

## TECHNICAL MEMORANDUM

**To:** Stacie Henderson  
CAJA Environmental Services, LLC  
15350 Sherman Way, Suite 315  
Van Nuys, California 91406

**From:** Mathew Carson, M.S., Lead Paleontologist

**Date:** December 15, 2022

**Re:** **Paleontological Resources Technical Memorandum for the Chaminade College Preparatory – High School Project, Los Angeles, Los Angeles County, California**

---

### INTRODUCTION

On behalf of Chaminade College Preparatory, SWCA Environmental Consultants (SWCA) conducted a paleontological resources assessment for the proposed Chaminade College Preparatory – High School Project (project) in the West Hills neighborhood of the city of Los Angeles, Los Angeles County, California (Figure 1). The following study was conducted to analyze any potential impacts the project may have on paleontological resources located in the project area, to comply with the California Environmental Quality Act (CEQA), local regulations, and best practices in paleontological mitigation (Murphey et al. 2019). This technical memorandum documents the methods and results of the paleontological resources assessment, which included a review of geologic maps, scientific literature, and confidential fossil locality records from the Natural History Museum of Los Angeles County (NHMLA). These data were used to evaluate the likelihood of paleontological resources within the project area.

SWCA Lead Paleontologist Mathew Carson, M.S., conducted the paleontological resources assessment presented herein and authored this technical memorandum. SWCA Principal Paleontologist Russell Shapiro, Ph.D., provided quality assurance/quality control. Figures were generated by SWCA Geographic Information System (GIS) Specialist Marty Kooistra, M.A., Registered Professional Archaeologist (RPA). Copies of the report are on file with SWCA's Pasadena office.

### PROJECT DESCRIPTION AND LOCATION

The project consists of changing the existing main campus and adding a new north campus (Figure 2). The changes to the main campus include a partial demolition of existing surface parking lots; demolition of approximately 32,204 square feet of existing classroom buildings, including the removal of existing portable buildings; and the addition of approximately 60,760 square feet of new floor area to include a new administrative, multipurpose, and classroom building, as well as the renovation of existing offices and the addition of electric vehicle parking and charging stations within most existing surface parking lots.



Figure 1. Project vicinity within the western San Fernando Valley of Los Angeles County.



Figure 2. Project area plotted on an aerial photograph.

The project also involves the expansion of the high school to the north campus on the north side of Saticoy Street, to include demolition of the existing structures on-site totaling approximately 58,706 square feet and the demolition of the existing surface parking lot (see Figure 2). The expansion to the north campus includes the development of approximately 8,494 square feet of floor area within a proposed athletic field pool house, locker rooms, and proposed building to house restrooms and concessions. The balance of the north campus site will include a proposed new soccer and baseball field, a new pool, and two new proposed surface parking lots.

A new pedestrian bridge will be constructed to span Saticoy Street connecting the north campus to the main campus. The pedestrian bridge will have access at the surface parking lot of the north campus and the new main entrance to the high school on the main campus. In addition, to complete the perimeter security on the main campus, new fencing and vehicular gates will be added along the northeast drive aisle, parent drop-off along Chaminade Avenue, and the most eastern access along Cohasset Street. A new 10-foot-high ornamental fencing will be provided around the perimeter of the north campus.

New construction on the main campus includes a new, multistory building at the main entrance that will include administrative offices, counseling offices, library, multipurpose room, classrooms, and labs. The existing single-story buildings, used for administrative offices located at the southeast corner of the main campus, will undergo renovation, but will not increase in floor area or height. A new surface parking lot will be constructed in place of the existing paved driveway adjacent to the single-story office building at the southeast corner of the main campus. Finally, additional improvements to the main campus will include minor demolition and resurfacing of the existing baseball field along Cohasset Street, to be reutilized as a softball field, and removal of the north surface parking lot and resurfacing to create a new landscaped quad area adjacent to the new administrative building.

Improvements on the north campus include a baseball field, practice soccer fields, swimming pool, associated facilities, and surface parking. The baseball field and soccer field are inclusive of 40-foot-high safety netting along a portion of the outfield perimeter, a 26-foot-high electric scoreboard located in left-center field facing Saticoy Street, single-story locker rooms, batting cages and bull pens located along the first and third base-lines, bleachers providing approximately 350 seats, and a shade structure reaching 19 feet in height located behind home plate with a press box of approximately 100 square feet located between the home and visiting seating sections. Eight stadium light standards ranging in height from 70 feet to 90 feet are proposed with the 70-foot light standards located along the perimeter of left and right field, with 80- and 90-foot light standards along Saticoy Street and adjacent to the new surface parking lot. To the west of the baseball field is a 1,540-square-foot single-story concession and restroom building (16 feet in height) and a 95-stall surface parking lot and entrance to the pedestrian bridge.

To the east of the baseball field is a proposed in-ground pool, with four 40-foot-high light standards, a single-story (19 feet), 6,094-square-foot athletic field and pool house, and 19 surface parking stalls. There are currently four ingress/egress points along Saticoy Street that will be reduced to the two access points for this project. There are currently two ingress/egress points along Woodlake Avenue that will be reduced to one ingress/egress driveway at the approximate location of the existing north access point.

## **PROJECT LOCATION**

The project area is in Section 35, Township 2 North, Range 17 West, and is plotted on the U.S. Geological Survey (USGS) Calabasas, California, quadrangle (Figure 3). The project area comprises six parcels: 7500 Chaminade Avenue (Assessor Parcel Numbers [APNs] 2027-005-002 and -009), which contains the high school campus (the Main Campus); the proposed project will develop another property designated as the North Campus, which is located at the northwest corner of Saticoy Street and Woodlake Avenue, at 23255 Saticoy Street, 7629 Woodlake Avenue, and 7621 Woodlake Avenue (APNs 2027-005-005, 2027-005-006, and 2027-005-007). Combined, the Main Campus and proposed North Campus total

approximately 25.9 acres. The proposed North Campus is currently developed with a multi-tenant mini shopping center and surface parking lot, built between 1962 and 1964.

## **PROFESSIONAL STANDARDS**

The Society of Vertebrate Paleontology (SVP) has established standard guidelines that outline professional protocols and practices for conducting paleontological resource assessments and surveys, monitoring and mitigation, data and fossil recovery, sampling procedures, and specimen preparation, identification, analysis, and curation (SVP 1995, 2010). Most practicing professional vertebrate paleontologists adhere closely to the SVP's assessment, mitigation, and monitoring requirements, as specifically provided in its standard guidelines. Most state regulatory agencies with paleontological laws, ordinances, regulations, and standards accept and use the professional standards set forth by the SVP.

