permits for human occupancy projects within these zones unless geologic studies demonstrate that there would be no issues associated with the development of projects.

California Building Code

The California Building Standards Commission is responsible for coordinating, managing, adopting, and approving building codes in California. CCR Title 24 is reserved for state regulations that govern

the design and construction of buildings, associated facilities, and equipment, known as building standards. The California Building Code (CBC) is based on the Federal Uniform Building Code used widely throughout the country (generally adopted on a state-by-state or district-by-district basis). The California Health and Safety Code (HSC) Section and 18980 HSC Section 18902 give CCR Title 24 the name of California Building Standards Code. The updates to the 2019 California Building Standards Code were published on January 1, 2021, with an effective date of July 1, 2021.

Seismic Hazards Mapping Act

The Seismic Hazards Mapping Act aims to reduce the threat of seismic hazard to public health and safety by identifying and mitigating seismic hazards. Through the Act, the California Department of Conservation, Division of Mines and Geology, is directed to delineate seismic hazard zones. State, county, and city agencies are directed to utilize such maps in land use and permitting processes. The Act also requires geotechnical investigations particular to the site be conducted before permitting occurs on sites within seismic hazard zones.

Local

Imperial County Land Use Ordinance

Title 9 Division 15 (Geological Hazards) of the County Land Use Ordinance has established procedures and standards for development within earthquake fault zones. Per County regulations, construction of buildings intended for human occupancy are prohibited across the trace of an active fault. An exception exists when such buildings located near the fault or within a designated Special Studies Zone are demonstrated through a geotechnical analysis and report not to expose a person to undue hazard created by the construction.

Imperial County General Plan

The County of Imperial General Plan, Seismic and Public Safety Element identifies potential natural and human-induced hazards and provides policy to avoid or minimize the risk associated with hazards. The Seismic and Public Safety Element identifies ‘lifelines and critical facilities’ whose disruption could endanger the public safety. Lifelines are defined as networks of services that extend over a wide area and are vital to the public welfare, and can be classified into four categories: energy, water, transportation, and communications. The IID has a formal Disaster Readiness Standard Operating Procedure for the Water Department, Power Department, and the entire District staff for response to earthquakes and other emergencies.

Table 3.8-1 analyzes the consistency of the project with specific policies contained in the County of Imperial General Plan associated with geology, soils, and seismicity. While this EIR analyzes the project’s consistency with the General Plan pursuant to CEQA Guidelines Section 15125(d), the Imperial County Board of Supervisors ultimately determines consistency with the General Plan.

Table 3.8-1. Project Consistency with Applicable General Plan Policies

General Plan Policies	Consistency with General Plan	Analysis
Seismic and Public Safety Element		
Goal 1. Include public health and safety considerations in land use planning.	Consistent	Division 15 of the County Land Use Ordinance has established procedures and standards for development within earthquake fault zones. Per County regulations, construction of buildings intended for human occupancy which are located across the trace of an active fault are prohibited. An exception exists when such buildings located near the fault or within a designated Special Studies Zone are demonstrated through a geotechnical analysis and report not to expose a person to undue hazard created by the construction. Since the project site is located in a seismically active area, the project is required to be designed in accordance with the CBC. It should be noted that, the project would be remotely operated and would not require any habitable structures on site. In considering these factors in conjunction with mitigation requirements outlined in the impact analysis, the risks associated with seismic hazards would be minimized. A preliminary geotechnical study has been prepared for the proposed project. The preliminary geotechnical study has been referenced in this environmental document. Additionally, a design-level geotechnical investigation will be conducted to evaluate the potential for site specific hazards associated with seismic activity.
Objective 1.1. Ensure that data on geological hazards is incorporated into the land use review process, and future development process.		
Objective 1.3. Regulate development adjacent to or near all mineral deposits and geothermal operations.		
Objective 1.4. Require, where possessing the authority, that avoidable seismic risks be avoided; and that measures, commensurate with risks, be taken to reduce injury, loss of life, destruction of property, and disruption of service.		
Objective 1.7. Require developers to provide information related to geologic and seismic hazards when siting a proposed project.		
Goal 2: Minimize potential hazards to public health, safety, and welfare and prevent the loss of life and damage to health and property resulting from both natural and human-related phenomena.		
Objective 2.2. Reduce risk and damage due to seismic hazards by appropriate regulation.		
Objective 2.5 Minimize injury, loss of life, and damage to property by implementing all state codes where applicable.		
Objective 2.8 Prevent and reduce death, injuries, property damage, and economic and social dislocation resulting from natural hazards including flooding, land subsidence, earthquakes, other geologic phenomena, levee or dam failure, urban and wildland fires and building collapse by appropriate planning and emergency measures.		

