Yolo 80 Corridor Improvement Project
Paleontological Identification Report

Solano/Yolo/Sacramento County

04-SOL-080 (PM 40.7 to 44.7)
03-YOL-080 (PM 0.00 to 11.72)
03-SAC-080 (PM 0.00 to 1.36)
03-YOL-50 (PM 0.00 to 3.12)
03-SAC-50 (PM 0.00 to 0.62)
03-3H900

July 2023

Caltrans
CALIFORNIA DEPARTMENT OF TRANSPORTATION

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July 2023

STATE OF CALIFORNIA
Department of Transportation

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Acronym List

ADA	Americans with Disabilities Act of 1990
Af	Artificial Fill
Caltrans	California Department of Transportation
CCTV	Closed-circuit television
CEQA	California Environmental Quality Act
CFR	Code of Federal Regulations
CR-105	County Road 105
CR-32A	County Road 32A
EA	Environmental Assessment
EB	Eastbound
EIR	Environmental Impact Report
GSRD	Gross solids removal devices
HOT	High Occupancy Toll
HOV	High Occupancy Vehicle
I-5	Interstate 5
I-80	Interstate 80
ITS	Intelligent Transportation System
Ka	Thousands of Years Ago
Ma	Millions of Years Ago
NB	Northbound
NEPA	National Environmental Policy Act
NAHC	Native American Heritage Commission
PIR	Paleontological Identification Report
PBDB	Paleobiology Database
PM	Post mile
PRC	Public Resources Code
Project	Interstate 80 (I-80) Yolo Corridor Improvement Project
Qa	Holocene alluvial deposits
Qb	Holocene basin deposits
Qmu/Qml	Modesto Formation
Qrl	Riverbank Formation
Qsc	Stream channel deposits
SB	Southbound
SER	Caltrans Standard Environmental Reference
TMS	Transportation Management Systems
UCMP	University of California at Berkeley Museum of Paleontology
US-50	U.S. Route 50
USC	United States Code
WB	Westbound

Executive Summary

The purpose of this Paleontological Identification Report (PIR) is to provide technical information and to review the project in sufficient detail to determine the extent to which the project may affect paleontological resources. Caltrans has prepared this PIR under its assumption of responsibility per the California Environmental Quality Act (CEQA) and National Environmental Policy Act (NEPA).

This PIR has been prepared for the Interstate 80 (I-80) Yolo Corridor Improvement Project (Project). The California Department of Transportation (Caltrans) proposes to construct managed lanes, pedestrian/bicycle facilities, and Intelligent Transportation System (ITS) elements along I-80 and U.S. Route 50 (US-50) from Kidwell Road in eastern Solano County (near Dixon), through Yolo County, to West El Camino Avenue on I-80 and Interstate 5 (I-5) on US-50 in Sacramento County.

The paleontological potential of the geologic units underlying and near the Project corridor was evaluated. These units include artificial fill (Af), stream channel deposits (Qsc), Holocene alluvial deposits (Qa), Holocene basin deposits (Qb), Modesto Formation (Qmu/Qml), and Riverbank Formation (Qrl). These units were determined to have low to high paleontological sensitivity according to the *Caltrans Standard Environmental Reference* (SER), Volume 1, Chapter 8 – Paleontology (Caltrans, 2014).

No paleontological resources were identified in the Project corridor. However, because the Project is located within four miles of seven vertebrate fossil localities found in sediment similar to that of the Project corridor, there is potential for the Project to create impacts on scientifically significant resources. Avoiding these impacts is not likely to be feasible because of the extent of the Project corridor. Therefore, we recommend that a Paleontological Evaluation Report be prepared.

Chapter 1. Project Description and Setting

1.1. Introduction

The purpose of this PIR is to provide technical information and to review the proposed Yolo Corridor Improvement Project (Project) in sufficient detail to determine to what extent the Project has the potential to affect paleontological resources. Paleontological resources, or fossils, are afforded protection by environmental legislation set forth under CEQA and NEPA.

1.1.1. CALTRANS POLICY

Caltrans and local project sponsors, as part of the project delivery process, are obligated to conduct paleontological studies in response to federal and state laws and regulations. Local project sponsors must comply with local laws and ordinances. Caltrans complies with local laws and ordinances when practicable. If geologic units with a high paleontological potential ranking may be impacted by a project, avoidance, minimization, and/or mitigation measures must be considered.

1.2. Definition and Significance of Paleontological Resources

Paleontological resources are the remains or traces of once-living organisms preserved in the geologic record as fossils. Paleontological resources can include body fossils (e.g., bones, teeth, shells, leaves), trace fossils (e.g., tracks, trails, burrows, coprolites), and microfossils (e.g., pollen grains, spores, diatoms). Fossils are generally considered to be older than about 11,700 years (the end of the Pleistocene Epoch), but organic remains older than middle Holocene age (about 5,000 years) can also be considered to represent fossils because they are part of the record of past life. Paleontological resources also include fossil localities and formations or rock units containing fossils or with the potential to contain fossils.

Fossils are considered important scientific and educational resources because they serve as direct and indirect evidence of past life and are used to understand the history of life on Earth and of past environments, ecosystems, and climates. Fossils can answer questions relating to patterns and processes of evolution and extinction, and how life has responded to changes in climates and environments through time.

1.2.1. SCIENTIFIC SIGNIFICANCE

Fossils vary in their preservation, abundance, and distribution. Therefore, not all fossils are considered scientifically significant. Scientifically significant paleontological resources are fossils and fossiliferous deposits consisting of large or small identifiable vertebrate fossils, uncommon invertebrate, plant, and trace fossils, and other data that provide taphonomic, taxonomic, phylogenetic, paleoecologic, stratigraphic, or biochronologic information.

1.2.2. PALEONTOLOGICAL RESOURCE ASSESSMENT CRITERIA

Evaluating the potential effects on paleontological resources involves assigning paleontological potential rankings to individual geologic units based on the potential for the unit to contain scientifically significant fossils. The ranking systems are based on the relative abundance of vertebrate fossils or scientifically significant invertebrate or plant fossils, and the sensitivity of these fossils to adverse impacts.

Caltrans uses a tripartite scale for assessing paleontological potential. This scale consists of high potential, low potential, and no potential.

- **High Potential**: Rock units that, based on previous studies, contain or are likely to contain significant vertebrate, invertebrate, or plant fossils. These units include but are not limited to, sedimentary formations that contain significant nonrenewable paleontological resources anywhere within their geographical extent, and sedimentary rock units temporally or lithologically suitable for the preservation of fossils. These units may also include some volcanic and low-grade metamorphic rock units. Fossiliferous deposits with extremely limited geographic extent or an uncommon origin (e.g., tar pits and caves) are given special consideration and ranked as highly sensitive. High sensitivity includes the potential for containing 1) abundant vertebrate fossils; 2) a few significant fossils (large or small vertebrate, invertebrate, or plant fossils) that may provide new and significant taxonomic, phylogenetic, ecologic, and/or stratigraphic data; 3) areas that may contain datable organic remains older than recent, including *Neotoma* (spp.) (packrat) middens; or 4) areas that may contain unique new vertebrate deposits, traces, or trackways. Areas with a high potential for containing significant paleontological resources require monitoring and mitigation.

