APPENDIX F

Paleontological Resources Technical Report

Paleontological Resources Technical Report La Brea Tar Pits Master Plan, Los Angeles, California

JANUARY 2023

PREPARED FOR

Los Angeles County Museum of Natural History Foundation

LEAD AGENCY

County of Los Angeles

PREPARED BY

SWCA Environmental Consultants

PALEONTOLOGICAL RESOURCES TECHNICAL REPORT
LA BREA TAR PITS MASTER PLAN
LOS ANGELES, CALIFORNIA

Prepared for:

Los Angeles County Museum of Natural History Foundation
On behalf of County of Los Angeles Museum of Natural History
900 Exposition Boulevard
Los Angeles, California 90007
Attn: Dawn McDivitt, Chief Deputy Director

Lead Agency: County of Los Angeles

Prepared by:

Mathew Carson, M.S., Lead Paleontologist
Kristina Akesson, B.S., Assistant Staff Paleontologist
Russell Shapiro, Ph.D., Principal Paleontologist

SWCA Environmental Consultants
320 North Halstead Street, Suite 120
Pasadena, California 91107
(626) 240-0587
www.swca.com

SWCA Project No. 63953

January 2023

EXECUTIVE SUMMARY

Purpose and Scope: The Los Angeles County Museum of Natural History Foundation (Foundation) retained SWCA Environmental Consultants (SWCA) to prepare a Paleontological Resources Technical Report in support of the proposed La Brea Tar Pits Master Plan (proposed project) in the City of Los Angeles, California. The La Brea Tar Pits, the George C. Page Museum (Page Museum), and associated facilities are owned by the County of Los Angeles (County) but are managed by the non-profit Foundation. The Foundation's role is to carry out all County services including public access and programming, administration, and operation of the Natural History Museums of Los Angeles County, including the La Brea Tar Pits and Page Museum. The overall Master Plan consists of nine principal project components: 1) Page Museum renovations, 2) Wilshire Gateway entry plaza and Lake Pit, 3) enhanced Central Green, 4) revamped Pit 91, 5) new museum building, 6) new public promenade, 7) new pedestrian path, 8) 6th Street entry gateway, and 9) support building. SWCA has prepared this technical report to summarize the results of a paleontological existing conditions assessment that includes a review of asphalt pit and fossil locality data from multiple sources, published scientific literature, online fossil locality database results, previous paleontological resources assessments, and museum records search results from the County Museum of Natural History (Museum of Natural History); regional and local geologic maps; and subsurface geotechnical/borehole data. This technical report also includes an impacts assessment for the potential project and proposes avoidance and minimization measures to reduce potential impacts to less-than-significant levels, pursuant to the requirements of the California Environmental Quality Act (CEQA).

Date of Investigation: In summer 2022, SWCA reviewed scientific literature; online fossil locality databases; geologic and paleontological information from previous paleontological resources assessments and environmental documents; and fossil taxonomic data provided by the Page Museum. These data were supplemented by a museum records search from the Museum of Natural History that was received on February 5, 2022. SWCA also conducted site visits to verify the data with the Page Museum curators, collections managers, and preparators in September and October 2022.

Summary of Findings: The La Brea Tar Pits represents a world-renowned fossil site that has yielded millions of significant late Pleistocene to middle Holocene fossils, with recovered taxa characteristic of the "Rancholabrean" North American Land Mammal Age stage. A review of the existing conditions at the site indicates that the entirety of Hancock Park contains a veneer of artificial fill overlying older alluvium that is subsequently underlain by the San Pedro Sand and Fernando Formation at greater depths. Although considered scientifically less valuable or scientifically nonsignificant in most circumstances (Society of Vertebrate Paleontology 2010), fossils from artificial fill and reworked sediments originating from within Hancock Park may still provide scientifically important information due to the heightened paleontological importance and level of fossil preservation of this world-renown fossil site. Therefore, Recent artificial fill and reworked sediments originating from Hancock Park have a high potential to produce significant paleontological resources. Additionally, asphalt deposits seeping from the underlying geologic units to the surface through the artificial fill may contain fossils, albeit to lesser degrees than the underlying older alluvium. The thickness of fill and disturbed sediments likely varies across the site but may extend as deep as 8 feet below ground surface in some areas, or as shallow as 3 feet below ground surface in others. Generally, late Pleistocene older alluvium, early Pleistocene San Pedro Sand, and early Pleistocene to Pliocene Fernando Formation have high paleontological potential throughout their extents within the Los Angeles Basin. Crosscutting the site's stratigraphy, asphalt pools, seeps, and chimneys have yielded a substantial proportion of the fossils recovered from Hancock Park. Most asphalt or asphalt-saturated alluvial sediments that have yielded Rancholabrean fossils are from 13 to 20 feet below ground surface, but possibly range from near the surface to approximately 40 feet below ground surface. It is critical to recognize that the age of the fossils is related to when the asphalt reached the surface, not the age of the enclosing geological formation. This has proved a challenge to researchers as established principles of

superposition do not apply at Rancho La Brea. Therefore, significant paleontological resources may be impacted by construction or implementation of the project regardless of depth since ground-disturbing activities associated with the construction of the project have the potential to impact asphalt seeps containing aggregates of fossils.

Conclusions and Recommendations: Any fossils encountered during ground-disturbing activities could be at risk for damage or destruction from such activities, which could constitute a potentially significant impact under CEQA, depending on the nature of the fossil encountered. The implementation of appropriate feasible mitigation measures prior to and during ground-disturbing activities will ensure that fossils, if encountered, are assessed for significance and, if significant, salvaged to the extent feasible for laboratory analysis and (eventual) curation within the Page Museum (or their designee). These actions will reduce impacts to paleontological resources to less-than-significant levels, pursuant to CEQA.

Avoidance and minimization measures include: 1) retaining a Qualified Professional Paleontologist (Project Paleontologist) who meets the standards defined by the Society of Vertebrate Paleontology; and 2) development of a Paleontological Resources Management Plan (PRMP) that includes (but is not limited to) communication and coordination protocols, monitoring procedures, fossil salvage and processing procedures, and final reporting requirements. The PRMP shall require that full-time paleontological monitoring shall occur during all ground-disturbing activities (regardless of depth), including the inspection of artificial fill and reworked sediments to check for the presence of asphaltum and fossilized remains previously not collected. The Project Paleontologist may recommend changes in the implementation of the PRMP in consultation with the County of Los Angeles (County) and the Page Museum curators. Additionally, special considerations shall be given to the project design elements and geotechnical and soils remediation or hazard reduction recommendations, including but not limited to the paleontological screening of tar sands prior to disposal or treatment. Paleontological monitoring shall include inspection of exposed sedimentary units during active excavations, grading, tar sand removal, and any other ground-disturbing activity that has the potential to impact sediments capable of preserving significant fossils. The Page Museum curators (or their representatives) and the paleontological monitor shall have authority to temporarily divert activity away from exposed fossils to evaluate the significance of the find and, should the fossils be determined significant or likely significant, professionally and efficiently recover the fossil specimens and collect associated data. Data collection procedures may require the support of construction contractors to carefully and efficiently collect field data and extract the fossils to allow construction to continue. Grading and earthwork contractors shall follow the guidance of the Page Museum staff or Project Paleontologist regarding the collection and/or extraction of paleontological resources. The monitor shall record pertinent geologic data and collect appropriate sediment samples from any fossil localities. Recovered fossils shall be directly retained by the Page Museum for later analysis, laboratory preparation, and eventual curation if deemed significant or important.

Upon conclusion of ground-disturbing activities, the Project Paleontologist overseeing paleontological monitoring shall prepare a final monitoring report 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. The final monitoring report and any associated data pertinent to the salvaged fossil specimen(s) shall be submitted to the Page Museum and the County within 90 days after construction is completed.

Disposition of Data: This report will remain on file at the Page Museum, the County, and SWCA's Pasadena office.

CONTENTS

Appendices

Figures

Tables

1 INTRODUCTION

1.1 Project Purpose and Scope

The 13-acre La Brea Tar Pits project site is located within the eastern and northwestern portions of the 23-acre Hancock Park (Assessor's Parcel Number [APN] 5508-016-902). The La Brea Tar Pits, the George C. Page Museum (Page Museum), and associated facilities, are owned by the County of Los Angeles but are managed by the non-profit Los Angeles County Museum of Natural History Foundation (Foundation). The Foundation's role is to carry out all County services including public access and programming, administration, and operation of the County of Los Angeles Museum of Natural History (Museum of Natural History), including the La Brea Tar Pits and the Page Museum. The County of Los Angeles (County) is the Lead Agency under the California Environmental Quality Act (CEQA); the Museum of Natural History is a County departmental unit.

The Foundation retained SWCA Environmental Consultants (SWCA) to prepare a Paleontological Resources Technical Report in support of the proposed La Brea Tar Pits Master Plan (proposed project) in the City of Los Angeles, California. The Foundation proposes a redevelopment, or "reimagining," of the La Brea Tar Pits site, including the Page Museum and portions of the surrounding Hancock Park. The Foundation proposes a reimagined site design, expansion, and upgrades for the La Brea Tar Pits complex, including renovations to the Page Museum. The project site is located at 5801 Wilshire Boulevard in Los Angeles, California. Hancock Park was established on the site in the early twentieth century. The western boundary of the project site is approximately 0.05 miles to the eastern entrance of the Los Angeles County Museum of Art (LACMA).

The project site encompasses the La Brea Tar Pits, whose facilities include the 1977 Page Museum; 1952 Observation Pit; various excavation sites (including the Lake Pit) and features, primarily with temporary construction serving as support facilities; a concession and public restroom building; a multipurpose lawn and recreational areas; hardscaping/landscaping features throughout the park; and a surface parking lot.

This study was conducted to address potentially significant adverse direct and indirect impacts to paleontological resources to facilitate compliance with the CEQA, California Public Resources Code (PRC) 5097.5, and local regulations.

1.2 Key Personnel

The lead author and investigator for this study was Lead Paleontologist, Mathew Carson, M.S. Assistant Staff Paleontologist Kristina Akesson, B.S., contributed to researching and writing portions of the report. Principal Paleontologist, Russell Shapiro, Ph.D., provided oversight and quality assurance/quality control (QA/QC). Mr. Carson and Dr. Shapiro are Qualified Professional Paleontologists (Project Paleontologists) who meet or exceed the professional standards defined by the SVP (2010) (see Appendix A). Additional input was provided by SWCA Senior Archaeologist, Chris Millington, M.A., Registered Professional Archaeologist (RPA). John Dietler, Ph.D., RPA, served as the Principal-in-Charge of the project, and Bobbette Biddulph served as Project Manager. Figures were generated by SWCA Geographic Information System (GIS) Specialists Marty Kooistra, M.A., RPA, and Matthew DeFreese, M.A. Copies of the report are on file with the County, the Foundation, and SWCA's Pasadena office.

2 PROJECT LOCATION AND DESCRIPTION

2.1 Project Location

The La Brea Tar Pits property (project site) is located at 5801 Wilshire Boulevard within the 23-acre Hancock Park (Assessor's Parcel Number 550-801-6902) (Figures 1 and 2). The project site includes 13 acres of the eastern and northwestern portions of Hancock Park and is directly adjacent to the LACMA. The project site is located approximately 5.5 miles west from downtown Los Angeles and approximately 8.6 miles east of the Pacific Ocean. It is bounded by West 6th Street to the north (an approximately 1,200-foot-long frontage), South Curson Avenue to the east (an approximately 830-foot-long frontage), Wilshire Boulevard to the south (an approximately 500-foot-long frontage), and the LACMA to the west (an approximately 250-foot-long frontage). The area is known as the Miracle Mile neighborhood of the city of Los Angeles. This location is plotted in Sections 20 and 21, Township 1 South, Range 14 West, as depicted on the U.S. Geological Survey (USGS) Hollywood, California, 7.5-minute topographic quadrangle (Figure 1, Figure 2, and Figure 3).

2.2 Existing Conditions and Surrounding Land Uses

The project site includes 13 acres of the eastern and northwestern portions of Hancock Park and broadly encompasses what is known as the La Brea Tar Pits, which includes the Page Museum (see Figure 2). The entirety of Hancock Park is enclosed within an 8- to 10-foot-high metal fence, which serves to secure the site by providing full closure of Hancock Park when the La Brea Tar Pits, Page Museum, and LACMA are closed in the evenings.

The Page Museum is approximately 63,200 square feet and is located on the eastern portion of the project site. The project site contains multiple active fossil quarries, commonly called "tar pits." The active tar pits (Pits 3, 4, 9, 13, 61, 67, and 91) are located within the northwestern portion of the project site, along with the Observation Pit on the western boundary of the project site. Project 23[1] and Pit 91 are active fossil recovery and excavation sites also located in the northwestern portion of the project site. The Lake Pit is a former commercial asphalt quarry and is the largest excavation on the grounds of Hancock Park; the Lake Pit is located in the southeastern portion of the project site.

The project site includes an approximately 28,000-square-foot multipurpose grass lawn, known as the Central Green, located to the west of the Page Museum. Parking for the La Brea Tar Pits is located in the northeast corner of the project site, at the corner of South Curson Avenue and West 6th Street (see Figure 2). Vehicles enter and depart the lot from both directions on South Curson Avenue.

The project site is surrounded by a variety of commercial uses, museums, residential buildings, and schools. The project site is bounded by the Park La Brea Pool and multi-family residential uses to the north across West 6th Street, commercial and residential uses to the east across South Curson Avenue, the Craft Contemporary Museum and other museum and commercial uses south across Wilshire Boulevard, and museum and commercial uses to the west.

[1] During construction on the LACMA parking garage in 2006, 16 new paleontological deposits were discovered, including an almost-complete skeleton of an adult mammoth. Given the size of the discoveries, 23 large wooden boxes were built around the various deposits, allowing many of the discoveries to remain intact. "Project 23" has now become the short-hand descriptor for the location and activities related to the excavation of deposits within the 23 large wooden boxes that is now occurring in a portion of the La Brea site.

Figure 1. Project site vicinity.

