Appendix O. Paleontological Identification Report (PIR) and Paleontological Evaluation Report (PER)

Paleontological Identification Report (PIR) and Paleontological Evaluation Report (PER) for the State Route 1 (Lincoln Boulevard) Multimodal Improvement Project

City of Los Angeles, California

EA 33880 / Project ID 0717000061

Prepared for

Kimberly Harrison
Principal Investigator
Prehistoric and Historical Archaeology (PQS)
Prehistoric Archaeology and Paleontology Coordinator
California Department of Transportation, District 7
100 South Main Street
Los Angeles, California 90012

Prepared by

Psomas
3 Hutton Centre, Suite 200
Santa Ana, California 92707-8794
T: 714.751.7373

November 2019

PALEONTOLOGICAL IDENTIFICATION REPORT (PIR) AND PALEONTOLOGICAL EVALUATION REPORT (PER) FOR THE STATE ROUTE 1 (LINCOLN BOULEVARD) MULTIMODAL IMPROVEMENT PROJECT CITY OF LOS ANGELES, CALIFORNIA EA 33880

Approved by:

Dawn Kukla
Principal Investigator
Prehistoric and Historical Archaeology (PQS)
Prehistoric Archaeology and Paleontology Coordinator
California Department of Transportation, District 7
100 South Main Street, Los Angeles, CA 90012

Prepared by:

Melissa K. Macias
Paleontologist I
and
Charles Cisneros, M.A., RPA
Senior Archaeologist, Project Manager
Psomas
3 Hutton Centre Drive, Ste. 200
Santa Ana, CA 92707
714-751-7373

December 2019

Paleontology, Fossils, Quaternary older dissected surficial sediments, Quaternary alluvium, Los Angeles, Lincoln Boulevard, USGS 7.5 Minute Venice Quadrangle, Township 2 South, Range 15 West, Sections 22, 23, 26, and 27.

TABLE OF CONTENTS

Section **Page**

Summary of Findings **S-1**

1.0 Introduction **1**

2.0 Project Location and Description **1**

2.1 Geologic Setting 2

2.2 Stratigraphy 2

2.2.1 Quaternary Younger Alluvium, Unit 2 (Qya_2) *2*

2.3 Known Paleontological Resources 2

2.4 Relevant Previous Studies 11

3.0 Paleontological Sensitivity **11**

3.1 California Department of Transportation Paleontological Sensitivity Scale 12

3.2 Bureau of Land Management Potential Fossil Yield Classification 13

3.2.1 Class 1 – Very Low *13*
3.2.2 Class 2 – Low *13*
3.2.3 Class 3 – Moderate or Unknown *13*
3.2.4 Class 4 – High *13*
3.2.5 Class 5 – Very High *13*

4.0 Study Findings and Conclusions **14**

5.0 References Cited **15**

TABLES

Table		Page
1	Fossil Localities Near the Project Site	3
2	Paleontological Sensitivity Ratings Using California Department of Transportation and Bureau of Land Management Guidelines	14

FIGURES

Figure		Follows Page
1	Project Vicinity Map	1
2	Project Location Map	1
3	Construction & Evacuation Depths	2
4	Geologic Map	2

ATTACHMENTS

Attachment	
A	Professional Qualifications
B1	LACM Records Search Results
B2	PBDB Records Search Results

SUMMARY OF FINDINGS

The purpose of this document is to provide the California Department of Transportation (Caltrans) with the results of a paleontological resource survey undertaken as part of this Combined Paleontological Identification Report (PIR) and Paleontological Evaluation Report (PER) for the State Route 1 (Lincoln Boulevard) Multimodal Improvement Project (Figure 1). Caltrans is the lead agency pursuant to the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA), in cooperation with the City of Los Angeles.

The Project is located on State Route 1, known locally as Lincoln Boulevard, in the Marina Del Rey area of Los Angeles, Los Angeles County, California. The southern limit of the Project is the Lincoln Boulevard/Jefferson Boulevard intersection (Post Mile [PM] 30.74), and the northern limit is Lincoln Boulevard/Fiji Way (PM 30.15). The Project is approximately 0.61 mile in length. The Project purpose is to achieve a consistent roadway design, while also enhancing safety and mobility for pedestrians, bicyclists, automobiles, and transit vehicles on Lincoln Boulevard in the vicinity of Ballona Creek. The Project purpose is also to increase southbound roadway capacity along Lincoln Boulevard within the Project limits at the location where Lincoln Boulevard bottlenecks from three lanes to two lanes in the southbound direction.

The Project occurs within and near the Ballona Wetlands in the Los Angeles Basin. Sediments within the Area of Potential Effect (APE) were deposited on the distal end of alluvial fans coming off the nearby northern San Gabriel Mountains. Except for areas of artificial fill in the northwestern portion of the APE, much of the Project is underlain by Quaternary younger alluvium, Unit 2 (Figure 4).

This PIR/PER has been prepared in accordance with Caltrans requirements applicable to paleontological resources.

A paleontological resources records search for the Project indicated there are no previous recorded paleontological sites within the APE, but there are three nearby localities in similar sedimentary deposits. The majority of the ground surface of the northwest portion of the APE is buried beneath deposits of engineered fill from the development of Marina Del Rey. Consequently, most of the proposed roadway improvements would be too shallow to impact paleontological resources in this portion of the APE. However, the areas immediately north and south of Lincoln Bridge are in areas underlain by Quaternary alluvium. In these areas, and in areas where excavation would exceed five feet below the artificial fill, earth-disturbing activities should be monitored for paleontological resources.

1.0 INTRODUCTION

Caltrans, in cooperation with the City of Los Angeles, proposes to improve circulation and safety along Lincoln Boulevard by constructing an additional southbound lane, installing sidewalks and protected bicycle lanes, and implementing complete streets and other related improvements along an approximate 0.61-mile segment of Lincoln Boulevard between Jefferson Boulevard (PM 30.16) and just south of Fiji Way (PM 30.74). The Project occurs in the City of Los Angeles and unincorporated Los Angeles County.

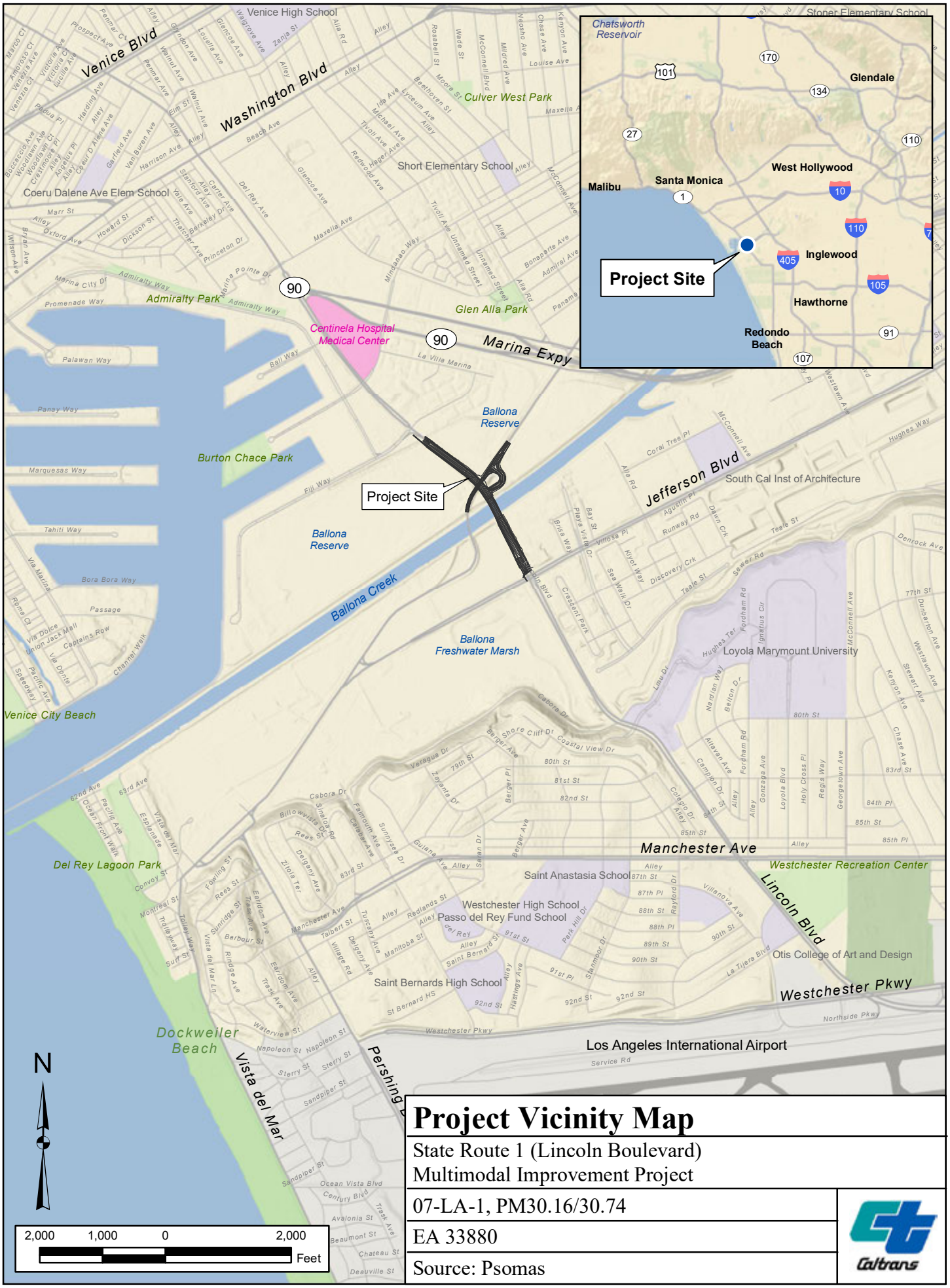
The Project site is depicted on the U.S. Geological Survey's (USGS') 7.5-minute Venice Topographic Quadrangle in Sections 22, 23, 26 and 27 of Township 2 South, Range 15 West of the San Bernardino Baseline and Meridian (Figure 1, Location Map). A detailed Project map is provided in Figure 2.

