5.8 Paleontological Resources

This section describes the existing environment for and potential effects on paleontological resources (fossils) resulting from the construction and operation of the Huntington Beach Energy Project (HBEP). Section 5.8.1 describes the project setting and Section 5.8.2 discusses the affected environment, including the resource inventory and its results. Section 5.8.2 presents the environmental analysis and impact assessment. Section 5.8.3 considers cumulative effects on paleontological resources, and 5.8.4 presents Applicant-proposed mitigation measures. Section 5.8.5 discusses applicable laws, ordinances, regulations, and standards (LORS). Section 5.8.6 lists involved agencies and agency contacts, Section 5.8.7 lists applicable permits that will be required for construction, and Section 5.8.8 provides the references consulted.

This section of the Application for Certification (AFC) meets the siting regulations of the California Energy Commission (CEC) (2000, 2007) and conforms with the recommendations of professional standards that address the assessment of and mitigating impacts on paleontological resources resulting from earth-moving activities, including the Society of Vertebrate Paleontology (SVP, 1995) and the Bureau of Land Management (BLM, 2008). This paleontological resources inventory and impact assessment was conducted by Mr. James Verhoff, Staff Paleontologist with CH2MHILL, under the direct supervision of Dr. W. Geoffrey Spaulding, the Paleontological Resources Specialist (PRS) for this project. Dr. Spaulding has advanced degrees in geology with emphases in paleobiology, and is a recognized expert on the glacial-age environments of the American West. His qualifications as a PRS have been recognized by CEC Staff.

5.8.1 Setting

The HBEP site is located in an industrial area of Huntington Beach at 21730 Newland Street, just north of the intersection of the Pacific Coast Highway (Highway 1) and Newland Street. The project will be located entirely within the existing Huntington Beach Generating Station, an operating power plant. The HBEP site is bounded on the west by a manufactured home/recreational vehicle park, on the north by a tank farm, on the north and east by the Huntington Beach Channel and residential areas, on the southeast by the Huntington Beach Wetland Preserve / Magnolia Marsh wetlands, and to the south and southwest by the Huntington Beach State Park and the Pacific Ocean. The site is located on a gently sloping coastal plain.

HBEP is a 939-megawatt combined-cycle power plant, consisting of two power blocks. Each power block is composed of three combustion turbines with supplemental fired heat recovery steam generators, a steam turbine generator, an air-cooled condenser, and ancillary facilities. HBEP will reuse existing onsite potable water, natural gas, stormwater, process wastewater, and sanitary pipelines and electrical transmission facilities. No offsite linear developments are proposed as part of the project.

The project will use potable water, provided by the City of Huntington Beach, for construction and operational process and sanitary uses. During operation, stormwater and process wastewater will be discharged to a retention basin and then ultimately to the Pacific Ocean via an existing outfall. Sanitary wastewater will be conveyed to the Orange County Sanitation District via the existing City of Huntington Beach sewer connection. Two 230-kilovolt (kV) transmission interconnections will connect HBEP Power Blocks 1 and 2 to the existing onsite Southern California Edison 230-kV switchyard.

HBEP construction will require the removal of the existing Huntington Beach Generating Station Units 1, 2, and 5. Demolition of Unit 5, scheduled to occur between the fourth quarter of 2014 and the end of 2015, will provide the space for the construction of HBEP Block 1. Construction of Blocks 1 and 2 are each expected to take approximately 42 and 30 months, respectively, with Block 1 construction scheduled to occur from the first quarter of 2015 through the second quarter of 2018, and Block 2 construction scheduled to occur from the first quarter of 2018 through the second quarter of 2020. Removal/demolition of existing Huntington Beach Generating Station Units 1 and 2 is scheduled to occur from the fourth quarter of 2020 through the third quarter of 2022.

Existing Huntington Beach Generating Station Units 3 and 4 were licensed through the California Energy Commission (00-AFC-13C) and demolition of these units is authorized under that license and will proceed

irrespective of the HBEP. Therefore, demolition of existing Huntington Beach Generating Station Units 3 and 4 is not part of the HBEP project definition. However, to ensure a comprehensive review of potential project impacts, the demolition of existing Huntington Beach Generating Station Units 3 and 4 is included in the cumulative impact assessment. Removal/demolition of existing Huntington Beach Generating Station Units 3 and 4 will be in advance of the construction of HBEP Block 2.

HBEP construction will require both onsite and offsite laydown and construction parking areas. Approximately 22 acres of construction laydown will be required, with approximately 6 acres at the Huntington Beach Generating Station used for a combination of laydown and construction parking, and 16 acres at the AES Alamitos Generating Station (AGS) used for construction laydown (component storage only/no assembly of components at AGS). During HBEP construction, the large components will be hauled from the construction laydown area at the AGS site to the HBEP site as they are ready for installation.

Construction worker parking for HBEP and the demolition of the existing units at the Huntington Beach Generating Station will be provided by a combination of onsite and offsite parking. A maximum of 330 parking spaces will be required during construction and demolition activities. As shown on Figure 2.3-3 in Section 2.0, Project Description, construction/demolition worker parking will be provided at the following locations:

- Approximately 1.5 acres onsite at the Huntington Beach Generating Station (approximately 130 parking stalls)
- Approximately 3 acres of existing paved/graveled parking located adjacent to HBEP across Newland Street (approximately 300 parking stalls)
- Approximately 2.5 acres of existing paved parking located at the corner of Pacific Coast Highway and Beach Boulevard (approximately 215 parking stalls)
- 225 parking stalls at the City of Huntington Beach shore parking west of the project site.
- Approximately 1.9 acres at the Plains All American Tank Farm located on Magnolia Street (approximately 170 parking stalls)

