

**DOCKETED**

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<b>Description:</b>	This section describes the geological hazards and resources present in the vicinity of the Darden Clean Energy Project site, as well as the potential impacts that may result from construction and operation of the Project related to geological hazards and geological resources of commercial, recreational, or scientific value.
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## 5.16 Geological Hazards and Resources

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This section describes the geological hazards and resources present in the vicinity of the Darden Clean Energy Project (Project) site, as well as the potential impacts that may result from construction and operation of the Project related to geological hazards and geological resources of commercial, recreational, or scientific value. Section 5.16.1 describes the existing environmental setting, including regional and local geology and hydrogeology, as well as geological hazards. Section 5.16.2 provides an overview of the regulatory setting related to geological hazards and resources. Section 5.16.3 identifies potential impacts that may result from Project construction and operation (including maintenance), as well as mitigation measures that should be considered during Project construction and operation. Section 5.16.4 discusses cumulative impacts. Section 5.16.5 presents laws, ordinances, regulations, and standards (LORS) applicable to geological hazards and resources. Section 5.16.6 identifies regulatory agency contacts and Section 5.16.7 describes permits required for the Project related to geological hazards and resources. Section 5.16.8 provides references for this section.

### 5.16.1 Environmental Setting

#### 5.16.1.1 Regional Geology

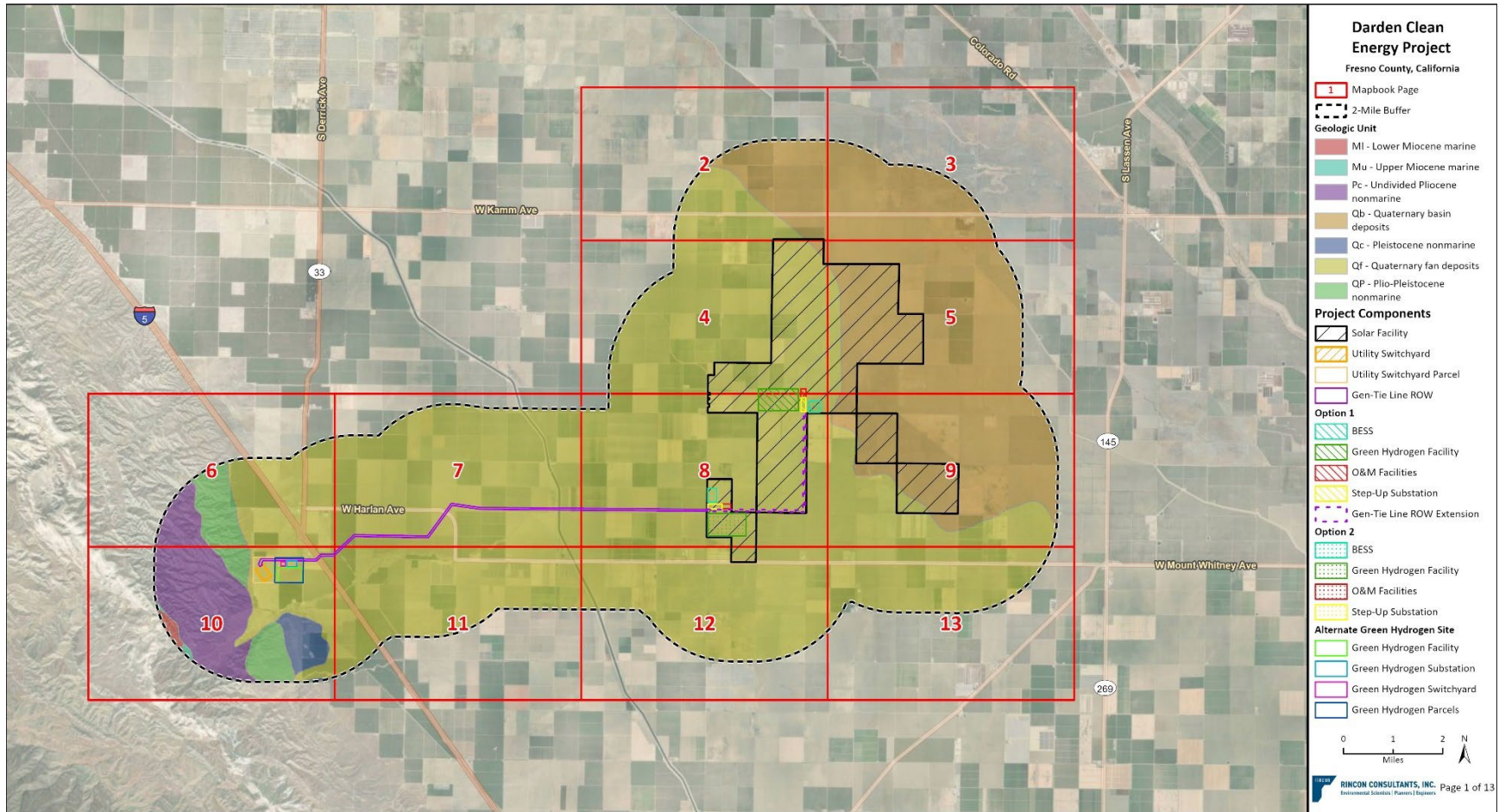
The Project site borders the Sierra Nevada and Great Valley ranges of the California Geomorphic Provinces (California Geologic Survey [CGS] 2002). The western portion of Fresno County, in which the Project site is located, is dominated by rocks of the Great Valley Sequence, which consist of marine and non-marine sedimentary rocks such as sandstone, shale, and conglomerate that were deposited during the Cretaceous and Tertiary periods.

#### 5.16.1.2 Local Geology and Stratigraphy

The Project site is generally underlain by Quaternary alluvium composed of mixtures of sand and gravel (Dibblee and Minch 2007). As shown in Figure 5.16-1a through Figure 5.16-1m, the following geological units underlie the Project site:

- Quaternary basin deposits underlie much of the eastern part of the solar facility site. Quaternary basin deposits consist of fine-grained sediments that are deposited during flooding events of the major streams and rivers of the San Joaquin Valley (Jennings and Strand 1958).
- Quaternary fan deposits underlie the majority of the Project site, including all of the gen-tie line easement and Option 1 gen-tie line extension; all of the Options 1 and 2 BESS, green hydrogen facility, O&M facilities, and step-up substation; all of the alternate green hydrogen site; and much of the solar facility site. In this region, Quaternary fan deposits consist of a variety of sediments ranging from coarse- to fine-grained and represent alluvial fan sediments deposited by ephemeral streams and mudslides/debris flows originating from the Coast Ranges that form the western border of the San Joaquin Valley (Jennings and Strand 1958; Miller et al. 1971).
- Quaternary older alluvium underlies the utility switchyard. Quaternary older alluvium consists of Pleistocene-aged, dissected gravel and sand (Dibblee and Minch 2007).

Figure 5.16-1a Surface Geology Within Two Miles of Project Site Overview

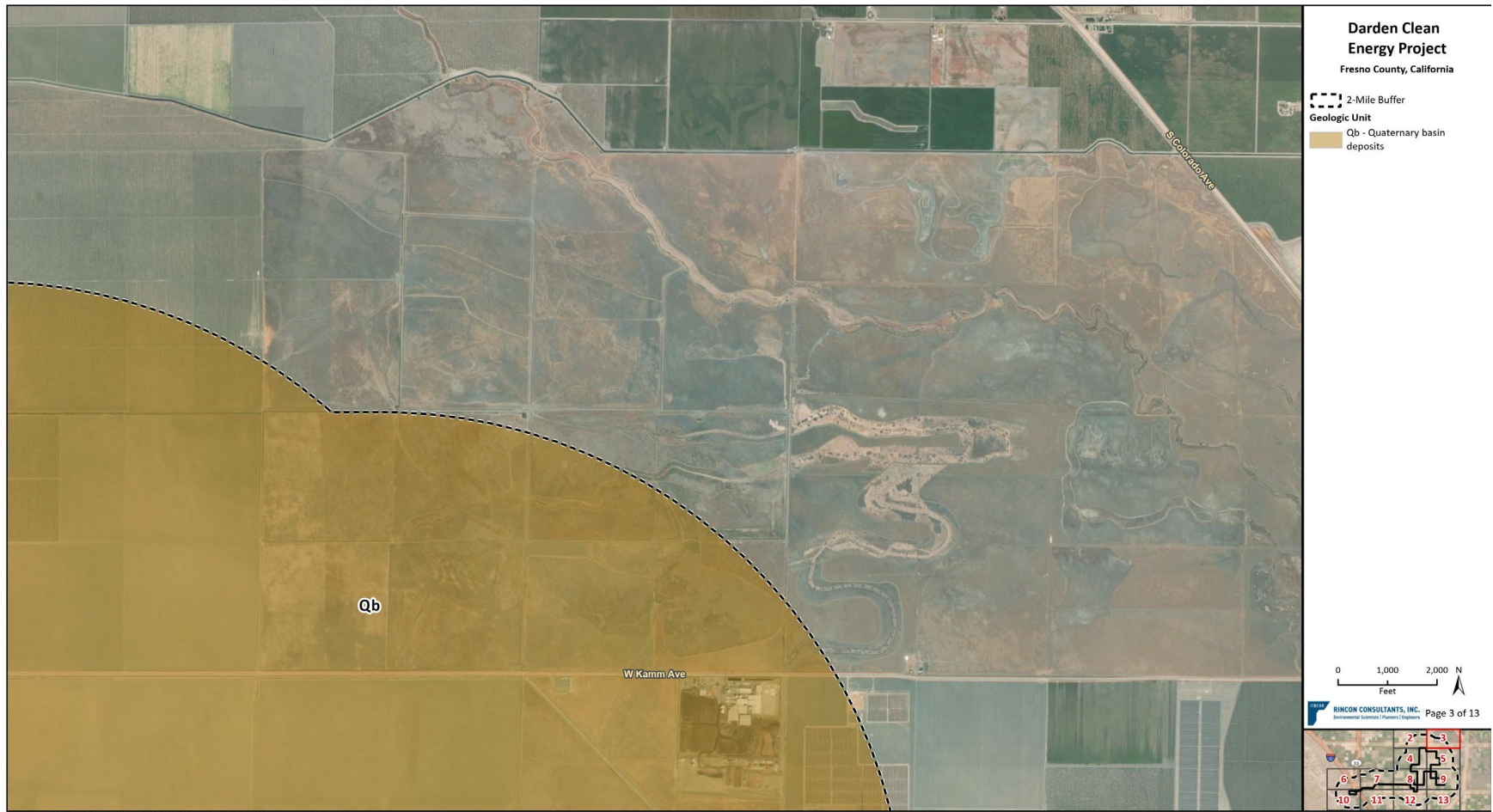


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Figure 5.16-1b Surface Geology Within Two Miles of Project Site (Mapbook Page 2)



Figure 5.16-1c Surface Geology Within Two Miles of Project Site (Mapbook Page 3)



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**Figure 5.16-1d Surface Geology Within Two Miles of Project Site (Mapbook Page 4)**



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Figure 5.16-1e Surface Geology Within Two Miles of Project Site (Mapbook Page 5)



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Figure 5.16-1f Surface Geology Within Two Miles of Project Site (Mapbook Page 6)

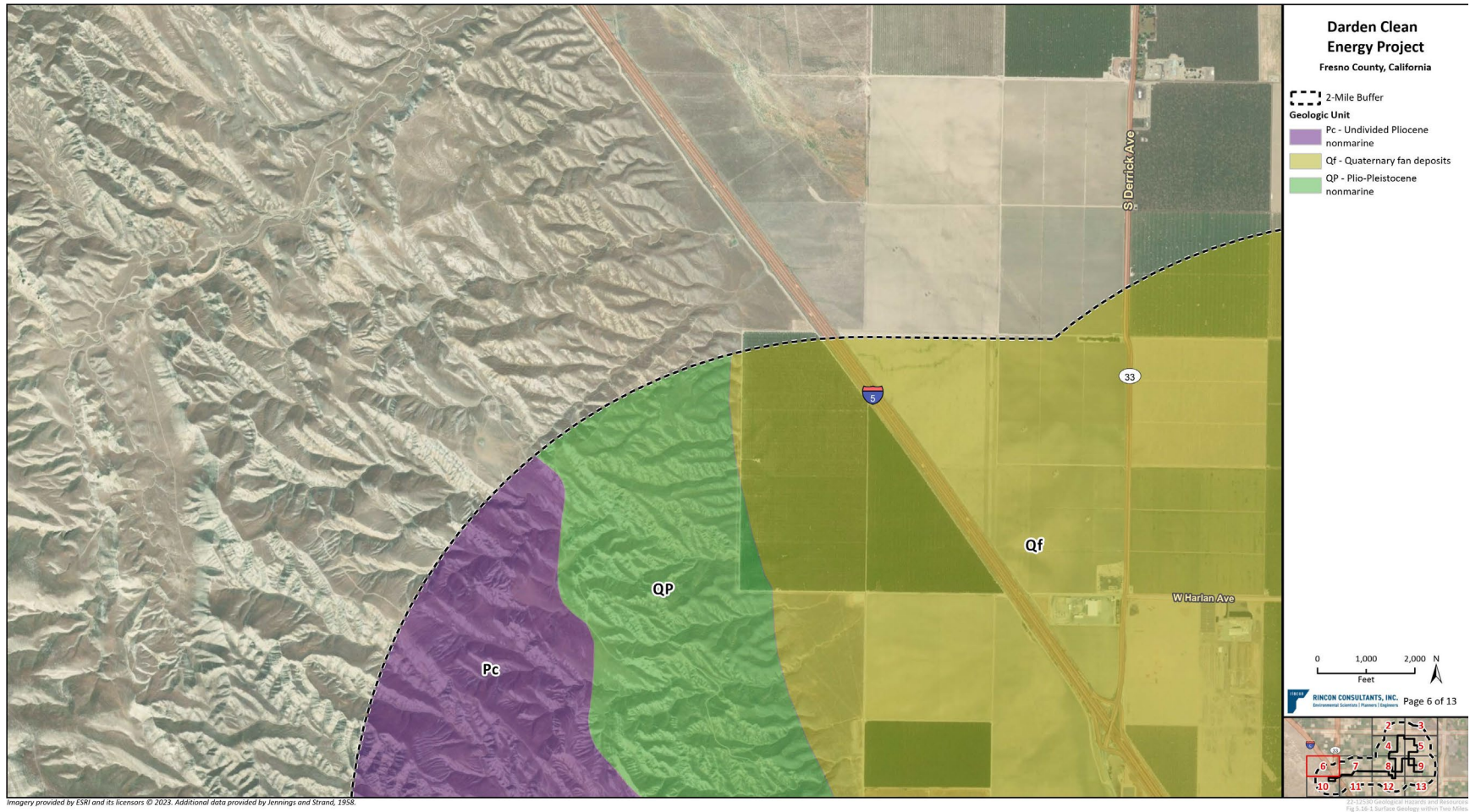




Figure 5.16-1g Surface Geology Within Two Miles of Project Site (Mapbook Page 7)