This Paleontological Identification Report (PIR) and Paleontological Evaluation Report (PER) has been prepared in accordance with California Department of Transportation (Caltrans) requirements (Caltrans 2015). This report includes (1) a summary of findings; (2) an introduction; (3) a Project description; (4) a description of sources consulted; (5) paleontologic sensitivity; (6) a determination of impacts; (7) study findings and conclusions; and (8) a references cited section.

This report was prepared by Psomas staff Melissa K. Macias and Charles Cisneros, M.A., RPA according to the guidelines presented in Caltrans' 2015 *Standard Environmental Reference, Volume 1* (Chapter 8 Paleontological Resources). Ms. Macias has a B.S. degree in Paleontology and has 4 years of professional experience. Mr. Cisneros has an M.A. degree in Anthropology with an emphasis in prehistoric archaeology and approximately 14 years of professional experience. Mr. Cisneros is a Registered Professional Archaeologist (RPA) qualified under the Secretary of the Interior's Professional Qualifications Standards (1983). Please refer to Attachment A for Ms. Macias' and Mr. Cisneros' resumes.

2.0 PROJECT LOCATION AND DESCRIPTION

The Project extends approximately 0.61 miles along Lincoln Boulevard between Fiji Way and Jefferson Boulevard, within the City of Los Angeles in Los Angeles County. (Figure 2). The Project's build alternative includes: realignment of the Lincoln Boulevard centerline approximately 50 feet to the east; addition of one southbound lane along Lincoln Boulevard for a length of approximately 1,800 feet; demolition, replacement, and widening of the Lincoln Boulevard Bridge over Ballona Creek; demolition, replacement, and widening of the Culver Boulevard Bridge over Lincoln Boulevard; demolition, replacement, and realignment of the connector ramps between Lincoln Boulevard and Culver Boulevard; construction of active transportation improvements including sidewalks, Class IV protected bicycle lanes on both sides of Lincoln Boulevard, ADA-compliant curb ramps, and signal upgrades at intersections within the Project limits. The Project would also include: utility relocation; landscaping; low-intensity street lighting, striping, signage, drainage, and water quality improvements. The Project would install a striped center median that would allow space to accommodate a future center-running transit facility within the Project limits, which is not included as part of the Project. Construction of the Project build alternative would result in three through lanes in the northbound and southbound directions of Lincoln Boulevard between Fiji Way and Jefferson Boulevard, with additional turning lanes at intersections. Project right-of-way needs are still being refined for the build alternative, but it is likely that partial right-of-way acquisition and/or temporary construction easements would be required from approximately 15 parcels. No full right-of-way takes, residential displacements, or business displacements would be required under the build alternative; however, local parking and driveways may need to be reconfigured for parcels where partial right-of-way acquisition occur to accommodate the Project.



Project Vicinity Map

State Route 1 (Lincoln Boulevard)
Multimodal Improvement Project

07-LA-1, PM30.16/30.74

EA 33880

Source: Psomas

Caltrans

Figure 1

Project Location Map

State Route 1 (Lincoln Boulevard)
Multimodal Improvement Project

07-LA-1, PM30.16/30.74

EA 33880

Source: Psomas; Aerial: LAR-IAC 2014

Caltrans

Figure 2

Under the build alternative, the replacement Lincoln Boulevard Bridge over Ballona Creek would include three 12-foot travel lanes in each direction, a 12-foot center median, and 2-foot lane buffers, 8-foot shoulders including 6-foot-wide, Class IV protected bicycle lanes, 6-foot sidewalks, and 1-foot edge barriers on both sides of the roadway.

Under the build alternative, the replacement Culver Boulevard Bridge would include one 12-foot travel lane in each direction as well as 5-foot shoulders, 6-foot sidewalks, and 1-foot bridge barriers on both sides of the roadway.

Construction-related activities for the Build Alternative would include removal of existing bridge piers within Ballona Creek, road widening, installation of retaining walls, and signal and utility pole installation. Other Project improvements would require grading and trenching to a depth up to 15 feet below ground surface (bgs). Bridge construction would require driving of piles to an estimated depth of approximately 100 feet below existing ground surface. Precise excavation depths are shown on Figure 3.

2.1 GEOLOGIC SETTING

The Project site occurs within the Los Angeles Basin Geomorphic Province; a geologic basin that has accumulated sediments for the past 16 million years. It formed a large triangular basin as the San Andreas Fault system evolved to the east, causing the Transverse Ranges in the west to break off and rotate away from the Peninsular Ranges in the south. The basin filled with over 30,000 feet of Miocene – recent marine and non-marine sediments at the deepest point (Sylvester and Gans, 2016). Compression during the Pliocene – Pleistocene has caused uplifting of hills and folds to form throughout the basin (Ingersoll and Rumelhart, 1999; Sylvester and Gans, 2016). Surface deposits at the Project site are primarily Holocene fluvial deposits from Ballona Creek, underlain by Quaternary alluvium and older marine and non-marine sediments.

2.2 STRATIGRAPHY

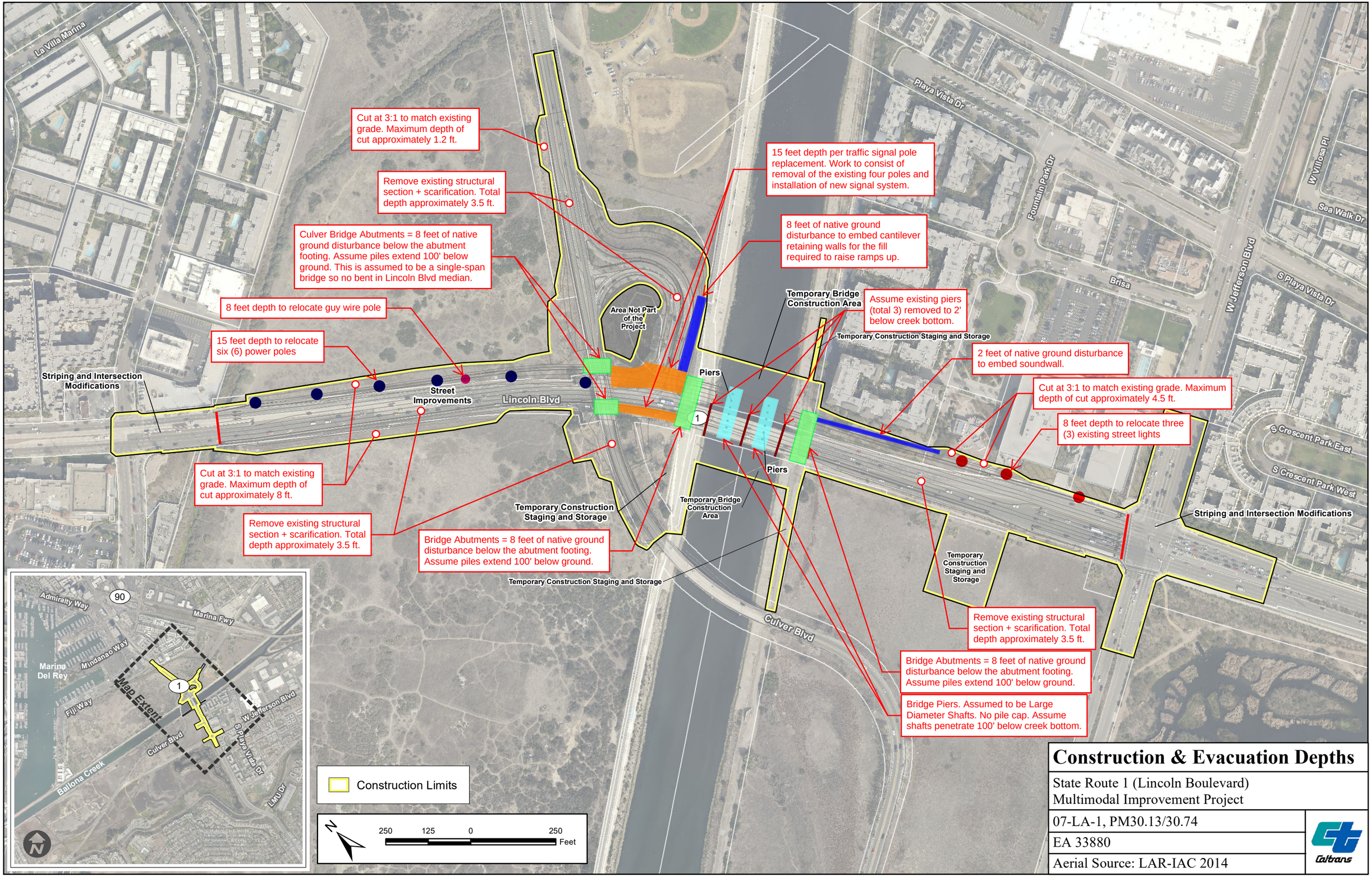
2.2.1 Quaternary Younger Alluvium, Unit 2 (Qya_2)

The literature review shows that the APE is underlain by surficial sediments identified as Quaternary younger alluvium, unit 2 (Qya_2), which consists of alluvial gravel, sand, and silt/clay of valleys and canyon flood plains (Saucedo et al. 2016). The underlying Quaternary younger alluvium, unit 2 extends to the depth of the borings detailed in previous geotechnical reports. (Figure 4) (Group Delta 2018, Saucedo et al. 2016). Gravel and sand deposits are present in stream drainages. Quaternary alluvium is present at the surface throughout the southeastern portion of the APE and is overlain by approximately 10 feet of artificial fill within the northwestern portion (Group Delta 2018). These sediments are Holocene in age at shallow depths but increase in age to late Pleistocene at greater depths.