5.8.2 Affected Environment

5.8.2.1 Physiographic Setting

The HBEP site, offsite construction/demolition worker parking areas and offsite construction laydown area lie in the southwestern portion of the Los Angeles Basin, on the Coastal Plain of southern California. The Los Angeles Basin developed in the Late Miocene (after about 12 million years ago) in response to tectonic events encompassing regional pull-apart of a quiescent continental shelf margin, and reached a maximum depth of approximately 6,000 feet (Norton and Otott Jr., 1996). Geologically, this basin and vicinity are divided into four structural blocks related to uplifted zones and synclinal depressions, and bounded by faults. The project site lies near the boundary of the Southwest Block and Central Block, near the Newport-Inglewood fault zone (Ninyo & Moore, 2011). Oil and natural gas have been found associated with these structures (Norton and Otott Jr., 1996).

The surface geology of the region has been largely masked by historical and modern construction, and is only visible in small, discontinuous areas. Where visible, the undisturbed sediment near the project site includes grey sands and silts associated with coastal marches and eolian deposits, and it is likely that these deposits dominated the project area prior to construction. No undisturbed sediment is visible at the offsite construction laydown area or offsite parking areas. Farther from the coastline, the coastal plain was dominated by young (Holocene) alluvial fan deposits and axial channel deposits of the Santa Ana River, both of which include gravels, sands, and silts (Ninyo & Moore, 2011). The Pacific Ocean lies 800 feet to the west, the Huntington Beach Channel is immediately to the north and east, and mouth of the Santa Ana River is 1.5 miles to the southeast.

5.8.2.2 Resource Inventory Methods

Published and available unpublished geological and paleontological literature was reviewed to develop a baseline paleontological resource inventory of the project area, offsite construction/demolition workers parking areas, and offsite construction laydown area, to assess the potential paleontological productivity of the stratigraphic units that

may be present. Sources included geological maps, satellite photography, technical and scientific reports, and available electronic databases. A paleontological resources record review was conducted for the project using the online database maintained by the University of California Museum of Paleontology at Berkeley (UCMP) and the PaleoBiology Database (n.d.).

Reconnaissance of the project site and offsite components was conducted on September 28, 2011. Field reconnaissance rather than formal survey was conducted because, like most of urban southern California, the area of potential effect to paleontological resources is heavily developed, and the native sediment is obscured by artificial fill, pavement, and onsite structures. No native sediments could be observed within the boundary of the existing Huntington Beach Generating Station or the AGS sites.

5.8.2.3 Resource Inventory Results

It is important to note that during the last glacial age, and during prior glacial ages that occurred during the Late Pleistocene (the last 0.7 million years), sea level was hundreds of feet below that of the present day, and, consequently, for much of the last million years the project site lay on a vast coastal plain, with the shoreline some distance to the west.

5.8.2.3.1 Geological Units in the Vicinity

Available geologic maps (Morton, 2004; Morton and Miller, 1981; Figure 1) indicate that the project area is underlain by recently active eolian (sand dune and sand sheet) deposits. The properties north and east of the project site are underlain by Holocene-age axial channel deposits, chiefly sands and silts associated with coastal marshes, while beach sands dominate the areas southwest of the project area (Morton, 2004).

Recent geotechnical surveys (Ninyo & Moore, 2011) indicate the project area and the offsite parking areas are underlain by a generally thin (2 to 3 feet thick) layer of artificial fill; near-shore (lagoonal and tidal marsh) deposits extend from the bottom of fill to a depth of between 9 and 18 feet below ground surface (bgs), although in some areas alluvial deposits reached 23 feet bgs; and marine sediments continue from that level to an unknown depth. Artificial fill is immediately identifiable by its orange-brown color, and consists of silty to clayey sand (Ninyo & Moore, 2011). The near-shore deposits were referred to as alluvium and estuarine deposits in the geotechnical survey (Ninyo & Moore, 2011); however, earlier work (California Department of Water Resources [DWR], 1968) lists these as lagoonal and tidal marsh deposits. The lithology described in the geotechnical survey (Ninyo & Moore, 2011) is identical to both the sediments within modern coastal marshes near the project site and sediment attributed to coastal marshes in previous surveys (DWR, 1968); therefore, these sediments are considered here to be preserved shallow lagoon and tidal marsh deposits. These sediments consisted of dark grey sandy silt, and included shell fragments and trace organic material. The marine deposits underlying these paralic sediments consist of fine-grained sand with variable amounts of silt, and shells deposited in a shallow marine setting (Ninyo & Moore, 2011). Eolian sediments, included in various geologic maps of the region (Morton, 2004; Morton and Miller, 1981) were not encountered during geotechnical excavations (Ninyo & Moore, 2011); presumably those sediments were removed during previous construction of the existing Huntington Beach Generating Station. The age of the sediments encountered was not determined during the geotechnical survey (Ninyo & Moore, 2011); however, based on the lithology, the depths of the sediments, and the presence of shell fragments, the native sediments encountered during geotechnical excavations are likely Holocene deposits recording the latest transition from marine to paralic deposition in this region (DWR, 1966).

Chiefly marine Pleistocene, Pliocene, and Miocene rocks and sediments extend several thousand feet below these upper units (Norton and Otott Jr., 1996). These units are important for oil and natural gas production (Norton and Otott Jr., 1996), but occur at depths below those likely to be reached during construction of the HBEP. Further below these units, at over 9,000 feet bgs, lies highly weathered crystalline basement rock of presumed Jurassic age (Norton and Otott Jr., 1996).

