2.3.3 Paleontology

2.3.3.1 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.

16 U.S. Code (USC) 470aaa (Paleontological Resources Preservation Act) prohibits the excavation, removal, or damage of any paleontological resources located on federal land under the jurisdiction of the Secretaries of the Interior or Agriculture without first obtaining an appropriate permit. The statute establishes criminal and civil penalties for fossil theft and vandalism on federal lands.

Under 36 Code of Federal Regulations 62, the National Natural Landmarks Program, property owners agree to protect biological and geological resources such as paleontological features. Federal agencies and their agents must consider the existence and location of designated national natural landmarks and of areas found to meet the criteria for national significance in assessing the effects of their activities on the environment under the National Environmental Policy Act.

23 USC 305 (Archeological and Paleontological Salvage) authorizes the appropriation and use of federal highway funds for paleontological salvage as necessary by the highway department of any state, in compliance with 54 USC 320301-320303 above and state law.

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

2.3.3.2 Affected Environment

The initial Paleontological Identification Report/Paleontological Evaluation Report (PIR/PER) was approved by the California Department of Transportation (Caltrans) on December 10, 2018 (Caltrans 2018). Following design changes, a Supplemental PIR/PER was prepared and subsequently approved by Caltrans on August 21, 2025 (Caltrans 2025).

Proposed excavations for this Project would result in impacts on four sedimentary geologic formations with high potential for paleontological resources at all depths below any artificial fill:

- Quaternary very old axial-channel deposits
- Quaternary very old alluvial-fan deposits

- Pliocene Niguel Formation
- Miocene Monterey Formation

In addition, high potential for paleontological resources is specified for excavations exceeding 10 feet in depth within Quaternary younger alluvial fan deposits and younger axial channel deposits due to the transition to older, high sensitivity sediments.

Very old axial-channel deposits and alluvial-fan deposits have produced fossil mammoths, mastodons, horses, camels, saber-toothed cats, coyotes, deer, peccaries, sloths, rodents, birds, reptiles, and fish, which all provide unique insights into the ecology and evolutionary changes these species underwent, especially in the case of species that are still extant. Therefore, these geologic units are categorized as having high potential for paleontological resources. (Caltrans 2025.)

The lower marine beds within the Niguel Formation contain diverse marine vertebrate and invertebrate fauna, as well as a relatively small number of terrestrial vertebrates and plants. No paleontological resources are documented from the upper terrestrial beds. However, the Niguel Formation as a whole is categorized as having high potential for paleontological resources. (Caltrans 2025.)

The Monterey Formation has yielded an extensive suite of marine vertebrates and invertebrates from interbeds of platy siltstone and sandstone. Due to the highly fossiliferous nature of this geologic unit, the Monterey Formation has a high potential for paleontological resources (Caltrans 2025). In addition, the paleontological records search and literature review identified six holotypes, or specimens upon which a new taxon is based, within the Monterey Formation in the vicinity of the Project.

2.3.3.3 Environmental Consequences

The results of the PIR/PER and Supplemental PIR/PER indicate that the Project footprint is underlain, in part, by geologic units with high paleontological sensitivity (Figure 2.3.3-1). These are known to potentially contain scientifically significant paleontological resources. These units consist of the following:

- Middle to early Pleistocene-age very old alluvial fan deposits (Qvof)
- Middle to early Pleistocene-age very old axial channel deposits (Qvoa)
- Pliocene-age Niguel Formation (Tn)
- Miocene-age Monterey Formation (Tm)

In addition, although high-sensitivity “Miocene to early Pliocene Capistrano Formation, siltstone facies” was not observed directly along the survey corridor, these sediments were observed in nearby hill exposures immediately adjacent to the survey area.

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Figure 2.3.3-1

I-5 El Toro Road Interchange Project
Paleontological Sensitivity

12-ORA-5 PM 17.8/19.7
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Artificial fill is considered to have no potential for paleontological resources. The existing geotechnical borings within the Project limits indicate up to 20 feet of artificial fill underlying the Interstate (I-) 5 overpass at El Toro Road. However, little to no artificial fill is documented in the remainder of the Project, and only small amounts were observed at the on-ramps and off-ramps at El Toro Road during the paleontological field survey (Caltrans 2025).

Build Alternative 1 and its design variation (Build Alternative 1a) would both result in impacts on two geologic units with high potential for paleontological resources: early to middle Pleistocene very old alluvial-fan deposits and Miocene Monterey Formation. Build Alternative 3 and the No-Build Alternative would not require ground disturbance and therefore would not result in impacts on paleontological resources.

Temporary Impacts

Build Alternatives

Build Alternatives 1 and Its Design Variation (Build Alternative 1a) and 3

No temporary impacts on paleontological resources are expected. Any impacts on such resources during the construction period, should they occur, would be considered permanent impacts and are discussed under the Build Alternative headings below.

No-Build Alternative

Under the No-Build Alternative, no Project-related effects on paleontological resources would occur.

Permanent Impacts

Build Alternatives

Build Alternative 1

For Build Alternative 1, the potential for impacts on paleontological resources is expected to be primarily within early to middle Pleistocene very old alluvial-fan deposits, as the majority of ground disturbance would be no greater than 10 feet below ground surface (bgs). Ground disturbance related to bridge work for the southbound El Toro Road east off-ramp would extend into the Miocene Monterey Formation to a depth of approximately 30 feet bgs. Pile-driving associated with the off-ramp would extend to approximately 100 feet bgs. However, this work is not expected to result in observable sediment during monitoring.