2.3 KNOWN PALEONTOLOGICAL RESOURCES

A paleontological records search was requested of Dr. Sam McLeod at the Natural History Museum (LACM) of Los Angeles County, Vertebrate Paleontology Department. Results were received on April 28, 2017 (Attachment B1). The results indicate that there are no vertebrate fossil localities directly within the boundaries of the Project site; however, two fossil-bearing localities are recorded near the Project segment (LACM 7879 and 5462).

An online records search using Paleobiology Database (PBDB) Navigator 1.0 online application (paleobiodb.org) located two additional previously prepared paleontological resource localities (LACM 2014 and LACMIP 59) that were not included in the LACM records search (Attachment B2). Howard (1936), Willet (1937), and Fitch (1964) recorded a rich vertebrate and invertebrate



Construction & Evacuation Depths

State Route 1 (Lincoln Boulevard)
Multimodal Improvement Project

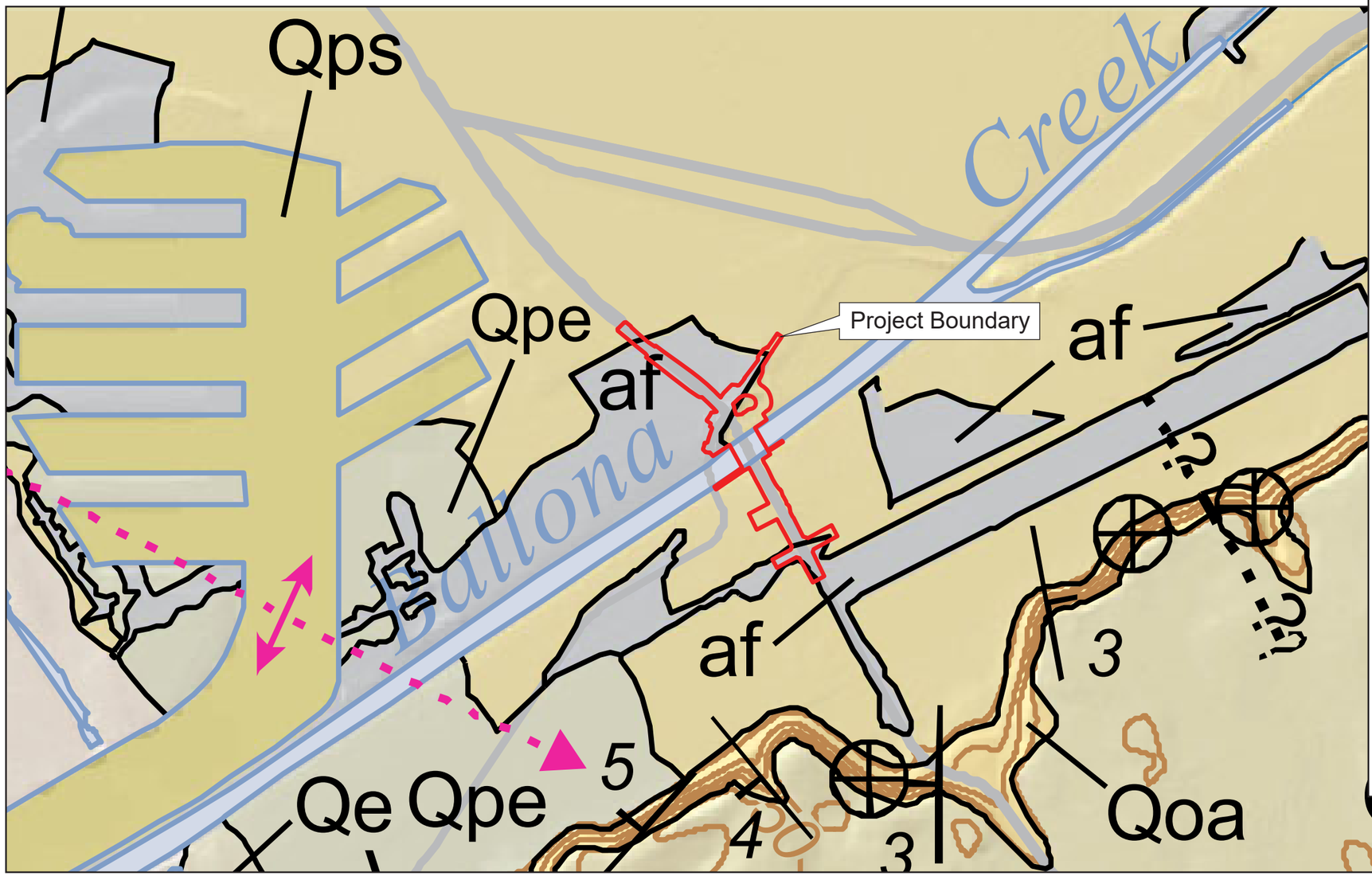
07-LA-1, PM30.13/30.74

EA 33880

Aerial Source: LAR-IAC 2014

Caltrans

Figure 3



ABBREVIATED EXPLANATION
Approximate stratigraphic relationships only: see accompanying pamphlet for more detailed

CENOZOIC	QUATERNARY	HOLOCENE	af	Artificial fill *(only selected larger fills shown)*
			Qa	Alluvium
			Qw	Wash deposits
			Qb	Beach deposits
			Qe	Eolian deposits
			Qpe	Paralic estuarine deposits
			Qya	Young alluvium, undivided
			Qya_3	Young alluvium, Unit 3
			Qya_2	Young alluvium, Unit 2
			Qya_1	Young alluvium, Unit 1
			Qyf	Young alluvial fan deposits, undivided
			Qyf_2	Young alluvial fan deposits, Unit 2
			Qyf_1	Young alluvial fan deposits, Unit 1
			Qye	Young eolian deposits
			Qype	Young paralic estuarine deposits
			Qls	Landslide deposits *(only selected larger landslides shown)*
		PLEISTOCENE	Qoa	Old alluvium, undivided
			Qof	Old alluvial fan deposits, undivided
			Qoe	Old eolian deposits
			Qom	Old shallow marine deposits on wave-cut surface
			Qvoa	Very old alluvium, undivided
			Qvof	Very old alluvial fan deposits, undivided
			Qlh	La Habra Formation
				San Pedro Formation
			Qsp	San Pedro Formation, undivided
			Qspt	Timms Point Silt Member
			Qspl	Lomita Marl Member
			QTi	Inglewood Formation
	TERTIARY	PLIOCENE		Fernando Formation
			QTfu	Upper Member
			QTfl	Lower Member QTflc QTflc = conglomerate
				Puente Formation
			Tpnsc	Sycamore Canyon Member Tpnscc Tpnscc = conglomerate
		MIOCENE	Tpny	Yorba Member
			Tpnsq	Soquel Member
			Tpnlv	La Vida Member
				Monterey Formation
			Tmm	Malaga Mudstone Member
			Tmvd	Valmonte Diatomite Member
			Tmv	Volcanic rocks within the Monterey Formation
			Tma	Altamira Shale Member
MESOZOIC	CRETACEOUS JURASSIC		mcs	Catalina Schist

OFFSHORE REGION

Qms	Unconsolidated shelf sediment
Qmfl	Unconsolidated flank sediment
Qmb	Unconsolidated basin sediment
Qmr	Unconsolidated ridge sediment
Qmc	Unconsolidated canyon sediment
Qgf	Gully fill
Qcf	Canyon fill
Qol	Overbank levee deposits
Qmf	Fan deposits
Qls	Landslide deposits
Qps	Pleistocene sedimentary deposits, undivided
QTmt	Plio-Pleistocene terrace deposits
Tps	Pliocene sedimentary rocks, undivided*
Tmu	Tertiary sedimentary and volcanic rocks, undivided*
Tmp	Miocene plutonic and hypabyssal rocks, undivided*
Tmms	Miocene sedimentary rocks, undivided*
Tmmv	Miocene volcanic rocks*
ms	Metamorphic rocks of pre- Late Cretaceous age*

* Q/ = Map unit overlain by more than 3 meters of unconsolidated Quaternary sediment (i.e. Q/Tmms).

N

Project Boundary

Source: Long Beach 30'x60' Quadrangle CA Dept of Conservation, 2016

Geologic Map

State Route-1/Lincoln Boulevard Bridge Multi-Modal Improvement Project

07-LA-1, PM30.16/30.74

EA 33880

Caltrans

Figure 4

locality on Lincoln Boulevard, just south of the Project site (LACM 1024/LACMIP 59). This locality produced over 30,000 molluscan fossils, as well as ten avian species. One of these avian specimens, *Morus reyana,*is the holotype of the species (the type specimen upon which the species was formally described). Four invertebrate holotypes have also been described from the same locality. A later study of the same area and geologic formation produced fossils of a Rancholabrean seal, *Phoca vitulina* (Barnes and Mitchell, 1975). The LACM records search may have excluded these localities because it is from the Palos Verdes sand formation, and not Quaternary alluvium (Qya_2). However, they are located within 0.5 mile of the Project area, and it is possible that similar fossils could be found in the area.

Results of the records searches and fossil taxa lists from the literature review are detailed in Table 1 below.

