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3.8 Paleontological Resources

This section describes the potential effects the construction and operation of the Potentia-Viridi BESS Project may have on paleontological resources at and in the vicinity of the Project site. This evaluation of paleontological resources includes the following elements:

- **Section 3.8.1** describes the existing environment that could be affected, including regional and local geologic environment, faulting, and seismicity, and geologic resources;
- **Section 3.8.2** provides an overview of the regulatory setting related to paleontological resources;
- **Section 3.8.3** identifies potential environmental impacts that may result from Project construction, operation, maintenance, and decommissioning;
- **Section 3.8.4** discusses cumulative effects;
- **Section 3.8.5** identifies mitigation measures that should be considered during Project construction, operation, maintenance, and decommissioning;
- **Section 3.8.6** presents laws, ordinances, regulations, and standards applicable to paleontological resources;
- **Section 3.8.7** identifies regulatory agency contacts;
- **Section 3.8.8** describes permits required for the Project related to paleontological resources; and
- **Section 3.8.9** provides references used to develop this section.

The following environmental setting and impact evaluation is based in part on the following Project-specific technical report and engineering plans, included as appendices to this EIR:

1. **Appendix 3.8A** –Paleontological Resources Review – Potentia-Viridi Battery Energy Storage System, prepared by Dudek, February 2024.
2. **Appendix 3.8B** – Confidential Paleontological Records Search Results Letter
3. **Appendix 3.4A** – Geotechnical Considerations Report, prepared by Terracon, December 2023.
4. **Appendix 3.5A** – Phase I Environmental Site Assessment, prepared by Tetra Tech, August 2023

3.8.1 Affected Environment

3.8.1.1 Physiographic and Geologic Setting

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; and an arbitrary line from the Bay into the Diablo Range forms the southern boundary. Bedrock of various types and age underlie the areas within the Diablo Range. Almost all of the hills have a mantle of topsoil and weathered bedrock.

3.8.1.1.1 Geological Units Within the Project Site

The geology of the region around the Project site was mapped by Dibblee and Minch (2006) and Delattre et al. (2023), who identified two geologic units directly underlying the Project site (listed youngest to oldest): younger Quaternary alluvium (map unit Qa and Qha) and the Neroly Formation (map unit Tn) (Appendix 3.4A, Geotechnical Considerations Report, Dibblee and Minch 2006). While not mapped by Dibblee and Minch (2006) or Delattre et al (2023), older Quaternary alluvium is mentioned in Appendix 3.5A, the Phase I Environmental Site Assessment, and is anticipated below the younger Quaternary alluvium. Although the Tulare Formation is referenced in the greater Tracy Subbasin in Appendix 3.5A, it is not surface mapped within the Project site according to Dibblee and Minch (2006) and Delattre et al. (2023).

Younger Quaternary Alluvium

According to Section 3.4 Geological Hazards and Resources, recent (Holocene; less than ~11,700 years ago) alluvium underlies the canyon area within the Project site (Cohen et al. 2024). These sedimentary deposits are generally too young to contain paleontological resources in their original context, and therefore have low paleontological resource sensitivity that increases to high with depth, where they transition into older Quaternary alluvium and become old enough to preserve fossils.

Older Quaternary Alluvium

Older Quaternary alluvium is not mapped at the surface within the Project site but is anticipated at an undetermined depth below the younger Quaternary alluvium. Jefferson (1991) reported a number of Rancholabrean North American Land Mammal Age (~11,700 to 250,000 years ago) localities from Alameda County that yielded Ice Age fossil megafaunal remains (e.g., sloth, mastodon, mammoth, bear, camel, and bison) (Bell et al. 2004; Cohen et al. 2024). These Pleistocene age deposits are considered to have high paleontological resource sensitivity.

