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3.4 Geological Hazards and Resources

This section describes the potential effects of the construction and operation of the Potentia-Viridi Battery Energy Storage Project (Project) may have on geologic hazards and geologic resources at and in the vicinity of the Project site. This evaluation of geological hazards and resources includes the following elements:

- **Section 3.4.1** describes the existing environment that could be affected, including regional and local geologic environment, faulting, and seismicity, and geologic resources;
- **Section 3.4.2** provides an overview of the regulatory setting related to geologic resources;
- **Section 3.4.3** identifies potential environmental impacts that may result from Project construction, operation, maintenance, and decommissioning;
- **Section 3.4.4** discusses cumulative effects;
- **Section 3.4.5** identifies mitigation measures that should be considered during Project construction, operation, maintenance, and decommissioning;
- **Section 3.4.6** presents laws, ordinances, regulations, and standards (LORS) applicable to geologic resources;
- **Section 3.4.7** identifies regulatory agency contacts;
- **Section 3.4.8** describes permits required for the Project related to geologic resources; and
- **Section 3.4.9** provides references used to develop this section.

The following environmental setting and impact evaluation is based in part on the following Project-specific geotechnical report and engineering plans (Appendices 3.4A and 2A):

1. **Appendix 3.4A** – Geotechnical Considerations Report, prepared by Terracon, December 2023.
2. **Appendix 2A** – Project Design Layout and Elevations, prepared by Coffman Engineers, July 2024.

3.4.1 Affected Environment

3.4.1.1 Regional Geology

The Project site is located within the Diablo Range of the Coast Ranges Geomorphic Province, which includes the northwest-trending belt of mountain ranges, valleys, and basins that parallel the California coastline from Point Conception north to the Oregon border. Alameda County is bounded on the north by the south flank of Mount Diablo, one of the highest peaks in the Bay Area, reaching an elevation of 3,849 feet above sea level. San Francisco Bay forms the western boundary of the County; the San Joaquin Valley borders it on the east. Bedrock of various types and age underlie the areas within the Diablo Range. Almost all the hills have a mantle of topsoil and weathered bedrock. These soil materials vary in depth and may present a substantial slope instability hazard.

3.4.1.2 Local Geology and Stratigraphy

The Project site encompasses flat to rolling topography, located adjacent to a northeast trending seasonal drainage. The subsurface of the Project site is made up of Holocene alluvium and Miocene Neroly Formation (Figure 3.4-1, Surface Geology). The following is a summary of geologic units underlying the Project site.

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Holocene Alluvium

Holocene age (i.e., past 11,700 years), brown, poorly-sorted, dense, sandy or gravelly clay. Small fans at mountain fronts have a probable debris flow origin (Helley and Graymer 1997; Delattre et al. 2023).

Neroly Formation

The Neroly Formation consists of inter-bedded blue gray sandstones, light brown mudstones, and granule-sized conglomerates (Dibblee 1980; Wilson 2013; Delattre et al. 2023).

National Resource Conservation Service mapping indicates bedrock may be encountered at 3 to 4 feet below ground surface (bgs). Bedrock with varying degrees of weathering have been encountered as shallow as 1.5 feet bgs in the Project vicinity, although bedrock elevations can vary greatly over short distances (Appendix 3.4A, Geotechnical Considerations Report).

The following is a summary of geologic units within 2.0 miles of the Project site, from youngest to oldest (Figure 3.4-1).

Artificial Fill (Af)

Man made deposit of various materials and ages. Some are compacted and quite firm, but fills made before 1965 are nearly everywhere not compacted and consist simply of dumped materials (Helley and Graymer 1997; Delattre et al. 2023).

Alluvium, Undivided (Qa)

Quaternary age (i.e., past 1.6 million years) unconsolidated to semi-consolidated sand, silt, clay, and gravel, which could either be Holocene age (i.e., past 11,700 years) or Pleistocene age (i.e., 11,700 to 1.6 million years ago). The Holocene age alluvium consists of brown, poorly-sorted, dense, sandy or gravelly clay and the Pleistocene age alluvium consists of brown, dense, gravely and clayey sand or clayey gravel that fines upward to sandy clay (Helley and Graymer 1997; Delattre et al. 2023).

Landslide Deposits (Qls)

Quaternary age poorly sorted clay, silt, sand, and gravel that have been displaced from their original location due to a landslide (Helley and Graymer 1997; Delattre et al. 2023).

Latest Pleistocene Alluvial Fan Deposits, Undivided (Qpf)

Latest Pleistocene age alluvial fan deposits, consisting of brown, dense, gravely and clayey sand or clayey gravel that fines upward to sandy clay and is undifferentiated from other Latest Pleistocene age alluvial fan deposits in the area (Helley and Graymer 1997; Delattre et al. 2023).

Carbona Formation (PMc)

Early Pliocene to late Miocene (i.e., approximately 5 million to 23 million years ago) conglomerate, sandstone, and siltstone (Delattre et al. 2023).

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Cierbo Sandstone (Mc)

Late Miocene age light gray, massive sandstone with marine fossils. Contains sandstone and conglomerate near the base (Graymer et al. 1996; Delattre et al. 2023).

Cretaceous Unit D Sandstone (Kd)

Late Cretaceous age (66 to 100 million years ago), light gray to gray-brown, foraminifera bearing siltstone and mudstone. Reddish-brown weathering and iron concretions are conspicuous (Graymer et al. 1996; Delattre et al. 2023).

Late Cretaceous Upper Member Shale and Siltstone (Kcu)

Late Cretaceous age, Unit C (Upper Member) shale and siltstone with local interbeds of sandstone (Graymer et al. 1996; Delattre et al. 2023).

Late Cretaceous Sandstone (Kd)

Late Cretaceous age, Unit D, medium- to coarse-grained, light gray, clean sandstone, locally interbedded with siltstone, mudstone, and fine- to medium-grained mudstone rip-up clasts (Graymer et al. 1996; Delattre et al. 2023).

Panoche Formation (Kps)

Late Cretaceous age, light gray, arkosic sandstone, with large concretions and some interbedded shale and thin sandstone beds (Dibblee 1980).