**Figure 5.16-1h Surface Geology Within Two Miles of Project Site (Mapbook Page 8)**

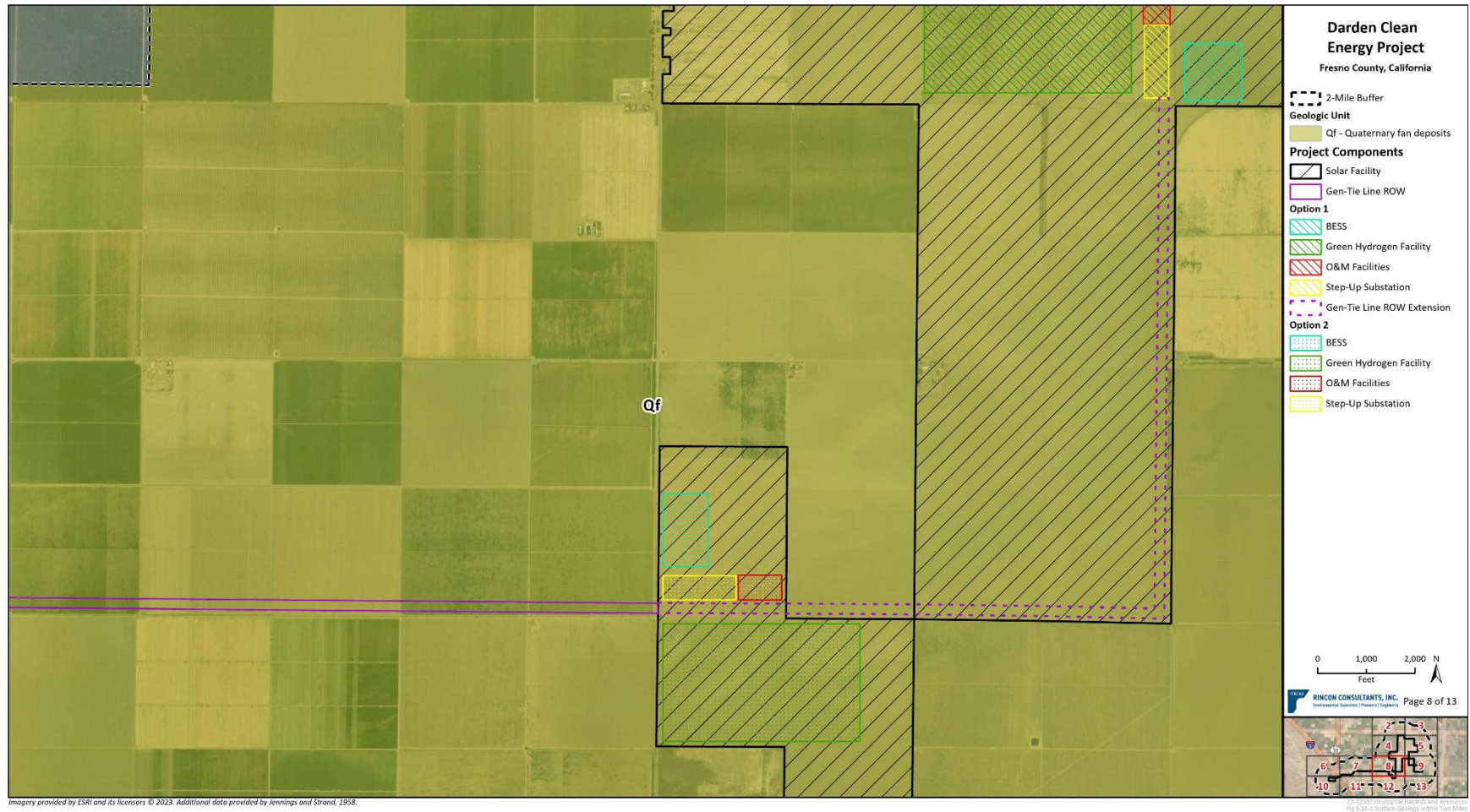
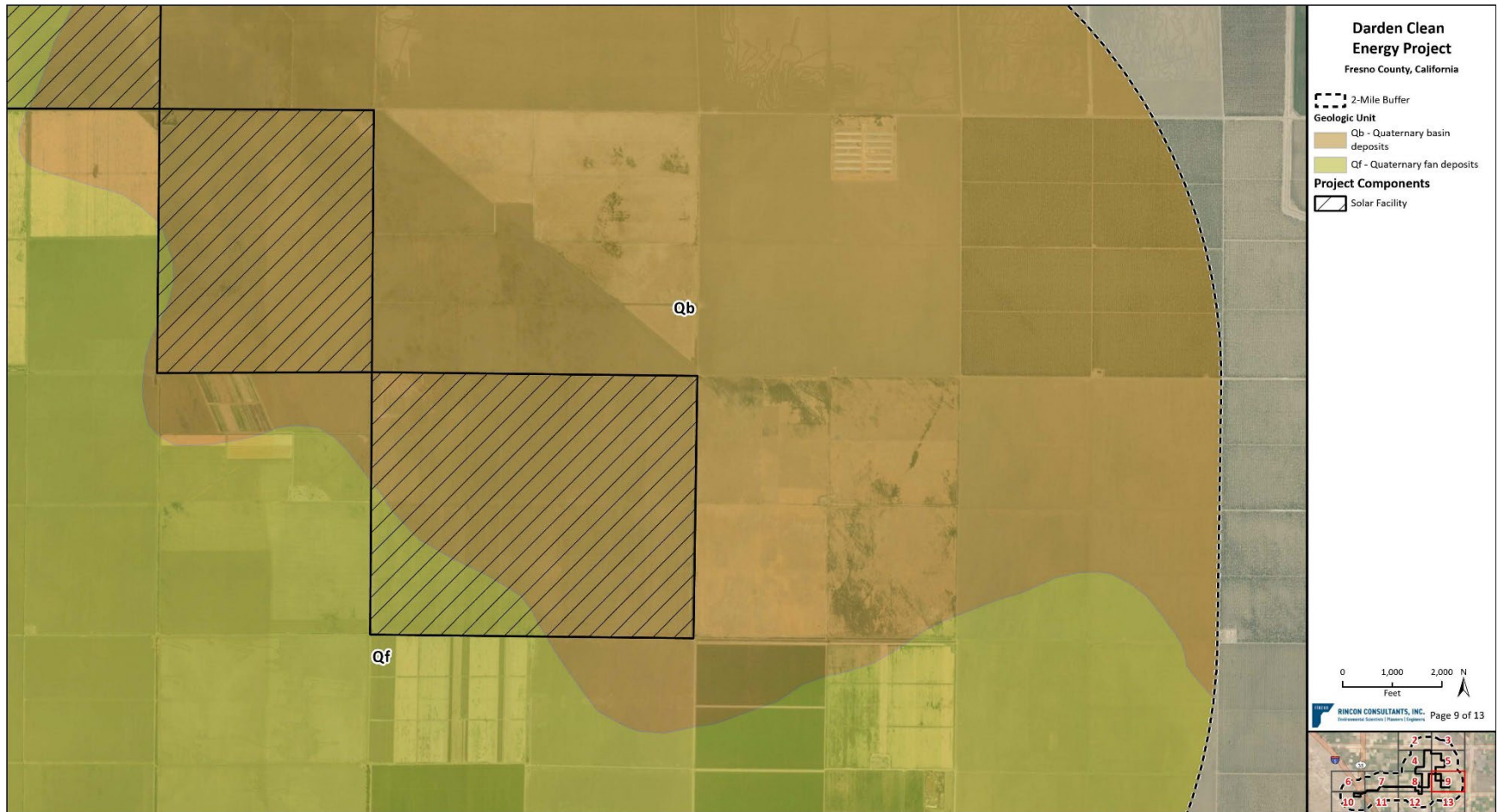


Figure 5.16-1i Surface Geology Within Two Miles of Project Site (Mapbook Page 9)



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**Figure 5.16-1j Surface Geology Within Two Miles of Project Site (Mapbook Page 10)**

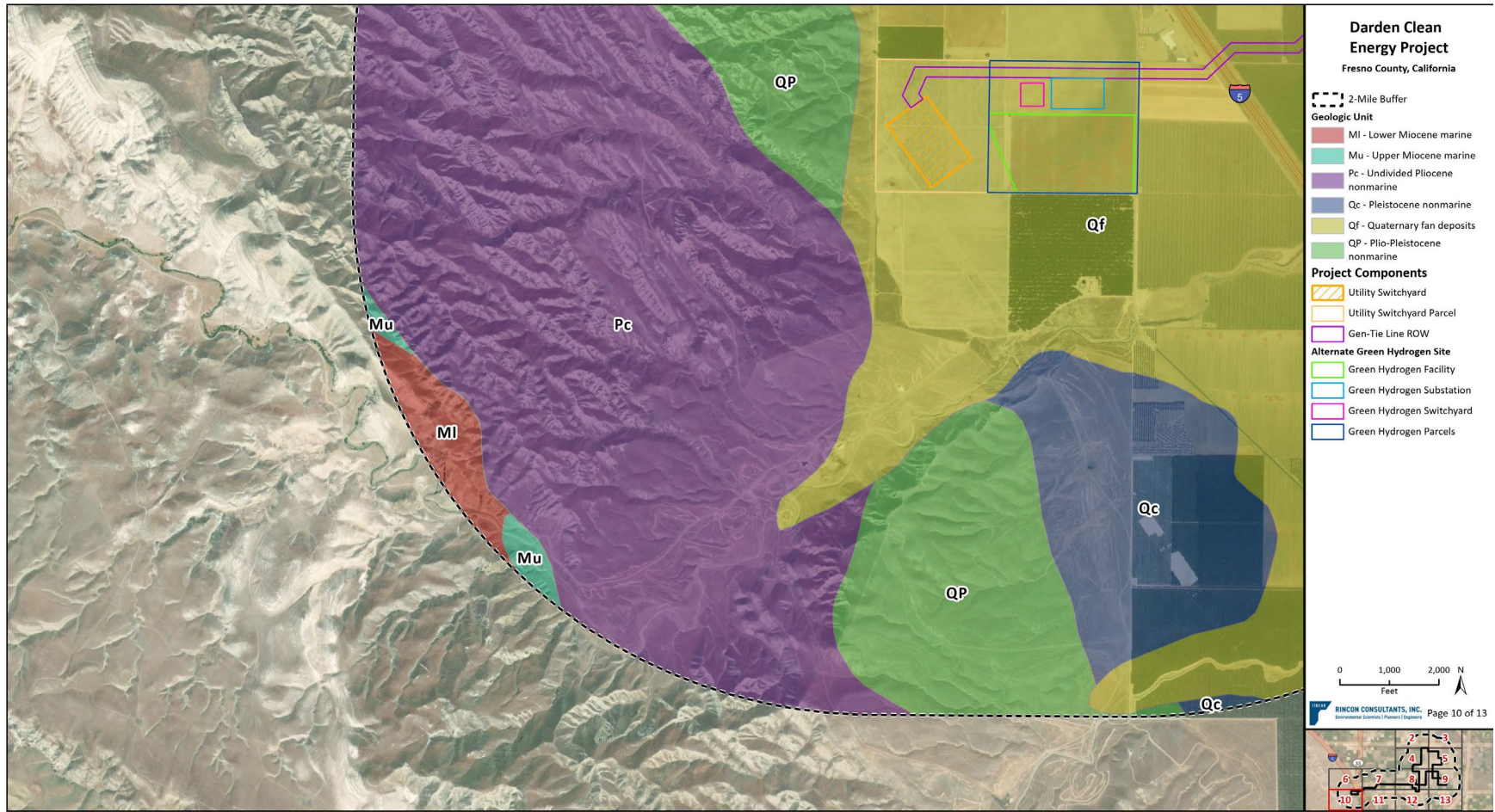


Figure 5.16-1k Surface Geology Within Two Miles of Project Site (Mapbook Page 11)



Figure 5.16-11 Surface Geology Within Two Miles of Project Site (Mapbook Page 12)



Figure 5.16-1m Surface Geology Within Two Miles of Project Site (Mapbook Page 13)



### 5.16.1.3 Seismic Setting

Although most of Fresno County is situated within an area of relatively low seismic activity, the faults and fault systems that lie along the eastern and western boundaries of Fresno County, as well as other regional faults, have the potential to produce high-magnitude earthquakes throughout the County. Most of Fresno County, from approximately I-5 eastwards, is located in Seismic Zone 3, as defined by the most recent California Uniform Building Code, which requires specific seismic design standards (Fresno County 2018).