- **Low Potential**: This category includes sedimentary rock units that 1) are potentially fossiliferous but have not yielded significant fossils in the past; 2) have not yet yielded fossils but possess a potential for containing fossil remains; or 3) contain common or widespread invertebrate fossils if the taxonomy, phylogeny, and ecology of the species contained in the rock are well understood. Sedimentary rocks expected to contain vertebrate fossils are not placed in this category because vertebrates are generally rare and found in more localized stratum. Rock units designated as low potential generally do not require monitoring and mitigation. However, as excavation for construction gets underway, new and unanticipated paleontological resources might be encountered. If this occurs, a qualified Principal Paleontologist must evaluate the resource. If the resource is determined to be significant, monitoring and mitigation are required.

- **No Potential**: Rock units of intrusive igneous origin, most extrusive igneous rocks, and moderately to highly metamorphosed rocks are classified as having no potential for containing significant paleontological resources. For projects encountering only these types of rocks, paleontological resources can generally be eliminated as a concern and no further action must be taken.

1.3. Project Location and Description

1.3.1. OVERVIEW[1]

Caltrans proposes to construct managed lanes, pedestrian/bicycle facilities, and Intelligent Transportation System (ITS) elements in Solano, Yolo, and Sacramento Counties on the I-80 corridor between Kidwell Road and the Solano/Yolo County line, between the Solano/Yolo County line and the Yolo/Sacramento County line, and between the Yolo/Sacramento County line and West El Camino Avenue; and on the US-50 corridor between the I-80/I-50 interchange and the Yolo/Sacramento County line and between the Yolo/Sacramento County line and the US-50/I-5 interchange. The total Project length is approximately 20.8 miles (Figure 1).

[1] This project description is current as of July 2023. Subsequent changes in project components or depth or excavation area may alter this analysis's results.

Figure 1. Project Location

Figure 1.1-1
Project Location and Vicinity
Yolo 80 Corridor Improvement Project
EA 03-3H900
Solano, Yolo, and Sacramento Counties, California

1.3.2. PROJECT DESCRIPTION

Build Alternatives

This section describes alternatives developed to meet the purpose and need of the Project. Build Alternatives 2a, 3a, 4a, 5a, and 6a propose the same geometric footprint but would incorporate different managed lane types. Build Alternatives 2b, 3b, 4b, 5b, and 6b propose the same geometric footprint, including an I-80 connector structure, but would incorporate different managed lane types. Build Alternatives 7a and 7b would not construct new lanes but would repurpose an existing lane instead; however, Build Alternative 7b would include the I-80 connector structure.

- Build Alternative 2a: Add a high-occupancy vehicle lane in each direction for vehicles with two or more riders (HOV 2+).
- Build Alternative 2b: Add a high-occupancy vehicle lane in each direction for vehicles with two or more riders (HOV 2+) and build an I-80 connector structure.
- Build Alternative 3a: Add a high-occupancy toll lane in each direction for use by vehicles with two or more riders (HOT 2+).
- Build Alternative 3b: Add a high-occupancy toll lane in each direction for use by vehicles with two or more riders (HOT 2+) and build an I-80 connector structure.
- Build Alternative 4a: Add a high-occupancy toll lane in each direction for use by vehicles with three or more riders (HOT 3+).
- Build Alternative 4b: Add a high-occupancy toll lane in each direction for use by vehicles with three or more riders (HOT 3+) and build an I-80 connector structure.
- Build Alternative 5a: Add an express lane in each direction (i.e., everyone pays to use the lane, regardless of number of riders).
- Build Alternative 5b: Add an express lane in each direction (i.e., everyone pays to use the lane, regardless of number of riders), and build an I-80 connector structure.
- Build Alternative 6a: Add a transit-only lane in each direction.
- Build Alternative 6b: Add a transit-only lane in each direction and build an I-80 connector structure.
- Build Alternative 7a: Repurpose the current number one general-purpose lane for use by vehicles with two or more riders (HOV 2+); no new lanes would be constructed.
- Build Alternative 7b: Repurpose the current number one general-purpose lane for use by vehicles with two or more riders (HOV 2+); no new lanes would be constructed. Build an I-80 connector structure.

The Build Alternatives consist of the following three geographic segments.

Segment 1

Segment 1 stretches from Kidwell Road in Eastern Solano County through Davis to the Eastern end of the Yolo Causeway east of Enterprise Boulevard in West Sacramento. Segment 1 consists of three sub-segments:

- *Segment 1a* is from Kidwell Road to the Solano County/Yolo County Line.
- *Segment 1b* is from the Solano/Yolo County Line to the west end of the Yolo Causeway.
- *Segment 1c* is from the start of the Yolo Causeway to the east of Enterprise Boulevard.

Segment 2

Segment 2 starts east of Enterprise Boulevard and continues north on I-80 to West El Camino Avenue.

Segment 3

Segment 3 starts at the I-80/US-50 separation and continues east along US-50 to I-5 near downtown Sacramento. Segment 3 consists of two sub-segments:

- *Segment 3a* is the I-80/US-50 Separation to Jefferson Boulevard undercrossing.
- *Segment 3b* is the Jefferson Boulevard Undercrossing to just east of I-5.

1.3.3. COMMON DESIGN FEATURES OF THE BUILD ALTERNATIVES

A few common design features and standardized measures are shared among the Build Alternatives.

Intelligent Transportation System/Transportation Management Systems

Each Build Alternatives would include the placement of ramp meters and other ITS/Transportation Management Systems (TMS). In addition to ramp metering equipment, additional street lighting or relocation of lighting may be needed, traffic monitoring stations may be relocated, and closed-circuit television (CCTV) and fiber-optic may be added. Several maintenance pullouts are proposed adjacent to I-80 on-ramps to accommodate an electrical cabinet for proposed ramp meters or other ITS/TMS infrastructure. Table 1 summarizes the proposed ITS elements. Proposed ITS elements would be installed on a new pole foundation; some existing ITS infrastructure in these locations would be abandoned or replaced. Accordingly, it is assumed that each ITS pole foundation would have a permanent buffer of up to a 6-foot radius footprint with a temporary buffer of up to a 10-foot radius for construction.

