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4.8 Paleontological Resources

This section describes the potential impacts to paleontological resources during the construction and operation of the Project and meets the siting regulations of the California Energy Commission and the Society of Vertebrate Paleontology (SVP 2010) guidelines for successful mitigation of adverse impacts to paleontological resources. Paleontological resources are the remains or traces of plants and animals that are preserved in Earth's crust, and per the SVP (2010) guidelines, are older than written history or older than approximately 5,000 years (middle Holocene). They are limited, nonrenewable resources of scientific and educational value.

This paleontological resources inventory, evaluation, and impact assessment was prepared by Dudek Paleontological Principal Investigator, Michael Williams, Ph.D., with editorial comments by Dudek Paleontological Principal Investigator, Ms. Sarah Siren, M.Sc. The information presented in the following sections is based on a paleontological survey of the Project site, available geological mapping, review of the site-specific geotechnical report, and a geological and paleontological literature review. This paleontological resources assessment and evaluation includes the following elements: Section 4.8.1 discusses the affected environment including the resource inventory methods and results; Section 4.8.2 presents the environmental analysis of the Project site; Section 4.8.3 considers the cumulative effects of Project implementation on paleontological resources; Section 4.8.3 provides mitigation measures to protect paleontological resources; Section 4.8.5 presents the applicable laws, ordinances, regulations, and standards (LORS) protecting paleontological resources: 4.8.6 lists agencies and agency contacts: Section 4.8.7 lists permits and permit schedule; and references cited are provide in Section 4.8.8.

4.8.1 Affected Environment

This section describes the affected environment for paleontological resources within the Project site and includes a description of the physiographic and geological setting; resource inventory methods and results; mapped geological units/formations present within the Project site; and the results of the paleontological records search, literature review, and paleontological survey.

4.8.1.1 Physiographic and Geologic Setting

The Project study area lies within the Peninsular Ranges Geomorphic Province (California Geological Survey 2002). This province extends from the tip of the Baja California Peninsula to the Transverse Ranges (the San Gabriel and San Bernardino Mountains) and includes the Los Angeles Basin, offshore islands (Santa Catalina, Santa Barbara, San Nicholas, and San Clemente), and the continental shelf. The eastern boundary is the Colorado Desert Geomorphic Province (California Geological Survey 2002; Morton and Miller 2006). The ancestral Peninsular Ranges were formed by uplift of plutonic igneous rock resulting from the subduction of the Farallon Plate underneath the North American Plate during the latter portion of the Mesozoic era (approximately 90 to 125 million years ago [mya]) (Abbott 1999).

More specifically, the Project site is situated within the Capistrano Embayment, which is a flat-bottomed structural trough formed by the downward displacement along the west side of the Cristianitos Fault and down-warping along the east side of the San Joaquin Hills. The embayment was subsequently in-filled with marine siltstone and clayey siltstone of the late Miocene to early Pliocene (approximately 5 to 15 million years old) Capistrano Formation. This sedimentary unit, in excess of 3,000 feet thick near the center of the embayment, was uplifted, folded, and eroded in Pliocene and post-Pliocene times (approximately 2 to 3 million years ago) producing the low, rolling ridges

observed today. More recently, the local geology has also been influenced by a drop in sea level resulting in a series of abandoned terrace deposits, both marine and non-marine.

4.8.1.2 Resource Inventory Methods

This study 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 paleontological survey of the Project site. The paleontological resources records search was requested from the Natural History Museum of Los Angeles County (NHMLA 2023) on March 17, 2023, and the paleontological resources survey was conducted by Dudek field paleontologist, David Alexander, on March 28, 2023. The NHMLA paleontological resources records search, survey for paleontological resources, and map and literature review were conducted to identify the geological units onsite, determine if any previously recorded fossil localities are present within or nearby the Project site, and determine the paleontological resources sensitivity or potential of the geological units present within the Project site to make recommendations for future management considerations for the protection of significant paleontological resources if necessary.

4.8.1.3 Resource Inventory Results

4.8.1.3.1 Geological Units Within the Project Site

According to surficial geological mapping at a scale of 1:100,000 by Morton and Miller (2006a) and the International Chronostratigraphic Chart of Cohen et al. (2023), the Project site is underlain Holocene (< 11,700 years ago) to late Pleistocene (approximately 11,700 to 129,000 years ago) young axial-channel deposits (map unit Qya) and questionable young landslide deposits and confirmed young landslide deposits (map units ?Qyls and Qyls), with the Pliocene (approximately 3.6 million years ago [mya] to 5.3 mya) Niguel Formation (map unit Tn) and early Pliocene (approximately 3.6 mya) to late Miocene (approximately 5.3 mya to 11.63 mya) siltstone facies of the Capistrano Formation (map unit Tcs) mapped in the hills to the east, just outside the Project site boundary (Figure 4.4-2).