According to the Division of Mines and Geology Special Publication 42, which includes an index of 7.5-minute quadrangle maps containing Earthquake Fault Zones, no known faults have been mapped through the Project site (CGS 2018). The closest active fault to the Project site is within the Nunez Fault Zone, located approximately 20 miles to the northwest (United States Geological Survey [USGS] 2017). The San Andreas Fault Zone is located approximately 40 miles west of the Project site. Table 5.16-1 lists the faults within 100 miles of the Project site and Figure 5.16-2 shows these faults in relation to the Project site.

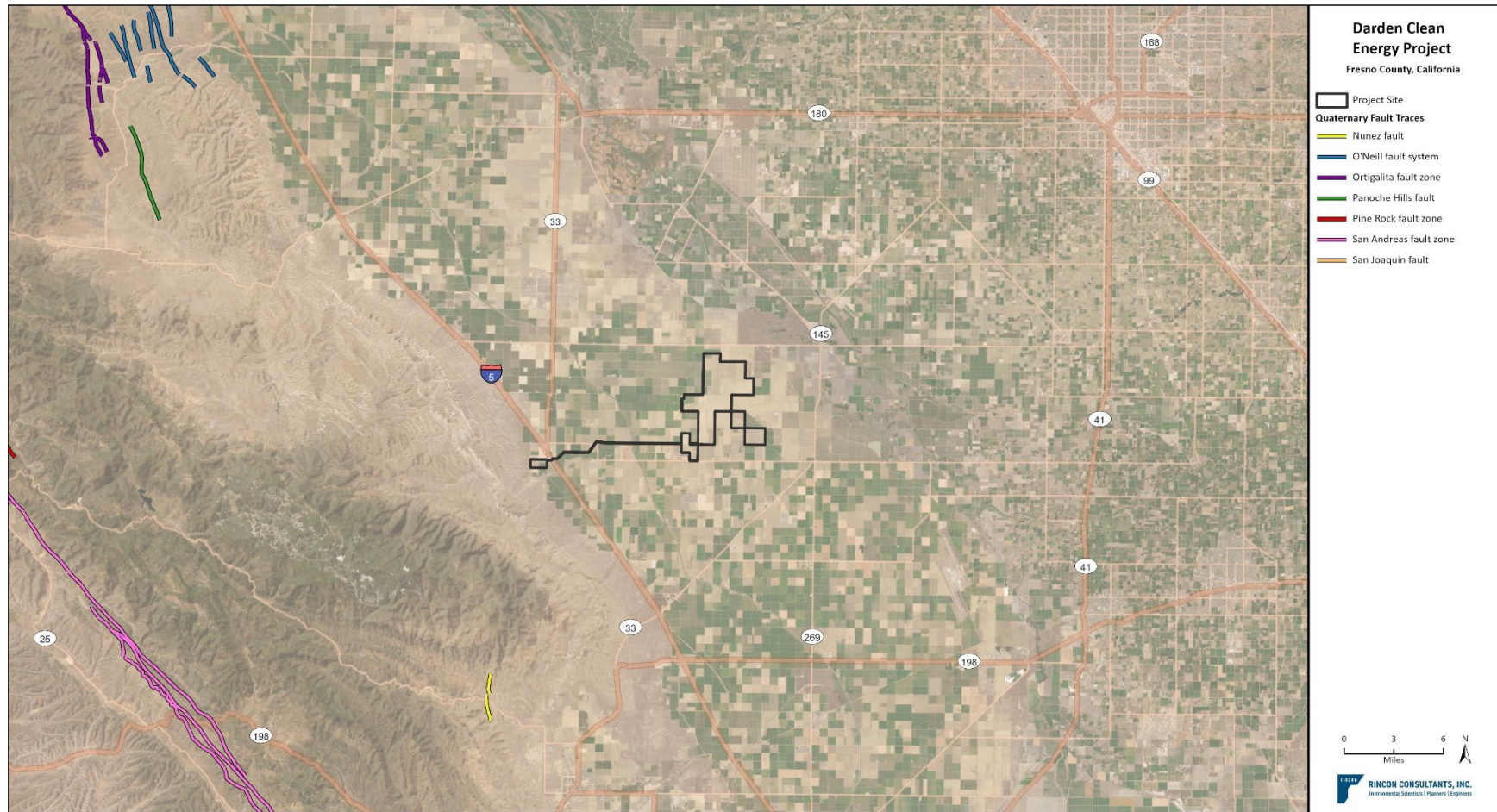
**Table 5.16-1 Faults in Proximity to the Project Site**

Fault	Approximate Fault to Project Site Distance (miles)
Nunez fault	20
O'Neill fault system	35
Panoche Hills fault	30
San Andreas fault zone	40
San Joaquin fault	40

Source: USGS 2017



Figure 5.16-2 Regional Quaternary Faults



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Fig. 5.16-2 Regional Quaternary Faults

### 5.16.1.4 Potential Geologic Hazards

The following subsections discuss the geologic hazards that have the potential to occur in the Project area.

#### Ground Rupture

Ground rupture refers to the displacement of the ground surface along a pre-existing fault. Ground rupture can endanger life and property if structures are constructed on, or cross over, a fault, due to the differential movement of the ground surface. The Alquist-Priolo Earthquake Fault Zoning Act (Alquist-Priolo Act) directed the State Geologist to delineate regulatory “zones of required investigation” to reduce the threat to public health posed by geologic faults and earthquakes. Zones of required investigation indicate areas with active faults that have the potential for surface rupture. There are no known faults (CGS 2015), and no zones of required investigation (CGS 2023a) within the Project site; the closest zone of required investigation to any Project component is a section of the Nunez Fault (Alcalde Hills), located approximately 20 miles southeast of the Project site.

#### Seismic Shaking

As with virtually all of California, the Project site is located in an area with the potential for ground shaking that may cause structural or property damage in the event of an earthquake. The intensity of ground motion depends upon the magnitude of an earthquake, the distance from the epicenter, and the geology between the epicenter and the site. Ground motion caused by earthquakes can be amplified in softer, unconsolidated soil, in which seismic wave velocity decreases but wave amplitude increases, as opposed to in harder material, such as bedrock. As amplitude increases, so does ground acceleration, and the ground shaking intensity.

The USGS Unified Hazard Tool<sup>1</sup> was used to calculate estimated peak ground accelerations (PGA) based on a given time horizon and on-site specific parameters and published earthquake hazard and probability maps (Terracon 2023). The PGA for the Project site were compared to the Modified Mercalli scale (Kramer and Upsall 2006)<sup>2</sup> to provide a qualitative assessment of the potential for ground shaking. Table 5.16-2 shows the PGA associated with each Project component.

**Table 5.16-2 PGA for the Project Components**

Project Component	Latitude/Longitude	PGA	Potential for Damage
Solar Facility	36.492679, -120.205786	0.6g	Weak perceived shaking, no potential damage
Utility Switchyard	36.424185, -120.402854	0.6g	Weak perceived shaking, no potential damage
Gen-Tie Line	36.443734, -120.339706	0.6g	Weak perceived shaking, no potential damage
Alternate Green Hydrogen Site	36.424185, -120.402854	0.7g	Weak perceived shaking, no potential damage
Option 1 Project Components	36.475689, -120.216703	0.6g	Weak perceived shaking, no potential damage
Option 2 Project Components	36.441673, -120.240167	0.6g	Weak perceived shaking, no potential damage

g – acceleration due to gravity  
 PGA – peak ground acceleration

<sup>1</sup> Available online at <https://earthquake.usgs.gov/hazards/interactive/>

<sup>2</sup> The PGA derived for this Report is intended to offer a qualitative assessment of potential ground shaking and is not intended to provide information for use in engineering calculations or designs for the Project.

## Liquefaction

Liquefaction is a process in which saturated soil temporarily becomes fluid during intense and prolonged ground shaking, or because of a sudden shock or strain. Liquefaction typically occurs in areas with loose sand or silt where groundwater is shallow (less than 30 feet below ground surface [bgs]) (Fresno County 2018; State Mining and Geology Board [SMGB] 2014). Settlement is the vertical compression of the soil structure in response to a load, such as a building or compressive ground shaking in an earthquake. Settlement can be rapidly induced by liquefaction as sediments densify in response to the dissipation of pore water pressures (dewatering). Lateral spreading occurs when, during liquefaction, soil is not constrained laterally and flows horizontally. Parts of Fresno County may be subject to liquefaction during seismic events due to the presence of shallow groundwater. The Project site is not mapped within a known liquefaction zone on the California State Geoportal, CGS Seismic Hazards Program Liquefaction Zones map (California State Geoportal 2023). No specific countywide assessments to identify liquefaction hazards have been performed (Fresno County 2018) and the site-specific geotechnical report determined there is a low potential for liquefaction (Terracon 2023). Groundwater depths at the Project site may be as shallow as 8 feet bgs. The Project site overlies Quaternary-aged alluvium which may contain unconsolidated fine-grained fractions that are susceptible to liquefaction.

## Slope Stability and Mass Wasting

Landslides are a form of mass wasting, in which rocks or soil material travel downhill under the force of gravity in a slope failure. Landslides typically occur on moderate-to-steep slopes when masses of rock or earth move down the slope. Landslides can be caused by natural events (e.g., rainfall, earthquakes, snow melt, and soil erosion) or human activities (e.g., grading) that can result in unstable fill slopes or excessive cuts. Important factors that affect slope stability include the steepness of the slope and the strength of rock or soil material. Significant damage to structures and/or infrastructure can occur depending on the extent and energy of the landslide.

No records of major historical landslides were found in proximity to the Project site and the Project site is not mapped within a deep-seated landslide susceptibility zone (California Department of Conservation [DOC] 2023). Landslide risk at the solar facility, Options 1 and 2 Project components, and gen-tie line locations would be minimal due to the virtually flat topography with its footprint and surroundings. The utility switchyard and alternate green hydrogen site are located near the foothills of the Diablo Range; however, the foothills do not feature steep slopes and the Project site itself is relatively flat. The utility switchyard and alternate green hydrogen site locations do not appear to have been assessed by the CGS (CGS 2023b); therefore, it is unknown if landslides have occurred in the areas located in the Diablo Range foothills.

## Expansive Soils

Soils with relatively high clay content that contain specific clay minerals (such as smectite clays) are considered expansive, which indicates that they shrink and swell in response to changing water content. This action is characterized by a soil's "shrink-swell potential," and can damage building and structural foundations via the differential movement of soil.

Expansive soils are present in Fresno County, and while the Project site is not located within areas specifically known to contain expansive soils, it overlies soil classes that feature varying clay fractions that could indicate a shrink-swell risk (Fresno County 2018). A discussion of the potential for expansive soils within the Project site is included in Section 5.14, *Soils*.

## **Subsidence and Collapse of Below Grade Features**

Subsidence is the differential (lateral or vertical) movement of the ground due to the collapse of soil pore space, which occurs without the application of an external load, such as a building. Subsidence can also occur during the compressive ground shaking of an earthquake. Common causes of subsidence in California are the over-pumping of groundwater, which reduces pore pressure, or the decay of organic matter, such as peat, which allows the soil substrate to compress and surface elevations to decrease. Subsidence is generally viewed as a regional change in surface elevation; however, localized differential displacements of the ground surface can damage foundations and structures as does settlement. Subsidence in the Great Valley has increased due to increased groundwater withdrawal during the severe multi-year drought of 2012-2017. Subsidence risk is concentrated in the western portion of Fresno County (Fresno County 2018), within the region in which the Project site is located.

The solar facility and portions of the gen-tie line components would be located in areas where land subsidence, or vertical displacements, between 1949 and 2005 range between 5 to 10 feet (California State Water Resources Control Board 2023). Other portions of the gen-tie line component are located in areas with 10 to 15 feet of estimated vertical displacement. The Option 1 step-up substation, BESS, and green hydrogen components are located in an area with 5 to 10 feet of estimated vertical displacement. The Option 2 step-up substation, BESS, and green hydrogen components are located in an area with 0 to 5 feet of estimated vertical displacement. The solar facility location is also within an area with approximately 1 foot of vertical displacement between 2015 and 2023. The alternate green hydrogen and utility switchyard component locations have not specifically been assessed with respect to vertical displacement between 1949 and 2005, although based on a review of the displacement contours these component locations are likely to have a similar subsidence potential as the remainder of the Project site.

Although the Sustainable Groundwater Management Act requires local governments to bring groundwater pumping to sustainable levels by 2040, subsidence would likely continue to impact the region into the future.

## **Dam Failure Inundation**

Based on review of the Department of Water Resources (DWR) Inundation Maps, the Project site is mapped in an area subject to flooding from a failure of the Mud Dam and the Stinson Weir (DWR 2023); however, it is noted that the downstream hazard is low in the case of both of these structures. Additionally, dams in California are monitored by various governmental agencies (such as the State of California Division of Safety of Dams and the U.S. Army Corps of Engineers) to guard against the threat of dam failure. Current design and construction practices, and ongoing programs of review, modification, seismic retrofitting, or total reconstruction of existing dams are intended to ensure that dams are capable of withstanding the maximum credible earthquake. Mud Dam is approximately 5 miles from the Project site and the Stinson Weir is approximately 15 miles from the Project site.