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3.4.1.3 Faulting and Seismicity

The Project site is located in a geologically complex and seismically active region that is subject to earthquakes and potentially strong ground shaking. Based on criteria established by the California Geological Survey (CGS), faults are classified as either Holocene-active, pre-Holocene, or age-undetermined. Faults are considered active when they have shown evidence of movement within the past 11,700 years (i.e., Holocene epoch). Pre-Holocene faults, also known as potentially active faults, are those that have shown evidence of movement more than 11,700 years ago and generally before 1.6 million years (Quaternary age). Faults whose age of most recent movement is not known or is unconstrained by dating methods or by limitations in stratigraphic resolution are considered age-undetermined and inactive (CGS 2018). These CGS fault classifications are in part used to determine locations of Alquist-Priolo Fault Zones, which are regulatory zones that encompass the minimum distance for human occupancy from active faults that have the potential for surface rupture. No structures designed for human occupancy can be placed over the fault or within 50 feet in any direction. No Alquist-Priolo Fault Zones are located in the vicinity of the Project site. The closest such zone is located approximately 6 miles southwest of the site, along the Greenville Fault (CDMG 1981, 1982).

Similarly, the U.S. Geological Survey (USGS) classifies faults with respect to Quaternary age, with Latest Quaternary Age (less than 15,000 years, well-constrained) being similar in age to Holocene-active faults, as classified by the CGS (USGS 2023a). No Holocene-active to Latest Quaternary faults are located on-site; however, numerous such faults are located within 25 miles of the Project site (Table 3.4-1, Regional Active Faults). The closest major

Holocene-active fault is the Greenville Fault, located approximately 6 miles southwest of the Project site (Figure 3.4-2, Regional Faulting). Other major active faults in Alameda County, located southwest of the Project site, include the Calaveras and Hayward Faults. The closest potentially active fault, the Midway Fault, is located approximately 0.4 miles northeast of the Project site (CGS 2023a, USGS 2023a).

Table 3.4-1. Regional Active Faults

Fault	Approximate Distance and Direction to Project Site
Greenville	6 miles southwest
Carnegie	6 miles southwest
Las Positas	7 miles southwest
Pleasanton	16 miles southwest
Calaveras	18 miles southwest
Warm Springs	22 miles southwest
Hayward	23 miles southwest

Source: CGS 2023, USGS 2023a

Alameda County has been subjected to numerous seismic events, originating both on faults within the County and in other parts of the region. Six major Bay Area earthquakes have occurred since 1800 that have affected the County, and at least two of the faults that produced those major earthquakes traverse the County. These earthquakes and the originating faults include the 1836 and 1868 earthquakes on the Hayward-Rogers Creek Fault, and the 1861 earthquake on the Calaveras Fault. Three earthquakes, in 1838, 1906, and 1989 originated on the San Andreas Fault, west of the County near San Francisco or to the south (Alameda County 2022). In the past 150 years, the region has experienced 22 earthquakes of magnitude 6 or greater. Currently, there is a 72% chance over the next 30 years of a magnitude 6.7 or greater in the region. In the event of a M 6.8 earthquake on the Concord-Green Valley Fault System, the seismic forecasts presented on an Association of Bay Area Government's interactive GIS website suggest that the Project site is expected to experience moderate to strong ground shaking. Similarly, in the event of a M 7.0 earthquake on the Calaveras Fault, the seismic forecasts presented on an Association of Bay Area Government's interactive GIS website suggest that the Project site is expected to experience strong ground shaking (ABAG 2021, 2022, 2024). The Hayward and Calaveras Faults are capable of generating a maximum credible earthquake of 7.5 and the Greenville Fault is capable of generating a maximum credible earthquake of 6.7 (Alameda County 1993).

3.4.1.3.1 Liquefaction

Liquefaction is a mode of ground failure that results from the generation of high pore water pressures during earthquake ground shaking, causing loss of shear strength. Liquefaction is typically a hazard where loose sandy soils exist below groundwater. The CGS has designated certain areas as potential liquefaction hazard zones. These are areas considered at a risk of liquefaction-related ground failure during a seismic event, based upon mapped surficial deposits and the presence of a relatively shallow water table. However, the CGS has not determined the liquefaction susceptibility within the USGS 7.5-Minute Midway quadrangle, in which the Project site is located (CGS 2023b).

National Resource Conservation Service mapping indicates bedrock may be encountered at 3 to 4 feet bgs on the Project site. Bedrock with varying degrees of weathering have been encountered as shallow as 1.5 feet bgs in the Project vicinity. As a result, liquefaction is not anticipated at the Project site (Appendix 3.4A, Geotechnical Considerations Report).

3.4.1.3.2 Landslides

The potential for landslides to occur depends on a variety of factors including, but not limited to, the steepness of the slope, geology, and soil moisture. The Project Design Layout and Elevations (Appendix 2A) for the Project indicate the steepest slopes within the area of proposed grading have a gradient of approximately 25%. Similar to liquefaction, the CGS has not determined the seismically induced landslide susceptibility within the USGS 7.5-Minute Midway quadrangle, in which the Project site is located (CGS 2023b). However, the Project area is located in an area of few landslides and relatively low deep-seated landslide susceptibility (Alameda County 2021).

3.4.1.3.3 Subsidence

Subsidence occurs when a substantial portion of land is vertically displaced, usually due to the withdrawal of groundwater, oil, or natural gas, or as a result of decomposition of natural organic materials. Soils that are particularly subject to subsidence include those with high silt or clay content and/or high organic content. The effects of subsidence include damage to buildings and infrastructure, increased flood risk in low-lying areas, and lasting damage to groundwater aquifers and aquatic systems. The Project site is not located in an area of historic or recent subsidence (USGS 2023b).

3.4.1.3.4 Tsunamis and Seiches

Tsunamis are large ocean waves that are seismically induced and often the result of offshore earthquakes or landslides. The Project site is not located in a coastal area and would not be subject to tsunami runup.

Seiches are waves and oscillations within confined bodies of water that are seismically induced by ground shaking. There are no large, confined bodies of water immediately adjacent to or uphill of the site; therefore, the Project site would not be subject to seiche impacts.

3.4.1.4 Geologic Resources of Recreational, Commercial, or Scientific Value

Geologic resources underlying the Project site include Holocene alluvium and Miocene Neroly Formation. These deposits are not unique in terms of recreational or scientific value and occur throughout eastern Alameda 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. Alameda County contains a variety of minerals, both metallic and nonmetallic. Major mineral resources include sand and gravel, salt, stone, petroleum, and clays. Mineral extraction in the County has included asbestos, bromine, chromite, coal, copper, gold, lead, lime, magnesite, magnesium compounds, manganese, potash (potassium salts), pyrite, silica (molding or specialty sand), silver, soapstone, and travertine (Alameda County 1994).