Site-specific geotechnical exploration was performed within the Project boundary to characterize the site-specific surface and subsurface conditions and a report was prepared to document results (see Attachment 4.4A, Geotechnical Evaluation Report). The Project's subsurface exploration included 30 test borings to approximate depths ranging between 5 and 101.5 feet below existing ground surface (bgs) within and adjacent to the proposed BESS facility footprint. Review of the geotechnical borings, which extended to a maximum depth of 101.5 feet bgs within the current Project site, indicated the Project site is underlain by alluvial sediments ranging from lean clays, sandy clays, silt, silty clays, silty clayey sands, silty sands, clayey sands, silty sands. No sedimentological indicators, such as caliche, were listed that would indicate the age of the sediments. However, white mottling, which could be calcium carbonate (caliche) was reported in boring B-1 at a depth of approximately 8 feet bgs, in boring B-7 at a depth of 15 feet bgs, in boring B-8 at a depth of 10 feet bgs, in boring B-9 at a depth of 25 feet bgs, in boring B-14 at a depth of 3 feet bgs, B-15 at a depth of 15 feet bgs, and in boring B-21 at a depth of 3 feet bgs. In addition, rust-stained (oxidized) sediments, which could also be indicative of older sediments, were logged in boring B-7 at a depth of 2.5 feet bgs, in boring B-19 at a depth of 15 feet bgs, in boring B-14 at a depth of 3 feet bgs, in boring B-15 at a depth of 7.5 feet bgs, in boring B-16 at a depth of 5 feet bgs, in borings B-17 and B-19 at a depth of 20 feet bgs, and boring B-20 at a depth of 8 feet bgs (Attachment 4.4A, Geotechnical Evaluation Report). The Capistrano Formation was encountered in the following borings within the Project site: boring B-14 at a depth of 30 feet bgs, boring B-15 at a depth of 60 feet bgs, and boring B-19 at a depth of 26.5 feet bgs

4.8.1.3.2 Results of the Paleontological Records Search and Literature Review

The NHMLA paleontological resources records search results were received on March 26, 2023. The museum reported one fossil locality from within the former Project site (LACM [Los Angeles County Museum] IP [Invertebrate Paleontology] 6303) that produced uncatalogued fossil invertebrate specimens from the Capistrano Formation on the surface (NHMLA 2023). This locality is outside the updated Project site boundary. In addition to this locality, the NHMLA reported other nearby Capistrano Formation localities, including LACM VP (Vertebrate Paleontology) 4979-4983 and LACM IP 6300-6302, 6304-6306, 6308, and 6310-6320, which produced unspecified uncatalogued vertebrate and invertebrate fossils collected at an unknown depth below the ground surface (bgs) during excavations for a housing development in San Juan Capistrano. LACM VP 5502-5505 yielded whale fossils from an unknown depth bgs just south-southwest of the Project site in Laguna Niguel; LACM VP 5002 produced a fossil mysticete (baleen whale) north-northeast of the Project site from the surface within landslide deposits; and LACM VP 3806 yielded fossil whale from a roadcut west of the Project site, also in Laguna Niguel (NHMLA 2023). The final Capistrano Formation locality reported by the NHMLA, LACM VP 5792 and 5889, produced numerous cartilaginous fishes (sharks and rays), sheephead (*Semicossyphus pukcher*), several bird taxa, sea lion (*Otorinae*), eared seal (*Otoriidae*), walrus subfamily (*Odobeninae*), dugong family (*Dugongidae*), numerous cetaceans (whales and dolphins), and nonmarine taxa, including pond turtle (*Clemmys marmorata*), elephant order (*Proboscidea*), antelope family (*Antelocapridae*), and camel family (*Camelidae*). These fossils were collected during a housing construction Project, east of Interstate 5, in San Juan Capistrano (NHMLA 2023). The NHMLA reported one Pleistocene fossil locality, LACM VP 1215, that produced shark and unspecified mammals from the surface of a streambed in Oso Creek, north of the Project site in San Juan Capistrano.