## **Soil Erosion**

A discussion of the potential for soil erosion within the Project site is included in Section 5.14, *Soils*.

## **Tsunami Run Up**

Tsunamis are large, seismically induced ocean waves that are often a result of offshore earthquakes, landslides, or submarine volcanic activity. The Project site is located approximately 70 miles from the coastline and is separated from the coastline by the Great Valley range; therefore, the potential for the Project site to be impacted by a Tsunami is negligible.

### *5.16.1.5 Geologic Resources of Recreational, Commercial, or Scientific Value*

Geologic resources in the Project site include Quaternary alluvium composed of mixtures of sand and gravel. These deposits are not unique in terms of recreational or scientific value and occur throughout the western portion of Fresno County. A mineral resource is the concentration or occurrence of a solid material of economic interest in or on the Earth's crust in such form, grade, or quality and quantity that there are reasonable prospects for eventual economic extraction. An aggregate resource is sand, gravel, and crushed stone that has been mechanically broken down and is of economic interest. Fresno County produces minerals and aggregates due to the abundance and variety of resources present within the county. Extracted resources include aggregates (sand and gravel), fossil fuels (oil and coal), metals (chromite, copper, gold, mercury, and tungsten), and other minerals used in construction or industrial applications (asbestos, high-grade clay, diatomite, granite, gypsum, and limestone) (Fresno County 2023).

CGS and SMGB classify the regional significance of mineral resources in accordance with the California Surface Mining and Reclamation Act of 1975. The SMGB uses a classification system that divides land into four mineral resource zones (MRZ) that have been designated based on quality and significance of mineral resources. No designated mineral resource zones are present at the Project site (DOC 2023).

According to the California Geologic Energy Materials Division (CalGEM), the gen-tie line is situated in the abandoned Cantua Creek oil field and adjacent to the abandoned Turk Anticline oil field. Most of the wells associated with the abandoned Cantua Creek and Turk Anticline oil fields are identified as plugged, idle, or cancelled (California Department of Conservation 1998; CalGEM 2023). Additional plugged, dry oil wells are located within the eastern portion of the solar facility (CalGEM 2023). Figure 5.16-3a through Figure 5.16-3h depicts where such abandoned oil wells are located.

Figure 5.16-3a Geologic Resources of Recreational, Commercial, or Scientific Value Overview

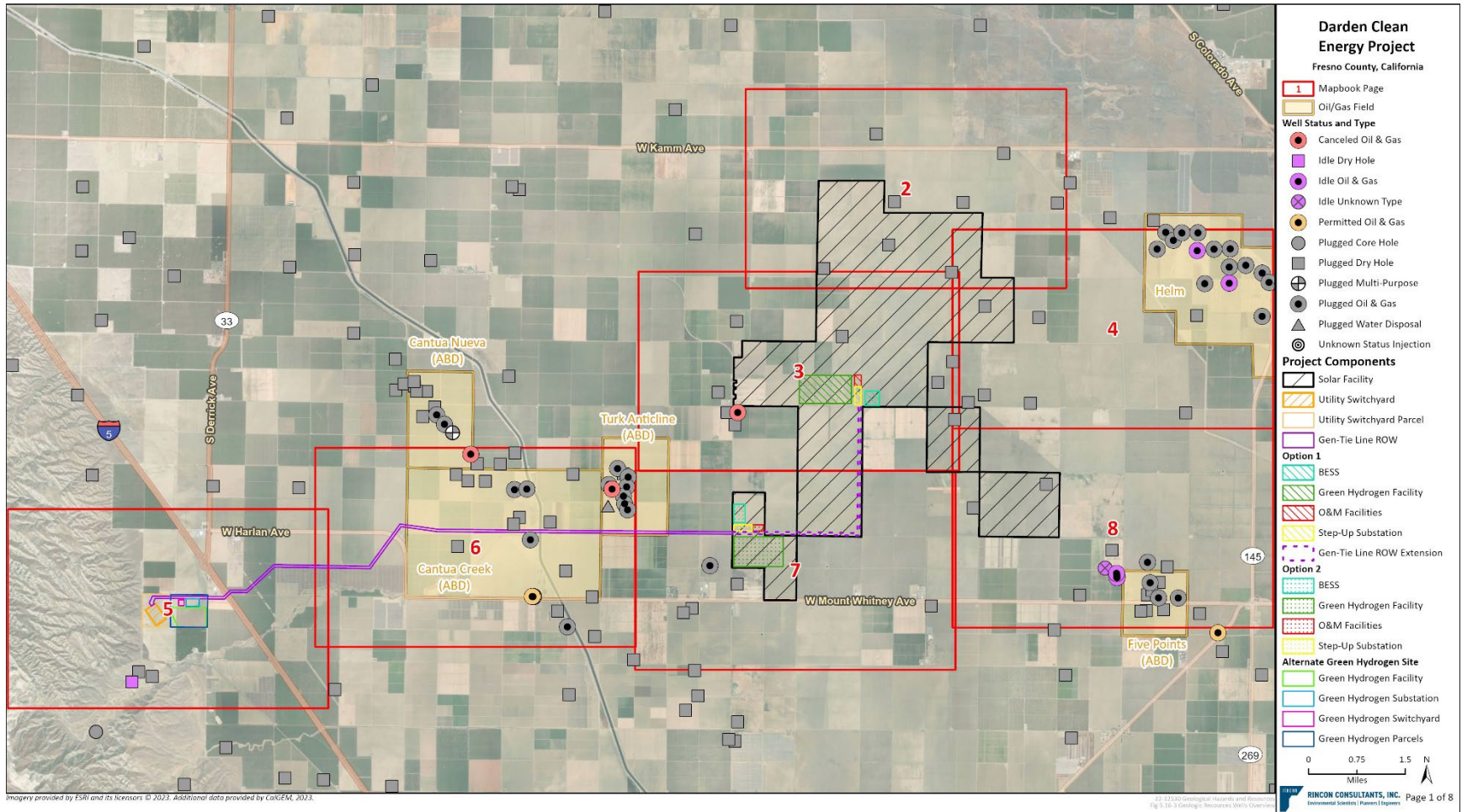
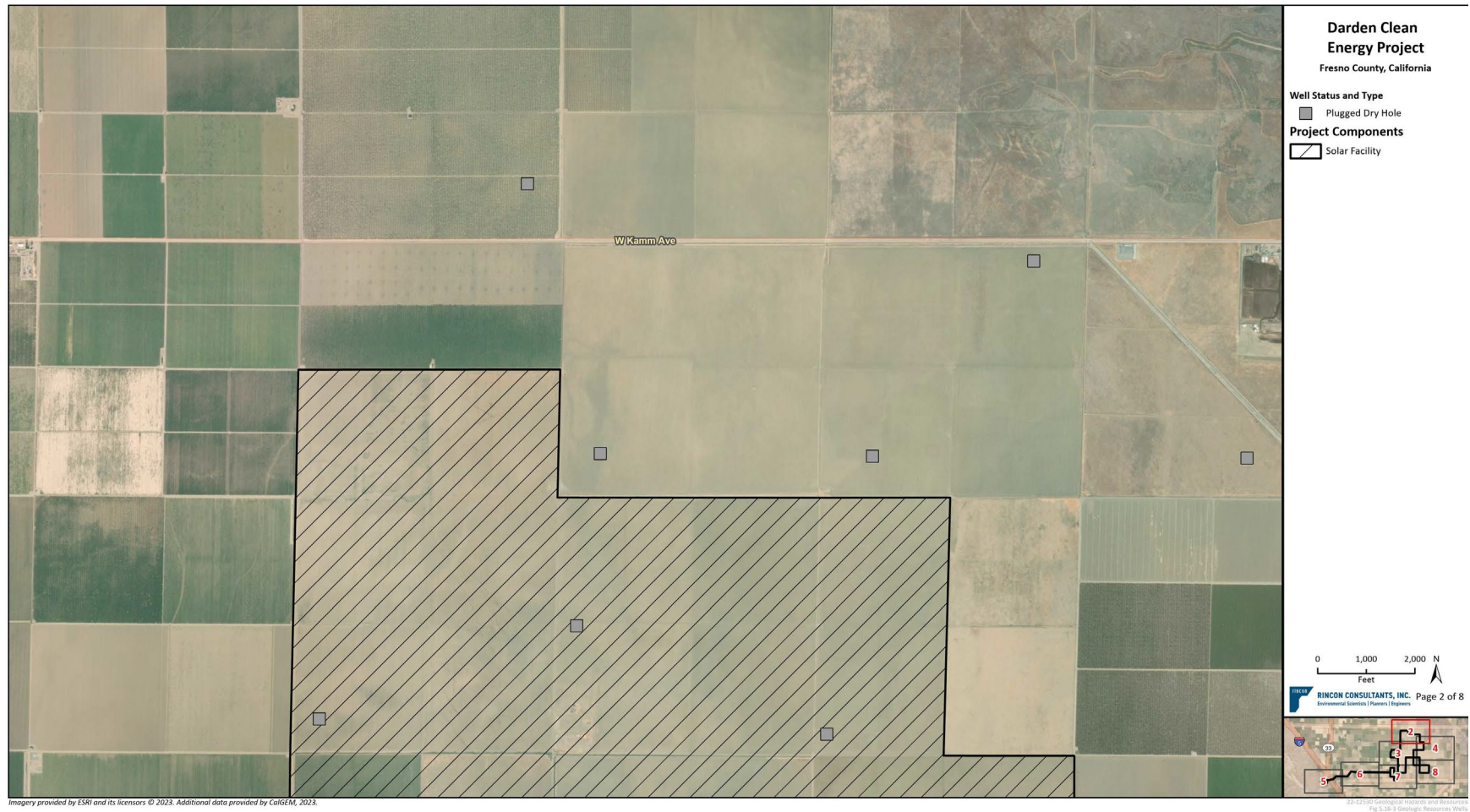


Figure 5.16-3b Geologic Resources of Recreational, Commercial, or Scientific Value (Mapbook Page 2)



**Figure 5.16-3c Geologic Resources of Recreational, Commercial, or Scientific Value (Mapbook Page 3)**

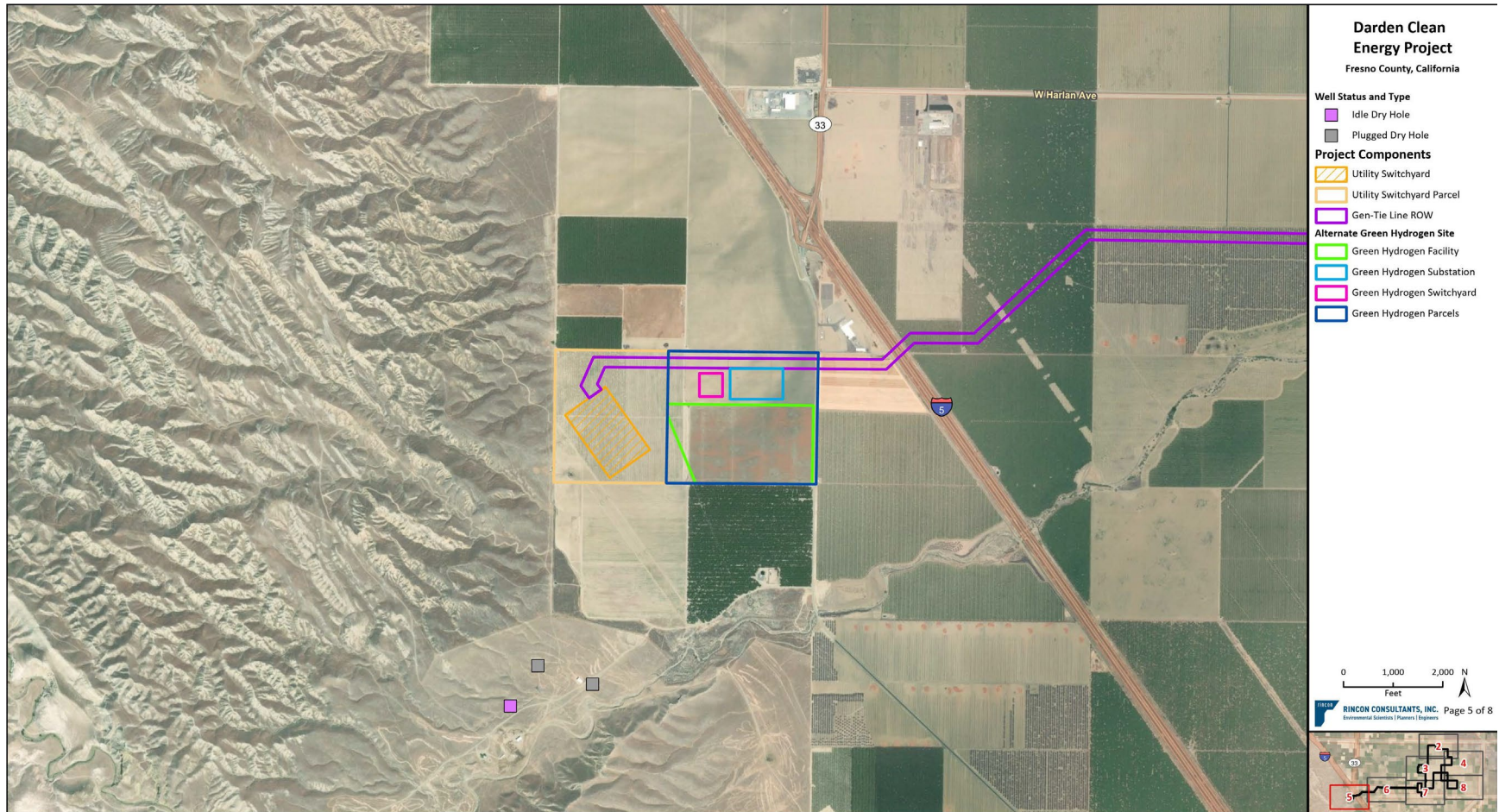




Figure 5.16-3d Geologic Resources of Recreational, Commercial, or Scientific Value (Mapbook Page 4)



**Figure 5.16-3e Geologic Resources of Recreational, Commercial, or Scientific Value (Mapbook Page 5)**



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Figure 5.16-3f Geologic Resources of Recreational, Commercial, or Scientific Value (Mapbook Page 6)



**Figure 5.16-3g Geologic Resources of Recreational, Commercial, or Scientific Value (Mapbook Page 7)**



Figure 5.16-3h Geologic Resources of Recreational, Commercial, or Scientific Value (Mapbook Page 8)



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## 5.16.2 Regulatory Setting

Federal, state, and local LORS related to geological hazards and resources were reviewed for applicability to the Project. These are detailed in Section 5.16.5.

