3.11. PALEONTOLOGICAL RESOURCES

This section was prepared based on a paleontological resource assessment report prepared by Applied EarthWorks in June 2017, which is contained in Appendix E of this EIR.

3.11.1. ENVIRONMENTAL SETTING

Introduction

Definition of Paleontological Resources

Paleontological resources are the evidence of once-living organisms as preserved in the rock record. They include both the fossilized remains of ancient plants and animals and the traces thereof (trackways, imprints, burrows, etc.). In general, fossils are considered to be greater than 5,000 years old (older than Middle Holocene) and are typically preserved in sedimentary rocks. Although rare, fossils can also be preserved in volcanic rocks and low-grade metamorphic rocks formed under certain conditions.

Significant paleontological resources are defined as “identifiable” vertebrate fossils, uncommon invertebrate, plant, and trace fossils. The data provided by fossils are scientifically important because they increase understanding of evolutionary relationships, provide insight into the development of and interaction between biological communities, increase knowledge of the physical history of the earth, the distribution of mineral resources, dynamics of earth processes, and past climatic changes.

Regional Geology

The Westlands Solar Park and the WSP Gen-Tie Corridors are located in the San Joaquin Valley within the Great Valley geomorphic province of California. The Great Valley is roughly 400 miles long and 50 miles wide and was covered by marine waters as far back as the Jurassic and into the Paleogene. Deposition into the Great Valley began during the Late Jurassic as the paleo-Sierra Nevada began to rise and deliver eroded sediments to the lowlands. During the late Mesozoic and much of the Cenozoic, the actively subsiding region persisted as a submerged lowland basin known as the Great Valley Sea. By the Pliocene, most of the marine waters in the Great Valley were drained coincident with the uplift of the Coast Ranges above sea level. Subsequently, during the Quaternary period, extensive deposits of terrestrial material, including alluvial fan, fluviol, basin, and lacustrine sediments, were deposited in the Great Valley during continued uplift and erosion of the Sierra Nevada, Temblor and Coast Ranges.

Westlands Solar Park and WSP Gen-Tie Corridors

Geologic and Paleontological Setting

The WSP plan area is underlain entirely by Quaternary age deposits, including unnamed alluvial fan (Qf), basin (Qc), fluvial (Qb), and lacustrine deposits (Ql). These geologic units are described below and
generally depicted in Figure GEO-2. Detailed descriptions and mapping of the geologic units are contained in the *Paleontological Resource Assessment for the Westlands Solar Park*, in Appendix E of this EIR.

**Tulare Lake Lacustrine Deposits (Ql)**

Quaternary lacustrine deposits (Ql) of Pleistocene to Holocene age, attributed to former Tulare Lake, are mapped along the southeastern to eastern margin of the Project area. The Tulare Lake deposits underlie a large shallow depression in southeastern Kings County, which extends into neighboring Tulare and Kern Counties. Former Tulare Lake formed in response to climatic changes during Pleistocene glaciation, and later evolved into a seasonal playa during the warmer Holocene.

Pleistocene age sedimentary deposits have yielded significant vertebrate fossil localities throughout the Central Valley. Fine-grained lacustrine sediments, such as the Tulare Lake deposits, have an especially high potential for the preservation of fossilized remains. The Pleistocene Tulare Lake deposits from Kings County have yielded specimens of mammoth, bison, ground sloth, turtle, and other unspecified mammals. A particularly important site along former Tulare Lake is the Witt Site near Kettleman City, which has yielded over 1,500 Pleistocene age vertebrate fossil specimens, including taxa of bison, horse, mammoth, ground sloth, wolf, badger, rodent, turtle, and fish.

**Quaternary Alluvium (Qf, Qb)**

Quaternary alluvial fan (Qf) and basin deposits (Qb) of Holocene to latest Pleistocene age underlie the majority of the Project area. The Quaternary alluvial fan deposits are composed of coarse- to fine-grained alluvial sediments primarily derived from erosion of volcanic, plutonic, and metamorphic rocks of the Coast Ranges. The Quaternary basin deposits are derived from Sierran and Coast Ranges alluvium. The Coast Ranges alluvium was deposited as a system of coalescing alluvial fans and terrace deposits consisting of locally variable compositions of silt, sand, gravel, and larger clasts. Holocene deposits are generally considered too young to contain fossilized remains, but may shallowly overlie older Pleistocene deposits that have the potential to yield paleontological resources.