Neroly Formation

The late Miocene age (approximately 5.33 million years ago to 11.63 million years ago; Cohen et al. [2024]) Neroly Formation has yielded invertebrate fossil specimens, including echinoderms, approximately 1.5 miles southeast of Burton Station, between Tice Valley and Grizzly Creek (Los Angeles County Museum (LACM) Invertebrate Paleontology (IP) localities 15355 and 15369) (Confidential Appendix 3.8A). Additional invertebrate fossil specimens from the Neroly Formation, including *Astrodapsis whitneyi* (Whitney's sand dollar) have been recovered from the Cuyama Valley in Santa Barbara County (LACM IP 2975), as well as invertebrate shell beds with *Pecten crassicardo* (scallop) and other invertebrates from Mount Diablo Scenic Highway in Contra Costa County (LACM IP 7963-7968) (Confidential Appendix 3.8A). This formation has been described as a gray to blue, friable sandstone with pebbly clay (Dibblee and Minch, 2006). The Neroly Formation has been assigned a high paleontological resource sensitivity.

3.8.1.1.1.1 Geological Units Within Two Miles of the Project Site

Artificial Fill

Artificial fill consists of man-made deposits 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

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Graymer 1997; Delattre et al. 2023). The recent artificial fill, which has been disturbed and moved from its original location, has no paleontological resource sensitivity.

Quaternary Alluvial Deposits

Quaternary alluvial deposits (map units Qa and Qha) consist 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). Quaternary landslide deposits (Qls) are 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). The Quaternary alluvium, undivided, Quaternary landslide deposits, and Holocene alluvium would all have low paleontological resource sensitivity at the surface due to the young age of the sediments, but the deeper these sediments reach, the older they also become, being more conducive for fossilization. All three of these units have low paleontological sensitivity at the surface that becomes high paleontological sensitivity at depth.

Carbona Formation

The Carbona Formation (map unit PMc), which is a local designation, is in part equivalent to the Oro Loma Formation (Dibblee and Minch 2006) and the Tehama Formation (Dellatre et al. 2023), and in other areas would be mapped in with those two units. The Carbona Formation is composed of moderately well bedded, poorly to moderately consolidated conglomerate, sandstone, siltstone, and clay. The Oro Loma and Tehama Formations contain invertebrates, fish, reptiles, and mammal fossils (UCMP 2024; PBDB 2024), and the Carbona Formation would also yield similar fossils. Both the Oro Loma and Tehama Formations are assigned high paleontological resource sensitivity, and so the Carbona Formation would also have high paleontological resource sensitivity.

Cierbo Sandstone

The Cierbo Sandstone (map unit Mc) is a light-gray, blue, and white, fine to coarse grained marine sandstone that is thickly bedded, locally contains minor pebble conglomerate, siltstone, and tuff, and is also highly fossiliferous (Dellatre et al. 2023). Fossils that have been previous found with the unit are primarily marine invertebrates but plants and unnamed vertebrate material have also been documented (UCMP 2024). The Cierbo Sandstone has high paleontological resource sensitivity.

Cretaceous Geological Units

A comparison of mapping between Dellatre et al. (2023) and Dibblee and Minch (2006) shows that the Cretaceous Unit C-upper member and D are likely equivalent to members of the Panoche Formation and may also belong, in part, to the Miocene Briones Sandstone, which is often lumped together with the Neroly sandstone that Dibblee and Minch (2006) have mapped in the same area as Dellatre et al. (2023) Unit D. Unit C- upper member consists of marine shale and siltstones, while Unit D is made up of marine sandstone. The Panoche Formation of Dellatre et al. (2023) consists of a light gray to light brown, hard, fine to medium grained sandstone, and Dibblee and Minch (2006) further have the unit locally composed of interbedded clay shale with the sandstone, and a gray to dark gray claystone or clay shale portion of the formation. The Panoche Formation generally contains fossilized wood, marine invertebrates, fish, and marine reptiles (UCMP 2024; PBDB 2024). The Panoche Formation and the Cretaceous Unit C and D, which are likely Panoche equivalents, all have high paleontological resource sensitivity.

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3.8.2 Regulatory Setting

Federal, state, and local laws, ordinances, regulations, and standards (LORS) related to paleontological resources were reviewed for applicability to the Project and detailed in Section 3.8.6, Laws, Ordinances, Regulations, and Standards.

The standards used for determining paleontological sensitivities as set forth by the Society of Vertebrate Paleontology (SVP 2010) are listed in Table 3.8-1.

