

3.12 Paleontological Resources

Paleontological resources are fossils, the remains or traces of prehistoric life preserved in the geological (rock stratigraphic) record. They range from the well known and well publicized (such as dinosaur and mammoth bones) to the more obscure but nevertheless scientifically important fossils (such as paleobotanical remains, trace fossils, and microfossils).

Paleontological resources include the casts or impressions of ancient animals and plants, their trace remains (for example, burrows and trackways), microfossils (for example, fossil pollen, ostracodes, and diatoms), and unmineralized remains (for example, bones of Ice Age mammals or trunks of trees, such as those from the famous La Brea Tar Pits).

3.12.1 Existing Conditions

3.12.1.1 Data Sources and Limitations

Literature on the Tertiary and Quaternary geology and paleontology of the City of Lompoc and Santa Barbara County was reviewed to determine the paleontological sensitivity of surface and subsurface sediments at and within 1 mile of the Project site and power line corridor. The results are presented as inventories of geological units and of the fossil sites in the vicinity, including an assessment of the paleontological sensitivity of each geological unit (its potential to yield scientifically significant, nonrenewable paleontological resources [fossils]). The geological inventory was accomplished by reviewing publications addressing the surface and subsurface geology of the Santa Ynez Mountains, including geological maps.

Paleontological site records for the study area cataloged at the University of California, Museum of Paleontology at Berkeley (UCMP) were accessed through the university's online paleontological records search utility. Those sites within the study area, or close to the study area and information on paleontological sensitivity of geological units present within the study area, were recorded for this study with the results summarized in this section.

The rocks at and near the surface of the Project area are composed largely of Neogene marine sediments. Geologic and paleontological research in the specific Project area has been limited, and no paleontological survey was performed for this assessment.

3.12.1.2 Paleontological Sensitivity

The paleontological sensitivity of the Project study area was assessed by identifying the stratigraphic units within the study site, conducting a paleontological records search and literature review, and determining what is known of the fossils contained within those units. Since the distribution of stratigraphic units can be identified through geologic mapping, parts of the Project that have varying paleontological sensitivity (high, moderate, low, or no sensitivity) can be delineated.

For this analysis, a paleontologically sensitive stratigraphic unit is a sedimentary deposit that has a high to moderate potential to yield fossils that may be unique or scientifically important. An individual fossil specimen may be considered scientifically 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, or (7) an organism or

element different from, or a specimen more complete than, those now available for its species.

3.12.1.3 Stratigraphic Inventory of Relevant Geological Units

The study area is within one of the most complex and diverse geological provinces in the United States. Moreover, the geology is typified by marine sedimentary units that are typically fossiliferous, and a relatively large number of these units have been discriminated by geologists. The stratigraphic units identified within the Project area are described in Section 3.9, Geology and Soils, and shown on Figure 3.9-1.

3.12.1.4 Records Review

The records of the UCMP were searched to gather information on fossil finds in the study area and associated with the stratigraphic units listed in Section 3.9.

The UCMP has more than 2,400 fossil records listed for Santa Barbara County, many of which are microfossil samples (chiefly diatoms) used in geochronological studies of the sequence of these marine units. The Cozy Dell, Matilija Sandstone, Sacate, and Quaternary sediments are all rich in microfossils. For invertebrate (chiefly mollusks and echinoderms) and vertebrate fossil faunas, the results of the records search are presented in Table 3.12-1.

TABLE 3.12-1
Fossil Finds Information for the Regional Study Area

Formation Name	No. of Sites	No. of Taxa	
		Invertebrate	Vertebrate
Franciscan	4	11	2
Vaqueros Sandstone	21	31	5
Rincon Shale	1	0	2
Monterey Shale	7	3	2
Sisquoc Shale	6	14	1

It is important to note that not all fossil records are associated with a specific formation, and the stratigraphic provenience of some records is quite uncertain. Nevertheless, it would appear that the older Franciscan (including the Espada) Formation, and the younger, chiefly Neogene marine sequence (the Vaqueros Sandstone and Rincon, Monterey, and Sisquoc Shales) are paleontologically productive. These are discussed briefly in this section.

The Franciscan Formation

The Franciscan formation is heavily deformed and metamorphosed in many locations, and whatever fossils existed in these strata have been destroyed. Fossils from the Franciscan formation are therefore generally rare and are all the more important, because they can provide information on the age of a particular sedimentary suite, fixing it in the comparatively vast 150 million years spanned by the formation. Fossils recorded from the Franciscan formation of coastal California include trace fossils (preserved tracks or other signs of the behaviors of animals), mollusks, and marine reptiles.