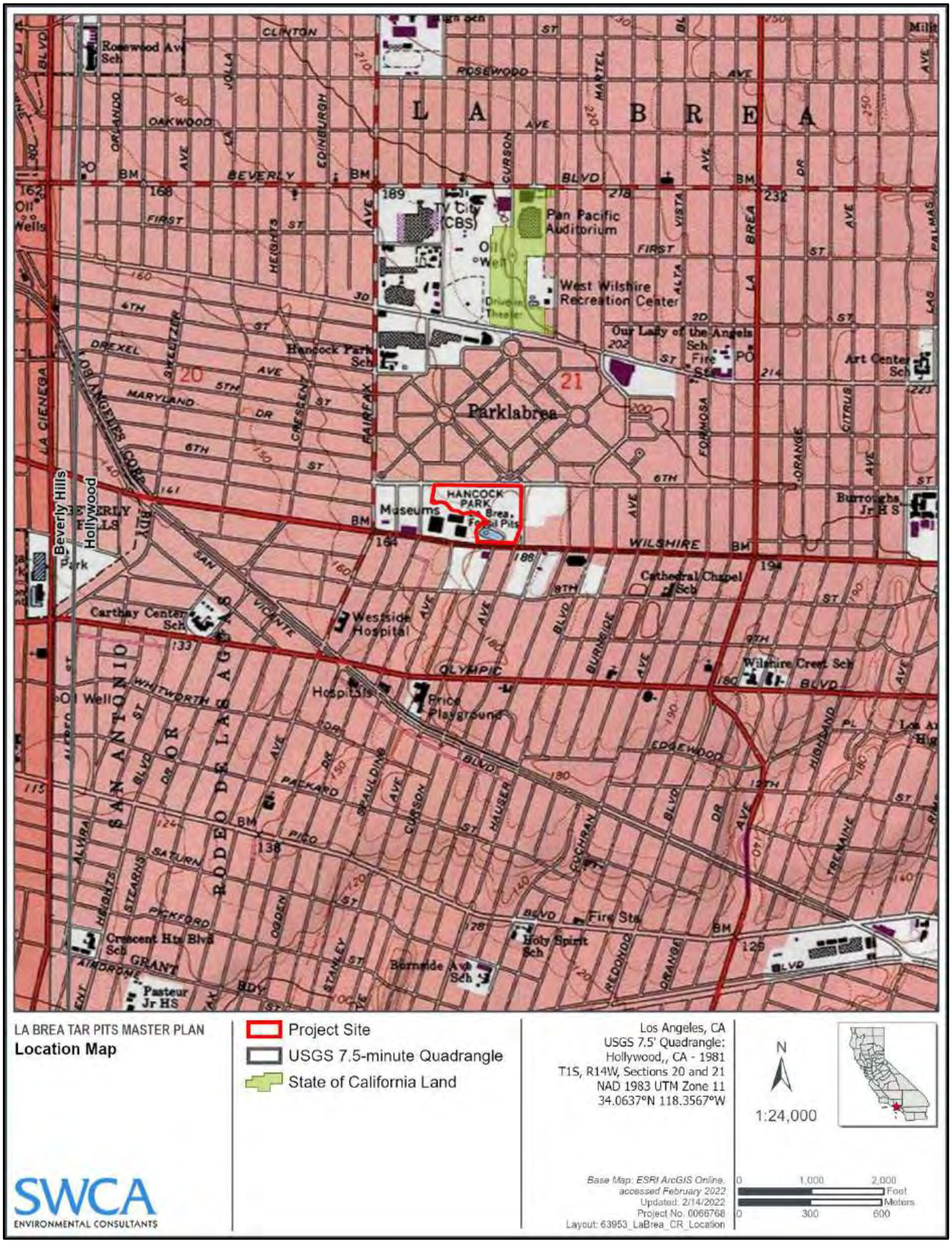


Figure 2. Project site plotted on the Hollywood, California, USGS 7.5-minute topographic quadrangle.

Figure 3. Project site shown on 2020 aerial photograph.

2.3 Proposed Project

The project would result in a reimagined site design, expansion, and upgrades for the La Brea Tar Pits complex and portions of Hancock Park, including renovations to the Page Museum (Figure 4). Table 1 provides a summary of the project components; more detail on the project components is provided following the table.

Table 1. Project Components Summary

Project Component	Description
Page Museum Renovations	Renovate existing building in same footprint (approximately 63,200 square feet). Demolish existing maintenance building and service facilities along the northern boundary, directly west of the parking lot. Construct new 2,000-gross-square-foot (gsf) satellite maintenance and support building.
New Museum Building	Construct a new two-story 40,000-gsf museum building northwest of the Page Museum, including two new theaters.
Wilshire Gateway	Renovate the existing entrance to the La Brea Tar Pits at Wilshire Boulevard and South Curson Avenue with shaded canopy and new welcome pavilion.
The Lake Pit	Construct a pedestrian bridge and walking path over the Lake Pit. Install a new garden bioswale.
6th Street Gateway	Renovate the existing entrance at the northwest corner of West 6th Street and the entrance to the LACMA service drive with shaded canopy and new welcome pavilion.
Tar Pits (Pits 3, 4, 9, 13, 61, 67, and 91; Project 23)	Renovate the existing facilities at all the tar pits in the northwestern portion of the project site.
Pedestrian Path and Recreation Areas	Reconfigure the existing pedestrian pathways on-site into a continuous 1-kilometer-long paved pedestrian path linking existing features on the project site. Improvements to the Central Green (establish a drivable path for food truck access). Establish a children's play area, picnic areas, and a small dog park west of the 6th Street Gateway.
Circulation and Parking	Expand existing parking lot from 63,000 square feet to 65,000 square feet and relocate approximately 50 to 70 feet to the north. This would require removal and relocation of existing trees on-site. Increase vehicle parking spaces approximately 5 to 15 spaces for a total of 160 to 170 vehicle parking spaces. Addition of new landscaping and vehicle access lanes to the parking lot. Establish new school drop-off/loading area approximately 215 to 230 feet long on South Curson Avenue adjacent to the Wilshire Gateway picnic area.
Landscaping Concept Plan	Establish three distinct landscaping zones encircled by looping pedestrian path. Creation of biofiltration areas for stormwater management. Introduction or relocation of approximately 84 trees from existing locations on-site to new locations on-site.

Figure 4. Conceptual site plan, La Brea Tar Pits Master Plan

2.3.1 Page Museum Renovations

The project would renovate the existing Page Museum within the same footprint as the existing building (currently approximately 63,200 square feet) to allow for enlarged exhibition space, additional storage, a ground floor café, and retail space. The central atrium would be renovated to provide additional exhibitions and provide additional classroom and laboratory space. The second floor of the Page Museum would contain two classrooms and a multipurpose space. An outdoor café and bar would be located next to these spaces on the center terrace on the west side of the Page Museum. A sloped green roof would be installed to the north of the Page Museum and would curve to the west. The project would add several sustainability features to the Page Museum. The features include enhanced daylighting, rainwater collection leading to bioswales, a sloped green roof, and rooftop solar photovoltaic panels.

In addition, the project would demolish the existing maintenance building and service facilities along the northern boundary, directly west of the parking lot. A new 2,000-gross-square-foot (gsf) satellite maintenance and support building would be constructed for additional storage, administration, and research space directly west of the parking lot.

2.3.2 New Museum Building

A new two-story museum building would be located to the northwest of the Page Museum (see Figure 3 and Figure 4). The building would be approximately 40,000 gsf and would increase the total museum square footage to 104,000 gsf. The new museum building would include an extended central lobby, exhibit spaces, two theaters, a mechanical equipment room, research and collections rooms, administration spaces, and a loading dock.

The Page Museum and new museum building would be continuously connected on the first floor. The first-floor central lobby would face southwest toward the Central Green and branch off into the Page Museum to the east and the new museum building to the west. An updated retail and café space would be located off the lobby and look out over the Central Green. The Page Museum and the new museum buildings would be disconnected on the second floor, which would rise above the earthen berm. The separated facilities would be accessible through sloped outdoor walkways from the Central Green or interior staircases in the museum. There would be pedestrian entrances leading into the central lobby from the Central Green and from the parking lot. The existing Page Museum entrance would be converted to an educational group and tour entrance, which would be connected to a new school drop-off area on South Curson Avenue.

2.3.3 Entrance Renovation and Other Internal Circulation Improvements

The project would renovate the existing entrance to the La Brea Tar Pits located at Wilshire Boulevard and South Curson Avenue. A large, shaded canopy would stretch down Wilshire Boulevard and curve around to South Curson Avenue to create a new welcome pavilion and shaded entry plaza; this would provide orientation, spaces for gathering and queuing, and restrooms (see Figure 3 and Figure 4). A picnic area would also be located under the shaded canopy.

A pedestrian bridge and walking path would be constructed over the Lake Pit. Directly to the east of the Lake Pit, a new garden bioswale would be installed to manage stormwater and would include vegetation related to the relocated mammoths and mastodon sculptures.

A school drop-off area on South Curson Avenue would lead directly to the education museum entrance, enabling the choreography of student tour itineraries that are distinct from general museum visitors and other tour groups.

The project would renovate the existing entrance at the northwest corner of West 6th Street and the entrance to the LACMA parking garage. Similar to the Wilshire Gateway, a shaded canopy and welcome pavilion would provide orientation, legibility, and amenities. As a visible point of arrival from the residential communities to the north, this new entry would welcome visitors to a shaded park space where community park and recreational needs are balanced with the research activities of La Brea. Under the canopy of shade trees, visitors would find diverse destinations, including play areas, picnic areas, seating and interpretation zones at the protected tar seeps, the gentle topography and bioswales along Oil Creek, and the revitalized destinations of the Dorothy Brown Amphitheater, Observation Pit, and Pit 91. Along the south edge of the loop path, connections would allow access to other Hancock Park programs and transportation connections.

2.4 Ground Disturbances

At the time of preparation of this report, the proposed project is at the preliminary design stages, and final engineering, design, and grading plans for the project have not been finalized. Therefore, estimates of the depth of ground disturbances that were provided by the Foundation are discussed here. Due to anticipated soil conditions, on-site soils are not expected to be suitable for reuse and would need to be exported for remediation and disposal. As such, it is anticipated that project earthwork activities would include an estimated 53,000 cubic yards of cut/export and potentially 37,000 cubic yards of imported fill. While the exact depth of construction and the finish grade of the new museum building has not been established, this analysis assumes that the depth of excavation would be approximately 6 to 10 feet below ground surface. While the final elevation of the foundation for the new museum building is not known at this time, it may be below the existing ground surface in order to provide a smooth connection to the existing Page Museum.

3 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.

3.1 State Regulations

3.1.1 California Environmental Quality Act

CEQA is the principal statute governing environmental review of projects occurring in the state and is codified at California PRC Section 21000 et seq. CEQA requires lead agencies to determine whether 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 most recently on December 28, 2018 (Title 14, Chapter 3, California Code of Regulations 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.

3.1.2 California 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 Section 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.

3.2 County of Los Angeles

The Conservation and Natural Resources Element of the *Los Angeles County General Plan 2035* (General Plan) (County of Los Angeles 2015) recognizes paleontological resources in Section VIII: Historic, Cultural, and Paleontological Resources, and aims to promote public awareness of their value and foster their public enjoyment. Therefore, the General Plan contains one goal (C/NR 14) aimed at the protection of historic, cultural, and paleontological resources, with the following four policies pertinent to paleontological resources:

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

3.3 City of Los Angeles

While the project site is located within the City of Los Angeles, it is owned by the County of Los Angeles and is proposed for uses that benefit the public. Accordingly, the project is not subject to the regulatory controls of the City of Los Angeles; however, the project will be in compliance with City of Los Angeles requirements. Planning documents of the City of Los Angeles that are most relevant to the project as they relate to paleontological resources are discussed herein for informational purposes.

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.
- Whether the paleontological resource is of regional or statewide significance.

4 DEFINITION OF SIGNIFICANCE

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 mitigation paleontologists in California 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, 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). (SVP 2010:11)

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.
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.

5 PALEONTOLOGICAL POTENTIAL CLASSIFICATION

Geologic units known to preserve significant fossils or fossil localities are likely to contain additional undiscovered and potentially significant fossils throughout their areal and stratigraphic extent. Paleontological potential ("sensitivity") is defined as the potential for a geologic unit to produce scientifically significant fossils. This is determined by the paleoenvironmental conditions or depositional setting of the geologic units, 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 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)

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. Subsurficial 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 *Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources* (SVP 2010:1–2), the SVP defines four categories of paleontological sensitivity for rock units with considerations for the potential of direct or indirect adverse impacts. These categories are: 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 volcaniclastic 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)

6 METHODS

The following sections present an overview of the methodology used to establish the existing paleontological conditions of the project site, analyze the potential for adverse impacts to significant paleontological resources due to implementation or construction of the proposed project, and determine avoidance and minimization measures to reduce adverse impacts to less-than-significant levels. The methodology used in this assessment conforms to industry standards as developed by the SVP (1995, 2010), as well as published best practices for mitigation paleontology (Murphey et al. 2019).

6.1 Existing Conditions Review

The La Brea Tar Pits has yielded the best preserved, most diverse, and most numerous fossils of the late Pleistocene and early to middle Holocene, providing paleontologists a unique opportunity to reconstruct the paleoecology of life as it existed in the Los Angeles region during that time (Stock and Harris 2007). Based on conditions listed in Section 4, Definition of Significance, and the paleontological potential classes described in Section 5, Paleontological Potential Classification, above, the geologic units within Hancock Park have an undeniably high paleontological sensitivity. In fact, the La Brea Tar Pits site has been selected as one of the first 100 Geological Heritage Sites by the International Union of Geological Sciences due to its local and global importance in understanding evolution, extinction, and climate change (personal communication from Dr. Lori Bettison-Varga [2022]). Nonetheless, questions persist regarding 1) the vertical and horizontal extent of fossiliferous deposits within the site; 2) the variation in quantities and irregular distribution of fossil material recovered from the different exploration pits across the site; 3) the historic exploration and salvage of fossils within the site and the influence such activities may have had on the current distribution of subsurface fossils in reworked sediments within Hancock Park; and 4) the ideal methodology to be used for data recovery and fossil salvage during preconstruction ground-disturbing activities that minimizes the loss of scientifically important paleontological information. To establish the existing conditions within the site to the extent feasible, SWCA conducted an analysis of available existing data pertinent to paleontological resources within Hancock Park. This analysis included a review of asphalt pit and fossil locality data from multiple sources including published scientific literature; online fossil locality database results; previous paleontological resources assessments; museum records search results from the Museum of Natural History; regional and local geologic maps; and subsurface geotechnical/borehole data.

In summer 2022, SWCA reviewed scientific literature, online fossil locality databases, geologic and paleontological information from previous paleontological resources assessments and environmental documents, and fossil taxonomic data provided by the Page Museum. These data were supplemented by a museum records search from the Museum of Natural History that was received on February 5, 2022. Appendix B (confidential) provides a copy of the museum records search results. For a review of geologic mapping within and around Hancock Park, SWCA reviewed geologic maps prepared by Dibblee and Ehrenspeck (1991) at a scale of 1:24,000, Yerkes and Graham (1997) at a scale of 1:24,000, and Campbell et al. (2014) at a scale of 1:100,000. Being the most recently published map at the highest resolution, SWCA uses geologic mapping by Yerkes and Graham (1997) as the base for this investigation, with special considerations from Dibblee and Ehrenspeck (1991) and Campbell et al. (2014), following published best practices (Murphey et al. 2019). At the time of preparation of this report, a preliminary geotechnical investigation for the proposed project within Hancock Park was completed; however, further geotechnical work is needed following refinement of the project design. To supplement SWCA’s synthesis of existing data relevant to the project site, Mr. Carson and Dr. Shapiro verified these data sources with the Page Museum curators, collections managers, and preparators during site visits in September and October of 2022. A summary of the existing conditions is presented in Section 7, Paleontological Resources Results.

6.2 Potential Impacts Review

CEQA requires that significant adverse impacts to paleontological resources be reduced to less-than-significant levels to the extent feasible. To determine if a project could result in direct or indirect impacts, published best practices in mitigation paleontology (Murphey et al. 2019; SVP 2010) recommend that the extent and depth of ground-disturbing activities that have the potential to impact previously undisturbed sediments of high paleontological sensitivity should be considered when assessing potential impacts. At the time of this paleontological resources study, the project is still in the conceptual stages, and the full extent and depth of ground-disturbing activities is unknown. Nonetheless, the potential for direct or indirect impacts can be assessed based on review of the existing conditions described above. After reviewing the existing data, SWCA analyzed the potential for direct and indirect impacts to significant paleontological resources due to construction or implementation of the project. A summary of the potential impacts is presented in Section 8 below.

6.3 Avoidance and Minimization Measures Determination

Based on review of the existing conditions and determination of the potential impacts, SWCA developed appropriate avoidance and minimization measures to reduce significant adverse impacts to less-than-significant levels, pursuant to the CEQA. To develop appropriate measures that would not preclude or drastically delay construction of the project while still protecting the scientific integrity of this world-renowned fossil site, SWCA reviewed previous paleontological resources assessments, CEQA environmental documents, paleontological mitigation plans, and final paleontological monitoring reports prepared by other environmental consultants for projects located within or adjacent to Hancock Park, many of which were for private development projects; published standard field and laboratory procedures prepared by the Page Museum staff; and information from the Page Museum staff obtained by SWCA's Lead Paleontologist during two site visits in September 2022, and one site visit by SWCA Principal Paleontologist in October 2022. The information in these references, coupled with additional information from the Page Museum staff, were synthesized to develop avoidance and minimization measures that, when implemented under the direct supervision of the Page Museum, would reduce potential impacts to less-than-significant levels.