## 5.16.3 Impact Analysis

The following subsections discuss the potential direct and indirect impacts related to geologic hazards and resources from construction and operation (including maintenance) of the Project.

### 5.16.3.1 Methodology

To identify and assess potential impacts related to geologic hazards and resources, Rincon Consultants, Inc. geologists reviewed publicly available information, including maps, online databases, articles, reports, and published research papers. The literature review included the following:

- USGS topographic maps
- USGS and CGS geologic maps
- Seismic hazard zone maps
- Landslide inventory maps
- USGS and CGS active fault maps and ground shaking maps
- Alquist-Priolo Special Studies Zones Earthquake Fault maps
- Natural Resources Conservation Services soils maps
- Safety Elements of the General Plan for the County of Fresno
- Natural Resource Elements of the General Plan for the County of Fresno
- CalGEM maps
- Paleobiology Database

This analysis also relies on a project-specific preliminary geotechnical engineering report prepared by Terracon (Terracon 2023). The geotechnical engineering report includes the results of soil borings, field electrical resistivity testing, laboratory thermal resistivity testing, laboratory corrosion testing, and pile load testing, as well as geotechnical engineering recommendations for the Project. Geologic hazards evaluated within the report included pile drivability, shallow bedrock, frost potential, expansive soils, shallow groundwater, and liquefaction (Terracon 2023).

### 5.16.3.2 Impact Evaluation Criteria

The potential for impacts related to geological hazards and resources were evaluated using the relevant criteria described in the California Environmental Quality Act (CEQA) Environmental Checklist (Appendix G of the CEQA Guidelines). In 2015, the California Supreme Court in *California Building Industry Association v. Bay Area Air Quality Management District (CBIA v. BAAQMD)*, 2015, 62 Cal.4th 369, held that CEQA generally does not require a lead agency to consider the impacts of existing environmental conditions on the future occupants or users of a project. However, if a project could exacerbate pre-existing environmental hazards or conditions, then the lead agency must analyze the impact of that exacerbated condition on the environment, which may include

future occupants and users within the project area. Specific to geological hazards and resources and mineral resources, the CEQA Checklist asks, would the project:

- Directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:
  - Rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map, issued by the State Geologist for the area or based on other substantial evidence of a known fault;
  - Strong seismic ground shaking;
  - Seismic-related ground failure, including liquefaction; and/or
  - 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 risks to life or property;
- Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature;
- Result in the loss of availability of a known mineral resource that would be a value to the region and the residents of the state; and/or
- Result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?

### Impact GEO-1

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**Threshold:** Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault, as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map issued by the State Geologist for the area or based on other substantial evidence of a known fault?

There are no known faults (CGS 2015), and no zones of required investigation (CGS 2023a) within the Project site; the closest zone of required investigation to any Project component is a section of the Nunez Fault (Alcalde Hills), located approximately 20 miles southeast of the Project site.

### Solar Facility, Step-Up Substation, and Gen-Tie

#### *Construction*

**No Impact.** The solar facility, Options 1 and 2 step-up substation, and gen-tie line components would not be located within a mapped Alquist-Priolo Earthquake Fault Zone or Division of Mines and Geology Special Publication 42 (CGS 2018); therefore, construction of these Project components would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map. Additionally, construction of these Project components does not include the injection of water or liquid wastes or the extraction of crude oil or natural gas

in close proximity to a known Earthquake Fault Zone or regional Quaternary faults as shown in Table 5.16-1. As such, these Project components would not directly include construction activities that could trigger movement along a fault. No impact would occur.

### *Operation*

**No Impact.** The solar facility, Options 1 and 2 step-up substation, and gen-tie line components would not be located within a mapped Alquist-Priolo Earthquake Fault Zone or Division of Mines and Geology Special Publication 42 (CGS 2018); therefore, operation of these Project components would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map. Operation of these Project components does not include the injection of water in close proximity to a known Earthquake Fault Zone or regional Quaternary faults as shown in Table 5.16-1, nor would these Project components include injection of liquid wastes or the extraction of crude oil or natural gas. As such, these Project components would not include operational activities that could trigger movement along a fault. No impact would occur.

## **BESS**

### *Construction*

**No Impact.** The Options 1 and 2 BESS component would not be located within a mapped Alquist-Priolo Earthquake Fault Zone or Division of Mines and Geology Special Publication 42 (CGS 2018); therefore, construction of this Project component would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map. Additionally, construction of this Project component does not include the injection of water or liquid wastes or the extraction of crude oil or natural gas in close proximity to a known Earthquake Fault Zone or regional Quaternary faults as shown in Table 5.16-1. As such, this Project component would not directly include construction activities that could trigger movement along a fault. No impact would occur.

### *Operation*

**No Impact.** The Options 1 and 2 BESS component would not be located within a mapped Alquist-Priolo Earthquake Fault Zone or Division of Mines and Geology Special Publication 42 (CGS 2018); therefore, operation of this Project component would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map. Operation of this Project component does not include injection of water or liquid wastes or extraction of crude oil or natural gas. As such, this Project component would not include operational activities that could trigger movement along a fault. No impact would occur.

## **Green Hydrogen**

### *Construction*

**No Impact.** The Options 1 and 2 green hydrogen component, and the alternate component site would not be located within a mapped Alquist-Priolo Earthquake Fault Zone or Division of Mines



and Geology Special Publication 42 (CGS 2018); therefore, construction of this Project component would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map. Additionally, construction of this Project component does not include the injection of water or liquid wastes or the extraction of crude oil or natural gas in close proximity to a known Earthquake Fault Zone or regional Quaternary faults as shown in Table 5.16-1. As such, this Project component would not directly include construction activities that could trigger movement along a fault. No impact would occur.

### *Operation*

**No Impact.** The Options 1 and 2 green hydrogen component, and the alternate component site would not be located within a mapped Alquist-Priolo Earthquake Fault Zone or Division of Mines and Geology Special Publication 42 (CGS 2018); therefore, operation of this Project component would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map. While operation of this Project component may include aquifer recharge injection wells, installation and operation of the wells would be required to comply with the U.S. Environmental Protection Agency's Underground Injection Control program, which regulates the construction, operation, permitting, and closure of injection wells used to place fluids underground for storage or disposal and considers the proximity and potential connectivity of proposed injection wells to known faults (Code of Federal Regulations 40 Part 146 Subsection 62; see Section 5.13, *Water Resources*, for additional discussion related to proposed injection wells and program compliance). Operation of this Project component does not include the injection of water in close proximity to a known Earthquake Fault Zone or regional Quaternary faults as shown in Table 5.16-1, nor would this Project component include injection of liquid wastes or the extraction of crude oil or natural gas. As such, this Project component would not include operational activities that could trigger movement along a fault. No impact would occur.

## **Utility Switchyard**

### *Construction*

**No Impact.** The utility switchyard component would not be located within a mapped Alquist-Priolo Earthquake Fault Zone or Division of Mines and Geology Special Publication 42 (CGS 2018); therefore, construction of this Project component would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map. Additionally, construction of this Project component would not include the injection of water or liquid wastes or the extraction of crude oil or natural gas near a known Earthquake Fault Zone or regional Quaternary faults as shown in Table 5.16-1. As such, this Project component would not directly include construction activities that could trigger movement along a fault. No impact would occur.

### *Operation*

**No Impact.** The utility switchyard would not be located within a mapped Alquist-Priolo Earthquake Fault Zone or Division of Mines and Geology Special Publication 42 (CGS 2018); therefore, operation of this Project component would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault as

delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map. Operation of this Project component does not include injection of water or liquid wastes or extraction of crude oil or natural gas. As such, this Project component would not include operational activities that could trigger movement along a fault. No impact would occur.

## **Overall Project**

**No Impact.** The overall Project would not include components located within a mapped Alquist-Priolo Earthquake Fault Zone. Therefore, construction and operation of the Overall Project would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving rupture of a known earthquake fault as delineated on the most recent Alquist-Priolo Earthquake Fault Zoning Map. No impact would occur.

## **Impact GEO-2**

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<b>Threshold:</b> Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking?
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## **Solar Facility, Step-Up Substation, and Gen-Tie**

### *Construction*

**Less Than Significant Impact.** As shown in Table 5.16-2, the solar facility, Options 1 and 2 step-up substation, and gen-tie line components would be located in areas with PGA ratings that correspond to "weak perceived shaking" and "no potential damage" when compared to the Modified Mercalli scale, indicating that these areas are susceptible to seismic activity and would be subject to weak ground shaking during a reasonably likely earthquake. The project-specific geotechnical report determined that the PGA at the sites of the solar facility, Options 1 and 2 step-up substation, and gen-tie line components is approximately 0.6 g, and that these sites have a mean magnitude of 6.3 in the event of seismic ground shaking (Terracon 2023). All grading and construction would adhere to the specifications, procedures, and site conditions contained in the geotechnical report and final design plans, which would be fully compliant with the seismic recommendations provided by the California-registered professional engineer in accordance with California Building Code (CBC) requirements as well as Title 15 of the Fresno County Code of Ordinances. The required measures encompass site preparation, foundation specifications, and protection measures for buried metal. The final structural designs would be subject to approval and follow up inspection by the CEC. Final design requirements would be provided to the on-site construction supervisor and the CEC to ensure compliance. Furthermore, the components would be constructed in accordance with all applicable codes, which require property line and public roadway setbacks that would protect the general public from potential hazards associated with the components that could result from an earthquake.

Construction of these Project components does not include the injection of water or liquid wastes or the extraction of crude oil or natural gas in close proximity to a known Earthquake Fault Zone or regional Quaternary faults as shown in Table 5.16-1. As such, these Project components would not directly include construction activities that could trigger movement along a fault.

Implementation of the applicable CBC requirements (including design requirements provided in the site-specific geotechnical report, such as scarification and compaction of subgrade soil; cleaning, sloping, and shoring of excavation areas; use of appropriate fill materials, and preparation

specifications for both shallow and deep foundations) and CEC enforcement would ensure that these Project components would not directly or indirectly cause substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking. Therefore, impacts related to ground shaking during construction of these Project components would be less than significant.

### *Operation*

**Less than Significant Impact.** As discussed above, the solar facility, Options 1 and 2 step-up substation, and gen-tie line components would be located in areas with PGA ratings that correspond to "weak perceived shaking" and "no potential damage" when compared to the Modified Mercalli scale, indicating that these areas are susceptible to seismic activity and would be subject to weak ground shaking during a reasonably likely earthquake. Operation of these Project components does not include the injection of water near a known Earthquake Fault Zone or regional Quaternary faults as shown in Table 5.16-1, nor would these Project components include injection of liquid wastes or the extraction of crude oil or natural gas. As such, these Project components would not include operational activities that could trigger movement along a fault. Impacts would be less than significant.

## **BESS**

### *Construction*

**Less Than Significant Impact.** As shown in Table 5.16-2, the Options 1 and 2 BESS component would be located in areas with PGA ratings that correspond to "weak perceived shaking" and "no potential damage" when compared to the Modified Mercalli scale, indicating that the area is susceptible to seismic activity and would be subject to weak ground shaking during a reasonably likely earthquake. The project-specific geotechnical report determined that the PGA at the sites of the Options 1 and 2 BESS component is approximately 0.6 g, and that these sites have a mean magnitude of 6.3 in the event of seismic ground shaking (Terracon 2023). Construction of this Project component would implement the recommendations included in the geotechnical report and would be required to comply with CBC requirements and Title 15 of Fresno County Code of Ordinances.

Construction of this Project component does not include the injection of water or liquid wastes or the extraction of crude oil or natural gas in close proximity to a known Earthquake Fault Zone or regional Quaternary faults as shown in Table 5.16-1. As such, this Project component would not directly include construction activities that could trigger movement along a fault.

Implementation of the applicable CBC requirements (including design requirements provided in the site-specific geotechnical report, such as scarification and compaction of subgrade soil; cleaning, sloping, and shoring of excavation areas; use of appropriate fill materials, and preparation specifications for both shallow and deep foundations) and CEC enforcement would ensure that construction of this Project component would not directly or indirectly cause substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking. Therefore, impacts related to ground shaking during construction of this Project component would be less than significant.

### *Operation*

**Less Than Significant Impact.** As discussed above, the Options 1 and 2 BESS component would be located in areas with PGA ratings that correspond to "weak perceived shaking" and "no potential

damage” when compared to the Modified Mercalli scale, indicating that the area is susceptible to seismic activity and would be subject to weak ground shaking during a reasonably likely earthquake. Operation of this Project component does not include the injection of water in close proximity to a known Earthquake Fault Zone or regional Quaternary faults as shown in Table 5.16-1, nor would this Project component include injection of liquid wastes or the extraction of crude oil or natural gas. As such, this Project component would not include operational activities that could trigger movement along a fault. Impacts would be less than significant.