**Quaternary Older Alluvium (Qc)**

Quaternary alluvial fan and fluvial deposits of Middle to Late Pleistocene age (Qc) are exposed in a very small area (less than 5 acres) at the southern tip of the plan area. These Pleistocene deposits consist of unconsolidated coarse to fine sand and silt with abundant pebbles and cobbles, which drained from the Coast Ranges during the Quaternary period. The Pleistocene age sediments typically display well-developed soil and dissection by channels that are partially filled with Holocene age alluvium. The total thickness of the Pleistocene deposits varies locally, but is up to 150 feet thick in the vicinity of the proposed Project area. Quaternary alluvial deposits of Pleistocene age have yielded significant vertebrate fossil localities throughout Kings County, especially within the fine-grained lacustrine sediments of the Tulare Lake deposits. Pleistocene age alluvial sediments in Kings County have preserved a characteristic Ice Age vertebrate fauna of large land mammals, including specimens of bison, camel, mammoth, horse, wolf, sloth, and gopher. Further north, during excavations near Tranquility, California, 149 vertebrate localities were recorded, which yielded over 100 specimens of mammal, bird, reptile, and fish.
3. Environmental Setting, Impacts, and Mitigation Measures
3.11. Paleontological Resources

Fossil Records

Based on a museum records of the Natural History Museum of Los Angeles County (LACM), the University of California Museum of Paleontology (UCMP), and the Paleobiology Database (PDBD), there are no previously recorded vertebrate fossil localities directly within the WSP boundaries. Six localities with fossil records have been identified in the region within similar Pleistocene age sedimentary deposits. These include the following localities as identified by record number: 1) UCMP V82055 and PBDB 93249 (Witt Site), located near Kettleman City approximately 5 miles south along the southwest shoreline of former Tulare Lake, yielded at least 1,632 vertebrate specimens including bison, horse, turtle, mammoth, ground sloth, camel, wolf, badger, gopher, ungulate, and fish; 2) UCMP V69205, located at an unspecified site in Tulare Lake, yielded horse, bison, ground sloth, turtle, and mammoth; 3) UCMP V75041, located at an unspecified site in western Tulare Lake, yielded a mammoth specimen; 4) LACM 1156, located approximately 45 miles east-southeast of the WSP plan area, just north of city of Delano, yielded a fossil specimen of horse from younger Quaternary lacustrine deposits; 5) LACM 6701, located approximately 65 miles southeast of the WSP plan area near White River, yielded fossil specimen of mammoth, and; 6) LACM 4087, located approximately 50 miles southeast of the WSP plan area east of Highway 65 near Terra Bella, also yielded fossil specimen of mammoth.

Potential for Paleontological Resources to Occur within the WSP Plan Area and Gen-Tie Corridors

Based on the literature review and museum records search results, the geologic units underlying the WSP plan area have a paleontological resource potential (sensitivity) ranging from low to high, as determined in accordance with the Society of Vertebrate Paleontology guidelines. The Quaternary older alluvial (Qc)(located at the southern tip of the WSP plan area) and former Tulare Lake deposits (Ql)(located along the eastern margins of the plan area) are considered to have a high paleontological resource potential because they have proven to yield vertebrate fossils near the WSP plan area and throughout California. Holocene-age alluvial and basin deposits (Qf, Qb)(found in the majority of the WSP plan area) are determined to have a low paleontological resource potential, increasing with depth, because they are generally too young or too coarse to preserve significant fossilized; however, younger alluvium may overlie the older sensitive geologic deposits at depth. The areas with high potential for paleontological resources are located along the eastern boundary of the WSP plan area, mainly between Laurel and Nevada Avenues, and encompass approximately 2,400 acres. The remaining 18,538 acres if the WSP plan area have a low potential for paleontological resources. (Detailed mapping of paleontological sensitivity of the WSP plan area is contained in the Paleontological Resource Assessment for the Westlands Solar Park, in Appendix E of this EIR).