7 PALEONTOLOGICAL RESOURCES RESULTS

7.1 Regional Geology

The geological conditions that have made the La Brea Tar Pits the most renowned paleontological locality in the world are closely tied to the origin and development of petroleum reservoirs within the Los Angeles Basin, a structural depression approximately 50 miles long and 20 miles wide in the northernmost Peninsular Ranges Geomorphic Province (Ingersoll and Rumelhart 1999; Norris and Webb 1990; Yerkes et al. 1965). Although referred to as the "La Brea Tar Pits" today, the terms "brea" are "tar" are misnomers—the sticky, organic substance that is present at the surface is more correctly referred to as asphaltum (asphalt) or bitumen derived from naturally occurring petroleum. Within the La Brea Tar Pits and its vicinity within the Los Angele Basin, alluvial sediments are often saturated with the asphalt that seeps up to the surface from the underlying reservoirs. Asphalt from Rancho La Brea has been widely used by humans during prehistoric and historic periods, resulting in the discovery of the large quantities of significant fossil material during its extraction (see Millington et al. 2022).

Beginning in the Miocene when tectonic movement along the San Andreas Fault zone caused the rotation and northern migration of the Transverse Ranges from the Peninsular Ranges, the Los Angeles Basin originated as a subsided structural block located between these two providences (Critelli et al. 1995; Norris and Webb 1990). By the middle Miocene, tectonic subsidence resulted in the advancement of the sea across the primordial Los Angeles Basin, resulting in the deposition of thick, organic-rich, deep submarine basin sediments along the sea floor. Organic-rich sediments consisted of the deposition of dead microorganisms, such as diatoms, algae, and bacteria that settled to the seafloor, as well as organic-rich clays washed in from the Peninsular Ranges and Transverse Ranges. After subsequent burial and lithification, these organic-rich marine strata formed substantial petroleum reservoirs, some of which are the most prolific sources of oil in Southern California (Norris and Webb 1990; Yerkes et al. 1965).

The deposition of thick, organic-rich marine strata persisted through the Pliocene, a time when the rate of subsidence accelerated within the central region of the Los Angeles Basin where the La Brea Tar Pits are located today; this subsidence coincided with marked uplift of the surrounding mountain ranges along the basin's margins that continued contributing to the thick accumulations of organic-rich marine deposits within the basin (Norris and Webb 1990).

By the end of the Pliocene, more than 3,000 meters (10,000 feet) of mostly marine sedimentary deposits had filled the basin (Norris and Webb 1990). The latest Pliocene and early to middle Pleistocene were marked by tectonic movement of ancillary faults branching from the San Andreas Fault Zone. Tectonic movement during the latest Pliocene and early to middle Pleistocene deformed the older marine strata, facilitating the movement of gas and oil in the Los Angeles Basin to the surface via fractures and seeps, forming asphalt pools at the surface (Stock and Harris 2007). For example, local fissures, pipes, and chimneys allow petroleum from the underlying Miocene to Pliocene marine strata extracted below the surface within the Salt Lake Oil Field located immediately north of Hancock Park to seep to the surface as asphalt within Hancock Park (Stock and Harris 2007). The continuous recharge of asphalt seeped to the surface from the underlying Miocene and Pliocene marine petroleum reservoirs, plus the influx of terrestrial alluvial sediments deposited at the surface, resulted in one of the best depositional environments for preserving fossils.

During the late Pleistocene and early to middle Holocene, changes in global sea level, tectonic subsidence, and rates of sedimentation resulted in the deposition of thick accumulations of nonmarine, alluvial deposits within the Los Angeles Basin (Norris and Webb 1990; Yerkes et al. 1965). The formation of asphalt pools at the surface, drawn up to the surface from the underlying marine Miocene and Pliocene strata via structural fractures, continues today within Hancock Park, though likely to a much lesser degree since the middle Holocene.

7.2 Local Geology and Paleontology

Because of its importance in petroleum exploration and the public and scientific interest in its paleontological setting, the La Brea Tar Pits has been the subject of intense study for the past 100 years. This section provides a summary of the local existing conditions at La Brea Tar Pits, including an overview of the history of paleontological discovery and exploration, as well as an overview of more recent local geological mapping and geotechnical investigations within Hancock Park and its immediate vicinity.

7.2.1 Paleontology of the La Brea Tar Pits

The paleoecological and paleoenvironmental conditions and unique geologic setting during the late Pleistocene and Holocene within Rancho La Brea have contributed to the high level of fossil preservation at the La Brea Tar Pits. In places where petroleum reached the surface, sticky pools of asphalt were left behind as the lighter petroleum products evaporated (Akersten et al. 1983). These pools of asphalt would then trap most organisms that passed through, most notably large predators, such as saber-toothed cats, dire wolves, and other extinct carnivores. This mechanism is reflected in the composition of mammals and birds discovered at the La Brea Tar Pits, which are 90% carnivores that likely had been attracted to the site to prey on those individuals already mired in the asphalt, but ultimately became mired themselves (Friscia et al. 2008). Bones could also be transported and entrapped in the asphaltic sediments through normal fluvial processes (Spencer et al. 2003); however, the extent that fluvial systems flowing across the asphaltic pools at the surface affected the preservation of paleontological resources in the vicinity of Hancock Park remains largely unexplored. Regardless, the asphalt that saturates the bones and other hard tissues of animals contributes to their excellent preservation.

With more than 100 excavation sites/pits resulting in over 3 million specimens representing over 600 species having been collected since the first scientific explorations (Figure 5), late Pleistocene and Holocene fossil taxa recovered, described, and curated include: diatoms, green algae, flowering plants and gymnosperms, scorpions, spiders, ostracods, isopods, millipedes, centipedes, insects, bivalves, gastropods, bony fish, salamanders, frogs, toads, pond turtles, lizards, iguanas, snakes, grebes, cormorant, herons, spoonbills, ibis, waterfowl, storks, teratornithids, vultures, hawks, eagles, falcons, landfowl, cranes, shorebirds, pigeons, roadrunners, owls, nightjars, woodpeckers, perching birds, shrews, moles, bats, ground sloths, rabbits, hares, rodents, weasels, badgers, skunks, coyotes, domesticated dogs, wolves, dire wolves, foxes, racoons, ringtails, short-faced bears, black bears, grizzly bears, saber-toothed cats, scimitar-toothed cats, American lions, cougars, bobcats, mastodons, mammoths, horses, tapirs, camels, llamas, peccaries, deer, antelopes, bison, shrub-ox, sheep, and others, as well as the human remains of one individual (i.e., the La Brea Woman) recovered from Pit 10 in 1914 (see Figure 5) (ArchaeoPaleo Resource Management, Inc. 2014; Museum of Natural History 2022; Pham 2015; Stock and Harris 2007).

Prior to the advent of modern radiometric dating methods, the geologic age of the fossil-bearing deposits at Rancho La Brea was determined by biochronologic correlations, comparing the fossil taxa excavated from Rancho La Brea (see above) to taxa recovered from other fossil sites in North America (Stock and Harris 2007). Based on these comparisons, Stock and Harris determined that the Rancho La Brea deposits likely date to the late Pleistocene (Stock and Harris 2007). In fact, the "Rancholabrean" North American Land Mammal Age (NALMA) stage, characterized by the presence of the genus *Bison* and other extinct megafauna (e.g., genus *Mammuthus*), is named after the fossils recovered from Rancho La Brea that represent the latest Pleistocene Epoch (Savage 1951). Since Stock and Harris's work, modern radiometric dating confirmed the results of relative dating, with the oldest specimens recovered from Rancho La Brea being at least 55,000 years old (latest Pleistocene) and the youngest at least 200 years old (latest Holocene, which extends after the Rancholabrean NALMA stage) (Mychajliw et al. 2020; Bischoff and Rosenbauer 1981; Ho et al. 1969; Holden et al. 2017; Marcus and Berger 1984; McMenamin et al. 1982). It is critical to recognize that the age of the fossils is related to when the asphalt reached the surface, not the age of the enclosing geological formation. This has proved a challenge to researchers as established principles of superposition do not apply at Rancho La Brea. Therefore, the geological context of the discovery is most critical to retain scientific value.

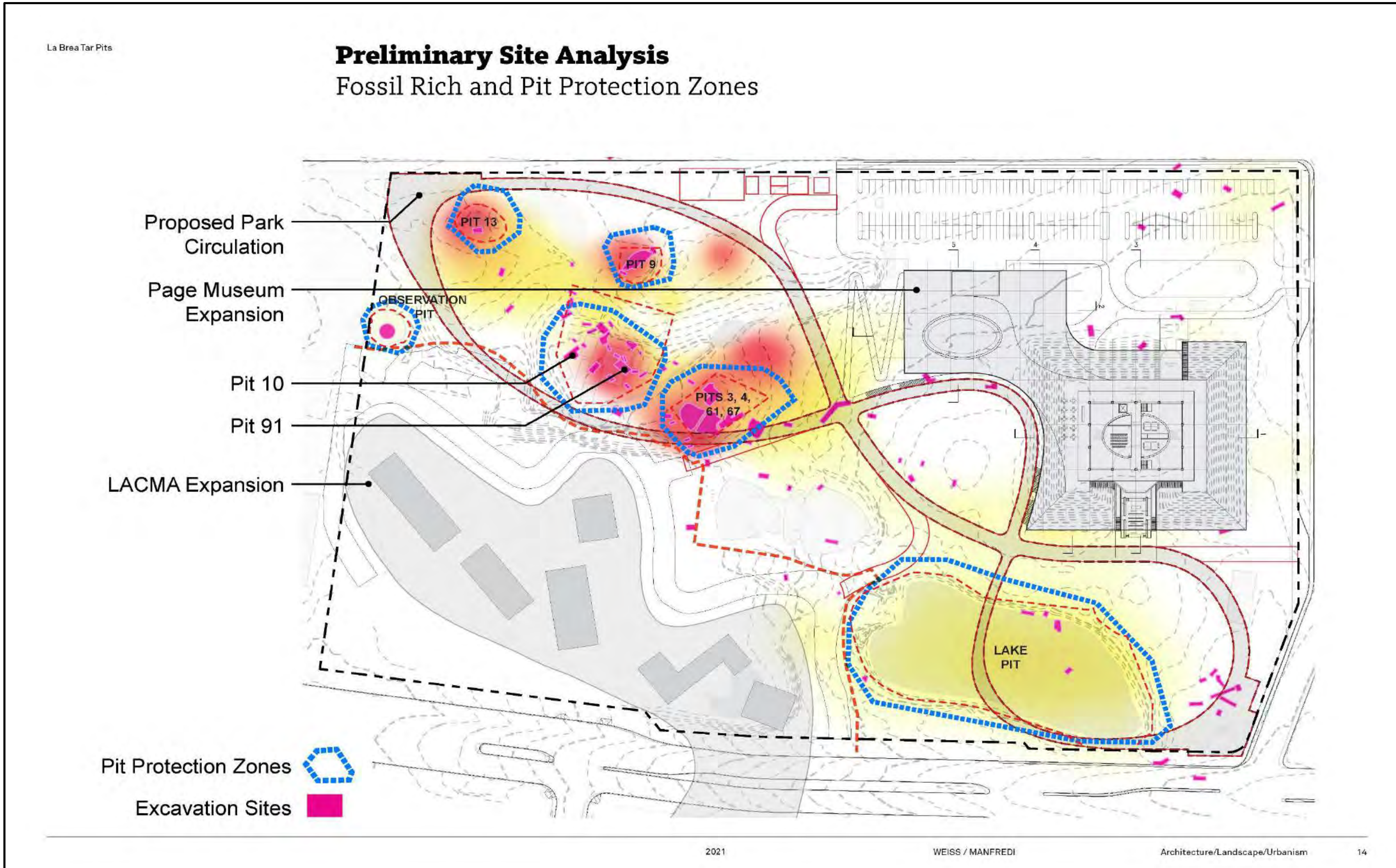


Figure 5. Conceptual site plan with excavation/pit sites and fossil heat map.

This page intentionally left blank.

7.2.2 Previous Excavations at La Brea Tar Pits

Records of bones being discovered at Rancho La Brea date to the 1800s; however, these bones were widely regarded as modern domesticated and wild animals that had fallen into the asphalt "traps" (Seaman 1914), and it was not until 1875 that the first extinct organism, a *Smilodon* (saber-toothed cat), was reported (Denton 1875). The first scientific excavations at La Brea Tar Pits site began much later when Orcutt assessed the feasibility of the site for oil extraction in 1901 and discovered more fossils of extinct taxa (Stock and Harris 2007). By 1906, Orcutt had amassed a collection of fossil material and gave it to Dr. John C. Merriam of the University of California, who requested permission from the Hancock family to conduct paleontological investigations. By 1913, the Hancock family granted the County exclusive privilege to excavate the site for 2 years, during which hundreds of thousands of bones were discovered among the various exploration pits (see Figure 5) (Stock and Harris 2007). By May 1915, the Hancock family donated approximately 23 acres of Rancho La Brea to the County; this land ultimately became Hancock Park. Today, excavations continue under the direction of the Page Museum, which houses this world-renowned collection.

After the initial excavations that occurred between 1913 and 1915, little in the way of formal excavation was accomplished until 1969. Intermittent small-scale excavations occurred between 1929 and 1931. In 1969 excavations resumed in one of the exploration pits, dubbed Pit 91, with excavations continuing to the present (Friscia et al. 2008; see Figure 5). Since the reopening of Pit 91, 320 species have been recovered. During the 20072007 field season alone, 3,300 specimens were recovered, including the skulls of saber-toothed cats and dire wolves, ground sloth bones, and the first confirmed juvenile mammoth. As of the 20072007 field season, Pit 91 had been excavated to a depth of 15 feet, with an estimated 3 to 8 feet of asphaltic deposits remaining further below ground. Over the years, excavations at Pit 91 have resulted in the discovery of more than 50,000 fossils (with many more waiting to be prepared and curated in the laboratory at the Page Museum). A few other asphalt pits, such as Pit 3 and Pit 4, have resulted in the discovery of similarly impressive quantities of fossil specimens, but the quantities of fossil specimens recovered from the asphalt pits has varied widely, even among co-located pits or exploration sites (Figure 6). Although the quantities of fossil specimens recovered from asphalt pits are uneven, the distribution of the asphalt pools is not completely random and may be related to the orientation of subsurface faults or fissures that facilitate the movement of petroleum to the surface (see Figure 6). Additionally, the degassing of hydrocarbons during the conversion of petroleum to asphalt, evidenced by surface bubbles within the asphalt pools observed today, may have circulated and redistributed bones and other organic remains within the asphalt chimneys and seeps (Stock and Harris 2007), also potentially affecting the apparent distribution and quantity of fossil specimen.

Several recent construction projects within or immediately adjacent to Hancock Park have yielded numerous significant paleontological resources from the same deposits as those that would be encountered during implementation of the proposed project. ArchaeoPaleo Resource Management, Inc. (2014) provided a thorough review of paleontological resource assessment reports and mitigation monitoring reports from nearby development projects. A detailed description of each project included in their 2014 review is not included in this report; however, the results are summarized in Table 2. Recent projects from within or immediately adjacent to Hancock Park include the LACMA Transportation Project, the Academy Museum of Motion Pictures Project, the New LACMA Building for the Permanent Collection Project, and the One Museum Square Project. From the LACMA Transportation Project, numerous paleontological resources were discovered during monitoring of ground disturbances. In fact, 16 deposits of asphalt (or asphalt-rich sediments) containing abundant fossilized remains were extracted in 23 "landscaping/tree box" crates, as well as several isolated macrofossils (for example, one isolate yielded a nearly complete adult Columbian mammoth nicknamed "Zed") and 327 buckets of matrix containing microfossils.