TABLE 1
FOSSIL LOCALITIES NEAR THE PROJECT SITE

Locality Number	Resource Type	Taxa	Proximity to Area of Potential Effect	Depth
LACM 7879[1]	Vertebrate Fossils	*Equus sp.* (horse) *Paramylodon sp.* (giant ground sloth)	Outside (2.5 miles from APE)	11 feet
LACM 5462[1]	Vertebrate Fossils	*Felis atrox* (American lion)	Outside (4 miles from APE)	6 feet
LACM 1024[2, 4]	Vertebrate Fossils	*Uria aalge* (common murre) *Chendytes lawi* (goose) *Anatidae indet.* (water bird) *Corvus corax* (raven) *Gavia aff. immer* (loon) *Aechmophorus occidentalis* (western grebe) *Phoebastria albatrus* (short-tailed albatross) *Puffinus opisthomelas* (black-vented shearwater) *Ardenna grisea* (sooty shearwater) *Morus reyana* * (gannet) *Phoca cf. vitulina* (harbor seal)	Outside (0.5 miles from APE)	3 feet
LACM 1024[5]	Vertebrate Fossils (Chondrichthyes)	*Carcharhinus brachyurus* (Narrowtooth Shark) *Carcharhinus obscurus* (Dusky Shark) *Galeorhinus zyopterus* (Soupfin Shark) *Rhizoprionodon longurio* (Pacific Sharpnose Shark) *Sphyrna zygaena* (Smooth Hammerhead Shark) *Notorhynchus maculatus* (Sevengill Shark) *Alopias vulpinus* (Common Thresher Shark) *Carcharodon carcharias* (Great White Shark) *Isurus glaucus* (Bonito Shark) *Myliobatis californica* (Bat Ray) *Urolophus halleri* (Round Stingray) *Raja* (Skate) *Squatina californica* (Pacific Angel Shark)	Outside (0.5 miles from APE)	3 feet

TABLE 1
FOSSIL LOCALITIES NEAR THE PROJECT SITE

Locality Number	Resource Type	Taxa	Proximity to Area of Potential Effect	Depth
LACM 1024[5]	Vertebrate Fossils (Teleost)	*Atherinops affinis* (Topsmelt) *Atherinopsis californiensis* (Jacksmelt) *Leuresthes tenuis* (California Grunion) *Porichthys myriaster* (Specklefin Midshipman) *Porichthys notatus* (Plainfin Midshipman) *Anchoa compressa* (Deepbody Anchovy) *Engraulis mordax* (Northern Anchovy) *Merluccius productus* (Pacific Hake) *Stenobrachius leucopsarus* (Northern Lampfish) *Symbolophorus californiensis* (California Lanternfish) *Lepophidium negropinna* (Black-fin Cusk-Eel) *Otophidium scrippsae* (Scripps Cusk-Eel) *Otophidium taylori* (Taylor's Cusk-Eel) *Trachurus symmetricus* (Jackmackerel) *Cymatogaster aggregata* (Shiner Surfperch) *Lepidogobius lepidus* (Bay Goby) *Lepidogobius tenuis* (Lesser Goby) *Anisotremus davidsoni* (David's Sargo) *Xenistius californiensis* (California Sargo) *Pimelometopon pulchrum* (Sheepshead) *Cynoscion nobilis* (Noble Croaker) *Cynoscion reticulatus* (Reticulated Croaker) *Genyonemus lineatus* (White Croaker) *Menticirrhus undulatus* (California Corbina) *Micropogon ectenes* (Little Croaker) *Roncador stearnsi* (Spotfin Croaker) *Seriphus politus* (Queenfish) *Umbrina roncador* (Yellowfin Croaker) *Paralabrax* (Sand Bass) *Sphyraena argentea* (California Barracuda) *Coelorhynchus scaphopsis* (Swordfish) *Paralichthys californicus* (California Halibut) *Citharichthys sordidus* (Pacific Sanddab)	Outside (0.5 miles from APE)	3 feet
LACMIP 59[3]	Invertebrate Fossils (Bivalvia)	*Nucula exigua* *Leda taphria* *Yoldia cooperi* *Glycymeris septentrionalis* *Ostrea lurida* *Ostrea palmula* *Pecten multirugosus* *Pecten hericeus* *Pecten circularis* *Pecten vogdesi* *Lima dehiscens* *Anomia peruviana* *Pododesmus macroschisma* *Mytilus californianus* *Mytilus adamsianus* *Volsella modiolus* *Volsella capax* *Volsella flabellate* *Lithophaga plumula* *Periploma planiscula*	Outside (0.5 miles from APE)	3 feet

TABLE 1
FOSSIL LOCALITIES NEAR THE PROJECT SITE

Locality Number	Resource Type	Taxa	Proximity to Area of Potential Effect	Depth
LACMIP 59[3]	Invertebrate Fossils (Bivalvia)	*Thracia undulata* *Pandora punctate* *Crassinella branneri* *Crassinella varians* *Glans carpenteri* *Chama pellucida* *Lucina nuttallii* *Lucina tenuisculpta approximata* *Lucina excavata* *Taras orbellus* *Kellia suborbicularis laperousii* *Aligena cerritensis* *Rochefortia aleutica* *Rocefortia reyana** *Bornia retifera* *Bornia cooki** *Cardium (Laevicardium) elatum* *Cardium (Laevicardium) substriatum* *Cardium (Laevicardium) procerum* *Cardium (Laevicardium) quadragenarium* *Cardium (Fragum) biangulatum* *Venus (Antigona) fordii* *Venus (Chione) succincta* *Venus (Chione) fluctifraga* *Venerupis (Callithaca) tenerrima* *Venerupis (Protothaca) staminea* *Compsomyax subdiaphana* *Transenella tantilla* *Tivela (Pachydesma) stultorum* *Saxidomus nuttalli* *Pitar newcombianus* *Amiantis callosa* *Petricola tellimyalis* *Petricola californiensis* *Petricola carditoides* *Cooperella subdiaphana* *Tellina idae* *Tellina buttoni* *Tellina bodegensis* *Tellina santarosae* *Apolymetis biangulata* *Macoma nasuta* *Macoma yoldiformis* *Macoma secta* *Macoma indentata* *Semele decisa* *Semele pulchra* *Donax californicus* *Donax gouldii* *Tagelus californianus* *Tagelus subteres* *Solen sicarius* *Ensis californicus* *Siliqua lucida* *Madra (Mactra) califomica* *Madra (Spisula) planulata* *SpisuLa planulata*	Outside (0.5 miles from APE)	3 feet

TABLE 1
FOSSIL LOCALITIES NEAR THE PROJECT SITE

Locality Number	Resource Type	Taxa	Proximity to Area of Potential Effect	Depth
LACMIP 59[3]	Invertebrate Fossils (Bivalvia)	*Mactra (Spisula) hemphilli* *Mactra (Spisula) catilliformis* *Madra (Mulinia) pallida modesta* *Schizothaerus nuttallii* *Cryptomya californica* *Corbula (Lentidium) luteola* *Panope (Panope) generosa* *Saxicava ardica* *Pholas pilsbryi* *Pholadidea (Pholadidea) penita*	Outside (0.5 miles from APE)	3 feet
LACMIP 59[3]	Invertebrate fossils (Scaphopoda)	*Dentalium neohexagonum* *Dentalium numerosum* *Siphonodentalium quadrifissatum* *Cadulus fusiformis*	Outside (0.5 miles from APE)	3 feet
LACMIP 59[3]	Invertebrate fossils (Gastropoda)	*Cavolina telemus tricuspida* *Cavolina trispinosa Lesueur.* *Acteon (Acteon) traski* *Acteon (Bictaxis) punctocaelatus* *Retusa (Acteocina) culcitella* *Retusa (Acteocina) carinata* *Retusa (Acteocina) inculta* *Volvulella cylindrica* *Atys casta* *Cylichna attonsa* *Bulla punctulata* *Haminoea vesicula* *Melampus olivaceous* *Williamia peltoides* *Terebra (Strioterebrum) pedroana* *Conus californicus* *Megasurcula remondii* *Megasurcula carpenteriana* *Lora fidicula* *Spirotropis (Borsonella) barbarensis* *Spirotropis (Antiplanes) perversa* *Moniliopsis incisa fancherae* *Moniliopsis incisa ophioderma* *Clavus (Cymatosyrinx) empyrosia* *Clavus (Cymatosyrinx) halocydne* *Clavus (Cymatosyrinx) hemphilli* *Clavus (Crassispira) montereyensis* *Mangelia (Mangelia) hexagona* *Mangelia (Mangelia) merita* *Mangelia (Bela) variegata* *Mangelia (Bela) cetolaca* *Mangelia (Bela) arteaga roperi* *Cancellaria crawfordiana* *Cancellaria cooperi* *Olivella biplicata* *Olivella baetica* *Hyalina (Cypraeolina) pyriformis* *Mitra idae* *Mitra fultoni* *Mitra catalinae*	Outside (0.5 miles from APE)	3 feet

TABLE 1
FOSSIL LOCALITIES NEAR THE PROJECT SITE

Locality Number	Resource Type	Taxa	Proximity to Area of Potential Effect	Depth
LACMIP 59[3]	Invertebrate fossils (Gastropoda)	*Fusinus barbarensis* *Fusinus amoldi* *Fusinus kobelti* *Fusinus monksae* *Fusinus luteopictus* *Kelletia (Kelletia) kelletii* *Cantharus fortis* *Neptunea (Sulcosipho) tabulata* *Exilioidea rectirostris* *Nassarius (Zeuxis) tegula* *Nassarius (Schizopyga) califomianus* *Nassarius (Schizopyga) cerritensis* *Nassarius (Schizopyga) mendicus cooperi* *Nassarius (Schizopyga) perpinguis* *Nassarius (Schizopyga) fossatus** *Nassarius (Schizopyga) insculptus* *Mitrella carinata* *Mitrella carinata gausapata* *Mitrella tuberosa* *Amphissa reticulata* *Amphissa versicolor* *Amphissa undata* *Purpura (Pteropurpura) carpenteri* *Purpura (Centrifuga) leeana** *Purpura (Jaton) festiva* *Purpura (Jaton) gemma* *Purpura (Jaton) santarosana* *Tritonalia foveolata* *Tritonalia interfossa* *Tritonalia poulsoni* *Thais biserialis* *Thais emarginata* *Acanthina spirata* *Trophon (Boreotrophon) orpheus* *Forreria belcheri* *Bursa califomica* *Ranella (Priene) oregonensis* *Simnia (Neosimnia) catalinensis* *Cypraea spadicea* *Trivia californiana* *Trivia solandri* *Erato vitellina* *Erato columbella* *Alabina tenuisculpta diegensis* *Bittium (Lirobittium) omatissimum* *Cerithidea califomica* *Seila montereyensis* *Cerithiopsis antefilosa* *Cerithiopsis cosmia* *Cerithiopsis oxys* *Cerithiopsis antemunda* *Cerithiopsis halia* *Triphora pedroana* *Rissoella sp.* *Rissoina kelseyi* *Rissoina pleistocena*	Outside (0.5 miles from APE)	3 feet