The geology outside of the project area, but within 1 mile of the HBEP site (including the offsite construction/demolition worker parking areas), is represented by the same units that are found in the immediate vicinity of the project site. Further northwest are paralic deposits typical of coastal environments. Peat deposits,

which are important for dating non-indurated sediments in this region, lie several miles to the north of the project area, as do indurated Pleistocene geologic units (Morton, 2004).

The offsite construction laydown area at the AGS site is underlain by modern artificial fill associated with previous development at the site. Prior to development, the uppermost sediments in the AGS area consisted predominantly of alluvial and fluvial sediments of the San Gabriel River further inland, with minor paralic (near-shore) deposits (Poland et al., 1959; California Department of Conservation, 1998) consisting of recent (Holocene) eolian sands (California Department of Conservation, 1998). The San Gabriel River lies immediately to the east, and this river contributed much of the sediment in the project area from the Pleistocene on. In the AGS area these sediments consist of silts and clays (California Department of Conservation, 1998). The age of the deposits can be roughly determined in the field by how loose the sediment is: Pleistocene age deposits are denser than Holocene age deposits (California Department of Conservation, 1998). The thickness of the Pleistocene-age alluvium is highly variable, ranging from a few feet to a few hundred feet in thickness (Poland et al., 1959). Underlying these deposits are Pleistocene-age marine terrace deposits of unknown thickness, generally consisting of red silty sand (Poland et al., 1959).

The Palos Verdes Sands, a fossiliferous layer of marine gray sands and gravels, is exposed to the northwest and southeast of the AGS area (Poland et al., 1959), and is likely to underlie the AGS site. The formation is variable in thickness, ranging from a maximum of 15 feet to nonexistent in some areas (Woodring et al., 1946). This unit was deposited between 95,000 and 130,000 years before present as a marine terrace deposit, and has produced a large number of fish fossils, as well as the remains of terrestrial and aquatic birds and mammals (Miller, 1971; Jefferson, 1991).

The Pleistocene San Pedro Formation, which consists of massive, poorly consolidated marine sand deposits (California Department of Conservation, 1998), extends from the bottom of these deposits to a depth of approximately 1,000 feet below mean sea level (Poland et al., 1959). This formation was defined in the Coyote Hills in the northern portion of Orange County, though the definition of this formation has undergone much revision, in part because several of the original sections have been destroyed (Powell and Stevens, 2000). Due to the difficulty in determining the exact extent of this formation, the San Pedro Formation is often defined based on its stratigraphic location, rather than its lithology; for example, the formation has been defined as lying between the Pliocene Pico Formation and the Pleistocene Palos Verdes Sands or, if the Palos Verdes Sands are absent, overlying Holocene deposits by some authors (Poland et al., 1959). The formation is generally considered to consist of two members: an upper member consisting of coarse sandstone and cobbles, and a lower member consisting of fine-grained sandstones and siltstones (Powell and Stevens, 2000). A diverse invertebrate fauna has been collected from this formation in the Coyote Hills, and evidence from this invertebrate fauna indicates that the formation was deposited in a marine setting, at a maximum depth of 70 meters (Powell and Stevens, 2000). Thicknesses range from about 52 meters to 224 meters in measured sections within the Coyote Hills (Powell and Stevens, 2000).

The Pliocene Pico Formation, which is composed of marine sands, silts, and clays, extends nearly a thousand feet below the base of the San Pedro Formation (Poland et al., 1959). The uppermost portion of this unit is composed of silts and clays, with local lenses of gravel, while the lowermost portion of this unit is composed of sands and gravels (Poland et al., 1959). This unit, and those underlying it, were not analyzed in detail, because they lie well below the depth of any anticipated construction activity.

5.8.2.3.2 Results of the Records Search

A search of the UCMP database on January 4, 2012, queried Quaternary fossil site records within Orange County. Over 900 fossil sites have been found in the county, most are far from the project site. No fossil sites were recorded for Huntington Beach in the UCMP database (n.d.) or PaleoBiology Database (n.d.). However, numerous coastal sites within 5 miles of the project area and parking sites, including Seal Beach, Bolsa Bay, Sunset Beach, and Newport Bay (Morton and Miller, 1981) have produced invertebrate and limited vertebrate fossil faunas (UCMP, n.d.). The results are predominately invertebrate fossils from the Holocene (UCMP, n.d.), and therefore do not represent paleontological resources normally considered scientifically significant. The exception to this is Newport Bay, which has produced Pleistocene invertebrate fossils from the San Pedro Formation and Pleistocene

vertebrate and invertebrate fossils from the Palos Verdes Sand (UCMP, n.d.). Neither of these units is known to underlie the project area and neither outcrop within 1 mile of the project area.

Regionally, vertebrate fossils are recorded from the Pico, Repetto, Puente, and Topanga formations. These include the remains of mammals, birds, and fish (UCMP, n.d.; PaleoBiology Database, n.d.). Because these units are unknown in the project vicinity, and therefore unlikely to be encountered during construction, they were not analyzed in detail. No records were found within the Holocene and Pleistocene sediments underlying the project area (UCMP, n.d.; PaleoBiology Database, n.d.).

The offsite construction laydown area at the AGS site is covered by a layer of modern fill of unknown thickness, which is underlain (from youngest to oldest) by Holocene eolian deposits, Quaternary alluvial deposits, the Palos Verdes Sands, the San Pedro Formation, and older sedimentary formations. Both the Palos Verdes Sands and the San Pedro Formation have produced numerous fossil sites, including scientifically significant vertebrate fossils (UCMP, n.d.; PaleoBiology Database, n.d.). The Quaternary alluvial deposits have also yielded Recent shell material (UCMP, n.d.). However, no localities are known within one mile of the offsite construction laydown area. The majority of the finds within the Palos Verdes Sands have been in outcrops elsewhere in the Los Angeles Basin, while finds in the San Pedro Formation are primarily isolated finds associated with construction in the basin, and poorly constrained geographically.