In his compilation of late Quaternary vertebrate fossils from California, Jefferson (1991) reported numerous fossils from Pleistocene deposits in south Orange County. One Pleistocene fossil locality in San Juan Capistrano produced a bottlenose dolphin (*Tursiops* sp.). Nearby fossil localities in Laguna Niguel yielded the following Pleistocene taxa: ground sloth (*Paramylodon* sp.), mastodon (*Mammut* sp.), mammoth (*Mammuthus* sp.) horse (*Equus* sp.), tapir (*Tapirus* sp. cf. *T. californicus* and *Tapir* sp.), horse (*Equus* sp. [large size]), deer (*Odocoileus hemionus*), and bison (*Bison* sp.) During excavations in Laguna Hills, paleontologists recovered frogs (*Bufo boreas* and *Rana aurora*), salamander (*Aneides lugubris*), turtles (cf. *Clemmys marmorata* and *Gopherus* sp.), lizards (*Sceloporus* sp. and *Cnemidophorus* sp.), snakes (*Crotalus viridis* and *Pituophis melanoleucas*), birds (*Anas* sp. *Buteogallus* sp., *Callipepla* sp., *Fulica* sp. cf. *F. americana*, *Athene* sp., and Passeriformes), ground sloth (*Paramylodon* sp. cf. *P. harlani*), shrew (*Notiosorex crawfordi*), rabbit/hare (*Sylvilagus* sp. cf. *S. bachmani, S. audubonii,* and *Lepus* sp. cf. *L. californicus*), rodents (*Spermophilus beecheyi, Thomomys bottae, Dipodomys* sp., *Perognathus* sp. cf. *P. californicus, Reithrodontomys* sp. cf. *R. humulus, Peromyscus maniculatus,Neotoma* sp., *Microtus* sp., and *Ondatra* sp.), carnivorous mammals (*Canis* sp. cf. *C. latrans, Canis* sp. cf. *C. dirus*, *Mustela frenata,* and *Smilodon* sp. cf. *S. fatalis*), mammoth (*Mammuthus columbi*), small and large horses (cf. *Equus* sp. and *Equus* sp.), camels (*Camelops* sp. cf. *C. hesternus* and *Hemiauchenia* sp.), deer (Cervidae), antelope (*Capromeryx* sp.), and bison (*Bison latifrons* and *B. antiquus*) (Jefferson 1991). Other south Orange County fossil sites include a Dana Point locality, which produced mammoth (*Mammuthus* sp.) and bison (*Bison* sp.) and four San Clemente fossil localities, which produced fish (Osteichthyes), salamander (*Plethodontidae*), turtle (*Chelonia*), Lizard (*Gerrhonotus multicarinatus*), snakes (*Pituophis melanoleucus, Tantilla* sp*., Thamnophis* sp. cf. *T. couchii, Lampropeltis getulus, Salvadora* sp. or *Coluber constrictor*), birds (*Lophortyx californicus* and *Zonotrichia* sp.), ground sloths (*Nothrotheriops shastensis*, *Nothrotheriops* sp., and *Paramylodon* sp.), shrews (*Sorex* sp. cf. *S. ornatus, Sorex* sp*., and* cf. *Sorex* sp.), mole (? *Scapanus* sp.), rabbit (*Sylvilagus* sp.), rodents (*Thomomys* sp., cf. *Thomomys* sp., *Perognathus* sp., cf. *Dipodomys* sp., *Peromyscus* sp. cf. *P. boylii*, *Peromyscus* sp. cf. *P. maniculatus*, *Peromyscus* sp., cf. *Peromyscus* sp., *Microtus*

californicus, and rodentia), mammoth (*Mammuthus columbi* and *Mammuthus* sp.), horses (*Equus* sp. cf. *E. occidentalis* and *Equus* sp.), camel (*Camelops* sp.), bison (*Bison* sp. cf. *B. latifrons* and *Bison* sp.) (Jefferson 1991).

The early Pliocene to late Miocene Capistrano Formation commonly produces significant invertebrate and vertebrate fossils within Orange County. Named for an exposed section near the city of San Juan Capistrano and exposed in the hills to the west of the Project, the Capistrano Formation consists of one formal member (the Oso Member = the Oso Sand) and one informal named facies (the siltstone facies) (Morton and Miller 2006). The siltstone facies is comprised of gray siltstones and mudstones that were deposited in an embayment of moderate depth, approximately five to seven million years ago. Both the Oso Member and siltstone facies consistently produce abundant, scientifically significant invertebrate and vertebrate fossil remains in Orange County (Barboza et al. 2017). One example of an exceptional discovery from the siltstone facies of the Capistrano Formation was the recovery of a new genus and species of pinniped, *Gomphotaria pugnax*, which was salvaged during construction related excavations in 1980 (Barnes and Raschke 1991). During excavations for a construction project in Laguna Niguel the author of this chapter recovered fossil bivalve specimens, *Lucinoma* sp, and a gastropod (an abalone), *Haliotis* sp., that were accessioned into the John D. Cooper Center, an Orange County repository for fossils and artifacts (Williams, pers. obs., 2013). In addition, during project excavations for a church expansion in San Clemente, the author of this report salvaged fossil baleen whale vertebrae and ribs, with some articulated in a very large siltstone boulder (Williams, pers. Obs., 2011). Through consultation with the NHMLA, it was determined the fossil specimen was not well enough preserved to warrant accessioning into a repository. The fossils were donated to the church, which also has a school associated with it, to be used as an educational resource.