## **Green Hydrogen**

### *Construction*

**Less Than Significant Impact.** As shown in Table 5.16-2, the Options 1 and 2 green hydrogen component, and the alternate component site would be located in areas with PGA ratings that correspond to "weak perceived shaking" and "no potential damage" when compared to the Modified Mercalli scale, indicating that the area is susceptible to seismic activity and would be subject to weak ground shaking during a reasonably likely earthquake. The project-specific geotechnical report determined that the PGA at the green hydrogen component site is approximately 0.6 g, and that this site has a mean magnitude of 6.3 in the event of seismic ground shaking. The geotechnical report also determined that the PGA at the alternate component site is approximately 0.7 g, and that this site has a mean magnitude of 6.4 in the event of seismic ground shaking (Terracon 2023). Construction of this Project component would implement the recommendations included in the geotechnical report and would be required to comply with CBC requirements and Title 15 of Fresno County Code of Ordinances.

Construction of this Project component does not include the injection of water or liquid wastes or the extraction of crude oil or natural gas in close proximity to a known Earthquake Fault Zone or regional Quaternary faults as shown in Table 5.16-1. As such, this Project component would not directly include construction activities that could trigger movement along a fault.

Implementation of the applicable CBC requirements (including design requirements provided in the site-specific geotechnical report, such as scarification and compaction of subgrade soil; cleaning, sloping, and shoring of excavation areas; use of appropriate fill materials, and preparation specifications for both shallow and deep foundations) and CEC enforcement would ensure that construction of this Project component would not directly or indirectly cause substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking. Therefore, impacts related to ground shaking during construction of this Project components would be less than significant.

### *Operation*

**Less Than Significant Impact.** As discussed above, the Options 1 and 2 green hydrogen component, and the alternate component site would be located in areas with PGA ratings that correspond to "weak perceived shaking" and "no potential damage" when compared to the Modified Mercalli scale. As discussed in the context of Impact GEO-1, operation of this Project component may include aquifer recharge injection wells, which would be required to comply with the U.S. Environmental Protection Agency’s Underground Injection Control program. Operation of this Project component does not include the injection of water in close proximity to a known Earthquake Fault Zone or regional Quaternary faults as shown in Table 5.16-1, nor would this Project component include injection of liquid wastes or the extraction of crude oil or natural gas. As such, this Project

component would not include operational activities that could trigger movement along a fault. Impacts would be less than significant.

## Utility Switchyard

### *Construction*

**Less Than Significant Impact.** As shown in Table 5.16-2, the utility switchyard would be located in areas with PGA ratings that correspond to "weak perceived shaking" and "no potential damage" when compared to the Modified Mercalli scale, indicating that the area is susceptible to seismic activity and would be subject to weak ground shaking during a reasonably likely earthquake. The project-specific geotechnical report determined that the PGA at the utility switchyard site is approximately 0.6 g, and that this site has a mean magnitude of 6.3 in the event of seismic ground shaking (Terracon 2023). Construction of this Project component would implement the recommendations included in the geotechnical report and would be required to comply with CBC requirements and Title 15 of Fresno County Code of Ordinances.

Construction of this Project component does not include the injection of water or liquid wastes or the extraction of crude oil or natural gas in close proximity to a known Earthquake Fault Zone or regional Quaternary faults as shown in Table 5.16-1. As such, this Project component would not directly include construction activities that could trigger movement along a fault.

Implementation of the applicable CBC requirements (including design requirements provided in the site-specific geotechnical report, such as scarification and compaction of subgrade soil; cleaning, sloping, and shoring of excavation areas; use of appropriate fill materials, and preparation specifications for both shallow and deep foundations) and CEC enforcement would ensure that construction of this Project component would not directly or indirectly cause substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking. Therefore, impacts related to ground shaking during construction of this Project component would be less than significant.

### *Operation*

**Less than Significant Impact.** As discussed above, the utility switchyard would be located in areas with PGA ratings that correspond to "weak perceived shaking" and "no potential damage" when compared to the Modified Mercalli scale, indicating that the area is susceptible to seismic activity and would be subject to weak ground shaking during a reasonably likely earthquake. Operation of this Project component does not include the injection of water in close proximity to a known Earthquake Fault Zone or regional Quaternary faults as shown in Table 5.16-1, nor would this Project component include injection of liquid wastes or the extraction of crude oil or natural gas. As such, this Project component would not include operational activities that could trigger movement along a fault. Impacts would be less than significant.

## Overall Project

**Less Than Significant Impact.** The overall Project site would be subject to weak ground shaking during a reasonably likely earthquake. As detailed above, overall Project construction would adhere to the specifications, procedures, and site conditions contained in the geotechnical report and final design plans, which would be fully compliant with the seismic recommendations provided by the California-registered professional engineer in accordance with CBC requirements. Construction of the overall Project would not include the injection of water or liquid wastes or the extraction of

crude oil or natural gas in close proximity to a known Earthquake Fault Zone or regional Quaternary faults as shown in Table 5.16-1. As discussed in the context of Impact GEO-1, the Project may include aquifer recharge injection wells, which would be required to comply with the U.S. Environmental Protection Agency's Underground Injection Control program. Project operation does not include the injection of water in close proximity to a known Earthquake Fault Zone or regional Quaternary faults, nor would Project operation include injection of liquid wastes or the extraction of crude oil or natural gas. As such, the overall Project would not directly include construction or operational activities that could trigger movement along a fault. Implementation of the applicable CBC requirements (including design requirements provided in the site-specific geotechnical report, such as scarification and compaction of subgrade soil; cleaning, sloping, and shoring of excavation areas; use of appropriate fill materials, and preparation specifications for both shallow and deep foundations) and CEC enforcement would ensure that the overall Project would not directly or indirectly cause substantial adverse effects, including the risk of loss, injury, or death involving strong seismic ground shaking. Therefore, impacts related to ground shaking during construction or operation of the overall Project would be less than significant.

### **Impact GEO-3**

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<b>Threshold:</b> Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving seismic-related ground failure, including liquefaction?
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### **Solar Facility, Step-Up Substation, and Gen-Tie**

#### *Construction*

**Less Than Significant Impact.** The Project site is not mapped within a known liquefaction zone on the California State Geoportal, CGS Seismic Hazards Program Liquefaction Zones map (California State Geoportal 2023). However, the solar facility, Options 1 and 2 step-up substation, and gen-tie line components would be located in areas underlain with soils that may be susceptible to liquefaction. The project-specific geotechnical report determined that on-site soils within the proposed substation area are susceptible to liquefaction at approximately depths of 7.5 to 12 feet, and 35 to 29 feet bgs (Terracon 2023). Compliance with CBC requirements, which require that all improvements be constructed to withstand potential impacts caused by liquefaction and lateral spreading, and Title 15 of Fresno County Code of Ordinances, as well as implementation of the recommendations included in the geotechnical report (positive drainage, prevention of water infiltration into excavations, and compaction of backfill), would ensure construction impacts related to seismic-related ground failure, including liquefaction, would be less than significant.

#### *Operation*

**Less Than Significant Impact.** The solar facility, Options 1 and 2 step-up substation, and gen-tie line components would not be located within a known liquefaction zone (California State Geoportal 2023). In addition, as discussed above, these Project components would be constructed to withstand potential impacts caused by liquefaction and lateral spreading, as required by CBC. Operation of these Project components does not include the injection of water near a known Earthquake Fault Zone or regional Quaternary faults as shown in Table 5.16-1, nor would these Project components include injection of liquid wastes or the extraction of crude oil or natural gas. As such, these Project components would not include operational activities that could trigger

movement along a fault that may result in seismic-related ground failure, including liquefaction. Impacts would be less than significant.

## **BESS**

### *Construction*

**Less Than Significant Impact.** The Project site is not mapped within a known liquefaction zone on the California State Geoportal, CGS Seismic Hazards Program Liquefaction Zones map (California State Geoportal 2023). However, the Options 1 and 2 BESS component would be located in an area that is underlain with soils that may be susceptible to liquefaction. Compliance with CBC requirements, which require that all improvements be constructed to withstand potential impacts caused by liquefaction and lateral spreading, and Title 15 of Fresno County Code of Ordinances, as well as implementation of the recommendations included in the geotechnical report, would ensure construction impacts related to seismic-related ground failure, including liquefaction, would be less than significant.

### *Operation*

**Less Than Significant Impact.** The Options 1 and 2 BESS component would not be located within a known liquefaction zone (California State Geoportal 2023). In addition, as discussed above, this Project component would be constructed to withstand potential impacts caused by liquefaction and lateral spreading, as required by CBC. Operation of this Project component does not include the injection of water near a known Earthquake Fault Zone or regional Quaternary faults as shown in Table 5.16-1, nor would this Project component include injection of liquid wastes or the extraction of crude oil or natural gas. As such, this Project component would not include operational activities that could trigger movement along a fault that may result in seismic-related ground failure, including liquefaction. Impacts would be less than significant.

## **Green Hydrogen**

### *Construction*

**Less Than Significant Impact.** The Project site is not mapped within a known liquefaction zone on the California State Geoportal, CGS Seismic Hazards Program Liquefaction Zones map (California State Geoportal 2023). However, the Options 1 and 2 green hydrogen component, and the alternate component site would be located in an area that is underlain with soils that may be susceptible to liquefaction. Compliance with CBC requirements, which require that all improvements be constructed to withstand potential impacts caused by liquefaction and lateral spreading, and Title 15 of Fresno County Code of Ordinances, as well as implementation of the recommendations included in the geotechnical report, would ensure construction impacts related to seismic-related ground failure, including liquefaction, would be less than significant.

### *Operation*

**Less Than Significant Impact.** The Options 1 and 2 green hydrogen component, and the alternate component site would not be located within a known liquefaction zone (California State Geoportal 2023). In addition, as discussed above, this Project component would be constructed to withstand potential impacts caused by liquefaction and lateral spreading, as required by CBC. As discussed in the context of Impact GEO-1, operation of this Project component may include aquifer recharge

injection wells, which would be required to comply with the U.S. Environmental Protection Agency's Underground Injection Control program. Operation of this Project component does not include the injection of water in close proximity to a known Earthquake Fault Zone or regional Quaternary faults as shown in Table 5.16-1, nor would this Project component include injection of liquid wastes or the extraction of crude oil or natural gas. As such, this Project component would not include operational activities that could trigger movement along a fault that may result in seismic-related ground failure, including liquefaction. Impacts would be less than significant.

## **Utility Switchyard**

### *Construction*

**Less Than Significant Impact.** The Project site is not mapped within a known liquefaction zone on the California State Geoportal, CGS Seismic Hazards Program Liquefaction Zones map (California State Geoportal 2023). However, the utility switchyard would be located in an area that is underlain with soils that may be susceptible to liquefaction. Compliance with CBC requirements, which require that all improvements be constructed to withstand potential impacts caused by liquefaction and lateral spreading, and Title 15 of Fresno County Code of Ordinances, as well as implementation of the recommendations included in the geotechnical report, would ensure construction impacts related to seismic-related ground failure, including liquefaction, would be less than significant.

### *Operation*

**Less Than Significant Impact.** The utility switchyard component would not be located within a known liquefaction zone (California State Geoportal 2023). In addition, as discussed above, this Project component would be constructed to withstand potential impacts caused by liquefaction and lateral spreading, as required by CBC. Operation of this Project component does not include the injection of water near a known Earthquake Fault Zone or regional Quaternary faults as shown in Table 5.16-1, nor would this Project component include injection of liquid wastes or the extraction of crude oil or natural gas. As such, this Project component would not include operational activities that could trigger movement along a fault that may result in seismic-related ground failure, including liquefaction. Impacts would be less than significant.

## **Overall Project**

**Less Than Significant Impact.** The overall Project site is not mapped within a known liquefaction zone on the California State Geoportal, CGS Seismic Hazards Program Liquefaction Zones map (California State Geoportal 2023). However, the Project site would be located in areas underlain with soils that may be susceptible to liquefaction. As detailed above, overall Project construction would adhere to the specifications, procedures, and site conditions contained in the geotechnical report and final design plans, which would be fully compliant with the seismic-related recommendations provided by the California-registered professional engineer in accordance with CBC requirements. Construction of the overall Project would not include the injection of water or liquid wastes or the extraction of crude oil or natural gas in close proximity to a known Earthquake Fault Zone or regional Quaternary faults as shown in Table 5.16-1. As discussed in the context of Impact GEO-1, the Project may include aquifer recharge injection wells, which would be required to comply with the U.S. Environmental Protection Agency's Underground Injection Control program. Project operation does not include the injection of water in close proximity to a known Earthquake Fault Zone or regional Quaternary faults, nor would Project operation include injection of liquid wastes or the extraction of crude oil or natural gas. As such, the overall Project would not directly



include construction or operational activities that could trigger movement along a fault. Implementation of the applicable CBC requirements (including design requirements provided in a required site-specific geotechnical report) and CEC enforcement would ensure that the overall Project would not directly or indirectly cause substantial adverse effects, including the risk of loss, injury, or death involving strong seismic-related ground failure, including liquefaction and lateral spreading. Therefore, impacts related to seismic-related ground failure, including liquefaction, during construction or operation of the overall Project would be less than significant.