This records review was augmented by a literature review. One record for Rancholabrean-age vertebrate fossils was found for Huntington Beach (Jefferson, 1991), and includes mammoth and bison fossils of Rancholabrean (Late Pleistocene) age. The mammoth specimen was found immediately above a coarse sand unit and was uncovered between 6 and 8 feet below soil level, while the bison jaw was recovered from diatomaceous sandstone 14 to 20 feet below soil level (Miller, 1971). No records for fossils within 1 mile of the project site were found, and no further records of fossils within the city of Huntington Beach are known.

Because the entire project area, including the offsite construction/demolition parking areas, is highly developed, no paleontological resources survey was conducted. As noted previously, a reconnaissance-level field review confirmed that no native sediment is present at the surface, and that the majority of the project site is covered by concrete or blacktop.

5.8.2.3.3 Paleontological Sensitivity of the Project Site

Paleontological sensitivity is the qualitative assessment made by a professional paleontologist taking into account the paleontological potential of the stratigraphic units present, the local geology and geomorphology, and any other local factors that may be germane to the preservation and discovery of fossils. According to SVP (1995) and BLM (2008) standard guidelines, paleontological sensitivity comprises (1) the potential for a sedimentary unit to yield abundant or significant vertebrate fossils, or to yield a few significant fossils, large or small, vertebrate, invertebrate, or paleobotanical remains, and (2) the importance of the recovered fossils in terms of providing new and significant taxonomic, phylogenetic, paleoecological, or stratigraphic data. A summary of the paleontological sensitivity ratings used is provided in Table 5.8-1.

Because no fossil sites have been recorded within 1 mile of the project area, including the offsite parking areas, or within 1 mile of the offsite construction laydown area at the AGS site, no map of fossil sites is provided.

TABLE 5.8-1
Paleontological Sensitivity Ratings

	Definition
High	Assigned to geological formations known to contain paleontological resources that include rare, well-preserved, and/or fossil materials important to ongoing paleoclimatic, paleobiological and/or evolutionary studies. They have the potential to produce, or have produced vertebrate remains that are the particular research focus of many paleontologists, and can represent important educational resources.
Moderate	Stratigraphic units that have yielded fossils that are but moderately well preserved, are common elsewhere, and/or that are stratigraphically long ranging would be assigned a moderate rating. This evaluation also can be applied to strata that have an unproven but strong potential to yield fossil remains based on the stratigraphy and/or geomorphologic setting.
Low	Sediment that is relatively recent, or that represents a high-energy subaerial depositional environment where fossils are unlikely to be preserved. A low abundance of invertebrate fossil remains, or reworked marine shell from other units, can occur but the paleontological sensitivity would remain low due to their lack of potential to serve as significant scientific or educational purposes. This evaluation also can be applied to strata that have been monitored and that have failed to yield scientifically significant fossil remains.
Marginal and Zero	Stratigraphic units with marginal potential include pyroclastic flows and soils that might preserve traces or casts of plants or animals. Most igneous rocks, however, have zero paleontological potential. Other stratigraphic units deposited subaerially in a high energy environment (such as alluvium and beach sands) also may be assigned a marginal or zero sensitivity rating. Manmade fill is also considered to possess zero (no) paleontological potential.

5.8.2.3.4 Paleontological Sensitivity of Geologic Units at the Project Site and Offsite Construction/Demolition Worker Parking Areas

The paleontological sensitivity of the geologic units underlying the project area is discussed below. Many of these units do not outcrop within 1 mile of the project area (including the offsite parking areas, and therefore are not shown in the geologic map (Figure 5.4-1).

- **Artificial Fill:** This modern material is generally orange-brown silty sand to clayey sand, and extends to 2 to 3 feet bgs throughout the project site and the offsite parking areas. Because this fill has been reworked and removed from its original stratigraphic context, any fossils in this fill will be of no scientific significance; therefore, this surficial fill is considered to have zero paleontological sensitivity.
- **Lagoonal and Tidal Flat Deposits:** These deposits consist of sandy silts (Ninyo & Moore, 2011), and are Holocene in age (DWR, 1968). North of the project site peat lenses have been found in these deposits; these lenses date to approximately 8,000 years before present (DWR, 1968). Geotechnical investigations found shell fragments and trace organics in these units (Ninyo & Moore, 2011). Remains from these sediments are not paleontologically significant because of their fragmentary nature, their young (Holocene) age, and because fragmentary shell is generally not considered scientifically significant because it is common in the fossil record. These units therefore are considered to have a low paleontological sensitivity.
- **Marine Deposits:** Quaternary marine deposits extending from approximately 9 feet bgs to approximately 150 feet bgs (DWR, 1966), consist of grey fine-grained sands (Ninyo & Moore, 2011). Shell fragments were found throughout this unit (Ninyo & Moore, 2011). Based on the lithology of the sediment it is likely that these sands represent the Talbert Aquifer, which extends to a maximum depth of 180 feet bgs in this region (DWR, 1966). These sediments range from Holocene to Pleistocene in age (DWR, 1966; DWR, 1968). While the Holocene-age deposits are not known to have produced fossils typically considered scientifically significant, Late Pleistocene deposits (identifiable by their increased cementation compared with the uncemented Holocene deposits of the region [DWR, 1966]) have produced mammoth and bison remains (Miller, 1971). The paleontological sensitivity of these sediments is therefore dependant on the age of the sediment, with Holocene-age sediments possessing a low paleontological sensitivity and Pleistocene-age sediments possessing a high paleontological sensitivity.