4.8.1.3.3 Results of the Field Survey

The Project site terrain consists of a moderately sloping hillside in the west and a gently sloping alluvial plain in the east, with a dense cover of grasses and wild mustard. Much of the ground surface was obscured by vegetation when the survey was conducted on March 28, 2023. A large eroded area along the western flank of Oso Creek provided a glimpse into the subsurface sediments of the alluvial plain. No fossils were discovered during the intensive survey for paleontological resources.

4.8.1.4 Paleontological Sensitivity of the Project Site

Geological units are evaluated based on their paleontological sensitivity or potential to produce fossils. Several classification schemes exist for the assessment of geological units (e.g., BLM, County of San Diego, etc.); however, this study utilizes the SVP (2010) criteria. Table 4.8-1 below provides definitions for high, low, undetermined, and no paleontological resource potential, or sensitivity, as set forth in and by the SVP (2010) guidelines.

Table 4.8-1. Paleontological Resource Sensitivity Criteria

Resource Sensitivity / Potential	Definition
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 Potential	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.

Source: SVP (2010)

Through the analysis of the site-specific geological units mapped on the surface and at depth, the paleontological sensitivity/potential of the geologic units underlying the Project site were determined in accordance with criteria set forth by SVP (2010) and the results of the paleontological literature review, NHMLAC records search, and field reconnaissance survey. The following describes the paleontological sensitivity of the geologic units underlying the Project area:

- Young axial-channel deposits (Qya): The Holocene to late Pleistocene young axial channel deposits present on the western side of the Project site are considered to have low paleontological sensitivity/potential on

the surface, owing to their young age. However, these deposits are commonly underlain by older geological units having high paleontological sensitivity or potential (e.g., Pleistocene alluvial deposits or sedimentary geological formations such as the Capistrano Formation in this area) at variable depths bgs. Given the presence of sedimentological indicators logged in the geotechnical borings for the Project, this geological unit is considered to have high paleontological sensitivity or potential below a depth of five feet bgs within the Project site.

- **Young Landslide Deposits (Qyls):** The Holocene to Pleistocene young landslide deposits are mapped on the surface of the southwest portion of the Project site and are considered to have low paleontological sensitivity due to the young age and any fossils transported within the landslide deposit are no longer in situ. However, the geotechnical boring log for the borehole drilled in the area mapped as young landslide deposits indicated they are young axial-channel deposits that are underlain by the Capistrano Formation at a depth of 30 feet bgs at borehole B-14. Therefore, areas of the Project site mapped as young landslide deposits are assigned low paleontological sensitivity on the surface increasing to high paleontological sensitivity or potential below a depth of five feet bgs.
- **Questionable Young Landslide Deposits (?Qyls):** The Holocene to late Pleistocene questionable young landslide deposits are considered to have undetermined paleontological sensitivity; however, given the potential for these deposits to undisturbed Capistrano Formation sediments, they are assigned high paleontological sensitivity or potential.
- **The Capistrano Formation (Siltstone Facies):** While not mapped on the surface within the Project site, the early Pliocene to late Miocene siltstone facies of the Capistrano Formation is present in the subsurface as indicated in the geotechnical borings. This formation has produced numerous significant paleontological resources in this portion of Orange County and is assigned high paleontological sensitivity or potential.

4.8.2 Environmental Analysis

The Project site is underlain on the surface by Holocene to late Pleistocene axial-channel deposits, landslide deposits, and questionable landslide deposits and the Capistrano Formation at depth. The following subsections present environmental effects to paleontological resources from construction and operation of the Project.

4.8.2.1 Paleontological Resource Significance Criteria

The CEQA Guidelines (15 CCR 15000 et seq.) require that all private and public activities not specifically exempted be evaluated against the potential for environmental damage, including effects to paleontological resources. Section VII(f) of CEQA Guidelines Appendix G, the "Environmental Checklist Form," which addresses the potential for adverse impacts to paleontological resources and unique geological features, asks the question "Would the Project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?"