This page intentionally left blank.

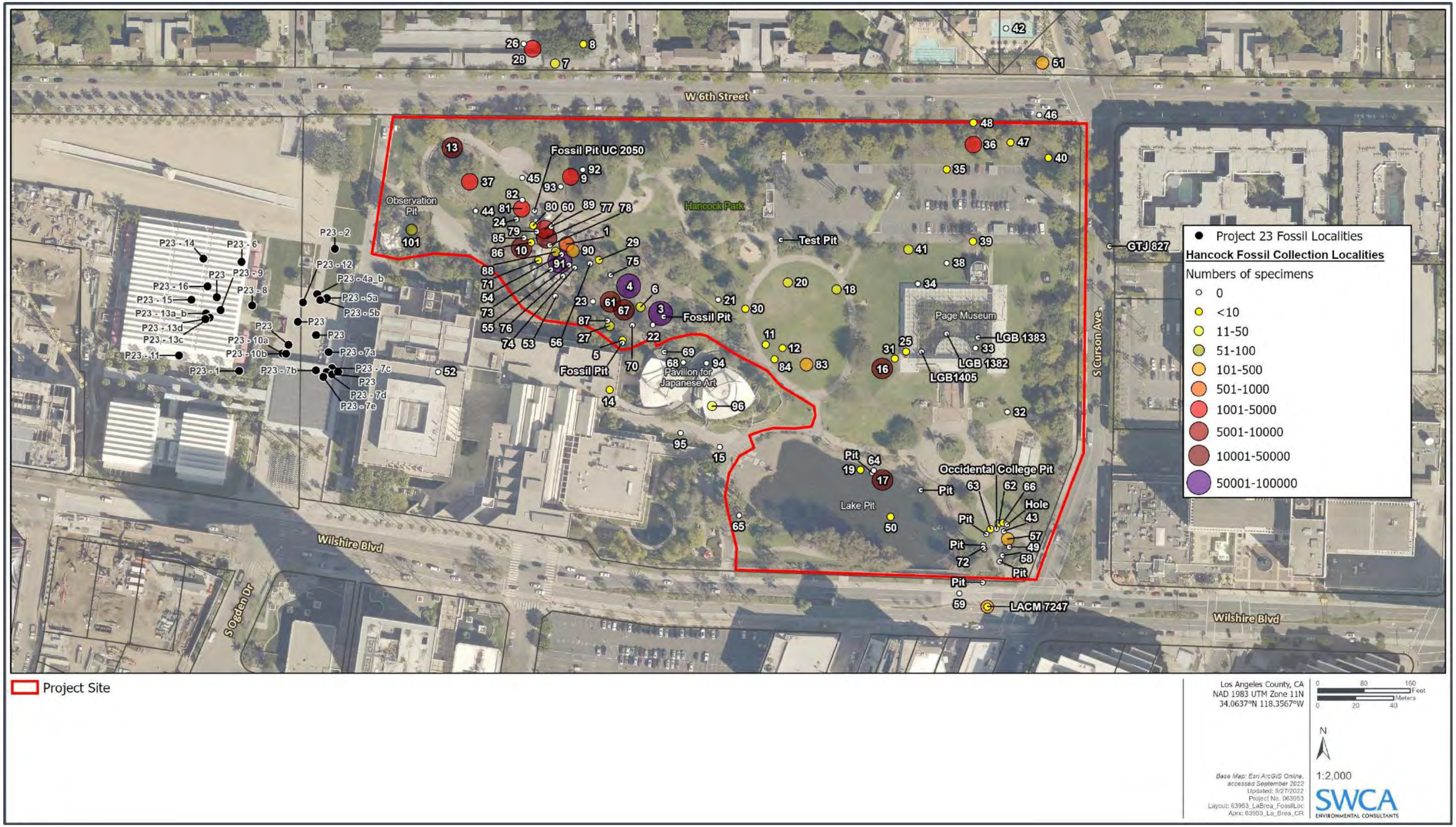


Figure 6. Quantity of fossil specimens recovered from each pit/site; quantities from Project 23 are not provided. Data received from Page Museum staff in 2022.

This page intentionally left blank.

The crated deposits are still being processed on the grounds of La Brea Tar Pits (referred to as "Project 23" by the Page Museum), with estimates of the number of fossils contained within ranging from 1 million to 3 million (ArchaeoPaleo Resource Management, Inc. 2014) (see Figure 6). Similar discoveries have been made during ground-disturbing activities at the Academy Museum of Motion Pictures and the New LACMA Building projects, each of which uncovered numerous significant fossil discoveries that were crated in a similar fashion, with each crate possibly containing hundreds to thousands of fossils remaining to be processed.

Table 2. Sample of Completed Local Paleontological Resources Monitoring Projects

Project Name	Year	Distance/Direction from Proposed Project	Monitoring Results
The Grove at Farmers Market	2001	1,000 meters (0.62 mile) north	Pleistocene gopher and plants; blue-green sandy silt
Farmers Market Renovation (also known as The Grove at Farmers Market Phases 2 and 3)	2001–2004	1,000 meters (0.62 mile) north	Pleistocene macrofauna, such as mammoth, horse, and indeterminant mammal; microfauna and flora; streambed soils, some asphalt deposit stringers
Park La Brea Community Center	2004	650 meters (0.40 mile) northeast	No fossils, caliche soils
Palazzo West/Palazzo at Park La Brea	1999–2003	700 meters (0.43 mile) north	Pleistocene macrofauna, such as horse, mammoth, bison, sloth; other vertebrates, such as frog, bird, rabbit, snake, skunk, various rodents; microfauna, such as clam, gastropod; plants; streambed sandstone, siltstone, claystone, some asphaltic deposit stringers
Palazzo East/Palazzo at Park La Brea	1999–2003	1,100 meters (0.68 mile) northeast	Pleistocene macrofauna, such as horse, sloth, camel, bison, and proboscidean/elephant; microfauna, such as ostracod; plants; fluvial alluvium composed of sandstone, siltstone, and claystone
The Villas at Park La Brea	1999–2003	1,100 meters (0.68 mile) east-northeast	No fossils observed; silty clay, caliche
Median Improvements, Wilshire Boulevard from Fairfax Avenue to La Brea Avenue	1996	80 meters (263 feet) south	No fossils observed; deposits too young to contain fossils
Hancock Park Renovation	1989–2003	Adjacent, east and north	Pleistocene macrofauna, such as mammoths; microfauna and flora; streambed soils and asphaltic deposits
Hancock Park Replacement Pipeline Discharge System	2012	245 meters (0.15 mile) east	Indeterminant mammal, large bird, small bird, microfossils; asphaltic deposits
Luxe@375 (apartment construction with subterranean parking)	2012	2,200 meters (1.37 miles) northwest	Pleistocene indeterminant bony fish, toad, frog, pond turtle, rattlesnake, indeterminant reptile, indeterminant bird, various rodents, camel, horse, rabbit, mastodon, ground sloth, bivalve, gastropod, plant (i.e., charcoal)
LACMA Transformation Project	2006–2008	Adjacent, west	"Project 23" – during construction, 16 asphaltic deposits, recovered in 23 trapezoidal/prismatic "tree boxes" holding 383 cubic meters of material contain an array of Pleistocene fossils, including terrestrial macrofauna, such as bison, dire wolf, mammoth, sloth, lynx, saber-toothed cat, horse, bird, turtle; microfossils; and plants resulting in thousands of fossil specimens. Additionally, individual or isolated specimens were jacketed or collected, including a Columbian mammoth.
Academy Museum of Motion Pictures	2019–2020	Adjacent, west	Numerous macrofauna, including saber-toothed cat, dire wolf, bison, ground sloth; and microfauna; plants; fluvial deposits with some asphaltic deposits

Project Name	Year	Distance/Direction from Proposed Project	Monitoring Results
New LACMA Building Project	2016–2017	Adjacent, west and southwest	Gastropods and bivalves from depths of 41 to 65 feet below ground surface; fine-grained sand and silty clay, saturated with asphalt
One Museum Square Project	2018–2019	Adjacent, east	Approximately 20,000 fossil specimens of birds and small mammals

Sources: AECOM (2016a, 2017); ArchaeoPaleo Resource Management, Inc. (2014); Environmental Science Associates (ESA) 2020

7.2.3 Museum Records Search

Since its construction in the 1970s, the Page Museum, included in the Museum of Natural History, has curated most of the fossil specimens excavated from the La Brea Tar Pits. Therefore, SWCA requested a museum records search from the Museum of Natural History to provide additional information pertaining to the paleontological resource potential at the surface and at depth within Hancock Park and its immediate vicinity.

Fossil localities within the project site include fossil locality LACM VP 7298 that produced approximately 10,000 plant, invertebrate, and vertebrate specimens. Additional vertebrate, invertebrate, and plant fossils have been discovered at locality LACM VP 6909 at the surface down to 20 feet below ground surface (bgs) within the project site. Numerous other fossil localities, including Project 23 described above, have been discovered and curated from within the project site.

Outside of the project site, the closest fossil locality is LACM VP 7297, which is located 16 meters (53 feet) southwest of the project site and has yielded approximately 250,000 vertebrate, invertebrate, and botanical specimens from asphaltic sand and clay. Fossil locality LACM VP 7247 was recorded 32 meters (106 feet) away from the project site and yielded an extinct dire wolf and horse from a depth of approximately 2 feet bgs. The presence of Pleistocene fossil taxa at 2 feet bgs suggests that fossils could be present just below the surface throughout most of Hancock Park. Additionally, an antelope fossil was discovered 113 meters (370 feet) from the project site within Pleistocene asphaltic older alluvium at locality LACM VP 4204. Other fossil localities approximately 322 meters (0.2 mile) or less from the project site, such as LACM VP 6345, LACM VP 5481, and LACM VP 1724, have yielded Pleistocene taxa “typical” of asphaltic alluvial sand deposits within the La Brea Tar Pits, including fossil turtle, bird, racoon, saber-toothed cat, dire wolf, coyote, mammoth, horse, tapir, camel, antelope, and bison.

Although not included in the museum records search results by the Museum of Natural History (2022), fossil locality LACM VP 8090, recorded during construction of the One Museum Square Project located approximately 100 meters (330 feet) away from the Page Museum on the eastside of Curson Ave yielded approximately 20,000 small mammal and bird fossils that are currently being processed at the Page Museum today (personal communication from Dr. Regan Dunn [2022]).

Table 3 summarizes the results of the Museum of Natural History (2022) museum records search. Appendix B (confidential) provides the results of the museum records search.

Table 3. Museum of Natural History Fossil Localities within and near the Project Site

Locality Number	Approximate Distance from the Project Site	Formation	Taxa	Approximate Depth Below the Ground Surface
LACM VP 7298	Within Hancock Park	Variably asphaltic silts and silty clays	Approximately 10,000 botanical, invertebrate, and vertebrate specimens	Unrecorded (approximately 25 feet below ground surface based on elevation of Hancock Park)
LACM VP 6909	Within Hancock Park	Asphaltic sands	Vertebrate, invertebrate, and plant fossils	0–20 feet
Project 23 (16 separate fossil deposits)	Within Hancock Park	Pleistocene fluvial deposits and asphaltic sands	Over 1 million fossil specimens including one nearly complete mammoth	Starting at 10 feet
LACM VP 7297	0.01 mile (53 feet/ 16 meters)	Asphaltic sand grading to asphaltic clay	Approximately 250,000 botanical, invertebrate, and vertebrate specimens	Unrecorded (approximately 2 feet to 10 feet below ground surface based on elevation of Hancock Park)
LACM VP 7247	0.02 mile (106 feet/ 32 meters)	Asphalt impregnated silt with lenses of asphaltic sand	Dire wolf (*Canis dirus*); horse (*Equus*)	2 feet
LACM VP 4204	0.07 mile (370 feet/ 113 meters)	Pleistocene asphaltic older alluvium	Antelope (*Antilocapra*)	Unrecorded
LACM VP 6345	0.10 mile (528 feet/ 161 meters)	Asphaltic sands	Bird (Aves); horse (*Equus* cf. *E. occidentalis*)	Unrecorded
LACM VP 5481	0.13 mile (686 feet/ 209 meters)	Asphalt-impregnated Palos Verdes Sand	Mammoth (*Mammuthus*); tapir (*Tapirus*); horse (*Equus*); camelid (*Camelops*, cf. *Hemiauchenia*); bison (*Bison*)	27–28 feet
LACM VP 1724	0.20 mile (1,056 feet/ 322 meters)	Pleistocene asphaltic sands	Pond turtle (*Clemmys marmorata*); bird (Aves); racoon (Procyonidae); sabretooth cat (*Smilodon fatalis*); dire wolf (*Canis dirus*), coyote (*Canis latrans*), pronghorn antelope (*Capromeryx minor*); bison (*Bison*)	8 feet

Source: Museum of Natural History (2022)

7.2.4 Geologic Mapping and Geotechnical Investigations

Local geologic mapping and previous geotechnical investigations of Hancock Park and the surrounding area provide the geological framework that informs the paleontological setting of this world-renowned fossil site; although as noted previously, the fossil deposits follow asphalt pits and are not confined to one particular geologic unit. Geologic mapping by Dibblee and Ehrenspeck (1991) and Yerkes and Graham (1997) indicate that the surface of the project site is mapped as late Pleistocene older alluvium (Qao) (for the purposes of this study, SWCA uses Yerkes and Graham [1997] as the basis for the geologic map shown in **Error! Reference source not found.**). Previous geotechnical investigations of the site summarized by Shannon and Wilson, Inc. (2022) indicate that the surface of the project site is capped by a thin layer of artificial fill that overlies the "native" older alluvium. The presence of artificial fill and/or previously disturbed sediments is evident along the 15-foot-high soil slopes surrounding the base of the

Page Museum but extends across the site in the subsurface. Additionally, regional and local subsurface geological data suggest that the