As defined by the SVP (2010:11), significant paleontological resources are

fossils and fossiliferous deposits, here defined as consisting of identifiable vertebrate fossils, large or small, uncommon invertebrate, plant, and trace fossils, and other data that provide taphonomic, taxonomic, phylogenetic, paleoecologic, stratigraphic, and/or biochronologic information. Paleontological resources are considered to be older than recorded human history and/or older than middle Holocene (i.e., older than about 5,000 radiocarbon years).

Numerous paleontological studies have developed criteria for the assessment of significance for fossil discoveries (e.g., Eisentraut and Cooper 2002; Murphey et al. 2019; Scott and Springer 2003). In general, these studies assess fossils as significant if one or more of the following criteria apply:

1. The fossils provide information on the evolutionary relationships and developmental trends among organisms, living or extinct;
2. The fossils provide data useful in determining the age(s) of the rock unit or sedimentary stratum, including data important in determining the depositional history of the region and the timing of geologic events therein;
3. The fossils provide data regarding the development of biological communities or interaction between paleobotanical and paleozoological biotas;
4. The fossils demonstrate unusual or spectacular circumstances in the history of life; or
5. The fossils are in short supply and/or are in danger of being depleted or destroyed by the elements, vandalism, or commercial exploitation, and are not found in other geographic locations.

Geologic units known to preserve significant fossils or fossil localities are likely to contain additional undiscovered and potentially significant fossils and are generally considered sensitive for paleontological resources throughout their areal and stratigraphic (i.e., vertical) extent. The extent of sensitivity differs from that defined for archaeological resource sites as follows:

It is extremely important to distinguish between archaeological and paleontological (fossil) resource sites when defining the sensitivity of rock units. The boundaries of archaeological sites define the areal extent of the resource. Paleontological sites, however, indicate that the containing sedimentary rock unit or formation is fossiliferous. The limits of the entire rock formation, both areal and stratigraphic, therefore define the scope of the paleontological potential in each case. (SVP 1995:23)

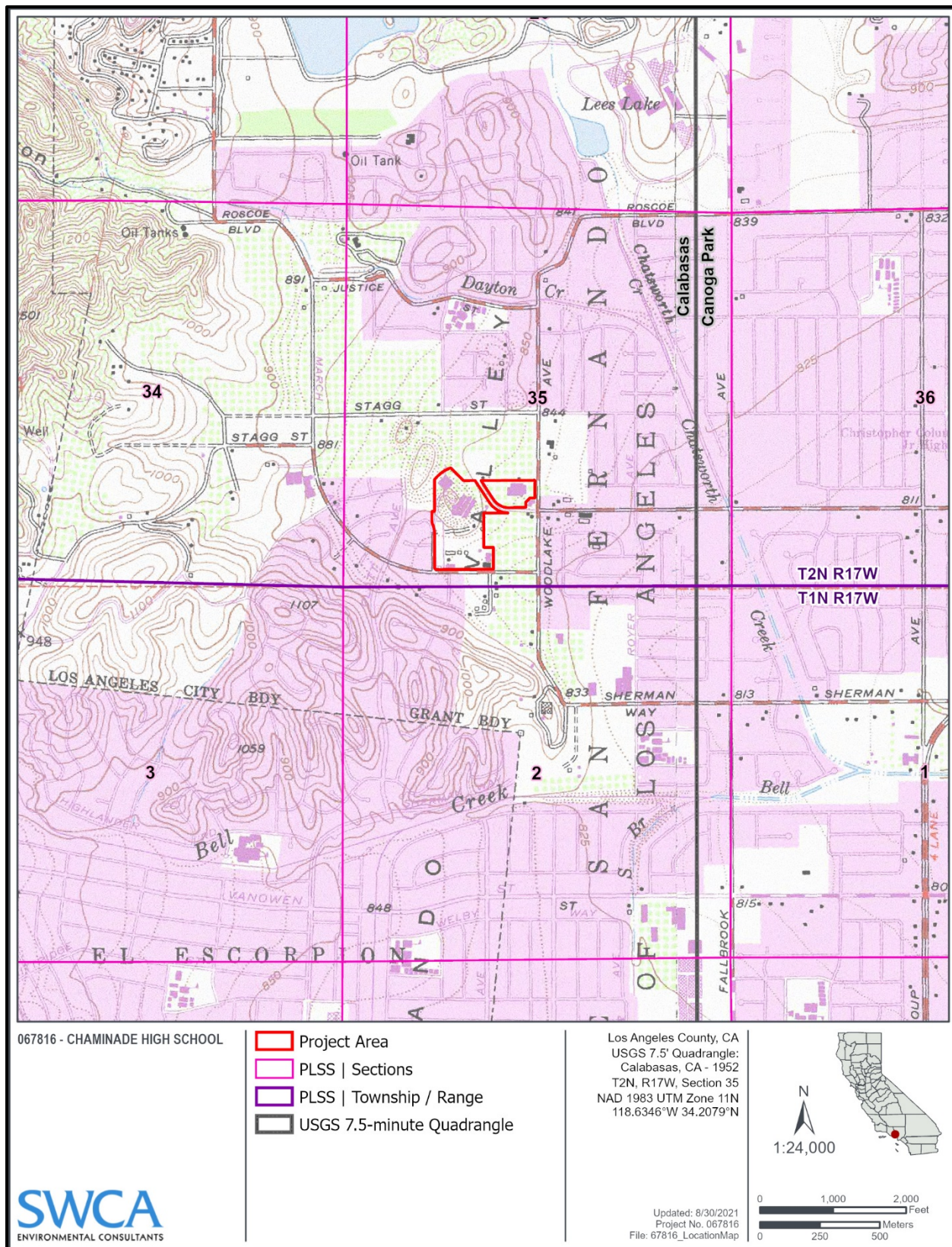


Figure 3. Project area plotted on the USGS Calabasas, California, 7.5-minute topographic quadrangle.

Many archaeological sites contain features visually detectable on the surface. In contrast, fossils may be present at the surface or at depth within sediments or bedrock. Subsurface fossils would not be observable or detectable unless exposed by erosion or human activity. In the case of human activity, such as project-related ground disturbances within geologic units with a high probability to yield significant fossils, direct or indirect adverse impacts to significant fossils may occur.

