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Document Title:	Section 5-15_Paleontological Resources_VDPC
Description:	This section describes the paleontological resources and geologic units present in the vicinity of the Project Site, as well as the potential impacts that may result from construction and operation of the Project related to the destruction of a unique paleontological resource or Site, or unique geologic feature.
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5.15 Paleontological Resources

This section discusses the potential effect to paleontological resources during construction and operation of the Vaca Dixon Power Center Project (Project). Section 5.15.1 describes the environmental setting, including the paleontological setting of the Project Site. Section 5.15.2 describes the Regulatory Setting of the Project with regard to paleontological resources. Section 5.15.3 presents the impact analysis, and Section 5.15.4 presents the cumulative impacts of the Project with respect to paleontology. Section 5.15.5 describes the Laws, Ordinances, Regulations, and Standards (LORS) applicable to paleontological resources for the Project. Section 5.15.6 presents the agencies that have jurisdiction over paleontological resources at the Project Site and specifies the contact at each agency. Section 5.15.7 describes the permits required for paleontological resources at the Project Site and a schedule for obtaining the permits. Section 5.15.8 provides the references used to prepare this section.

5.15.1 Environmental Setting

5.15.1.1 Physiographic and Geologic Setting

The Project Site is located in the Great Valley geomorphic province, one of the eleven geomorphic provinces of California (California Geological Survey 2002). The Great Valley is an elongated lowland approximately 50 miles wide and 400 miles long. It is bounded to the east by the Sierra Nevada Range and to the west by the Coast Range. A relatively undeformed basin, the Great Valley rises from about sea level to approximately 400 feet in elevation at the north and south ends. The northern portion of the valley, referred to as the Sacramento Valley, is drained by the Sacramento River, while the southern portion of the valley, referred to as the San Joaquin Valley, is drained by the San Joaquin River. Consequently, the Great Valley is predominantly alluvial, flood, and delta plains formed by these two major river systems (Weissmann et al. 2005).

The Project Site is in the southwestern part of the Sacramento Valley, approximately 4.5 miles west of the English Hills and 0.4 mile south of Gibson Canyon Creek. The Project Site is within the *Allendale, CA* United States Geological Survey 7.5-minute quadrangle.

5.15.1.2 Geology of the Project Site

The geology of the region around the Project was mapped by Dawson (2009) who identified one geologic unit underlying the Project Site, Pleistocene alluvial fan deposits. Pleistocene alluvial fan deposits consist of moderately to poorly sorted gravel, sand, silt, and clay, deposited in gently sloping alluvial fans and are late Pleistocene in age (Dawson 2009; Graymer et al. 2002).

5.15.1.3 Paleontology of the Project Site

A formal fossil locality search of the University of California Museum of Paleontology (UCMP) identified no fossil localities within the Project Site (Holroyd 2023). The nearest known fossil locality to the Project Site occurs approximately 10 miles to the northeast near Davis, California.

5.15.1.4 Paleontological Sensitivity of Project Site

Paleontological Sensitivity

Paleontological sensitivity refers to the potential for a geologic unit to produce scientifically significant fossils. Direct impacts to paleontological resources occur when earthwork activities, such as grading or trenching, cut into the geologic deposits within which fossils are buried and physically destroy the fossils. Because fossils are the remains of prehistoric animal and plant life, they are considered to be nonrenewable. These activities may constitute significant impacts under CEQA and may require mitigation. Sensitivity is determined by rock type, history of the geologic unit in producing significant fossils, and fossil localities recorded from that unit. Paleontological sensitivity is derived from the known fossil data collected from the entire geologic unit, not just from a specific survey.

The discovery of a vertebrate fossil locality is of greater significance than that of an invertebrate fossil locality, especially if it contains a microvertebrate assemblage. The recognition of new vertebrate fossil locations could provide important information on the geographical range of the taxa, their radiometric age, evolutionary characteristics, depositional environment, and other important scientific research questions. Vertebrate fossils are almost always significant because they occur more rarely than invertebrates or plants. Thus, geologic units having the potential to contain vertebrate fossils are considered the most sensitive.