#### Impact GEO-4

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<b>Threshold:</b> Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving landslides?
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### Solar Facility, Step-Up Substation, and Gen-Tie

#### *Construction*

**No Impact.** Due to the virtually flat topography, landslide risk at the solar facility, Options 1 and 2 step-up substation, and gen-tie line component locations would be minimal. Construction of these Project components would not cause any geologic unit or soil to become unstable because they would be located primarily on flat to gentle terrain that is not prone to landslides; therefore, Project construction would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving landslides, and no impact would occur.

#### *Operation*

**No Impact.** As described above, landslide risk at the solar facility, Options 1 and 2 step-up substation, and gen-tie line component locations would be minimal due to the virtually flat topography. As such, operation of these Project components would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving landslides, and no impact would occur.

### BESS

#### *Construction*

**No Impact.** Due to the virtually flat topography, landslide risk at the Options 1 and 2 BESS component location would be minimal. Construction of this Project component would not cause any geologic unit or soil to become unstable because it would be located primarily on flat to gentle terrain that is not prone to landslides; therefore, Project construction would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving landslides, and no impact would occur.

#### *Operation*

**No Impact.** As described above, landslide risk at the Options 1 and 2 BESS component location would be minimal due to the virtually flat topography. As such, operation of this Project component would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving landslides, and no impact would occur.

## Green Hydrogen

### *Construction*

**No Impact.** Due to the virtually flat topography, landslide risk at the Options 1 and 2 green hydrogen component location would be minimal. The alternate green hydrogen component site would be located near the foothills of the Diablo Range; however, the foothills do not feature steep slopes and the Project site itself is relatively flat. Construction of this Project component would not cause any geologic unit or soil to become unstable; therefore, Project construction would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving landslides, and no impact would occur.

### *Operation*

**No Impact.** As described above, landslide risk at the Options 1 and 2 green hydrogen component, and the alternate component site location would be minimal due to the virtually flat topography. As such, operation of this Project component would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving landslides, and no impact would occur.

## Utility Switchyard

### *Construction*

**No Impact.** Due to the virtually flat topography, landslide risk at the utility switchyard location would be minimal. Construction of this Project component would not cause any geologic unit or soil to become unstable because it would be located primarily on flat to gentle terrain that is not prone to landslides; therefore, Project construction would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving landslides, and no impact would occur.

### *Operation*

**No Impact.** As described above, landslide risk at the utility switchyard location would be minimal due to the virtually flat topography. As such, operation of this Project component would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving landslides, and no impact would occur.

## Overall Project

**No Impact.** Landslide risk at the overall Project site would be minimal due to the virtually flat topography and the lack of steep slopes in the foothills of the Diablo Range. As such, operation and construction of the overall Project would not directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving landslides and no impact would occur.

## Impact GEO-5

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<b>Threshold:</b> Would the project directly or indirectly result in substantial soil erosion or the loss of topsoil?
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Please see Section 5.14, *Soils*, for a discussion of potential impacts related to this impact evaluation criteria.

### Impact GEO-6

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**Threshold:** 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?

For hazard-specific discussions, please refer to Impact GEO-3 for liquefaction and lateral spreading-related geologic hazards and refer to Impact GEO-4 for landslide-related geologic hazards. The following analysis focuses on Project impacts related to unstable soils, including subsidence and collapse.

### Solar Facility, Step-Up Substation, and Gen-Tie

#### *Construction*

**Less Than Significant Impact.** The solar facility, Options 1 and 2 step-up substation, and gen-tie line components would be located in areas that have experienced land subsidence in the past (California State Water Resources Control Board 2023). The project-specific geotechnical report did not identify geologic hazards related to unstable soils, including subsidence, on the Project site (Terracon 2023). Compliance with CBC requirements, which require that all improvements be constructed to withstand potential impacts caused by unstable soils, and Title 15 of Fresno County Code of Ordinances, as well as implementation of the recommendations included in the geotechnical report, would ensure construction impacts related to unstable soils would be less than significant.

#### *Operation*

**Less Than Significant Impact.** As discussed above, potentially unstable soils present at the Project site would be addressed during Project construction in compliance with CBC requirements such that the solar facility, Options 1 and 2 step-up substation, and gen-tie line components would not operate on unstable soils. Therefore, operation of these Project components would result in less than significant impacts related to unstable soils resulting in on- or off-site subsidence or collapse.

### BESS

#### *Construction*

**Less Than Significant Impact.** The Options 1 and 2 BESS component would be located in areas that have experienced land subsidence in the past (California State Water Resources Control Board 2023). The project-specific geotechnical report did not identify geologic hazards related to unstable soils, including subsidence, on the Project site (Terracon 2023). Compliance with CBC requirements, which require that all improvements be constructed to withstand potential impacts caused by unstable soils, and Title 15 of Fresno County Code of Ordinances, as well as implementation of the recommendations included in the geotechnical report, would ensure construction impacts related to unstable soils would be less than significant.

### *Operation*

**Less Than Significant Impact.** As discussed above, potentially unstable soils present at the Project site would be addressed during Project construction in compliance with CBC requirements such that the Options 1 and 2 BESS component would not operate on unstable soils. Therefore, operation of this Project component would result in less than significant impacts related to unstable soils resulting in on- or off-site subsidence or collapse.

## **Green Hydrogen**

### *Construction*

**Less Than Significant Impact.** The Options 1 and 2 green hydrogen component, and the alternate component site would be located in areas that have experienced or are likely to have experienced land subsidence in the past (California State Water Resources Control Board 2023). The project-specific geotechnical report did not identify geologic hazards related to unstable soils, including subsidence, on the Project site (Terracon 2023). Compliance with CBC requirements, which require that all improvements be constructed to withstand potential impacts caused by unstable soils, and Title 15 of Fresno County Code of Ordinances, as well as implementation of the recommendations included in the geotechnical report, would ensure construction impacts related to unstable soils would be less than significant.

### *Operation*

**Less Than Significant Impact.** As discussed above, potentially unstable soils present at the Project site would be addressed during Project construction in compliance with CBC requirements such that the green hydrogen component would not operate on unstable soils within the Options 1 or 2, or alternate component site locations.

As detailed in Section 5.13, *Water Resources*, Westlands Water District (WWD) Groundwater Sustainability Agency (GSA) and County of Fresno GSA-Westside GSAs are currently implementing a subsidence monitoring network throughout the subbasin, in cooperation with other agencies including the USGS, DWR, and United States Bureau of Reclamation. The monitoring network provides robust spatial coverage of subsidence conditions using enhanced monitoring in key locations along the San Luis Canal, where rates of subsidence impact the freeboard and conveyance capacity in the San Luis Canal (WWD GSA and County of Fresno GSA-Westside 2022a [pg. ES-12]). Measurements taken through the existing subsidence monitoring network are taken continuously, bi-annually and annually depending on the monitoring agency (WWD GSA and County of Fresno GSA-Westside 2023a [pg. ES-12]).

Any groundwater use for the Project would be within the limits of allocations authorized by WWD's rules and regulations, and use of local groundwater for the Project would be subject to the review and approval of WWD. As a GSA for the Westside Subbasin, WWD is also responsible for implementation of the Westside Subbasin Groundwater Sustainability Plan, including continued implementation of the subsidence monitoring network. The Project is not anticipated to cause or exacerbate existing subsidence issues, and any changes to existing subsidence conditions during implementation of the Project would be detected by the subsidence monitoring network. If necessary, the GSAs may use data from the subsidence monitoring network to adjust management of the Westside Subbasin to avoid the exacerbation of existing subsidence issues, and to support regional recovery from subsidence. Therefore, operation of this Project component would result in

less than significant impacts related to unstable soils resulting in on- or off-site subsidence or collapse.

## Utility Switchyard

### *Construction*

**Less Than Significant Impact.** The utility switchyard would be located in an area that has not specifically been assessed with respect to land subsidence between 1949 and 2005, although based on a review of the vertical displacement contours it is likely to have a similar subsidence potential as the remainder of the Project site. The project-specific geotechnical report did not identify geologic hazards related to unstable soils, including subsidence, on the Project site (Terracon 2023). Compliance with CBC requirements, which require that all improvements be constructed to withstand potential impacts caused by unstable soils, and Title 15 of Fresno County Code of Ordinances, as well as implementation of the recommendations included in the geotechnical report, would ensure construction impacts related to unstable soils would be less than significant.

### *Operation*

**Less Than Significant Impact.** As discussed above, potentially unstable soils present at the Project site would be addressed during Project construction in compliance with CBC requirements such that the utility switchyard component would not operate on unstable soils. Therefore, operation of this Project component would result in less than significant impacts related to unstable soils resulting in on- or off-site subsidence or collapse.

## Overall Project

**Less Than Significant Impact.** The overall Project site is located in areas that have experienced or are likely to have experienced land subsidence in the past (California State Water Resources Control Board 2023). As detailed above, overall Project construction would adhere to the specifications, procedures, and site conditions contained in the geotechnical report and final design plans, which would be fully compliant with the seismic recommendations provided by the California-registered professional engineer in accordance with CBC requirements. Potentially unstable soils present at the Project site would be addressed during Project construction in compliance with CBC requirements such that Project components would not operate on unstable soils and impacts would be less than significant. As discussed above under *Green Hydrogen*, the Project is not anticipated to cause or exacerbate existing subsidence issues, and any changes to existing subsidence conditions during implementation of the Project would be detected by the subsidence monitoring network. If necessary, the GSAs may use data from the subsidence monitoring network to adjust management of the Westside Subbasin to avoid the exacerbation of existing subsidence issues, and to support regional recovery from subsidence. Therefore, operation of the overall Project would result in less than significant impacts related to unstable soils resulting in on- or off-site subsidence or collapse.

## Impact GEO-7

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<b>Threshold:</b> Would the project be located on expansive soil, as defined in Table 18-1-B of the Uniform Building Code (1994), creating a substantial risk to life or property?
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Please see Section 5.14, *Soils*, for a discussion of potential impacts related to this impact evaluation criteria.

### **Impact GEO-8**

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<b>Threshold:</b> Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?
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Please see Section 5.15, *Paleontological Resources*, for a discussion of potential impacts related to this impact evaluation criteria.

### **Impact GEO-9**

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<b>Threshold:</b> Would the project result in the loss of availability of a known mineral resource that would be a value to the region and the residents of the state?
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<b>Threshold:</b> Would the project result in the loss of availability of a locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan?
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## **Solar Facility, Step-Up Substation, and Gen-Tie**

### *Construction*

**No Impact.** According to the review of available data from USGS, CGS, and Fresno County, no significant mineral resources are present at the locations of the solar facility, Options 1 and 2 step-up substation, and gen-tie line components, nor would these Project components result in the loss of availability of any mineral resource in the area. These Project components would not be located in a MRZ or locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan. Therefore, construction of these Project components would not result in the loss of availability of a known mineral resource that would be of value to the region or residents of the state or locally important mineral resources, and no impact would occur.

### *Operation*

**No Impact.** As detailed above, no significant mineral resources are present at the locations of the solar facility, Options 1 and 2 step-up substation, and gen-tie line components, nor would these Project components result in the loss of availability of any mineral resource in the area. Therefore, operation of these Project components would not result in the loss of availability of a known mineral resource that would be of value to the region or residents of the state or locally important mineral resources, and no impact would occur.

## **BESS**

### *Construction*

**No Impact.** According to the review of available data from USGS, CGS, and Fresno County, no significant mineral resources are present at the location of the Options 1 and 2 BESS component, nor would this Project component result in the loss of availability of any mineral resource in the area. This Project component would not be located in a MRZ or locally important mineral resource

recovery site delineated on a local general plan, specific plan or other land use plan. Therefore, construction of this Project component would not result in the loss of availability of a known mineral resource that would be of value to the region or residents of the state or locally important mineral resources, and no impact would occur.

#### *Operation*

**No Impact.** As detailed above, no significant mineral resources are present at the location of the Options 1 and 2 BESS component, nor would this Project component result in the loss of availability of any mineral resource in the area. Therefore, operation of this Project component would not result in the loss of availability of a known mineral resource that would be of value to the region or residents of the state or locally important mineral resources, and no impact would occur.

### **Green Hydrogen**

#### *Construction*

**No Impact.** According to the review of available data from USGS, CGS, and Fresno County, no significant mineral resources are present at the location of the Options 1 and 2 green hydrogen component or the alternate component site, nor would this Project component result in the loss of availability of any mineral resource in the area. This Project component would not be located in a MRZ or locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan. Therefore, construction of this Project component would not result in the loss of availability of a known mineral resource that would be of value to the region or residents of the state or locally important mineral resources, and no impact would occur.

#### *Operation*

**No Impact.** As detailed above, no significant mineral resources are present at the location of the Options 1 and 2 green hydrogen component or the alternate component site, nor would this Project component result in the loss of availability of any mineral resource in the area. Therefore, construction of this Project component would not result in the loss of availability of a known mineral resource that would be of value to the region or residents of the state or locally important mineral resources, and no impact would occur.

### **Utility Switchyard**

#### *Construction*

**No Impact.** According to the review of available data from USGS, CGS, and Fresno County, no significant mineral resources are present at the location of the utility switchyard, nor would this Project component result in the loss of availability of any mineral resource in the area. This Project component would not be located in a MRZ or locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan. Therefore, construction of this Project component would not result in the loss of availability of a known mineral resource that would be of value to the region or residents of the state or locally important mineral resources, and no impact would occur.

### *Operation*

**No Impact.** As detailed above, no significant mineral resources are present at the location of the utility switchyard, nor would this Project component result in the loss of availability of any mineral resource in the area. Therefore, construction of this Project component would not result in the loss of availability of a known mineral resource that would be of value to the region or residents of the state or locally important mineral resources, and no impact would occur.

