

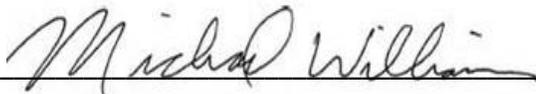
**Paleontological Resources Inventory Report  
for the  
San Diego State University Mission Valley Campus Master  
Plan Project,  
City of San Diego,  
San Diego County, California  
PTS #616992**

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# Acronyms and Abbreviations

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Acronym/Abbreviation	Definition
Board	California State University Board of Trustees
CSU	California State University
CEQA	California Environmental Quality Act
City	City of San Diego
EIR	Environmental Impact Report
GEI	GEI Consultants Inc.
IS	Initial Study
PI	Principal Investigator
PRC	Public Resources Code
SDSU	San Diego State University
SDNHM	San Diego Natural History Museum
SVP	Society of Vertebrate Paleontology
USGS	U.S. Geological Survey

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# Executive Summary

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The Board of Trustees (Board) of the California State University (CSU), which is the State of California acting in its higher education capacity, on behalf of San Diego State University (SDSU) (one of 23 campuses in the CSU system) is proposing to implement the SDSU Mission Valley Campus Master Plan project (proposed project). The proposed project is referenced in San Diego Municipal Code section 22.0908, *Sale of Real Property to SDSU*, which was adopted after the *SDSU West Campus Research Center, Stadium, and River Park Initiative* (Measure G) was approved by City of San Diego voters on November 6, 2018. The proposed project would include (a) development of a Mission Valley campus for SDSU, including facilities for educational, research, technology, and support programs within a mixed-use campus village and research park; (b) demolition of the existing San Diego County Credit Union Stadium (“Stadium,” previously known as “San Diego Stadium,” “Jack Murphy Stadium,” and “Qualcomm Stadium”); (c) construction of a new, multipurpose stadium; (d) creation of the River Park; (e) passive and active recreation space and parks; and (f) associated infrastructure and amenities. Dudek was retained to initiate the processing of an EIR. As a requirement of the EIR, this *Paleontological Resources Inventory Report* was completed for the proposed project.

This report presents the results of a paleontological investigation performed by Dudek for the proposed project, located in the City of San Diego, San Diego County, California. The proposed project study area is located on the La Mesa, California U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle. The CSU Board is the lead agency for compliance with the California Environmental Quality Act (CEQA) and the CEQA Guidelines. In accordance with CEQA and the Guidelines, Dudek performed a paleontological study of the proposed project study area.

A paleontological records search was requested from the San Diego Natural History Museum (SDNHM), and a letter was received in response on February 05, 2019, indicating that there are 37 fossil localities within a one-mile radius of the proposed project area. However, 26 of these localities occur in geological units that would not be impacted by the proposed project (Appendix A, Museum Records Search Results). The remaining 11 localities were reported from the Friars Formation, which underlies the proposed project area at variable depths. Published geological maps and reports and unpublished reports were reviewed to identify geological units underlying the study area and their paleontological sensitivity or potential.

The regional geological mapping indicates that the geological units present within the study area are (listed in order from youngest to oldest): young alluvial floodplain deposits, old alluvial floodplain deposits, and the Friars Formation (at variable depths beneath the surface), as confirmed by the museum record search results (Appendix A, Museum Records Search Results) and geological mapping (Kennedy 1975; Kennedy and Tan 2007; Kennedy and Tan 2008). The museum records search results indicate that the study area is underlain by geological units ranging from high to low paleontological potential (County of San Diego 2009; Appendix A).

The young alluvial floodplain deposits have low paleontological sensitivity on the surface, which increases to moderate with depth where they become old enough to have the potential to yield significant paleontological resources; the old alluvial floodplain deposits have moderate paleontological sensitivity; and the Friars Formation has high paleontological sensitivity according to the SDNHM records search results. Areas of the proposed project underlain by low sensitivity young alluvial floodplain deposits do not require paleontological mitigation on the surface; excavations into old alluvial floodplain deposits require either full-time or part-time paleontological monitoring as determined by the qualified paleontologist; and excavations into the Friars Formation requires full-time paleontological monitoring. In the event that significant paleontological resources are inadvertently uncovered, a qualified paleontologist should be retained to implement the paleontological mitigation program, which would be sufficient to reduce the impacts to less than significant.

