



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

tel 213.763.DINO
www.nhm.org

Vertebrate Paleontology Section
Telephone: (213) 763-3325

e-mail: smcleod@nhm.org

7 December 2016

TADIARchitecture
117 West 9th Street, #424
Los Angeles, CA 90015

Attn: Dino G. Tadiar, California Registered Architect

re: Paleontological resources for the proposed 3712 and 3710 Camino De La Cumbre
Project, in the City of Los Angeles, Los Angeles County, project area

Dear Dino:

I have conducted a thorough search of our paleontology collection records for the locality and specimen data for the proposed 3712 and 3710 Camino De La Cumbre Project, in the City of Los Angeles, Los Angeles County, project area as outlined on the portion of the Van Nuys USGS topographic quadrangle map that you sent to me on 21 November 2016. We have one vertebrate fossil locality that occurs either within or adjacent to the proposed project site boundaries, and we have numerous localities nearby from the same sedimentary deposits that occur in the proposed project area.

Below a thin layer of topsoil, bedrock in the proposed project area consists of deposits of the marine late Miocene Monterey Formation (also referred to as the Lower Modelo Formation in this area). These Monterey Formation rocks in this area are typically diatomaceous silts to shales or even sandstones. We have one vertebrate fossil locality from this rock unit, LACM 7285, that occurs either within or adjacent to the proposed project area. Fossil specimens of bonito shark, *Isurus hastalis*, and snake mackerel, *Thyrsocles*, were recovered from locality LACM 7285.

We have several important vertebrate fossil localities from this rock unit within a half mile radius of the proposed project area including LACM 7955, immediately northeast of the

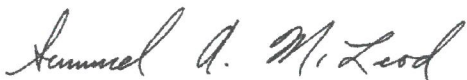
proposed project area along Stansbury Avenue, LACM (CIT) 387, further northeast of the proposed project area along Hollyline Avenue, LACM 5435, just south of the proposed project area near Glorietta Drive, LACM 1894, just south of due west of the proposed project area along Deervale Drive, LACM (CIT) 381, southwest of the proposed project area along Oakfield Drive, LACM 4176, LACM 7045 and especially LACM (CIT) 326, all between Beverly Ridge Drive and Oakfield Drive just west of the proposed project area. These localities have produced a composite fossil fauna of primarily bony fish (see appendix).

Most importantly, locality LACM (CIT) 326 produced an extensive fossil fish fauna including the holotypes (name-bearing specimens for species new to science) of the lanternfish *Lampanyctus bolini* and *Lampanyctus petrolifer*, the viperfish *Chauliodus barbatus*, and the pipefish *Hipposyngnathus imporcitor*. The *Lampanyctus* species were named by L.R. David (1943. Miocene fishes of southern California. Geological Society of America Special Papers, 43:1-193). *Chauliodus barbatus* was named by J.M. Crane (1966. Late Tertiary radiation of viperfishes (Chauliodontidae) based on a comparison of Recent and Miocene species. Contributions in Science, Natural History Museum of Los Angeles County, 115:1-29). The pipefish *Hipposyngnathus imporcitor* was named by R.A. Fritzsche (1980. Revision of the eastern Pacific Syngnathidae (Pisces: Syngnathiformes), including both Recent and fossil forms. Proceedings of the California Academy of Science, 42(6):181-227).

Any excavations in the bedrock Monterey Formation deposits occurring throughout the proposed project area may well encounter significant fossil vertebrate remains. Any substantial excavations in the proposed project area, therefore, should be monitored closely to quickly and professionally collect any vertebrate fossil remains without impeding development. The fossil fish collected from nearby localities are mostly quite small so the qualified paleontological monitor on the site should closely examine the rock surfaces exposed during excavations for fish fossils. Also, sediment samples from the proposed project area should be collected and processed to determine the small fossil potential of the site. Any fossils collected during mitigation activities should be placed in an accredited 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, Ph.D.
Vertebrate Paleontology

enclosures: attachment, invoice

Composite fossil fauna from Monterey Formation localities
LACM (CIT) 326, 381, 387, LACM 1894, 4176, 5435, 7045, 7285, and 7955
closest to 3712 and 3710 Camino De La Cumbre

Chondrichthyes

Lamniformes

Lamnidae - mackerel sharks

Isurus *hastalis*

Osteichthyes

Atheriniformes

Belonidae- needlefishes

Clupeiformes

Clupeidae - herrings

Ganolytes *cameo*

Xyne *grex*

- Published

Gadiformes

Gadidae - cods

Eclipes

Moridae - mora

Myctophiformes

Myctophidae - lanternfishes

Lampanyctus *bolini*

- HOLOTYPE

Lampanyctus *petrolifer*

- HOLOTYPE

Perciformes

Carangidae - jacks

Decapterus *agilis*

Gempylidae - snake mackerels

Thyrsocles *kriegeri*

Scombridae - mackerels & tunas

Sarda *stocki*

Scomber

- Published

Zaproridae - prowfish

Araeosteus *rothi*

Pleuronectiformes - flounders

Salmoniformes

Bathylagidae - deep sea smelts

Bathylagus *angelensis*

- Figured

Quaesita *angelensis*

Stomiatiiformes

Chauliodontidae - viperfishes

Chauliodus *barbatus*

- HOLOTYPE

Chauliodus *eximius*

Gonostomidae - bristlemouths

Cyclothone *solitudinis*

Sternoptychidae - Hatchetfishes

Argyropelecus *bullockii*

Syngnathiiformes

Syngnathidae - pipefishes & seahorses

Hipposyngnathus *imporcitor*

- HOLOTYPE

Syngnathus *avus*

- Published

**PALEONTOLOGICAL EVALUATION AND INVENTORY
REPORT**

**3700 AND 3712 CAMINO DE LA CUMBRE
PROJECT**



Prepared for: **Farrell Atlassi**
Keller Williams Realty
439 N. Canon Drive, 3rd Floor
Beverly Hills, CA 90210

Prepared by: **Paleo Solutions, Inc.**
911 S. Primrose Ave., Unit N
Monrovia, CA 91016

Geraldine Aron, M.S. – Project Manager
Courtney Richards, M.S. – Principal Investigator
Joey Raum, B.S. – Report Author

PSI Report: CA18LosAngelesFAR01R

February 8, 2018



This page intentionally left blank.



Table of Contents

1.0	EXECUTIVE SUMMARY.....	5
2.0	INTRODUCTION	7
2.1	Project Description and Location	7
3.0	DEFINITION AND SIGNIFICANCE OF PALEONTOLOGICAL RESOURCES.....	11
4.0	LAWS, ORDINANCES, REGULATIONS, AND STANDARDS	12
4.1	State Regulatory Setting	12
4.1.1	California Environmental Quality Act (CEQA)	12
4.1.2	State of California Public Resources Code	12
4.2	Local Regulatory Setting	12
4.2.1	Los Angeles County	12
4.2.2	City of Los Angeles Guidelines	13
5.0	METHODS.....	13
5.1	Analysis of Existing Data	13
5.2	Field Survey.....	13
5.3	Criteria for Evaluating Paleontological Potential.....	14
6.0	ANALYSIS OF EXISTING DATA RESULTS	15
6.1	Literature Review	16
6.1.1	Monterey Formation – Miocene.....	16
6.1.2	Quaternary Young Alluvium – Holocene.....	17
6.2	Paleontological Record Search Results.....	19
7.0	FIELD SURVEY.....	21
7.1	Geology	25
7.2	Paleontology	31
8.0	IMPACTS ON PALEONTOLOGICAL RESOURCES.....	33
9.0	CONCLUSIONS.....	33
10.0	PALEONTOLOGICAL RESOURCES MONITORING AND MITIGATION RECOMMENDATIONS	34
	REFERENCES	36
	APPENDIX A: Natural History Museum of Los Angeles County Paleontological Record Search ...	38

Figures

Figure 1.	Project Location Map.....	9
Figure 2.	Project Overview Map.....	10
Figure 3.	Project Geologic Map.....	18
Figure 4.	Overview of Camino de la Cumbre Road and western limit of Project area. View southeast.	22
Figure 5.	Overview of Project area and adjacent valley floor from northwestern boundary. View southeast.	22
Figure 6.	Overview of western boundary of Project area. Camino de la Cumbre road shown. View south. ...	23
Figure 7.	Edge of the central portion of the Project area which has relatively gentle relief. The terrain steepens down to the east and up to the west. View south.	23
Figure 8.	Eastern boundary of the Project area. Vegetation becomes denser and the terrain steepens down into the valley located to the east. View southeast.	24



Figure 9. Northwestern boundary of the Project area. Camino de la Cumbre Road, debris pile, and property fence shown. View north..... 24

Figure 10. Monterey Formation sediments exposed on the slope of western portion of the Project area. View west..... 25

Figure 11. Monterey Formation sediments exposed on the slope of western portion of the Project area. View west..... 26

Figure 12. Monterey Formation sediments exposed on the slope of western portion of the Project area. View west..... 26

Figure 13. Monterey Formation sediments exposed on the slope of western portion of the Project area. View west..... 27

Figure 14. Monterey Formation sediments exposed on the slope of western portion of the Project area. View west..... 27

Figure 15. Monterey Formation sediments exposed on the slope of western portion of the Project area. View west..... 28

Figure 16. Overview of Camino de la Cumbre Road and adjacent Monterey Formation outcrops. View northwest..... 28

Figure 17. Monterey Formation sandstone and shale units observed immediately west of the Project area along a road cut exposure. View northwest..... 29

Figure 18. Monterey Formation sandstone unit observed immediately west of the Project area along a road cut exposure. View west. 29

Figure 19. Monterey Formation sandstone unit observed immediately west of the Project area along a road cut exposure. View west. 30

Figure 20. Loosely deposits surficial sediments consisting of weathered bedrock detritus that has eroded down slope. View south..... 30

Figure 21. Loosely deposits surficial sediments consisting of weathered bedrock detritus that has eroded down slope. View west..... 31

Figure 22. Poorly preserved fish scales discovered in Monterey Formation shale on the 3700 property of the Project area. Fossil locality F180205-16-01. View down..... 32

Figure 23. Poorly preserved fish bones discovered in Monterey Formation shale on the 3700 property of the Project area. Fossil locality F180205-16-01. View down..... 32

Tables

Table 1. 3700 and 3712 Camino de la Cumbre Project Summary..... 7

Table 2. Potential Fossil Yield Classification (BLM, 2016) 14

Table 3. Museum Record and Literature Search Results Summary..... 19

Table 4. Summary of Field Survey Fossil Localities..... 31



1.0 EXECUTIVE SUMMARY

This report presents the results of the paleontological technical study conducted by Paleo Solutions, Inc. (Paleo Solutions) under contract to Farrell Atlassi in support of the 3700 and 3712 Camino de la Cumbre Project (Project) located in the Sherman Oaks neighborhood in the City of Los Angeles, Los Angeles County, California (see Figure 1). This work was required by the City of Los Angeles Planning Department to meet their requirement as the lead agency under the California Environmental Quality Act (CEQA). All paleontological work was completed in compliance with CEQA, local regulations, and best practices in mitigation paleontology (Murphey et al., 2014). The Project area encompasses approximately 0.53 acres and is located on the Mission-Ex de San Francisco Land Grant in Township 1 North and Range 15 West of the USGS Van Nuys (2012) 7.5-minute topographic map.