Source: County of Imperial 1997

3.8.3 Impacts and Mitigation Measures

This section presents the significance criteria used for considering project impacts related to geologic and soil conditions, the methodology employed for the evaluation, an impact evaluation, and mitigation requirements, if necessary.

Thresholds of Significance

Based on CEQA Guidelines Appendix H of this EIR, project impacts related to geology and soils are considered significant if any of the following occur:

- Directly or indirectly cause potential substantive adverse effects, including the risk of loss, injury, or death involving:
    - Rupture of a known earthquake fault, as delineated on the most recent AP 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)
    - Strong seismic ground shaking
    - Seismic related ground failure, including liquefaction
    - Landslides
- Result in substantial soil erosion or the loss of topsoil
- 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
- 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
- Have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater
- Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature

Methodology

This analysis evaluates the potential for the project, as described in Chapter 2, Project Description, to interact with local geologic and soil conditions, as well as paleontological resources on the project site. A *Geotechnical Site Assessment* prepared by Catalyst Environmental Solutions (Appendix H of this EIR) was prepared for the project. The information obtained from this report was reviewed and summarized to present the existing geologic and soil conditions on the project site. This analysis considers whether these conditions would result in an exceedance of one or more of the applied significance criteria as identified above.

Impact Analysis

Impact 3.8-1 Would the project directly or indirectly cause potential substantive adverse effects, including the risk of loss, injury, or death involving:

Rupture of a known earthquake fault, as delineated on the most recent AP 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)?

As described in Section 3.8.1 above, the Imperial Valley is a seismically active region, as is much of southern California. According to the California Geologic Survey (CGS), the project site is not located within or near an Alquist-Priolo Special Studies Earthquake Hazards Act Zone (Appendix H of this EIR). Fault lines through the Imperial Valley are well-delineated and the closest known fault is the Imperial Fault located 6.7 miles east of the project site. In addition, the project would not construct any buildings designed for human occupancy. As such, the probability for surface fault rupture within the project site during construction or operations is considered low and the project would not increase or exacerbate existing hazards related to fault rupture. The proposed project would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury or death involving rupture of a major fault as delineated on the most recent Alquist-Priolo Fault Zoning map. This impact would be less than significant.

Mitigation Measure(s)

No mitigation measures are required.

Impact 3.8-2 Would the project directly or indirectly cause potential substantive adverse effects, including the risk of loss, injury, or death involving:

Strong seismic ground shaking?

The Imperial Fault Zone is the nearest active fault zone to the project site and is located approximately 6.7 miles to the east. In the event of an earthquake along this fault or another regional fault, seismic hazards related to ground motion could occur in susceptible areas within the project site. The intensity of such an event would depend on the causative fault and the distance to the epicenter, the moment magnitude, and the duration of shaking.

Even with the integration of building standards that are designed to resist the effects of strong ground motion, ground shaking within the project site could cause some structural damage to the facility structures or, at least, cause unsecured objects to fall. During a stronger seismic event, ground shaking could result in structural damage or collapse of electrical distribution facilities. Given the potentially hazardous nature of the project facilities, the potential impact of ground motion during an earthquake is considered a significant impact, as proposed structures, such as the substation, and isopentane tanks could be damaged. However, the proposed project would be constructed in accordance with the applicable geotechnical and seismic design standards as well as the site-specific design recommendations in the final geotechnical report per Mitigation Measure GEO-1; and upon operation, the proposed project would not result in any significant changes related to the risk of seismic hazards on the project site when compared to existing conditions, nor would project operation increase or exacerbate the potential for strong seismic ground shaking to occur. Upon implementation of Mitigation Measure GEO-1, impacts would be reduced to a level less than significant.