The WSP gen-tie corridors are entirely underlain by Holocene-age alluvial and basin deposits (Qf, Qb)(as is the majority of the WSP plan area), which are determined to have a low paleontological resource potential, increasing with depth, because they are generally too young or too coarse to preserve significant fossilized; however, younger alluvium may overlie the older sensitive geologic deposits at depth. The gen-tie corridors, including the WSP-North to Gates Gen-Tie, and the WSP-South to Gates Gen-Tie, have a consistently low potential for paleontological resources throughout their lengths. (Detailed mapping of paleontological sensitivity is contained in the Paleontological Resource Assessment for the Westlands Transmission Corridors, in Appendix E of this EIR).
3.10.2. REGULATORY CONTEXT

State

California Public Resources Code (PRC)

California Public Resources Code (PRC) §5097.5 states: “[a] person shall not knowingly and willfully excavate upon, or remove, destroy, or deface any…vertebrate paleontological site or…paleontological…feature, situated on public lands, except with the express permission of the public agency having jurisdiction over the lands.”

Local

County of Kings

Kings County has no policies or regulations that specifically address paleontological resources.

County of Fresno

The following Fresno County General Plan policy addresses paleontological resources:

Open Space and Conservation Element

Policy OS-J.44 The County shall require that discretionary development projects, as part of any required CEQA review, identify and protect important historical, archeological, paleontological, and cultural sites and their contributing environment from damage, destruction, and abuse to the maximum extent feasible. Project-level mitigation shall include accurate site surveys, consideration of project alternatives to preserve archeological and historic resources, and provision for resource recovery and preservation when displacement is unavoidable.

Professional Paleontological Standards

The Society of Vertebrate Paleontology (SVP), a national scientific organization of professional vertebrate paleontologists, has established “Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources.” These guidelines establish detailed protocols for the assessment of the paleontological resource potential (i.e., “sensitivity”) of a project area and outline measures to follow in order to mitigate adverse impacts to known or unknown fossil resources during project development. Absent specific agency guidelines, most professional paleontologists adhere to the SVP assessment, mitigation, and monitoring requirements set forth in the SVP standard procedures.
3.11.3. ENVIRONMENTAL IMPACT ANALYSIS

SIGNIFICANCE CRITERIA

Based on the State CEQA Guidelines, Appendix G, the project would be considered to have a significant impact upon paleontological resources if it would:

a. Directly or indirectly destroy a unique paleontological resource or site or unique geological feature. (Impact PALEO-1)

IMPACTS AND MITIGATION

Impact PALEO-1. Loss of Paleontological Resources

Westlands Solar Park. The WSP plan area includes approximately 2,100 acres that are underlain by geologic units that have a high potential for paleontological resources. The remainder of the WSP plan area is underlain by materials with low sensitivity for paleontological resources at the surface, but with increasing sensitivity toward the older alluvial deposits beneath. The construction of solar generating facilities on these lands could potentially result in the destruction of paleontological resources. (Less-than-Significant Impact with Mitigation)

WSP Gen-Tie Corridors. The WSP gen-tie corridors are entirely underlain by surface deposits that have a low potential for paleontological resources; however, the surface units may overlie older geologic units that have a high potential for paleontological resources. The construction of the gen-tie projects could potentially result in the destruction of paleontological resources. (Less-than-Significant Impact with Mitigation)

This impact analysis addresses significance criterion ‘a’ above.

Westlands Solar Park

As discussed in Section 3.11.1. Environmental Setting, the Quaternary older alluvial (Qc) and former Tulare Lake deposits (Ql) located at the eastern and southeastern margins of the WSP plan area are considered to have a high paleontological resource potential because they have proven to yield vertebrate fossils near the WSP plan area and throughout California. Holocene-age alluvial and basin deposits (Qf, Qb) that underlie the majority of the WSP plan area are determined to have a low to high paleontological resource potential, with sensitivity increasing with depth. The surface material is generally too young or too coarse to preserve significant fossilized remains; however, younger alluvium may overlie the older sensitive geologic deposits at depth. The construction of solar facilities on lands with high paleontological sensitivity could result in the destruction of paleontological resources, which
would represent a *significant impact*. With implementation of Mitigation Measure PALEO-1 below, the impact would be reduced to *less than significant*.