- **Quaternary Marine Deposits:** These older deposits, which underlie the project area from a depth of approximately 150 feet bgs (DWR, 1966) to approximately 9,000 feet bgs (Norton and Otott Jr., 1996), range in age from Pleistocene to Miocene, and include the Pico, Repetto, Puente, and Topanga Formations (Norton and Otott Jr., 1996). These deposits consist of well-indurated, interbedded sands and shales representing preserved turbidite deposits (Norton and Otott Jr., 1996). Mammal, bird, and fish fossils have been found in these units in Orange and Los Angeles counties (UCMP, n.d.; PaleoBiology Database, n.d.); however, because these units lie below depths likely to be reached during construction-related excavations for the project these records were not analyzed in detail. Because vertebrate fossils have been found in these units, albeit not frequently, the Quaternary marine deposits have a moderate paleontological sensitivity.
- **Crystalline Rock:** Weathered and unweathered crystalline rock lies at approximately 9,000 feet bgs, below the marine deposites of Miocene to Pleistocene age (Norton and Otott Jr., 1996). Paleontological resources do not survive the formation of igneous or metamorphic units, and therefore these crystalline rocks have zero paleontological sensitivity.

5.8.2.3.5 Paleontological Sensitivity of Geologic Units in the Vicinity of the Offsite Construction Laydown Area

- **Disturbed Sediment/Artificial Fill:** This material has been reworked and removed from its original stratigraphic context. Any fossils found in these sediments will therefore be out of stratigraphic context and will likely be badly damaged, and therefore are of no scientific interest. These sediments have zero paleontological sensitivity.
- **Holocene Eolian Deposits:** It is unlikely that the Holocene-age eolian sediments contain any scientifically significant paleontological resources, both because of the young age and the continual reworking of the sediment. Further, no records of scientifically significant paleontological resources are known from these units. Therefore, these Holocene-age eolian deposits have a low paleontological sensitivity.
- **Quaternary Alluvial Deposits:** No scientifically significant paleontological resources have been found in these sediments. While mollusk shells have been found in the Holocene-age alluvial deposits these fossils are not considered scientifically significant. The Holocene-age portion of these deposits are therefore of low paleontological sensitivity. While no fossils have been found in Pleistocene-age alluvium in this region, these fine-grained sediments represent an environment in which fossils may be preserved; therefore, these units have an unknown paleontological sensitivity.
- **Palos Verdes Sand**: This formation has produced a large number of vertebrate fossils, including birds, fish, marine mammals, and terrestrial mammals. This formation therefore possesses a high paleontological sensitivity.
- **San Pedro Formation:** This formation has produced a large number of fossils, ranging from relatively common invertebrate remains to much rarer mammal, lizard, and bird remains. Because this formation has previously produced paleontological resources, it is considered to possess a high paleontological sensitivity.
- **Deeper Deposits:** These deposits range from high-sensitivity marine units to low-sensitivity metamorphic basement rock. These are highly unlikely to be encountered during project excavations.

5.8.3 Environmental Analysis

The subsurface of within 1 mile of the HBEP site consists of a sequence of deposits recording a relative decline in sea level, ranging (from oldest and deepest to youngest and most shallow) from Miocene- to Holocene-age marine deposits to Holocene-age alluvial and estuarine deposits. These marine deposits lie atop Mesozoic-age crystalline bedrock. The uppermost portion of these sediments has been stripped from the project site, and the remaining sediments are covered by artificial fill and construction materials (concrete and blacktop) to a depth of 2 to 3 feet bgs. An analysis of potential impacts on paleontological resources from HBEP construction and operation is presented in the following sections.

5.8.3.1 Paleontological Resource Significance Criteria

In its standard guidelines for assessment and mitigation of adverse impacts to paleontological resources, the SVP (1995) notes that an individual fossil specimen is considered scientifically important and significant if it is: (1) identifiable, (2) complete, (3) well preserved, (4) age-diagnostic, (5) useful in paleoenvironmental reconstruction, (6) a member of a rare species, (7) a species that is part of a diverse assemblage, or (8) a skeletal element different from, or a specimen more complete than, those now available for that species. In general, the value or importance of different fossil groups varies depending on the age and depositional environment of the stratigraphic unit that contains the fossils, their abundance in the record, and their degree of preservation.

For example, identifiable land mammal or terrestrial plant fossils are considered scientifically important because of their potential use in determining the age and paleoenvironment of the sediments in which they occur. Moreover, vertebrate and plant remains are comparatively rare in the fossil record. Fossil plants are particularly important in this regard and, as sessile (anchored in place) organisms, are actually more sensitive indicators of their paleoenvironment and, thus, more important than mobile mammals for paleoenvironmental reconstructions. For marine sediments, invertebrate megafossils (for example, mollusks, cephalopods) are individually infrequently scientifically important because individual species are generally widely represented in academic archives. Marine microfossils such as foraminifera or diatoms are very common, and consequently usually not considered for resource protection because of their relative abundance.

Using these criteria and the sensitivity ratings provided above, the significance of potentially adverse impacts of project-related excavations on the paleontological resources was assessed. Any unmitigated impact on a fossil site, or on a fossil-bearing rock unit of high or moderate sensitivity, would be considered significant.

5.8.3.2 Potential to Affect Paleontological Resources

The potential for project-related activities to adversely affect paleontological resources within each stratigraphic unit anticipated to be present at the project site is presented in this section. This assessment includes the entirety of the project area, including the offsite construction/demolition worker parking areas, and offsite construction laydown area at the AGS site. Because no fossil sites have been confidently recorded within 1 mile of this portion of project area or within 1 mile of the AGS, no map of fossil sites is provided.