Table 3.8-1. Standards for Determining Paleontological Sensitivities

Resource Sensitivity/Potential	
High	Rock units from which vertebrate or significant invertebrate, plant, or trace fossils have been recovered are considered to have a high potential for containing additional significant paleontological resources. Rock units classified as having high potential for producing paleontological resources include, but are not limited to, sedimentary formations and some volcaniclastic formations (e.g., ashes or tephras), and some low-grade metamorphic rocks that contain significant paleontological resources anywhere within their geographical extent, and sedimentary rock units temporally or lithologically suitable for the preservation of fossils (e.g., middle Holocene and older, fine-grained fluvial sandstones, argillaceous and carbonate-rich paleosols, cross-bedded point bar sandstones, fine-grained marine sandstones). Paleontological potential consists of both (1) the potential for yielding abundant or significant vertebrate fossils or for yielding a few significant fossils, large or small, vertebrate, invertebrate, plant, or trace fossils and (2) the importance of recovered evidence for new and significant taxonomic, phylogenetic, paleoecologic, taphonomic, biochronologic, or stratigraphic data. Rock units that contain potentially datable organic remains older than late Holocene, including deposits associated with animal nests or middens, and rock units that may contain new vertebrate deposits, traces, or trackways are also classified as having high potential.
Low	Reports in the paleontological literature or field surveys by a qualified professional paleontologist may allow determination that some rock units have low potential for yielding significant fossils. Such rock units will be poorly represented by fossil specimens in institutional collections or, based on general scientific consensus, only preserve fossils in rare circumstances and the presence of fossils is the exception not the rule; e.g., basalt flows or Recent colluvium. Rock units with low potential typically will not require impact mitigation measures to protect fossils.
Undetermined Potential	Rock units for which little information is available concerning their paleontological content, geologic age, and depositional environment are considered to have undetermined potential. Further study is necessary to determine whether these rock units have high or low potential to contain significant paleontological resources. A field survey by a qualified professional paleontologist to specifically determine the paleontological resource potential of these rock units is required before a paleontological resource impact mitigation program can be developed. In cases where no subsurface data are available, paleontological potential can sometimes be determined by strategically located excavations into subsurface stratigraphy.

No Potential	Some rock units have no potential to contain significant paleontological resources; for instance, high-grade metamorphic rocks (such as gneisses and schists) and plutonic igneous rocks (such as granites and diorites). Rock units with no paleontological resource potential require neither protection nor impact mitigation measures relative to paleontological resources.

Paleontological sensitivities have been assigned to each formation found within the Project site and within a two-mile radius of the Project site and can be found in subsections 3.8.1.1.1 and 3.8.1.1.1.1.

3.8.3 Impact Analysis

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

3.8.3.1 Methodology

This impact evaluation is based on a paleontological records search of the Project site and surrounding area, a review of published geological mapping and published and unpublished reports, and an intensive survey for paleontological resources to identify geological units on the site and determine their paleontological sensitivity. Dudek requested a paleontological records search from the Natural History Museum of Los Angeles County (NHMLA) on December 27, 2023. Additionally, Dudek conducted a digital search of the University of California, Berkeley Museum of Paleontology (UCMP) online database. Dudek also conducted a review of published geological maps and paleontological literature. A field survey of the Project site was conducted on October 11, 2023 by Dudek. The paleontological resources study was completed in accordance with CEQA and guidelines from the SVP (2010).

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3.8.3.1.1 Results of the Records Search and Literature Review

The NHMLA paleontological resources records search results were received on January 14, 2023. The NHMLA did not report any fossil localities from within the Project site, but they did report nearby localities from deposits similar to those underlying the site on the surface and at depth (Confidential Appendix 3.8A).

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3.8.3.1.2 Results of the Field Survey

A pedestrian field survey of the Project site was conducted on October 11, 2023, by Gregory Wada of Dudek, who is dual qualified in archaeology and paleontology, and Victoria Martin, archaeologist. In addition to examining the Project site for paleontological resources, Mr. Wada searched for outcrops to field check mapped geological units. The Project site was heavily vegetated and thus outcrops were generally obscured (Confidential Appendix 3.8A). No paleontological resources were observed during the pedestrian survey.