The Project consists of construction of two houses on two land parcels located at the properties of 3700 and 3712 Camino de la Cumbre, Sherman Oaks neighborhood, City and County of Los Angeles, California 91423 (see Figure 2). The paleontological potential of the Project area was evaluated based on an analysis of existing paleontological data and field survey. The three components of the analysis of existing data included a geologic map review, a literature search, and an institutional record search. Geologic mapping by Dibblee and Ehrenspeck (1991) indicates that the Project is primarily underlain by Miocene Monterey Formation and Quaternary young alluvium (see Figure 3).

According to the record search conducted by the Natural History Museum of Los Angeles County (LACM), there is one previously recorded vertebrate fossil locality within or adjacent to the Project area (McLeod, 2016). There are also several additional vertebrate fossil localities recorded from within a half-mile radius of the Project area (McLeod, 2016). Moreover, literature and online database reviews identified numerous vertebrate fossils recovered from the Miocene Monterey Formation elsewhere in the Project vicinity, particularly within the Fossil Ridge Park—a section of the Santa Monica Mountains National Recreation Area—as well vertebrate and invertebrate fossils from elsewhere in Los Angeles County and California (see Table 3).

The field survey confirmed geologic mapping by Dibblee and Ehrenspeck (1991), which indicates that the majority of the Project area is underlain by Miocene Monterey Formation. Additionally, the field survey resulted in the recordation of one new fossil locality, which consists of fossilized fish scales and bones (see Section 7.2 and Table 4). These fossils were determined to be non-significant and were not collected due to their poor preservation and lack of diagnostic features. However, their presence is indicative of the high fossilization potential of the sediments underlying the Project area.

The Potential Fossil Yield Classification (PFYC) system was applied to the results of the analysis of existing data. Miocene Monterey Formation has a very high paleontological potential (PFYC 5). Quaternary young (Holocene-age) alluvial deposits are estimated to be less than 10,000 years old and have a low paleontological potential (PFYC 2), because they are typically too young to contain *in situ* fossils. However, these younger deposits often overlie older geologic units with higher paleontological potential, which may be impacted at shallow depth. Miocene unnamed marine shale and Quaternary landslide debris deposits, which are mapped within a half-mile radius of the Project area, lie stratigraphically above Monterey Formation and are unlikely to be encountered at depth during excavations.

Based on the ground disturbance necessary to complete the Project, there is the potential for adverse impacts to scientifically significant paleontological resources within Miocene Monterey Formation within the subsurface of the Project area. Full time monitoring is recommended for all excavations impacting Monterey Formation (PFYC 5). Areas mapped as Quaternary young alluvium (PFYC 2) should be spot-checked during excavations that exceed depths of 5 feet to check for underlying, paleontologically sensitive Monterey



Formation deposits. If Monterey Formation deposits are observed, full time monitoring should be implemented in those areas. If it is determined that only Quaternary young alluvial deposits (PFYC 2) or previously disturbed sediments (PFYC 2) are impacted, the monitoring program should be reduced or suspended. Any subsurface bones or potential fossils that are unearthed during construction should be evaluated by a Qualified Paleontologist. Proposed paleontological monitoring and mitigation measures are provided in Section 10 of this report.



2.0 INTRODUCTION

This report presents the results of the paleontological technical study conducted by Paleo Solutions under contract to Farrell Atlassi in support of the 3700 and 3712 Camino de la Cumbre Project. This work was required by the City of Los Angeles Planning Department to meet their requirement as the lead agency under CEQA. All paleontological work was completed in compliance with CEQA, local regulations, and best practices in mitigation paleontology (Murphey et al., 2014).

2.1 Project Description and Location

The Project consists of the construction of two houses on two land parcels located at 3700 and 3712 Camino de la Cumbre, Sherman Oaks neighborhood, City and County of Los Angeles, California 91423 (Figures 1 and 2). The Project area encompasses approximately 0.53 acres and is located on the Mission-Ex de San Francisco Land Grant in Township 1 North and Range 15 West of the USGS Van Nuys (2012) 7.5-minute topographic map. The Project area is situated in the eastern Santa Monica Mountains within the Transverse Ranges geomorphic province, which is characterized by east-west trending mountain ranges and valleys. The Santa Monica Mountains form the southwestern portion of the Transverse Ranges and comprise a relatively low, west trending coastal range that is approximately 80-kilometers-long and extends from the Oxnard Plain in the west to the Los Angeles River in the east. The mountains consist of plutonic and metamorphic basement rock overlain by Cretaceous, Tertiary, Oligocene, and Miocene clastic rocks. Geologic mapping by Dibblee and Ehrenspeck (1991) indicates that the Project is primarily underlain by Miocene Monterey Formation and Quaternary young alluvium (Figure 3).

The Project area is situated on the eastern slope of a moderate relief northern trending elongated hill that is incised by predominantly east-southeast trending drainages that terminate at the relatively flatter and low lying valley floor to the east. Disturbances in the Project area consist of an existing paved road (i.e., Camino de la Cumbre Road), guardrails, electrical and telecommunication distribution poles, a chain link fence, and trash and debris. Sedimentary deposits are exposed in nearly vertical cuts along the western side of the road, where earthmoving associated with road grading occurred. Vegetation in the Project area consists of desert grasses, shrubs, and small trees.

Table 1. 3700 and 3712 Camino de la Cumbre Project Summary

Project Name	3700 and 3712 Camino de la Cumbre Project				
Project Description	The Project consists of construction of two houses on two land parcels.				
Project Area	The Project is located at the properties of 3700 and 3712 Camino de la Cumbre, Sherman Oaks neighborhood, City and County of Los Angeles, California 91423.				
Total Acreage	0.53 acres				
Location (PLSS) and Land Owner	Quarter-Quarter	Section	Township	Range	Land Ownership
	N/A	Mission-Ex de San Francisco Land Grant	T1N	R15W	Private
Topographic Map(s)	USGS Van Nuys (2012) 7.5' Topographic Quadrangle				
Geologic Map(s)	Geologic Map of the Beverly Hills and Van Nuys (South ½) Quadrangles, Los Angeles County, California (Dibblee and Ehrenspeck, 1991)				
Mapped Geologic Unit(s) and Age	Geologic Units	Age	Paleontological Sensitivity (PFYC*)		
	Monterey Formation	Miocene	Very High (Class 5)		
	Unnamed marine shale	Miocene	High (Class 4)		
	Quaternary landslide debris deposits	Pleistocene to Holocene	Unknown (Class U)		
	Quaternary young alluvium	Holocene	Low (Class 2)		



Surveyor(s)	Joey Raum, B.S.
Date(s) Surveyed	February 5, 2018
Permits	No permits were required for the paleontological work conducted for this Project.
Geologic Unit(s) Surveyed	Miocene Monterey Formation
Paleontological Results	One new vertebrate fossil locality (F180205-16-01) was recorded from the Monterey Formation during the field survey and consisted of poorly preserved fish scales and bones. These fossils were determined to be non-significant, and were not collected due to their poor preservation and lack of diagnostic features. However, their presence is indicative of the high fossilization potential of the sediments underlying the Project area.
Disposition of Fossil(s)	No fossils were collected during the field survey.
Previously Documented Fossil Localities within the Project area	The Natural History Museum of Los Angeles County reported that there is one vertebrate fossil locality recorded from the Monterey Formation that is located either within or adjacent to the Project area. There are several additional fossil localities recorded within a half-mile radius of the Project area (see Section 6.2).
Recommendation(s)	Due to the very high paleontological potential of the geologic units within the Project area, mitigation of potential adverse impacts resulting from construction-related ground disturbance is recommended. Full time paleontological monitoring is recommended for all excavations impacting Monterey Formation (PFYC 5). Areas mapped as Quaternary young alluvium (PFYC 2) should be spot-checked during excavations that exceed depths of 5 feet to check for underlying, paleontologically sensitive Monterey Formation deposits. If Monterey Formation deposits are observed, full time monitoring should be implemented in those areas. If it is determined that only Quaternary young alluvial deposits (PFYC 2) or previously disturbed sediments (PFYC 2) are impacted, the monitoring program should be reduced or suspended. Any subsurface bones or potential fossils that are unearthed during construction should be evaluated by a Qualified Paleontologist. Proposed paleontological monitoring and mitigation measures are provided in Section 10 of this report.



Figure 1. Project Location Map.



Figure 2. Project Overview Map.



3.0 DEFINITION AND SIGNIFICANCE OF PALEONTOLOGICAL RESOURCES

As defined by Murphey and Daitch (2007): “Paleontology is a multidisciplinary science that combines elements of geology, biology, chemistry, and physics in an effort to understand the history of life on earth. Paleontological resources, or fossils, are the remains, imprints, or traces of once-living organisms preserved in rocks and sediments. These include mineralized, partially mineralized, or unmineralized bones and teeth, soft tissues, shells, wood, leaf impressions, footprints, burrows, and microscopic remains. Paleontological resources include not only fossils themselves, but also the associated rocks or organic matter and the physical characteristics of the fossils’ associated sedimentary matrix.