TABLE 1
FOSSIL LOCALITIES NEAR THE PROJECT SITE

Locality Number	Resource Type	Taxa	Proximity to Area of Potential Effect	Depth
LACMIP 59[3]	Invertebrate fossils (Gastropoda)	*Turritella jewettii* *Turritella cooperi* *Vermicularia eburnea* *Aletes squamigerus* *Spiroglyphus lituellus* *Micranellum crebricinctum* *Fartulum orcutti* *Fartulum occidentale* *Littorina scutulata* *Lacuna unifasciata* *Iselica fenestrata* *Hipponix antiquatus cranioides* *Hipponix tumens* *Crepidula onyx* *Crepidula excavata* *Crepidula lingulata* *Crepidula nummaria* *Crepidula nummaria glottidiarum* *Crucibulum spinosum* *Calyptraea contorta* *Polinices (Neverita) reclusianus* *Polinices (Neve'rita) altus* *Polinices (Euspira) lewisii* *Sinum scopulosum* *Acmaea cassis* *Acmaea cassis nacelloides* *Acmaea insessa* *Tricolia pulloides* *Tricolia substriata* *Astraea (Pomaulax) undosa* *Leptothyra carpenteri* *Norrisia norrisi* *Halistylus pupoideus* *Tegula (Chlorostoma) gallina* *Tegula (Chlorostoma) gallina multifilosa* *Tegula (Chlorostoma) aureotincta* *Tegula (? Chlorostoma) ligulata* *Tegula (Promartynia) pulligo* *Calliostoma canaliculatum* *Calliostoma gemmulatum* *Calliostoma tricolor* *Calliostoma gloriosum* *Calliostoma supragranosum* *Calliostoma splendens* *Turcica caffea* *Margarites (Lirularia) optabilis* *Vitrinella williamsoni* *Vitrinella eshnauri* *Vitrinella steamsi* *Delphinoidea coronadoensis* *Haliotis cracherodii* *Fissurella volcano* *Epitonium (Opalia) wroblewskyi* *Epitonium (Opalia) retiporosum* *Epitonium (Asperiscala) bellastriatum* *Epitonium (Asperiscala) clarki*	Outside (0.5 miles from APE)	3 feet

TABLE 1
FOSSIL LOCALITIES NEAR THE PROJECT SITE

Locality Number	Resource Type	Taxa	Proximity to Area of Potential Effect	Depth
LACMIP 59[3]	Invertebrate fossils (Gastropoda)	*Epitonium (Nitidiscala) acrostephanum* *Epitonium (Nitidiscala) indianorum* *Epitonium (Nitidiscala) tinctum* *Epitonium (Nitidiscala) cooperi* *Epitonium (Nitidiscala) sawinae* *Melanella micans* *Melanella oldroydi Bartsch.* *Melanella rutila* *Melanella sp.* *Strombiformis raymondi* *Turbonilla (Turbonilla) hypolispa* *Turbonilla (Turbonilla) asser* *Turbonilla (Turbonilla) torquata* *Turbonilla (Turbonilla) stylina* *Turbonilla (Turbonilla) buttoni* *Turbonilla (Turbonilla) ralphi* *Turbonilla (Turbonilla) simpsoni* *Turbonilla (Pyrgolampros) lowei* *Turbonilla (Pyrgolampros) pedroana* *Turbonilla (Pyrgolampros) arnoldi* *Turbonilla (Pyrgolampros) halia* *Turbonilla (Pyrgolampros) keepi* *Turbonilla (Pyrgiscus) sanctorum* *Turbonilla (Pyrgiscus) d. superba* *Turbonilla (Pyrgiscus) vexativa* *Turbonilla (Pyrgiscus) antestriata* *Turbonilla (Pyrgiscus) almo* *Turbonilla (Pyrgiscus) adusta* *Turbonilla (Pyrgiscus) weldi* *Turbonilla (Pyrgiscus) d. ista* *Turbonilla (Pyrgiscus) canfieldi* *Turbonilla (Bartschella) laminata* *Turbonilla (Mormula) tridentata* *Turbonilla (Mormula) regina* *Turbonilla (Mormula) pentalopha* *Odostomia (Chrysallida) eugena* *Odostomia (Evalea) nemo* *Odostomia (Evalea) donilla* *Odostomia (Evalea) cf. phanea* *Odostomia (Amaura) helena* *Lepidopleurus nexus* *Mopalia acuta* *Ischnochiton sanctaemonicae* *Helisoma cf. trivolvis* *Gyraulus vermicularis* *Zonitoides arboreus*	Outside (0.5 miles from APE)	3 feet
LACMIP 59[3]	Invertebrate fossils (Echinodermata)	*Trongylocentrotus sp.?* *Lovenia cardiformis* *Dendraster sp. nov.*	Outside (0.5 miles from APE)	3 feet
LACMIP 59[3]	Invertebrate fossils (Bryozoa)	*Lichenopora radiata*	Outside (0.5 miles from APE)	3 feet
LACMIP 59[3]	Invertebrate fossils (Arthropoda)	*Balanus tintinnabulum californicus* *Tetraclita squamosa rubescens* *Coronula regina*	Outside (0.5 miles from APE)	3 feet

TABLE 1
FOSSIL LOCALITIES NEAR THE PROJECT SITE

Locality Number	Resource Type	Taxa	Proximity to Area of Potential Effect	Depth
LACMIP 59	Invertebrate fossils (Decapoda)	*Callianassa longimana* *Dardanus arnoldi* *Dromidia larraburei* *Randallia ornate* *Hepatus lineatus* *Heterocrypta occidentalis* *Mesorhoea idae* *Pyromaia tuberculata* *Pugettia producta* *Pugettia richii* *Taliepus nuttallii* *Loxorhynchus grandis* *Callinectes bellicosus* *Portunus xantusii* *Cancer branneri* *Cancer antennarius* *Cancer gracilis* *Cancer anthonyi* *Cancerproductus* *Lophopanopeus frontalis* *Lophopanopeus diegensis* *Cycloxanthops novemdentatus*	Outside (0.5 miles from APE)	3 feet
*Holotypes (Type specimens) Source: LACM Records Search[1], PBDB Records Search/Howard 1936[2], Willett 1937[3], Barnes and Mitchell 1975[4], Fitch 1964[5]				

Surface sediments at and surrounding the Project site consist of Quaternary younger alluvium, unit 2 (Qya_2) deposits from Ballona Creek. Deep excavation that involves disturbance of native soils could result in the disturbance and/or destruction of paleontological resources that may be present in deeper Pleistocene alluvial deposits that underlie the Project. As recommended by the Natural History Museum, any substantial excavations that extend greater than five feet in depth in Quaternary younger alluvium, unit 2 (Qya_2) should be monitored closely to recover any fossil remains. Fossils recovered from such activities should be placed in an accredited scientific institution for the benefit of current and future generations.

A search of the database of Late Pleistocene vertebrate localities for California (Jefferson 1991a, 1991b, 2006), which includes institutional records and published references, which summarizes all the occurrences of Late Pleistocene vertebrates in California, was also searched for previously recorded paleontological sites within the Project site and surrounding areas from other museums. No additional fossil localities were discovered during this search.

An online records search of the University of California Museum of Paleontology (UCMP) collections database was also conducted, but no UCMP sites were present in or adjacent to the APE.

2.4 RELEVANT PREVIOUS STUDIES

Geotechnical Investigation Reports for the Ballona Wetlands and the Lincoln Boulevard Multimodal Improvement Project were prepared by Group Delta Consultants (2013, 2018) which identified four sedimentary rock units in the study area. One of these, Quaternary younger alluvium, unit 2 (Qya_2), was identified within in the APE. A Phase I Cultural Resources Assessment was prepared by BonTerra Psomas for the Ballona Wetlands (Psomas 2015).

3.0 PALEONTOLOGICAL SENSITIVITY

Paleontological resources are defined as physical evidence of prehistoric life that has been preserved in the geologic record and can be categorized as fossil remains (e.g., teeth, bones, shells, plant material) or trace fossils (e.g., tracks, burrows, coprolites). Generally, remains that are at least 10,000 years old are considered fossils, but resources older than recorded human history and/or early Holocene non-human remains of at least 5,000 radiocarbon years before present (SVP 2010) can be included in this definition. Fossil resources that stratigraphically correlated to human remains or cultural resources may be regarded as both paleontological and archaeological in nature. Fossils are important determining factors for the age and environment of an area at a given point in the geologic past.

Fossils are generally found in sedimentary rock deposits. Occasionally, volcaniclastic sediments, such as airfall tuff, or low-grade metamorphosed rocks have potential to contain fossil resources. To become a fossil, an organism must undergo a series of processes that include rapid burial in an anoxic environment with fine-grained sediments, minimal disturbance, and mineralization of organic material over an extended period of time. The fossils are then eventually exposed by natural erosion or by human disturbance. Because this preservation process is random and infrequent, fossils are considered nonrenewable resources and are of significant interest. Fossils in terrestrial sediments are of particular significance since they occur more infrequently than those from marine environments. There is a strong bias in the fossil record toward organisms with skeletal material, as soft tissue is rarely preserved.