An aggregate resource is sand, gravel, and crushed stone that has been mechanically broken down and is of economic interest. Alameda County is a principal source of aggregate materials for the San Francisco Bay Area. Much of the sand and gravel used in the Bay Area is obtained from open pit mines in deposits near Fremont and Pleasanton. Most of the County’s sand and gravel production is obtained from stream channel and alluvial fan deposits. Sand and gravel are the County’s most valuable mineral resources (Alameda County 1994).

The California Division of Mines and Geology classifies the regional significance of mineral resources in accordance with the California Surface Mining and Reclamation Act (SMARA) of 1975, using a classification system that divides land into four mineral resource zones (MRZs) that have been designated based on quality and significance of mineral resources. The Project site is not located within a designated MRZ (CDMG 1996), and no mines or gravel pits are located in the vicinity of the Project site (CDOC, Division of Mine Reclamation 2016).

The California Geologic Energy Management Division (CalGEM) provides locations of active and abandoned oil and gas wells in California. The Project site is not located in a designated CalGEM oil/gas field and no oil/gas wells are located in the vicinity of the site (CalGEM 2023).

3.4.2 Regulatory Setting

Federal, state, and local laws, ordinances, regulations, and standards (LORS) related to geologic hazards and resources were reviewed for applicability to the Project. These are detailed in Section 3.4.6, Laws, Ordinances, Regulations, and Standards.

3.4.3 Impact Analysis

The following sections present the potential effects from the construction and operation of the proposed Project on geologic hazards and geologic resources.

3.4.3.1 Methodology

Potential direct and indirect Project impacts related to geological hazards and soils were evaluated against the California Environmental Quality Act (CEQA) significance criteria and are discussed below.

3.4.3.2 Impact Evaluation Criteria

According to Appendix G of the CEQA statutes, a project would have a significant environmental impact in terms of geological hazards and resources if it would do the following:

- Directly or indirectly cause potential adverse effects, including the risk of loss, injury, or death involving the following:
  - 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
  - Landslides
- 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 onsite- or offsite landslide, subsidence, liquefaction, or collapse.
- Result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state.
- Result in the loss of availability of a locally important mineral resource recovery site delineated on a local plan, specific plan, or other land use plan.

3.4.3.3 Impact Evaluation

Impact 3.4-1 Would the project directly or indirectly cause potential substantial adverse effects, including the risk of loss, injury, or death involving:

a. 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 based on other substantial evidence of as known fault?

No Impact. As discussed in Section 3.4.1.3, the Project site is not located in an Alquist-Priolo Fault Zone and no known Holocene-active to Latest Quaternary faults are located on-site. The closest major Holocene-active fault is the Greenville Fault, located approximately 6 miles southwest of the Project site (Figure 3.4-2, Regional Faulting). In addition, construction and operation of the Project would not increase the potential for earthquakes or fault movement to occur. The proposed Project would not directly or indirectly cause potential substantial adverse effects, including rupture of a known earthquake fault. No impacts would occur.

b. Strong seismic ground shaking?

Less than Significant. The closest major Holocene-active fault is the Greenville Fault, located approximately 6 miles southwest of the Project site (Figure 3.4-2, Regional Faulting). Other major active faults in Alameda County, located southwest of the Project site, include the Calaveras and Hayward Faults. The closest potentially active fault, the Midway Fault, is located approximately 0.4 mile northeast of the Project site. Moderate to strong ground shaking is anticipated as a result of an earthquake on these and other regional faults, including the San Andreas Fault. The proposed Project would be constructed in accordance with the recommendations of the Project-specific geotechnical report (Appendix 3.4A, Geotechnical Considerations Report), Alameda County Building Code, Alameda County Grading Ordinance, current seismic design specifications, current California Building Code (CBC) standards, and other regulatory requirements, which would reduce the potential for risks related to seismic events. Therefore, the proposed Project would not directly or indirectly cause potential substantial adverse effects, including strong seismic ground shaking. Impacts would be less than significant.

c. Seismic-related ground failure, including liquefaction?

Less than Significant. The potential for liquefaction is low due to shallow bedrock conditions. However, other seismic related ground failure could occur during Project operations. Soil settlement is anticipated as a result of up to 30 feet of fill following grading (Appendix 3.4A, Geotechnical Considerations Report). Seismically induced ground shaking could exacerbate soil settlement, including differential settlement, which is variable amounts of settlement over a given distance. Differential settlement can result in cracking and distress of foundations, utilities, and other infrastructure. However, the proposed Project would be constructed in accordance with the recommendations of the Project-specific geotechnical report (Appendix 3.4A, Geotechnical Considerations Report), Alameda County Building Code, Alameda County Grading Ordinance, current seismic design specifications, current CBC standards, and other regulatory requirements, which would reduce the potential for risks related to seismic events. Therefore, the proposed Project would not directly or indirectly cause potential substantial adverse effects, including seismic related ground failure. Impacts would be less than significant.

d. Landslides?

Less than Significant. Based on the Alameda County Local Hazard Mitigation Plan, the Project area is located in an area of few landslides and relatively low deep-seated landslide susceptibility. Therefore, the potential for landslides is considered low. Project grading is anticipated to include approximately 588,018 cubic yards of cut and approximately 344,900 cubic yards of fill. Temporary excavations created during grading and construction would result in temporary vertical or steep slopes pending completion of final site grading. These temporary excavations would likely include relatively narrow trenches with vertical walls, such as for utility installation, or larger open excavations with temporary steep slopes. Vertical slopes greater than 5 feet in height would require shoring. Temporary steep slopes would typically be created at a gradient of 0.75:1 (horizontal to vertical) to prevent caving/failure. In the absence of proper shoring and/or temporary slope construction, trench sidewalls and temporary slopes could collapse, resulting in risk to on-site personnel. However, temporary excavations would be completed in accordance with Cal/OSHA, which has responsibility for implementing federal rules relevant to worker safety, including slope protection during construction excavations (see Section 3.4.6, LORS below). Cal/OSHA's requirements are more restrictive and protective than federal OSHA standards. Title 8 of the CCR, Chapter 4, Division of Industrial Safety, covers requirements for excavation and trenching operations, as well as safety standards whenever employment exists in connection with removal or wrecking of any fixed structure or its part. Compliance with Cal/OSHA regulations would prevent caving of temporary trench walls and failure of temporary steep slopes during grading and construction activities. Overall, with implementation of Project-specific geotechnical recommendations pertaining to slope stability, as well as compliance with Cal/OSHA regulations, the proposed Project would not directly or indirectly cause potential substantial adverse effects involving landslides. Impacts would be less than significant.