In summary, paleontologists cannot know either the quality or quantity of fossils prior to natural erosion or anthropogenic exposure. As a result, even in the absence of fossils on the surface, it is necessary to assess the sensitivity of geologic units based on their known potential to produce significant fossils elsewhere within the same geologic unit (both within and outside the study area), a similar geologic unit, and whether the unit in question was deposited in a type of environment known to be favorable for fossil preservation. Monitoring by experienced paleontologists greatly increases the probability that fossils will be discovered during ground-disturbing activities and that, if such fossils are determined to be potentially significant, successful mitigation and salvage efforts may be undertaken to prevent adverse impacts to these resources.

## **REGULATORY SETTING**

Paleontological resources are limited, nonrenewable resources of scientific, cultural, and educational value and are afforded protection under state and local laws and regulations. This study satisfies project requirements in accordance with state and local regulations and was conducted as a means of characterizing the existing conditions consistent with the application of the screening criteria defined in Appendix G of the State CEQA Guidelines (as amended December 28, 2018). This analysis also complies with guidelines and criteria specified by the SVP (2010) and follows best practices in mitigation paleontology (Murphey et al. 2019).

### **State Regulations**

#### ***California Environmental Quality Act***

CEQA is the principal statute governing environmental review of projects occurring in the state and is codified at Public Resources Code (PRC) Section 21000 et seq. CEQA requires lead agencies to determine if a proposed project would have a significant effect on the environment, including significant effects on paleontological resources. Guidelines for the Implementation of CEQA, as amended December 28, 2018 (Title 14, Chapter 3, California Code of Regulations [CCR] 15000 et seq.), define procedures, types of activities, persons, and public agencies required to comply with CEQA. Section VII(f) of the Environmental Checklist (State CEQA Guidelines Appendix G) asks whether a project would directly or indirectly destroy a unique paleontological resource and result in impacts to the environment.

#### ***Public Resources Code Section 5097.5***

Requirements for paleontological resource management are included in PRC Division 5, Chapter 1.7, Section 5097.5, which states:

No person shall knowingly and willfully excavate upon, or remove, destroy, injure or deface any historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological site, including fossilized footprints, inscriptions made by human agency, or any other archaeological, paleontological or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over such lands. Violation of this section is a misdemeanor.

These statutes prohibit the removal, without permission, of any paleontological site or feature from land under the jurisdiction of the state or any city, county, district, authority, or public corporation, or any agency thereof. Consequently, local agencies are required to comply with PRC 5097.5 for their own activities, including construction and maintenance, as well as for permit actions (e.g., encroachment permits) undertaken by others. PRC Section 5097.5 also establishes the removal of paleontological resources as a misdemeanor and requires reasonable mitigation of adverse impacts to paleontological resources from developments on public (state, county, city, and district) land.

## **Local Regulations**

### ***City of Los Angeles General Plan***

Section 3 (Archaeological and Paleontological) of the *City of Los Angeles General Plan Conservation Element* (Conservation Element) recognizes paleontological resources (page II-3) and contains an objective (page II-5) to protect the city’s archaeological and paleontological resources for historical, cultural, research, and/or educational purposes (City of Los Angeles 2001). The Conservation Element includes the policy to “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.” The Conservation Element also states the following:

Pursuant to CEQA, if a land development project is within a potentially significant paleontological area, the developer is required to contact a bona fide paleontologist to arrange for assessment of the potential impact and mitigation of potential disruption of or damage to the site. If significant paleontological resources are uncovered during project execution, authorities are to be notified and the designated paleontologist may order excavations stopped, within reasonable time limits, to enable assessment, removal or protection of the resources. (City of Los Angeles 2001:II-5)

Section D:1 of the *L.A. CEQA Thresholds Guide* (City of Los Angeles 2006) specifies that the determination of significance for paleontological resources shall be made on a case-by-case basis, taking into consideration the following factors:

- Whether, or the degree to which, the project might result in the permanent loss of, or loss of access to, a paleontological resource; and
- Whether the paleontological resource is of regional or statewide significance.

## **METHODS**

The following sections present an overview of the methodology used to analyze the potential for paleontological resources within the project area. This report conforms to industry standards as developed by the SVP (1995, 2010) and best practices in mitigation paleontology (Murphey et al. 2019). The purpose of this analysis is to: 1) determine whether any previously recorded fossil localities occur in the project area at the surface or at depth; 2) if so, assess the potential for disturbance of these localities during construction; 3) evaluate the paleontological potential of the project area; and 4) evaluate the potential for significant impacts or adverse effects on previously undiscovered scientifically significant paleontological resources that could be present within the project area and adversely impacted by implementation or construction of the project.

### **Existing Data Analysis**

SWCA conducted an analysis of available existing data pertinent to paleontological resources. This analysis included a review of geologic maps, scientific literature, and museum records search results.

The geologic mapping used in this analysis is from Yerkes and Campbell (1995) at a scale of 1:24,000. The museum records search was submitted to the NHMLA on August 25, 2021. The results of the museum records search were received on August 28, 2021, and are incorporated into the Results section of this technical memorandum and included in confidential Attachment A.

## **Paleontological Potential Classification**

Paleontological potential is defined as the potential for a geologic unit to produce scientifically significant fossils. This is determined by rock type, history of the geologic unit in producing significant fossils, and fossil localities recorded from that unit. Paleontological sensitivity is derived from the known fossil data collected from the entire geologic unit, not just from a specific survey. The SVP (2010:1–2) defines four categories of paleontological sensitivity (potential) for rock units: high, low, undetermined, and no potential:

**High Potential.** Rock units from which vertebrate or significant invertebrate, plant, or trace fossils have been recovered are considered to have a high potential for containing additional significant paleontological resources. Rocks units classified as having high potential for producing paleontological resources include, but are not limited to, sedimentary formations and some volcanoclastic formations (e.g., ash or tephra), and some low-grade metamorphic rocks which contain significant paleontological resources anywhere within their geographical extent, and sedimentary rock units temporally or lithologically suitable for the preservation of fossils (e.g., middle Holocene and older, fine-grained fluvial sandstone, argillaceous and carbonate-rich paleosols, cross-bedded point bar sandstone, fine-grained marine sandstone, etc.). Paleontological potential consists of both a) the potential for yielding abundant or significant vertebrate fossils or for yielding a few significant fossils, large or small, vertebrate, invertebrate, plant, or trace fossils and b) the importance of recovered evidence for new and significant taxonomic, phylogenetic, paleoecologic, taphonomic, biochronologic, or stratigraphic data. Rock units which contain potentially datable organic remains older than late Holocene, including deposits associated with animal nests or middens, and rock units which may contain new vertebrate deposits, traces, or trackways are also classified as having high potential.