Table 1. Intelligent Transportation System Improvements for All Build Alternatives

Improvement	Freeway	Post Mile	Direction	Location
Closed captioning television	I-80	41.776	EB	Kidwell Road
Changeable message signs	I-80	41.817	EB	Kidwell Road

Improvement	Freeway	Post Mile	Direction	Location
Emergency management system	I-80	41.983	WB	Kidwell Road
Emergency management system	I-80	42.081	WB	Kidwell Road
Closed captioning television	I-80	42.669	WB	Junction I-80/SR-113
Transportation management system	I-80	42.669	WB	Junction I-80/SR-113
Ramp meter	I-80	43.259	EB	SB SR-113 to EB I-80 freeway to freeway connector ramp
Ramp meter	I-80	43.636	EB	Old Davis Road to EB I-80 slip on-ramp
Changeable message signs	I-80	44.557	WB	Just west of Richards Boulevard
Automatic vehicle classification	I-80	0.002	WB	Solano/Yolo County Line
Ramp meter	I-80	0.113	WB	SB Richards Boulevard to WB I-80 slip on-ramp
Closed captioning television	I-80	0.235	WB	Richards Boulevard
Ramp meter	I-80	0.369	EB	Richards Boulevard
Changeable message signs	I-80	0.776	WB	Olive Drive
Closed captioning television	I-80	0.793	WB	Olive Drive
Transportation management system	I-80	1.25	EB	East of Pole Line Road
Transportation management system	I-80	1.997	EB	I-80 WB at Mace Boulevard
Ramp meter	I-80	2.506	WB	Mace Boulevard to WB I-80 slip on-ramp
Traffic signal	I-80	2.593	EB	Yolo I-80 EB at Chiles Road
Ramp meter	I-80	2.604	EB	SB Mace Boulevard to EB I-80 loop on-ramp
Traffic signal	I-80	2.662	WB	Yolo I-80 WB at Mace Boulevard
Closed captioning television	I-80	2.7	EB	Mace Boulevard
Ramp meter	I-80	2.762	EB	NB Mace Boulevard to EB I-80 slip on-ramp
Transportation management system	I-80	3.502	EB	East of Mace Boulevard
Transportation management system	I-80	3.986	EB	West of County Road 105D
Closed captioning television	I-80	4.313	EB	Chiles Road (100 feet west of existing changeable message sign)
Changeable message signs	I-80	4.361	WB	Chiles Road
Changeable message signs	I-80	4.365	EB	Chiles Road
Transportation management system	I-80	4.484	EB	East of County Road 105D
Closed captioning television	I-80	0.366	MEDIAN	Bryte Bend Bridge
Changeable message signs	I-80	0.606	WB	West El Camino Boulevard
Closed captioning television	I-80	1.358	WB	West El Camino Boulevard
Ramp meter	I-50	2.614	WB	Jefferson Boulevard
Ramp meter	I-50	2.869	WB	South River Road

Key:
EB = eastbound; NB = northbound; SB = southbound; WB = westbound

Ramp Modifications

Within Segment 2, eastbound ramp modifications would be constructed at I-80 eastbound on-ramp from Richards Boulevard to accommodate realignment within the right-of-way. In addition, ramp modifications would occur at the westbound I-80 off-ramp to CR-32A/Chiles Road to accommodate realignment within the right-of-way.

Bicycle/Pedestrian Facilities

Each Build Alternatives would extend the westernmost limit of the existing Class I bicycle pathway from I-80 to connect to CR-32A. Two extension options are considered, as described below. For the purposes of the EIR/EA, both bicycle paths are considered together as part of each Build Alternative.

Bicycle Pathway Extension - Option A

- Pavement rehabilitation of the Class I bicycle pathway along I-80 at the Yolo Causeway at various locations from PM 5.8 to PM 9.2.
- Pavement rehabilitation of the existing Class I bicycle pathway from County Road (CR) 32A to the levee road.
- Construction of a new Class I bicycle path along CR-32A would include widening the westbound off-ramp to CR-32A.
- Widening the shoulders of CR-32A from CR-105 to the proposed Class I bicycle path along CR-32A to accommodate a standard Class II bicycle lane. Construction of the Class II bicycle lane would involve widening the shoulders by 4 feet for the Class II 6-foot lane on both sides with standard edge line striping. No barriers would be constructed. Caltrans would coordinate with Yolo County Public Works Department to complete this bike path design.

Bicycle Pathway Extension - Option B

The proposed bicycle pathway extension – option B would be located adjacent to the westbound I-80 off-ramp to Chiles Raod and would be approximately 12 feet wide. The area surrounding the pathway would be graded to comply with Americans with Disabilities Act of 1990 (ADA) regulations. A concrete barrier would separate the westbound off-ramp from the proposed pathway. The existing bicycle pathway along the Yolo Causeway would not require closure during construction activities.

Park-and-Ride Facility

Within Segment 2 of each of the Build Alternatives, a Park-and-Ride Facility would be constructed on the east side of Enterprise Boulevard in a 4.5-acre lot, providing 300 parking spaces. Users of the Park-and-Ride Facility would have the option to park their cars for the day and connect to several county and regional transit services. The facility would be located

partially within the existing Caltrans right-of-way and partially outside the existing Caltrans right-of-way, as further described in the right-of-way discussion in Build Alternatives 2a and 2b.

Signage

The Build Alternatives would include several signs to provide graphic or text messages informing motorists of general road guidance. Some signs would have hours of operation that restrict certain classes of vehicles during peak periods. Other signs would notify motorists of the conditions or hazards they are approaching.

Smaller signs would be mounted on the existing freeway concrete median barrier, while larger ones would be mounted on cantilevered overhead sign structures above the express lane. The total height of the overhead sign structure (including the sign) would depend on the type of sign being mounted. Except for the smaller, median-mounted signs, all overhead sign structures would have a maximum height of approximately 40 feet and would either be supported on a cast-in-drilled-hole pile foundation or supported on a retaining wall structure.

Lighting

Street lighting would be added near CR-32A at the proposed bicycle pathway extension (option B) adjacent to the westbound off-ramp. Some nighttime lighting would occur during nighttime construction work activities. Signage would use reflective lettering.

Within Segment 2, bridge deck lighting with Type 21 Barrier-Rail-Mounted Lighting Standards would be constructed. Additional street lighting would be added to the Bryte Bend Bridge and at proposed auxiliary lane locations, if necessary, during the design phase. Some nighttime lighting would occur during nighttime construction work activities. [Note to Caltrans: per 10/15 focus call, please provide lighting plan]

Sound Walls

The Noise Study Report (NSR) was prepared in December 2021 to determine if any additional soundwalls would be warranted on the project. A Noise Abatement Decision Report (NADR) was prepared for this project in December 2021, based on the results from the NSR. Noise abatement must be predicted to provide at least a 5 dB minimum reduction at an impacted receptor to be considered by Caltrans. The Protocol's acoustical design goals states that the noise barrier must provide at least 7 dB of noise reduction at one or more beneficial receptors.

Of the eight barriers evaluated in the NSR, only one evaluated barrier, Barrier 1, was feasible and evaluated. A 72 linear foot soundwall, was evaluated with heights ranging from 6 to 12-feet located along eastbound Solano 80, between South Davis Road and Richards Boulevard. Based on the NADR analysis the cost of the proposed sound wall is estimated to be significantly higher than the reasonable monetary allowance that they would be allocated.

Therefor no soundwalls are being proposed on this project.

Road Cut/Fill

Some locations would require full structural section reconstruction, and others would require cut and fill of the embankment due to road widening.

Grinding

Cold planing, the process of removing part of the surface of a paved area, would be required throughout the Project limits. Cold planing would be required for ramp conforms at all ramps and may be required at other locations along the travel way wherever hot mix asphalt (HMA) is currently in place. A mill (cold planing) and fill operation may be proposed to repair roadway surface scarring that occurs during temporary restriping associated with some stage construction operations.