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# 1 Introduction

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The proposed project is located south of Friars Road, west of Interstate 15 (I-15), north of the San Diego River, and east of the existing Fenton Marketplace shopping center. As previously stated, the proposed project would include (a) development of a Mission Valley campus for SDSU, including facilities for educational, research, technology, and support programs within a mixed-use campus village and research park, including (b) demolition of the existing San Diego County Credit Union Stadium (“Stadium,” previously known as “San Diego Stadium,” “Jack Murphy Stadium,” and “Qualcomm Stadium”); (c) construction of a new, multi-purpose stadium; (d) creation of the River Park; (e) passive and active recreation space and parks; and (f) associated infrastructure and amenities. Specifically, the proposed project would consist of development of facilities to accommodate the new 35,000-seat multi-purpose stadium; approximately 1.6 million square feet for campus uses; approximately 4,600 residential units; two hotels with approximately 400 hotel rooms; approximately 95,000 square feet of commercial/retail uses to support SDSU’s Mission Valley campus and related project facilities; approximately 84 acres of parks, recreation and open space, including the approximate 34-acre River Park and pedestrian and bicycle trails; transit opportunities due to the existing on-site transit station; and associated infrastructure and other amenities.

This Paleontological Resources Inventory Report analyzes the proposed project’s impacts on paleontological resources. In particular, this report describes the existing setting of the project site, identifies the relevant regulatory setting, evaluates potential impacts, and identifies mitigation measures related to potential paleontological resources that may be affected as a result of implementation of the proposed project.

## 1.1 Project Site, Location and Setting

The property comprising the project site is located in the northeast portion of the Mission Valley community within the City of San Diego (see **Figure 1, Regional and Vicinity Map**). Specifically, the project site is situated south of Friars Road, west of I-15, north of Interstate 8 (I-8), and east of the existing Fenton Marketplace shopping center. It is approximately 5 miles from downtown San Diego and approximately 2.5 miles west of the existing SDSU main campus situated along I-8 within the College Area community of the City of San Diego.

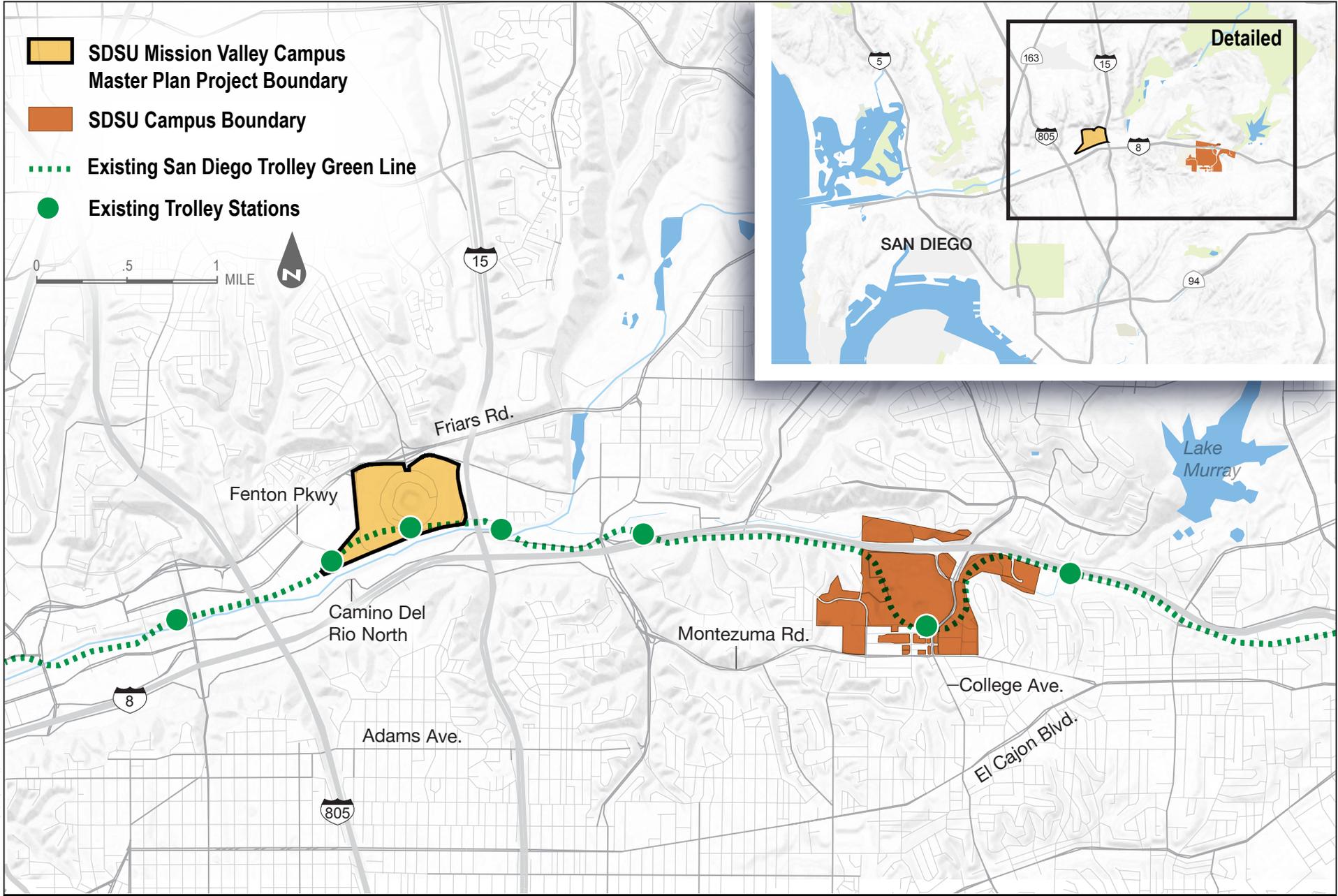
Regional access to and from the project site is provided by four major freeways – I-15, I-8, Interstate 805 (I-805), and State Route 163 (SR-163), accessed via Friars Road (see **Figure 2 Project Site and Surrounding Land Uses**). Further, the existing Metropolitan Transit System’s trolley station is situated on the project site as shown on Figure 2.