**Low Potential.** Reports in the paleontological literature or field surveys by a qualified professional paleontologist may allow determination that some rock units have low potential for yielding significant fossils. Such rock units will be poorly represented by fossil specimens in institutional collections or based on general scientific consensus only preserve fossils in rare circumstances and the presence of fossils is the exception not the rule, e.g., basalt flows or Recent colluvium. Rock units with low potential typically will not require impact mitigation measures to protect fossils.

**Undetermined Potential.** Rock units for which little information is available concerning their paleontological content, geologic age, and depositional environment are considered to have undetermined potential. Further study is necessary to determine if these rock units have high or low potential to contain significant paleontological resources. A field survey by a qualified professional paleontologist to specifically determine the paleontological resource potential of these rock units is required before a paleontological resource impact mitigation program can be developed. In cases where no subsurface data are available, paleontological potential can sometimes be determined by strategically located excavations into subsurface stratigraphy.

**No Potential.** Some rock units have no potential to contain significant paleontological resources, for instance high-grade metamorphic rocks (such as gneisses and schists) and plutonic igneous rocks (such as granites and diorites). Rock units with no potential require no protection or impact mitigation measures relative to paleontological resources. (SVP 2010:1–2)

## **RESULTS**

### **Regional Geology**

The project area is situated in the San Fernando Valley, a structural trough located within the Transverse Ranges Geomorphic Province, consisting of a complex series of young, east-west-trending mountain ranges and valleys that contradict the general north-south orientation of California's other mountain ranges, such as the adjacent Peninsular Ranges and Coastal Ranges geomorphic provinces (Norris and Webb 1990; Sylvester and O'Black Gans 2016). The Transverse Ranges Geomorphic Province begins at Point Conception in Santa Barbara County and extends in an easterly direction, terminating at the San Bernardino Mountains in San Bernardino County (Sylvester and O'Black Gans 2016). Most of the Transverse Ranges Geomorphic Province is bounded on the north and east by the San Andreas Fault System that separates the province from the Peninsular Ranges and Coastal Ranges geomorphic provinces. Topography of the Transverse Ranges Geomorphic Province is noted for being extremely steep and difficult to cross (Norris and Webb 1990).

The Transverse Ranges Geomorphic Province includes a wide variety of geologic units, ranging in age from the Proterozoic to Recent (Norris and Webb 1990). Mountain ranges within the Transverse Ranges Geomorphic Province are mainly composed of two distinct types of crystalline basement rocks that are separated by thrust faults (Norris and Webb 1990). The sedimentary units within the province are composed of a thick sequence of late Mesozoic- and Cenozoic-aged strata that rest unconformably on a variety of basement rocks (Namson and Davis 1988). The province is undergoing active north-south shortening due to faulting (Wentworth and Yerkes 1971), causing a significant rise in elevation on an annual scale. The San Fernando Valley specifically is bounded by several of these fault-bounded mountain ranges, such as the Santa Susana Mountains on the northwest, the San Gabriel Mountains on the northeast, the Santa Monica Mountains on the south, and the Simi Hills on the west. Near the Granada Hills neighborhood, the Mission Hills Fault presumably trends along the northern border of the San Fernando Valley along its contact with the topographically rugged Santa Susana Mountains (Dibblee and Ehrenspeck 1992). The San Fernando Valley forms a deep trough into which sediments have been deposited from the Miocene to the present (Wentworth and Yerkes 1971). Sediments are primarily sourced from the Santa Susana Mountains and San Gabriel Mountains to the north and consist of clasts of Precambrian gneisses, the Mesozoic Pelona Schist, and Jurassic siliceous sediments (Yerkes 1997). These sediments have accumulated to thicknesses of more than 9,840 feet in the San Fernando Valley (Yerkes 1997). The valley is situated in a tectonically active area, with sedimentary deposits subjected to uplift and deformation from ongoing fault activity (Wentworth and Yerkes 1971).

### **Local Geology and Paleontology**

According to geologic mapping by Yerkes and Campbell (1995), the project area is mapped at the surface as late to middle Pleistocene old alluvial fan deposits, undivided (Qof) and late Miocene Modelo Formation, undivided (Tm). Although unmapped by Yerkes and Campbell (1995), the project area also contains unmapped Recent to late Holocene artificial fill (Qaf) at the surface based on aerial imagery (see Figure 2). These geologic units are described in geochronological order below and shown in Figure 4.