The analysis provided herein affirms that the answer to the question is yes, that there is the potential for the Project to directly or indirectly destroy a unique paleontological resource or site. Significant paleontological resources are defined by SVP (2010) as "…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." Scott and Springer (2003) define significant paleontological resources as displaying one or more of the following criteria:

1. The fossils provide data on the evolutionary relationships and developmental trends among organisms, both living and extinct;

2. The fossils provide data useful in determining the age(s) of the rock unit or sedimentary stratum, including data important in determining the depositional history of the region and the timing of geologic events therein;
3. The fossils provide data regarding the development of biological communities or interaction between paleobotanical and paleozoological biotas;
4. The fossils demonstrate unusual or spectacular circumstances in the history of life; and/or
5. The fossils are in short supply and/or in danger of being depleted or destroyed by the elements, vandalism, or commercial exploitation, and are not found in other geographic locations."

They go on to state that "*All identifiable paleontologic resources are always potentially significant."* However, some paleontological resources, such as foraminifera, diatoms, and radiolarians, are not considered significant under CEQA due to their commonness in the fossil record. In addition, the degree of preservation of fossil remains plays a role in determining their significance.

4.8.2.2 Paleontological Resource Impact Assessment

4.8.2.2.1 Young Axial-Channel Deposits

While generally considered too young on the surface to preserve fossils and therefore assigned low paleontological sensitivity or potential, young axial-channel deposits can be underlain by older, Pleistocene axial-channel or alluvial deposits or the Capistrano Formation in this area that have high paleontological sensitivity or potential. Given this, young axial-channel deposits are assigned low paleontological sensitivity or potential from the surface to a depth of five feet bgs, where the sensitivity or potential increases to high. If ground disturbing activities are planned below a depth of five feet bgs in areas underlain by this geological unit, implementation of the recommended mitigation measures would reduce the impacts to paleontological resources below a significant level.

4.8.2.2.2 Young Landslide Deposits

While generally considered to have low paleontological sensitivity throughout their stratigraphic extent due to the young age and prior movement displacing fossils from their original place of deposition, the young landslide deposits mapped within the Project site, are likely young axial-channel deposits, as indicated by the geotechnical borings, and therefore, are assigned low paleontological sensitivity or potential on the surface to a depth of five feet bgs, where they are assigned high paleontological sensitivity or potential. If ground disturbing activities are planned below a depth of five feet bgs in areas mapped as being underlain by this geological unit, implementation of the recommended mitigation measures would reduce the impacts to paleontological resources below a significant level.

4.8.2.2.3 Questionable Young Landslide Deposits

Given the questionable nature of the young landslide deposits mapped in the northwestern portion of the Project site, they are assigned high paleontological sensitivity or potential throughout their stratigraphic extent. If they are not landslide deposits, they are likely undisturbed Capistrano Formation deposits that have high paleontological sensitivity or potential. If ground disturbing activities are planned in areas mapped as being underlain by this geological unit, implementation of the recommended mitigation measures would reduce the impacts to paleontological resources below a significant level.

4.8.2.2.4 Siltstone Facies of the Capistrano Formation

The early Pliocene to late Miocene Siltstone Facies of the Capistrano Formation has a proven track record of producing significant invertebrate and vertebrate fossils and thus is assigned high paleontological sensitivity or potential throughout its geographic and stratigraphic extent. If ground disturbing activities are planned in areas mapped as being underlain by this geological unit, implementation of the recommended mitigation measures would reduce the impacts to paleontological resources below a significant level.

4.8.3 Cumulative Effects

Potential cumulative impacts to paleontological resources would result from projects that combine to create an environment where fossils, exposed on the surface, are vulnerable to destruction by earthmoving equipment, looting by the public, and natural causes such as weathering and erosion. The majority of impacts to paleontological resources are site-specific and are therefore generally mitigated on a project-by-project basis. Cumulative projects would be required to assess impacts to paleontological resources. Additionally, as needed, projects would incorporate individual mitigation for site-specific geological units present on each individual project site. Furthermore, the Project does not propose construction (including grading/excavation) or design features that could directly or indirectly contribute to an increase in a cumulative impact to paleontological resources, as the mitigation measure provided in this analysis ensures any significant paleontological resources uncovered during Project excavations would be properly analyzed and salvaged by the on-site paleontological monitor. Therefore, the Project, in combination with the past, present, and reasonably foreseeable future projects in the Project vicinity, would result in less-than-significant cumulative impacts to paleontological resources, and no further mitigation measures are required. Moreover, impacts to paleontological resources would be avoided and/or mitigated with implementation of a paleontological mitigation program during excavations into paleontologically sensitive geological units. Therefore, the Project's contribution to cumulative impacts would not be cumulatively considerable. As such, cumulative impacts on paleontological resources would be less than significant.

4.8.4 Mitigation Measures

The mitigation measures proposed below comply with CEC environmental guidelines and adhere to SVP standard guidelines for successful mitigation of potential impacts to paleontological resources during Project construction. Implementation of these mitigation measures assures that potential impacts from Project-related ground disturbance to paleontological resources will be insignificant.