The project site is in a developed area surrounded by major freeways, roadways, existing development, and the San Diego River. Higher density multi-family residential land uses are located to the northwest, southwest, and east, across I-15. Friars Road, Mission Village Road, and San Diego Mission Road are located to the north. The San Diego River, which flows east to west, is located south of the project site; and south of the river are additional office uses and I-8. To the north of Friars Road is San Diego Fire Department Fire Station 45, undeveloped hillsides, and single-family residences situated atop the mesa. To the west are office and large commercial retail uses. Murphy Canyon Creek, a partially earthen and concrete line channel that conveys flow into the river, is located immediately to the east, and I-15 is located east of Murphy Canyon Creek.

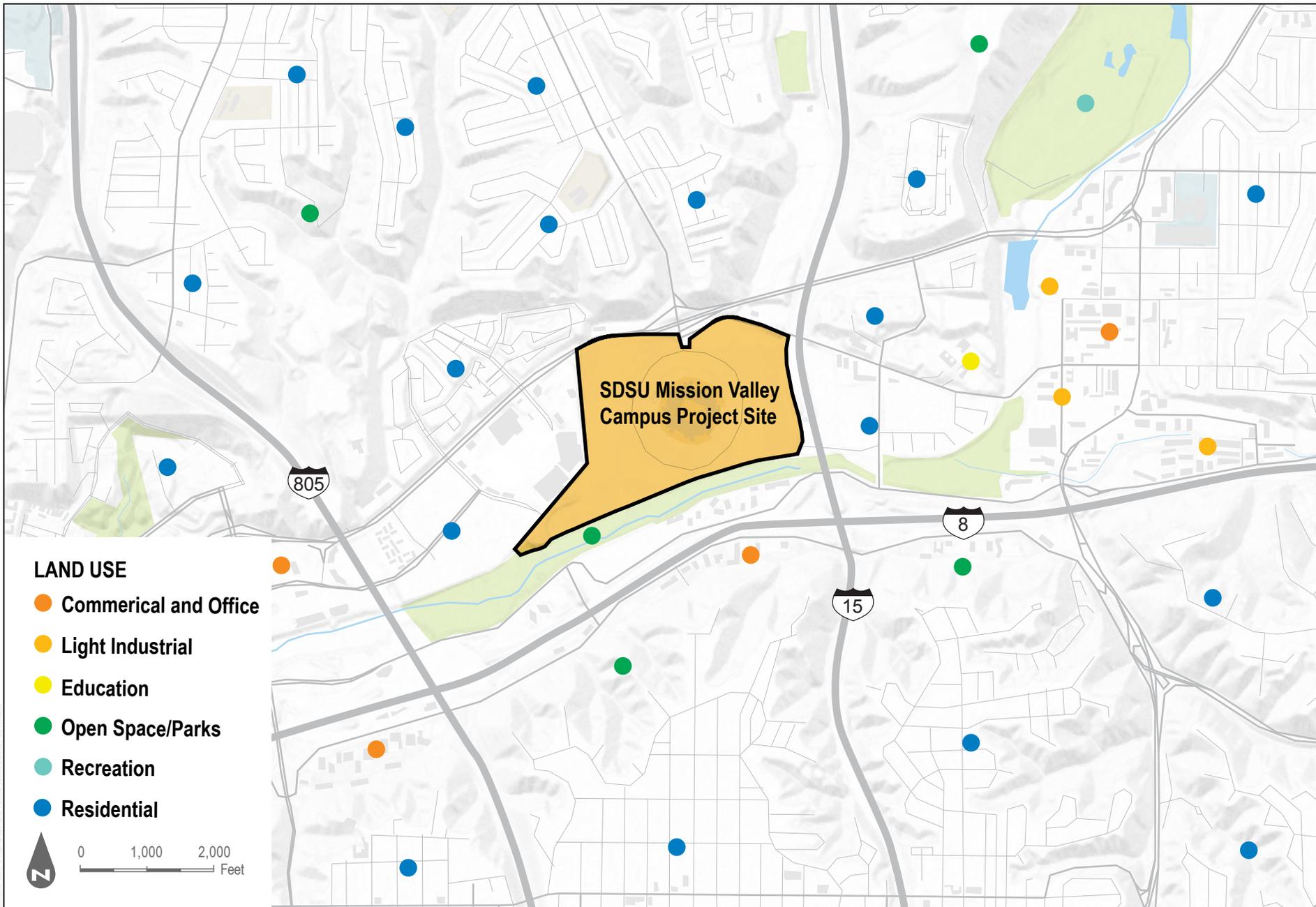
Kinder Morgan owns the existing Mission Valley Terminal, which is a fuel storage facility located just north of the project site in Mission Valley at 9950 San Diego Mission Road. The Mission Valley Terminal has been in operation since the 1960s and is a primary fuel distribution center in San Diego County.

Regionally, the City of San Diego covers approximately 206,989 acres in southwestern San Diego County, is located approximately 17 miles north of the United States-Mexico border, and borders the cities of Del Mar, Poway, Santee, El Cajon, La Mesa, Lemon Grove, National City, Chula Vista and Coronado and unincorporated San Diego County. The Pacific Ocean forms the City's western border and the U.S.-Mexico border is the City's southern border.