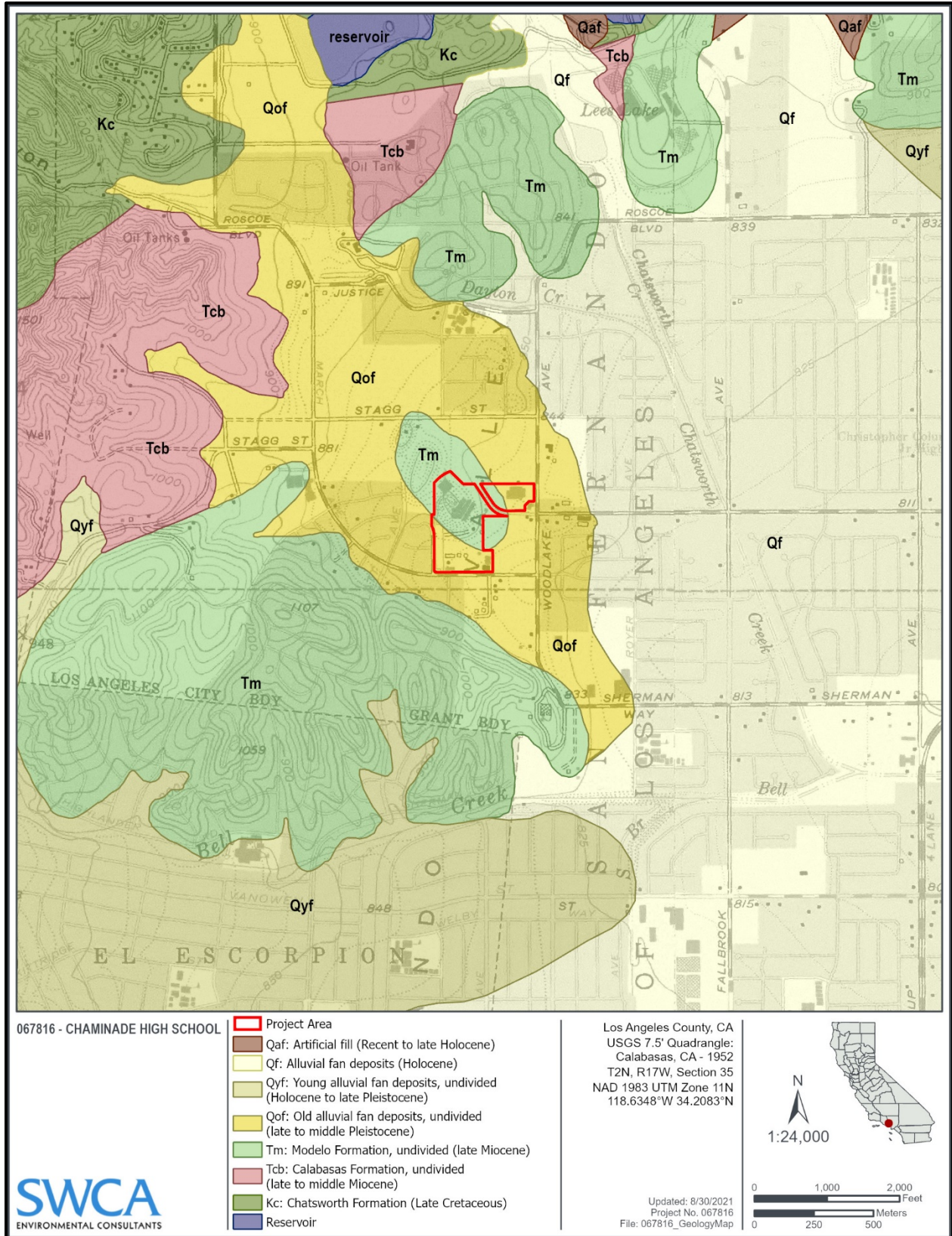


Figure 4. Geology of the project area.

### ***Recent to late Holocene Artificial Fill (Qaf)***

Recent to late Holocene artificial fill (Qaf) is not mapped at the surface within the bounds of the project area by Yerkes and Campbell (1995); however, based on aerial imagery, the flat topography of the San Fernando Valley, and previous site development, artificial fill likely caps the project area as a thin veneer. Previously disturbed sediments or artificial fill may contain fossils; however, any such fossil from these deposits has been removed from its original stratigraphic context (provenance). Therefore, artificial fill is unlikely to yield significant paleontological resources. Artificial fill is likely underlain by geologic units capable of preserving scientifically significant paleontological resources (i.e., old alluvial fan deposits [Qof] and/or Modelo Formation [Tm]).

### ***Late to middle Pleistocene Old Alluvial Fan Deposits, undivided (Qof)***

According to geologic mapping by Yerkes and Campbell (1995), late to middle Pleistocene old alluvial fan deposits (Qof) are mapped at the surface of the project area but are likely capped by Recent to late Holocene artificial fill (Qaf) (see Figure 4). Old alluvial fan deposits consist of gravel, sand, silt, and clay, moderately to well consolidated, silty to well cemented, and dissected (Yerkes and Campbell 1995). The depth to the old alluvial fan deposits underlying the artificial fill in the subsurface of the project area is unknown but likely shallow based on the flat topography of the San Fernando Valley and on the presence of Pleistocene-age fossils recorded at shallow depths within the project's vicinity (NHMLA 2021).

The SVP (2010) defines fossil resources as being those over 5,000 years in age; therefore, late Pleistocene (i.e., 10,000 to 129,000 years old) old alluvial fan deposits in the subsurface within the project area are of an age to preserve fossil resources. Several paleontological resources have been recovered in the San Fernando Valley and Los Angeles Basin from undifferentiated Pleistocene-aged alluvial deposits. For example, fossil bison and mammoth have been recovered from near the Van Norman Reservoir; fossil bison, camel, peccary, and horse have been recovered from near the Sepulveda Dam Recreation Area; and fossil mammoth and horse were collected in Chatsworth (SWCA 2018; Yerkes 1997). In general, undifferentiated alluvial sediments of Pleistocene age have a rich fossil history in southern California (Jefferson 1991a, 1991b; McDonald and Jefferson 2008; Miller 1971; Reynolds and Reynolds 1991; Springer et al. 2009). The most common Pleistocene terrestrial mammal fossils include the bones of mammoth, bison, deer, and small mammals, but other taxa, including horse, lion, cheetah, wolf, camel, antelope, peccary, mastodon, capybara, and giant ground sloth, have been reported (Graham and Lundelius 1994), as well as reptiles, snakes, frogs, and salamanders (Hudson and Brattstrom 1977). These fossils illuminate the striking differences between southern California in the Pleistocene and southern California today, and this abundant fossil record has been vital in studies of extinction (e.g., Barnosky et al. 2004; Sandom et al. 2014; Scott 2010), ecology (e.g., Connin et al. 1998), and climate change (e.g., Roy et al. 1996).

### ***Late Miocene Modelo Formation, undivided (Tm)***

According to geologic mapping by Yerkes and Campbell (1995), late Miocene Modelo Formation (Tm) deposits are mapped at the surface within the project area but are likely capped by Recent to late Holocene artificial fill (Qaf) (see Figure 4). Here, strata of the Modelo Formation are mostly late Miocene in age but may include middle Miocene strata. The Modelo Formation consists of predominantly gray to brown, thin-bedded mudstone, diatomaceous clay shale, or siltstone, with interbeds of very fine-grained to coarse-grained sandstone (Yerkes and Campbell 1995). Throughout its geographic extent, strata of the Modelo Formation rest unconformably over older rocks of middle Miocene age and may be time-equivalent to marine strata of the Puente Formation in the southern Los Angeles Basin and diatomaceous rocks of the Monterey Formation west of the Newport-Inglewood fault zone (Campbell et al. 2014; Yerkes and Campbell 1995). In fact, Dibblee and Ehrenspeck (1992) refer to the rocks in the

immediate vicinity of the project area as the Monterey Formation that is equivalent to the lower Modelo Formation due to its similar lithology to the Monterey Formation. Since Dibblee and Ehrenspeck’s (1992) geologic investigation, other geologists have reclassified these strata as part of the Modelo Formation, aligned with earlier investigations. The earliest investigation and description of the Modelo Formation comes from Eldridge and Arnold (1907), who based their description on exposures within the Topatopa Mountains. Later on, Winterer and Durham (1962) described the Modelo Formation within the Santa Susana Mountains and San Fernando Pass. Since these investigations, at least five members have been described by Cemen (1977), with at least four of them present within the Santa Susana Mountains area (Campbell et al. 2014; Yerkes and Campbell 1995). The informal members have been numbered member 1 (oldest) to member 5 (youngest) and consist of alternating shale and sandstone of variable thicknesses (ranging between 200 and 1,000 feet thick) (Campbell et al. 2014). Within the vicinity of the project area, the Modelo Formation has largely been left undivided but may consist of any combination of the five informal members.