4.8.4.1 Project Paleontological Resources Specialist

Prior to the issuance of grading permits, the Project applicant shall retain a Paleontological Resources Specialist (PRS) who meets or exceeds the standards outlined by the Society of Vertebrate Paleontology. The Applicant shall provide the name and contact information of the PRS to the construction management team, cultural resource monitors, and Project compliance manager. The PRS will prepare a paleontological resources awareness module (PRAM) as part of the worker education program.

4.8.4.2 Construction Personnel Education

The PRS will present PRAM training to all construction personnel involved in ground disturbing activities and their supervisors prior to their working on the Project. The PRS will inform workers that they may encounter fossils and

will provide workers with information on the types of fossils that may be encountered during Project construction, laws protecting paleontological resources, the role of paleontological monitors, and proper notification procedures if fossil discoveries are made. Construction personnel may receive subsequent paleontological trainings via video presentation and/or hard-copy training materials.

4.8.4.3 Develop and Implement a Paleontological Resources Monitoring and Mitigation Plan

Prior to the start of construction, the PRS shall prepare a Paleontological Resources Monitoring and Mitigation Plan (PRMMP) for CEC review and approval. The PRMMP shall be consistent with the 2010 SVP guidelines and contain the following components:

- Introduction to the Project, including Project location, description of grading activities with the potential to impact paleontological resources, and underlying geologic units
- Requirements for the PRS or their representative to attend the pre-construction meeting and provide worker environmental awareness training at the jobsite the day grading is to be initiated or via a pre-recorded worker awareness training program
- Identification of where paleontological monitoring is required within the Project site for excavations with the potential to impact paleontologically sensitive geological units. This includes deep (>5 feet below the ground surface) excavations into Holocene to late Pleistocene young axial channel deposits and young landslide deposits and all excavations into questionable young landslide deposits and the Capistrano Formation. The amount of paleontological monitoring will be determined based on construction plans and/or geotechnical reports and the PRS professional judgement
- Procedures for paleontological monitoring (including necessary monitoring equipment), methods for treating fossil discoveries, fossil recovery procedures, and sediment sampling for microvertebrate fossils.
- Paleontological reporting and collections management:
  - Prepared fossils along with copies of all pertinent field notes, photos, maps, and the final paleontological monitoring report discussed below shall be deposited in a scientific institution with paleontological collections such as the Cooper Center in Santa Ana or the Natural History Museum of Los Angeles County within 90 days of completion of monitoring unless the applicant and the qualified paleontologist determine the extent of fossils recovered will require more preparation, stabilization, and/or curatorial time. Any laboratory or curation costs shall be paid for by applicant.

4.8.4.4 Develop a Final Paleontological Resources Report

Following construction for the Project, a final paleontological monitoring report shall be completed by the PRS. If there were no fossils salvaged that require curation at a paleontological repository, then a final monitoring memorandum detailing the monitoring program will suffice. If significant fossils are recovered, the report shall include discussions of the methods used, stratigraphy exposed, fossils collected, and significance of recovered fossils, and shall be submitted to the designated scientific institution within 90 days of the completion of monitoring unless the CEC and the qualified paleontologist determine the extent of fossils recovered will require more preparation, stabilization, and/or curatorial time. The applicant shall submit the final monitoring memorandum or report to the CEC.

4.8.5 Laws, Ordinances, Regulations, and Standards

Paleontological resources are nonrenewable resources of scientific and educational value that are protected by federal, state, and local laws.

4.8.5.1 Federal LORS

4.8.5.1.1 Paleontological Resources Preservation Act of 2009

The Omnibus Public Land Management Act, Paleontological Resource Preservation Subtitle (16 U.S.C. 470aaa et seq.) directs the Secretaries (Interior and Agriculture) to manage and protect paleontological resources on federal land using scientific principles and expertise. (This act is known by its common name, the Omnibus Act or the Paleontological Resources Preservation Act [PRPA].) The PRPA incorporates most of the recommendations of the report of the Secretary of the Interior titled "Assessment of Fossil Management on Federal and Indian Lands" to formulate a consistent paleontological resources management framework. In passing the PRPA, Congress officially recognized the scientific importance of paleontological resources on some federal lands by declaring that fossils from these lands are federal property that must be preserved and protected. The PRPA codifies existing policies of the BLM, National Park Service (NPS), U.S. Forest Service (USFS), Bureau of Reclamation, and the U.S. Fish and Wildlife Service, and provides the following:

- Uniform criminal and civil penalties for illegal sale and transport, and theft and vandalism of fossils from federal lands.
- Uniform minimum requirements for paleontological resource-use permit issuance (terms, conditions, and qualifications of applicants).
- Uniform definitions for "paleontological resources" and "casual collecting."
- Uniform requirements for curation of federal fossils in approved repositories.