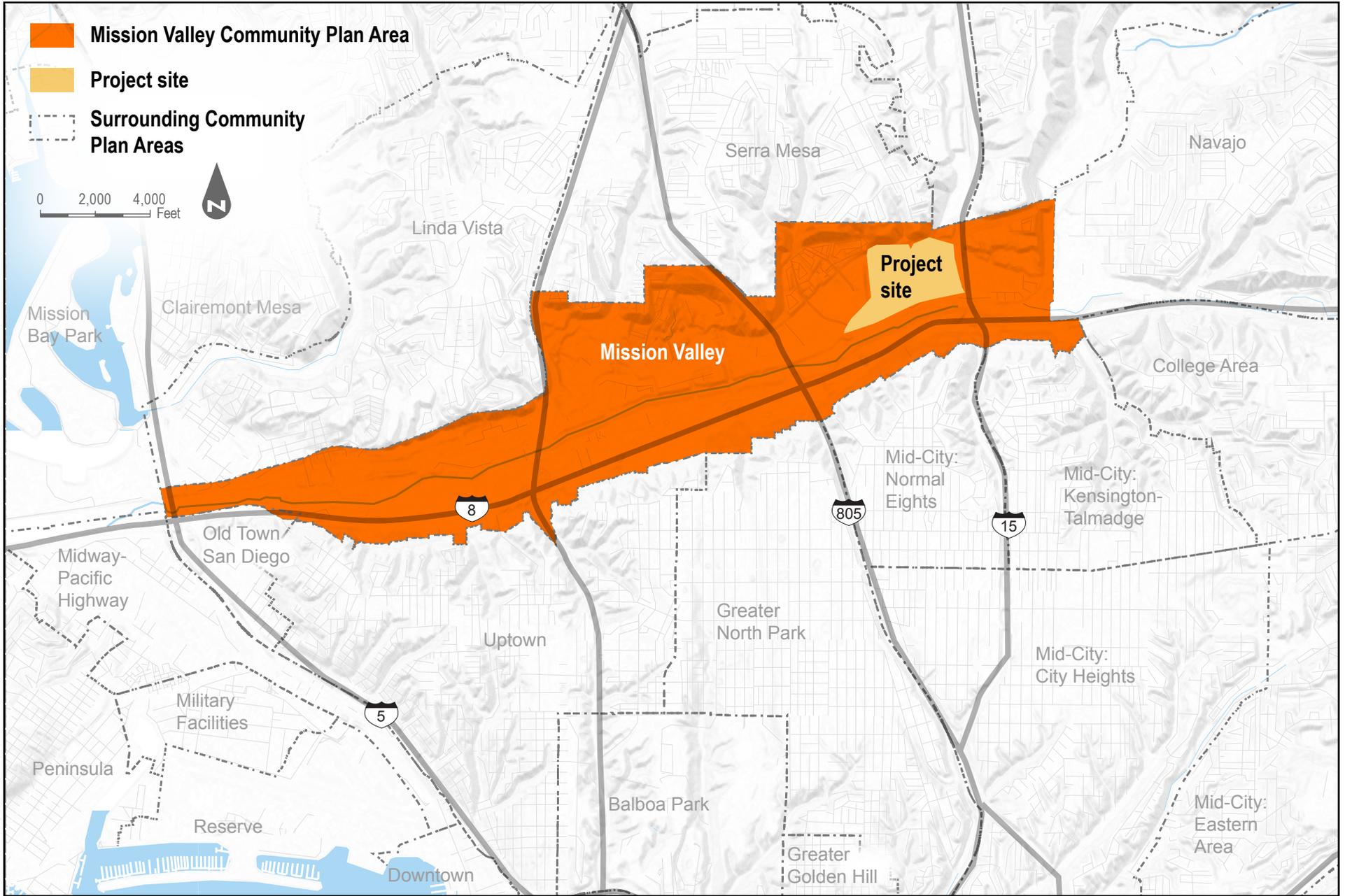
The Mission Valley community is located in the central portion of the San Diego metropolitan area (see **Figure 3, Mission Valley Community Plan**). This community is located approximately 4 miles north of downtown San Diego and 7 miles east of the Pacific Ocean. The communities of Linda Vista, Serra Mesa, Kearney Mesa, and Tierrasanta are located north of Mission Valley. Kensington-Talmadge, Normal Heights, Greater North Park, Uptown, and Old Town are located to the south of Mission Valley. Mission Bay Park is located west of Mission Valley, and the communities of Navajo and College Area are located east of Mission Valley.



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## 1.2 Project Description

The proposed project entails the acquisition, construction, and operation of a SDSU Mission Valley campus, innovation district, and stadium to support SDSU's education, research, entrepreneurial, technology, and athletics programs. Specifically, the proposed project would include:

1. approximately 86 acres of parks, recreation, and open space, including a 66-acre River Park which includes the 34-acres identified pursuant to the framework set forth in SDMC Section 22.0908 and the Purchase and Sale Agreement, and which shall be built and operated by SDSU/CSU; shared SDSU/community active and passive parks and recreation fields and open space; and pedestrian, hiking, and biking trails;<sup>1</sup>
2. approximately 1.6 million square feet of campus uses for education, research, entrepreneurial, and technology programs;
3. construction of a new, multipurpose 35,000-capacity stadium and the corresponding demolition of the existing San Diego County Credit Union (SDCCU) Stadium (formerly, "Qualcomm Stadium");
4. approximately 4,600 market-rate, workforce, and affordable homes including homes for students, faculty, and staff, in proximity to a vibrant, transit-oriented university village setting;
5. approximately 400 hotel rooms to support campus visitors and stadium-related events, provide additional conference facilities, and serve as an incubator for graduate and undergraduate students in SDSU's hospitality and tourism management program;
6. approximately 95,000 square feet of community-serving retail space to support campus, stadium, and the community;
7. enhanced use of the Metropolitan Transit System (MTS) Green Line Stadium Station; thereby, minimizing vehicular traffic use; and accommodating the planned Purple Line on the project site; and
8. associated onsite and offsite infrastructure, utilities, facilities, and other amenities.