**WSP Gen-Tie Corridors**

As discussed in Section 3.11.1. *Environmental Setting*, the Holocene alluvial (Qf) and basin Qb) deposits that occur along the gen-tie corridors are determined to have a low to high paleontological resource potential, with sensitivity increasing with depth. The surface material is generally too young or too coarse to preserve significant fossilized remains; however, younger alluvium may overlie older sensitive geologic deposits at depth. The construction of transmission facilities on lands with high paleontological sensitivity could result in the destruction of paleontological resources, which would represent a *significant impact*. With implementation of Mitigation Measure PALEO-1 below, the impact would be reduced to *less than significant*.

**Mitigation Measures:**

**Westlands Solar Park.** Implement MM PALEO-1.

**WSP Gen-Tie Corridors.** Implement MM PALEO-1.

**MM PALEO-1 Protection of Paleontological Resources.** In order to reduce the potential impacts to paleontological resources to less-than-significant levels, the following mitigation measures shall be implemented in conjunction with all ground disturbance and construction work.

a. **Workers Environmental Awareness Training.** Prior to any ground-disturbing activities, all field personnel shall receive a worker’s environmental awareness training module on paleontological resources. The training shall provide a description of the fossil resources that may be encountered in the project area, outline steps to follow in the event that a fossil discovery is made, and provide contact information for the Project Paleontologist and on-site monitor(s). The training shall be developed by the Project Paleontologist and may be conducted concurrent with other environmental training (e.g., cultural and natural resources awareness training, safety training, etc.).

b. **Prepare Paleontological Resource Management Plan (RPMP).** Prior to the commencement of ground-disturbing activities, a qualified and professional paleontologist shall be retained to prepare and implement a PRMP for the project. The PRMP shall describe mitigation recommendations in detail, including field reconnaissance methodology; paleontological monitoring procedures; communication protocols to be followed in the event that an unanticipated fossil discovery is made during project development; and preparation, curation, and reporting requirements. The PRMP shall include the mitigation procedures described below.
c. **Paleontological Reconnaissance Survey.** A qualified paleontologist shall be retained to conduct a field reconnaissance survey of the project area prior to any ground-disturbing activities. The purpose of the field survey will be to inspect the ground surface visually for exposed fossils or traces thereof and to further evaluate geologic exposures for their potential to contain preserved fossil material at the subsurface. The field survey shall be limited to project areas underlain by geologic units with a high paleontological sensitivity (e.g., Quaternary older alluvium [Qc] and lacustrine deposits [Ql]). Project areas underlain by geologic units with low sensitivity shall not be subject to the survey. Particular attention shall be paid to rock outcrops, both inside and in the vicinity of the project area, and any areas where geologic sediments are well exposed. Areas determined to be heavily disturbed or otherwise obscured by heavy vegetation, agriculture, or buildings, etc., will not require a ground reconnaissance survey and may be subject to a windshield survey.

d. **Document All Finds.** All fossil occurrences observed during the course of fieldwork, significant or not, shall be adequately documented and recorded at the time of discovery. The data collected for each fossil occurrence shall include, at minimum, the following information: Universal Transverse Mercator (UTM) coordinates, approximate elevation, description of taxa, lithologic description, and stratigraphic context (if known). In addition, each locality shall be photographically documented with a digital camera. If feasible, with prior consent of the landowner(s), all significant or potentially significant fossils shall be collected at the time they are observed in the field. If left exposed to the elements, fossil materials are subject to erosion and weathering. If the fossil discovery is too large to collect during the survey (e.g., a mammoth skeleton or bone bed) and requires a large-scale salvage effort, then it will be documented and a recovery strategy will be devised pursuant to Society of Vertebrate Paleontology (2010) guidelines.

e. **Conduct Paleontological Monitoring.** Monitoring entails the visual inspection of excavated or graded areas and trench sidewalls for evidence of fossils. Full-time monitoring shall be required during ground-disturbing activities in the portions of any project that are underlain by geologic units with high sensitivity for paleontological resources (e.g., Quaternary older alluvium [Qc]) and lacustrine deposits [Ql]). In addition, spot checking may also occur at the discretion of the Project Paleontologist in areas underlain by younger Quaternary alluvium deposits (e.g., Qf, Qb), in order to determine if underlying sensitive geologic units are being impacted by construction, and at what depth.