Federal legislative protections for scientifically significant fossils apply to projects that take place on federal lands (with certain exceptions, such as the Department of Defense, which continue to protect paleontological resources under the Antiquities Act). Such protections involve federal funding, require a federal permit, or involve crossing state lines.

4.8.5.1.2 Antiquities Act of 1906 (16 U.S.C. 431-433)

The Antiquities Act of 1906 states, in part:

> … any person who shall appropriate, excavate, injure or destroy any historic or prehistoric ruin or monument, or any object of antiquity, situated on lands owned or controlled by the Government of the United States, without the permission of the Secretary of the Department of the Government having jurisdiction over the lands on which said antiquities are situated, shall upon conviction, be fined in a sum of not more than five hundred dollars or be imprisoned for a period of not more than ninety days, or shall suffer both fine and imprisonment, in the discretion of the court.

Although there is no specific mention of natural or paleontological resources in the Antiquities Act, or in the act's uniform rules and regulations (43 Code of Federal Regulations [CFR] 3]), "objects of antiquity" has been interpreted to include fossils by the NPS, BLM, USFS, and other federal agencies. Permits to collect fossils on lands

administered by federal agencies are authorized under this act. Therefore, projects involving federal lands will require permits for both paleontological resource evaluation and mitigation efforts.

4.8.5.1.3 Archaeological and Paleontological Salvage (23 U.S.C. 305)

Statute 23 U.S.C. 305 amends the Antiquities Act of 1906. Specifically, it states:

> Funds authorized to be appropriated to carry out this title to the extent approved as necessary, by the highway department of any State, may be used for archaeological and paleontological salvage in that state in compliance with the Act entitled "An Act for the preservation of American Antiquities," approved June 8, 1906 (PL 59-209; 16 U.S.C. 431-433), and State laws where applicable.

This statute allows funding for mitigation of paleontological resources recovered pursuant to federal aid highway projects, provided that "excavated objects and information are to be used for public purposes without private gain to any individual or organization" (Federal Register [FR] 46[19]: 9570).

4.8.5.1.4 National Registry of Natural Landmarks (16 U.S.C. 461-467)

The National Natural Landmarks (NNL) program, established in 1962, is administered under the Historic Sites Act of 1935. Regulations were first published in 1980 under 36 CFR 1212 and the program was re-designated as 36 CFR 62 in 1981. A National Natural Landmark is defined as:

> … an area designated by the Secretary of the Interior as being of national significance to the United States because it is an outstanding example(s) of major biological and geological features found within the boundaries of the United States or its Territories or on the Outer Continental Shelf (36 CFR 62.2).

National significance describes:

> … an area that is one of the best examples of a biological community or geological feature within a natural region of the United States, including terrestrial communities, landforms, geological features and processes, habitats of native plant and animal species, or fossil evidence of the development of life (36 CFR 62.2).

Federal agencies and their agents should consider the existence and location of designated NNLs, and of areas found to meet the criteria for national significance, in assessing the effects of their activities on the environment under Section 102(2)(c) of the National Environmental Policy Act (NEPA) (42 U.S.C. 4321). The NPS is responsible for providing requested information about the National Natural Landmarks Program for these assessments (36 CFR 62.6[f]). However, other than consideration under NEPA, NNLs are afforded no special protection. Furthermore, there is no requirement to evaluate a paleontological resource for listing as an NNL. Finally, project proponents (state and local) are not obligated to prepare an application for listing potential NNLs, should such a resource be encountered during project planning and delivery.

Examples of geological and paleontological NNLs in California include:

- **Imperial Sand Hills:** Imperial Sand Hills is one of the largest dune patches in the United States. It is an outstanding example of dune geology and ecology in an arid land. (Designated: 1966. Ownership: federal, private.)

- **Eureka Dunes:** Eureka Dunes, located within Death Valley National Park, is an excellent example of aeolian (wind) geological processes. It is the tallest dune complex in the Great Basin biophysiographic province. The site contains an endangered grass genus, one species of which is the only plant capable of surviving on and stabilizing the steep dune slopes. (Designated: 1983. Ownership: federal.)
- **Amboy Crater:** Amboy Crater is an excellent example of a recent volcanic cinder cone with an unusually flat crater floor. (Designated: 1973. Ownership: federal, private.)
- **Rainbow Basin:** Comprised of deep erosion canyons with rugged rims, Rainbow Basin is an outstanding example of geologic processes. The site also contains significant fossil remains and traces (e.g., footprints) of Miocene plants, insects, and land mammals. (Designated: 1966. Ownership: federal.)