As part of the proposed project, CSU as lead agency would consider approval of the SDSU Mission Valley Campus Master Plan, which is the physical master plan to guide the future development of CSU facilities, based on academic goals and projected student enrollment levels, for an established time horizon. The new Mission Valley Campus Master Plan would accommodate 15,000 full-time equivalent students (FTES) over time, resulting in a total student headcount of approximately 20,000 students and resulting in approximately 1,900 total faculty and staff. <sup>2</sup>

For further project-related information, please refer to **Figure 4, Concept Design Site Plan**, which graphically depicts the proposed project and its components; and **Table 1, Campus Land Use Summary**, which provides a statistical breakdown of the components of the proposed project.

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<sup>1</sup> The City of San Diego (City) would remain the owner of the approximate 34-acre River Park located immediately adjacent to and south of the project site and north of the San Diego River. As part of CSU's purchase of the property comprising the project site, CSU would revitalize, and restore the 34-acre River Park, which would be retained by the City in fee ownership.

<sup>2</sup> One full-time equivalent student is defined as one student taking fifteen course units (which is considered to be a "full course load"). Two part-time students, each taking 7.5 course units, also would be considered one FTES; and, therefore, the total student headcount enrolled at the university is higher than the FTES enrollment. At buildout, SDSU estimates that when enrollment reaches 15,000 FTES at the SDSU Mission Valley campus, total students enrolled at that campus site would be approximately 20,000 students.

**Table 1. Campus Land Use Summary**

Proposed Campus Land Uses	Footprint (acres)	No. of Buildings	Stories	Units	
				Homes	Hotel Rooms
Parks, Recreation and Open Space <sup>1</sup>	86.1 <sup>2</sup>	— <sup>3</sup>	—	—	—
Mixed-use Campus (Including Stadium)	28.6	17	3-5	—	—
Campus Residential	24.6	16	3-24	4,600	
Campus Hospitality <sup>4</sup>	5.2	2	3-22		400
Circulation	27.4	—	—	—	
<b>Total</b>	<b>172</b>	<b>34</b>	<b>—</b>	<b>4,600</b>	<b>400</b>

Source: Carrier Johnson 2017

**Notes:**

- <sup>1</sup> Includes trails.
- <sup>2</sup> Excludes 1.3-acre MTD fee-title for San Diego Trolley Line; no development proposed within that area.
- <sup>3</sup> A dash (—) signifies that the information does not apply for a given category.
- <sup>4</sup> Hotel H1 includes both hotel and residential uses.

## 1.3 Regulatory Setting

### 1.3.1 State

CEQA (Pub. Resources Code, § 21000 et seq.) requires lead agencies to consider the potential effects of a project on unique paleontological resources. More specifically, CEQA requires an assessment of impacts associated with the direct or indirect destruction of unique paleontological resources or sites that are of value to the region or state. This study satisfies project requirements in accordance with CEQA and Public Resources Code Section 5097.5 (Stats 1965, c 1136, p. 2792). This analysis also complies with guidelines and significance criteria specified by the Society of Vertebrate Paleontology ([SVP] 2010).

Paleontological resources are explicitly addressed by CEQA, specifically in Section VII(f) of CEQA Guidelines Appendix G, the “Environmental Checklist Form,” which addresses the potential for adverse impacts to “unique paleontological resource[s] or site[s] or unique geological feature[s].” This provision covers scientifically significant fossils – remains of species or genera new to science, for example, or fossils exhibiting features not previously recognized for a given animal group – as well as localities that yield fossils significant in their abundance, diversity, preservation, and so forth. Public Resources Code, sections 5097.5 and 30244, also regulate removal of paleontological resources from state lands, define unauthorized removal of fossil resources as a misdemeanor, and require mitigation of disturbed sites.

### 1.3.2 Paleontological Resources

Paleontological resources are the fossilized remains or traces of plants and animals that are preserved in earth’s crust, and per the Society of Vertebrate Paleontology SVP (2010) guidelines, are older than written history or older than approximately 5,500 years. They are limited, nonrenewable resources of scientific and educational value, which are afforded protection under state laws and regulations. This study satisfies requirements in accordance with CEQA and the Guidelines and Public Resources Code Section 5097.5. This analysis also complies with guidelines and significance

criteria specified by SVP (2010). Table 2 provides definitions for high, moderate, low, marginal, and no paleontological resource potential, or sensitivity, as set forth in and in agreement with the County of San Diego’s (2009) *Guidelines for Determining Significance: Paleontological Resources*.