Drainage/Culverts

Anticipated work includes extending existing culverts through existing unpaved medians, extending existing culverts at locations where widening may occur outside the existing edge of pavement lining, and possibly abandoning any existing culverts draining the existing median that may no longer be required where median widening would occur in crowned sections of the roadway. Additionally, new drainage inlets, culverts, or culvert replacements could be required to accommodate areas where existing shoulders are being narrowed, additional runoff due to the increased pavement area, or perpetuate existing drainage patterns. Due to poor condition, two culverts are proposed to be replaced within the environmental study limits. In addition, 17 culverts are proposed to be repaired; however, such repairs may lead to replacing the entire culvert. Therefore, for the EIR/EA, it is assumed that these 17 culverts would be replaced, totaling approximately 1,200 linear feet. It is assumed that the temporary impacts would be a 20 foot wide trench for culvert replacement and a 20 foot by 20 foot boring pit for each culvert and inlet.

Utilities

The Build Alternatives would not result in potential conflicts with existing utilities along the I-80/US-50 corridor. Utility companies would require verification of facilities and involvement in construction plans. Accordingly, prior to construction, an estimated 15 test hole sites would be drilled at eight different locations for natural gas lines running transversely underneath I-80, the Yolo Causeway, and West Capitol Avenue in Sacramento, where the new managed lane would be constructed with retaining walls and columns. Positive findings would verify whether the gas line would require relocation or redesign to avoid conflicts with existing utilities.

Under Build Alternatives 2b, 3b, 4b, 5b, 6b, and 7b, up to four 115-kilovolt overhead utility towers may need to be relocated or tower height increased near the new I-80 connector structure at the I-80/US-50 separation in West Sacramento.

Fiber-Optic Cable

The Build Alternatives would install a fiber-optic cable and associated fiber-optic splice boxes within the roadbed at the eastbound outside shoulder of I-80 from west of Kidwell Road in Solano County at about PM 40.7 to PM 4.35 in Yolo County via trenching, boring, or attachment to structures within a 12-foot buffer surrounding the running line. Cut and cover or trenching would be the primary construction method and would require excavation of up to 42 inches deep to install. Fiber-optic cable may also be placed via directional borings to avoid conflicts with existing utilities.

Staging Areas

Staging areas would be located at the I-80/West El Camino Avenue interchange, South River Road, I-80/Richards Boulevard interchange, the I-80 and SR-113 interchange, and along Kidwell Road. These areas total approximately 53.3 acres and would be used for equipment storage and maintenance, construction materials, fuels, lubricants, solvents, and other possible contaminants during construction.

Vegetation and Tree Removal

Vegetation clearing would be required and would be confined to the area within the Project footprint, including construction access routes. Vegetation removal and clearing would be completed with hand tools where possible. Chainsaws, grinders, and excavators would be used for vegetation that cannot be removed by hand. All vegetation would be removed within the proposed cut and fill lines as well as within temporary impact lines where ITS components and proposed sound walls would be constructed. It may be possible to avoid some vegetation removal within areas of temporary impact.

Construction Equipment

The equipment used for the proposed work of the Build Alternatives would be similar among the alternatives. Center median work would use excavators, scrapers, motor graders, loaders, backhoes, pavers, concrete barrier slip-form pavers, truck-mounted cranes, 18-wheel trucks, dump trucks, and water trucks. Reconstruction and modification of ramps/gores/shoulder embankments will use excavators, motor graders, loaders, backhoes, pavers, 18-wheel trucks, dump trucks, and water trucks. For road surfacing, including placement for sensors in the road surface, equipment would include core drillers, trailers containing and dispersing sealant, and water trailers.

Construction of the I-80 connector structure under Build Alternatives 2b, 3b, 4b, 5b, 6b, and 7b would require pile driving, which would be undertaken during construction for installation of footings of the connector bridge. Each cast-in-place drilled footing would be excavated to a depth of up to 40 feet. Equipment for bridge construction would also include a crane (for pile driving), excavator, dozer, loader, manlift, articulated 4x4 forklift, truck, dump truck, trailer unit air compressor, and water truck. This equipment and a truck-mounted crane would also be used

for structural sign mounts. A truck-mounted auger can be used for installing roadside single-post signs. In addition, Build Alternative 2b proposes pile driving during construction for the installation of footings of the connector structure to a depth of approximately 40 feet.

Ground Disturbance

The depth of ground disturbance would vary throughout the Project limits. At locations where CMS, sign structures, or piles would be installed, disturbance could exceed 30 feet. At locations of culverts, the depth of ground disturbance could vary from 3 feet to 10 feet (the estimated depth to the bottom of the culvert/inlet). At locations of linear electrical facilities, such as fiber-optic and conduit installations, the ideal depth is typically 4 feet (assuming 42 inches of cover); however, depth could be increased to avoid conflicts with existing or proposed drainage or existing utilities.

1.3.4. UNIQUE FEATURES OF THE BUILD ALTERNATIVES

Build Alternatives 2a and 2b: HOV 2+ Managed Lane

Lane Configuration – Build Alternatives 2a and 2b

Build Alternatives 2a and 2b would start from the Solano/Yolo County Line west of Davis to West El Camino Avenue on I-80 and to I-5 on US-50 in Sacramento County. The Build Alternatives propose to construct managed lanes eastbound and westbound. This would be accomplished by constructing in the median from the Solano/Yolo County line to the west of the Yolo Causeway and continuing eastward by restriping to West El Camino Avenue on I-80 and to I-5 on US-50 in Sacramento County. Build Alternative 2b would involve the construction of an I-80 connector structure in addition to the construction activities planned for Build Alternative 2a. The I-80 managed lane connector structure would directly connect the managed lanes by flying over US-50 at the I-80/US-50 Interchange. The connector structure would include a retaining wall on either side and travel underneath the existing eastbound connector from I-80 to US-50. The proposed connector would be constructed of columns and include concrete barrier type 842 railings. The construction of the connector structure would also require widening of eastbound and westbound 80 freeway, widening the Enterprise Bridge and construction of a retaining walls along the outside shoulder of westbound and eastbound 80.

Segment 1: Within Segment 1b, from the Solano/Yolo County Line to the west end of the Yolo Causeway, the Project would involve the replacement of the existing inside shoulders and construction of the eastbound and westbound median from around Richards Boulevard to 1.5 miles east of Mace Boulevard to accommodate managed lanes in the eastbound and westbound directions. The new shoulders and construction areas would be asphalt concrete material. The median barriers would be upgraded from a metal beam guard rail to a reinforced concrete barrier.

Segment 2: Within Segment 2, the Bryte Bend Bridge overhead would be restriped to accommodate an additional managed lane in each direction. Reducing lane and shoulder widths would accommodate a fourth lane on the Bryte Bend Bridge. The bridge striping would change from three lanes (two 12-foot lanes and one 11.5-foot lane) to four (four 11-foot lanes) with 1-foot inside and 2.5-foot outside shoulders.