Impact 3.4-2 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 offsite landslide, subsidence, liquefaction, or collapse?

Less than Significant. As discussed for Impact 3.4-1, the Project site is not located in an area susceptible to liquefaction or subsidence. Project grading would result in temporary steep slopes and vertical trench excavations. In addition, up to 30 feet of fill could result in soil settlement, including differential settlement. However, with implementation of Project-specific geotechnical recommendations pertaining to slope stability and soil settlement, as well as compliance with Cal/OSHA regulations, the proposed Project would not result in on- or off-site landslide, subsidence, liquefaction or collapse. Impacts would be less than significant.

Impact 3.4-3 Would the project result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state?

No Impact. The Project site is not located within a designated MRZ and no mines or gravel pits are located in the vicinity of the Project site. As a result, the Project would not result in the loss of availability of a known mineral resource that would be of value to the region and the residents of the state. No impacts would occur.

Impact 3.4-4 Would the project result in the loss of availability of a locally important mineral resource recovery site delineated on a local plan, specific plan, or other land use plan?

No Impact. As stated for Impact 3.4-3, the Project site is not located within a designated MRZ and no mines or gravel pits are located in the vicinity of the Project site. As a result, the Project would not result in the loss of availability of a locally important mineral resource recovery site delineated on a local plan, specific plan, or other land use plan. No impacts would occur.

3.4.4 Cumulative Effects

The cumulative projects detailed in Chapter 3, Environmental Analysis, Table 3.1, Cumulative Projects, have the potential to result in cumulative impacts to geologic hazards and resources when considered together with the Project. Risks related to geological hazards and resources are typically localized in nature because they tend to be site-specific and related to on-site geotechnical constraints. Cumulative projects were chosen based on proximity to the proposed Project. Other projects include residential, commercial, and industrial development. The majority of the cumulative projects would involve both construction and operational activities. These selection factors are appropriate in the context of geological hazards and resources cumulative impacts because generally there needs to be a direct nexus and similar geologic conditions for a synergistic impact to occur, such as site modifications at nearby projects combining to destabilize soils. Currently, there is not a known existing significant cumulative impact related to geological hazards and resources within this geographic scope.

As discussed above, like much of California, the Project site is a seismically active area. All areas of Alameda County are considered seismically active, to a lesser or greater extent depending on their proximity to active regional faults. Impacts of the proposed Project would be cumulatively considerable if the Project, in combination with related projects, would result in significant cumulative impacts. However, the effects of the cumulative projects are not of a nature to cause cumulatively significant effects from geological hazards and resources impacts, because such impacts are site-specific and would only have the potential to combine with impacts of the proposed Project if they occurred in the same location.

All planned projects in the vicinity of the proposed Project are subject to environmental review and would be required to conform to CBC requirements. With implementation of mitigation measures and other grading and building requirements, the proposed Project would not contribute to cumulative impacts for geological hazards and resources or related events because the proposed Project and other cumulative projects in the area would be required to demonstrate compliance with local, state, and federal building and safety standards. As a result, cumulative impacts related to geological hazards and resources would not be cumulatively considerable.

3.4.5 Mitigation Measures

No mitigation measures are required as no significant impacts would occur.

3.4.6 Laws, Ordinances, Regulations, and Standards

Federal, state, and local Laws, Ordinances, Regulations, and Standards (LORS) applicable to geological hazards and resources are discussed below and summarized in Table 3.4-2.

Table 3.4-2. LORS Applicable to Geological Hazards and Resources

Jurisdiction	LORS	Applicability	Opt-In Application Reference	Project Conformity
Federal	International Building Code	Requires state to comply with during design and construction of engineered facilities	Impact 3.4-1a Impact 3.4-1b Impact 3.4-1c Impact 3.4-1d	Project design and construction would comply with the International Building Code with respect to geologic hazards through compliance with the CBC and the

Table 3.4-2. LORS Applicable to Geological Hazards and Resources

Jurisdiction	LORS	Applicability	Opt-In Application Reference	Project Conformity
			Impact 3.4-2	recommendations of a Project-specific geotechnical report.
State	California Building Code, 2022	Defines acceptable design criteria for structures with respect to seismic design and load-bearing capacity	Impact 3.4-1a Impact 3.4-1b Impact 3.4-1c Impact 3.4-1d Impact 3.4-2	Project design and construction would comply with the California Building Code with respect to geologic hazards through compliance with the recommendations of a Project-specific geotechnical report.
State	Cal/OSHA, CCR Title 8	Specifies the measures to be used for temporary excavation and trench work where workers could be exposed to unstable soil conditions	Impact 3.4-1c Impact 3.4-2	Project construction would comply with Cal/OSHA with respect to temporary slopes and excavations.
Local	Alameda County Code of Ordinances, Chapter 15.08-Building Code	Adopts the 2022 California Building Code, with amendments	Impact 3.4-1a Impact 3.4-1b Impact 3.4-1c Impact 3.4-1d Impact 3.4-2	Project design and construction would comply with the Alameda County Building Code with respect to geologic hazards through compliance with the recommendations of a Project-specific geotechnical report.
Local	Alameda County Code of Ordinances, Chapter 15.36-Grading Erosion and Sediment Control	Standards for grading and erosion control, including permit requirements	Impact 3.4-1c Impact 3.4-2	Project construction would comply with Alameda County erosion and sediment control ordinances with respect to erosion control during grading and construction through compliance with the CBC and the recommendations of a Project-specific geotechnical report.
Local	Alameda County General Plan, Safety Element: Goal 1 - Seismicity	Goals and policies to protect against geologic hazards	Impact 3.4-1a Impact 3.4-1b Impact 3.4-1c Impact 3.4-1d Impact 3.4-2	Project design and construction would comply with Alameda County Safety Element goals with respect to seismicity through compliance with the CBC and the recommendations of a Project-specific geotechnical report.
Local	East County Area Plan, Environmental Health and Safety Element	Includes policies and programs that are intended to minimize risks to lives and property	Impact 3.4-1d Impact 3.4-2	Project design and construction would comply with the East County Area Plan with regard to soil and slope stability through compliance with the CBC and the

Table 3.4-2. LORS Applicable to Geological Hazards and Resources

Jurisdiction	LORS	Applicability	Opt-In Application Reference	Project Conformity
	-Soil and Slope Stability	due to soil and slope instability		recommendations of a Project-specific geotechnical report.
Local	East County Area Plan, Environmental Health and Safety Element -Seismic and Geologic Hazards	Includes policies and programs that are intended to minimize risks to lives and property due to seismic and geologic hazards	Impact 3.4-1a Impact 3.4-1b Impact 3.4-1c Impact 3.4-1d Impact 3.4-2	Project design and construction would comply with the East County Area Plan with regard to seismicity and geologic hazards through compliance with the CBC and the recommendations of a Project-specific geotechnical report.