**Table 2. Paleontological Resource Sensitivity Criteria**

Resource Sensitivity / Potential	Definition
High	High resource potential and high sensitivity are assigned to geologic formations known to contain paleontological localities with rare, well preserved, critical fossil materials for stratigraphic or paleoenvironmental interpretation, and fossils providing important information about the paleoclimatic, paleobiological and/or evolutionary history (phylogeny) of animal and plant groups. In general, formations with high resource potential are considered to have the highest potential to produce unique invertebrate fossil assemblages or unique vertebrate fossil remains and are, therefore, highly sensitive.
Moderate	Moderate resource potential and moderate sensitivity are assigned to geologic formations known to contain paleontological localities. These geologic formations are judged to have a strong, but often unproven, potential for producing unique fossil remains (Deméré and Walsh 1993).
Low	Low resource potential and low sensitivity are assigned to geologic formations that, based on their relatively young age and/or high-energy depositional history, are judged unlikely to produce unique fossil remains. Low resource potential formations rarely produce fossil remains of scientific significance and are considered to have low sensitivity. However, when fossils are found in these formations, they are often very significant additions to our geologic understanding of the area.
Marginal	Marginal resource potential and marginal sensitivity are assigned to geologic formations that are composed either of volcanoclastic (derived from volcanic sources) or metasedimentary rocks, but that nevertheless have a limited probability for producing fossils from certain formations at localized outcrops. Volcanoclastic rock can contain organisms that were fossilized by being covered by ash, dust, mud, or other debris from volcanoes. Sedimentary rocks that have been metamorphosed by heat and/or pressure caused by volcanoes or plutons are called metasedimentary. If the sedimentary rocks had paleontological resources within them, those resources may have survived the metamorphism and still be identifiable within the metasedimentary rock, but since the probability of this occurring is so limited, these formations are considered marginally sensitive.
No Potential	No resource potential is assigned to geologic formations that are composed entirely of volcanic or plutonic igneous rock, such as basalt or granite, and therefore do not have any potential for producing fossil remains. These formations have no paleontological resource potential, i.e., they are not sensitive.

Source: County of San Diego 2009.

## 1.4 Report Format and Key Personnel

Following this Introduction (Chapter 1), Chapter 2 presents the overall geology of the study area. Chapter 3 outlines the methods used to conduct this study. Chapter 4 presents the results of the records search. Chapter 5 summarizes the study and provides management considerations. Chapter 6 lists the references cited in this report. Michael J. Williams, Ph.D., served as Principal Investigator (PI), conducted the study and co-authored the report with Sarah Siren, M.S. (Appendix B, Qualifications of Key Personnel).

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# 2 Setting

## 2.1 Geological Setting

The proposed project study area lies within the Peninsular Ranges Geomorphic Province (California Geological Survey, 2002). This province extends from the tip of the Baja California to the Transverse Ranges (the San Gabriel and San Bernardino Mountains) and includes the Los Angeles Basin, offshore islands (Santa Catalina, Santa Barbara, San Nicholas, and San Clemente), and continental shelf. The eastern boundary is the Colorado Desert Geomorphic Province (California Geological Survey 2002; Morton and Miller 2006). The Peninsular Ranges were formed by uplift of plutonic igneous rock resulting from the subduction of the Pacific Plate underneath the North American Plate during the latter portion of the Mesozoic era (approximately 125 to 90 million years ago) (Abbott 1999).