Segment 3: Within Segment 3b, from Jefferson Boulevard Undercrossing to just east I-5, the Jefferson Boulevard undercrossing (Br. No. 22-0106 L/R), and the Sacramento River viaduct (Br. No. 24-0014 R/L) between Jefferson Boulevard and the I-5/US-50 interchange would be restriped to add an additional managed lane in each direction.

Lane Access – Build Alternatives 2a and 2b

An HOV lane is a type of managed lane that allows qualified users who meet the minimum number of passengers to use the managed lane. The number of vehicle occupants required to qualify can vary depending on location. Under Build Alternatives 2a and 2b, vehicles with two or more occupants would be permitted to access the HOV lane, and all other vehicles would be prohibited from using those lanes. The HOV lanes would be designated using a striping pattern and a diamond marking to distinguish them from mixed-flow lanes and operate only during peak commute hours.

Structure Modifications – Build Alternatives 2a and 2b

As summarized in Table 2, Build Alternatives 2a and 2b would improve existing structures to accommodate proposed managed lanes.

Table 2. Structure Modifications

Structure Name	Structure Number	Route	Post Mile	Alternative	Structure Work
South Fork Putah Creek	23-0054 R	Sol 80	42.36	All Build Alternatives	Place fiber-optic conduit
Old Davis Rd Undercrossing	23-0155R	Sol 80	R43.5	All Build Alternatives	Place fiber-optic conduit
South Davis Overhead	23-0156R	Sol 80	R43.93	All Build Alternatives	Place fiber-optic conduit
Putah Creek Pedestrian Undercrossing	22-0194	Yol 80	0.01	All Build Alternatives	Place fiber-optic conduit
Richard Boulevard Overcrossing RW NO. 3	TBD	Yol 80	0/0.60	All Build Alternatives	Retaining wall at abutment along eastbound I-80 off-ramp to Richards Boulevard

Structure Name	Structure Number	Route	Post Mile	Alternative	Structure Work
I-80 Connector Structure	TBD	Yol 80	9.5/10.0	Build Alternatives 2b, 3b, 4b, 5b, 6b, 7b	I-80 Connector Structure; Proposed Connector RW #1; Proposed Connector RW #2.; Widen Enterprise bridge, RW#3 (NE of Enterprise Bridge); RW #4 (along EB 80 with Soundwall on top)

Signage – Build Alternatives 2a and 2b

A total of 136 new signs are proposed, of which 45 would be overhead signs for Build Alternatives 2a and 2b; 311 existing signs would be replaced. Note to Caltrans: Please confirm difference in number of signs in build alternative 2a vs.2b.]

1.4. Regulatory Setting

The following sections outline the federal, state, and local regulatory protections for paleontological resources that apply to the proposed Project.

1.4.1. FEDERAL LAWS AND REGULATIONS

Federal laws protect paleontological resources on federal lands and projects performed by federal agencies such as the United States Department of Transportation.

Preservation of American Antiquities (43 Code of Federal Regulations [CFR] 3)

CFR Title 43, Part 3 originally contained the regulations to implement the Antiquities Act of 1906. The Antiquities Act was recodified in 2014 by the National Park Service and Related Programs (54 United States Code [USC] 320301 – 320303). CFR Title 43, Part 3 has been revised to contain the regulations implementing 54 USC 320301–320303. CFR Title 43, Part 3 requires the Secretary of Agriculture, Secretary of the Army, or the Secretary of Interior over lands within their jurisdiction to grant a permit for the examination of ruins, excavation of archaeological sites and removal of objects of antiquity to reputable museums, universities, colleges, or other recognized scientific or educational institutions, or to their duly authorized agents. CFR Title 43, Part 3 “objects of antiquity” has been interpreted to include fossils by the Bureau of Land Management, the National Park Service, the United States Forest Service, and other federal agencies.

Archaeological and Paleontological Salvage (23 United States Code [USC] 305.20)

The Federal-Aid Highway Act of 1956 was the first highway act to specifically authorize the use of federal highway funds for archaeological and paleontological salvage. In 1958, President Eisenhower signed Public Law 85–767, codifying all pertinent portions of existing federal

highway legislation as “highways” in Title 23 of the USC, including the section for archaeological and paleontological salvage (23 USC 305). In 1960, Public Law 86-657 amended Section 305 to apply to the Highway Act of 1956 explicitly.

National Environmental Policy Act (42 USC 4321 et seq.)

NEPA directs federal agencies to use all practicable means to “Preserve important historic, cultural, and natural aspects of our national heritage…” (42 USC 4331(b)(4)). Regulations for implementing the procedural provisions of NEPA are found in 40 CFR 1500-1508.

Paleontological resources are a natural aspect of our national heritage and must be considered during the project scoping process. If the presence of a paleontological resource is identified, federal agencies and their agents must take the resource into consideration when evaluating project effects. Consideration of paleontological resources may be required under NEPA when a project is proposed for development on federal land, land under federal jurisdiction, or involves federal funding, permits or approvals. The manner of consideration depends upon the federal agency involved.

Limitation on Federal Participation (23 CFR 1.9)

Section 1.9(a) of the CFR Title 23 states:

> Federal-aid funds shall not participate in any cost which is not incurred in conformity with applicable Federal and State law, the regulations in this title, and policies and procedures prescribed by the Administrator. Federal funds shall not be paid on account of any cost incurred prior to authorization by the Administrator to the State highway department to proceed with the project or part thereof involving such cost.

Since CEQA requires that paleontological resources be addressed as part of the state environmental process (see California Environmental Quality Act below), any project, administered by a state agency, including local agencies such as county and city planning departments, that is receiving federal-aid funds, must also address paleontological resources.

1.4.2. STATE LAWS AND REGULATIONS

California Environmental Quality Act

The CEQA Statute, Public Resources Code (PRC), section 21002, states that:

> It is the policy of the state that public agencies should not approve projects as proposed if there are feasible alternatives or feasible mitigation measures available which would substantially lessen the significant environmental effects of such projects, and that the procedures required … are intended to assist public agencies in systematically identifying both the significant effects of proposed

> projects and the feasible alternatives or feasible mitigation measures which will avoid or substantially lessen such significant effects.

The CEQA Guidelines, California Code of Regulations, Title 14, Division 6, Chapter 3, section 15002(a)(3), states that CEQA is intended to:

> Prevent significant, avoidable damage to the environment by requiring changes in projects through the use of alternatives or mitigation measures when the governmental agency finds the changes to be feasible.

Paleontological resources are specifically referenced in CEQA Appendix G: The Environmental Checklist Form, which asks:

> Would the project directly or indirectly destroy a unique paleontological resource or site, or unique geologic feature?

Caltrans considers unique paleontological resources or sites to be those resources or sites that meet the criteria for scientific significance, as defined above. If paleontological resources are identified within the project corridor, the sponsoring agency (Caltrans or local) must consider those resources when evaluating project effects.

Archaeological, Paleontological, and Historical Sites (PRC, Division 4, Chapter 1.7)

Section 5097.5(a) of the PRC states:

> A person shall not knowingly and willfully excavate upon, or remove, destroy, injure, or deface any historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological site, including fossilized footprints, inscriptions made by human agency, rock art, or any other archaeological, paleontological or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over such lands. Violation of this section is a misdemeanor.