5.8.3.2.1 Project Area and Offsite Construction/Demolition Worker Parking Areas

- **Previously Disturbed Sediment/Fill:** Construction-related excavations that do not extend beyond sediments disturbed by previous construction (typically 2 to 3 feet bgs) will not result in any adverse impacts on paleontological resources. Reworked and disturbed fossil material can be present in previously disturbed sediment or fill, but lack of stratigraphic context and likely mechanical damage would compromise all scientific value. This would apply to all excavations within 3 feet of current ground surface and operations such as grading and surface preparation for roads and parking areas, as well as the removal of existing foundations, underground utilities, and other excavations in previously disturbed sediments. Therefore, no adverse impacts on paleontological resources will occur from excavations within previously disturbed sediment at the project site.
- **Lagoonal and Tidal Flat Deposits:** Excavations extending to depths below the artificial fill within the HBEP site will affect Holocene-age lagoonal and tidal flat deposits. While many of the recorded fossil sites in this area were found less than ten feet bgs (Miller, 1971), these records do not include stratigraphic descriptions of sufficient detail to determine which Rancholabrean-age deposit the fossils were found in (Miller, 1971). It is unlikely that the near-shore sediments underlying the project site contain scientifically significant paleontological resources. These sediments are Holocene in age (DWR, 1968), and while invertebrate remains have been found (Ninyo & Moore, 2011), no vertebrate fossil records are known to have been found in these sediments. Adverse impacts on paleontological resources are unlikely to occur from excavations into these sediments.

- **Quaternary Marine Deposits:** Quaternary marine deposits at depths greater than 9 feet bgs at the HBEP site possess moderate sensitivity, with some vertebrate fossils found in the city of Huntington Beach, approximately 6 miles from the project site (Miller, 1971). In the geotechnical survey of the project area, these marine deposits have produced only invertebrate remains (Ninyo & Moore, 2011), and they are therefore assigned moderate paleontological sensitivity. There is potential for deeper excavations (greater than about 9 feet bgs) to adversely affect scientifically significant paleontological resources.

5.8.3.2.2 Offsite Construction Laydown Area – Alamitos Generating Station

- **Holocene Eolian Deposits:** It is unlikely that the Holocene-age eolian sediments contain any scientifically significant paleontological resources, both because of the young age and the continual reworking of the sediment. Further, no records of scientifically significant paleontological resources are known from these units. Therefore these Holocene eolian deposits have a low paleontological sensitivity.
- **Quaternary Alluvial Deposits:** No scientifically significant paleontological resources have been found in these sediments. The Holocene-age alluvial deposits represent the current environment, and therefore are unlikely to produce scientifically significant paleontological resources; these deposits are therefore of low paleontological sensitivity. While no fossils have been found in Pleistocene alluvium in this region, these fine-grained sediments represent an environment in which fossils may be preserved; therefore, these units have an unknown paleontological sensitivity.
- **Palos Verdes Sand**: This formation has produced a large number of vertebrate fossils, including birds, fish, marine mammals, and terrestrial mammals. This formation therefore possesses a high paleontological sensitivity.
- **San Pedro Formation:** This formation has produced a large number of fossils, ranging from relatively common invertebrate remains to much rarer mammal, lizard, and bird remains. Because this formation has previously produced paleontological resources, it is considered to possess a high paleontological sensitivity.
- **Deeper Deposits:** These deposits range from high-sensitivity marine units to low-sensitivity metamorphic basement rock. These are unlikely to be encountered during activities conducted at the laydown yard.

Because no excavations in paleontologically sensitive sediments are anticipated from either the operation or the maintenance of the project, no impacts on paleontological resources are expected beyond those that may occur from HBEP construction.

5.8.4 Cumulative Effects

Development in the Los Angeles Basin has resulted in proportionately extensive impacts on paleontological resources (Jefferson, 1991), and this is anticipated to continue in the outlying regions, while the basin itself is now largely built. The extensive nature of these cumulative impacts is due to this extensive development combined with the widespread presence of fossiliferous sedimentary units in the region, if not in the project area. However, measures typically implemented pursuant to state statutes (see Section 5.8.6) serve to mitigate these impacts through the recovery of the scientific and educational potential of the affected paleontological resources. Although not all projects are subject to California Environmental Quality Act (CEQA) review, and only a proportion of those incorporate paleontological protection measures, application of paleontological monitoring and mitigation measures is common and therefore mitigates the cumulative and direct impacts of continued development.

The potential of the HBEP to contribute to cumulative impacts on paleontological resources is low, given the low to moderate paleontological sensitivity of the sediments to be disturbed, and mitigation to be implemented. Furthermore, because no subsurface demolition activities are proposed as part of the Huntington Beach Generating Station Units 3 and 4 demolition, no cumulative paleontological impacts are expected. Thus, with the mitigation described below, the contribution of HBEP to cumulative negative impacts on paleontological resources would be negligible.

5.8.5 Mitigation Measures

Guidelines for the implementation of CEQA (Public Resources Code Sections 15000 et seq.) include among the questions to be answered in the Environmental Checklist (Section 15023, Appendix G) the following: "Would the project directly or indirectly destroy a unique paleontological resource or site?" and "Does the project have the potential to …eliminate important examples of the major periods of California…pre-history?" The project has a low potential to affect paleontological resources; therefore, a mitigation and monitoring program should be developed, to be implemented if significant paleontological resources are encountered.

The mitigation measures proposed below are in compliance with CEC environmental guidelines (CEC, 2000; 2007) and with SVP standard guidelines for mitigating adverse construction-related impacts on paleontological resources (SVP,1995). Implementation of these mitigation measures would assure that potential impacts on paleontological resources from project-related ground disturbance would be maintained at an insignificant level.