Caltrans utilizes a tripartite scale to determine paleontological sensitivity, consisting of (1) no potential, (2) low potential, and (3) high potential (Caltrans 2015). The Caltrans scale is utilized as the primary sensitivity evaluation method for this PER. Also, the Bureau of Land Management, in assessing paleontology sensitivity, uses a five-part ranking system called the Potential Fossil Yield Classification (PFYC) rating system (Bureau of Land Management 2007). In determining the sensitivity rating, the PFYC bases its rankings on previously documented yields of fossils based on records searches as well as unpublished and published literature (Table 2).

The PFYC system provides additional information regarding assessment management for different fossil yield rankings and is, therefore, used in this PER to complement the Caltrans scale. On the subject of sensitivity rating, Caltrans SER Vol 1 Chapter 8 states:

> Generally, scientifically significant paleontological resources are identified sites or geologic deposits containing individual fossils or assemblages of fossils that are unique or unusual, diagnostically or stratigraphically important, and add to the existing body of knowledge in specific areas, stratigraphically, taxonomically, or regionally (Reynolds 1990:6). Particularly important are fossils found in situ (undisturbed) in primary context (e.g., fossils that have not been subjected to disturbance subsequent to their burial and fossilization). As such, they aid in stratigraphic correlation, particularly those offering data for the interpretation of tectonic events, geomorphological evolution, paleoclimatology, the relationships between aquatic and terrestrial species, and evolution in general. Discovery of in situ fossil bearing deposits is rare for many species, especially vertebrates. Terrestrial vertebrate fossils are often

assigned greater significance than other fossils because they are rarer than other types of fossils. This is primarily due to the fact that the best conditions for fossil preservation include little or no disturbance after death and quick burial in oxygen depleted, fine-grained, sediments. While these conditions often exist in marine settings, they are relatively rare in terrestrial settings (e.g., as a result of pyroclastic flows and flashflood events). This has ramifications on the amount of scientific study needed to adequately characterize an individual species and therefore affects how relative sensitivities are assigned to formations and rock units.

3.1 CALIFORNIA DEPARTMENT OF TRANSPORTATION PALEONTOLOGICAL SENSITIVITY SCALE

Caltrans employs a paleontological sensitivity scale or rating system to assess the potential of geologic units to yield fossils during ground-disturbing activities associated with construction. This scale consists of fossil potential ratings of high potential, low potential or no potential. This rating system is used for primary sensitivity evaluations for this PER (Caltrans 2015).

- **High Potential.** This category includes rock units which, based on previous studies, contain or are likely to contain significant vertebrate, significant invertebrate, or significant 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 very 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* (sp.) middens; or (4) areas that may contain unique new vertebrate deposits, traces, and/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 and/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 or mitigation. However, as excavation for construction gets underway, it is possible that new and unanticipated paleontological resources might be encountered. If this occurs, a Construction Change Order must be prepared in order to have a qualified Principal Paleontologist evaluate the resource. If the resource is determined to be significant, monitoring and mitigation is 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 rock units, paleontological resources can generally be eliminated as a concern when the Preliminary Environmental Analysis Report (PEAR) is prepared and no further action taken.

3.2 BUREAU OF LAND MANAGEMENT POTENTIAL FOSSIL YIELD CLASSIFICATION

The Bureau of Land Management's (BLM's) Potential Fossil Yield Classification (PFYC) is based on past productivity to yield fossils. It is based on information gathered though published and unpublished sources and paleontological resource record searches (see below). The BLM utilizes this rating system (BLM 2007).

The proposed Project's potential impacts to the paleontological resources were obtained from the evaluations of potential impacts the proposed Project could have on existing paleontological resources. During the assessment of impacts on paleontological resources, the affected geologic formations are classified based on the relative abundance of vertebrate fossils and significant non-vertebrate fossils using the BLM's PFYC (BLM 2007). Under the PYFC, a higher classification indicates a higher potential fossil yield rating (Table 2).

3.2.1 Class 1 – Very Low

Geologic units rated with a very low yield potential are those that, for the most part, are not likely to contain fossil remains, such as igneous rocks (rocks cooled by magma) and metamorphic rocks (rocks changed by heat and pressure); these geologic units are also not likely to contain sedimentary rocks that are older than 542 million years (Precambrian in age). No Class 1 rock units occur in the APE.

3.2.2 Class 2 – Low

Geologic units with low yield potential are those that are not likely to contain vertebrate fossil or scientifically significant non-vertebrate fossils, such as units that are generally younger than 10,000 years, recent aeolian deposits, and sediments that have undergone significant physical and chemical changes. Shallow Quaternary alluvium sediments within the APE (generally less than 5 feet in depth) are assigned as Class 2.

3.2.3 Class 3 – Moderate or Unknown

Geologic units with moderate or unknown yield potential are sedimentary deposits in which fossil discoveries vary in significance, abundance, and predictable occurrence (moderate) or sedimentary units of unproven or unknown fossil potential. The entire APE contains Quaternary younger alluvium, unit 2 (Qya_2), which is assigned as Class 3.

3.2.4 Class 4 – High

Geologic units with high yield potential are those that contain a high occurrence of significant fossils that have been documented, but which may vary in occurrence and predictability. No Class 4 rock units occur in the APE.

3.2.5 Class 5 – Very High

Geologic units with very high yield potential are those that consistently and predictably produce vertebrate or scientifically significant non-vertebrate fossils. No Class 5 rock units occur in the APE.

TABLE 2
PALEONTOLOGICAL SENSITIVITY RATINGS USING CALIFORNIA DEPARTMENT OF TRANSPORTATION AND BUREAU OF LAND MANAGEMENT GUIDELINES

Geologic Unit	PFYC rating	Caltrans Rating	Likelihood of Impact and Recommendations
Quaternary alluvium (Qya_2)	2 (Low)	high	Likelihood increases with depth. Moderate sensitivity (PFYC rating 3) in excavations 5 feet below fill
PFYC: Potential Fossil Yield Classification; Caltrans: California Department of Transportation; Source: BLM 2009; Caltrans 2015; McLeod 2017.			

4.0 STUDY FINDINGS AND CONCLUSIONS

The literature review documented one sedimentary rock unit in the APE: Quaternary younger alluvium, unit 2 (Qya_2) (Figure 4). Holocene – Pleistocene alluvial deposits (Qya_2) underlie the entirety of the APE, with artificial fill overlying the alluvial deposits in the northwest portion of the APE.

A paleontological resources records search for the APE was conducted at the Vertebrate Paleontology Section of the Natural History Museum of Los Angeles County. No previously recorded paleontological sites were found in the APE. As stated earlier, the northwestern portion of the APE consists of up to ten feet of engineered fill that resulted from the dredging of Marina del Rey, overlying Quaternary younger alluvium, Unit 2. Consequently, the majority of the proposed roadway improvements in this area would not extend deep enough to impact paleontological resources. However, the areas immediately north and south of Lincoln Bridge are in areas underlain by Quaternary alluvium: In these areas, and in areas where excavation that exceeds 5 feet below the artificial fill, as indicated on Figure 3, earth disturbing activities should be monitored for paleontological resources. Pile driving during bridge construction will not involve excavation of sediments, and therefore does not require monitoring.

The records search documented four significant paleontological sites within a one-mile radius of the Project within Quaternary younger alluvium, unit 2 and Pleistocene San Pedro Sand. These paleontological sites were discovered at depths as shallow as six feet in Qya_2 and three feet in the Pleistocene San Pedro Sand. Based on this information and using the Caltrans and BLM paleontological sensitivity rating systems (Table 2), the Quaternary alluvium was rated high (Caltrans) and low to moderate, increasing with depth (Bureau of Land Management).

The Caltrans sensitivity rating system states “areas with a high potential for containing significant paleontological resources require monitoring and mitigation” (Caltrans 2015). Therefore, to minimize possible impacts to paleontological resources, a Paleontological Mitigation Plan (PMP) will be prepared to specify monitoring required for disturbance areas within Quaternary alluvium (Figure 4). Other earthwork proposed for the remainder of the APE that is in engineered fill would not result in impacts to sensitive paleontological resources and thus would not require monitoring or mitigation during construction.

It is Caltrans’ policy to mitigate impacts to possible paleontological resources during construction to an insignificant level by requiring paleontological monitoring. Much of the Project is in engineered fill but is underlain by Quaternary alluvium at varying depths throughout the APE. Areas where Quaternary alluvium will be disturbed needs to be monitored for buried paleontological resources during construction.

5.0 REFERENCES CITED

Barnes, L.G. and Mitchell, E.D.

1975 Late Cenozoic northeast Pacific Phocidae. Rapports et Proces-Verbaux des Reunions (Denmark).

Bureau of Land Management (BLM)

2007 Potential Fossil Yield Classification (PFYC) System for Paleontological Resources on Public Lands. Online at http;//www.blm.gov/wo/st/en/info/ regulations/Instruction.

California Department of Transportation (Caltrans).

2015 Paleontology-Standard Environmental References. Volume 1, Chapter 8-Paleontology. http//www.dot.ca.gov/ser//vol1/sec3/physical/Ch08Paleo/chap08 paleo.

Fitch, J.E.

1964. The fish fauna of the Playa Del Rey locality, a Southern California marine Pleistocene deposit. Los Angeles County Museum.

Group Delta Consultants, Inc. (GDC),

2013 Geotechnical Investigation Report, Ballona Wetlands Restoration Project, Marina Del Rey Area, Los Angeles County, California.

Group Delta Consultants, Inc. (GDC),

2018 District Preliminary Geotechnical Report, Lincoln Bridge Multi-Modal Improvement Project, Los Angeles, California.

Howard, Hildegarde

1936 A new fossil bird locality near Playa del Rey, California, with description of a new species of sulid. *The Condor*, *38*(5), pp.211-214

Ingersoll, Raymond V., and Peter E. Rumelhart.

1999 "Three-stage evolution of the Los Angeles basin, southern California." Geology 27.7: 593-596.

Jefferson, G.T.