The fossil record is the only evidence that life on earth has existed for more than 3.6 billion years. Fossils are considered non-renewable resources because the organisms they represent no longer exist. Thus, once destroyed, a fossil can never be replaced. Fossils are important scientific and educational resources because they are used to:

- Study the phylogenetic relationships amongst extinct organisms, as well as their relationships to modern groups;
- Elucidate the taphonomic, behavioral, temporal, and diagenetic pathways responsible for fossil preservation, including the biases inherent in the fossil record;
- Reconstruct ancient environments, climate change, and paleoecological relationships;
- Provide a measure of relative geologic dating that forms the basis for biochronology and biostratigraphy, and which is an independent and corroborating line of evidence for isotopic dating;
- Study the geographic distribution of organisms and tectonic movements of land masses and ocean basins through time;
- Study patterns and processes of evolution, extinction, and speciation; and
- Identify past and potential future human-caused effects to global environments and climates.”

Fossil resources vary widely in their relative abundance and distribution and not all are regarded as significant. According to the Bureau of Land Management (BLM) Instructional Memorandum (IM) 2009-011, a “Significant Paleontological Resource” is defined as:

“Any paleontological resource that is considered to be of scientific interest, including most vertebrate fossil remains and traces, and certain rare or unusual invertebrate and plant fossils. A significant paleontological resource is considered to be of scientific interest if it is a rare or previously unknown species, it is of high quality and well-preserved, it preserves a previously unknown anatomical or other characteristic, provides new information about the history of life on earth, or has an identified educational or recreational value. Paleontological resources that may be considered not to have scientific significance include those that lack provenience or context, lack physical integrity due to decay or natural erosion, or that are overly redundant or are otherwise not useful for research. Vertebrate fossil remains and traces include bone, scales, scutes, skin impressions, burrows, tracks, tail drag marks, vertebrate coprolites (feces), gastroliths (stomach stones), or other physical evidence of past vertebrate life or activities” (BLM, 2008).

Vertebrate fossils, whether preserved remains or track ways, are classified as significant by most state and federal agencies and professional groups (and are specifically protected under the California Public Resources



Code). In some cases, fossils of plants or invertebrate animals are also considered significant and can provide important information about ancient local environments.

The full significance of fossil specimens or fossil assemblages cannot be accurately predicted before they are collected, and in many cases, before they are prepared in the laboratory and compared with previously collected fossils. Pre-construction assessment of significance associated with an area or formation must be made based on previous finds, characteristics of the sediments, and other methods that can be used to determine paleoenvironmental and taphonomic conditions.

4.0 LAWS, ORDINANCES, REGULATIONS, AND STANDARDS

This section of the report presents the regulatory requirements pertaining to paleontological resources that apply to this Project.

4.1 State Regulatory Setting

4.1.1 California Environmental Quality Act (CEQA)

The procedures, types of activities, persons, and public agencies required to comply with CEQA are defined in the Guidelines for Implementation of CEQA (State CEQA Guidelines), as amended on March 18, 2010 (Title 14, Section 15000 et seq. of the California Code of Regulations) and further amended January 4th, 2013. One of the questions listed in the CEQA Environmental Checklist is: “Would the project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?” (State CEQA Guidelines Section 15064.5 and Appendix G, Section V, Part C).

4.1.2 State of California Public Resources Code

The State of California Public Resources Code (Chapter 1.7), Sections 5097 and 30244, includes additional state level requirements for the assessment and management of paleontological resources. These statutes require reasonable mitigation of adverse impacts to paleontological resources resulting from development on state lands, and define the excavation, destruction, or removal of paleontological “sites” or “features” from public lands without the express permission of the jurisdictional agency as a misdemeanor. As used in Section 5097, “state lands” refers to lands owned by, or under the jurisdiction of, the state or any state agency. “Public lands” is defined as lands owned by, or under the jurisdiction of, the state, or any city, county, district, authority, or public corporation, or any agency thereof.

4.2 Local Regulatory Setting

4.2.1 Los Angeles County

The Conservation and Natural Resources Element of the County of Los Angeles General Plan (County of Los Angeles, 2015) recognizes paleontological resources as non-renewable and irreplaceable resources that are an important part of the County’s identity. The general plan includes four policies to protect paleontological resources (Goal C/NR 14):

- **Policy C/NR 14.1:** Mitigate all impacts from new development on or adjacent to historic, cultural, and paleontological resources to the greatest extent feasible;
- **Policy C/NR 14.2:** Support an inter-jurisdictional collaborative system that protects and enhances historic, cultural, and paleontological resources;



- **Policy C/NR 14.5:** Promote public awareness of historic, cultural, and paleontological resources; and
- **Policy C/NR 14.6:** Ensure proper notification and recovery processes are carried out for development on or near historic, cultural, and paleontological resources.

4.2.2 City of Los Angeles Guidelines

The City of Los Angeles (City of Los Angeles, 2001), in Section 3 of the Conservation Element of the General Plan, requires that measures be taken to protect the City's archaeological and paleontological resources for historical, cultural, research and/or educational purposes. One policy and one program support this requirement. This policy requires that the City continue to identify and protect significant archaeological and paleontological sites and/or resources known to exist or that are identified during land development, demolition or property modification activities.

5.0 METHODS

This paleontological analysis of existing data included a geologic map review, a literature search, and a museum record search. The analysis of existing data was supplemented with a pedestrian field survey. The goal of this report is to evaluate the paleontological potential of the Project area and make recommendations for the mitigation of adverse impacts on paleontological resources that may occur as a result of Project construction. Joey Raum, B.S., performed the background research and co-authored this report with Courtney Richards, M.S. Courtney Richards, M.S., performed the technical review of this report. GIS maps were prepared by Barbara Webster, M.S. Geraldine Aron, M.S., and Courtney Richards, M.S., oversaw all aspects of the Project as the Project Manager and Paleontological Principal Investigator, respectively.

Paleo Solutions will retain an archival copy of all Project information including field notes, maps, and other data.

5.1 Analysis of Existing Data

Paleo Solutions reviewed geologic mapping of the Project area by T.W. Dibblee and E.H. Ehrenspeck (1991). The literature reviewed included published and unpublished scientific papers. A paleontological museum record search was conducted at the LACM. Samuel McLeod, Ph.D., performed the LACM search. The results of the museum record search (dated December 7, 2016) are attached as Appendix A. Additional record searches of online databases were completed by Paleo Solutions staff.

5.2 Field Survey

The field survey was conducted by Paleo Solutions staff member Joey Raum, B.S., on February 5, 2018. The paleontological field survey was performed in order to inspect the Project area for the presence of surface fossils and to evaluate the Project area for the likelihood of subsurface fossil occurrences. The survey was completed after a review of aerial photographs indicated the survey sections were within areas of exposed sediment. The pedestrian survey included thorough inspection of potentially fossiliferous bedrock exposures and surficial deposits occurring within the Project area. Sediment exposures as well as the surrounding areas were photographed and documented. Reference points were acquired using a Trimble GPS unit. Sediment lithologies were recorded and analyzed and used to better interpret the Project's paleontological sensitivity, and thus better understand the Project's potential impact.



5.3 Criteria for Evaluating Paleontological Potential

The PFYC system was developed by the BLM (BLM, 2016). Because of its demonstrated usefulness as a resource management tool, the PFYC has been utilized for many years for projects across the country, regardless of land ownership. It is a predictive resource management tool that classifies geologic units on their likelihood to contain paleontological resources on a scale of 1 (very low potential) to 5 (very high potential). This system is intended to aid in predicting, assessing, and mitigating paleontological resources. The PFYC ranking system is summarized in Table 2.

Table 2. Potential Fossil Yield Classification (BLM, 2016)

BLM PFYC Designation	Assignment Criteria Guidelines and Management Summary (PFYC System)
1 = Very Low Potential	Geologic units are not likely to contain recognizable paleontological resources.
	Units are igneous or metamorphic, excluding air-fall and reworked volcanic ash units.
	Units are Precambrian in age.
	Management concern is usually negligible, and impact mitigation is unnecessary except in rare or isolated circumstances.
2 = Low	Geologic units are not likely to contain paleontological resources.
	Field surveys have verified that significant paleontological resources are not present or are very rare.
	Units are generally younger than 10,000 years before present.
	Recent eolian deposits
	Sediments exhibit significant physical and chemical changes (i.e., diagenetic alteration) that make fossil preservation unlikely
	Management concern is generally low, and impact mitigation is usually unnecessary except in occasional or isolated circumstances.
3 = Moderate Potential	Sedimentary geologic units where fossil content varies in significance, abundance, and predictable occurrence.
	Marine in origin with sporadic known occurrences of paleontological resources.
	Paleontological resources may occur intermittently, but these occurrences are widely scattered
	The potential for authorized land use to impact a significant paleontological resource is known to be low-to-moderate.
	Management concerns are moderate. Management options could include record searches, pre-disturbance surveys, monitoring, mitigation, or avoidance. Opportunities may exist for hobby collecting. Surface-disturbing activities may require sufficient assessment to determine whether significant paleontological resources occur in the area of a proposed action and whether the action could affect the paleontological resources.
4 = High Potential	Geologic units that are known to contain a high occurrence of paleontological resources.
	Significant paleontological resources have been documented but may vary in occurrence and predictability.
	Surface-disturbing activities may adversely affect paleontological resources.
	Rare or uncommon fossils, including nonvertebrate (such as soft body preservation) or unusual plant fossils, may be present.
	Illegal collecting activities may impact some areas.
	Management concern is moderate to high depending on the proposed action. A field survey by a qualified paleontologist is often needed to assess local conditions. On-site monitoring or spot-checking may be necessary during land disturbing activities. Avoidance of known paleontological resources may be necessary.
5 = Very High Potential	Highly fossiliferous geologic units that consistently and predictably produce significant paleontological resources.