The Modelo Formation, and its equivocal geologic units throughout southern California, have yielded numerous significant paleontological resources localities. The Modelo Formation has yielded marine mammals, such as baleen whales and dolphins; birds, such as cormorants, puffins, boobies, and others; bony fishes, such as viperfish, lanternfish, boafish, herrings, smelts, pipefish, mackerels, and others; invertebrates, such as clams, abalones, and gastropods; and green and brown algae (Barnes 1985; Crane 1966; David 1943; Denton 2013; Fink and Fink 1986; Howard 1962; Kellogg 1934; Miller 1929; Woodring 1931). These fossils illuminate the environmental changes that occurred in southern California from the late Miocene to today.

## Museum Records Search

The NHMLA (2021) performed a museum records search for paleontological localities within the vicinity of the project area. Based on the results of the museum records search, the NHMLA does not contain records of paleontological resources from within the project area; however, several fossil localities have been recorded within the project vicinity from the Modelo Formation and unknown/unnamed Pleistocene deposits. The closest fossil locality from the Modelo Formation is LACM VP 4506, situated approximately 1.5 miles from the project area; it yielded fossil bony fish (Osteichthyes) from near the surface. From unknown/unnamed Pleistocene deposits, the closest fossil locality is LACM VP 1817, situated approximately 2.7 miles away; it yielded fossil horse (*Equus*) from 3 feet below ground surface. The results of the museum records search from the NHMLA (2021) are summarized in Table 1 and included in confidential Attachment A.

**Table 1. NHMLA Fossil Localities near the Project Area from Relevant Geologic Units**

Locality Number	Approximate Distance to the Project Area	Formation	Taxa	Depth (below ground surface)
LACM VP 4506	1.5 miles	Modelo Formation	Bony fish (Osteichthyes)	Surface
LACM IP 500	1.8 miles	Modelo Formation	Unspecified invertebrates	Unknown
LACM VP 5658	5.4 miles	Modelo Formation	Baleen whale (Mysticeti)	Unknown
LACM VP 1817	2.7 miles	Unspecified Pleistocene deposits	Horse ( <i>Equus</i> )	3 feet
LACM VP 5878	3.3 miles	Unspecified Pleistocene deposits	Mastodon ( <i>Mammut</i> )	Unknown
LACM VP 3822	10.0 miles	Unnamed Pleistocene lacustrine deposits	Bison ( <i>Bison</i> )	75 to 100 feet

Source: NHMLA (2021)

## **Paleontological Potential of the Project Area**

Based on an analysis of available existing data, SWCA determined the paleontological potential of the geologic units underlying the project area. Recent to late Holocene artificial fill (Qaf) likely exists within the project area as a thin veneer, overlying previously undisturbed sedimentary deposits. Artificial fill has the potential to yield paleontological resources; however, any such fossil has been removed from its original stratigraphic context (provenance). Therefore, artificial fill has a low paleontological sensitivity based on SVP (2010) guidelines. Based on SVP (2010) guidelines and definition of significant paleontological resources, late to middle Pleistocene old alluvial fan deposits (Qof) and late Miocene Modelo Formation (Tm), which both underlie the artificial fill at unknown, but likely very shallow depths, have a high paleontological sensitivity. In summary, the overall project area has a low paleontological sensitivity in the uppermost disturbed sediments and a high paleontological sensitivity in the underlying, previously undisturbed sediments. The depth to the previously undisturbed sediments within the project area is likely very shallow based on the local topography of the existing built environment (i.e., a parking lot and sports stadium). The paleontological sensitivity of the project area and the relevant geologic units within it are summarized in Table 2.

**Table 2. Paleontological Potential of the Project Area and its Relevant Geologic Units**

<b>Geologic Unit</b>	<b>Age</b>	<b>Paleontological Potential</b>	<b>Recommendations</b>
Artificial fill (Qaf)	Recent to late Holocene	Low	No monitoring during ground-disturbing activities that impact only artificial fill or previously disturbed sediments.
Old alluvial fan deposits (Qof)	Late to middle Pleistocene	High	Full-time monitoring during ground-disturbing activities that impact previously undisturbed sediments at 3 feet below ground surface or greater; no monitoring of previously disturbed sediments regardless of depth.
Modelo Formation (Tm)	Late Miocene	High	Full-time monitoring during ground-disturbing activities that impact previously undisturbed sediments at 3 feet below ground surface or greater; no monitoring of previously disturbed sediments regardless of depth.

Source: Geologic units from Yerkes and Campbell (1995)

## **IMPACT ASSESSMENT**

This paleontological assessment was conducted to analyze any potential impacts this project may have on paleontological resources located in the project area to comply with state and local regulations, as well as best practices in paleontological mitigation (Murphey et al. 2019). The changes to the main campus include a partial demolition of existing structures and the addition of approximately 60,760 square feet of new floor area to include a new administrative, multipurpose, and classroom building, as well as the renovation of existing offices and the addition of electric vehicle parking and charging stations. The expansion to the north campus includes the development of approximately 8,494 square feet of floor area within a proposed athletic field pool house, locker rooms, and proposed building to house restrooms and concessions. The balance of the north campus site will include a proposed new soccer and baseball field, a new pool, and two new proposed surface parking lots. Based on the features of the proposed project, substantial ground-disturbing activities are anticipated to impact previously undisturbed sediments underlying the artificial fill present as a veneer across the site. The depth to the underlying, previously undisturbed sediments is unknown, but likely very shallow (e.g., 3 feet below ground surface). Project-related ground-disturbing activities are likely to exceed the depth of the artificial fill and impact the underlying previously undisturbed geologic units of high paleontological sensitivity. Therefore, fossils may be encountered during the ground-disturbing activities. Should significant fossils be encountered, they would be at risk for damage or destruction from construction activities, which would constitute an impact under CEQA.

## **CONCLUSIONS AND RECOMMENDATIONS**

Based on this analysis of available existing data, the surface of the project area contains unmapped Recent to late Holocene artificial fill (Qaf). Artificial fill is subsequently underlain at very shallow depth (e.g., 3 feet below ground surface) by late to middle Pleistocene old alluvial fan deposits (Qof) and late Miocene Modelo Formation (Tm). Based on SVP (2010) guidelines, artificial fill has a low paleontological sensitivity; however, the underlying old alluvial fan deposits and Modelo Formation have a high paleontological sensitivity. Project-related ground-disturbing activities are likely to exceed the depth of the artificial fill and impact the underlying previously undisturbed geologic units of high paleontological sensitivity. If fossils are encountered, they would be at risk for damage or destruction from construction activities, which would constitute an impact under CEQA. The implementation of the following recommendations will ensure that fossils, if encountered, are assessed for significance and, if determined to be significant, salvaged and curated with an accredited repository. Implementation of these recommendations will reduce potential impacts to paleontological resources from the project to less-than-significant levels, pursuant to CEQA.