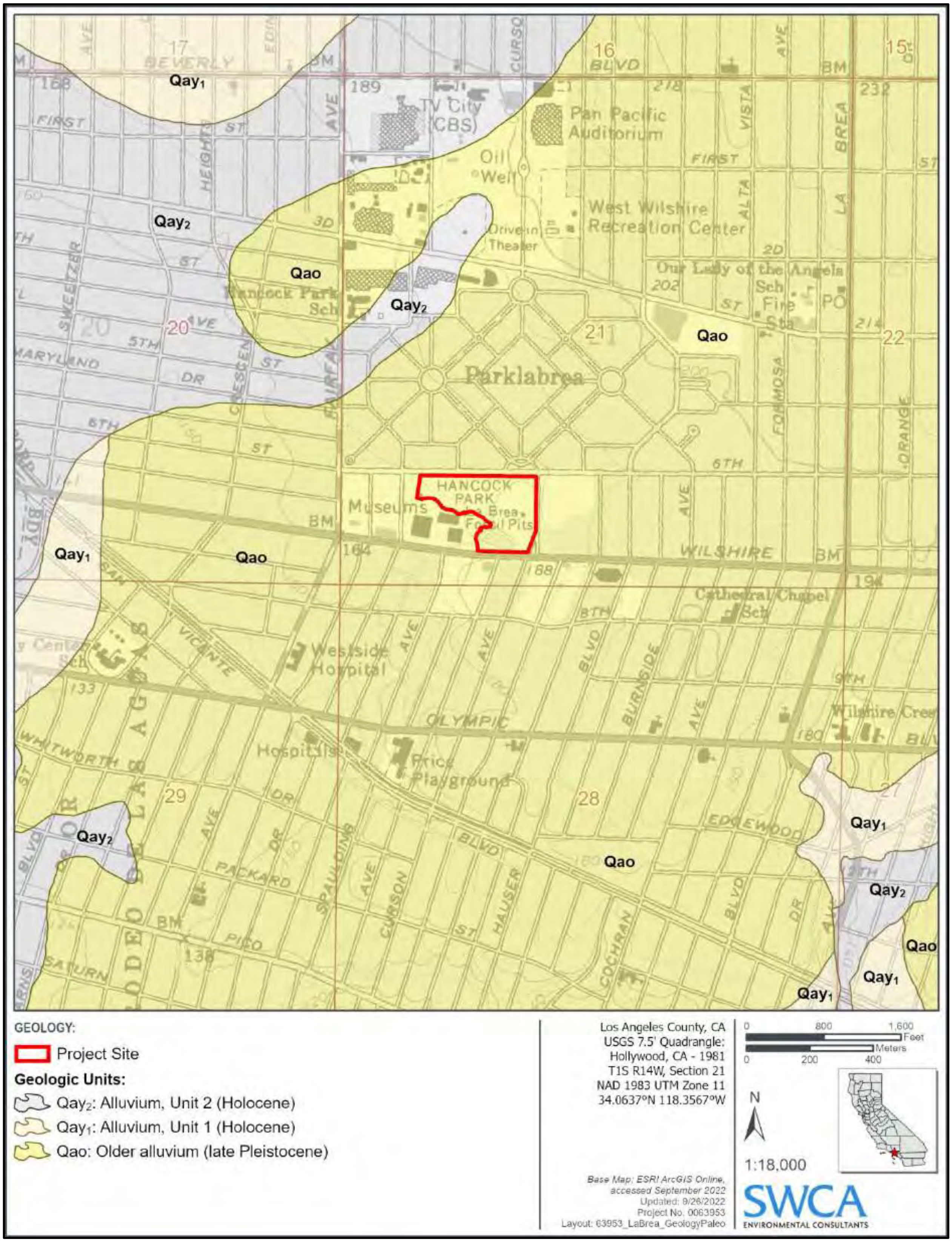


Figure 7. Surficial geologic units within the project site and its vicinity.

early Pleistocene San Pedro Sand and the early Pleistocene to Pliocene Fernando Formation are also present at depth within Hancock Park, despite not being exposed at the surface in the immediately vicinity. Therefore, artificial fill, older alluvium, San Pedro Sand, and Fernando Formation are considered in this analysis and are described in geochronological order (youngest to oldest) below.

7.2.4.1 UNMAPPED RECENT ARTIFICIAL FILL AND REWORKED SEDIMENTS

Based on previous site development, unmapped Recent artificial fill and reworked (i.e., previously disturbed) sediments are present at the surface of the project site from 1- to 3-foot depth or 1- to 8-foot depth, likely partially replacing the uppermost "native" sediments of older alluvium (AECOM 2017; Shannon and Wilson, Inc. 2014, 2022). The presence of artificial fill and reworked sediments across the entirety of the site to varying depths was confirmed during the archaeological testing conducted by SWCA within Hancock Park (Millington et al. 2022).

The artificial fill material consists of silty clay, sandy clay, clayey silt, and silty sand (Shannon and Wilson, Inc. 2022). In general, fill sediments typically consist of reworked and recompacted sediments originating from within a project site during its construction, or they consist of imported sediments delivered from other regions that are delivered and recompacted at a project site. Artificial fill or previously disturbed sediments may contain fossils, but any such fossil from these deposits has been removed from its original stratigraphic, taphonomic, or paleoenvironmental context (provenance), making it scientifically invalid in most instances. Here, artificial fill sediments, at least in part, consist of reworked and compacted sediments originating from Hancock Park, which explains the presence of some fossil fragments recovered from the sediment stratum capping the project site.

It is also important to note that early paleontological investigations prioritized salvage or collection of large fossil specimens or extinct fauna, with little regard for the small-sized fossil fragments or smaller taxa (e.g., rodents, plants, insects, etc.). Asphalt or asphalt-rich sediments containing small fossils may have been discarded or ignored by early investigators and later reworked as fill at the site. Although considered scientifically less valuable or scientifically nonsignificant in *most* circumstances (SVP 2010), fossils from artificial fill and reworked sediments originating from within Hancock Park may still provide scientifically important information due to level of fossil preservation that allows radiocarbon dating of specimens from the site to help elucidate the changing environment during the late Pleistocene and Holocene of Southern California. Therefore, Recent artificial fill and reworked sediments originating from Hancock Park have a high potential to produce significant paleontological resources and are immediately underlain by "native" geologic units that also have a high potential for scientifically significant fossils.

7.2.4.2 LATE PLEISTOCENE OLDER ALLUVIUM (QAO)

Yerkes and Graham (1997) map late Pleistocene older alluvium (Qao) at the surface of the project site (see **Error! Reference source not found.**); however, the uppermost strata of older alluvium likely have been partially replaced by artificial fill/reworked sediments to 1- to 3-foot depth or 1- to 8-foot depth within Hancock Park (see above). Older alluvium consists of slightly to moderately consolidated to moderately to well consolidated (stiff to very stiff) clays with some dense silt and silty sand deposits (Campbell et al. 2014; Dibblee and Ehrenspeck 1991; Shannon and Wilson, Inc. 2022; Yerkes and Graham 1997). These deposits have subsequently been uplifted and variably dissected at the surface (Campbell et al. 2014; Dibblee and Ehrenspeck 1991; Yerkes and Graham 1997). The thickness of older alluvium varies across the Los Angeles Basin (Woodring et al. 1946; Yerkes et al. 1965). For example, deposits of sands, clay, gravel, and angular rubble are approximately 40 to 190 feet thick (only a subset of that thickness is classified as older alluvium) within the Salt Lake Oil Field immediately north of and adjacent to Hancock Park (Stock and Harris 2007); however, most asphalt or asphalt-saturated alluvial sediments that have

yielded Rancholabrean fossils are from 13 to 20 feet bgs (Shannon and Wilson, Inc. 2022), but possibly range from near the surface to approximately 40 feet bgs (AECOM 2016b).

The older alluvium within Hancock Park has been equivalated or correlated to various informal or formal late Pleistocene geologic units by previous researchers. For example, Grant and Sheppard (1939) suggest that the local older alluvium represents marginal deposits of the Hollywood alluvial fan that radiated off the southern border of the Santa Monica Mountains. Conversely, Woodring et al. (1946) equate the "Palos Verdes Sand," an informal unit of nonmarine, alluvial deposits overlying marine terraces exposed in the Palos Verdes Hills/San Pedro area to the west (i.e., also referred to the "Upper San Pedro Series" by Arnold and Arnold [1902]), as comparable to older alluvium observed at Hancock Park. Based on the work of Woodring et al. (1946), the stratigraphy of asphalt-saturated deposits has been interpreted by Woodard and Marcus (1973, 1976) and Shaw and Quinn (1986), who divide the "Palos Verdes Sand" into three unnamed members, the latter of which contains three additional unnamed submembers based on lithology, the types of fossils and inferred paleoenvironment, and the thickness of asphalt pipes. AECOM (2016b) and Shannon and Wilson, Inc. (2014, 2022) refer to the older alluvium as the "Lakewood Formation," which extends to 12 to 16 feet bgs, with a maximum thickness of approximately 40 feet. For the sake of simplicity and congruence with geologic mapping, SWCA retains the geologic designations of Quinn (1991), Dibblee and Ehrenspeck (1991), Yerkes and Graham (1997), and Campbell et al. (2014), who refer to it simply as old alluvial fan deposits or older alluvium that originated from a northwestern source during the late Pleistocene (similarly to the interpretations of Grant and Sheppard [1939]) that overlies the San Pedro Sand and was subsequently uplifted during the early Holocene (Stock and Harris 2007).

Since the onset of geologic investigations into the petroleum reservoirs within the Los Angeles Basin, geologists have reviewed the structural deformation of the Pleistocene strata overlying the Miocene and Pliocene marine rocks containing petroleum. Given the northwest-southeast trend of fossiliferous sites within Hancock Park, the asphalt springs may originate from a subsurface fault along West 6th Street (Stock and Harris 2007). Accounts by Eaton (1928) point out that the early Pleistocene strata are deeply eroded and sloped, suggesting the same tectonic forces that caused considerable folding and faulting of the deeper Miocene and Pliocene marine rocks within the subsurface of the Los Angeles Basin were still active during the early Pleistocene, as evidenced by similar deformed marine and nonmarine deposits from the early Pleistocene. Horizontal beds of late Pleistocene older alluvium unconformably overlie the deformed beds of early Pleistocene (i.e., San Pedro Sand) and older strata (Stock and Harris 2007). The stratigraphic succession and orientation of the Pleistocene sediments may be relevant for understanding the paleoenvironmental and tectonic changes that occurred between the early and late Pleistocene that resulted in the development of asphalt pools at the surface, trapping or miring organisms, and the subsequent burial of organic remains by alluvial or fluvial processes (i.e., alluvial fans and stream channels of the Los Angeles and San Gabriel Rivers) at the surface during the late Pleistocene and early Holocene. Despite the near horizontal stratigraphy of older alluvium, geotechnical investigations indicate that asphalt is present within the older alluvium, seeping to the surface via fissures, fractures, and chimneys crosscutting the stratigraphy and concentrating in sandy layers (AECOM 2016b; Shannon and Wilson, Inc. 2022).

In general, equivocal non-asphaltic older alluvial deposits within Southern California have yielded similar taxa from sporadic fossil localities; however, the level of fossil preservation of both micro-fossils and macro-fossils is far less at these localities (Jefferson 1991a, 1991b; McDonald and Jefferson 2008; Miller 1971; Reynolds and Reynolds 1991; Springer et al. 2009), demonstrating the unique state of preservation at the La Brea Tar Pits. Therefore, late Pleistocene older alluvium has a high potential for producing significant paleontological resources.

7.2.4.3 EARLY PLEISTOCENE SAN PEDRO SAND

Although the early Pleistocene San Pedro Sand is not mapped at the surface within the project site, it is noted in geotechnical investigations as underlying the late Pleistocene older alluvium at depth ranges of approximately 17 to 50 feet bgs within Hancock Park (AECOM 2016b). However, other geotechnical investigations summarized by Shannon and Wilson, Inc. (2022) indicate that the San Pedro Sand may extend to depths of 65 to 94 feet bgs, indicating variation in the thickness of the older alluvium and San Pedro Sand overlying "bedrock" Fernando Formation (see below). The San Pedro Sand consists of yellow to light brown and gray, cross-bedded to massive, poorly consolidated marine pebble gravel, sand, and silty sand (Blake 1991; Dibblee et al. 2010; Dibblee and Minch 2007). The pebbles are derived mostly from Miocene hard siliceous shale and limestone. Previous and recent geotechnical investigations indicate that some asphalt is present within the matrix of the San Pedro Sand to varying degrees (AECOM 2016b; Shannon and Wilson, Inc. 2022).

During early investigations, Pleistocene-aged marine deposits in the San Pedro area were broken up into two distinct horizons, the Upper and Lower San Pedro Series, distinguished by a prominent unconformity (Arnold and Arnold 1902). The Lower San Pedro Series consists largely of gray sandstone, and Arnold and Arnold (1902) noted that these sands were deposited in a nearshore environment. The Lower San Pedro Series has been the main focus of research and is currently referred to as the San Pedro Sand (Woodring et al. 1946). The Upper San Pedro Series, consisting of a bed of lime-hardened gravel overlain by a thick layer of fine-grained sand (Arnold and Arnold 1902), is now known as the "Palos Verdes Sand" in the Palos Verdes/San Pedro geographic areas (Woodring et al. 1946), and throughout the Los Angeles Basin, it may be equivalated to late Pleistocene older alluvium, as discussed above.

The abundance of fossil specimens known from the San Pedro Sand is one of the major reasons for the importance of this unit. Fossils recovered from the San Pedro Sand include: foraminifera, bryozoans, bivalves, gastropods, scaphopods, polyplacophorans, crabs, sea urchins, sharks, rays, bony fish, turtle, cormorants, ducks, sea eagles, quail, gulls, geese, whales, bison, camels, horses, saber-toothed cats, ground sloths, elephants, and rodents (Fitch 1967; Howard 1948; Jordan and Hannibal 1923; Miller 1930; Oldroyd 1924; Woodring et al. 1946). Therefore, early Pleistocene San Pedro Sand has a high potential for producing significant paleontological resources, even without the subsequent asphalt deposits.

7.2.4.4 EARLY PLEISTOCENE TO PLIOCENE FERNANDO FORMATION

Although not mapped at the surface within the project site or its immediate vicinity, early Pleistocene to Pliocene Fernando Formation is mapped at the surface near downtown Los Angeles (Campbell et al. 2014; Dibblee and Ehrenspeck 1991) and is present at depth throughout the Los Angeles Basin. Previous geotechnical investigations summarized by AECOM (2016b) and Shannon and Wilson, Inc. (2022) indicate that the Fernando Formation is present in the subsurface at depths as shallow as 65 feet bgs and may extend to depths of 120 feet bgs. The Fernando Formation consists of light olive brown and light yellowish brown to dark yellowish brown, clayey siltstone, fine- to medium-grained sandstone, and pebbly conglomerate of marine origin, which is massive, highly weathered, and oxidized and becoming darker in color, more massive, unoxidized, and more lithified with depth (Campbell et al. 2014; Dibblee and Ehrenspeck 1991; Lamar 1970; Shannon and Wilson, Inc. 2022). The Fernando Formation has yielded marine and nonmarine fossils and is generally regarded as having the potential to yield fossils. It is also a significant petroleum reservoir for the Los Angeles Basin, with petroleum seeping through fractures to the surface. Fossil localities from surface exposures from this unit have yielded foraminifera, sponges, corals, brachiopods, bryozoans, scaphopods, gastropods, bivalves, cephalopods, fiddler crabs, sea urchins, sharks, bony fish, birds, unidentifiable mammals, and plants (Clarke et al. 1980; Groves 1992; Huddleston and Takeuchi 2006; Morris 1976; Paleobiology Database 2022; Schoellhamer et al. 1981; University of California Museum of Paleontology 2022; Woodring 1938). Therefore, the early

Pleistocene and Pliocene Fernando Formation has a high potential to yield significant paleontological resources.

7.2.5 Paleontological Site Visit

To supplement SWCA's review of existing conditions to inform the impact assessment and proposed avoidance and minimization measures, SWCA's Lead Paleontologist, Mathew Carson, M.S., verified information and data with the Page Museum curators, collections managers, and preparators during site visits in September 2022. An additional site visit was conducted by SWCA's Principal Paleontologist Russell Shapiro, Ph.D. in October 2022. The focus of the site visits was to confirm the latest paleontological data, as well as to discuss mitigation strategies from adjacent projects within and immediately adjacent to the La Brea Tar Pits/Hancock Park. The Page Museum staff provided SWCA with raw data regarding the number of fossil specimens recovered from each pit or excavation site within Hancock Park (see Figure 6), as well as confirmed that the published field and laboratory procedures used on adjacent projects, such as Academy Museum of Motion Pictures Project (ArchaeoPaleo Resource Management, Inc. 2014) or the Westside Subway Extension Project (Los Angeles County Metropolitan Transportation Authority 2011), may either be outdated or may not capture fully the most recent or preferred protocols for the salvage and processing of fossils observed in asphaltum. These standard procedures include:

- George C. Page Museum of La Brea Discoveries. 2011. *Paleontological methods and mitigation of fossils in vicinity of Hancock Park*. 16 p.
- George C. Page Museum of La Brea Discoveries. 2011. *Techniques for excavation, preparation and curation of fossils from the Project 23 salvage at Rancho La Brea: A Manual for the Research and Collections Staff of the George C. Page Museum*. 34 p.
- Los Angeles County Metropolitan Transportation Authority. 2011. *Westside Subway Extension Project. Wilshire/Fairfax Station Construction. Paleontological Resources Extraction*. 31 p.