Neogene Marine Sediments

The later Neogene sequence consisting of Vaqueros Sandstone and the subsequent Rincon, Monterey, and Sisquoc Formations are relatively rich in fossils. For the Sisquoc Shale alone, the UCMP database has 127 fossil records for the Santa Barbara County area with 23 of those records in the vicinity of the Project. Significant fossil finds in the general area of Lompoc associated with the Sisquoc formation include extinct cartilaginous fish, bony fish, birds, and mammals. Although all fossil taxa indicate a marine environment, the presence of sea lion, walrus, and many shore birds indicate that land was close by.

3.12.1.5 Paleontological Sensitivity of Study Area Formations

The paleontological sensitivity of an area is based on the records of fossil finds from that area and an understanding of the geologic units from which the fossils were recovered. If those units have been previously mapped across the landscape, it is possible to portray the spatial distribution of paleontological sensitivity across the landscape. This approach conforms to the guidelines of the Society of Vertebrate Paleontology (SVP, 1995, 1996) followed in this study. Paleontological sensitivity of the formations known to occur in the study area is provided in Table 3.12-2.

3.12.2 Regulatory Framework

The California Environmental Quality Act (CEQA) Guidelines (Appendix G, Section V, Part c) refer to whether or not implementation of a project would “directly or indirectly destroy a unique paleontological resource.” Additionally, the Public Resources Code, Section 31244, states that “where development would adversely impact archaeological or paleontological resources as identified by the State Historic Preservation Officer, reasonable mitigation measures shall be required.”

3.12.3 Project Impacts, Mitigation, and Residual Impacts

3.12.3.1 Impact Assessment Methodology

Professional standards promulgated by SVP were used to assess impact significance. Potential mitigation measures also follow an established protocol codified within the SVP guidelines (SVP 1995, 1996, 2005).

3.12.3.2 Thresholds of Significance

The threshold of significance is based on Appendix G of the CEQA guidelines. Impacts would be significant if the Project would directly or indirectly destroy a unique paleontological resource or site.

TABLE 3.12-2

Sedimentary Units Mapped in the General Vicinity of the Project Area by Dibblee (1988) and their Assigned Paleontological Sensitivity

Map Unit	Name	Paleontologic Sensitivity (Provisional)	Remarks
Quaternary Terrestrial Sediments			
Qa	Surficial Sediment	Low	Regional relationships suggest that surficial eolian sediments within the study area are middle Holocene and younger (the last 6,000 years).
Qls; Qfl	Landslide Debris; Fluvial Deposits	Moderate	Landslides may entomb organic remains from Pleistocene to recent age, although such finds are relatively rare. Fluvial and paludal facies in topographic lows can yield Rancholabrean-age vertebrate remains.
Qoa	Older Dissected Surficial Sediments	Low	Quaternary sediments near the Lompoc Project area have not yielded fossils according to the online search utility from the UCMP.
Neogene Marine Rocks			
Tsqd	Sisquoc Shale	High	In the Project area the Sisquoc is a highly bleached and weathered diatomaceous mudstone or shale. The Sisquoc has yielded well-preserved fossil specimens.
Tml, Tmls, Tm, and Tmd	Monterey Shale	High	The Monterey is marine sediment from the middle to late Miocene. Eight significant fossils have been identified from this formation.
Tr	Rincon Shale	High	Rincon Shale represents the start of a deep ocean depositional environment. The majority of paleontological finds from the Rincon Shale are microfossils; however, two significant fossil finds have been documented in Santa Barbara County.
Tvqcg	Vaqueros Sandstone	High	The Vaqueros Sandstone is late Oligocene to early Miocene in age and represents a shallow marine transgressive régime. The Vaqueros is highly fossiliferous and has yielded over 70 well-preserved fossil specimens.
Ttr	Tranquilon Volcanics	Low	Although certain depositional environments promote fossilization, most associated with these igneous rocks are not conducive to fossil preservation.
Paleogene Marine Rocks			
Tsass(?)	Sacate-Gaviota (Coldwater) Sandstone Formation	Moderate	The Sacate formation is also known as the Coldwater Sandstone formation. This formation is a marine formation from the late Eocene. In the scope of this study there is only one known fossil from this formation.
Tcd	Cozy Dell Shale Formation	Low	The depositional environment was a deep ocean setting. There are no fossils found in this formation besides microfossils.

TABLE 3.12-2

Sedimentary Units Mapped in the General Vicinity of the Project Area by Dibblee (1988) and their Assigned Paleontological Sensitivity

Map Unit	Name	Paleontologic Sensitivity (Provisional)	Remarks
Tma	Matilija Sandstone Formation	Low	The depositional environment was a deep ocean setting. Only microfossils are recorded for this formation.
Tan	Anita Shale/Juncal Formation	Low	The depositional environment was a deep ocean setting. The Anita Shale/Juncal formation has not yielded fossils according to the online search utility from the UCMP.
Franciscan-Age Rocks			
Ka	Espada Formation	Low	The depositional environment was a deep ocean setting. The Espada formation has not yielded fossils according to the online search utility from UCMP.
fm	Franciscan Formation	Moderate	Franciscan formation has been deformed and locally metamorphosed. Fossil finds are rare but are highly important in contributing to the understanding of the depositional environment.