BLM PFYC Designation	Assignment Criteria Guidelines and Management Summary (PFYC System)
	Significant paleontological resources have been documented and occur consistently Paleontological resources are highly susceptible to adverse impacts from surface disturbing activities. Unit is frequently the focus of illegal collecting activities. Management concern is high to very high. A field survey by a qualified paleontologist is almost always needed and on-site monitoring may be necessary during land use activities. Avoidance or resource preservation through controlled access, designation of areas of avoidance, or special management designations should be considered.
U = Unknown	Geologic units that cannot receive an informed PFYC assignment Geological units may exhibit features or preservational conditions that suggest significant paleontological resources could be present, but little information about the actual paleontological resources of the unit or area is unknown. Geologic units represented on a map are based on lithologic character or basis of origin, but have not been studied in detail. Scientific literature does not exist or does not reveal the nature of paleontological resources. Reports of paleontological resources are anecdotal or have not been verified. Area or geologic unit is poorly or under-studied. BLM staff has not yet been able to assess the nature of the geologic unit. Until a provisional assignment is made, geologic units with unknown potential have medium to high management concerns. Field surveys are normally necessary, especially prior to authorizing a ground-disturbing activity.

6.0 ANALYSIS OF EXISTING DATA RESULTS

Prior to marine deposition starting during the Miocene Epoch, the western margin of what is now the United States was an active plate margin, comprised of the Farallon Plate subducting under the North American Plate during the Jurassic and Cretaceous periods. As the Farallon Plate was drawn under the North American Plate, portions of the sea floor were accreted onto the margin of the North American Plate. As subduction slowed and the oceans receded and advanced between Cretaceous and Oligocene times, both terrestrial and oceanic sediments were deposited in what is now known as Los Angeles. Beginning in the middle to late Oligocene, active subduction of the Farallon Plate began to cease, and the San Andreas Fault began to form. This changed the character of motions and uplifts in the Los Angeles area and led to significant faulting in the area as stresses changed on the rocks. Finally, from the Oligocene to the Holocene, the San Andreas Fault became the dominant tectonic regime we know today, and the depositional regime changed from mainly oceanic to almost exclusively terrestrial (Norris and Webb, 1976; Stoffer, 2002).

The Project area is situated in the eastern Santa Monica Mountains within the Transverse Ranges geomorphic province, which is characterized by east-west trending mountain ranges and valleys. The Santa Monica Mountains form the southwestern portion of the Transverse Ranges and comprise a relatively low, west trending coastal range that is approximately 80-kilometers-long and extends from the Oxnard Plain in the west to the Los Angeles River in the east. The mountain range is roughly 5 to 16 kilometers wide and is bounded on the south by the east trending Malibu Coast and Santa Monica Fault Zone and on the north by the Oxnard Plain, Simi Hills, and San Fernando Valley (Dibblee, 1987; Yerkes and Campbell; 1979). The Santa Monica Mountains were uplifted into a broad anticline as a result of plate interactions along the Santa Monica Fault Zone and have undergone faulting, intrusion of igneous sills and dikes, and bisection by the water flow through the Malibu Canyon (Dibblee, 1987; Yerkes and Campbell; 1979). The basement rocks consist of granite, granodiorite, and slate, which are exposed in the eastern part of the range, and are overlain by upper Cretaceous and lower Tertiary marine clastic deposits, which are exposed in the Simi Hills. These



units are unconformably overlain by westward thickening Oligocene to Miocene sequences including the Sespe Formation, Topanga Formation, Conejo Volcanics, and Monterey Formation.

6.1 Literature Review

Geologic mapping by Dibblee and Ehrenspeck (1991) indicates that the Project is underlain by Miocene Monterey Formation and Quaternary young alluvium. Within a half-mile buffer surrounding the Project center, Miocene unnamed marine shale and Quaternary landslide debris deposits are mapped. These units lie stratigraphically above Monterey Formation in the Project vicinity and therefore are unlikely to be impacted during earthmoving activities, and therefore are not included in this analysis. The paleontological potential of each geologic unit potentially impacted by ground-disturbing activities are discussed below. The geographic distributions of the geologic units in the Project area, as mapped by Dibblee and Ehrenspeck (1991), are illustrated in Figure 3.

6.1.1 Monterey Formation – Miocene

The Monterey Formation is a discontinuous belt of fine-grained, siliceous sediments that extend from northern California to southern California, as well as offshore and onto the Channel Islands (Behl, 1999). The type locality for the formation is located in the region east of Monterey, and it was originally described by Blake (1856). The sediments were deposited during the middle to late Miocene (approximately five million years ago) in deep marine environments along the North American Plate boundary. Monterey Formation rocks record, in part, the transition of the California margin from a convergent to a transform setting (Behl, 1999). Specifically, the Monterey Formation sediments accumulated in the extensional rift basins that formed along the continental margin as the San Andreas Fault was forming and lengthening (Behl, 1999). The rocks in this geographically and temporally extensive formation, although variable in lithology and thickness, generally comprise one or more of the following rock types: diatomite, diatomaceous and siliceous mudrocks, porcelanite, chert, calcareous and phosphatic mudrocks, dolostone, and limestone (Bramlette, 1946).

The Monterey Formation within the Project area includes both sandstone and shale units. The sandstone unit is mapped on the majority of the Project area and consists of tan to gray, semi-friable bedded sandstone that is locally interbedded with the shale unit (Dibblee and Ehrenspeck, 1991; Figure 3). Mapped at the northwestern most corner of the Project area is the shale unit, which consists of dark brown, white weathering, moderately hard to brittle, porcelaneous, cherty, thin bedded, platy siliceous shale (Dibblee and Ehrenspeck, 1991; Figure 3).

The Monterey Formation contains abundant fossilized foraminifera as well as larger invertebrate and vertebrate fossils, particularly mollusks and fish, respectively (Bramlette, 1946). Fish remains are common in both diatomaceous and harder siliceous beds and recorded specimens include bony fish (*Ganohytes cameo*, Osteichthyes), rock bass (*Paralabrax*), ray-finned fish (*Oligodiodon vetus*), and herring (*Xyne grex*) (Bramlette, 1946; University of California Museum of Paleontology [UCMP], 2018). Larger vertebrate fossils are less common and include remains of turtle (Dermochelyidae), booby (*Palaeosula stocktoni*), ray (*Myliobatis*), white shark (*Isurus bastalis*), hook tooth mako shark (*Isurus planus*), requiem shark (*Galeocerdo aduncus*, *Carcharhinus*), eared seal (*Allodesmus kernensis*, Otariidae), whale (*Plesiocetus occidentalis*, *Kampholophos serrulus*, Physeteridae), sea cow (*Dusisren jordani*, Sirenia), and porpoise (*Salumiphocaena stocktoni*, *Loxolithax stocktoni*) (UCMP, 2018). The Monterey Formation in Los Angeles County has produced vertebrate fossils of booby (*Palaeosula stocktoni*), whale (Cetacea and Physeteridae), porpoise (*Salumiphocaena stocktoni* and *Loxolithax stocktoni*), and hippopotamus-like creature (*Desmostylus hesperus*) (Table 3; UCMP, 2018). The Santa Monica Mountains National Recreation Area, part of which is located east of and within a half-mile radius of the Project area, contains abundant fish fossils preserved in Miocene-age sediments such as the Monterey Formation. These deposits have yielded 7 genera of shark (Chondrichthyes) and 41 genera of bony fish (Osteichthyes), and specimens include scales, skeletons, and teeth, often representing mass death assemblages (Hunt et al., 2006;



Table 3). The area east of the Project, known as Fossil Ridge Park, has produced numerous fish fossils, which are thought to be remains of one of these mass death assemblages.

Also recorded from the Monterey Formation in California are invertebrates such as mollusks, echinoids, annelids, and crustaceans. Specimens include sand dollar (*Echinarachnius brewerianus*, *Astrodapsis cuyamanus*, *A. perrini*, *A. schencki*, and *Scutella merriami*), gastropod (*Turritella chaneyi*, *T. pachecoensis*, and *Brackysphingus liratus*), bivalve (*Spisula albaria*, *S. catilliformis*, *Anadara obispoana*, *A. montereyana*, *Meretrix meretrix*, *Delectopecten peckhami*, *Scapharca obispensis*, *Lucinoma aequizonata*, *Tellina cryphia*, and *Vesicomidae*), fanworm (*Pectinaria*), and soft body crab (Pinnotheriidae) (UCMP, 2018; Table 3). Mollusks are generally more common in the diatomaceous units and rare in the siliceous beds, where they are only represented by *Arca* and Pectinidae (Bramlette, 1946; Table 3). Additional recorded fossils include terrestrial plant material, horse teeth, and a dog skull (Bramlette, 1946; Table 3). The Monterey Formation has a very high paleontological potential (PFYC 5).

6.1.2 Quaternary Young Alluvium – Holocene

Quaternary young alluvium is Holocene-age (less than 11,000 years old) and consists of variable compositions of gravel, sand, silt, and clay derived from uplift of the Santa Monica Mountains and deposited in streams and channels (Dibblee and Ehrenspeck, 1991). These deposits are mapped in the low lying valleys of the Project vicinity and occur along the eastern boundary of the Project area (Dibblee and Ehrenspeck, 1991; Figure 3). Sediments are typically too young to contain fossilized material (Society of Vertebrate Paleontology [SVP], 2010), but they may overlie older (e.g., Miocene-age) more paleontologically sensitive deposits at depth. Quaternary young alluvium has a low paleontological potential (PFYC 2).