3.8.3.~~2~~1.3 Impact Evaluation Criteria

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- The potential for impacts related paleontological resources were evaluated using the relevant criteria described in the California Environmental Quality Act (CEQA) Environmental Checklist (Appendix G of the CEQA Guidelines). Specific to paleontological resources, the CEQA Checklist asks, would the project: Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

3.8.3.2.1.3.4 Impact Evaluation

Impact 3.8-1 Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

Less than Significant with Mitigation. There are no known paleontological resources identified within the Project site as a result of the institutional records searches and desktop geological and paleontological review (Appendix 3.8A), and the Project site is not underlain by a known unique geological feature. However, ground-disturbing activities associated with construction of the Project, such as grading during site preparation, large-diameter (2 feet or greater) augering, and trenching for utilities, could have the potential to destroy a previously unknown unique paleontological resource or site that has not been previously recorded. If ground-disturbing activities result in destruction, damage, or loss of scientifically important paleontological resources and associated stratigraphic and paleontological data, they would be considered as having a significant impact or adverse effect on paleontological resources. Given the presence of the Neroly Formation mapped within the Project site and the invertebrate fossils recovered from this geological unit within Alameda County and other localities, and the potential for older Quaternary alluvium at depth, intact paleontological resources may be encountered below a surficial layer of topsoil or younger Quaternary alluvium during Project excavations. However, impacts would be less than significant to onsite unique paleontological resources or unique geologic features with incorporation of Mitigation Measure MM-PALEO-1.

3.8.4 Cumulative Effects

The cumulative projects detailed in Chapter 3, Environmental Analysis, Table 3-2, Cumulative Projects, would be limited to the geographic scope of the potential cumulative paleontological resources impacts due to the immediate vicinity of ground-disturbing activities that would occur during the Project's construction. As required for all planned projects in the vicinity of the proposed Project are subject to environmental review and would be required to comply with local, state, and federal laws. Additionally, with implementation of mitigation measures and other grading and building requirements, the proposed Project would not contribute to cumulative impacts for paleontological 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 laws, ordinances, and regulations. As a result, cumulative impacts related to paleontological resources would not be cumulatively considerable.

3.8.5 Mitigation Measures

The following mitigation measure would address the potentially significant impact to paleontological resources. Implementation of Mitigation Measure PALEO-1 would effectively reduce potential Project impacts to paleontological resources to a less than significant level through the recovery, identification, and curation of previously unrecovered fossils.

MM-PALEO-1: Paleontological Resources Impact Mitigation Program and Paleontological Monitoring. Prior to commencement of any grading activity on site, the applicant shall retain a qualified paleontologist per the Society of Vertebrate Paleontology (2010) guidelines. The qualified paleontologist shall prepare a Paleontological Resources Impact Mitigation Program (PRIMP) for the Project that shall be consistent with the SVP (2010) guidelines and outline requirements for preconstruction meeting attendance and worker environmental awareness training; where paleontological monitoring is required in areas of high sensitivity within the Project site based on

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construction plans and/or geotechnical reports; procedures for adequate paleontological monitoring and discoveries treatment; and paleontological methods (including sediment sampling for microinvertebrate and microvertebrate fossils), reporting, and collections management. A qualified paleontological monitor shall be on site during initial rough grading and other significant ground-disturbing activities (including augering) into all undisturbed Neroly Formation deposits and below a depth of 5 feet below the ground surface in areas underlain by younger Quaternary alluvium (Holocene age) to determine if deposits at depth are old enough (Pleistocene age) to preserve scientifically significant paleontological resources. No paleontological monitoring is necessary during ground disturbance within artificial fill or sediments determined by the qualified paleontologist to be too young to preserve fossils (e.g., younger Quaternary alluvium). In the event that paleontological resources (e.g., fossils) are unearthed during grading, the paleontological monitor will temporarily halt and/or divert grading activity to allow recovery of paleontological resources. The area of discovery will be roped off with a 50-foot radius buffer. Once documentation and collection of the find is completed, the monitor will allow grading to recommence in the area of the find. Fossil lab and curation costs are the responsibility of the project applicant or proponent.

3.8.6 Laws, Ordinances, Regulations, and Standards

Federal, state, and local Laws, Ordinances, Regulations, and Standards (LORS) applicable to paleontological resources are discussed below and summarized in Table 3.8-2.