Resource Assessment Criteria

In its *Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources*, the Society of Vertebrate Paleontology (SVP) outlines guidelines for categorizing paleontological sensitivity of geologic units within a Project site. The SVP describes sedimentary rock units as having a high, low, undetermined, or no potential for containing significant nonrenewable paleontological resources. This criterion is based on rock units within which vertebrates or significant invertebrate fossils have been determined by previous studies to be present or likely to be present. Significant paleontological resources are fossils or assemblages of fossils that are unique, unusual, rare, or uncommon diagnostically, stratigraphically, taxonomically, or regionally (SVP 2010). The paleontological sensitivity of the Project Site has been evaluated according to the following SVP (2010) categories:

- **High Potential (Sensitivity).** Rock units from which significant vertebrate or significant invertebrate fossils or significant suites of plant fossils have been recovered are considered to have a high potential for containing significant non-renewable fossiliferous resources. These units include, but are not limited to, sedimentary formations and some volcanic formations that contain significant nonrenewable paleontological resources anywhere within their geographical extent and sedimentary rock units temporally or lithologically suitable for the preservation of fossils. Sensitivity comprises both (a) the potential for yielding abundant or significant vertebrate fossils or for yielding a few significant fossils, large or small, vertebrate, invertebrate, or botanical and (b) the importance of recovered evidence for new and significant taxonomic, phylogenetic, ecologic, or stratigraphic data. Areas that contain potentially datable organic remains older than recent, including deposits associated with nests or middens, and areas that may contain new vertebrate deposits, traces, or trackways are also classified as significant. Full-time monitoring is typically recommended during any Project-related ground disturbance in geologic units with high sensitivity.

- **Low Potential (Sensitivity).** Sedimentary rock units that are potentially fossiliferous but have not yielded fossils in the past or contain common and/or widespread invertebrate fossils of well-documented and understood taphonomic processes (those affecting an organism following death, burial, and removal from the ground), phylogenetic species (evolutionary relationships among organisms), and habitat ecology. Reports in the paleontological literature or field surveys by a qualified vertebrate paleontologist may allow determination that some areas or units have low potential for yielding significant fossils prior to the start of construction. Generally, these units will be poorly represented by specimens in institutional collections and will not require protection or salvage operations.
- **Undetermined Potential (Sensitivity).** Specific areas underlain by sedimentary rock units for which little information is available are considered to have undetermined fossiliferous potentials. Field surveys by a qualified vertebrate paleontologist to specifically determine the potential of the rock units are required before programs of impact mitigation for such areas may be developed.
- **No Potential.** Rock units of metamorphic or igneous origin are commonly classified as having no potential for containing significant paleontological resources.

Paleontological Sensitivity Assessment

Pleistocene-aged alluvial sediments have produced scientifically significant paleontological resources throughout California, including Solano County, yielding taxa such as mammoth (*Mammuthus*), ground sloth (*Paramylodon*, *Nothrotheriops*), horse (*Equus*), other mammals, and invertebrates (Jefferson 2010; Paleobiology Database 2025; UCMP 2025). Given the fossil-producing history of similar sediments in Solano County, Pleistocene alluvial fan deposits have high paleontological sensitivity.

The Project Site consists of an orchard, and it is assumed that agricultural activities have disturbed sediments within the Project Site to a depth of 2 feet. Therefore, sediments within the BESS Project Area have no sensitivity from 0 to 2 feet below the surface and high sensitivity below 2 feet. The gen-tie installation on the PG&E parcel would include deep drilling for power pole foundations and would extend into sediments with high paleontological sensitivity.

5.15.2 Regulatory Setting

Federal, state, and local LORS related to paleontological resources were reviewed for applicability to the Project. These are detailed in Section 5.15.5.

5.15.3 Impact Analysis

5.15.3.1 Methodology

Rincon reviewed published geologic maps to identify the geologic units present at and below the surface within the Project Site (Dawson 2009; Graymer et al. 2002). Rincon reviewed the online paleontological collections database of the University of California Museum of Paleontology (UCMP; 2025) and Paleobiology Database (2025) and consulted primary literature to identify known fossil localities in Solano County and surrounding regions from similar geologic units to those identified within the Project Site. Rincon requested a records search of the UCMP on May 3, 2023, to identify any fossil localities known from within the Project Site or nearby fossil localities known from the

same geologic units as those underlying the Project Site. The Project Site contains no bedrock exposures; therefore, a field survey was not warranted.

Paleontological sensitivity ratings of the geological formations were assigned based on the findings of the records search and literature review and based on the potential effects to nonrenewable paleontological resources from Project construction following SVP (2010) guidelines.

5.15.3.2 Impact Evaluation Criteria

The potential for impacts to paleontological resources were evaluated using the 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?

Impact PAL-1

Threshold:	Would the Project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?