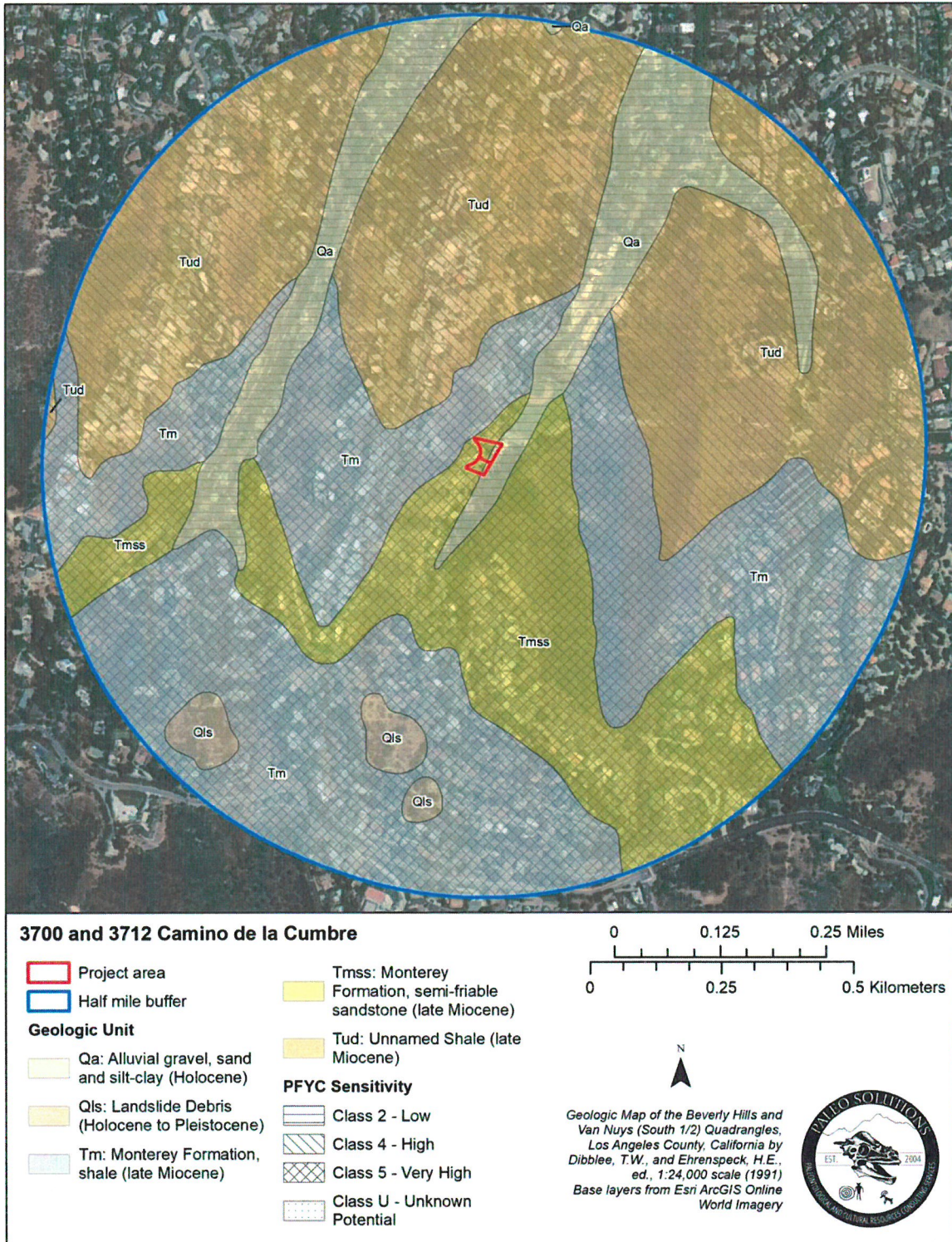


Figure 3. Project Geologic Map.



6.2 Paleontological Record Search Results

A paleontological search of records maintained by LACM was completed on December 7, 2016. The museum reported that there is one vertebrate fossil locality (LACM 7285) recorded either within or adjacent to the Project area that produced fossil bonito shark (*Isurus hastalis*) and snake mackerel (*Thyrsoctes kriegeri*) (McLeod, 2016; Table 3). Additionally, there are numerous fossil localities adjacent to the Project area that have been recorded from the same sedimentary deposits that occur within the Project area. Locality LACM 7955 is located immediately northeast of the Project area along Stansbury Avenue; locality LACM (CIT) 387 is located further northeast of the Project area along Hollyline Avenue; locality LACM 5435 is located south of the Project area near Glorietta Drive; locality LACM 1894 is located southwest of the Project area along Deervale Drive; locality LACM (CIT) 381 is located southwest of the Project area along Oakfield Drive; and localities LACM 4176 and 7045 are both located west of the Project area between Beverly Ridge Drive and Oakfield Drive. These localities collectively produced a composite fossil fauna of primarily bony fish including needlefish (Belonidae), herring (*Ganohytes cameo* and *Xyne grex*), cod (*Eclipes*), mora (Moridae), lanternfish (*Lampanyctus bolini* and *Lampanyctus petrolifer*), jack (*Decapterus agilis*), mackerel and tuna (*Sarda stocki* and *Scomber*), prowfish (*Araeosteus rothi*), flounder (Pleuronectiforme), deep sea smelt (*Bathylagus angelensis* and *Quaesita angelensis*), viperfish (*Chauliodus eximius*), bristlemouth (*Cyclothone solitudinus*), hatchetfish (*Argyropelecus bullockii*), pipefish and seahorse (*Syngnathus avus*) (McLeod, 2016; Table 3). Furthermore, locality LACM (CIT) 326, located west of the Project area between Beverly Ridge Drive and Oakfield Drive, produced an assemblage including the fish holotypes (name-bearing specimens for species new to science) of the lanternfish *Lampanyctus bolini* and *Lampanyctus petrolifer*, the viperfish *Chauliodus barbatus*, and the pipefish *Hipposyngnathus imperator* (McLeod, 2016; Table 3).

Table 3. Museum Record and Literature Search Results Summary

Locality Number	Geologic Unit	Common Name	Scientific Name	Location	Source
Not Reported	Monterey Formation (Miocene)	fish horse dog	- - -	Not Reported	Bramlette, 1946
UCMP V69176	Monterey Formation (Miocene)	whale	Cetacea	Los Angeles County	UCMP, 2018
UCMP V36118	Monterey Formation (Miocene)	booby porpoise porpoise whale	<i>Palaeosula stocktoni</i> <i>Salmiphocaena stocktoni</i> <i>Loxolithax stocktoni</i> Physeteridae	Los Angeles County	UCMP, 2018
UCMP V6848	Monterey Formation (Miocene)	hippopotamus-like creature	<i>Desmostylus hesperus</i>	Los Angeles County	UCMP, 2018
Not Reported	Monterey Formation (Miocene)	bony fish bony fish rock bass ray-finned fish herring turtle booby ray white shark hook tooth mako shark requiem shark requiem shark eared seal eared seal	<i>Ganohytes cameo</i> Osteichthyes <i>Paralabrax</i> <i>Oligodiodon vetus</i> <i>Xyne grex</i> Dermochelyidae <i>Palaeosula stocktoni</i> <i>Myliobatis</i> <i>Isurus hastalis</i> <i>Isurus planus</i> <i>Galeocerdo aduncus</i> <i>Carcharhinus</i> <i>Allodesmus kernensis</i> Otariidae	California	UMCP, 2018



Locality Number	Geologic Unit	Common Name	Scientific Name	Location	Source
		whale whale whale sea cow sea cow porpoise porpoise	<i>Plesiocetus occidentalis</i> <i>Kampholophos serrulus</i> Physeteridae <i>Dusisren jordani</i> Sirenia <i>Salumiphocaena stocktoni</i> <i>Loxolithax stocktoni</i>		
Not Reported	Monterey Formation (Miocene)	sand dollar sand dollar sand dollar sand dollar sand dollar gastropod gastropod gastropod bivalve bivalve bivalve bivalve bivalve bivalve bivalve bivalve bivalve bivalve bivalve scallop fanworm soft body crab	<i>Echinarachnius brewerianus</i> <i>Astrodapsis cuyamanus</i> <i>Astrodapsis perrini</i> <i>Astrodapsis schencki</i> <i>Scutella merriami</i> <i>Turritella chaneyi</i> <i>Turritella pachecoensis</i> <i>Brachysphingus liratus</i> <i>Spisula albaria</i> <i>Spisula catilliformis</i> <i>Anadara obispoana</i> <i>Anadara montereyana</i> <i>Meretrix meretrix</i> <i>Delectopecten peckhami</i> <i>Scapharca obispensis</i> <i>Lucinoma aequizonata</i> <i>Tellina cryphia</i> <i>Arca</i> Vesicomidae Pectinidae <i>Pectinaria</i> Pinnotheriidae	California	Bramlette, 1946; UCMP, 2018
Not Reported	Monterey Formation (Miocene)	bony fish shark	Osteichthyes Chondrichthyes	Santa Monica Mountains National Recreation Area	Hunt et. al, 2006
LACM 7285	Monterey Formation (Miocene)	bonito shark snake mackerel	<i>Isurus bastalis</i> <i>Thyrsocles kriegeri</i>	Within or adjacent to the Project area	McLeod, 2016
LACM (CIT) 326	Monterey Formation (Miocene)	lanternfish lanternfish viperfish pipefish	<i>Lampanyctus bolini</i> <i>Lampanyctus petrolifer</i> <i>Chauliodus barbatus</i> <i>Hipposyngnathus imperator</i>	West of Project area between Beverly Ridge Drive and Oakfield Drive	McLeod, 2016
LACM 7955, (CIT) 387, 5435, 1894, (CIT) 381, 4176, 7045	Monterey Formation (Miocene)	needlefish herring herring cod mora	Belonidae <i>Ganolytes cameo</i> <i>Xyne grex</i> <i>Eclipes</i> Moridae	Within 1/2 mile radius of Project area	McLeod, 2016



Locality Number	Geologic Unit	Common Name	Scientific Name	Location	Source
		jack	<i>Decapterus agilis</i>		
		mackerel and tuna	<i>Sarda stocki</i>		
		mackerel and tuna	<i>Scomber</i>		
		prowfish	<i>Araeosteus rothi</i>		
		flounder	Pleuronectiforme		
		deep sea smelt	<i>Bathylagus angelensis</i>		
		deep sea smelt	<i>Quaesita angelensis</i>		
		viperfish	<i>Chauliodus eximius</i>		
		bristlemouth	<i>Cyclothone solitudinus</i>		
		hatchetfish	<i>Argyropelecus bullockii</i>		
		pipefish and seahorse	<i>Syngnathus avus</i>		

7.0 FIELD SURVEY

The field survey was conducted on February 5, 2018 by Joey Raum, B.S., and involved inspection of the entire Project area with the purpose of recording any paleontological resources that may be exposed at the surface and also interpreting the paleontological sensitivity of the geologic units that occur within the Project area. The survey focus included inspecting areas of the Project that contain native sediment outcrops of geologic units with very high sensitivities.