### **Overall Project**

**No Impact.** As detailed above, no significant mineral resources are present within the Project site, nor would the Project result in the loss of availability of any mineral resource in the area. The Project site would not be located in a MRZ or locally important mineral resource recovery site delineated on a local general plan, specific plan or other land use plan. Therefore, construction and operation associated with the overall Project would not result in the loss of availability of a known mineral resource that would be of value to the region or residents of the state or locally important mineral resources, and no impact would occur.

## 5.16.4 Cumulative Impacts

Impacts of the Project would be found cumulatively considerable if they would have the potential to combine with other past, present, or reasonably foreseeable projects to become significant.

### **Overall Project**

Geological hazards are generally site-specific and depend on localized geologic and soil conditions. Construction and operation of the Project would result in less than significant impacts related to ground rupture, seismic shaking, mass wasting and slope stability, liquefaction, subsidence, tsunami runup, expansion or collapse of soil structures, and geological resources. The Applicant would comply with applicable laws, regulations, ordinances, and permits pertaining to structural design and geotechnical analysis. As is required for the Project, cumulative projects in the area would be required to comply with applicable regulations related to geological hazards and resources. Adherence to all federal, State, and local programs, requirements, and policies pertaining to building safety and construction would limit cumulative impacts related to geologic hazards and resources to a less than significant level.

### **Utility Switchyard**

Construction and operation of the utility switchyard is considered in the cumulative impact analysis of the overall Project discussed above; therefore, similar to the overall Project, cumulative impacts related to geologic hazards and resources would be less than significant.

## 5.16.5 Laws, Ordinances, Regulations, and Standards

The LORS that may apply to the Project related to geological hazards and resources are summarized in Table 5.16-3. The local LORS discussed in this section are ordinances, plans, or policies of Fresno County.



**Table 5.16-3 LORS Applicable to Geological Hazards and Resources**

Jurisdiction	LORS	Applicability	Opt-In Application Reference	Project Conformity
State	California Environmental Quality Act	Requires state and local government agencies to inform decision makers and the public about the potential environmental impacts of the Project and to reduce environmental impacts to the extent feasible.	Throughout this Opt-In Application	The Project's approval by the CEC would comply with CEQA, as required by the CEC's Opt-In Application process.
State	2022 California Building Code: Chapter 1 Chapters 16/16a Chapters 17/17a Chapters 18/18a Appendix J	Defines acceptable design criteria for structures with respect to seismic design and load bearing capacity.	<ul style="list-style-type: none"> <li>▪ Impact GEO-1</li> <li>▪ Impact GEO-3</li> <li>▪ Impact GEO-4</li> <li>▪ Impact GEO-5</li> <li>▪ Impact GEO-6</li> <li>▪ Impact GEO-7</li> </ul>	Project grading and construction would comply with seismic recommendations provided by a professional engineer in accordance with CBC requirements.
State	Alquist Priolo Earthquake Fault Zoning Act	Identifies areas subject to surface rupture from surface faults.	<ul style="list-style-type: none"> <li>▪ Impact GEO-1</li> <li>▪ Impact GEO-3</li> <li>▪ Impact GEO-5</li> <li>▪ Impact GEO-6</li> <li>▪ Impact GEO-7</li> </ul>	The Project does not include components located within a mapped Alquist-Priolo Earthquake Fault Zone.
State	Seismic Hazards Mapping Act	Identifies secondary seismic hazards including liquefaction and seismically induced landslides.	<ul style="list-style-type: none"> <li>▪ Impact GEO-1</li> <li>▪ Impact GEO-3</li> <li>▪ Impact GEO-5</li> <li>▪ Impact GEO-6</li> <li>▪ Impact GEO-7</li> </ul>	The Project is not located in a seismic hazard area and thus would conform with requirements set forth in the Seismic Hazards Mapping Act.
Local	Fresno County Code of Ordinances: Title 15 and Title 17	Identify building and construction requirements to reduce hazard potential that are applicable to all new construction, including the Project.	<ul style="list-style-type: none"> <li>▪ Impact GEO-1</li> <li>▪ Impact GEO-3</li> <li>▪ Impact GEO-4</li> <li>▪ Impact GEO-5</li> <li>▪ Impact GEO-6</li> <li>▪ Impact GEO-7</li> </ul>	The Project would adhere to the standards within Title 15 and Title 17 and obtain all necessary permits prior to construction.
Local	Fresno County General Plan: Policy HS.D-1, HS.D-3, HS.D-4, HS.D-8, and HS.D-9	These policies aim to minimize the loss of life, injury, and property damage due to seismic and geologic hazards.	<ul style="list-style-type: none"> <li>▪ Impact GEO-1</li> <li>▪ Impact GEO-3</li> <li>▪ Impact GEO-4</li> <li>▪ Impact GEO-5</li> <li>▪ Impact GEO-6</li> <li>▪ Impact GEO-7</li> </ul>	The Project would minimize the loss of life, injury, and property damage by complying with seismic and geologic hazard recommendations provided by a professional engineer in accordance with CBC requirements.

Jurisdiction	LORS	Applicability	Opt-In Application Reference	Project Conformity
Local	Fresno County Multi-Jurisdictional Hazard Mitigation Plan: Policy HS.D-3, HS.D-4, HS.D-7, and HS.D-8	These policies ensure that utility facilities are sited to minimize susceptibility to seismic and geologic hazards, and aim to minimize the loss of life, injury, and property damage due to seismic and geologic hazards.	<ul style="list-style-type: none"> <li>▪ Impact GEO-1</li> <li>▪ Impact GEO-3</li> <li>▪ Impact GEO-4</li> <li>▪ Impact GEO-5</li> <li>▪ Impact GEO-6</li> <li>▪ Impact GEO-7</li> </ul>	The Project would minimize the loss of life, injury, and property damage by complying with seismic and geologic hazard recommendations provided by a professional engineer in accordance with CBC requirements.

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Sources: California Code of Regulations, Fresno County Code of Ordinances, Fresno County 2000, Fresno County 2023

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### 5.16.5.1 Federal LORS

There are no applicable federal LORS related to geological hazards and resources.

### 5.16.5.2 State LORS

#### **California Environmental Quality Act**

CEQA requires state and local government agencies to inform decision makers and the public about the potential environmental impacts of the Project and to reduce environmental impacts to the extent feasible. Appendix G of the CEQA Guidelines includes recommended criteria for evaluating potential impacts related to geological hazards and resources and mineral resources.

#### **2022 California Building Code**

The Project is subject to the applicable sections of Title 24, Part 2 of the CBC, which is administered by the California Building Standards Commission. Under state law, all building standards must be centralized in Title 24 to be enforceable. The CBC contains necessary California amendments, which are based on American Society of Civil Engineers/Structural Engineering Institute Standards. These standards provide requirements for general structural design and include means for determining earthquake loads, as well as other loads for inclusion into building codes. The earthquake design requirements take into account the occupancy category of the structure, site class, soil classifications, and various seismic coefficients, which are used to determine a seismic design category (SDC) for a project. Once a project is categorized according to an SDC, design specifications can be determined. The provisions of the CBC apply to the construction, alteration, movement, replacement, and demolition of every building or structure—or any appurtenances connected or attached to such buildings or structures—throughout California.

#### **Alquist Priolo Earthquake Fault Zoning Act**

The Alquist-Priolo Earthquake Fault Zoning Act was enacted by the state in 1972 to mitigate the hazards of surface faulting on structures planned for human occupancy and other critical structures. The state has established regulatory zones, known as earthquake fault zones, around the surface traces of active faults. Earthquake fault zone maps have been issued for use by government agencies to plan and review new construction projects. In addition to residential projects, structures planned for human occupancy that are associated with industrial and commercial projects are also a

concern near the Alquist-Priolo earthquake fault zones. Project components would not be located in a mapped Alquist-Priolo earthquake fault zone; thus, the Project would inherently comply to the requirements of this act.

### **Seismic Hazards Mapping Act**

The Seismic Hazards Mapping Act of 1990 (California PRC, Chapter 7.8, §2690-2699.6) directs the CGS to identify and map areas prone to liquefaction, earthquake induced landslides, and amplified ground shaking. The purpose of this program is to minimize the loss of life and property through the identification, evaluation, and mitigation of seismic hazards. Seismic Hazard Zone Maps that identify Zones of Required Investigation have been generated as a result of the program. Counties and cities are then required to use the Seismic Hazard Zone Maps in their land use planning and building permit processes. The Project is not located in an area identified as a seismic hazard zone.

#### *5.16.5.3 Local LORS*

### **Fresno County Code of Ordinances**

The Fresno County Code of Ordinances (County Code) largely adopts the CBC with specific edits. Title 15 – Building and Construction and Title 17 – Divisions of Land include building and construction requirements to reduce hazard potential that are applicable to all new construction, including the Project. These requirements include, but are not limited to:

- **Grading and Excavation – Chapter 15.28.** Adopts Chapter 18, Chapter 33, and Appendix J of the 2019 CBC and Section R300 of the California Residential Code except as noted in Chapter 15.28.020 of the COO.
- **Preliminary Soils Report – Chapter 17.32.030.** Requires a Preliminary Soils Report to be prepared by a registered civil engineer.

### **Fresno County General Plan**

California Senate Bill 271 Assembly Bill 2038 required that counties and cities adopt General Plan policies regarding natural hazards. The County of Fresno’s General Plan provides direction and resources intended to mitigate death, injuries, and environmental and economic damage. The Fresno County General Plan contains several policies that are applicable to the Project, including, but not limited to:

- **Policy HS-D.1:** The County shall continue to support scientific geologic investigations that refine, enlarge, and improve the body of knowledge on active fault zones, unstable areas, severe groundshaking, avalanche potential, and other hazardous geologic conditions in Fresno County.
- **Policy HS-D.3:** The County shall require that a soils engineering and geologic-seismic analysis be prepared by a California-registered engineer or engineering geologist prior to permitting development, including public infrastructure projects, in areas prone to geologic or seismic hazards (i.e., fault rupture, groundshaking, lateral spreading, lurchcracking, fault creep, liquefaction, subsidence, settlement, landslides, mudslides, unstable slopes, or avalanche).
- **Policy HS-D.4:** The County shall require all proposed structures, additions to structures, utilities, or public facilities situated within areas subject to geologic-seismic hazards as identified in the soils engineering and geologic-seismic analysis to be sited, designed, and constructed in accordance with applicable provisions of the Uniform Building Code (Title 24 of the California

Code of Regulations) and other relevant professional standards to minimize or prevent damage or loss and to minimize the risk to public safety.

- **Policy HS-D.8:** The County shall require a soils report by a California-registered engineer or engineering geologist for any proposed development, including public infrastructure projects, that requires a County permit and is located in an area containing soils with high “expansive” or “shrink-swell” properties. Development in such areas shall be prohibited unless suitable design and construction measures are incorporated to reduce the potential risks associated with these conditions.
- **Policy HS-D.9:** The County shall seek to minimize soil erosion by maintaining compatible land uses, suitable building designs, and appropriate construction techniques. Contour grading, where feasible, and revegetation shall be required to mitigate the appearance of engineered slopes and to control erosion.

### **Fresno County Multi-Jurisdictional Hazard Mitigation Plan**

The Fresno County Multi-Jurisdictional Hazard Mitigation Plan (MJHMP) is intended to improve the resiliency in the community by identifying natural hazards present in Fresno County, determining the community’s vulnerability to each hazard, and identifying development mitigation strategies to reduce vulnerability before emergency situations develop. Fresno County’s MJHMP was adopted in 2009 and most recently updated in 2018. The MJHMP identifies earthquakes (including fault rupture and liquefaction), landslides, and other hazards as the most significant hazards present in the community and contains goals to reduce vulnerability to hazards. The MJHMP contains several policies that are applicable to the Project, including, but not limited to:

- **Policy HS-D.3:** The County shall require that a soils engineering and geologic-seismic analysis be prepared by a California-registered engineer or engineering geologist prior to permitting development, including public infrastructure projects, in areas prone to geologic or seismic hazards (i.e., fault rupture, ground shaking, lateral spreading, lurchcracking, fault creep, liquefaction, subsidence, settlement, landslides, mudslides, unstable slopes, or avalanche).
- **Policy HS-D.4:** The County shall require all proposed structures, additions to structures, utilities, or public facilities situated within areas subject to geologic-seismic hazards as identified in the soils engineering and geologic-seismic analysis to be sited, designed, and constructed in accordance with applicable provisions of the Uniform Building Code (Title 24 of the California Code of Regulations) and other relevant professional standards to minimize or prevent damage or loss and to minimize the risk to public safety.
- **Policy HS-D.7:** The County shall require a soils report by a California-registered engineer or engineering geologist for any proposed development, including public infrastructure projects, that requires a County permit and is located in an area containing soils with high “expansive” or “shrink-swell” properties. Development in such areas shall be prohibited unless suitable design and construction measures are incorporated to reduce the potential risks associated with these conditions.
- **Policy HS-D.8:** The County shall seek to minimize soil erosion by maintaining compatible land uses, suitable building designs, and appropriate construction techniques. Contour grading, where feasible, and revegetation shall be required to mitigate the appearance of engineered slopes and to control erosion.

### 5.16.6 Agencies and Agency Contact

CEC review and approval of this Opt-in Application would satisfy compliance with geological hazard-related standards, such as CBC standards. Because of the exclusive jurisdiction of the CEC, no other permits from other agencies are required for the Project.

### 5.16.7 Permits and Permit Schedule

No permits are required for compliance with LORS related to geological hazards and resources. Under the CEC's Opt-In provisions, the CEC is responsible for inspections and for ensuring compliance with building standards.

## 5.16.8 References

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