3.4.6.1 Federal LORS

No federal regulations apply to mineral resources in the Project area. The following federal regulations are related to geologic hazards.

International Building Code

The design and construction of engineered facilities in California must comply with the requirements of the International Building Code and the adoptions of that code by the State of California (see California Building Code in the State LORS subsection).

3.4.6.2 State LORS

California Building Code

The Project is subject to the applicable sections of Title 24, Part 2 of the 2022 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 for a project. Once a project is categorized according to a seismic design category, 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.

Building requirements specific to BESS enclosures are included in Chapter 17A of the 2022 California Building Code. Division of State Architects Interpretation of Regulations (IR) N-3 specifies code requirements relating to BESS enclosures that consist of prefabricated modular structures not on or inside a building for structural safety and fire life safety reviews.

IR N-3 clarifies the design or alternative shake table testing requirements of premanufactured enclosures and the internal components for seismic loading. The design of BESS enclosures connections shall comply with the applicable sections of the CBC, American Institute of Steel Construction Specification for Structural Steel Buildings (AISC 360), American Institute of Steel Construction Seismic Provisions for Structural Steel Buildings (AISC 341), and ASCE 7 Minimum Design Loads and Associated Criteria for Buildings and Other Structures (Division of State Architect 2023).

The BESS enclosures envisioned or this project are not "walk-in" type enclosures because the battery racks are accessible from outside the enclosure for maintenance purpose, and there is no ability to enter the enclosures. Based on this arrangement, each individual enclosure is considered electrical equipment (Battery Cabinet or Enclosure) and does not constitute a building. Therefore, construction type, fire resistance rated construction, means of egress requirements, etc. for buildings do not apply to the enclosures. In addition to the other laws, ordinances, regulations, and standards listed elsewhere int his section, the Project site and systems will be designed according to the applicable 2021 California Fire Code (CFC), 2023 National Electric Code (NEC), and 2023 NFPA codes and standards such as NFPA 72 and NFPA 855. As required by NFPA855, given the size and type of the BESS, the system will be tested per UL9540A testing standard (at the cell, module, and unit levels), and listed to the UL9540 listing.

California Division of Occupational Safety and Health

Grading and construction activities are subject to occupational safety standards for excavation and trenching, as specified in California Division of Occupational Safety and Health (Cal/OSHA) regulations (Title 8 of the CCR). These regulations specify the measures to be used for excavation and trench work where workers could be exposed to unstable soil conditions. The proposed Project would be required to employ these safety measures during excavation and trenching.

3.4.6.3 Local LORS

Alameda County Code of Ordinances

The Alameda County Code of Ordinances, Chapter 15.08-Building Code, adopts the 2022 CBC, with amendments and added sections. The purpose of a building code is to provide minimum standards to safeguard life or limb, health, property, and public welfare by regulating and controlling the design, construction, quality of materials, use and occupancy, location, and maintenance of all buildings and structures within the County. Building Code provisions apply to the construction, alteration, moving, demolition, repair, and use of any building or structure within the County. With establishment of the Building Code of Alameda County, the County exercised its authority to establish more restrictive and reasonably necessary differences to the provisions of the 2022 CBC, including modifications to Health and Safety Code Section 18941.5 for Building Standards Law.

The Alameda County Code of Ordinances, Chapter 15.36-Grading Erosion and Sediment Control, establishes standards for grading and erosion control, including permit requirements, for work on private property within the unincorporated area of Alameda County. Chapter 17.54.570-Grading requires the applicant to assure stable ground forms, erosion control, and adequate surface drainage.

Alameda County General Plan, Safety Element

The Alameda County General Plan includes policies and programs that are intended to address geology and soils and guide future development in a way that lessens impacts. For instance, the Safety Element (Alameda County 2022) addresses issues related to protecting the community from any unreasonable risks associated with seismically induced surface rupture, ground shaking, ground failure, seiche, and dam failure; slope instability leading to mudslides and landslides; subsidence, liquefaction, and other seismic hazards identified on seismic hazard maps; other known geologic hazards; flooding; and wildland and urban fires. Goals and policies from the City's General Plan relevant to the Project are summarized below:

Safety Goal. To minimize risks to lives and property due to seismic and geologic hazards.

Policies

Policy P1. To the extent possible, projects should be designed to accommodate seismic shaking and should be sited away from areas subject to hazards induced by seismic shaking (land sliding, liquefaction, lurking, etc.) where design measures to mitigate the hazards will be uneconomic or will not achieve a satisfactory degree of risk reduction.

Policy P2. Structures should be located at an adequate distance away from active fault traces, such that surface faulting is not an unreasonable hazard.

Policy P3. Aspects of all development in hillside areas, including grading, vegetation removal and drainage, should be carefully controlled in order to minimize erosion, disruption to natural slope stability, and landslide hazards.

Policy P7. The County, prior to approving new development, shall evaluate the degree to which the development could result in loss of lives or property, both within the development and beyond its boundaries, in the event of a natural disaster.

Policy P10. Buildings shall be designed and constructed to withstand ground shaking forces of a minor earthquake (1-4 magnitude) without damage, of a moderate (5 magnitude) earthquake without structural damage, and of a major earthquake (6-8 magnitude) without collapse of the structure.

Policy P11. All construction in unincorporated areas shall conform to the Alameda County Building Ordinance, which specifies requirements for the structural design of foundations and other building elements within seismic hazard areas.

Actions

Action A1. Require all new construction to meet the most current, applicable, lateral force requirements.

Action A3. Require sites to be developed in accordance with recommendations contained in the soil and geologic investigations reports.