Mitigation Measure(s)

GEO-1 **Prepare Geotechnical Report(s) as Part of Final Engineering for the Project and Implement Required Measures.** Facility design for all project components shall comply with the site-specific design recommendations as provided by a licensed geotechnical or civil engineer to be retained by the project applicant. The final geotechnical and/or civil engineering report shall address and make recommendations on the following:

- Site preparation

- Soil bearing capacity
- Appropriate sources and types of fill
- Potential need for soil amendments
- Structural foundations
- Grading practices
- Soil corrosion of concrete and steel
- Erosion/winterization
- Seismic ground shaking
- Liquefaction
- Expansive/unstable soils

In addition to the recommendations for the conditions listed above, the geotechnical investigation shall include subsurface testing of soil and groundwater conditions and shall determine appropriate foundation designs that are consistent with the version of the CBC that is applicable at the time building and grading permits are applied for. All recommendations contained in the final geotechnical engineering report shall be implemented by the project applicants. The final geotechnical and/or civil engineering report shall be submitted to Imperial County Public Works Department, Engineering Division for review and approval prior to issuance of building permits.

Significance after Mitigation

With implementation of Mitigation Measure GEO-1, potential impacts associated with strong seismic ground shaking would be reduced to a level less than significant with the implementation of recommendations made by a licensed geotechnical engineer in compliance with the CBC prepared as part of a formal geotechnical investigation.

Impact 3.8-3 Would the project directly or indirectly cause potential substantive adverse effects, including the risk of loss, injury, or death involving:

Seismic related ground failure, including liquefaction?

Liquefaction occurs in areas where loosely packed, saturated soil or sediment at or near the ground surface loses its strength, which can lead to excessive settlement, ground rupture, lateral spreading, or failure of shallow bearing foundations. No liquefaction areas have been mapped in the region, however, the El Mayor-Cucapah earthquake (magnitude 7.2) that occurred throughout southern Imperial valley in 2010 caused widespread liquefaction near the towns of Calexico (immediately southeast of Heber) and El Centro (immediately north of Heber) (Appendix H of this EIR). Despite this, liquefaction is not anticipated at the project site due to the cohesive nature of the site subsurface soils and risk of injury at the project site associated with seismic-related ground failure, including liquefaction is considered low. Thus, impacts to seismic-related ground failure, including liquefaction attributed to the project are considered less than significant.

Mitigation Measure(s)

No mitigation measures required.

Impact 3.8-4 Would the project directly or indirectly cause potential substantive adverse effects, including the risk of loss, injury, or death involving:

Landslides?

The project site topography is relatively flat, and no ancient landslides have been mapped in the area. Development of the proposed project would not directly or indirectly cause potential substantive adverse effects, including the risk of loss, injury, or death involving landslides. Based on project site conditions, the potential for a landslide to occur on-site is considered negligible and no impact would occur.

Mitigation Measure(s)

No mitigation measures required.

Impact 3.8-5 Would the project result in substantial soil erosion or the loss of topsoil?

Construction activities such as site grading would involve large areas of soil to be exposed to erosive forces. Construction activities will involve grubbing and grading of the project site to establish access roads and pads for electrical equipment, trenching for underground electrical collection lines and pipelines, the installation of geothermal and solar equipment, and security fencing which could result in increased erosion and sedimentation to surface waters. Therefore, construction could produce sediment-laden stormwater runoff (nonpoint source pollution), a major contributor to the degradation of water quality. If precautions are not taken to contain contaminants, construction-related erosion impacts are considered a significant impact.

As provided in Mitigation Measure GEO-1, during final engineering for the project, a design-level geotechnical study would identify appropriate measures for the project related to soil erosion. In addition, as part of Mitigation Measure HYD-1 provided in Section 3.11 Hydrology/Water Quality, potential impacts from erosion during construction activities would be reduced to a level less than significant with the preparation of a SWPPP for sediment and erosion control and implementation of BMPs to reduce erosion from the construction site.