Ground disturbance within the southern half of the Avenida de la Carlota improvements would result in impacts on late Pleistocene to Holocene young axial-channel deposits. Holocene sediments within this geologic unit have low potential for paleontological resources. However, at unknown depths the Quaternary younger axial-channel deposits may transition to highly sensitive portions of the same unit, dating to the late Pleistocene. In addition, the younger axial-channel deposits overlie the early to middle Pleistocene very old alluvial-fan deposits.

Project construction is expected to affect these units and, therefore, could result in impacts on any resources harbored within, if present. A Paleontological Mitigation Plan (PMP) will be prepared by a qualified paleontologist outlining a mitigation program, and paleontological monitoring will be implemented during ground-disturbing activities in areas of high paleontological sensitivity to address impacts on paleontological resources, should they be present, as identified in Mitigation Measure **PAL-1**, which is included in Section 2.3.3.4, *Avoidance, Minimization, and/or Mitigation Measures*. A Curation Agreement with a qualified repository will be obtained for paleontological specimens warranting preservation. Therefore, with implementation of Project Feature **PF-PAL-1** and Mitigation Measure **PAL-1**, impacts on paleontological resources, should they occur, would be minimized and would not result in permanent adverse impacts.

PF-PAL-1 addresses the possibility of paleontological resource discoveries during construction. As Build Alternative 1 and its design variation (Build Alternative 1a) include ground disturbance, **PF-PAL-1** is applicable to these alternatives.

PF-PAL-1 **Paleontological Resource Discoveries.** During construction, the Project contractor will adhere to Caltrans Standard Specification 14-7.03 if unanticipated paleontological resources are discovered at the job site. If paleontological resources are discovered during construction, the contractor may not disturb the resources and must immediately:

a. Stop all work within a 60-foot radius of the discovery.

b. Secure the area.

c. Notify the Engineer.

Caltrans will investigate the discovery and modify the dimensions of the secured area if needed. Paleontological resources may not be moved or taken from the job site. Work may not resume within the radius of discovery until authorized.

Design Variation: Build Alternative 1a

Build Alternative 1a includes all proposed improvements specified in Build Alternative 1 and would add a new public street and four-way intersection at the new southbound I-5 and Avenida de la Carlota ramp. The improvements would require cut-and-fill excavations to a maximum depth of 10 feet bgs and would potentially result in impacts on late Pleistocene to Holocene young axial-channel deposits and early to middle Pleistocene very old alluvial-fan deposits. Other than the new public street and intersection, impacts and recommendations, including implementation of Measures **PF-PAL-1** and Mitigation Measure **PAL-1**, would be the same as those identified for Build Alternative 1.

Build Alternative 3

Build Alternative 3 proposes standalone improvements that increase the efficiency of existing facilities via technological improvements rather than physical improvements. No

ground disturbance would be required under Build Alternative 3. Therefore, Build Alternative 3 would not have the potential to result in impacts on any geologic units with high potential for paleontological resources.

No-Build Alternative

Under the No-Build Alternative, no Project-related effects on paleontological resources would occur.

2.3.3.4 Avoidance, Minimization, and/or Mitigation Measures

Build Alternative 1 and its design variation (Build Alternative 1a) are expected to result in impacts on geologic units at or near the surface, with high paleontological sensitivity, during the excavations required for the construction of the Project. Therefore, a PMP will be prepared by a qualified Principal Paleontologist prior to the construction phase. The PMP will outline a strategy to reduce potential effects on scientifically important paleontological resources should they be discovered. It will be prepared subsequent to the Project's environmental document determination and initiated during the design phase. The PMP will include a Project location and description, background information, cost estimate, directions for implementation of paleontological fieldwork, laboratory techniques for fossil preparation and identification, potential repository facilities, and a cost estimate for permanent curation at the repository. If the Project scope changes prior to the preparation of the PMP, an updated SPIR/PER to address these changes may be combined with the PMP.

No permits related to paleontological resources have been identified as necessary for this Project.

Mitigation Measure **PAL-1** will be implemented during construction to mitigate, minimize, and/or avoid impacts related to paleontological resources should they be unearthed during construction.

PAL-1 **Paleontological Mitigation Plan**. Caltrans will ensure that a Paleontological Mitigation Plan (PMP) is prepared and adhered to during construction of the Project for alternatives with ground disturbance that could affect paleontological resources. At a minimum, the PMP will include the following instructions:

a. A qualified principal paleontologist (MS or PhD in paleontology or geology familiar with paleontological procedures and techniques) will be retained to prepare a PMP following Caltrans' Standard Environmental Reference (SER) if construction activities could result in impacts on paleontological resources.

b. The paleontologist will be present to consult with construction contractors at pre-grading meetings.

c. Paleontological monitoring under the direction of the qualified principal paleontologist will be performed for ground-disturbing construction activities involving sensitive geologic formations.

d. When fossils are discovered, the paleontologist (or paleontological monitor) will recover them. Construction work in these areas will be halted or diverted to allow recovery of fossil remains in a timely manner.

e. Fossil remains collected during the monitoring and salvage portion of the mitigation program will be cleaned, repaired, sorted, and cataloged.

f. Prepared fossils, along with copies of all pertinent field notes, photos, and maps, will then be deposited in a scientific institution with paleontological collections.

g. Once all ground-disturbing activities have been completed and approved by Caltrans, a final Paleontological Mitigation Report (PMR) will be completed that outlines the results of the mitigation program.

During construction, the Project contractor and Caltrans will adhere to the procedures outlined in the PMP. Additionally, Caltrans will retain a qualified Principal Paleontologist to implement the PMP.

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