1991a A Catalogue of Late Quaternary Vertebrates from California: Part One, Nonmarine Lower Vertebrate and Avian Taxa. *Natural History Museum of Los Angeles County Technical Reports* 5: 1–59.

1991b. A Catalogue of Late Quaternary Vertebrates from California: Part Two, Mammals. *Natural History Museum of Los Angeles County, Technical Reports* 7: 1–129.

2006 Catalogue of Late Quaternary Vertebrates from California. Unpublished manuscript on file at the Stout Research Center, Anza-Borrego Desert State Park.

Saucedo, G.J., Greene, H.G., Kennedy, M.P., and Bezore, S.P.

2016 Geologic map of the Long Beach 30'x 60'quadrangle. *California: A digital database: California Geological Survey, Preliminary Geologic Maps, scale*, *1*(100,000).

Society of Vertebrate Paleontology (SVP)
2010 Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources. Society of Vertebrate Paleontology Impact Mitigation Guidelines Revision Committee. Pp. 1-11.

Sylvester, Arthur G. and Gans, Elizabeth O.
2016 Roadside Geology of Southern California. Mountain Press Publishing Company, Missoula, Montana.

Willett, George
1937 An Upper Pleistocene fauna from the Baldwin Hills, Los Angeles County, California. San Diego Natural History Society.

ATTACHMENT A

PROFESSIONAL QUALIFICATIONS

Melissa Macias

Paleontologist

EDUCATION

2016/MS/Geosciences (Expected Summer of 2016)/Fort Hays State University

2013/BS/Earth Sciences/University of California, Santa Barbara

2010/AA/Earth and Planetary Science, Concentration: Geology/Santa Barbara City College

PROFESSIONAL AFFILIATIONS

Society of Vertebrate Paleontology

Association for Women Geoscientists

The Society for the Preservation of Natural History Collections

EXPERIENCE

With Psomas: 2 years/With Other Firms for: 2 years

Ms. Macias is currently in the process of completing a Master's Degree in Paleontology from Fort Hays State University in Hays, Kansas. Having completed all required coursework, graduation is pending thesis defense completion. During undergraduate and graduate studies, she has been involved in extensive paleontologic and geologic fieldwork in California and the Southwest, with a primary focus on late Cenozoic terrestrial mammals. Although the majority of her paleontological experience has been in primarily younger sediments in California, Ms. Macias has had experience in tutoring geology field courses throughout the Colorado Plateau region. These courses focused on the stratigraphy and geologic history of the region. In addition, she has many years of experience in computer programs such as Adobe Photoshop, Illustrator, and InDesign, as well as ArcGIS and PaleoGIS.

Experience

Sterling Residential Development, Los Angeles, CA: Paleontologist for mitigation planning, regulatory permitting, plant and wildlife surveys, construction monitoring, and general project management for this project dating back to 1998. To date, Psomas has provided the following services: botanical/wildlife surveys; construction monitoring; rare plant mitigation program development; riparian habitat mitigation planning; jurisdictional delineations; tree surveys; and regulatory permitting. Upon the initiation of project development, Psomas will provide (1) updates to existing environmental documentation (e.g., wildlife surveys, tree surveys, plant surveys); (2) regulatory agency coordination; (3) construction monitoring; (4) cultural resource construction monitoring; and (5) habitat mitigation monitoring.

Morningside Golf and Tennis Center Project, Fullerton, CA: Paleontologist for mitigation planning tasks provided for property improvement activities performed within the Morningside Retirement Community's facilities. The community is proposing to build a small pitch and putt golf course and pickle ball court for its residents. Compensatory mitigation was required for impacts to CDFW jurisdictional areas that resulted from fuel modification clearing activities performed in response to an order from the City of Fullerton Fire Department. Compensatory mitigation included the incorporation of native plant species and natural park interpretive and educational elements into the adjacent golf course landscape design.

Frank R. Bowerman Landfill Phase VIIIB-1 Landfill Buttress and Liner Project Paleontological Monitoring, Irvine, CA: Paleontologist for this project. The overall investigation includes monitoring grading areas for fossils and cataloging new fossil localities. This work is part of the environmental mitigation being completed as part of the buttress and liner installation being implemented for the landfill by Orange County Waste & Recycling. The work included monitoring during grading and excavation; screenwashing sediment for microfossils; and preparing jacketed material in the field.

Melissa Macias (Continued)

Lincoln Bridge Multi-Modal Improvements, Los Angeles, CA: Paleontologist for the geometric approved drawings for the widening of Lincoln Boulevard from Fiji Way to Jefferson Boulevard. The project included replacement of Lincoln Boulevard Bridge over Ballona Creek, and replacement of the Culver Boulevard overpass while minimizing impact to the creek and wetlands. The geometrics provided capacity for future light rail transit, three vehicle lanes in each direction, Class II bicycle lanes, and sidewalks on both sides of the bridge.

Proposed Correctional/Institutional Facility EIR/EA/FONSI, California City, CA: Paleontologist for the preparation of an EIR and EA/FONSI for a proposed institutional development that could potentially include secure correctional and/or mental health facilities located on 215 acres in California City in Kern County. Facilities would be arranged into one or more operational areas with supporting programming, administrative, maintenance, utilities, and infrastructure improvements. The Project will require both an EIR to satisfy CEQA for California City and other State agency permits and an Environmental Assessment (EA)/Finding of No Significant Impact (FONSI) for NEPA review based on anticipated federal wildlife permitting requirements. The Project will require extensive off-site utility infrastructure improvements and seamless coordination with the lead agency and utility providers to ensure cumulative impacts are adequately addressed.

Merrill Avenue Brownstones Initial Study/Mitigated Negative Declaration, Riverside, CA: Paleontologist for the IS/MND for the proposed mixed-use development with a total floor area of 98,608 square feet (sf) and consisting of with 108 dwelling units and associated amenities (leasing office, club room, swimming pool and spa, fitness center, and cabana) and an additional 1,200 sf of retail space would be located on the ground floor. In addition, the Merrill Avenue street section would be modified to provide on-street parking immediately adjacent to the project site. The IS/MND addressed impacts related to noise, vibration, pollutant emissions, and toxic emissions associated with train activity on the tracks north of the site and the traffic impacts from the narrowing of Merrill Avenue and during the holiday season at the Riverside Plaza shopping center to the south.

La Palma Recharge Basin, Anaheim, CA: Paleontologist for a Phase I cultural resources study. The study included records searches, Native American scoping, a pedestrian field survey, consultation with SHPO, and preparation of a technical report and SHPO cover letter. No resources were discovered as a result of the Phase I study. Psomas is currently monitoring grading of the recharge basin along with a Native American representative. Several isolated artifacts and cultural shell ecofacts have been recovered at this ongoing project.

EEG Quarry, Vandenberg Air Force Base, CA: Field Crew Chief for the EEG giant ground sloth quarry located at Vandenberg Air Force Base in the County of Santa Barbara. The project included conducting paleontological research and supervising a crew of student and Air Force Base staff volunteers in collecting vertebrate fossils, taphonomic data, and stratigraphic data at a Pleistocene giant ground sloth quarry. This site was discovered during a 2013 survey of fossil localities. In addition to fieldwork, Melissa gave presentations on this research to multiple groups, including scouting groups and professional scientists.

Charles Cisneros, MS, RPA

Senior Project Manager/Senior Archaelogist

EDUCATION

2008/MS/European Archaeology/University of Edinburgh, United Kingdom,

2004/BA/Anthropology/California State University, Los Angeles

2003 San Nicolas Island Archaeological Field School/California State Univeristy, Los Angeles

CERTIFICATIONS

Orange County Certified Archaeologist Certified Archaeologist/

Registered Professional Archaeologist/Register of Professional Archaeologists

Riverside County Certified Archaeologist/

PROFESSIONAL AFFILIATIONS

Society for American Archaeology

Society for California Archaeology

Western States Folklore Society

Charles Cisneros is a registered professional archaeologist and has more that 14-years of archaeological assessment and field experience in Southern California. He has directed numerous field projects in support of compliance with the California Environmental Quality Act (CEQA), the National Environmental Policy Act (NEPA), and Sections 106 and 110 of the National Historic Preservation Act (NHPA). Mr. Cisneros has managed a wide range of projects involving archaeological survey, testing, data recovery, monitoring, and laboratory analysis. He is skilled at research and data management, as well as maintaining and organizing digital and print publications. His training and background meet the U.S. Secretary of the Interior's Professional Qualifications Standards for prehistoric and historic archaeology.

Charles specializes in the prehistoric archaeology of Southern California and the Great Basin. His research interests include ritual use of landscape and sacred geography; applications of new culture-history theory; hunter-gatherer subsistence and technology; and the application of physical science techniques to archaeological questions. He has conducted inventories and analyses of a wide variety of archaeological features and settings, including tool stone prospects and quarries; prehistoric burials; and rock art complexes, including parietal art and geoglyphs.

Charles also specializes in folklore research. He has ethnographic experience in the Philippines, where he has conducted anthropological research for more than eight years. The purpose of his study was to explore the supernatural beliefs in nature spirits through the folklore of a small village located in the Western Visayas of the Philippines. Additionally, Charles has extensive experience in producing business proposals for environmental consulting projects in collaboration with other departments. He is a member of the Society for American Archaeology (SAA), Society for California Archaeology (SCA), and the Western States Folklore Society (WSFS). He has authored or co-authored several professional reports and routinely presents papers at professional meetings.

Experience

ORANGE COUNTY

Irvine Unified School District (IUSD) Initial Study/Mitigated Negative Declaration for the Planning Areas 6 North Elementary School; Orange County, California (2016): Senior Archaeologist/Principal Investigator.