Construction

Less than Significant Impact with Mitigation. The Project Site and gen-tie route are mapped as a single geologic unit with no paleontological sensitivity from 0 to 2 feet below the surface and high paleontological sensitivity greater than 2 feet below the surface. To prepare the Project BESS and switchyard facility areas, the topsoil, presumably corresponding to the uppermost 2 feet of disturbed sediments would be removed, and then up to 4.5 feet of imported fill, which also has no paleontological sensitivity, would be placed. Foundations for BESS and switchyard infrastructure that only reach up to 2 feet below the surface would only impact fill sediments. However, heavy infrastructure, such as in the Project switchyard, may require deeper excavations that could reach undisturbed, high-sensitivity sediments. Two stormwater ponds and other associated stormwater infrastructure would be built within the BESS Project Area, but would not reach previously undisturbed sediment depths. The depth of underground electric conduits connecting battery and switchyard facilities is currently unknown, but if their installation requires excavation beyond 4.5 feet below the surface, then impacts paleontological resources may occur. The gen-tie lines, which are not within the area where fill would be placed, would require drilling 7- to 10-foot diameter holes up to 40 feet deep for the installation of new steel monopoles, which would reach previously undisturbed, high-sensitivity sediments.

Drilling for gen-tie structures and, possibly, excavations for heavy switchyard infrastructure would impact previously undisturbed sediments with high paleontological sensitivity, meaning the Project may significantly impact paleontological resources. These impacts would be reduced to a less-than-significant level through implementation of Mitigation Measures PAL-1 through PAL-4, by ensuring that previously unrecorded paleontological resources within the Project Site are salvaged by qualified personnel and curated in an appropriate facility.

Operation

No Impact. Project operation and maintenance would not involve impacts to previously undisturbed sediments, and therefore, would not impact paleontological resources.

Mitigation Measures

PAL-1 Paleontological Resources Specialist & Paleontological Resources Mitigation and Monitoring Plan

The Project owner shall provide the CEC with the resume and qualifications of the individual who will serve as the Project's Paleontological Resources Specialist (PRS). The PRS shall meet the qualifications of a Qualified Professional Paleontologist as defined by the Society of Vertebrate Paleontology.

The PRS shall develop a Paleontological Resources Mitigation and Monitoring Plan (PRMMP) which shall serve as the guide for paleontological mitigation efforts for the Project, including pre-construction coordination, monitoring methodology (e.g., location, frequency, techniques), paleontological discovery protocols, fossil salvage and sediment sampling procedures, a curation agreement with an accredited institution that has agreed to accept fossils collected from the Project, and final reporting procedures. The PRS shall review Project grading plans, geotechnical reports, and/or other Project documents that may aid in the identification of paleontological mitigation methods. The PRMMP must be reviewed and approved by the CEC prior to the commencement of ground-disturbing activities for the Project.

PAL-2 Worker Environmental Awareness Program

The PRS shall develop a paleontological Worker Environmental Awareness Program (WEAP) training that addresses the possibility of encountering paleontological resources during Project construction, the sensitivity and importance of paleontological resources, appliable laws and regulations for protecting paleontological resources, protocols for the discovery of a potential paleontological resource onsite, and pictures of fossils that may be encountered in the Project Site. The WEAP shall be delivered by the PRS or their designee on the first day of ground disturbance. Construction personnel who begin work on the Project after that day may watch a recorded WEAP presentation.

PAL-3 Paleontological Monitoring

In accordance with the PRMMP, ground-disturbing activities reaching previously undisturbed sediments greater than 2 feet below the surface (i.e., pre-construction grade) shall be monitored by an individual meeting SVP standards for a Paleontological Resources Monitor (PRM). Ground-disturbing activities solely impacting fill or disturbed sediments will not be monitored.

The PRS and PRM shall have the authority to stop or redirect construction if a paleontological resource is discovered. Any paleontological resource discovered during ground-disturbing activities shall be salvaged, prepared for curation, and accessioned to an accredited institution as outlined in the PRMMP. Upon completion of the documentation and/or salvage of the paleontological resource, work in the vicinity may resume. The Project owner shall be responsible for costs associated with these salvage, preparation, and curation efforts.

Based on geological conditions, the PRS may recommend a reduction or cessation of paleontological monitoring. Any alterations to the paleontological monitoring schedule must be proposed in writing to the CEC and must be approved by the CEC prior to enactment.