As used in this section, “public lands” means lands owned by, or under the jurisdiction of, the State, or any city, county, district, authority, public corporation, or any agency thereof. Consequently, Caltrans, as well as local project proponents, are required to comply with PRC 5097.5 for their activities, including construction and maintenance, as well as for permit actions (e.g., encroachment permits) undertaken by others.

1.4.3. AGENCIES WITH JURISDICTION

No permit requirements for paleontological resources have been identified that are relevant to this Project.

1.4.4. LOCAL REGULATORY SETTING

The Project corridor crosses portions of Solano, Yolo, and Sacramento Counties and the Cities of Davis and Sacramento (City of Davis, 2001; City of Sacramento, 2015; Sacramento County, 2011; Solano County, 2008; Yolo County, 2009). The General Plans for these jurisdictions were reviewed. No provisions pertaining to paleontological resources for Solano or Sacramento Counties, or the Cities of Davis and Sacramento were found.

Yolo County has the following provisions:

Action CO-A63: Require cultural resource inventories of all new development projects in areas where a preliminary site survey indicates a medium or high potential for archaeological, historical, or paleontological resources. In addition, require a mitigation plan to protect the resource before the issuance of permits. Mitigation may include:

- Having a qualified archaeologist or paleontologist present during initial grading or trenching;
- Redesigning of the project to avoid historic or paleontological resources;
- Capping the site with a layer of fill; and/or
- Excavating and removing the historical or paleontological resources and curating in an appropriate facility under the direction of a qualified professional.

Action CO-A65: Require that when cultural resources (including non-tribal archeological and paleontological artifacts, as well as human remains) are encountered during site preparation or construction, all work within the vicinity of the discovery is immediately halted and the area protected from further disturbance. The project applicant shall immediately notify the County Coroner and the Planning and Public Works Department. Where human remains are determined to be Native American, the project applicant shall consult with the Native American Heritage Commission (NAHC) to determine the person most likely descended from the deceased. The applicant shall confer with the descendant to determine appropriate treatment for the human remains, consistent with state law.

1.5. Geologic Setting

1.5.1. REGIONAL GEOLOGIC SETTING

The Project corridor lies within the Great Valley geomorphic province of California (California Geological Survey, 2002; Norris and Webb, 1990). The Great Valley (also known as the Central Valley) is a relatively flat alluvial plain approximately 400 miles long and 50 miles wide, trending northwest to southeast. The Central Valley is a structural trough that evolved from the late Jurassic to the Paleocene period (150–40 million years ago [ma]) from the amalgamation of oceanic terranes. Thousands of feet of marine sediment were deposited on this basin until the early Miocene period (approximately 20 ma) when a change in the motion between the Pacific

and North American plates resulted in the gradual uplift of the Coast Ranges, cutting the basin off from the ocean.

By the late Pliocene period (2 to 3 ma), the basin was predominantly dry land, and sediments were derived from the neighboring Coast Ranges and the Sierra Nevada Mountains. Because of the size and elevation of the Sierra Nevada relative to the Coast Ranges, the alluvial fans from the Sierras are vastly larger than those from the Coast Ranges, and they dominated the geology of the Central Valley during the Pleistocene and Holocene periods (2.4 ma to present). Grain size progressively decreases in these alluvial deposits toward the center of the valley, where the clay-rich silt of the Sacramento River and American River flood plains dominate.

Differences between younger and older surficial sediments in the Sacramento Valley may include stratigraphic position, degree of consolidation, topographic expression, and attitude (i.e., tilted versus flat-lying). Late Pleistocene and Holocene sediments can often be distinguished from older Pleistocene sediments by their relatively flat-lying attitude. In contrast, Pliocene to Middle Pleistocene sediments have often been reported as slightly deformed or tilted by tectonic activity (Marchand and Allwardt, 1981). Central Valley geological formations can also be distinguished using radiocarbon and other dating methods, including magnetostratigraphy, association with Sierra Nevada glacial events, and oxygen-isotope stage chronology (Shlemon et al., 2000).

Underlying the Project corridor are gravel-filled channels laid down during the Pleistocene time by ancestors of the Sacramento River, the American River, and smaller tributaries such as Putah Creek. The American River migrated northward with each successive Pleistocene glaciation, thus preserving older sediments (Shlemon, 1972).

1.5.2. LOCAL GEOLOGIC SETTING[2]

The Project extends 20.8 miles along Interstate 80 (I-80) and U.S. Route 50 (US-50) from Kidwell Road near the eastern Solano County boundary (near Dixon), through Yolo County. The Project corridor forks at the I-80/SR-50 interchange near its eastern end. From the fork, one segment extends north on I-80 to the West El Camino Avenue interchange in Sacramento County, and one segment extends south on Interstate 5 (I-5) on US-50 in Sacramento County.

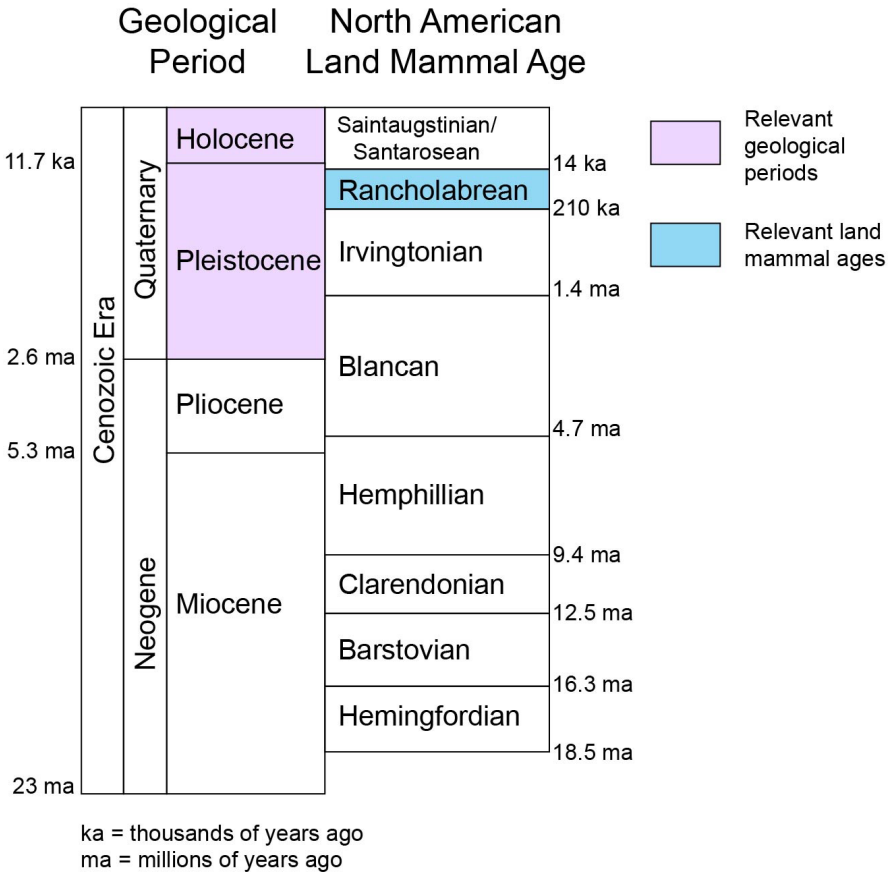
The Project corridor is generally on flat terrain and crosses Putah Creek near its western end and the Sacramento River in two places near its eastern end. The American River meets the Sacramento River between the Project corridor forks. Most of the Project corridor crosses farmland and the Sacramento delta. Smaller sections pass through urbanized environments in Davis and Sacramento.