Action A17. Aspects of all development in hillside areas, including grading, vegetation removal and drainage, should be carefully controlled in order to minimize erosion, disruption to

natural slope stability, and landslide hazards. The County's development standards and guidelines, permit application review process, Section 15.08.240 of its Building Ordinance, the Grading Erosion and Sediment Control Ordinance (Chapter 15.36 of the Alameda County General Ordinance Code), the Stormwater Management and Discharge Control Ordinance (Chapter 13.08), and Subdivision Ordinance (Title 16) shall serve to implement this policy.

East County Area Plan, Land Use Element

The East County Area Plan of the Alameda County General Plan (Alameda County 2000) includes policies and programs that are intended to address mineral resources in the East County area. Goals and policies from the East County Plan relevant to the Project are summarized below:

Hazard Zones

Goal. To minimize risks to lives and property due to seismic and geologic hazards.

Policy 134. The County shall not approve new development in areas with potential natural hazards (flooding, geologic, wildland fire, or other environmental hazards) unless the County can determine that feasible measures will be implemented to reduce the potential risk to acceptable levels, based on site-specific analysis.

Policy 135. The County, prior to approving new development, shall evaluate the degree to which the development could result in loss of lives or property, both within the development and beyond its boundaries, in the event of a natural disaster.

3.4.6.3.1 East County Area Plan, Environmental Health and Safety Element

The East County Area Plan of the Alameda County General Plan (Alameda County 2000) includes policies and programs that are intended to address environmental hazards in the East County area. Goals and policies from the East County Plan relevant to the Project are summarized below:

Seismic and Geologic Hazards

Goal. To minimize the risks to lives and property due to seismic and geologic hazards.

Policy 309. The County shall not approve new development in areas with potential for seismic and geologic hazards unless the County can determine that feasible measures will be implemented to reduce the potential risk to acceptable levels, based on site-specific analysis. The County shall review new development proposals in terms of the risk caused by seismic and geologic activity.

Policy 310. The County, prior to approving new development, shall evaluate the degree to which the development could result in loss of lives or property, both within the development and beyond its boundaries, in the event of a natural disaster.

Policy 313. The County shall require development in hilly areas to minimize potential erosion and disruption of natural slope stability which could result from grading, vegetation removal, irrigation, and drainage.

Policy 315. The County shall require that buildings be designed and constructed to withstand ground-shaking forces of a minor earthquake without damage, of a moderate earthquake without structural damage, and of a major earthquake without collapse of the structure.

3.4.7 Agencies and Agency Contacts

Applicable permits and agency contacts for geologic hazards and resources are shown in Table 3.4-3. Building and grading permits from the Alameda County Public Works Agency would be superseded by CEC approval of the Project under the opt-in program.

Table 3.4-3. Permits and Agency Contacts

Permit or Approval	Agency Contact	Applicability
Alameda County Public Works Agency*	Alameda County Public Works Agency 399 Elmhurst Street, Room 141 Hayward, CA 94544 (510) 567-5868	Building and grading permits
NPDES Construction General Permit	Alameda County Public Works Agency 399 Elmhurst Street, Room 141 Hayward, CA 94544 (510) 567-5868	Grading and erosion control

Note:
* Building and grading permits from the Alameda County Public Works Agency would be superseded by CEC approval of the Project under the opt-in program.

3.4.8 Permits and Permit Schedule

There are no applicable permits or permit schedule for geological hazards and resources. Pending Project approval from the CEC, construction of the Project would commence.

3.4.9 References

Alameda County. 1993. Draft Environmental Impact Report, East County Area Plan. Prepared by Alameda County Planning Department, June 1993. Accessed January 20, 2024. https://www.acgov.org/cda/planning/generalplans/documents/ECAPDraftEIRJune1993.pdf.

Alameda County. 1994. Conservation Element of the Alameda County General Plan. Accessed December 12, 2023. https://www.acgov.org/cda/planning/generalplans/documents/Conservation_Element_1994.pdf.

Alameda County. 2000. East County Area Plan, A Portion of the Alameda County General Plan. Prepared by the Community Development Agency, Planning Department. Accessed December 13, 2023. https://www.acgov.org/cda/planning/generalplans/documents/EastCountyAreaPlancombined.pdf.

Alameda County. 2021. Final 2021 Alameda County Local Hazard Mitigation Plan. Prepared by AECOM, December 2021. Accessed January 20, 2024. https://www.acgov.org/cda/planning/generalplans/documents/ResolutionExhibit1FinalHMP_AlamedaCo_Dec2021.pdf.

Alameda County. 2022. Safety Element of the Alameda County General Plan. Accessed January 17, 2024. https://www.acgov.org/cda/planning/generalplans/documents/SafetyElement-updateapprovedbyBOS31722-FINAL.pdf.

ABAG (Association of Bay Area Governments). 2021. Earthquake Shaking Scenario: Concord-Green Valley (Southern Segment) Fault. Accessed January 17, 2024. https://mtc.maps.arcgis.com/home/search.html?restrict=true&sortField=relevance&sortOrder=desc&searchTerm=earthquake+shaking+scenario+-liquefaction+-region+-assessment#content.

ABAG (Association of Bay Area Governments). 2022. Earthquake Shaking Scenario: Calaveras Fault. Accessed January 17, 2024. https://mtc.maps.arcgis.com/home/search.html?restrict=true&sortField=relevance&sortOrder=desc&searchTerm=earthquake+shaking+scenario+-liquefaction+-region+-assessment#content.

ABAG. 2024. Earthquake. Accessed January 17, 2024. https://abag.ca.gov/our-work/resilience/data-research/earthquake.

California Energy Commission. July 2021. California Code of Regulations, Title 20. Public Utilities and Energy, Division 2. State Energy Resources Conservation and Development Commission. Available: https://www.energy.ca.gov/sites/default/files/2021-07/Title%2020%20Updated%20July%2023%2C%202021.pdf.

CDOC (California Department of Conservation), Division of Mine Reclamation. 2016. Mines Online. Accessed December 12, 2023. https://maps.conservation.ca.gov/mol/index.html.

CDMG (California Division of Mines and Geology). 1981. Fault Evaluation Report FER-117, March 28, 1981. Accessed January 20, 2024. https://maps.conservation.ca.gov/cgs/informationwarehouse/regulatorymaps/.