The Project area is situated on the eastern slope of a moderate relief northern trending elongated hill that is incised by predominantly east-southeast trending drainages that terminate at the relatively flatter and low lying valley floor located to the east. Vegetation on the slope consists of desert grasses, shrubs, and small trees. The Project area is covered in a blanket of grass and a moderately dense thicket of small trees (Figures 5, 6, 7, 8, and 20). The western portion immediately east of Camino de la Cumbre Road is relatively steep, and the terrain becomes more gentle and modest towards the central and eastern portions. At the eastern boundary, brush is thicker and the terrain steepens down into the valley area, which has a moderately to heavily dense blanket of trees (Figures 7 and 8).

Disturbances in the Project area consist of an existing paved road (i.e., Camino de la Cumbre Road), guardrails, electrical and telecommunication distribution poles, trash and debris piles, and a chain link fence along the northern property boundary (Figures 4, 5, 6, and 9). The areas surrounding the Project area, including the adjacent ridgeline to the west, the valley to the east, and the areas along Camino de la Cumbre Road to the north and south, are all more developed. The ridgeline contains a paved road (i.e., Beverly Ridge Drive), houses, and electrical and telecommunication distribution poles. The valley floor contains a paved road (i.e., Stansbury Avenue), paved parking lots, houses, buildings, several park facilities such as courts and fields, and electrical and telecommunication distribution poles. The areas along Camino de la Cumbre Road to the north and south of the Project area contain several houses in addition to the paved road, guardrails, and distribution poles.



Figure 4. Overview of Camino de la Cumbre Road and western limit of Project area. View southeast.



Figure 5. Overview of Project area and adjacent valley floor from northwestern boundary. View southeast.



Figure 6. Overview of western boundary of Project area. Camino de la Cumbre road shown. View south.



Figure 7. Edge of the central portion of the Project area which has relatively gentle relief. The terrain steepens down to the east and up to the west. View south.



Figure 8. Eastern boundary of the Project area. Vegetation becomes denser and the terrain steepens down into the valley located to the east. View southeast.



Figure 9. Northwestern boundary of the Project area. Camino de la Cumbre Road, debris pile, and property fence shown. View north.



7.1 Geology

Sedimentary deposits are exposed in nearly vertical cuts along the western side of the road (adjacent to the Project area) where earthmoving associated with road grading has occurred (Figures 16 through 19). Native exposures of bedrock are also exposed on the western portion of the Project area, immediately east of Camino de la Cumbre Road. The sediments exposed on the Project area are confined to the western portion of the 3700 property along a relatively steep embankment immediately east of and below the guardrail (Figures 10 through 15). These two on-site outcrops are approximately six to nine feet thick where exposed and consist of sandstone and mudstone or shale of the Monterey Formation (Figures 12, 14, 15, and 19). Bedding planes are oriented approximately 270 degrees and dip approximately 10 to 20 degrees north. Bedding is well defined, rhythmic, and thick (~0.5 to 5 centimeters). The sandstone units consist of pale olive-green, olive-brown, to orange-brown colored, very well sorted, well lithified, fine-grained sand with very thin laminations and red colored oxidation bands (Figure 19). The shale units consist of buff, tan, to light brown colored, very well sorted, soft to well lithified and moderately porcelaneous, very fine-grained mudstone. The remaining Project area surface consists of loosely deposited sediments and weathered bedrock detritus that has eroded down slope (Figures 20 and 21). The thickness of this surficial layer could not be ascertained from the field survey.



Figure 10. Monterey Formation sediments exposed on the slope of western portion of the Project area. View west.



Figure 11. Monterey Formation sediments exposed on the slope of western portion of the Project area. View west.



Figure 12. Monterey Formation sediments exposed on the slope of western portion of the Project area. View west.



Figure 13. Monterey Formation sediments exposed on the slope of western portion of the Project area. View west.



Figure 14. Monterey Formation sediments exposed on the slope of western portion of the Project area. View west.



Figure 15. Monterey Formation sediments exposed on the slope of western portion of the Project area. View west.

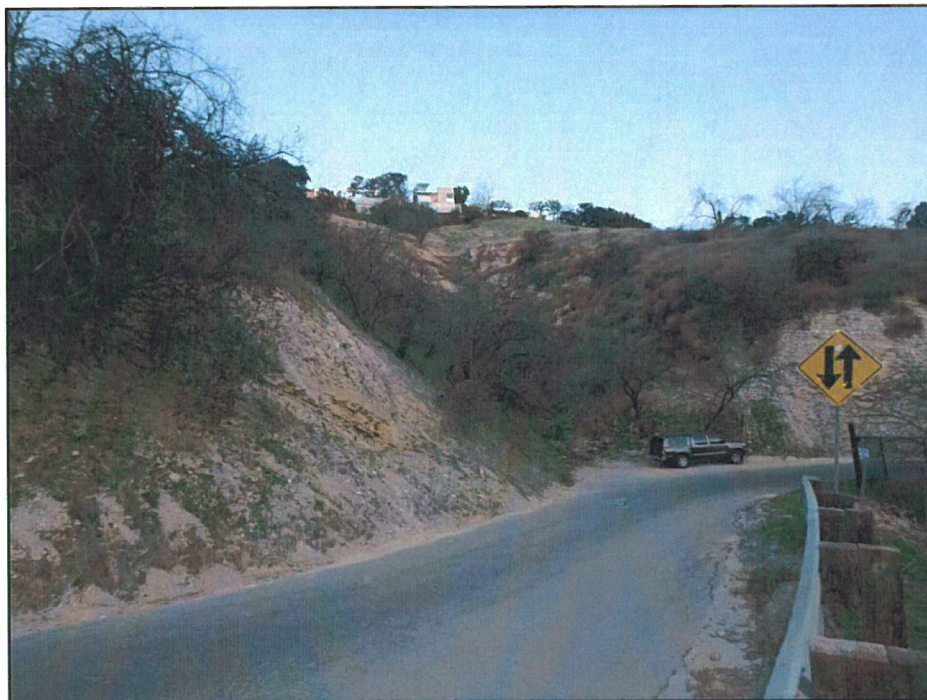


Figure 16. Overview of Camino de la Cumbre Road and adjacent Monterey Formation outcrops. View northwest.



Figure 17. Monterey Formation sandstone and shale units observed immediately west of the Project area along a road cut exposure. View northwest.



Figure 18. Monterey Formation sandstone unit observed immediately west of the Project area along a road cut exposure. View west.



Figure 19. Monterey Formation sandstone unit observed immediately west of the Project area along a road cut exposure. View west.



Figure 20. Loosely deposits surficial sediments consisting of weathered bedrock detritus that has eroded down slope. View south.



Figure 21. Loosely deposits surficial sediments consisting of weathered bedrock detritus that has eroded down slope. View west.

7.2 Paleontology

Several fossilized fish scales and very poorly preserved fish bones were discovered within clasts of Monterey Formation shale on the southern property (3700 Camino de la Cumbre) of the Project area. These fossils were discovered along the eastern-facing slope approximately 15 feet below the guardrail. The fossils are preserved on the surfaces of the sheet-like layers of the shale. Fish scales appear as small (< 0.5 centimeters), red colored, glossy, amorphous globules (Figure 22; Table 4). The bones are also small (~1 centimeter), red colored, and glossy and consist of very deformed vertebrae (Figure 23; Table 4). These fossils were documented but not collected, and are considered to be non-significant since they are poorly preserved and contain no diagnostic features. However, their presence within the rock suggests that these sediments have favorable fossilization potential, and that more scientifically significant specimens may be harbored within.

Table 4. Summary of Field Survey Fossil Localities

Field Locality Number	Formation	Taxa	Common Name	Location Found	Significance	Collected? Yes or No
F180205-16-01	Monterey Formation	Osteichthyes undet.	fish	3700 Camino de la Cumbre (southwestern Project area)	Non-significant	No

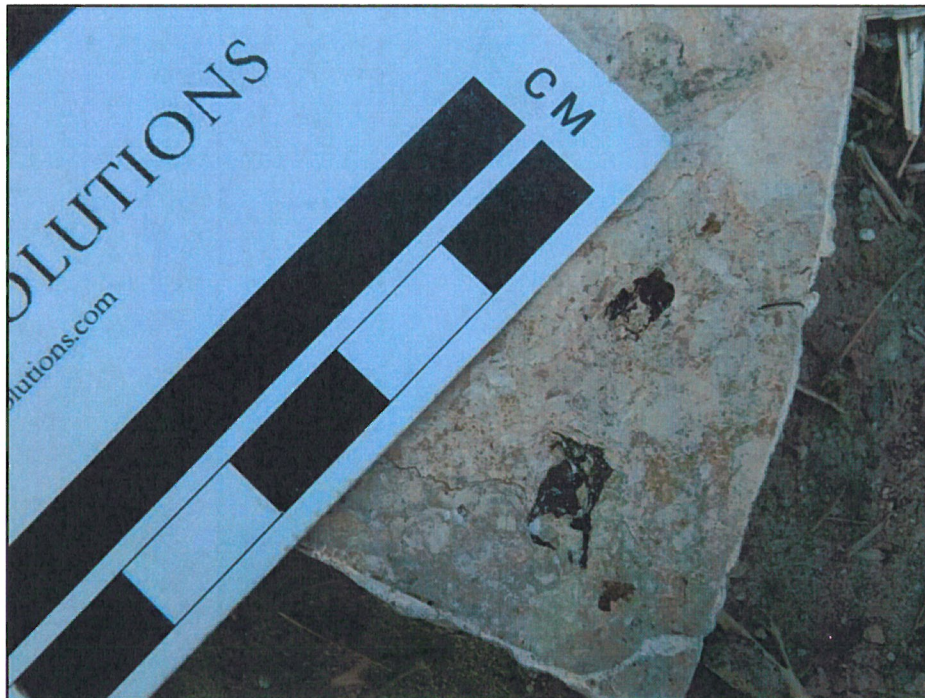


Figure 22. Poorly preserved fish scales discovered in Monterey Formation shale on the 3700 property of the Project area. Fossil locality F180205-16-01. View down.