Based on results of the discussion with the Page Museum staff, SWCA uses these procedures as more general guidelines (as opposed to definitive standard operating procedures) to inform the analysis, define paleontological resource impacts, and determine appropriate avoidance and minimization measures.

8 IMPACT ASSESSMENT

SWCA conducted this assessment to analyze the potential for adverse impacts to significant paleontological resources resulting from the project's construction. In summary, the La Brea Tar Pits represents a world-renowned fossil site that has yielded millions of significant fossils. At the time of this paleontological resources study, the project is still in the conceptual stages, and the full extent and depth of ground-disturbing activities is unknown. Nonetheless, a review of the existing conditions at the site indicates that the entirety of Hancock Park contains a veneer of artificial fill overlying older alluvium that is subsequently underlain by the San Pedro Sand and Fernando Formation at greater depths.

Asphalt deposits seeping to the surface through the artificial fill from the underlying geologic units may contain fossils. The thickness of fill and disturbed sediments, which may contain reworked but scientifically important paleontological resources, likely varies across the site (see Millington and Dietler [2023]), extending to depths of 8 feet bgs in some areas, or as shallow as 3 feet bgs in others. Generally, older alluvium, San Pedro Sand, and Fernando Formation have high paleontological potential throughout their extents within the Los Angeles Basin, and within Hancock Park, artificial fill or previously disturbed also have a high paleontological potential. Regardless of the site's stratigraphy, asphalt pools, seeps, and chimneys have yielded a substantial proportion of the fossils recovered from Hancock Park, particularly in the uppermost 40 feet of sediments. Therefore, significant paleontological resources may be impacted by construction or implementation of the project regardless of depth, since ground-disturbing activities associated with the construction of the project have the potential to impact asphalt seeps containing aggregates of fossils.

Based on the results of this assessment, the preliminary conceptual site design, and the estimated depth of ground disturbances, all ground-disturbing activities may result in adverse direct or indirect impacts to significant paleontological resources. Any fossils encountered during ground disturbances would be at risk for damage or destruction from construction activities, which would constitute an impact under CEQA.

9 CONCLUSIONS AND MITIGATION RECOMMENDATIONS

This analysis included a review of asphalt pit and fossil locality data from multiple sources, including published scientific literature; online fossil locality database results; previous paleontological resources assessments; museum records search results from the Museum of Natural History; regional and local geologic maps; and subsurface geotechnical/borehole data. Based on the results of this assessment, SWCA determined that the entirety of Hancock Park contains a veneer of artificial fill overlying older alluvium that is subsequently underlain by the San Pedro Sand and Fernando Formation at greater depths. Recent artificial fill and previously disturbed sediments originating from within Hancock Park, older alluvium, San Pedro Sand, and Fernando Formation all have a high potential for scientifically important fossils. These deposits may also be saturated with asphaltum that may contain an abundance of fossil specimens, especially from 13 feet to 20 feet bgs but possibly to depths of approximately 40 feet bgs.

Any fossils encountered during ground-disturbing activities could be at risk for damage or destruction from such activities, which could constitute a significant impact under CEQA, depending on the nature of the fossil encountered. The implementation of appropriate feasible mitigation measures prior to and during ground-disturbing activities would ensure that fossils, if encountered, are assessed for significance and, if significant, salvaged to the extent feasible for laboratory analysis (and eventual) curation within the Page Museum.

Feasible mitigation measures would include (but is not limited to) preparation and implementation of a Paleontological Resources Management Plan (PRMP) by a Qualified Professional Paleontologist (Project Paleontologist). Because the engineering, design, and grading plans for the project have not been finalized, it is not feasible and impractical to prepare a PRMP at this time. After finalization of the engineering, design, and grading plans, preparation and implementation of the PRMP by a Project Paleontologist, as well as other appropriate mitigation measures outlined below, would reduce adverse impacts to less-than-significant levels, pursuant to CEQA.

SWCA recommends the following mitigation measures, which have been developed in accordance with and incorporate the performance standards of the SVP (1995, 2010), state and local regulations, and best practices in mitigation paleontology (Murphey et al. 2019).

1. **Retain a Qualified Professional Paleontologist (Project Paleontologist):** Prior to the start of construction and/or ground-disturbing activities, a Qualified Professional Paleontologist (Project Paleontologist) shall be retained who meets or exceeds the professional standards defined by the SVP (2010), and who has specific experience overseeing mitigation projects in Pleistocene deposits of the Los Angeles Basin. The SVP (2010:10) defines a qualified professional paleontologist as: “a practicing scientist who is recognized in the paleontological community as a professional and can demonstrate familiarity and proficiency with paleontology in a stratigraphic context.” The Project Paleontologist shall have a graduate degree in paleontology or geology,

and/or a publication record in peer reviewed journals; have demonstrated competence in field techniques, preparation, identification, curation, and reporting; have at least two full years of professional experience as assistant to a qualified professional paleontologist with administration and project management experience (supported by a list of projects and referral contacts); have proficiency in recognizing fossils in the field and in determining their significance; have expertise in local geology, stratigraphy, and biostratigraphy; and have experience collecting vertebrate fossils in the field (SVP 2010). The Project Paleontologist and Page Museum curators and collections managers shall meet regularly over the life of the implementation of the project to address any outstanding questions or concerns that arise during mitigation efforts to ensure effective communication and coordination. The Project Paleontologist shall oversee all regulatory compliance measures, shall oversee mitigation protocols related to paleontological resources, and shall be a point of contact for the Page Museum curators and County officials. A professional resume or curriculum vitae of the Project Paleontologist shall be submitted for review to the curators of the Page Museum (on behalf of the Museum of Natural History, as the County departmental unit) for approval prior to the start of preconstruction ground-disturbing activities.

2. **Prepare a Paleontological Resources Management Plan:** After finalization of the engineering, design, and grading plans for the proposed project and prior to the start of preconstruction ground-disturbing activities, a Paleontological Resources Management Plan (PRMP) shall be prepared by the Project Paleontologist and submitted to the Page Museum curators, who shall review and approve the final PRMP on behalf of the County and Museum of Natural History. The PRMP shall define the processes and procedures for paleontological monitoring and fossil excavation based on the nature of ground-disturbing activities required for project. The PRMP shall:

    a. Incorporate the results of this paleontological resources technical report (Carson et al. 2022), the final geotechnical investigation, and the final engineering/grading plans for the project.

    b. Require all construction personnel to attend a Worker Environmental Awareness Program (WEAP) training to be presented by the Project Paleontologist, or their designee.

    c. Define the processes and procedures for coordinating and communicating with (including but not limited to) the contractors, consultants, County officials, and Museum of Natural History (specially, the Page Museum curators and collections managers), when construction activities would be halted due to discovery and subsequent salvage efforts during ground-disturbing activities, and when regularly scheduled meetings between the Project Paleontologist and the Page Museum curators and collections managers would be required.

    d. Outline a procedure whereby mechanical excavation is conducted to remove any non-fossil-bearing sediments or soils subject to environmental soil remediation, such that adequate time is afforded to identify fossil localities and to conduct scientific salvage operations to a feasible extent (see Millington and Dietler 2023); the timing of scientific fossil salvage operations during initial grading should be given special considerations in the PRMP such that delays to earthwork activities are minimized while allowing paleontological material to be salvaged at an acceptable level that retains the scientific integrity of the discoveries.

    e. Require full-time paleontological monitoring by qualified paleontological monitors who meets the standards of the SVP (2010) and shall be supervised by the Project Paleontologist; qualified paleontological monitors shall have the authority to temporarily halt construction activities to record and salvage fossil discoveries as they are unearthed to allow for potentially significant fossils to be collected with their scientific integrity intact to the extent feasible and practical.

f. Discuss unanticipated fossil discovery and communication protocols if paleontological resources are discovered by non-paleontology staff working on the project in instances where paleontological monitors are documenting or recording paleontological resources discovered elsewhere within the project site.

g. Discuss feasible monitoring procedures for each of the different ground-disturbing activities, including but not limited to active observation or inspection of sediments during active ground disturbances, whether they be trenching, grading, excavating, drilling, or some other activity that disturbs sediments; inspection of sedimentary spoils spiles or cuttings, as well as backfill originating from Hancock Park that may contain asphaltum or fossil material; and/or matrix screening of spoils for small or microfossils as needed.

h. Define fossil salvaging procedures, including but not limited to outlining the treebox method for asphaltum bearing large accumulations of fossils, salvaging of isolated fossils, matrix screening in the field for microfossils, and chain-of-custody procedures for transferring the fossil discoveries to the Page Museum curators or collection managers as they are exhumed from the project site. Because of the unique conditions of the La Brea Tar Pits and the chemical considerations of working with asphaltum fossil deposits, any paleontological resource discoveries shall remain on-site with the Page Museum. The paleontological monitor shall record pertinent geologic data and collect appropriate sediment samples from any fossil localities.

i. Require the Project Paleontologist to prepare a report of the findings of the monitoring efforts within 90 days after construction is completed.

3. **Conduct Worker Training.** The Project Paleontologist shall develop and present a WEAP training to educate the construction crew on the legal requirements for preserving fossil resources, as well as the procedures to follow in the event of an unanticipated fossil discovery. This training program shall be given to the crew before ground-disturbing work commences and shall include handouts to be given to new workers as needed.

4. **Monitor for Paleontological Resources:** Full-time monitoring shall be required during all ground-disturbing activities (including artificial fill or previously disturbed sediments), regardless of depth. Additionally, special considerations shall be given to the project design elements and geotechnical and soils remediation or hazard reduction recommendations, including but not limited to the paleontological screening of tar sands prior to disposal or treatment. Procedures and protocols for paleontological monitoring and fossil salvage shall be outlined in the PRMP. Monitoring shall:

a. Be conducted by a qualified paleontological monitor who meets the standards of the SVP (2010) and shall be supervised by the Project Paleontologist, who shall coordinate with the Page Museum curators and collections managers and County officials. The Project Paleontologist may periodically inspect construction activities to recommend adjusting the level of monitoring in response to subsurface conditions; however, modifications, such as increasing, reducing, or ceasing of paleontological monitoring, or any changes of the implementation of the PRMP, should be approved by Page Museum curators and the County Museum of Natural History.

b. Include inspection of exposed sedimentary units during active excavations, grading, tar sand removal, and any other ground-disturbing activity that has the potential to impact sediments capable of preserving significant fossils. The Page Museum curators (or their representatives) and the paleontological monitor shall have authority to temporarily divert activity away from exposed fossils to evaluate the significance of the find and, shall the fossils be determined significant or likely significant, professionally and efficiently recover the fossil specimens and collect associated data while minimizing delays. Data collection procedures may require the support of construction contractors to carefully and efficiently collect field data and extract the fossils to allow construction to continue.

c. Require grading and earthwork contractors to follow the guidance of Page Museum staff or the Project Paleontologist regarding the collection and/or extraction of paleontological resources. The paleontological monitor shall record pertinent geologic data and collect appropriate sediment samples from any fossil localities. Recovered fossils shall be directly retained by the Page Museum for later analysis, laboratory preparation, and eventual curation if deemed significant or important by the Page Museum curators or collection managers.

5. **Prepare a Paleontological Resources Monitoring Report:** Upon conclusion of ground-disturbing activities, the Project Paleontologist overseeing the implementation of the PRMP, including paleontological monitoring and fossil salvaging, shall prepare a final monitoring report 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. The final monitoring report and any associated data pertinent to the salvaged fossil specimen(s) shall be submitted to the Los Angeles County Museum of Natural History within 90 days after construction is completed.

10 LITERATURE CITED

AECOM. 2016a. *Cultural and Paleontological Resources Technical Report for the New LACMA Building Project, Los Angeles, California*. Prepared for the Museum Associates, dba Los Angeles County Museum of Art. 98 p.

———. 2016b. *Preliminary Geotechnical Evaluation Report: LACMA Building for the Permanent Collection Project, Los Angeles County Museum of Art, Los Angeles, California*. 44 p.

———. 2017. *Cultural and Paleontological Resources Technical Report for the New LACMA Building Project Los Angeles, California*. Prepared for the Museum Associates, dba Los Angeles County Museum of Art. 69 p.

Akersten, W., C.A. Shaw, and G.T. Jefferson, and G.C. Page. 1983. Rancho La Brea: status and future. *Paleobiology* 9(3):211–217.

ArchaeoPaleo Resource Management, Inc. 2014. *Paleontological Resources Phase I Assessment for the Academy Museum of Motion Pictures*. 175 p.

Arnold, D., and R. Arnold. 1902. The marine Pliocene and Pleistocene stratigraphy of the coast of southern California. *Journal of Geology* 10:117–138.

Bettison-Varga, L. 2022. Personal communication, email from Dr. Lori Bettison-Varga, President and Director of the County of Los Angeles Museum of Natural History, to Bobbette Biddulph, Senior Environmental Planner, SWCA Environmental Consultants, September 29, 2022.

Bischoff, J.L., and R.J. Rosenbauer. 1981. Uranium series dating of human skeletal remains from the Del Mar and Sunnyvale sites. *California Science* 213:1003–1005.

Blake, G.H. 1991. Review of the Neogene biostratigraphy and stratigraphy of the Los Angeles Basin and implication for basin evolution. In *Active Margin Basins*, edited by K.T. Biddle, pp. 135–184. American Association of Petroleum Geologists Memoir 52.

Campbell, R.H., C.J. Wills, P.J. Irvine, and B.J. Swanson. 2014. Preliminary Geologic Map of the Los Angeles 30’ x 60’ Quadrangle, California, Version 2.1. California Geological Survey, scale 1:100,000.

City of Los Angeles. 2001. *City of Los Angeles General Plan*. Adopted 2001. Los Angeles, California.

———. 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 August 17, 2021.

Clarke, M., J.E. Fitch, T. Kristensen, and T. Kubodera. 1980. Statoliths of one fossil and four living squids (Gonatidae: Cephalopoda). *Journal of the Marine Biological Association of the United Kingdom* 60:329–347.

County of Los Angeles. 2015. Chapter 9: Conservation and Natural Resources Element. In *Los Angeles County General Plan 2035*. Available at: https://planning.lacounty.gov/generalplan. Accessed March 2021.

Critelli, S., P. Rumelhart, and R. Ingersoll. 1995. Petrofacies and provenance of the Puente Formation (middle to upper Miocene), Los Angeles Basin, southern California: implications for rapid uplift and accumulation rates. *Journal of Sedimentary Research* A65:656–667.

Denton, W. 1875. On the asphalt bed near Los Angeles, California. *Proceedings of the Boston Society of Natural History* 18:185–186.

Dibblee, T.W., Jr., and H.E. Ehrenspeck. 1991. Geologic map of the Hollywood and Burbank (south 1/2) quadrangles, Los Angeles, California. Dibblee Geologic Foundation map DF-30, scale 1:24,000.

Dibblee, T.W., Jr., H.E. Ehrenspeck, and J.A. Minch. 2010. 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.

Dibblee, T.W., Jr., and J.A. Minch. 2007. Geologic map of the Venice and Inglewood quadrangles, Los Angeles County, California. Dibblee Geological Foundation, Map DF-322, scale 1:24,000.

Dunn, R. 2022. Personal communication, Response to comments on the draft Paleontological Resources Technical Report from Dr. Regan Dunn, Assistant Curator at the La Brea Tar Pits and George C. Page Museum, December 22, 2022.

Eaton, J.E. 1928. Divisions and durations of the Pleistocene in southern California. *Bulletin of the American Association of Petroleum Geologists* 12(2):111–141.