Accordingly, SWCA provides the following recommendations that are developed in accordance with and incorporate the performance standards of the SVP (1995, 2010), state and local regulations, and best practices in mitigation paleontology (Murphy et al. 2019).

1. **Retain a Qualified Professional Paleontologist:** Chaminade College Preparatory should retain a Qualified Professional Paleontologist (Project Paleontologist), who meets or exceeds the SVP standards, to oversee all regulatory compliance measures and protocols related to paleontological resources.
2. **Conduct Worker Training:** The Project Paleontologist should develop a Worker Environmental Awareness Program (WEAP) to train the construction crew on the legal requirements for preserving fossil resources, as well as the procedures to follow in the event of a fossil discovery. This training program would be given to the crew before ground-disturbing work commences and would include handouts to be given to new workers as needed.
3. **Monitor for Paleontological Resources:** Ground disturbances greater than or equal to 3 feet below ground surface with the potential to impact late to middle Pleistocene old alluvial fan deposits (Qof) and/or late Miocene Modelo Formation (Tm) should be monitored full-time. Monitoring should be reduced or ceased once over-excavations into the underlying previously undisturbed deposits have been completed, or if Recent to late Holocene artificial fill (Qaf) is the only geologic units encountered during earthwork activities. Ground disturbances in previously disturbed sediments should not be monitored, regardless of depth.

Monitoring should be conducted by a paleontological monitor who meets the standards of the SVP (2010) working under the supervision of the Project Paleontologist. The Project Paleontologist may periodically inspect construction activities to adjust the level of monitoring in response to subsurface conditions. In consultation with the lead agency and Chaminade College Preparatory, monitoring efforts can be increased, reduced, or ceased entirely if determined adequate by the Project Paleontologist. Paleontological monitoring should include inspection of exposed sedimentary units during active excavations within sensitive geologic sediments. The monitor should have authority to temporarily divert activity away from exposed fossils to evaluate the significance of the find and, should the fossils be determined significant, professionally and efficiently recover the fossil specimens and collect associated data. Paleontological monitors should record pertinent geologic data and collect appropriate sediment samples from any fossil localities.

4. **Prepare a Paleontological Resources Monitoring Report:** Upon conclusion of ground-disturbing activities, the Project Paleontologist overseeing paleontological monitoring should prepare a final Paleontological Resources Monitoring Report (PRMR) that documents the paleontological monitoring efforts for the project and describes any paleontological resources discoveries observed and/or recorded during the life of the project. If paleontological resources are curated, the final PRMR and any associated data pertinent to the curated specimen(s) should be submitted to the designated repository. A copy of the final PRMR should be filed with the lead agency.

## LITERATURE CITED

- Barnes, L.G. 1985. The Late Miocene dolphin *Pithanodelphis* Abel, 1905 (Cetacea: Kentriodontidae) from California. *Contributions in Science* 367:1–27.
- Barnosky, A., C. Bell, S. Emslie, H. T. Goodwin, J. Mead, C. Repenning, E. Scott, and A. Shabel. 2004. Exceptional record of Mid-Pleistocene Vertebrates helps differentiate climatic from anthropogenic ecosystem perturbations. *Proceedings of the National Academy of Sciences* 101:9297–9302.
- Campbell, R.H., C.J. Willis, P.J. Irvine, B.J. Swanson, C.I. Gutierrez, and M.D. O’Neal. 2014. Preliminary geologic map of the Los Angeles 30’ x 60’ quadrangle, California, Version 2.1. California Geological Survey, scale 1:100,000.
- Cemen, I. 1977. Geology of the Sespe-Piru Creek area, Ventura County, California. M.S. thesis for Ohio University, Athens. Part II of *Final Technical Report for Contract Number 14-08-0001-15886*, R.S. Yeats, principal investigator, sponsored by U.S. Geological Survey contract no. 14-08-0001-15271. Map in pocket, scale 1:24,000.
- City of Los Angeles. 2001. *Conservation Element of the City of Los Angeles General Plan*. City Plan Case No. 2001-0413-GPA, Council File No. 01-1094. Available at: [https://planning.lacity.org/odocument/28af7e21-ffdd-4f26-84e6-dfa967b2a1ee/Conservation\\_Element.pdf](https://planning.lacity.org/odocument/28af7e21-ffdd-4f26-84e6-dfa967b2a1ee/Conservation_Element.pdf). Accessed June 1, 2018.
- . 2006. Cultural Resources. In *L.A. CEQA Thresholds Guide*, Section D:1. Available at: <https://planning.lacity.org/eir/CrossroadsHwd/deir/files/references/A07.pdf>. Accessed June 1, 2018.
- Connin, S., J. Betancourt, and J. Quade. 1998. Late Pleistocene C4 plant dominance and summer rainfall in the southwestern United States from isotopic study of herbivore teeth. *Quaternary Research* 50:179–193.
- Crane, J.M., Jr. 1966. Late Tertiary radiation of viperfishes (Chauliodontidae) based on comparison of Recent and Miocene species. *Contributions in Science, Los Angeles County Museum* 115:1–29.
- David, L.R. 1943. Miocene fishes of Southern California. *Geological Society of America Special Paper* 43:1–187.
- Denton, J.S. 2013. Lanternfish (Teleostei, Myctophiformes, Myctophidae) body fossils from the Modelo Formation (Upper Miocene) of Los Angeles County, California. *Journal of Vertebrate Paleontology* 33(4):786–793.
- Dibblee, T.W., Jr., and H.E. Ehrenspeck. 1992. Geologic map of the Calabasas quadrangle, Los Angeles County, California. Dibblee Geological Foundation, Map DF-37, scale 1:24,000.
- Eisentraut, P., and J. Cooper. 2002. *Development of a Model Curation Program for Orange County’s Archaeological and Paleontological Collections*. Submitted to the County of Orange Public Facilities and Resources Department/Harbors, Parks and Beaches (PFRD/HPB). California State University, Fullerton.
- Eldridge, G.H., and R. Arnold. 1907. The Santa Clara Valley, Puente Hills, and Los Angeles oil districts, southern California. *U.S. Geological Survey Bulletin* 309:1–266.