5.8.5.1 Project Paleontological Resources Specialist

No less than 60 days prior to the start of construction of HBEP, the Applicant will submit the name and resume of a qualified PRS to the CEC for review and approval. This individual will prepare the paleontological resources module of the worker education program and be available during the course of ground-disturbing construction in case there is an unanticipated paleontological discovery. The name and contact information of the PRS will be provided to all construction management personnel, the compliance manager, and the cultural resource monitors (if any).

5.8.5.2 Development of a Paleontological Resources Monitoring and Mitigation Plan

Prior to construction of HBEP, a Paleontological Resources Monitoring and Mitigation Plan (PRMMP) will be drafted by or under the supervision of the PRS. This plan will provide detailed instructions regarding which strata are paleontologically sensitive, for the monitoring of construction activities, and for sampling procedures and the curation of any paleontological resources found. The PRMMP will also outline communications protocols to be used during construction, both in the case of an unanticipated discovery and to ensure adequate monitoring takes place. This plan will also outline the procedures to be used to ensure adequate curation of any discovered paleontological resources.

5.8.5.3 Construction Personnel Education

Prior to working on the project site for the first time, all personnel involved in earth-moving activities will be provided with Paleontological Resources Awareness Training. This training ideally would be provided as a module in the worker environmental awareness training. Construction personnel involved with or supervising excavations will be informed that fossils may be encountered, provided with information on the appearance of fossils, the role of paleontological monitors, and on proper notification procedures. This worker training will be prepared and initially presented by the PRS. Subsequent training may be conducted via video presentation and hard-copy training materials.

5.8.6 Laws, Ordinances, Regulations, and Standards

Paleontological resources are non-renewable scientific resources and are protected by several federal and state statutes (California Office of Historic Preservation, 1983; see also Marshall, 1976; Fisk and Spencer, 1994), most notably by the 1906 Federal Antiquities Act and other subsequent federal legislation and policies, and by State of California environmental regulations (CEQA, Section 15064.5). Professional standards for assessment and mitigation of adverse impacts on paleontological resources have been established by the SVP (1995) and BLM (2008). Design, construction, and operation of HBEP will be conducted in accordance with all LORS applicable to paleontological resources. Federal, state, and local LORS applicable to paleontological resources are summarized in Table 5.8-2 and discussed briefly below, along with professional standards for paleontological resources assessment and impact mitigation.

TABLE 5.8-2
Laws, Ordinances, Regulations, and Standards Applicable to Paleontological Resources

LORS	Applicability	AFC Reference	Project Conformity
Omnibus Public Land Management Act of 2009 (H.R. 146), Title 6, Subtitle D	Not applicable – Applies only to federal land managed by the Secretaries of the Interior and Agriculture	—	—
Antiquities Act of 1906	Federal entitlement required (Prevention of Significant Deterioration [PSD] Air Permit)	Section 5.8.6.1	Yes
National Environmental Policy Act of 1969	Not applicable – No federal land involved, or federal entitlement required	—	—
CEQA, Appendix G	Applicable – Requires assessment of the potential to affect paleontological resources during earth-moving activities	Sections 5.8.2, 5.8.3, and 5.8.5	Yes
Public Resources Code, Sections 5097.5/5097.9	Not applicable – Applies to state-owned land	—	—
Orange County General Plan 2005-2025	Applicable –Applies to the preservation of paleontological resources and literature and records reviews, monitoring grading activities, and salvaging paleontological resources, and the adequate curation of these resources	Section 5.8.6.3	Yes
City of Huntington Beach General Plan	Not Applicable – Does not address paleontological resources	—	—
Los Angeles County General Plan 2005-2025	Applicable – Places emphasis on the preservation of paleontological resources but does not include specific guidance for the preservation of paleontological resources	Section 5.8.6.3	Yes
City of Long Beach General Plan	Not applicable – Does not address paleontological resources	—	—

5.8.6.1 Federal LORS

Paleontological resources are protected by numerous federal regulations. Recently, President Obama signed into law the Omnibus Public Land Management Act of 2009 (H.R. 146). Implementing regulations for this law have yet to be developed by the affected agencies. Additional federal legislative protection for paleontological resources stems from the Antiquities Act of 1906 (PL 59-209; 16 United States Code 431 et seq.; 34 Stat. 225), which calls for protection of historic landmarks, historic and prehistoric structures, and other objects of historic or scientific interest on federal lands. In addition, the National Environmental Policy Act of 1969 (United States Code, section 4321 et seq.; 40 Code of Federal Regulations, section 1502.25), as amended, requires analysis of potential environmental impacts to important historic, cultural, and natural aspects of our national heritage.

Because a PSD permit under the federal Clean Air Act is required for the project, the construction of HBEP is considered a federal undertaking. As the lead federal agency, it is the responsibility of the U.S. Environmental Protection Agency (EPA) to conduct the federal evaluation of potential effect of the project on paleontological resources. The Applicant has submitted this AFC paleontological resources assessment to the EPA with the PSD permit application to facilitate compliance with the requirements of the federal Antiquities Act of 1906.

5.8.6.2 State LORS

The CEC environmental review process under the Warren-Alquist Act is considered functionally equivalent to that of CEQA (Public Resources Code Sections 21000 et seq.). CEQA requires that public agencies and private interests identify the environmental consequences of their proposed projects on any object or site of significance to the

scientific annals of California (Division I, California Public Resources Code: 5020.1 [b]). The CEQA Guidelines (Public Resources Code Sections 15000 et seq.) define procedures, types of activities, persons, and public agencies required to comply with CEQA. Appendix G in Section 15023 provides an Environmental Checklist of questions that a lead agency should normally address if relevant to a project's environmental impacts. One of the questions to be answered in the Environmental Checklist (Section 15023, Appendix G, Section V, part c) is the following: "Would the project directly or indirectly destroy a unique paleontological resource or site…?"