[2] Information about geology in this report is based on limited available data and was supplemented by the preliminary geotechnical reports (Caltrans, 2021a, 2021b). Geologic interpretations of future geotechnical studies may differ because they will be based on more specific information.

1.5.3. STRATIGRAPHIC INVENTORY OF THE PROJECT VICINITY

An inventory of geological units along the Project corridor from youngest to oldest is presented below and in Figure 3. Several maps were reviewed for this assessment. Helley and Harwood (1985) (1:62,500 scale) was chosen because it is the most detailed map of surficial sediment in the Project vicinity. Relevant geological timescales are presented in Figure 2 (Barnosky et al., 2014).

Figure 2. Geologic and Paleontological Periods Relevant to this Assessment



Artificial Fill (Af) is sediment transported by humans from an unknown location. This material is not on the Helley and Harwood (1985) map but was noted on the geotechnical report (Caltrans, 2021a). Fill is estimated to be between “a couple to approximately 25 feet” across the Project corridor.

Stream channel deposits (Qsc) are recent fluvial deposits. These deposits have no permanent vegetation and are generally in contact with surface waters. They are light tan and gray, unweathered. The thickness of these deposits varies and may reach up to 75 feet along the Sacramento River.

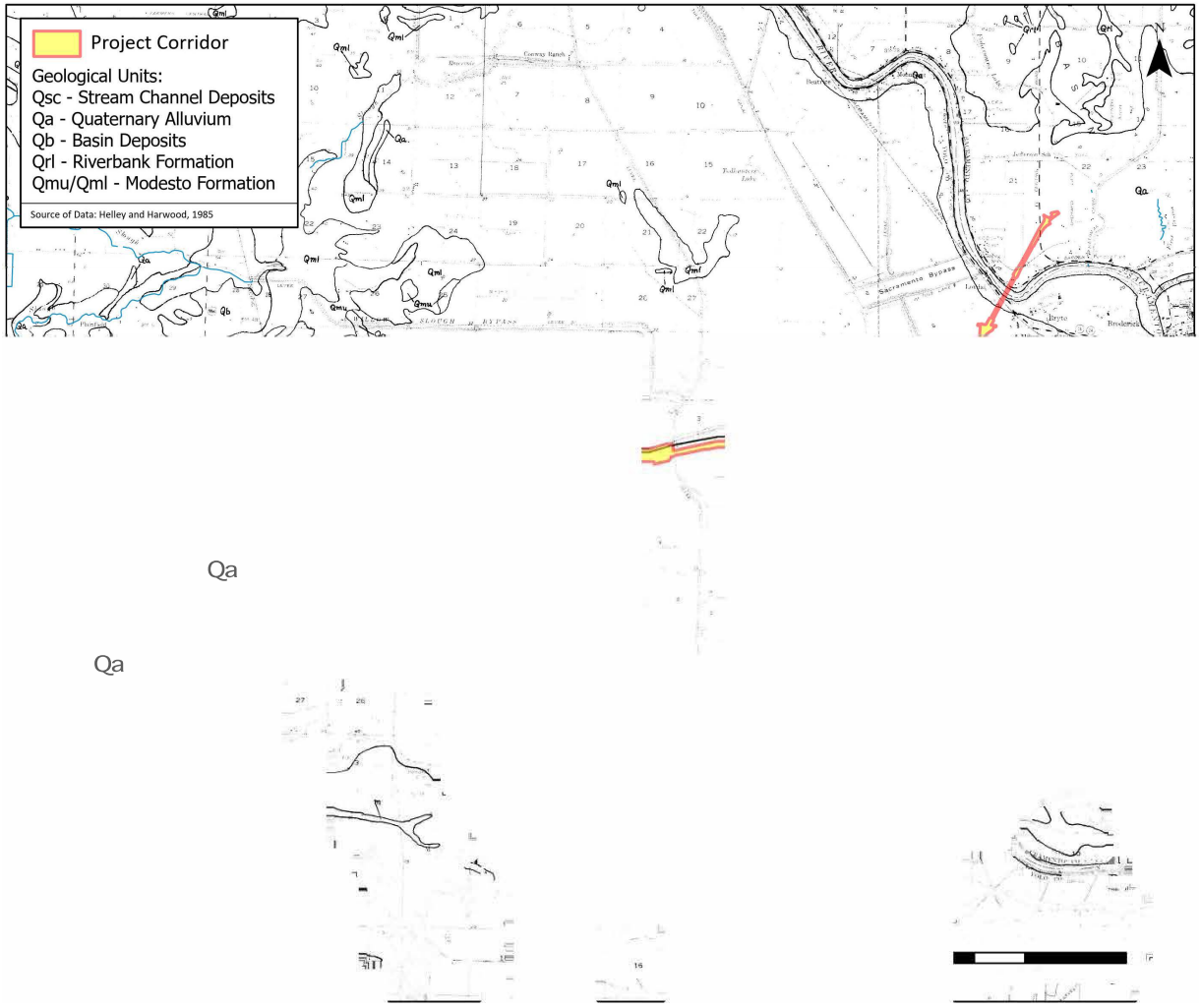
Quaternary alluvium (Qa) are deposits that lie outboard of stream channel deposits (Qsc) but inside the first low terraces flanking watercourses. Helley and Harwood (1985) characterize this unit as being Holocene age. This unit is composed of gravel, sand, and silt derived from the Sierra Nevada and Coast Ranges. These deposits can be differentiated from older stream-channel deposits by position and lack of weathering. They form levees along the main course of the Sacramento River and broad alluvial fans of low surface relief along the western and southwestern sides of the Sacramento Valley. Quaternary alluvium underlies much of the Project corridor. In the Project vicinity, it was laid down by the Sacramento River and its tributaries: the American River, Putah Creek, and Cache Creek.

Basin deposits (Qb) are recent to Holocene dark gray to black, fine-grained silt and clay deposits representing the distal facies of Quaternary alluvium (Qa). These deposits are common in the Project vicinity and have provided rich farmland, especially for rice production. This layer's thickness is estimated to be up to 180 feet (Helley and Harwood, 1985).