PAL-4 Paleontological Resources Report

Within 90 days of the completion of ground-disturbing activities, the PRS shall prepare a draft Paleontological Resources Report (PRR), which shall be submitted to the CEC for review and approval. The PRR shall contain a summary of paleontological monitoring efforts, descriptions of the observed geology, and an analysis of collected paleontological resources (e.g., map of discovery location(s), taxonomic identification, age, and scientific significance).

5.15.4 Cumulative Impacts

Cumulative impacts to paleontological resources can arise if a Project increases public access to a significant paleontological resource or paleontologically sensitive area, which increases the chances for vandalism, destruction, or unlawful collection of paleontological resources. The Project would not increase access to any such areas; and thus, the Project would not have cumulative impacts on paleontological resources.

5.15.5 Laws, Ordinances, Regulations, and Standards

The LORS that may apply to the Project related to paleontological resources are summarized in Table 5.15. The local LORS discussed in this section are ordinances, plans, or policies of Solano County and the City of Vacaville.

Table 5.15-1 LORS Applicable to Paleontological 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	The Project would comply with CEQA, as required by the California Energy Commission's Opt-In Application process.
State	California Public Resources Code Section 5097.5	Prohibits projects under the jurisdiction of any government agency or public corporation from knowingly removing, destroying, or defacing vertebrate paleontology sites.	MM PAL-1 through PAL-4	The Project would comply with PRC Section 5097.5.
Local	City of Vacaville General Plan	Requires the treatment or preservation of paleontological localities discovered during project construction.	MM PAL-3	The Project would comply with the City of Vacaville General Plan.

Source: City of Vacaville 2015

5.15.5.1 Federal LORS

No federal paleontological LORS apply to the Project.

5.15.5.2 State LORS

California Environmental Quality Act

Paleontological resources are protected under CEQA, which states a Project would "normally" have a significant effect on the environment if Project effects exceed an identified threshold of significance (CEQA Guidelines Section 15064.7[a]). Appendix G of the CEQA Guidelines (the Environmental Checklist Form) provides suggested thresholds of significance for evaluating a Project's environmental impacts, including impacts to paleontological resources. In Section VII(f), the question is posed thus: "Will the Project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?" To determine the uniqueness of a given paleontological resource, it must first be identified or recovered (i.e., salvaged). Therefore, CEQA mandates mitigation of adverse impacts, to the extent practicable, to paleontological resources.

CEQA does not define "a unique paleontological resource or site." However, the SVP (2010) has defined a "significant paleontological resource" in the context of environmental review as follows:

> Fossils and fossiliferous deposits, here defined as consisting of identifiable vertebrate fossils, large or small, uncommon invertebrate, plant, and trace fossils, and other data that provide taphonomic, taxonomic, phylogenetic, paleoecologic, stratigraphic, and/or biochronologic information.

Paleontological resources are typically older than recorded human history and/or older than middle Holocene (i.e., older than about 5,000 radiocarbon years) (SVP 2010).

The loss of paleontological resources meeting the criteria outlined above (i.e., a significant paleontological resource) would be a significant impact under CEQA, and the CEQA lead agency is responsible for mitigating impacts to paleontological resources, where practicable, in compliance with CEQA and other applicable statutes.

California Public Resources Code

California Public Resources Code Section 5097.5 states:

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

Here "public lands" means those owned by, or under the jurisdiction of, the State or any city, county, district, authority, or public corporation, or any agency thereof. Consequently, public agencies are required to comply with Public Resources Code Section 5097.5 for their own activities, including construction and maintenance, and for permit actions (e.g., encroachment permits) undertaken by others.

5.15.5.3 Local LORS

City of Vacaville General Plan

The Conservation and Open Space Element of the City of Vacaville General Plan (City of Vacaville 2015) includes the following policies related to the protection of paleontological resources:

> **Policy COS-P6.4** Require that if cultural resources, including archaeological or paleontological resources, are uncovered during grading or other on-site excavation activities, construction shall stop until appropriate mitigation is implemented.
>
> **Policy COS-P6.5** Require that any archaeological or paleontological resources on a development Project site be either preserved in their sites or adequately documented as a condition of removal. When a development Project has sufficient flexibility, avoidance and preservation of the resource shall be the primary mitigation measure, unless the City identifies superior mitigation. If resources are documented, coordinate with descendants and/or stakeholder groups, as warranted.

5.15.6 Agencies and Agency Contact

There are no agencies with jurisdiction to issue permits or approvals, or to enforce identified LORS related to paleontological resources.

5.15.7 Permits and Permit Schedule

No specific permits relevant to paleontological resources would be required for the Project.

5.15.8 References

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