Eisentraut, P.J., and J.D. Cooper. 2002. *Development of a Model Curation Program for Orange County's Archaeological and Paleontological Collections – Final Report*. Submitted to the County of Orange, California.

Environmental Science Associates (ESA). 2020. *Wilshire-Curson Project, Los Angeles, California: Archaeological and Paleontological Monitoring Report*, 449 p.

Fitch, J. E. 1967. The marine fish fauna, based primarily on otoliths, of a lower Pleistocene deposit at San Pedro, California (LACMIP 332, San Pedro Sand). *Contributions in Science* 128:1–23.

Friscia, A., B. Van Valkenburgh, L. Spencer, and J. Harris. et al., 2008. Chronology and spatial distribution of large mammal bones in Pit 91, Rancho La Brea. *PALAIOS* 23:35–42.

George C. Page Museum of La Brea Discoveries. 2011a. *Paleontological Methods and Mitigation of Fossils in Vicinity of Hancock Park*. 16 p.

———. 2011b. *Techniques for Excavation, Preparation and Curation of Fossils from the Project 23 Salvage at Rancho La Brea: A Manual for the Research and Collections Staff of the George C. Page Museum*. 34 p.

Grant, U.S., and W.E. Sheppard. 1939. Some recent changes in elevation in the Los Angeles basin of southern California, and their possible significance. *Bulletin of the Seismological Society of America* 29(2):299–326.

Groves, L. 1992. California cowries (Cypraeacea): past and present, with notes on recent tropical eastern Pacific species. *The Festivus* 24(9):101–107.

Ho, T.Y., L.F. Marcus, and R. Berger. 1969. Radiocarbon dating of petroleum-impregnated bone from tar pits at Rancho La Brea. *California Science* 164:1051–1052.

Holden, A.R., J.R. Southon, K. Will, M.E. Kirby, R.L. Aalbu, and M.J. Markey. 2017. A 50,000 year insect record from Rancho La Brea, Southern California: Insights into past climate and fossil deposition. *Quaternary Science Review* 168:123-136.

Howard, H. 1948. Later Cenozoic avian fossils from near Newport Bay, Orange County, California. *Abstracts with Programs, Geological Society of America* 59:1372–1373.

Huddleston, R.W., and G.T. Takeuchi. 2006. A new Late Miocene species of Sciaenid fish, based primarily on an *in situ* otolith from California. *Bulletin of the Southern California Academy of Sciences* 105:30–42.

Ingersoll, R.V., and P.E. Rumelhart. 1999. Three-stage evolution of the Los Angeles basin, southern California. *Geology* 27(7):593–596.

Jefferson, G.T. 1991a. *A Catalogue of Late Quaternary Vertebrates from California: Part One, Nonmarine Lower Vertebrate and Avian Taxa*. 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.

Jordan, D.S., and H. Hannibal. 1923. Fossil sharks and rays of the Pacific slope of North America. *Southern California Academy of Science Bulletin* 22:27–68.

Lamar, D.L. 1970. Geology of the Elysian Park-Repetto Hills area, Los Angeles County, California. *California Division of Mines and Geology* Special Report 101, 45 p.

Los Angeles County Metropolitan Transportation Authority. 2011. *Westside Subway Extension Project. Wilshire/Fairfax Station Construction. Paleontological Resources Extraction*. 31 p.

Marcus, L.F., and R. Berger. 1984. The significance of radiocarbon dates for Rancho La Brea. In *Quaternary Extinctions: A Prehistoric Revolution*, edited by P.S. Martin and R.G. Klein, pp. 159–183. Tucson: University of Arizona Press.

McDonald, H.G., and G.T. Jefferson. 2008. Distribution of Pleistocene Nothrotheriops (Xenartha, Nothrotheridae) in North America. In *Geology and Vertebrate Paleontology of Western and Southern North America*, edited by X. Wang and L. Barnes, pp. 313–331. Science Series 41. Los Angeles, California: Natural History Museum of Los Angeles County.

McMenamin, M.A.S., D.J. Blunt, K.A. Kvenvolden, S.E. Miller, L.F. Marcus, and R. Pardi. 1982. Amino acid geochemistry of fossil bones from the Rancho La Brea asphalt deposits, California. *Quaternary Research* 18:174-183.

Miller, L. 1930. Further bird remains from the upper San Pedro Pleistocene. *The Condor* 32:116–118.

Miller, W.E. 1971. Pleistocene vertebrates of the Los Angeles Basin and vicinity: Exclusive of Rancho La Brea. *Bulletin of the Los Angeles County Museum of Natural History* 10.

Millington, C., and J. Dietler. 2023. *Archaeological and Tribal Cultural Resources Assessment for the La Brea Tar Pits Master Plan Environmental Impact Report, Los Angeles, California*. SWCA Cultural Resources Report No. 23-47. Pasadena, California: SWCA Environmental Consultants.

Morris, P.A. 1976. Middle Pliocene temperature implications based on the bryozoa *Hippothoa* (Cheilostomata-Ascophora). *Journal of Paleontology* 50:1143–1149.

Murphey, P.C., G.E. Knauss, L.H. Fisk, T.A. Deméré, and R.E. Reynolds. 2019. Best practices in mitigation paleontology. *Proceedings of the San Diego Society of Natural History* 47.

Museum of Natural History. 2022. Paleontological resources for the La Brea Tar Pits Master Plan Project, Los Angeles, California (#00063953). Letter report submitted to SWCA Environmental Consultants on February 5, 2022.

Mychajiliw, A.M., K.A. Rice, L.R. Tewksbury, J.R. Southon, and E.L. Lindsey. Exceptionally preserved asphaltic coprolites expand spatiotemporal range of North America paleoecological proxy. *Scientific Reports* 10(1):1-12.

Norris, R.M., and R.W. Webb. 1990. *Geology of California.* Santa Barbara, California: John Wiley & Sons, Inc.

Oldroyd, T.S. 1924. The fossils of the lower San Pedro fauna of the Nob Hill cut, San Pedro, California. *Proceedings of the National Museum* 65(22).

Paleobiology Database. 2022. The Paleobiology Database. Available at: https://paleobiodb.org/#/. Accessed September 22, 2022.

Pham, K. 2015. GIS data curation and web map application for La Brea Tar Pits fossil occurrences in Los Angeles, California. Master's thesis, University of Southern California, Los Angeles.

Quinn, J.P. 1991. Stratigraphic analysis of the Late Pleistocene Rancho La Brea deposits. *Abstract, Annual Meeting California Academy of Sciences* No. 3.

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. *San Bernardino County Museum Special Publication* 38 (3 and 4).

Savage, D.E. 1951. Late Cenozoic vertebrates of the San Francisco Bay region. *University of California Publications in Geological Sciences* 28(10):215–314.

Schoellhamer, J.E., J.G. Vedder, R.F. Yerkes, and D.M. Kinney. 1981. Geology of the northern Santa Ana Mountains, California. *U.S. Geological Survey Professional Paper* 420-D.

Scott, E., and K. Springer. 2003. CEQA and fossil preservation in California. *Environmental Monitor* Fall:4-10. Sacramento, California: Association of Environmental Professionals.

Seaman, F. J. 1914. A brief history of Rancho La Brea. *Annual Publication of the Historical Society of Southern California* 9:253–256.

Shannon and Wilson, Inc. 2014. *Geology and Soil Discipline Report: Academy Museum of Motion Pictures Project*. 136 pp.

———. 2022. *Geology and Soils Discipline Report: La Brea Tar Pits Museum Master Plan Project*. 128 pp.

Shaw, C.A., and J.P. Quinn. 1986. Rancho La Brea: A look at coastal southern California's past. *California Geology* 39(6):123–133.

Society of Vertebrate Paleontology (SVP). 1995. Assessment and mitigation of adverse impacts to nonrenewable paleontologic resources: standard guidelines. *Society of Vertebrate Paleontology 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. Accessed August 15, 2021.

Spencer, L., B. Van Valkenburgh, and J.H. Harris. 2003. Taphonomic analysis of large mammals recovered from the Pleistocene Rancho La Brea tar seeps. *Paleobiology* 29:561–575.

Springer, K., E. Scott, J.C. Sagebiel, and L.K. 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.B. Albright III, pp. 217–236. *Museum of Northern Arizona Bulletin* 65.

Stock, C., and J.M. Harris. 2007. Rancho La Brea: A record of Pleistocene life in California. 7th ed. *Natural History Museum of Los Angeles County Science Series* No. 37. 113 p.

University of California Museum of Paleontology. 2022. Fossil Locality Database. Available at: https://ucmp.berkeley.edu/collections/databases/. Accessed September 22, 2022.

Woodard, G.D., and L.F. Marcus. 1973. Rancho La Brea fossil deposits: A re-evaluation from stratigraphic and geological evidence. *Journal of Paleontology* 47(1):54–69.

———. 1976. Reliability of late Pleistocene correlation using C-14 dating: Baldwin Hills-Rancho La Brea, Los Angeles, California. *Journal of Paleontology* 50(1):128–132.

Woodring, W.P. 1938. Lower Pliocene mollusks and echinoids from the Los Angeles Basin, California. *U.S. Geological Survey Professional Paper* 190.

Woodring, W.P., M.N. Bramlette, and W.S. Kew. 1946. Geology and Paleontology of Palos Verdes Hills, California. *Geological Survey Professional Paper* 207. Washington, D.C.: United States Government Printing Office.

Yerkes, R.F., and S. Graham. 1997. Preliminary geologic map of the Hollywood 7.5-minute quadrangle, Southern California. U.S. Geological Survey, Open-File Report 97-255, scale 1:24,000.

Yerkes, R.F., T.H. McCulloh, J.E. Schoellhamer, and J.G. Vedder. 1965. *Geology of the Los Angeles Basin – an Introduction*. Geological Survey Professional Paper 420-A.

APPENDIX A

Key Personnel Resumes

MATHEW CARSON, M.S., LEAD PALEONTOLOGIST

Mr. Carson is a cultural and paleontological resources project manager who maintains a comprehensive understanding of the National Environmental Policy Act (NEPA) and the California Environmental Quality Act (CEQA), as well as other regulations pertaining to cultural and paleontological resources. He provides paleontological expertise on projects spanning transportation, energy, mining, public works, transmission lines, education, and development throughout California. Additionally, Mr. Carson exceeds the qualifications of a Qualified Professional Paleontologist according to the guidelines of the Society of Vertebrate Paleontology and is listed as a Principal Investigator on SWCA's Bureau of Land Management California Paleontological Resources Use Permit. He has authored numerous paleontological assessments, as well as sections of NEPA/CEQA environmental documents. He has successfully managed cultural and paleontological projects from their initial planning to their final construction.

YEARS OF EXPERIENCE

8.5

EXPERTISE

Project management

Vertebrate and invertebrate paleontology, micropaleontology, and paleobotany

CEQA/NEPA compliance for cultural and paleontological resources

Paleontological technical studies, mitigation plans, construction monitoring, salvages, final reports

EDUCATION

M.S., Geology (Paleontology); Bowling Green State University, Ohio; 2013

B.S., Geology (Paleobiology); Bowling Green State University, Ohio; 2009

PERMITS

U.S. Bureau of Land Management California Paleontological Resource Use Permit (CA-22-08P), Principal Investigator

MEMBERSHIPS

Member, Paleontological Society

Member, Society of Vertebrate Paleontology

SELECTED PROJECT EXPERIENCE (⁎ denotes project experience prior to SWCA)

Paleontological Resources Monitoring and Mitigation Program for the 3rd and Fairfax Mixed-Use Development Project; Holland Partner Group; Los Angeles, California. The proposed project is a mixed-use development consisting of residential units and retail commercial space. *Role: Senior Paleontologist and Project Manager. Managed the overall project, prepared the paleontological mitigation and monitoring plan, and provided paleontological technical oversight during monitoring.*

Paleontological Resources Monitoring and Mitigation Program for the 3rd and Pacific Mixed-Use Development Project; Holland Partner Group; Long Beach, California. The proposed project is a mixed-use development consisting of residential units and retail commercial space. *Role: Senior Paleontologist and Project Manager. Managed the overall project, prepared the paleontological mitigation and monitoring plan, and provided paleontological technical oversight during monitoring.*

City of Chino Hills Technical Studies and EIR for General Plan Update; EcoTierra Consulting Inc.; San Bernardino County, California. Due to adoption of the 6th Cycle Housing Element, the proposed project consists of a program-level review of the City of Chino Hills, as well as a project-level review of nine specific sites, to update the City of Chino Hills 2015 General Plan. *Role: Senior Paleontologist and Task Lead: Managed the paleontology task oversaw paleontological surveying and prepared final report..*

Tapia Ranch Project; Private Developer and PlaceWorks; Los Angeles County, California. The proposed project would include 405-unit single-family residential lots and associated public works facilities. Approximately 74 percent of the 1,165-acre On-Site/In-Tract part of the project site (861.4 acres) would remain in its current undeveloped natural condition. *Role: Senior Paleontologist/Technical Lead. Conducted a paleontological resources assessment.*

***Prima Deshecha Landfill Landslide Remediation Project - Phase D; County of Orange Integrated Waste Management Department; City of San Juan Capistrano, California.** Project consisted of mass grading efforts to remediate landslides. The landfill is administered by the County of Orange Integrated Waste Management Department. *Role: Senior Paleontologist/Project Manager. Oversaw paleontological monitoring efforts, assessed the significance of fossil discoveries, and provided weekly reports to the County of Orange. Efforts resulted in the documentation and management of nearly 100 fossil sites of varying significance, including two highly significant articulated, nearly complete baleen whale fossils excavated over two months during project earthwork activities. Prepared the final Paleontological Monitoring Report and facilitated curation with John D. Cooper Center.*

Arroyo Seco Low Flow Diversion Project Cultural and Paleontological Support; City of Los Angeles Department of Public Works, Bureau of Engineering (LADPW BOE); Los Angeles County, California. The LADPW BOE is constructing several low-flow diversion (LFD) systems along the Arroyo Seco that will capture and divert dry weather flows from storm drains and divert them to sanitary sewers for treatment. *Role: Senior Paleontologist. Conducted a programmatic review of the paleontological resource potential, prepared the paleontological mitigation and monitoring plan, and provided paleontological technical oversight during monitoring.*

Los Angeles River Low Flow Diversion Project Cultural and Paleontological Support; LADPW BOE; Los Angeles County, California. The LADPW BOE is constructing several LFD systems along the Los Angeles River that will capture and divert dry weather flows from storm drains and divert them to sanitary sewers for treatment. *Role: Senior Paleontologist. Conducted a programmatic review of the paleontological resource potential, prepared the paleontological mitigation and monitoring plan, and provided paleontological technical oversight during monitoring.*

West Los Angeles Sewer Maintenance Yard Project; LADPW BOE; Los Angeles County, California. SWCA provided services under an on-call cultural resources contract. Tasks included preparation of a cultural and paleontological resources assessment reports. Work was conducted in compliance with CEQA, NEPA, and Section 106. *Role: Senior Paleontologist. Conducted a project-level review of the paleontological resource potential and prepared the technical report.*

7th Street Body Shop Replacement Project; LADPW BOE; Los Angeles County, California. SWCA provided services under an on-call cultural resources contract. Tasks included preparation of a cultural and paleontological resources assessment report. Work was conducted in compliance with CEQA, NEPA, and Section 106. *Role: Senior Paleontologist. Conducted a project-level review of the paleontological resource potential and prepared the technical report.*

Holy Cross Road Extension Project; Archdiocese of Los Angeles; Los Angeles County, California. Archdiocese of Los Angeles propose to expand their Holy Cross Cemetery onto two parcels in the Baldwin Hills area of unincorporated Los Angeles County. *Role: Senior Paleontologist and Task Lead. Tasks included preparation of a paleontological resources assessment report.*