Modesto Formation (Qmu/Qml) is the youngest unit of Pleistocene age in the Central Valley. It is essentially an alluvial fan composed of interbedded sand, silt, and clay (Marchand and Allwardt, 1981). On the landscape, Modesto Formation forms terraces and abandoned channel ridges (Helley and Harwood, 1985). The features are topographically lower than other Pleistocene age deposits but higher than Holocene deposits. We know the Modesto Formation was deposited by streams still existing today because the deposits mostly border existing streams. This formation is divided into an upper (Qmu) and lower (Qml) member separated by a soil horizon visible in some places (Marchand and Allwardt, 1981). The upper member is currently thought to date to 27,000 to 9,000 years before the present (Ibarra et al., 2009). The lower member is believed to date to 75,000 to 27,000 before the present (Marchand and Allwardt, 1981). The lower Modesto Formation (Qmu) is mapped across a small part of the Project corridor.

Riverbank Formation (Qrl) are terraces of weathered reddish gravel, sand, silt, with a strong soil profile development. Helley and Harwood (1985) divide Riverbank Formation into two members. Of these members, the lower Riverbank Formation member is found in the Project vicinity, and it is characterized by high terraces that are highly dissected and create much local relief. Most of the alluvium of the lower member is arkosic and probably derived from the western slopes of the Sierra Nevada. Marchand and Allwardt (1981) placed the age of the Riverbank Formation from 450,000 to 130,000 years before present. It was later dated to between 250,000 and 150,000 years before the present (Shlemon et al., 2000). Numerous quarry exposures and abundant subsurface data from well logs have made it possible to accurately trace the boundaries of this formation (Shlemon, 1972). Large alluvial fans of the Riverbank Formation crop out at the surface east of the Sacramento River. This formation does not underlie the Project corridor at the surface but may underlie it at depth.

Figure 3. Geology Map



Chapter 2. Paleontological Resource Identification

2.1. Fossil Locality Search and Literature Review

2.1.1. METHODS

Fossil locality searches were conducted within a minimum one-mile radius of the Project corridor. For this assessment, online and print databases were queried: Catalog of Late Quaternary Vertebrates (Jefferson, 1991a, 1991b); Paleobiology Database (PBDB, 2023); and the University of California at Berkeley Museum of Paleontology (UCMP) Database (UCMP, 2023).

A literature review was conducted to search for more detailed information about fossil localities, fossils not recorded in the databases, and detailed descriptions of geologic units, stratigraphy, and land use history. Peer-reviewed journals, scientific reports, geologic maps, dissertations, historical topographic maps, agency fact sheets, and news sources were also consulted.

2.1.2. RESULTS

Table 3 lists the fossil localities found to be closest to the Project corridor using paleontological databases and scientific literature. The localities span Solano, Yolo, and Sacramento Counties. Seven vertebrate fossil localities were found within four miles of the Project corridor in sediment like that of the Project corridor. The closest fossil locality was found at depth in the construction of a sports arena, however the other six were found at or near the surface near Putah Creek.

Table 3. Fossil Localities within Four Miles of the Project Corridor

Distance to Project Corridor (miles)		Locality Name	Location	Locality Number	Common Name	Taxon	Geological Formation	Reference
1	2.4	Arco Arena	Sacramento	not available	various vertebrate and plant	at least 12 taxa	Riverbank	Hilton et al., 2000
2	~4	Putah Creek 1	Putah Creek near Stevenson Bridge	V5430	sabertooth cat	*Smilodon*	Modesto or undifferentiated Riverbank/Modesto depending on the map	UCMP, 2023; Dundas and Cunningham, 1993
3		Putah Creek 2		V69182	mammoth	*Mammuthus*		
4		Putah Creek 3		V69183	mammoth, sloth	*Mammuthus, Glossotherium*		
5		Putah Creek 4		V69184	sloth	*Glossotherium*		
6		Putah Creek Nursery		V6911	mammoth	*Mammuthus*		
7		Stevenson Bridge		V76199	mammoth, sloth	Mammuthus, Glossotherium		

Chapter 3. Recommendations

3.1. Required Actions

Because the Project is located within four miles of seven fossil localities in sediment that is similar to that of the Project corridor, there is potential for the Project to create impacts on scientifically significant resources. Excavations associated with the Project that are greater than approximately four feet below the surface are determined to have the potential to encounter scientifically significant resources because they are likely to be below the depth of artificial fill and/or chemical weathering along much of the Project corridor. Avoiding these impacts is not likely feasible because of the extent of the Project corridor. Therefore, we recommend that a Paleontological Evaluation Report be prepared. The Paleontological Evaluation Report will flush out the depth that paleontological resources are likely to occur by Project Alternative, Project segment, and Project element with greater specificity.

3.2. Resource Agency Coordination

3.2.1. REQUIRED CONTACTS

No contact requirements relevant to paleontological resources were identified.

3.2.2. PERMITS

As discussed in Section 1.4, no permits relevant to paleontological resources have been identified for this Project.

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Appendix A Preparer's Qualifications

MariaElena Conserva, Ph.D.
SENIOR PALEONTOLOGIST

MariaElena Conserva has over 14 years of experience in paleontology research, consulting, and project management. She has completed all phases of paleontological work for energy, transportation, and other projects. She conducts paleontological analyses, compliance reports, field surveys, mitigation measure implementation, fossil recovery, and preparation for museum curation. She meets Society of Vertebrate Paleontology guidelines as a qualified lead paleontologist and is approved as a paleontological resource specialist by California Energy Commission, California Public Utilities Commission, and Caltrans.

EDUCATION

Ph.D. and M.A. University of California, Berkeley. Geography Department/University of California Museum of Paleontology.

REPRESENTATIVE PROJECT EXPERIENCE

SR-51 J Street to Arden Way – Sacramento County. Prepared PIR/PER for Caltrans D3 for an expansion of SR-51 across the American River in the City of Sacramento.

I-5 Corridor Improvement Project – Sacramento County. Prepared PER for Caltrans D3 for 12-mile project on I-5 between downtown Sacramento and the Sacramento airport.

D2 Expressway Project* – Sacramento County. Prepared paleo assessment for Capital Southeast Connector Joint Powers Authority for new four-lane expressway east of Sacramento.

Sacramento Regional Transit District – Green Line to Airport* - Sacramento County. Prepared paleo assessment for Sacramento County for light-rail project to connect downtown Sacramento with airport. The project route crosses paleontologically sensitive Riverbank formation.

North Fork Road over San Joaquin River Bridge Replacement Project – Fresno and Madera Counties. Prepared PER for Caltrans D6 for project on San Joaquin River just downslope of Friant Dam at the interface of the Central Valley and the Sierra Nevada.

Placerville Capital Preventive Maintenance Project – El Dorado County. Prepared PIR/PER for Caltrans D3 for a project on SR-50 in the Sierra Nevada near the mother lode zone.

Monte Vista Pavement Rehabilitation Project – Placer County. Prepared PER for Caltrans D3 for highway improvement on I-80 in Sierra Nevada through the Chalk Bluffs area, which contains a large fossil plant flora.

Northern San Joaquin Power Connect – San Joaquin County. Prepared paleo technical report for proposed 10-mile transmission corridor and substation construction east of Lodi. Multiple potential alignments analyzed for confidential energy client.

Almanor West Rehab Project – Plumas County. Prepared PER for Caltrans D2 for 10-mile corridor along the west bank of Lake Almanor at the border between the Sierra Nevada and the Cascades Range.