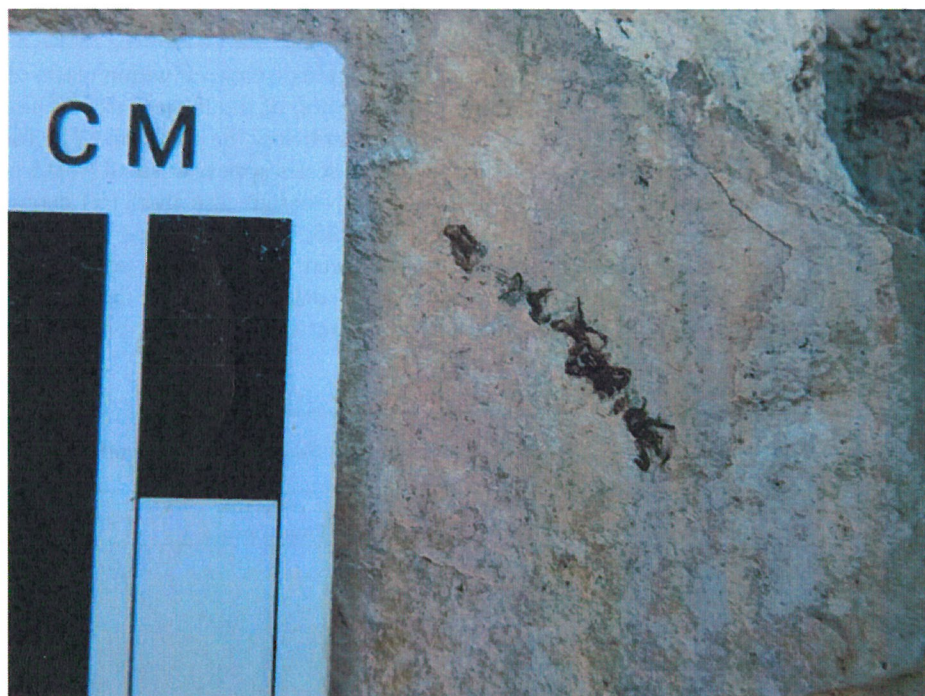


Figure 23. Poorly preserved fish bones discovered in Monterey Formation shale on the 3700 property of the Project area. Fossil locality F180205-16-01. View down.



8.0 IMPACTS ON PALEONTOLOGICAL RESOURCES

Impacts on paleontological resources can generally be classified as either direct, indirect or cumulative. Direct adverse impacts on surface or subsurface paleontological resources are the result of destruction by breakage and crushing as the result of surface disturbing actions including construction excavations. In areas that contain paleontologically sensitive geologic units, ground disturbance has the potential to adversely impact surface and subsurface paleontological resources of scientific importance. Without mitigation, these fossils and the paleontological data they could provide if properly recovered and documented, could be adversely impacted (damaged or destroyed), rendering them permanently unavailable to science and society.

Indirect impacts typically include those effects which result from the continuing implementation of management decisions and resulting activities, including normal ongoing operations of facilities constructed within a given project area. They also occur as the result of the construction of new roads and trails in areas that were previously less accessible. This increases public access and therefore increases the likelihood of the loss of paleontological resources through vandalism and unlawful collecting. Human activities that increase erosion also cause indirect impacts to surface and subsurface fossils as the result of exposure, transport, weathering, and reburial.

Cumulative impacts can result from incrementally minor but collectively significant actions taking place over a period of time. The incremental loss of paleontological resources over time as a result construction-related surface disturbance or vandalism and unlawful collection would represent a significant cumulative adverse impact because it would result in the destruction of non-renewable paleontological resources and the associated irretrievable loss of scientific information.

Excavations in the Project area that impact Miocene Monterey Formation, either at the surface or at depth beneath previously disturbed sediments, artificial fill, or Quaternary younger alluvium may well result in an adverse direct impact on scientifically important paleontological resources. Excavations entirely within previously disturbed sediments, artificial fill, or younger Quaternary deposits are unlikely to uncover significant fossil vertebrate remains; furthermore, any recovered resources from previously disturbed sediments or artificial fill will lack stratigraphic context. However, younger deposits may shallowly overlie older *in situ* sedimentary deposits.

Therefore, grading and other earthmoving activities may potentially result in significant adverse direct impacts to paleontological resources throughout the entirety of the Project area.

9.0 CONCLUSIONS

The results of the analysis of existing data and field survey indicates that Project construction will impact high paleontological potential Monterey Formation. Additionally, the field survey resulted in the recordation of one new fossil locality, which consists of fossilized fish scales and bones (see Section 7.2 and Table 4). These fossils were determined to be non-significant and were not collected due to their poor preservation and lack of diagnostic features. However, their presence is indicative of the high fossilization potential of the sediments underlying the Project area.

Due to the prevalence of very high paleontological potential of the geologic units within the Project area, mitigation of potential adverse impacts resulting from construction-related ground disturbance is recommended for excavations impacting Miocene Monterey Formation (PFYC 5). Full time monitoring is recommended for all excavations impacting Monterey Formation (PFYC 5). Areas mapped as Quaternary young alluvium (PFYC 2) should be spot-checked during excavations that exceed depths of 5 feet to check



for underlying, paleontologically sensitive Monterey Formation deposits. If Monterey Formation deposits are observed, full time monitoring should be implemented in those areas. If it is determined that only Quaternary young alluvial deposits (PFYC 2) or previously disturbed sediments (PFYC 2) are impacted, the monitoring program should be reduced or suspended. Any subsurface bones or potential fossils that are unearthed during construction should be evaluated by a Qualified Paleontologist. Proposed paleontological monitoring and mitigation measures are provided in Section 10 of this report.

10.0 PALEONTOLOGICAL RESOURCES MONITORING AND MITIGATION RECOMMENDATIONS

Mitigation measures should be in place prior to the initiation of this Project. Below are measures that when implemented would reduce impacts to paleontological resources to a less than significant level:

- **Retain a Qualified Paleontologist to oversee all paleontological mitigation.**
 - The Qualified Paleontologist must obtain a curation agreement with the Natural History Museum of Los Angeles County, or other approved repository, prior to that start of construction.
- **Conduct paleontological resources worker environmental awareness training prior to the commencement of ground disturbance.**
 - Verification of training will be provided to the City of Los Angeles Planning Department in the form of a signature sheet.
- **Implement procedures and recommendations for redirection of work should an unanticipated resource be located.**
 - The monitor will immediately notify the equipment operator and/or site project manager to stop work and mark the area with flagging until the discovery can be fully explored and evaluated.
 - The paleontological monitor shall notify the construction manager and Qualified Paleontologist, who will in turn notify Farrell Atlassi.
 - If a discovery is made by the crew when a paleontological monitor is not on-site, work will be temporarily halted within a 25-foot radius of the discovery until a Qualified Paleontologist has evaluated the find.
 - Appropriate salvage measures will be developed by the Qualified Paleontologist.
 - Work may not resume in the discovery area until it has been authorized by the Qualified Paleontologist.
- **Implement paleontological monitoring in areas of high paleontological sensitivity.**
 - All monitoring personnel will have a minimum of a Bachelor's degree in geology, paleontology, or related field; and all work will be conducted under the direction of the Qualified Paleontologist.
 - Trenching and excavating will be monitored full time when native sediments of the Monterey Formation are impacted.
 - Areas mapped as Quaternary young alluvium should be spot-checked during excavations that exceed depths of 5 feet to check for underlying, paleontologically sensitive Monterey Formation deposits. If Monterey Formation deposits are observed, full time monitoring should be implemented in those areas.
 - Monitoring of trenching and excavation determined to be entirely within Quaternary young alluvium and artificial fill is not recommended since these sediments are considered too young to contain *in-situ* significant paleontological resources and lack context, respectively. If it is determined that only Quaternary young alluvial deposits or previously disturbed sediments are impacted, the monitoring program should be reduced



or suspended at the discretion of the Qualified Paleontologist, in consultation with Farrell Atlassi and the City of Los Angeles Planning Department.

- Drilling will be monitored full time when native sediments of the Monterey Formation are impacted, and the drilling diameter is equal to or exceeds 36 inches.
- **Recover, prepare, and curate any significant paleontological resources.**
 - If a fossil discovery is made by the paleontological monitor, it must be quickly and professionally explored and evaluated in order to minimize construction delays.
 - If a discovery is determined to be potentially significant, additional paleontologists should be brought in to assist with the recovery as needed. Fossil recoveries may consist of the relatively rapid removal of small isolated fossils from an active cut, to hand-quarrying of larger fossils over several hours, to excavations of large fossils or large numbers of smaller fossils from a bone bed over several days. The duration of each excavation is determined by the size, preservation, and number of fossils at each locality, and all excavations must be carried out in consultation with the site project manager.
 - At each paleontological locality (regardless of significance), data recorded will minimally include the field number, date of discovery, date of collection (if applicable), geographic coordinates, elevation, formation, stratigraphic provenance, lithologic description of sediment that produced the fossil(s), type(s) of fossils and types(s) of element(s), taphonomic and paleoenvironmental interpretations, associations with other fossils, photograph(s), and collector(s).
 - Matrix samples may be collected if there is evidence that significant vertebrate, invertebrate, plant, or trace microfossils may be present. These samples will be screenwashed and picked in a paleontological laboratory.
 - The size of the sample should be based on the extent of the fossil-bearing horizon or deposit, however, per SVP guidelines (2010), the sample size shall not exceed 6,000 pounds.
 - All recovered fossils and matrix samples must be properly labeled prior to removal from the locality where they were discovered.
 - All recovered fossil will be prepared to the point of identification and curation, inventoried, and identified to taxon and element by a technical specialist, as necessary.
 - If significant paleontological resources are recovered, they will be curated at the Natural History Museum of Los Angeles County, or other approved repository. The Project owner will be responsible for the payment of any curation fee charged by the paleontological repository
 - Any recovered fossils found to be non-significant once they have been partially prepared in the laboratory should be either discarded or retained for educational purposes.
- **Prepare a final paleontological monitoring report, summarizing the results of the mitigation program implemented for the Project.**
 - Upon conclusion of ground-disturbing activities, a paleontological monitoring report shall be prepared that is consistent with discipline guidelines. It will include at a minimum the dates of field work, results of monitoring, fossil analyses, significance evaluation, conclusions, locality forms, and an itemized list of specimens. The report will be submitted to Farrell Atlassi and the City of Los Angeles Planning Department.