Table 3.8-2. LORS Applicable to Geological Hazards and Resources

Jurisdiction	LORS	Applicability	Opt-In Application Reference	Project Conformity
State	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.	Throughout this Opt-In Application	California Energy Commission (CEC), per the CEC's Opt-In Application process.
State	California PRC Section 5097.5	Provides protection for paleontological resources on public lands.	Impact 4.8.1 MM-PALEO-1	The Project would comply with the States law with respect to the protection of paleontological resources on public lands by implementing mitigation measure MM-PALEO-1.
Local	East County Area Plan, Cultural Element	Includes policies and programs that are intended to address cultural including archaeological resources in the East County area	Impact 4.8-1	Siting of the Project would comply with the East County Area Plan with respect to areas of potential paleontological resources.

3.8.65.1 Federal LORS

Federal regulations would apply to paleontological resources if the project involves federally owned or managed lands, a federal license, permit, approval or funding, and/or crosses federal lands. The Project site is not located on federally owned or managed lands and is therefore not subject to federal LORS related to paleontological resources.

3.8.65.2 State LORS

California Environmental Quality Act

Paleontological resources, which are limited, nonrenewable resources of scientific, cultural, and educational value, are recognized as part of the environment under the State CEQA Guidelines. Paleontological resources are explicitly afforded protection by CEQA, specifically in Section VII(f) of CEQA Guidelines Appendix G, the "Environmental Checklist Form," which addresses the potential for adverse impacts to "unique paleontological resource[s] or site[s] or … unique geological feature[s]." This provision covers fossils of significant importance – remains of species or genera new to science, for example, or fossils exhibiting features not previously recognized for a given animal group – as well as localities that yield fossils significant in their abundance, diversity, preservation, and so forth. Further, CEQA provides that a resource shall be considered "historically significant" if it has yielded or may be likely to yield information important in prehistory (PRC 15064.5 [a][3][D]). Paleontological resources would fall within this category.

California PRC Section 5097.5

California PRC Section 5097.5 provides protection for paleontological resources on public lands, where Section 5097.5(a) states, in part, that:

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

The PRC, Chapter 1.7, sections 5097.5 and 30244 also regulates removal of paleontological resources from state lands, defines unauthorized removal of fossil resources as a misdemeanor, and requires mitigation of disturbed sites.

3.8.65.3 Local LORS

East County Area Plan - General Plan

Policy 127. The County shall identify and preserve significant archeological and historical resources, including structures and sites which contribute to heritage of East County.

Proposed Modification to Policy 128. The County shall require development to be designed to avoid cultural resources or, if avoidance is determined by the County to be infeasible, to implement appropriate mitigation measures that offset the impacts.

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Proposed Modification to Program 57. If the project is located within an extreme or high archeological sensitivity zone as determined by the County, a background and records check of the site shall be required. If there is evidence of an archaeological site within a proposed project area, an archeological survey by a qualified professionals shall be required as a part of the environmental assessment process. If any archeological sites are found during construction, all work in the immediate vicinity shall be suspended pending site investigation by a qualified archaeology profession. Proposed structures or roads on property that contains archaeological sites should be sited in consultation with a professional archaeologist to avoid damaging the archaeological sites. The County shall follow Appendix K of the California Environmental Quality Act (CEQA) Guidelines for cultural resource preservation procedures in reviewing development projects located near identified cultural resources. Appropriate measures for preserving an historic structure include renovation or moving it to another location. Proposals to remove historic structures shall be reviewed by qualified professionals.

3.8.7 Agencies and Agency Contacts

There are no agencies that have wholesale jurisdiction over paleontological resources. The CEC has jurisdiction over paleontological resources for this Project. If encountered, any scientifically significant fossil specimens and associated site records would be submitted to the closest regional repository in operation, which currently is the University of California, Berkeley Museum of Paleontology. Table 3.8-3 presents the agency contacts for the Berkeley Museum of Paleontology.

Table 3.8-3. Permits and Agency Contacts

Permit or Approval	Agency	Applicability
Paleontological Resources Documentation and Specimen Repository	Museum of Paleontology University of California 1101 Valley Life Sciences Building Berkeley, CA 94720-4780 Voice: (510) 642-1821 Fax: (510) 642-1822 Email: ucmpwebmaster@berkeley.edu	Museum of Paleontology University of California

3.8.8 Permits and Permit Schedule

No permit related to paleontological resources is required by any federal, state, or county agency to allow for the recovery of fossil remains discovered as a result of construction-related ground-disturbance on the Project site.

3.8.9 References

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