CDMG. 1982. State of California Special Studies Zones, Midway Official Map, effective January 1, 1982. Accessed January 20, 2024. https://maps.conservation.ca.gov/cgs/informationwarehouse/regulatorymaps/.

CDMG. 1996. Update of Mineral Land Classification: Aggregate Materials in the South San Francisco Bay Production-Consumption Region. DMG Open-File Report 96-03. Accessed December 12, 2023. https://maps.conservation.ca.gov/cgs/informationwarehouse/index.html?map=mlc.

CalGEM (California Geologic Energy Management Division). 2023. Well Finder. Accessed December 12, 2023. https://maps.conservation.ca.gov/doggr/wellfinder/.

CGS (California Geological Survey). 2008. Guidelines for Evaluating and Mitigating Seismic Hazards in California. Special Publication 117A. Accessed December 13, 2023. https://www.conservation.ca.gov/cgs/Documents/Publications/Special-Publications/SP_117a.pdf.

CGS. 2018. Earthquake Fault Zones, A Guide for Government Agencies, Property Owners/Developers, and Geoscience Practitioners for Assessing Fault Rupture Hazards in California. Special Publication 42. Accessed January 17, 2024. https://www.conservation.ca.gov/cgs/documents/publications/special-publications/SP_042-a11y.pdf.

CGS. 2023a. Fault Activity Map of California. Accessed January 17, 2024. https://maps.conservation.ca.gov/cgs/fam/app/.

CGS. 2023b. CGS Information Warehouse: Regulatory Maps. Accessed January 20, 2024. https://maps.conservation.ca.gov/cgs/informationwarehouse/regulatorymaps/.

Delattre, M.P., Graymer, R.W., Langenheim, V.E., Knudsen, K.L., Dawson, T.E., Brabb, E.E., Wentworth, C.M, and Raymond, L.A. 2023. Geologic and Geophysical Maps of the Stockton 30' x 60' Quadrangle, California. USGS Regional Geologic Map Series, Map No. 5, Plate 1. Scale 1:100,000.

Dibblee, T.W. 1980. Preliminary Geologic Map of the Midway Quadrangle, Alameda and San Joaquin Counties, California. USGS Open File Report 80-535. Accessed January 19, 2024. https://pubs.usgs.gov/of/1980/0535/plate-1.pdf.

Division of State Architect. 2023. DSA IR N-3, Modular Battery Energy Storage Systems. Issued February 15, 2023. Accessed June 4, 2024. https://www.dgs.ca.gov/DSA/Publications.

Graymer, R.W., Jones, D.L., and Brabb, E.E. 1996. Preliminary Geologic Map Emphasizing Bedrock Formations in Alameda County, California: A Digital Database. USGS Open File Report 96-252. Accessed March 24, 2025. https://pubs.usgs.gov/of/1996/of96-252/algeo.pdf.

Helley, E.J. and Graymer, R.W. 1997. Quaternary Geology of Alameda County, and Parts of Contra Costa, Santa Clara, San Mateo, San Francisco, Stanislaus, and San Joaquin Counties, California: A Digital Database. To accompany USGS Map OF97-97. Accessed March 24, 2025. https://pubs.usgs.gov/of/1997/0097/pdf/alqgeo.pdf.

USGS (U.S. Geological Survey). 2023a. U.S. Quaternary Faults. Accessed January 19, 2024. https://usgs.maps.arcgis.com/apps/webappviewer/index.html?id=5a6038b3a1684561a9b0aadf88412fcf.

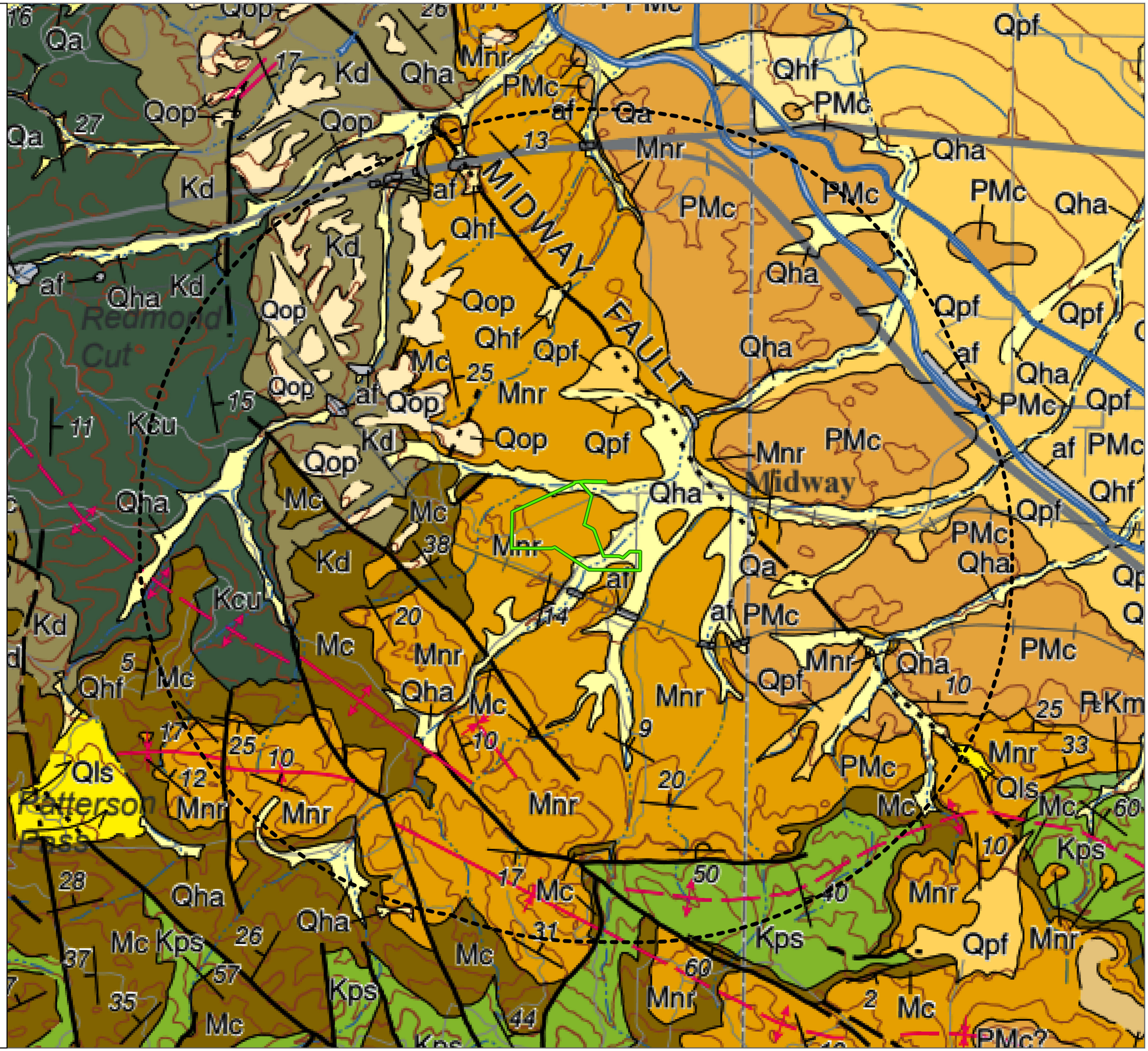
USGS. 2023b. "Areas of Land Subsidence in California." Accessed January 20, 2024. https://ca.water.usgs.gov/land_subsidence/california-subsidence-areas.html.