In the event that a paleontological resource is discovered, the monitor shall have the authority to divert the construction equipment around the find temporarily until it is assessed for scientific significance and collected. Monitoring efforts can be reduced or eliminated at the discretion of the Project Paleontologist if no fossil resources are encountered after 50 percent of the excavations are completed.
3. Environmental Setting, Impacts, and Mitigation Measures

3.11. Paleontological Resources

Monitoring is largely a visual inspection of sediments; therefore, the most likely fossils to be observed will be macrofossils of vertebrates (bones, teeth, tusk) or invertebrates (shells). At the discretion of the Project Paleontologist, the monitor shall periodically screen sediments to check for the presence of microfossils that can be seen with the aid of a hand lens (i.e., microvertebrates). Should microvertebrate fossils be encountered during the screening process, then bulk matrix samples will be taken for processing off site. For each fossiliferous horizon or paleosol, a standard sample (4.0 cubic yards or 6,000 pounds) shall be collected for subsequent wet screening per Society of Vertebrate Paleontology (2010) guidelines.

f. Procedures for Fossil Preparation, Curation, and Reporting. Upon completion of fieldwork, all significant fossils collected shall be prepared in a properly equipped paleontology laboratory to a point ready for curation. Preparation shall include the careful removal of excess matrix from fossil materials and stabilizing and repairing specimens, as necessary. Following laboratory work, all fossil specimens shall be identified to the lowest taxonomic level possible, cataloged, analyzed, and delivered to an accredited museum repository for permanent curation and storage. The cost of curation is assessed by the repository and is the responsibility of the project proponent.

At the conclusion of laboratory work and museum curation, a Paleontological Mitigation Report shall be prepared describing the results of the paleontological mitigation monitoring efforts associated with the project. The report shall include a summary of the field and laboratory methods, an overview of the project area geology and paleontology, a list of taxa recovered (if any), an analysis of fossils recovered (if any) and their scientific significance, the signed receipt of confirmation of museum deposition, and recommendations. The report shall be submitted to the designated museum repository, the project proponent, and other interested state and/or federal agencies involved within 45 days following completion of the monitoring and laboratory work.

Cumulative Impacts

Impact PALEO-2. Cumulative Impacts to Paleontological Resources

Westlands Solar Park. The WSP solar development would not make a cumulatively considerable contribution to paleontological resource impacts with mitigation; therefore, the WSP solar projects would not have a significant cumulative impact on paleontological resources. (Less-than-Significant Cumulative Impact with Mitigation)
WSP Gen-Tie Corridors. The gen-tie projects would not make a cumulatively considerable contribution to paleontological resource impacts with mitigation; therefore, the transmission projects would not have a significant cumulative impact on paleontological resources. *(Less-than-Significant Cumulative Impact with Mitigation)*

**Geographic Scope of Cumulative Impact Analysis**

The potential for cumulative destruction of paleontological resources is statewide in scope and impact. For purposes of this analysis, the geographic scope of the cumulative impact analysis for paleontological resources with respect to the WSP solar development and the WSP gen-tie projects is Kings County and southwestern Fresno County. The near-term cumulative projects considered in this analysis are shown in Figures PD-9 and PD-10, and are listed in Tables PD-9 and PD-10. For purposes of the far-term cumulative analysis, the buildout of the designated urban land uses under the Kings County and Fresno County General Plans, as well as buildout under the General Plans of incorporated cities in the vicinity, serves to define the nature and location of cumulative land uses anticipated under far-term conditions.

