

PHYSICAL ENVIRONMENT

2.9 Paleontology

2.9.1 Regulatory Setting

Paleontology is a natural science focused on the study of ancient animal and plant life as it is preserved in the geologic record as fossils.

A number of federal statutes specifically address paleontological resources, their treatment, and funding for mitigation as a part of federally authorized projects.

As required by 23 United States Code (USC) 1.9(a), the use of Federal-aid funds must be in conformity with all Federal and state laws.

Furthermore, 23 USC305 authorizes the appropriation and use of Federal highway funds for paleontological salvage as necessary by the highway department of any state, in compliance with 16 USC 431-433 above, and state law.

Under California law, paleontological resources are protected by the California Environmental Quality Act.

2.9.2 Affected Environment

This section is based on the *Paleontological Identification Report and Paleontological Evaluation Report* (December 2018).

Paleontological resource locality searches for any known localities within and surrounding the project limits were completed through the Natural History Museum of Los Angeles County (LACM) and the San Diego Natural History Museum (SDNHM) in July 2018. Relevant geologic maps and geological and paleontological literature were reviewed. A pedestrian survey within the project limits was conducted on July 17 and 18, 2018.

The project limits are within the Peninsular Ranges Geomorphic Province, a large structural block that extends from the Transverse Ranges in the north to the tip of Baja California in the south. Within this larger region, the Build Alternatives are in the Los Angeles Basin, which is a broad alluvial plain bounded by mountains to the north and to the east, and the Pacific Ocean to the west and the south.

Geologic units within the project limits include Holocene to late Pleistocene (less than 126,000 years ago) Young Axial Channel Deposits and Young Alluvial Fan Deposits, middle to early Pleistocene (126,000 years ago—2.588 Million Years Ago [Ma]) Very Old Axial Channel Deposits and Very Old Alluvial Fan Deposits, the Pliocene (2.588–5.333 Ma) Niguel Formation, and the late to middle Miocene (5.333–15.97 Ma) Monterey Formation. Although not mapped, Artificial Fill was also noted in many portions within the project limits during the pedestrian survey.

Because of its disturbed context, Artificial Fill does not have the potential to contain scientifically significant paleontological resources. The upper 10 feet (ft) of the Young Axial Channel Deposits and the Young Alluvial Fan Deposits are unlikely to contain

scientifically significant paleontological resources because of their young age (likely less than 4,200 years); however, the older sediments of the Young Axial Channel Deposits and the Young Alluvial Fan Deposits below a depth of 10 ft may be old enough to contain scientifically significant paleontological resources. The Very Old Axial Channel Deposits, the Very Old Alluvial Fan Deposits, the Niguel Formation, and the Monterey Formation may contain scientifically significant paleontological resources.

The results of the fossil locality searches conducted by the LACM and the SDNHM noted no known fossil localities within the boundaries of the project limits, nor do these museums have records of fossil localities from the uppermost layers (i.e., Holocene sediments of the Young Axial Channel or Young Alluvial Fan Deposits) near the project limits. However, both the LACM and the SDNHM have fossil localities from Pleistocene sediments similar to the older sediments in the Young Axial Channel Deposits and Young Alluvial Fan Deposits, as well as the Very Old Axial Channel Deposits and Very Old Alluvial Fan Deposits within the project limits. Both museums also have fossil localities from the Niguel and Monterey Formations near the project limits.

The LACM has one fossil locality from what it calls “older Quaternary terrace deposits,” which corresponds to the Pleistocene sediments in the geologic units noted above. This locality, LACM 65129, is southeast of the project limits in what is now Costeau Park, along Alicia Parkway south of I-5. It produced a substantial terrestrial vertebrate fauna. The SDNHM also has one fossil locality from these deposits near the project limits. This locality, SDNHM 6219, is near the Laguna Hills Community Center just over 1 mile from the project limits, and it yielded specimens of freshwater bony fish (stickleback and gar), snakes, pond turtles, falcons, rabbits, camelids, kangaroo rats, ground squirrels, pocket gophers, deer mice, woodrats, and voles.

The closest vertebrate fossil locality in the Niguel Formation noted by LACM is LACM 7058, situated immediately southeast of the project limits, northwest of the intersection of I-5 and Alicia Parkway. This locality produced a specimen of six-gilled shark (*Hexanchus*) and undetermined bony fish (Osteichthyes). The next closest locality from LACM is LACM 65187, between Alicia Parkway and La Paz Road north of Paseo De Valencia. This locality produced specimens of giant white shark (*Carcharocles megalodon*) and whale (Cetacea). Near the intersection of La Paz Road and Paseo de Valencia, LACM 5551 yielded specimens of sea cow (Dugongidae), early baleen whale (*Herpetocetus*) and sea lion (Otariidae). The SDNHM has three fossil localities in the Niguel Formation within 2 miles of the project limits. These localities produced trace fossils (burrows and sponge borings), wood fragments, marine invertebrates (bryozoans, brachiopods, snails, mussels, clams, scallops, oysters, tusk shells, barnacles, crabs, and sea urchins), and marine vertebrates (sharks, rays, bony fish, dolphins, baleen whales, desmostylians, and auks).