4.8.5.1.5 National Historic Preservation Act of 1966 (NHPA; 16 U.S.C. 470)

Section 106 of the NHPA does not apply to paleontological resources unless the paleontological specimens are found in culturally related contexts (e.g., fossil shell included as a mortuary offering in a burial or a culturally related site such as petrified wood locale used as a chipped stone quarry). In such instances the materials are considered cultural resources and are treated in the manner prescribed for the site in question; mitigation being almost exclusively limited to sites determined eligible for, or listed on, the National Register of Historic Places. Cooperation between the cultural resource and paleontological disciplines is expected in such instances.

4.8.5.2 State LORS

4.8.5.2.1 California Environmental Quality Act

The CEQA Guidelines (15 CCR 15000 et seq.) require that all private and public activities not specifically exempted be evaluated against the potential for environmental damage, including effects to paleontological resources. Paleontological resources, which are limited, nonrenewable resources of scientific, cultural, and educational value, are recognized as part of the environment under these state guidelines. This report satisfies project requirements in accordance with CEQA (California Public Resources Code, Section 21000 et seq.) and California Public Resources Code Section 5097.5 (Stats 1965, c 1136, p. 2792). This analysis also complies with guidelines and significance criteria specified in SVP 2010.

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 "a unique paleontological resource or site or unique geologic feature." This provision covers fossils of signal 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 generally, a resource shall be considered "historically significant" if it has yielded or may be likely to yield information important in prehistory (14 CCR 15064.5 [a][3][D]). Paleontological resources fall within this category. California Public Resources Code, Chapter 1.7, Sections 5097.5 and 30244 also regulate removal of paleontological resources from state lands, define unauthorized removal of fossil resources as a misdemeanor, and require mitigation of disturbed sites.

4.8.5.2.2 Public Resources Code Section 5097.5

California's Public Resources Code (PRC) Section 5097.5 states 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 [lands owned by, or under the jurisdiction of, the state, or any city, county, district, authority, or public corporation, or any agency thereof], except with the express permission of the public agency having the jurisdiction over the lands. Violation of this section is a misdemeanor.

4.8.5.2.3 California Code of Regulations

Two sections of the California Code of Regulations (14 CCR Division 3, Chapter 1), applicable to lands administered by State Parks, address paleontological resources:

Section 4307: Geological Features—

> "No person shall destroy, disturb, mutilate, or remove earth, sand, gravel, oil, minerals, rocks, paleontological features, or features of caves."

Section 4309: Special Permits—

> [California Department of Parks and Recreation] may grant a permit to remove, treat, disturb, or destroy plants or animals or geological, historical, archaeological or paleontological materials; and any person who has been properly granted such a permit shall to that extent not be liable for prosecution for violating the foregoing.

4.8.5.3 Local LORS

4.8.5.3.1 City of San Juan Capistrano General Plan

The Cultural Resources Element of the City of San Juan Capistrano General Plan discusses paleontological resources and details the following Goals and Policies regarding paleontological resources:

Cultural Resources Goal 1: Preserve and Protect historical, archaeological, and paleontological resources.

> Policy 1.1: Balance the benefits of development with the project's potential impacts to existing cultural resources.

4.8.5.4 Professional Standards

The SVP is an international organization of professional paleontologists that has established standard guidelines for acceptable professional practices. The SVP provides standards for conducting paleontological resource assessments and surveys, monitoring and mitigation, data and fossil recovery, sampling procedures, and specimen preparation, identification, analysis, and curation. The majority of professional paleontologists in the United States follow the SVP's guidelines and apply them not only to vertebrate fossils but also to scientifically significant invertebrate, plant, and trace fossils.

4.8.6 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, the Applicant's PRS will submit scientifically significant fossil specimens and associated site records to the closest regional repository in operation, which

currently is the Cooper Center in Santa Ana, which is run by the Orange County Parks. Table 4.8-2 presents the agency contacts for Orange County Parks and the Cooper Center.

Table 4.8-2. Agency Contacts

Issue	Agency	
Paleontological Resources Documentation and Specimen Repository	Orange County Parks/The Cooper Center	**William Gelnaw, PhD.** Paleontology Curator | Cultural Resources Operations OC Parks 13042 Old Myford Rd. Irvine, California 92602 Office: (714) 973-6663 Mobile: (949) 285-9027

4.8.7 Permits and Permit Schedule

No state, county, or city agency requires a paleontological collecting permit to allow for the recovery of fossil remains discovered because of construction-related earthmoving on this Project site.

4.8.8 References

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