**Westlands Solar Park**

**Near Term**

Since most of the geologic units that underlie the valley floor have a low potential for paleontological resources, the probability that any given project will encounter previously unknown paleontological resources is low. However, the areas that are underlain by lacustrine deposits (Ql) of the lakebed and margins of former Tulare Lake, as well as areas with exposures of older alluvium (Qc), have a high potential for paleontological resources. Some project sites in Kings County, such as the Quay Valley project site, are partially underlain by lacustrine deposits and therefore have a high potential for paleontological resources. While Kings County does not have any policies or regulations that address protection of paleontological resources, the County’s implementation of CEQA review for all solar projects is expected to provide for appropriate mitigation, similar to that set forth in Mitigation Measure PALEO-1 above, for projects located in paleontologically sensitive areas. It is reasonable to assume that such mitigation would be effectively implemented at each affected project site, such that the cumulative impact to paleontological resources would be less than significant. At WSP solar project sites that are underlain by paleontologically sensitive geologic units, it is expected that Mitigation Measure PALEO-1 would be fully and effectively implemented. Thus, the near-term cumulative impact to paleontological resources would be *less than significant with mitigation*. In any case, the contribution from the WSP solar development to any cumulative impacts would be *not cumulatively considerable with mitigation*.

**Far Term**

It is expected that most development under the general plans would occur outside of the paleontologically sensitive geologic units such as lacustrine (Ql) and older Alluvium (Qc). For projects that are proposed for sites with high potential for paleontological resources, it is expected that the CEQA reviews required for those projects would provide for effective protection of any inadvertent fossil discoveries, such that the cumulative impact to paleontological resources would be less than significant. The final solar projects within WSP are expected to be completed by 2030. If any of those WSP solar sites are underlain by paleontologically sensitive geologic units, it is expected that Mitigation Measure PALEO-1 above would be
fully and effectively implemented. Thus, the far-term impact to paleontological resources associated with WSP solar development would be *cumulatively less than significant with mitigation*. In any event, the contribution from the WSP solar development to any cumulative impacts would be *not cumulatively considerable with mitigation*.

**WSP Gen-Tie Corridors**

**Near-Term**
The WSP gen-tie corridors pass mainly over alluvial fan deposits (Qf), with the eastern ends of both gen-tie corridors underlain by basin deposits (Qb). The younger alluvium of the valley floor has low potential for paleontological resources at the surface, with increasing sensitivity with depth toward the older alluvial deposits beneath.

During the course of CEQA reviews, proposed projects would be required to undergo evaluation of paleontological sensitivity and identification of appropriate mitigation measures to avoid destruction of paleontological resources. It is expected that near-term cumulative projects would be subject to paleontological mitigation measures similar to those set forth in Mitigation Measure PALEO-1 above. Therefore, it is reasonable to assume that each cumulative project would avoid destruction of paleontological resources, and reduce the project impact to less-than-significant levels. Therefore, cumulative impacts to paleontological resources in conjunction with the WSP gen-tie projects in the near term are anticipated to be *less than significant*. In any event, since the WSP gen-tie projects would avoid impacts to paleontological resources through implementation of Mitigation Measure PALEO-1 above, the contribution of WSP gen-tie projects to any cumulative impact to paleontological resources in the near term would be *not cumulatively considerable with mitigation*.

**Far Term**
Far-term development in the vicinity of the transmission corridors could potentially result in cumulatively significant impacts to paleontological resources. However, as discussed above for near-term conditions, it is anticipated that the CEQA reviews for each project would ensure that projects are evaluated for paleontological sensitivity, and that mitigation measures similar to those set forth in Mitigation Measure PALEO-1 above would be required as appropriate to avoid destruction of paleontological resources. Therefore, cumulative impacts to paleontological resources in conjunction with the WSP gen-tie projects in the far term are anticipated to be *less than significant*. In any event, since the WSP gen-tie projects would avoid impacts to paleontological resources through implementation of Mitigation Measure PALEO-1 above, the contribution of the WSP gen-tie projects to any cumulative impact in the far term would be *not cumulatively considerable with mitigation*.

**Mitigation Measures:**

**Westlands Solar Park.** Implement MM PALEO-1. No additional mitigation is required

**Westlands Transmission Corridors.** Implement MM PALEO-1. No additional mitigation is required.
REFERENCES/BIBLIOGRAPHY – PALEONTOLOGICAL RESOURCES


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