The project is not expected to result in substantial soil erosion or the loss of topsoil over the long term. The project applicant would be required to implement on-site erosion control measures in accordance with County standards, which require the preparation, review, and approval of a grading plan by the County Engineer. Therefore, with implementation of Mitigation Measure GEO-1 and Mitigation Measure HYD-1 identified in Section 3.11 Hydrology/Water Quality, impacts from construction-related erosion would be reduced to a level less than significant.

Mitigation Measure(s)

The following mitigation measures would be required:

GEO-1 **Prepare Geotechnical Report(s) as Part of Final Engineering for the Project and Implement Required Measures** (as described above)**.**

HYD-1 **Prepare SWPPP and Implement BMPs Prior to Construction and Site Restoration.** (See Section 3.11, Hydrology and Water Quality).

Significance after Mitigation

With implementation of Mitigation Measures GEO-1 and HYD-1 (as described in Section 3.11, Hydrology and Water Quality), potential impacts from erosion during construction activities would be reduced to a level less than significant with the preparation of a SWPPP and implementation of BMPs to reduce erosion from the construction site.

Impact 3.8-6 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?

Based on the site conditions and gentle to relatively flat topography across the majority of the project site, lateral spreading is considered low. In addition, no liquefaction or landslide areas have been mapped near or within the project site. Baseline conditions at the project site do not show signs of geologic units or soil that are unstable and could potentially result in on-or off-site landslide, lateral spreading, liquefaction, or collapse. The project site is not located within a mapped area of known land subsidence (Appendix H of this EIR). However, as described previously, Eneva et al. (2019) has documented land subsidence at the project site attributed to existing geothermal activity within the HGF. Land subsidence up to 1.7 inches/year is occurring on-site with some subsidence and uplift off-site. This potential impact associated with subsidence is considered a significant impact. Implementation of Mitigation Measure GEO-1, which requires the preparation of a design-level geotechnical report, would reduce the potential impacts associated with subsidence to a level less than significant.

Mitigation Measure(s)

GEO-1 Prepare Geotechnical Report(s) as Part of Final Engineering for the Project and Implement Required Measures.

Significance after Mitigation

With implementation of Mitigation Measure GEO-1, potential impacts associated with subsidence would be reduced to a level less than significant with the implementation of recommendations made by a licensed geotechnical engineer in compliance with the CBC prepared as part of a formal geotechnical investigation.

Impact 3.8-7 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?

As discussed in Section 3.8.1 above, on-site soils are classified as Site Class D, which are characterized by a stiff soil profile with stiff clays as deep as 40 feet bgs. However, surface clays exhibit moderate swell potential, expanding when wet, shrinking when dry (Appendix H of this EIR). To accommodate the sites moderate swell potential, the development of the OEC foundation, concrete flatwork, and asphaltic concrete pavements shall include provisions for mitigating potential swelling forces and reduction in soil strength caused by soil saturation (Appendix H of this EIR). Likewise, the native soil has moderate to very severe levels of chloride ion concentration which can cause corrosion of reinforcing steel, anchor bolts and other buried metallic conduits. Preventative measures for the corrosion of steel can be achieved by using steel pipes coated with epoxy corrosion inhibitors,

asphaltic and epoxy coatings, or by encapsulating portions of pipe lying above groundwater with a minimum of three inches of densely consolidated concrete (Appendix H of this EIR).

Despite the project site's moderate swell potential and corrosive soils, project construction and operation would not result in substantial direct or indirect risks to life or property because of adherence to County building standards and CBC requirements for building on expansive soils. Moreover, Mitigation Measure GEO-1 would identify any potential hazards for building at the project site with recommended engineering practices that would reduce potential project impacts to a level less than significant.

Mitigation Measure(s)

GEO-1 Prepare Geotechnical Report(s) as Part of Final Engineering for the Project and Implement Required Measures.