Wilson, D. 2013. Petrography of Neroly Formation (Miocene), Diablo Range, San Joaquin County, California. Accessed January 19, 2024. https://scholarlycommons.pacific.edu/purcc/2013/events/62/.

Project Boundary
2-Mile Search Radius
Fault, accurately located
Fault, Inferred
Geologic Contact

Geologic Units

Af – Artificial fill
Qa – Alluvium, undivided
Qha – Holocene alluvium
Qls – Landslide deposits
Qpf – Pleistocene alluvial fan deposits,undivided
Qop – Pleistocene old pediment deposits
PMc – Pliocene to Miocene Carbona Formation, conglomerate,sandstone, and siltstone
Mnr – Miocene Neroly Formation blue sandstone
Mc – Miocene Cierbo sandstone
Kcu – Late Cretaceous (Campanian – Coniacian) Upper member – shale and siltstone
Kd – Late Cretaceous (Campanian)Sandstone
Kps – Panoche Formation (Late Cretaceous)



SOURCE: Delattre, et al. 2023

1:24,000

0 2,000 4,000 Feet

0 0.5 1 Miles

DUDEK

FIGURE 3.4-1

Surface Geology

Potentia-Viridi BESS Project

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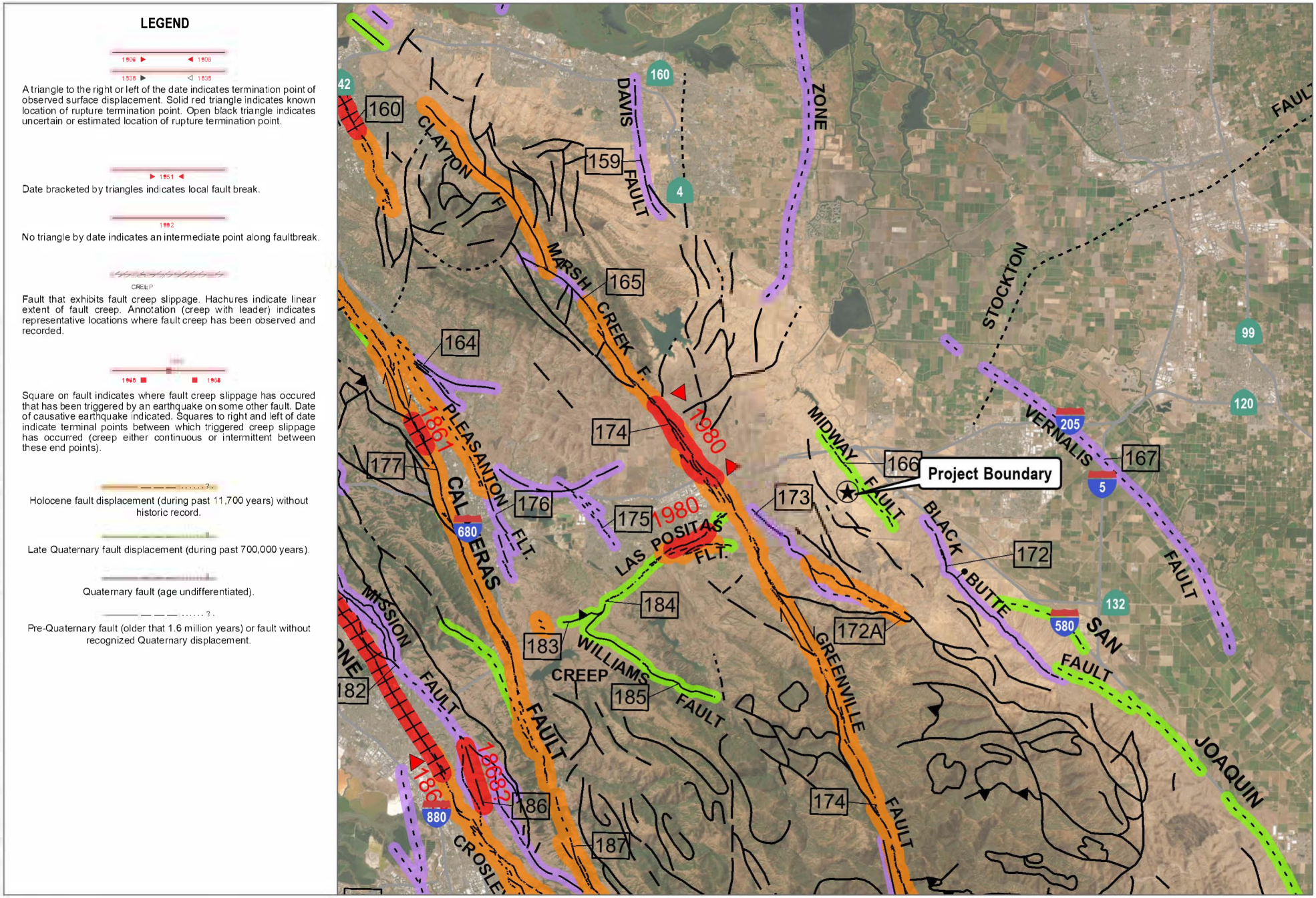

SOURCE: ESRI World Imagery (accessed 2024); CA Geological Survey 2024

DUDEK

0 15,000 30,000 Feet

FIGURE 3.4-2

Regional Faulting

Potentia-Viridi BESS Project

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