The LACM has multiple localities from the Monterey Formation near the project limits. Between Lake Forest Drive and Rockfield Boulevard, localities LACM 3198, 3209, 3210, 3412, 3413, and 4103–4114 yielded a suite of fossil marine vertebrates, including hammerhead shark (*Sphyrna*), giant white shark (*Carcharocles megalodon*), bonito sharks (*Isurus benedeni* and *I. oxyrichus*), bramble shark

(*Sphyræna*), crocodile (*Crocodylus*), bird (Aves), sea lion (Otariidae), dugong (*Diplotherium allisoni*), baleen whale (Mysticeti), and dolphin (Kentriodontidae). In the Laguna Hills south of the project limits near the intersection of Laguna Hills Drive and Paseo De Valencia, a series of fossil localities (LACM 1945, 3172, 3864, 4445, 4866, and 7506) produced a wide variety of vertebrates. Combined, the specimens from these localities included giant white shark (*Carcharocles megalodon*), requiem shark (Carcharhinidae), tiger shark (*Galeocerdo*), snake mackerel (*Thyrsoctes kriegeri*), triggerfish (Balistidae), porcupinefish (*Diodon scillae* and *Oligodiodon vetus*), sea turtle (*Psephophorus*), sea lion (*Allodesmus*), walrus (*Imagotaria*, *Neotherium*, *Pithanotaria*), undetermined pinniped (Pinnipedia), desmostylians (*Desmostylus* and *Neoparadoxia cecilians*), dugong (*Dusisiren*), primitive dolphin (*Liolithax kernensis*), porpoise (*Loxolithax stocktoni*), river dolphins (Platanistidae and Pontoporiidae), beluga whale (Delphinapterinae), beaked whale (*Tasmacetus*), sperm whale (*Scaldicetus*), toothed whale (Odontoceti), undetermined whales (Cetacea), puffins and auklets (*Aethia rossmoori*, *Alcodea ulnulus*, and *Praemancalla lagunensis*), fulmar (*Fulmarus hammeri*), shearwater (*Puffinus calhouni*), booby (Sulidae), undetermined bird (Aves), rabbit (*Hypolagus*), and squirrel (Sciuridae), dog (Canidae), even-toed ungulate (Artiodactyla). From the Monterey Formation, the SDNHM has five fossil localities, of which three are less than 0.5 mile northeast of the project limits, and two are less than 3 miles southwest of the project limits. These localities produced trace fossils (coprolites), wood and leaf impressions, marine invertebrates (murex snails and scallops), and vertebrates (sharks, rays, bony fish, turtles, crocodiles, birds, eared seals, toothed whales, baleen whales, and desmostylians).

The pedestrian survey indicated that most of the area within the project limits is paved and/or landscaped due to the existing roadway and surrounding businesses. Where open ground was visible, only Artificial Fill was noted. No native sediments were noted and no paleontological resources were observed during the field survey.

2.9.3 Environmental Consequences

2.9.3.1 Temporary Impacts

Build Alternatives (Alternatives 2 and 4 [including Design Option B])

The construction of Alternatives 2 and 4 (including Design Option B) would not result in temporary impacts to paleontological resources because the impacts to those types of resources during construction would be considered permanent as described later in Section 2.9.3.2.

No Build Alternative

Under the No Build Alternative, none of the proposed improvements to the existing I-5/EI Toro Road Interchange would be constructed. The No Build Alternative would maintain the existing conditions; therefore, the No Build Alternative would not result in temporary impacts related to paleontological resources as a result of construction activities.

2.9.3.2 Permanent Impacts

Build Alternatives (Alternatives 2 and 4 [including Design Option B])

Excavation depths for roadway construction are expected to extend up to approximately 7 ft for Alternatives 2 and 4 (including Design Option B). Replacing the existing sound walls along the northbound on-ramp and southbound off-ramp in the Build Alternatives (including Design Option B) would require piles 16 inches in diameter to be driven a depth of approximately 16 ft. Landscaping for the Build Alternatives would require excavations to depths of up to approximately 2 ft, and the drainage features for the Build Alternatives (including Design Option B) would require excavation depths of approximately 4–5 ft. Any relocation of utilities for the Build Alternatives (including Design Option B) would require excavation to a maximum depth of approximately 6 ft. As such, excavation for either of the Build Alternatives would have the potential to impact paleontological resources.

Unanticipated Paleontological Resources

There is a potential for unanticipated paleontological resources to be unearthed during site preparation, grading, or excavation for the Build Alternatives (including Design Option B). Those potential effects would be avoided or minimized through Project Feature PF-PAL-1.

PF-PAL-1 Caltrans Standard Specification 14-7.03: Discovery of Unanticipated Paleontological Resources. If unanticipated paleontological resources are discovered, all work within 60 feet of the discovery must cease and the construction Resident Engineer must be notified. Work cannot continue near the discovery until authorized.

No Build Alternative

Under the No Build Alternative, none of the proposed improvements to I-5 would be constructed. The No Build Alternative would maintain the existing conditions; therefore, the No Build Alternative would not result in permanent impacts to paleontological resources as a result of construction activities.

2.9.4 Avoidance, Minimization, and/or Mitigation Measures

The following measure provides procedures for the treatment of paleontological resources during construction of the Build Alternatives:

PAL-1 Paleontological Mitigation Plan. A qualified paleontologist shall prepare a Paleontological Mitigation Plan (PMP) following the guidelines in the California Department of Transportation (Caltrans) Standard Environmental Reference (SER), Environmental Handbook, Volume 1, Chapter 8 – Paleontology (November 2017) and guidelines developed by the Society of Vertebrate Paleontology (2010). The PMP shall be prepared concurrently with final design plans during the Plans, Specifications, and Estimates (PS&E) phase. The PMP shall include sections describing project activities, the geologic units within the project area and their paleontological sensitivities, the work plan for mitigating project impacts to paleontological resources, estimates of monitoring schedules and costs, decision thresholds for monitoring levels and fossil collections, a recommended repository for recovered

fossils, any necessary permits, and the contents of the Paleontological Mitigation Report that is required at the end of the monitoring program regardless of whether any paleontological resources are recovered.

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