Although CEQA does not define what is "a unique paleontological resource or site," Section 21083.2 defines "unique archaeological resources" as "…any archaeological artifact, object, or site about which it can be clearly demonstrated that, without merely adding to the current body of knowledge, there is a high probability that it meets any of the following criteria:

- Contains information needed to answer important scientific research questions and that there is a demonstrable public interest in that information
- Has a special and particular quality such as being the oldest of its type or the best available example of its type
- Is directly associated with a scientifically recognized important prehistoric or historic event"

With only slight modification, this definition is equally applicable to recognizing "a unique paleontological resource or site." Additional guidance is provided in CEQA Section 15064.5 (a)(3)(D), which indicates "generally, a resource shall be considered historically significant if it has yielded, or may be likely to yield, information important in prehistory or history."

The CEQA lead agency having jurisdiction over a project is responsible for ensuring that paleontological resources are protected in compliance with CEQA and other applicable statutes. The CEC is the lead agency with the responsibility to ensure that fossils are protected during HBEP construction. California Public Resources Code Section 21081.6, entitled Mitigation Monitoring Compliance and Reporting, requires that the CEQA lead agency demonstrate project compliance with mitigation measures developed during the environmental impact review process.

Section XVII, part a, of the CEQA Environmental Checklist asks a second question equally applicable to paleontological resources: "Does the project have the potential to …eliminate important examples of the major periods of California history or pre-history?" To be in compliance with CEQA, impact assessments must answer both these questions in the Environmental Checklist. If the answer to either question is "yes" or "possibly," a mitigation and monitoring plan must be designed and implemented to protect significant paleontological resources.

Other state requirements for paleontological resource management are in California Public Resources Code Chapter 1.7, Section 5097.5/5097.9 (Stats. 1965, c. 1136, p. 2792), entitled Archaeological, Paleontological, and Historical Sites. This statute defines any unauthorized disturbance or removal of a fossil site or remains on public land as a misdemeanor and specifies that state agencies may undertake surveys, excavations, or other operations as necessary on state lands to preserve or record paleontological resources. Public Resources Code, Sections 5097.5/5097.9 does not apply to HBEP because construction or other related project impacts will not occur on state owned or managed lands and no state agency is intended to obtain ownership of project lands during the term of the project license (Table 5.8-2).

5.8.6.3 Local LORS

The Orange County General Plan (Orange County, 2011) places emphasis on the preservation of historic and cultural resources, including paleontological resources. The general plan specifically calls for literature and records reviews to identify potentially fossiliferous sediments that may be affected by project activities, monitoring grading activities, and salvaging paleontological resources, and the adequate curation of these resources (Orange County, 2011).

The Los Angeles County General Plan (County of Los Angeles, 1980) places emphasis on the preservation of historic and cultural resources, including paleontological resources. However, this Plan does not include specific guidance for the preservation of paleontological resources (Los Angeles County, 1980).

The City of Huntington Beach General Plan (City of Huntington Beach, 2011) and City of Long Beach General Plan (City of Long Beach, 2002) do not address paleontological resources directly or indirectly.

HBEP will comply with the Paleontological Resources LORS set forth in the Orange County and Los Angeles County General Plans.

5.8.6.4 Professional Standards

The SVP, an international organization of professional paleontologists, has established standard guidelines (SVP, 1995) outlining acceptable professional practices in the conduct of paleontological resource assessments and surveys, monitoring and mitigation, data and fossil recovery, sampling procedures and specimen preparation, and curation. Most practicing paleontologists in the nation adhere to the SVP's guidelines, and extend those to address other types of fossils of scientific significance, such as invertebrate fossils and paleobotanical specimens. More recently, BLM's *Informational Memorandum 2008-009* (BLM, 2008) provided updates and elaboration on assigning levels of paleontological sensitivity, and other procedures for paleontological inventory on federal lands. These standards are relevant to non-federal undertakings as well and they are widely used by paleontologists because they provide for more detailed analysis of paleontological sensitivity, and therefore more efficient paleontological resources monitoring.

5.8.7 Agencies and Agency Contacts

No agencies have blanket jurisdiction over paleontological resources. The CEC has jurisdiction over paleontological resources for the project. The Orange County and Los Angeles County General Plans call for the preservation of paleontological resources, and the Orange County General Plan requires monitoring of grading activities. If encountered, scientifically significant fossil specimens and associated site records will be curated at a federally accredited repository, likely the Los Angeles County Museum of Paleontology or the UCMP (Table 5.8-3).

TABLE 5.8-3
Agency Contacts for Paleontological Resources

Issue	Agency Contacted	Persons Contacted
Orange County Historical Resources	Orange County Historical Commission	No Specific Person Assigned Historical Commission 211 West Santa Ana Blvd Santa Ana, CA 92701 (714) 973-6609
Potential Paleontological Resources Documentation and Specimen Repository	Vertebrate Paleontology Department, Natural History Museum of Los Angeles County	Dr. Samuel A. McLeod Curator of Vertebrate Paleontology 900 Exposition Boulevard Los Angeles, CA 90007 (213) 763-3325

5.8.8 Permits and Permit Schedule

No state, county, or city agency requires a paleontological collecting permit to allow for the recovery of fossil remains discovered as a result of construction-related earth moving on this project site.

5.8.9 References

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