3.12.3.3 Project Impacts

Impact No.	Impact Description	Phase	Impact Classification
PALEO-1	Ground-disturbing activities such as mechanical excavation, drilling, or trenching could affect paleontological resources.	Construction	Class II

Impact PALEO-1: Exposure and Potential Destruction of Significant Paleontological Resources. Ground-disturbing activities that could affect paleontological resources include mechanical excavation, drilling, or trenching that either (1) extends to sufficient depth to affect sediments that are unaltered by soil development and undisturbed; and that possess moderate to high paleontological sensitivity, or (2) affect exposed fossiliferous rocks such as in road cuts, natural outcrops, and arroyo walls. If a unique paleontological resource or site were destroyed, the impact would be significant but mitigable (*Class II*). Activities such as clearing, grubbing, and blading to prepare site surfaces and laydown areas are examples of construction-related work that would not be expected to adversely affect paleontological resources.

Impact No.	Impact Description	Phase	Impact Classification
PALEO-2	Unauthorized collection of fossils by construction workers or operational personal may occur.	Construction	Class II

Impact PALEO-2. Unauthorized collection of fossils by construction workers or operational personal may occur where newly exposed sediment reveals fossil-bearing strata. This impact would be significant but mitigable (*Class II*).

3.12.3.4 Mitigation Measures

Mitigation PALEO-1: Pre-construction Workshop. The County shall conduct a pre-construction workshop with a County-qualified paleontologist or individual qualified to identify paleontological resources and construction workers and other Project personnel. The workshop shall inform personnel what fossil resources are and what they look like, what to do and who to notify in case of a paleontological discovery, and penalties for the illicit disturbance of fossils.

Plan Requirements: All construction personnel must receive training. The Applicant will keep training records onsite for review by the County, if requested.

Timing: Training will occur prior to commencement of any construction-related activity.

MONITORING: County staff will receive and review the training material prior to any training, spot check construction staff to ensure compliance with this requirement, and request training attendance records, if determined necessary (*Addresses Impact PALEO-1 and PALEO-2*).

Mitigation PALEO-2: Implement Monitoring Program. Paleontological resources monitoring of mechanical disturbance only in Project areas known to have moderate to high sensitivity

sediments shall occur concurrently with those construction activities. Monitoring shall be performed by an individual determined by the County to be qualified to identify paleontological resources. Based on field data, a decrease or increase in the monitoring of specific activities and areas may be identified.

Plan Requirements and Timing: Prior to start of construction, a contract or Letter of Commitment between the Applicant and the monitor, consisting of a project description and scope of work, shall be prepared. The contract shall be executed and submitted to the County for review and approval prior to the issuance of the zoning clearance for the first phase of construction and all subsequent construction phases.

MONITORING: County staff will confirm monitoring by the County-qualified archaeologist and County grading inspectors shall spot check field work (*Addresses Impact PALEO-1*).

Mitigation PALEO-3: Discovery of Fossils. If fossils are found by the monitor or by construction personnel, the following actions will be taken:

- a. Follow appropriate notification procedures
- b. Assessment of the find, usually in the field by the Project paleontologist and determination of recovery procedures
- c. Provisions for construction avoidance until a find is assessed and, if recovery is called for, scientifically recovered; construction-related excavations would continue in other areas away from the discovery
- d. Provisions for continued monitoring of construction in all appropriate areas while the find is being recovered
- e. Post-field initial study and curation preparation and subsequent curation.

Plan Requirements: Fossils that may be discovered during construction must first be assessed to determine whether they are scientifically significant and whether recovery measures are warranted. If recovery is recommended, it shall be completed in a manner reflecting scientific standards currently applied to paleontological excavations. Within those limits, all appropriate measures shall be taken to expedite recovery and to minimize interference with construction scheduling. The County shall be notified within 48 hours of a paleontological resources discovery assessed by the Project paleontologist to be significant and warranting recovery. The paleontological monitor shall periodically update the County during the recovery, and notify them upon completion of recovery.

Timing: This measure shall be in effect throughout all construction phases.

MONITORING: County staff shall ensure that this measure is implemented through regular contact with the monitor and site visits as appropriate (*Addresses Impact Paleo-1*).

3.12.3.5 Residual Impacts

As a result of the implementation of the paleontological resources mitigation measures PALEO-1 through PALEO-3, residual Project-related impacts to paleontological resources would be less than significant.