- Fink, W.L., and S.V. Fink. 1986. A phylogenetic analysis of the genus *Stomias*, including the Synonymization of *Macrostomias*. *Copeia* 1986(2):494–503.
- Graham, R.W., and E.L. Lundelius. 1994. FAUNMAP: A Database Documenting the Late Quaternary Distributions of Mammal Species in the United States. *Illinois State Museum Scientific Papers* XXV(1).
- Howard, H. 1962. A new Miocene locality record for *Puffinus diatomicus* and *Sula willetti*. *The Condor* 64(6):512–513.
- Hudson, D., and B. Brattstrom. 1977. A small herpetofauna from the Late Pleistocene of Newport Beach Mesa, Orange County, California. *Bulletin of the Southern California Academy of Sciences* 76:16–20.
- Jefferson, G.T. 1991a. *A Catalogue of Late Quaternary Vertebrates from California: Part One, Nonmarine Lower Vertebrate and Avian Taxa*. Technical Reports No. 5. Los Angeles, California: Natural History Museum of Los Angeles County.
- . 1991b. *A Catalogue of Late Quaternary Vertebrates from California: Part Two, Mammals*. Technical Reports No. 7. Los Angeles, California: Natural History Museum of Los Angeles County.
- Kellogg, R. 1934. A new cetothere from the Modelo Formation at Los Angeles, California. *Carnegie Institution of Washington* 447:83–104.
- McDonald, H.G., and G.T. Jefferson. 2008. Distribution of Pleistocene Nothrotheriops (Xenartha, Nothrotheriidae) in North America. In *Geology and Vertebrate Paleontology of Western and Southern North America*, edited by X. Wang and L. Barnes. Natural History Museum of Los Angeles County Science Series 41:313–331.
- Miller, L. 1929. A new cormorant from the Miocene of California. *The Condor* 31(3):167–172.
- Miller, W.E. 1971. *Pleistocene Vertebrates of the Los Angeles Basin and Vicinity: Exclusive of Rancho La Brea*. Los Angeles County Museum of Natural History No. 10.
- Murphey, P., G. Knauss, L. Fisk, T. Demere, and R. Reynolds. 2019. Best practices in mitigation paleontology. *Proceedings of the San Diego Society of Natural History* 47:1–43.
- Namson, J., and T.L. Davis. 1988. Structural transect of the Western Transverse Ranges California: Implications for lithospheric kinetics and seismic risk evaluation. *Geology* 16:675–679.
- Natural History Museum of Los Angeles County (NHMLA). 2021. Unpublished collections data, August 28.
- Norris, R.M., and R.W. Webb. 1990. *Geology of California*. Santa Barbara, California: John Wiley & Sons, Inc.
- Reynolds, R.E., and R.L. Reynolds. 1991. The Pleistocene beneath our feet: Near-surface Pleistocene fossils in inland Southern California basins. In *Inland Southern California: The Last 70 Million Years*, edited by M.O. Woodburne, R.E. Reynolds, and D.P. Whistler, pp. 41–43. Redlands, California: San Bernardino County Museum Association.

- Roy, K., J. Valentine, D. Jablonski, and S. Kidwell. 1996. Scales of climatic variability and time averaging in Pleistocene Biotas: Implications for ecology and evolution. *Trends in Ecology and Evolution* 11:458–463.
- Sandom, C., S. Faurby, B. Sandel, and J.C. Svenning. 2014. Global Late Quaternary megafauna extinctions linked to humans, not climate change. *Proceedings of the Royal Society B* 281:20133254.
- Scott, E. 2010. Extinctions, scenarios, and assumptions: Changes in latest Pleistocene large herbivore abundance and distribution in Western North America. *Quaternary International* 217:225–239.
- Scott, E., and K. Springer. 2003. CEQA and fossil preservation in Southern California. *The Environmental Monitor* 4–10.
- Society of Vertebrate Paleontology (SVP). 1995. Assessment and mitigation of adverse impacts to nonrenewable paleontologic resources: Standard guidelines. *SVP News Bulletin* 163:22–27.
- . 2010. *Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources*. Available at: [https://vertpaleo.org/wp-content/uploads/2021/01/SVP\\_Impact\\_Mitigation\\_Guidelines.pdf](https://vertpaleo.org/wp-content/uploads/2021/01/SVP_Impact_Mitigation_Guidelines.pdf). Accessed November 4, 2020.
- Springer, K., E. Scott, J. Sagebiel, and L. Murray. 2009. The Diamond Valley Lake local fauna: Late Pleistocene vertebrates from inland Southern California. In *Papers on Geology, Vertebrate Paleontology, and Biostratigraphy in Honor of Michael O. Woodburne*, edited by L. Albright. *Museum of Northern Arizona Bulletin* 65:217–237.
- SWCA Environmental Consultants (SWCA). 2018. *Cultural and Paleontological Resources Assessment for the Granada Hills Pool and Bathhouse Replacement Project, City of Los Angeles, California*. Prepared for the City of Los Angeles Department of Public Works, Bureau of Engineering. Pasadena, California: SWCA Environmental Consultants.
- Sylvester, A.G., and E. O’Black Gans. 2016. *Roadside Geology of Southern California*. Missoula, Montana: Mountain Press Publishing Company.
- Wentworth, C.M., and R.F. Yerkes. 1971. Geologic Setting and Activity of Faults in the San Fernando Area, California. *The San Fernando, California, Earthquake of February 9, 1971: A Preliminary Report Published Jointly by the U.S. Geological Survey and the National Oceanic and Atmospheric Administration*. U.S. Geological Survey Professional Paper 773:6–16.
- Winterer, E.L., and D.L. Durham. 1962. *Geology of Southeastern Ventura Basin, Los Angeles County, California*. Shorter Contributions to General Geology. U.S. Geological Survey Professional Paper 334-H:275–366.
- Woodring, W.P. 1931. A Miocene *Haliotis* from Southern California. *Journal of Paleontology* 5(1):34–39.
- Yerkes, R.F. 1997. Preliminary geologic map of the San Fernando 7.5-minute quadrangle, Southern California. U.S. Geological Survey Open-File Report 96-88, scale 1:24,000.
- Yerkes, R.F., and R.H. Campbell. 1995. Preliminary geologic map of the Calabasas 7.5’ quadrangle, Southern California: A Digital Database. U.S. Geological Survey Open-File Report 95-51, scale 1:24,000.

**ATTACHMENT A**

**Natural History Museum of Los Angeles County  
Paleontological Records Search**

**CONFIDENTIAL – NOT FOR PUBLIC RELEASE**