Mr. Cisneros was responsible for cultural and paleontological resources research in support of the IUSD IS/MND, located in the City of Irvine, Orange County, California. His responsibilities consisted of a conducting record searches, pedestrian field survey and preparing the IS/MND technical analysis documenting the findings of the study, including preparing the project mitigation measures. Mr. Cisneros's other tasks included managing the task budget, correspondence with IUSD

personnel and tribal representatives from the Native American Heritage Committee contact list.

Initial Study/Mitigated Negative Declaration for the Jamboree Road Widening (Main to Barranca) Widening Project; Orange County, California (2016): Senior Archaeologist/Principal Investigator.

Mr. Cisneros was responsible for cultural and paleontological resources research in support of the City of Irvine, Public Works IS/MND. His responsibilities consisted of a conducting record searches, and preparing the IS/MND technical analysis documenting the findings of the study, including preparing the project mitigation measures. Mr. Cisneros's other tasks included managing the task budget, correspondence with tribal representatives from the Native American Heritage Committee contact list.

The West Coast Highway Beautification Project; Orange County, California (2016): Senior Archaeologist/Principal Investigator.

Mr. Cisneros was responsible for the cultural resources survey for a 1.65-mile linear project located in the City of Newport beach. His responsibilities include conducting the field study and to developing strategies to minimize impacts to sensitive resources, and preparing the Caltrans Archaeological Survey Report (ASR) and the Historical Resources Compliance Report (HRCR). Mr. Cisneros's other tasks include managing the task budget, correspondence with the Caltrans District 12 project archaeologist.

Archaeological Testing and Evaluation of Site CA-ORA-1720; University of California, City of Irvine, California (2012): Field Director and Senior Archaeologist.

Mr. Cisneros was the project field director and senior archaeologist for the NRHP significance evaluation of site CA-ORA-1720 located on the campus of University of California, Irvine (UCI).

LOS ANGELES COUNTY

Del Valle Road Water Main Replacement Project; Los Angeles County, California (2016): Project Manager and Senior Archaeologist.

Mr. Cisneros was the Project Manager and Senior Archaeologist for cultural resources research in support of the Del Valle Road Water Main Replacement Project, located in Los Angeles County, California. The Project involves replacement of 7,130 linear feet of existing water main along Del Valle Road, Hunstock Street, and Lincoln Avenue in the unincorporated area of Val Verde. His responsibilities consisted of a Phase 1 Cultural Resources Survey and preparing a technical study documenting the findings of the study. Mr. Cisneros's other tasks included managing the project budget, correspondence with County personnel and tribal representatives from the San Fernandeno Band of Mission Indians.

Cultural Resources Assessment for LACDPW Street Improvements Project; Los Angeles County, California (2016): Senior Archaeologist.

Mr. Cisneros was the Project Manager and Senior Archaeologist for an archaeological study located on private lands and lands managed by the United States Forest Service. His responsibilities included the investigation of cultural resources, GPS mapping, and management recommendations. His other tasks included managing the project budget, and working with USFS archaeologist and County personnel.

Peck Road Basin Pump Station Project; Los Angeles County, California (2014): Senior Archaeologist.

Mr. Cisneros was the Senior Archaeologist for a cultural resources and paleontological study in support of the LACDPW Peck Water Conservation Project located in eastern County of Los Angeles, California. His responsibilities included the investigation of cultural resources, paleontological resources, GPS mapping, and management recommendations. His other tasks included managing the project budget and working with County personnel.

Admiralty Way-Fiji Way Street Improvement Project; Los Angeles County, California (2014): Project Manager and Senior Archaeologist.

Mr. Cisneros was the Project Manager and Senior Archaeologist for a cultural resource stratigraphic study in support of the Admiralty Way-Fiji Way Street Improvement Project located in Marina Del Rey, California. His responsibilities consisted of a field visit and preparing a stratigraphic profile of soils located within a trench. Charles' other tasks included managing the project budget, correspondence with County personnel, and submitting a report of findings.

Los Angeles County Flood Control District (LACFCD) Storm Drain 505 Project; Los Angeles County, California (2016): Project Manager and Senior Archaeologist.

Mr. Cisneros was the Project Manager and Senior Archaeologist for an archaeological resources study in support of the LACFCD Storm Drain 505 project located in Area C of the Ballona Wetlands Ecological Preserve, Los Angeles County, California. His responsibilities included the investigation and identification of archaeological and tribal cultural resources near the project area and preparing management recommendations for these resources. His other responsibilities included managing the project budget and working with County and California Department of Fish and Wildlife personnel.

MISSION PERIOD ARCHAEOLOGY

ACE San Gabriel Trench Grade Separation Project; San Gabriel, California (2009-2012): Staff Archaeologist.

Staff Archaeologist for archaeological research and technical reports for the multiple-phase Caltrans project, including Phase II testing of part of the San Gabriel Mission site.

San Fernando Mission Excavation Project; Los Angeles, California (2007): Staff Archaeologist.

Staff Archaeologist for a phase three excavation on a Mission period archaeological site. His tasks included assisting the field director with testing, note taking, and illustrations.

ATTACHMENT B1

LACM RECORDS SEARCH RESULTS

Natural History Museum
of Los Angeles County
900 Exposition Boulevard
Los Angeles, CA 90007

tel 213.763.DINO
www.nhm.org

NATURAL HISTORY MUSEUM
LOS ANGELES COUNTY

Vertebrate Paleontology Section
Telephone: (213) 763-3325

e-mail: smcleod@nhm.org

28 April 2017

Psomas
3 Hutton Centre Drive, Suite 200
Santa Ana, CA 92707-8794

Attn: Melissa Macias, Paleontologist

re: Paleontological Resources for the proposed Lincoln Bridge Project, in the City of Los Angeles, Los Angeles County, project area

Dear Melissa:

I have conducted a thorough search of our Vertebrate Paleontology records for the proposed Lincoln Bridge Project, in the City of Los Angeles, Los Angeles County, project area as outlined on the portion of the Venice USGS topographic quadrangle map that you sent to me via e-mail on 17 April 2017. We do not have any vertebrate fossil localities that lie directly within the proposed project area boundaries, but we do have vertebrate fossil localities nearby from sedimentary deposits similar to those that may occur at depth in the proposed project area.

The entire proposed project area has surface deposits that consist of younger Quaternary Alluvium, derived predominately as fluvial deposits from Ballona Creek that currently flows through the proposed project area. These deposits typically do not contain significant fossil vertebrate remains, at least in the uppermost layers, and we have no vertebrate fossil localities nearby from such deposits. At relatively shallow depth in this area, however, older Quaternary sediments that contain significant vertebrate fossils are likely to be encountered. Our closest vertebrate fossil locality from these deposits is LACM 7879, north-northwest of the proposed project area near the intersection of Rose Avenue and Penmar Avenue, that produced fossil specimens of horse, *Equus*, and ground sloth, *Paramylodon*, at greater than eleven feet in depth. Our next closest vertebrate fossil locality from these deposits is LACM 5462, further north-northwest of the proposed project area just south of Olympic Boulevard along Michigan Avenue

east of Cloverfield Boulevard, that produced a fossil specimen of extinct lion, *Felis atrox*, at a depth of only six feet below grade.

Surface grading or very shallow excavations in the proposed project area probably will not uncover significant vertebrate fossil remains. Excavations that extend down below about five feet, however, may well encounter significant fossil vertebrate specimens. Any substantial excavations below the uppermost layers in the proposed project area, therefore, should be monitored closely to quickly and professionally recover any fossil remains discovered while not impeding development. Sediment samples from the proposed project area should also be collected and processed to determine the small fossil potential of the site. Any fossils recovered during mitigation should be deposited in an accredited and permanent scientific institution for the benefit of current and future generations.

This records search covers only the vertebrate paleontology records of the Natural History Museum of Los Angeles County. It is not intended to be a thorough paleontological survey of the proposed project area covering other institutional records, a literature survey, or any potential on-site survey.

Sincerely,

Samuel A. McLeod

Samuel A. McLeod, Ph.D.
Vertebrate Paleontology

enclosure: invoice

ATTACHMENT B2

PBDB RECORDS SEARCH RESULTS

Data Provider	The Paleobiology Database
Data Source	The Paleobiology Database
Data License	Creative Commons CC-BY
License URL	http://creativecommons.org/licenses/by/4.0/
Documentation U	http://paleobiodb.org/data1.2/occs/list_doc.html
Data URL	http://paleobiodb.org/data1.2/occs/list.csv?datainfo&rowcount&coll_id=59063&show=coords
Access Time	Mon 2019-11-25 18:27:04 GMT
Title	PBDB Data Service
Parameters:	
	coll_id
	timerule
	taxon_status
	show
Elapsed Time	0.00234
Records Found	12
Records Returned	12

Records:

occurrence_no	record_type	collection_	accepted_name	early_interval	reference_	lng	lat
565205	occ	59063	Phoca vitulina	Late Pleistocene	16773	-118.454	33.99445
800527	occ	59063	Gavia immer	Late Pleistocene	29329	-118.454	33.99445
800528	occ	59063	Aechmophorus occidentalis	Late Pleistocene	29329	-118.454	33.99445
800529	occ	59063	Phoebastria albatrus	Late Pleistocene	29329	-118.454	33.99445
800530	occ	59063	Ardenna grisea	Late Pleistocene	29329	-118.454	33.99445
800531	occ	59063	Puffinus opisthomelas	Late Pleistocene	29329	-118.454	33.99445
800532	occ	59063	Chendytes lawi	Late Pleistocene	29329	-118.454	33.99445
800533	occ	59063	Anatidae	Late Pleistocene	29329	-118.454	33.99445
800534	occ	59063	Uria aalge	Late Pleistocene	29329	-118.454	33.99445
800535	occ	59063	Corvus corax	Late Pleistocene	29329	-118.454	33.99445
800536	occ	59063	Moris reyana	Late Pleistocene	29329	-118.454	33.99445
1457605	occ	59063	Lytechinus pictus	Late Pleistocene	32966	-118.454	33.99445