REFERENCES

- Blake, W.P. 1856. Notice of remarkable strata containing the remains of Infusoria and Polythalmis in the Tertiary formation of Monterey, California: Philadelphia Acad. Nat. Science, Proc., v. 7, 328-331 p.
- Behl, R.J. 1999. "Since Bramlette (1946): The Miocene Monterey Formation of California revisited." *Classic Cordilleran Concepts: A View from California: Geological Society of America, Special Paper 338*: 301-313 p.
- Bramlette, M.N. 1946. The Monterey Formation of California and the origin of its siliceous rocks, U.S. Geological Survey Professional Paper 212, 61-65 p.
- Bureau of Land Management (BLM). 2008. Assessment and Mitigation of Potential Impacts to Paleontological Resources: BLM Instruction Memorandum No. 2009-011.
- Bureau of Land Management (BLM). 2016. Potential Fossil Yield Classification system: BLM Instruction Memorandum No. 2016-124 (PFYC revised from USFS, 2008).
- City of Los Angeles. 2001. City of Los Angeles Conservation Element of the General Plan, available at: <http://planning.lacity.org/cwd/gnlpln/ConsvElt.pdf>
- County of Los Angeles. 2015. Los Angeles County General Plan, available at: <http://planning.lacounty.gov/generalplan/generalplan>
- Dibblee, T.W. Jr. 1987. Geology of the Santa Monica Mountains and Simi Hills, California. *In AAPG Bulletin*: Volume 71:5.
- Dibblee, T.W. Jr., and H.E. Ehrenspeck. 1991. Geologic Map of the Beverly Hills and Van Nuys (South ½) Quadrangles, Los Angeles County, California. Dibblee Geological Foundation Map DF-31, Scale (1:24,000).
- Hunt, R.K., V.L. Santucci, and J. Kenworthy. 2006. A Preliminary Inventory of Fossil Fish from National Park Service Units. Fossils from Federal lands. New Mexico Museum of Natural History and Science Bulletin 34. Pp. 67.
- McLeod, S.A. 2016. Paleontological Resources for the Proposed 3712 and 3710 Camino De La Cumbre Project, in the City of Los Angeles, Los Angeles County, Project Area. Unpublished letter report by the Natural History Museum of Los Angeles County. Prepared for Paleo Solutions. Dated 7 December 2016.
- Murphey, P.C., and D. Daitch. 2007. Paleontological overview of oil shale and tar sands areas in Colorado, Utah and Wyoming: U.S. Department of Energy, Argonne National Laboratory Report Prepared for the U.S. Department of Interior Bureau of Land Management, 468 p. and 6 maps (scale 1:500,000).
- Murphey, P.C., Knauss, G.E., Fisk, L.H., Demere, T.A., Reynolds, R.E., Trujillo, K.C., and Strauss, J.J. 2014. A foundation for best practices in mitigation paleontology: Proceedings of the 10th Conference on Fossil Resources. *Dakoterra* vol. 6, p. 243-285.
- Norris, R.M., and R.W. Webb. 1976. Geology of California, John Wiley & Sons, N.Y.



Society of Vertebrate Paleontologists (SVP). 2010. Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources, 11 p.

Online: <http://vertpaleo.org/PDFS/68/68c554bb-86f1-442f-a0dc-25299762d36c.pdf>

Stoffer, P. 2002. Rocks and geology in the San Francisco Bay Area: In U.S. Geological Survey, Bulletin 2195, 58 pp. Available: <http://geopubs.wr.usgs.gov/bulletin/b2195/b2195.pdf>

University of California Museum of Paleontology (UCMP). 2018. Online search of the University of California Museum of Paleontology database, accessed January 29-30.

Yerkes, R.F. and R.H. Campbell. 1979. Stratigraphic Nomenclature of the Central Santa Monica Mountains, Los Angeles County, California. *In* Contributions to Stratigraphy: Geology Survey Bulletin 1457-E.

FARRELL ATLASI
3700 AND 3712 CAMINO DE LA CUMBRE PROJECT
PSI REPORT NO.: CA18LOSANGELESFAR01R



APPENDIX A: Natural History Museum of Los Angeles County Paleontological Record Search



Natural History Museum
of Los Angeles County
900 Exposition Boulevard
Los Angeles, CA 90007
tel 213.763.DINO
www.nhm.org

Vertebrate Paleontology Section
Telephone: (213) 763-3325

e-mail: smcleod@nhm.org

7 December 2016

TADIARchitecture
117 West 9th Street, #424
Los Angeles, CA 90015

Attn: Dino G. Tadiar, California Registered Architect

re: Paleontological resources for the proposed 3712 and 3710 Camino De La Cumbre
Project, in the City of Los Angeles, Los Angeles County, project area

Dear Dino:

I have conducted a thorough search of our paleontology collection records for the locality and specimen data for the proposed 3712 and 3710 Camino De La Cumbre Project, in the City of Los Angeles, Los Angeles County, project area as outlined on the portion of the Van Nuys USGS topographic quadrangle map that you sent to me on 21 November 2016. We have one vertebrate fossil locality that occurs either within or adjacent to the proposed project site boundaries, and we have numerous localities nearby from the same sedimentary deposits that occur in the proposed project area.

Below a thin layer of topsoil, bedrock in the proposed project area consists of deposits of the marine late Miocene Monterey Formation (also referred to as the Lower Modelo Formation in this area). These Monterey Formation rocks in this area are typically diatomaceous silts to shales or even sandstones. We have one vertebrate fossil locality from this rock unit, LACM 7285, that occurs either within or adjacent to the proposed project area. Fossil specimens of bonito shark, *Isurus hastalis*, and snake mackerel, *Thyrsocles*, were recovered from locality LACM 7285.

We have several important vertebrate fossil localities from this rock unit within a half mile radius of the proposed project area including LACM 7955, immediately northeast of the

Inspiring wonder, discovery and responsibility for our natural and cultural worlds.



proposed project area along Stansbury Avenue, LACM (CIT) 387, further northeast of the proposed project area along Hollyline Avenue, LACM 5435, just south of the proposed project area near Glorietta Drive, LACM 1894, just south of due west of the proposed project area along Deervale Drive, LACM (CIT) 381, southwest of the proposed project area along Oakfield Drive, LACM 4176, LACM 7045 and especially LACM (CIT) 326, all between Beverly Ridge Drive and Oakfield Drive just west of the proposed project area. These localities have produced a composite fossil fauna of primarily bony fish (see appendix).

Most importantly, locality LACM (CIT) 326 produced an extensive fossil fish fauna including the holotypes (name-bearing specimens for species new to science) of the lanternfish *Lampanyctus bolini* and *Lampanyctus petrolifer*, the viperfish *Chauliodus barbatus*, and the pipefish *Hipposyngnathus imporcitor*. The *Lampanyctus* species were named by L.R. David (1943. Miocene fishes of southern California. Geological Society of America Special Papers, 43:1-193). *Chauliodus barbatus* was named by J.M. Crane (1966. Late Tertiary radiation of viperfishes (Chauliodontidae) based on a comparison of Recent and Miocene species. Contributions in Science, Natural History Museum of Los Angeles County, 115:1-29). The pipefish *Hipposyngnathus imporcitor* was named by R.A. Fritzsche (1980. Revision of the eastern Pacific Syngnathidae (Pisces: Syngnathiformes), including both Recent and fossil forms. Proceedings of the California Academy of Science, 42(6):181-227).

Any excavations in the bedrock Monterey Formation deposits occurring throughout the proposed project area may well encounter significant fossil vertebrate remains. Any substantial excavations in the proposed project area, therefore, should be monitored closely to quickly and professionally collect any vertebrate fossil remains without impeding development. The fossil fish collected from nearby localities are mostly quite small so the qualified paleontological monitor on the site should closely examine the rock surfaces exposed during excavations for fish fossils. Also, sediment samples from the proposed project area should be collected and processed to determine the small fossil potential of the site. Any fossils collected during mitigation activities should be placed in an accredited 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,

A handwritten signature in cursive script that reads "Samuel A. McLeod".

Samuel A. McLeod, Ph.D.
Vertebrate Paleontology

enclosures: attachment, invoice



Composite fossil fauna from Monterey Formation localities
 LACM (CIT) 326, 381, 387, LACM 1894, 4176, 5435, 7045, 7285, and 7955
 closest to 3712 and 3710 Camino De La Cumbre

Chondrichthyes		
Lamniformes		
Lamnidae - mackerel sharks		
<i>Isurus</i>	<i>hastalis</i>	
Osteichthyes		
Atheriniformes		
Belontiidae - needlefishes		
Clupeiformes		
Clupeidae - herrings		
<i>Ganolytes</i>	<i>cameo</i>	
<i>Xyne</i>	<i>grex</i>	- Published
Gadiformes		
Gadidae - cods		
<i>Eclipes</i>		
Moridae - mora		
Myctophiformes		
Myctophidae - lanternfishes		
<i>Lampanyctus</i>	<i>bolini</i>	- HOLOTYPE
<i>Lampanyctus</i>	<i>petrolifer</i>	- HOLOTYPE
Perciformes		
Carangidae - jacks		
<i>Decapterus</i>	<i>agilis</i>	
Gempylidae - snake mackerels		
<i>Thyrsocles</i>	<i>kriegeri</i>	
Scombridae - mackerels & tunas		
<i>Sarda</i>	<i>stocki</i>	
<i>Scomber</i>		- Published
Zaproridae - prowlfish		
<i>Araosteus</i>	<i>rothi</i>	
Pleuronectiformes - flounders		
Salmoniformes		
Bathylagidae - deep sea smelts		
<i>Bathylagus</i>	<i>angelensis</i>	- Figured
<i>Quaesita</i>	<i>angelensis</i>	
Stomiiformes		
Chauliodontidae - viperfishes		
<i>Chauliodus</i>	<i>barbatus</i>	- HOLOTYPE
<i>Chauliodus</i>	<i>eximius</i>	
Gonostomidae - bristlemouths		
<i>Cylothone</i>	<i>solitudinis</i>	
Sternoptychidae - Hatchetfishes		
<i>Argyropelecus</i>	<i>bullockii</i>	
Syngnathiformes		
Syngnathidae - pipefishes & seahorses		
<i>Hipposyngnathus</i>	<i>imporcitor</i>	- HOLOTYPE
<i>Syngnathus</i>	<i>avus</i>	- Published