Judson Transmission Pipeline Project; Eastern Municipal Water District (EMWD); City of Moreno Valley; Riverside County, California. SWCA provided biological, cultural, and paleontological support for CEQA compliance on behalf of the EMWD. Tasks included preparation of biological, cultural, and paleontological resources assessment reports. Work was conducted in compliance with CEQA, and other state and local regulations. *Role: Senior Paleontologist. Conducted a project-level review of the paleontological resource potential and prepared the technical report.*

***Climate Action Plan Project; Metropolitan Water District of Southern California; Multiple Counties in California.** The project included the preparation of the Program Environmental Impact Report (PEIR) for the Climate Action Plan for Metropolitan Water District of Southern California. *Role: Senior Paleontologist. Mr. Carson prepared a paleontological resources assessment focused on regional paleontological studies, regional and local geologic maps, primary literature, online fossil locality databases, and the regulatory framework surrounding paleontological resources in various government jurisdictions within California.*

***High Park/Ponte Vista Residential Development Project; iStar Financial, Inc.; County of Los Angeles, California.** The project, located on State Route 213, between Agajanian Drive and Fitness Drive in the San Pedro Port District, entailed the demolition of former U.S. Navy facilities and redevelopment with approximately 1,135 housing units on a 61.5-acre lot, with significant excavation operations consisting of cut/fill operations, mass grading, and sidewall cuts for retaining wall development. *Role: Paleontologist. Oversaw construction monitoring for paleontological resources.*

***Whiskey Hotel Project; Private Developer; City of Los Angeles, California.** The Whiskey Hotel Project consists of construction of a new hotel located in the City of Los Angeles, California. *Role: Senior Paleontologist/Project Manager. Provided overall project management and paleontological oversight during the project's construction.*

***Echo Hotel Project; Private Developer; City of Los Angeles, California.** The Echo Hotel Project, located in the city of Los Angeles, California, proposes to combine nine contiguous lots, demolish the existing commercial building, reroute an alley, and construct an eight-story hotel, with an attached restaurant, meeting space, fitness facility, and aboveground and subterranean parking. *Role: Senior Paleontologist/Project Manager. Prepared a paleontological resources assessment technical memorandum for the project.*

RUSSELL SHAPIRO, PH.D., PRINCIPAL INVESTIGATOR, PALEONTOLOGY

Dr. Shapiro is a principal investigator in SWCA's Pasadena office, supporting paleontological resource assessments and evaluations, field surveys and construction monitoring, preparation of technical reports, and peer or senior review for technical reports and mitigation plans, as well as researches and drafts paleontology sections for the environmental impact reports/statements for California Environmental Quality Act (CEQA) and/or National Environmental Policy Act (NEPA) compliance throughout California and the western United States. As a paleontology principal investigator who exceeds the definition of a Qualified Professional Paleontologist as defined by Society of Vertebrate Paleontology (SVP), Dr. Shapiro has reviewed resource planning documents for several counties in California and was the lead on the Bureau of Land Management's (BLM's) assessment of fossil resources of Northern California.

In his academic role as Professor of Geology and California State University, Chico, Dr. Shapiro teaches several paleontology courses, focusing on CEQA and NEPA regulations, field surveys, geographic information system projections, fossil recovery, budgeting, and curation. He also teaches in the annual Field Camp courses, manages the rock preparation laboratory, and maintains the microscopes.

YEARS OF EXPERIENCE

20

EXPERTISE

Project management

Paleontological resources management

CEQA/NEPA compliance

Fossil preparation

EDUCATION

Ph.D., Geological Sciences; University of California, Santa Barbara; 1998

B.S., Geology; Humboldt State University, Arcata, California; 1992

PERMITS AND MEMBERSHIPS

U.S. Fish and Wildlife Cultural Resources Use Permit

U.S. Forest Service Cultural Resources Use Permit

Bureau of Land Management Cultural Resources Use Permit

Wilderness and Remote First Aid (Red Cross Certified)

Geobiology Society; Treasurer

Society for Sedimentary Geology (SEPM); Secretary

Society for Vertebrate Paleontology

SELECTED PROJECT EXPERIENCE (* denotes project experience prior to SWCA)

***N-99414 12.5-kV Distribution Facility Goodsprings-Sandy Valley; NV Energy; Clark County, Nevada.** Conducted all phases of paleontological resource assessment for a transmission line replacement. These tasks included the desktop analysis of known resources, field survey of the project footprint, and follow-up reporting. *Role: Principal Investigator. Conducted field mapping.*

I-10/Robertson/National Area Circulation Improvement Project; Michael Baker International; Los Angeles County, California. SWCA conducted a cultural resources analysis, which includes a California Historical Resources Information System (CHRIS) records search, an Electronic Database Resources records search, an architectural resources survey and recording, an archaeological resources survey, and writing the Caltrans Archaeological Survey Report (ASR), Historic Property Survey Report (HPSR), and Historical Resources Evaluation Report (HRER). *Role: Principal Investigator. Desktop analysis of the geology and paleontological resources; authored the technical report.*

General Plan Update for City of Corona; City of Corona; Riverside County, California. Co-authored Paleontological Resources Technical Report based on review of geological reports, museum records, and published literature to support the proposed revision to the City's general plan. The revised general plan will guide all paleontological mitigation in the City's jurisdiction. *Role: Principal Investigator, Paleontologist, co-author of final reports.*

***Research on the Jurassic Bedford Canyon Formation; Riverside County, California.** This project covers independent research on unique fossil ecosystems preserved in the Santa Ana Mountains in Riverside County. As Research Lead, Dr. Shapiro coordinates paleontologists from the Polish National Museum (Warsaw) and the Natural History Museum of Los Angeles County as well as geochemists from Caltech and the State College of Pennsylvania. The project is ongoing. *Role: Research Lead. Duties include field mapping and collection, fossil and powder preparation, and coordinating between research partners.*

City of Hope Specific Plan and EIR; PlaceWorks; Duarte, Los Angeles County, California. SWCA provided a cultural resources study which included a records search and literature review, Native American coordination, an archaeological resources field survey, preparation of a cultural resources technical report with evaluations of potential historic properties and an assessment of potential impacts to those properties, and a paleontological resources study. The project area corresponds with the approximately 116-acre City of Hope campus, with approximately 89.5 acres in the city of Duarte and 26.5 acres in the city of Irwindale, Los Angeles County, California. This study was completed in compliance with the CEQA. *Role: Principal Investigator. Reviewed general plan and provided changes for the final draft.*

75 Howard Street; Paramount Group, Inc.; San Francisco, San Francisco City and County, California. SWCA prepared the EIR for the proposed project at 75 Howard Street, which tiered off the Transit Center District Plan and Transit Tower Final EIR. The proposed project at 75 Howard Street consists of the demolition of an existing 91 foot-tall, eight-level parking garage and the construction of a 31-story, 348-foot-tall, residential high-rise tower on the site. SWCA directed technical background studies for aesthetics, archaeology, transportation, noise, air quality, wind, and shadow and prepared and distributed a Notice of Preparation of an EIR and Initial Study, which focused on the environmental topics for which the proposed project would have less-than-significant impacts. *Role: Principal Investigator. Reviewed geological data and museum records to draft the environmental review document.*

Ann Project Paleo Study; SRK Consulting, Inc.; Nye County, Nevada. SWCA was contracted by SRK Consulting to provide a paleontological resources assessment for the Ann Project located in central Nevada. The project is located on lands administered by the U.S. Forest Service and the BLM. The project will involve the construction of a barite mine and jig plant on the site. *Role: Principal Investigator. Conducted pre-survey discussion of local geology and reviewed report.*

City of Corona General Plan Interim Technical Update and Environmental Analysis; PlaceWorks; Corona, Riverside County, California. The City of Corona initiated the process to prepare an interim technical update to its General Plan. The City's General Plan was last comprehensively updated in 2004 along with environmental analysis and is still the City's guiding land use document to the year 2025. The update did not substantially alter the outcomes of the visioning process that founded the 2004 update but ensured that all technical data and policies remain current, relevant, and effective to ensure that the document successfully guides decisions and activities carried out by the City's decision makers and City staff. SWCA provided multi-disciplinary support for this General Plan technical update and environmental analysis. *Role: Principal Investigator. Reviewed general plan and provided changes for the final draft.*

San Bernardino Web-based Countywide General Plan and EIR; PlaceWorks; San Bernardino County, California. SWCA is currently conducting cultural and paleontological resources studies supporting PlaceWorks to prepare a Web-based Countywide Plan and a PEIR for the County of San Bernardino. SWCA is providing Native American consultation support, and conducting records searches for cultural and paleontological resources to summarize the existing conditions and inform a sensitivity analysis for the plan area, which includes a Community Plan Area within unincorporated portions of San Bernardino County. *Role: Principal Investigator. Reviewed general plan and provided changes for the final draft.*

SCAG 2020 RTP/SCS Program Environmental Impact Report (PEIR); Impact Sciences, Inc.; Multiple Counties, California. SWCA was retained by Impact Sciences to provide environmental services in support of the Southern California Association of Governments PEIR for the 2020 Regional Transportation Plan/Sustainable Communities Strategy in accordance with environmental compliance procedures under federal metropolitan planning law and regulations, the CEQA statutes and guidelines, and other relevant federal and state environmental laws and regulations. SWCA is conducting biological, cultural, and paleontological resources studies in support of the PEIR. *Role: Principal Investigator. Reviewed paleontology report.*

SCE Fort Irwin Reliability Project Environmental Assessment; Southern California Edison Company; San Bernardino County, California. SWCA is providing support for this transmission line improvement project located on lands administered by the BLM and Department of Defense as well as private landowners. Services include the development of the BLM Plan of Development (POD), preparation of the Environmental Assessment (EA), and biological, jurisdictional waters, cultural, and paleontological technical studies and reports to support the EA, POD, and environmental permits. *Role: Principal Investigator. Reviewed drafts of technical reports.*

Confidential Transmission Project; Confidential Clients; California. SWCA is providing permitting and licensing support, including preparation of a PEA, for a new 230/70-kV substation, 7 miles of new aboveground 70-kV power line, 3 miles of reconductored 70-kV line, and a 230-kV interconnection in Paso Robles. Services include cultural, biological, and paleontological surveys; PEA preparation; PTC application filing support and noticing; and post-filing CEQA and permitting support. *Role: Principal Investigator. Conducted desktop analysis of geological setting and paleontological resources.*

APPENDIX B

Museum of Natural History Paleontological Records Search

CONFIDENTIAL – NOT FOR PUBLIC RELEASE

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

tel 213.763.DINO
www.nhm.org

Research & Collections

e-mail: **paleorecords@nhm.org**

February 5, 2022

SWCA Environmental Consultants
Attn: Georgia Knauss

re: Paleontological resources for the La Brea Tar Pits Master Plan Project, #00063953

Dear Georgia:

I have conducted a thorough search of our paleontology collection records for the locality and specimen data for proposed development at the La Brea Tar Pits Master Plan project area as outlined on the portion of the Hollywood USGS topographic quadrangle map that you sent to me via e-mail on January 31, 2022.

The asphaltic deposits of Rancho La Brea contain perhaps the densest accumulation of vertebrate fossils in the world, and are unique in their occurrence in a major urban area and still being productive after more than 100 years of excavation. In fact, one localized deposit designated as Pit 91, locality LACM 6909, is still being actively excavated. The Rancho La Brea asphalt deposits are also unusual in preserving a substantial portion of the total biota, including an extensive list of fossil plants, insects, and invertebrates in addition to the justly renowned vertebrate fauna. Over 200 species of fossil vertebrates are represented in these deposits, including extinct forms of bison, camel, horse, mammoth, mastodon, ground sloths, dire wolf, lion, condor, eagle, turkey, etc. One of the earliest human skeletal remains from California has also been recovered from these deposits. Numerous holotypes have come from the Rancho La Brea deposits, including the holotype of the sabre-toothed cat, *Smilodon californicus* (now known as *Smilodon fatalis*), designated as the California state fossil. The Rancho La Brea paleobiota documents climatic change in the Los Angeles Basin during the latest Pleistocene and earliest Holocene, including the last "ice age". It is so significant that this deposit served as the basis for designating the late Pleistocene as the North American Land Mammal Age called the Rancholabrean.

There are numerous fossil localities documents within Hancock Park, of which some of the most fossiliferous are listed in the table below:

Locality Number	Location	Formation	Taxa	Depth/Elevation
LACM VP 7298	The Page Museum (collected during construction of the museum building)	Variably asphaltic silts & silty clays	Botanical; Invertebrate & Vertebrate; estimated around 10,000 specimens	159 ft above mean sea level
LACM VP 6909	Rancho La Brea. Pit # 91 at Hancock Park.	Asphaltic sands	Abundant vertebrate, invertebrate, and plant fossils	Surface – 20 feet bgs
Numerous	Los Angeles County Museum of Art,	Pleistocene fluvial deposits and	16 asphaltic fossil deposits preserving an estimated over one	Starting at 10 feet bgs

	Project 23	asphaltic sands	million specimens including one nearly complete mammoth	

VP, Vertebrate Paleontology; IP, Invertebrate Paleontology; bgs, below ground surface

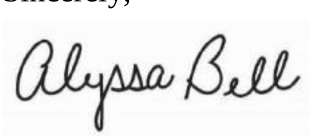
The asphaltic deposits extend in the subsurface beyond the bounds of Hancock Park, with some of the closest localities listed in the following table.

Locality Number	Location	Formation	Taxa	Depth
LACM VP 4204	SW corner of Wilshire Boulevard & Spaulding Avenue	Older alluvium (asphaltic)	Antelope (*Antilocapra*)	Unknown
LACM VP 5481	Museum Square South; SW of Wilshire Blvd. and Masselin Ave.	Palos Verdes Sand (Member C; 0.5 to 1 meter thick bed of asphalt- impregnated gravelly medium grained sandstone)	Mammoth (*Mammuthus*), tapir (*Tapirus*); horse (*Equus*); camelid (*Camelops*, cf. *Hemiauchenia*); bison (*Bison*)	8.5 m bgs
LACM VP 6345	Parcel bounded by Wilshire Blvd. to the south, Orange Grove Avenue on the west, Ogden Avenue on the east & the May Company parking structure on the north	Asphaltic sands	Bird (Aves); horse (*Equus* cf. *E. occidentalis)*	Unknown
LACM VP 7247	Westbound lane of Wilshire Boulevard just west of Curson Street	Brown asphalt impregnated silt with lenses of coarse asphaltic sand	Dire wolf (*Canis dirus*), horse (*Equus*)	Approx. 2 feet bgs
LACM VP 7297	SE corner of 6th St and S Curson Ave	Medium to coarse grained asphaltic sand grading to asphaltic clay	Botanical; Invertebrate & Vertebrate; estimated around 250,000 specimens	173-180 ft above man sea level
LACM VP 1724	Near intersection of Hauser & Wilshire Blvd	Pleistocene, asphaltic sands	Pond turtle (*Clemmys marmorata),* bird (Aves), racoon (Procyonidae), sabretooth cat (*Smilodon fatalis)*, dire wolf (*Canis dirus)*, coyote (*Canis latrans)*, pronghorn antelope (*Capromeryx minor)*, and bison (*Bison)*	8 feet bgs

VP, Vertebrate Paleontology; IP, Invertebrate Paleontology; bgs, below ground surface

This records search covers only the records of the NHMLA. It is not intended as a paleontological assessment of the project area for the purposes of CEQA or NEPA. Fossil-bearing units are present in the project area, either at the surface or in the subsurface. As such, NHMLA recommends that a full paleontological assessment of the project area be conducted by a paleontologist meeting Bureau of Land Management or Society of Vertebrate Paleontology standards.

Sincerely,



Alyssa Bell, Ph.D.
Natural History Museum of Los Angeles County