Significance after Mitigation

With implementation of Mitigation Measure GEO-1, potential impacts associated with expansive soils and corrosive soils would be reduced to a level less than significant with the implementation of recommendations made by a licensed geotechnical engineer in compliance with the CBC prepared as part of a formal geotechnical investigation.

Impact 3.8-8 Would the project have soils incapable of adequately supporting the use of septic tanks or alternative wastewater disposal systems where sewers are not available for the disposal of wastewater?

The proposed project does not include any septic tanks or wastewater disposal systems. Therefore, the project would have no impact on the project site soil and its capacity to adequately support the use of septic tanks or alternative wastewater disposal systems. No impact would occur.

Mitigation Measure(s)

No mitigation measures are required.

Impact 3.8-9 Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

The project site is in the Salton Basin near the shoreline of ancient Lake Cahuilla. The lake covered much of the Imperial Valley and created an extensive lacustrine environment. Lake Cahuilla experienced several fill recession episodes before it finally dried up about 300 years ago. In 1905, the Colorado River overflowed into the Salton Basin creating the present-day Salton Sea. As previously noted, the project site is generally underlain by deposits from periodic flooding of the Colorado River and Lake Cahuilla (Appendix H of this EIR). Sediments from this formation have yielded fossilized remains of continental vertebrates, invertebrates, and plants at numerous previously recorded fossil sites in the Imperial Valley. Therefore, the project site is considered paleontologically sensitive.

Although unlikely, project construction has the potential to unearth and/or potentially destroy previously undiscovered paleontological resources. This potential impact is considered a significant impact. However, implementation of Mitigation Measure GEO-2 would reduce the potential impact on paleontological resources to a level less than significant.

Mitigation Measure(s)

GEO-2 **Paleontological Resources.** In the event that unanticipated paleontological resources or unique geologic resources are encountered during ground-disturbing activities, work must cease within 50 feet of the discovery and a paleontologist shall be hired to assess the scientific significance of the find. The consulting paleontologist shall have knowledge of local paleontology and the minimum levels of experience and expertise as defined by the Society of Vertebrate Paleontology's Standard Procedures (2010) for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources. If any paleontological resources or unique geologic features are found within the project site, the consulting paleontologist shall prepare a paleontological Treatment and Monitoring Plan to include the methods that will be used to protect paleontological resources that may exist within the project site, as well as procedures for monitoring, fossil preparation and identification, curation of specimens into an accredited repository, and preparation of a report at the conclusion of the monitoring program.

Significance after Mitigation

Implementation of Mitigation Measure GEO-2 would reduce the potential impact on paleontological resources to a level less than significant. In the event that unanticipated paleontological resources or unique geologic resources are encountered during ground-disturbing activities, work must cease within 50 feet of the discovery and a paleontologist shall be hired to assess the scientific significance of the find.

3.8.4 Decommissioning/Restoration and Residual Impacts

Decommissioning/Restoration

At the end of the project's useful life, all equipment and facilities will be properly abandoned and dismantled. The geothermal production well and injection wells will be abandoned in conformance with the well abandonment requirements of the DOGGR. CalGEM requirements will be prepared and implemented. The abandonment plan would describe the proposed approach to facility abandonment, equipment removal, disposal, and site restoration. All above-ground equipment will be dismantled and removed from the entire site. The surface of the site would be restored to conform to approximate pre-Project land uses (e.g., agriculture or open space).

No impacts are anticipated during the decommissioning and restoration, all ground disturbance would have occurred during the construction phase of the project.

Residual

With implementation of Mitigation Measure GEO-1, impacts related to strong seismic ground shaking, subsidence, expansive soils, and corrosive soils would be reduced to a level less than significant. With implementation of Mitigation Measure GEO-1 and Mitigation Measure HYD-1 in Section 3.10 Hydrology/Water Quality, potential impacts from erosion during construction activities would be reduced to a level less than significant. Implementation of Mitigation Measure GEO-2 would reduce the potential impact on paleontological resources to a level less than significant. The project would not result in residual significant and unmitigable impacts related to geology and soil resources.

This page is intentionally blank.