According to surficial geological mapping at a scale of 1:100,000 (Kennedy and Tan 2008) and at a scale of 1:24,000 (Kennedy 1975) and the paleontological records search through the San Diego Natural History Museum (SDNHM) (McComas 2019 – Appendix A), the majority of the proposed project area is underlain by late to middle Pleistocene (~ 11,700 – 781,000 years ago) old alluvial floodplain deposits (map unit Qoa = Qt of Kennedy [1975]). In addition to the old alluvial floodplain deposits, there are small exposures of Holocene age (< 11,700 years ago) young alluvial floodplain deposits (map unit Qya = Qal + Qsw of Kennedy [1975]) in the southernmost and easternmost project area. Finally the middle Eocene (~ 46 – 47 million years ago) Friars Formation (map unit Tf) crops out just outside the northern project area (on the north side of Interstate 8) and likely underlies the old alluvial floodplain deposits at an unknown depths (Kennedy and Tan 2008; McComas 2019 – Appendix A). Geological descriptions and paleontological sensitivities of mapped units are detailed below in order from youngest to oldest and summarized in Table 3. Generalized stratigraphic relationships of geological units in western San Diego County are presented in Figures 1 and 2, below.

**Table 3. Geological Units, Paleontological Sensitivities, and SDNHM Localities within One-Mile of the Study Area**

Geological Unit	Epoch, Period, or Era	Geological Age (Millions of Years)	Paleontological Sensitivity	No. of SDNHM Localities within One Mile of Program Area
Young Alluvial Floodplain deposits (Qya)	Holocene	<0.120	Low	N/A
Old Alluvial Floodplain deposits (Qoa)	Pleistocene	~ 2.6 – 0.13	Moderate	0
Friars Formation (Tf)	Middle Eocene	~ 46–47	High	11

### Young Alluvial Floodplain Deposits (Qya)

The Holocene young alluvial floodplain deposits (map unit Qya) along drainages and lower elevations are generally described as poorly sorted, unconsolidated, permeable, deposits consisting of sand, silt, or clay-rich alluvium with cobbles and boulders present in some areas of its extent.

Small slivers of the project area along the San Diego River and I-15 is underlain by Holocene-age young alluvial floodplain deposits (Kennedy and Tan 2008; McComas 2019 – Appendix A). Due to the young (recent) nature of these deposits, Holocene-age alluvial floodplain deposits have low potential to produce scientifically significant paleontological resources (County of San Diego 2009; City of San Diego 2016; McComas 2019 - Appendix A).

However, this geological unit oftentimes overlies older alluvial floodplain deposits or geological formations with moderate to high paleontological sensitivity at a relatively shallow depth.

#### **Old Alluvial Floodplain Deposits (Qoa)**

Pleistocene old alluvial floodplain deposits (map unit Qoa) are generally lithologically the same Holocene young alluvial floodplain deposits except they are usually more oxidized (reddish brown color) and are more indurated. In his compilation of Quaternary (~2.58 million years ago [Ma] – recent) vertebrates from California, Jefferson (1991) reported numerous fossil localities from San Diego County that produced fossil amphibian, reptile, bird, and mammal specimens throughout the County. Thus, this geological unit has produced significant paleontological resources in San Diego County and is assigned moderate paleontological sensitivity (McComas 2019 – Appendix A).

#### **Friars Formation (Tf)**

The middle Eocene (approximately 46–47 Ma) Friars Formation (map unit Tf) is a terrestrial and lagoonal sedimentary unit found along coastal San Diego. The formation is named for strata located along the north side of Mission Valley, near Friars Road. The Friars Formation consists mainly of medium-grained sandstones, interstratified mudstones, and cobble conglomerates that increase eastward (Kennedy and Tan 2008; GEI Consultants 2017; McComas 2019 – Appendix A). It is rich in vertebrate fossils, especially terrestrial mammals such as primates, rodents, artiodactyls, perissodactyls, and carnivorans. Tomiya (2013) described middle Eocene Carnivoraforms from California, some of which included specimens from the Friars Formation in San Diego County. Although the Friars Formation is considered chiefly a terrestrial unit, well-preserved remains of marine microfossils and macroinvertebrates have been recovered from the Friars Formation. Squires and Demere (1991) described a faunal assemblage that included scaphopod, bivalve, gastropod, and nautiloid specimens in addition to fishes, crocodilians, and mammals. The Friars Formation has high potential to produce scientifically significant paleontological resources (County of San Diego 2009; City of San Diego 2016; Appendix A).

# 3 Research Methods

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This section discusses the field and background research methods used to perform this study.

## 3.1 Museum Records Search

A records search request was sent to the SDNHM on January 30, 2019. The purpose of the museum records search is to determine whether there are any known fossil localities in or near the study area, identify the sensitivity of geological units present within the study area, and aid in determining whether a paleontological mitigation program is warranted to avoid or minimize potential adverse effects of construction on paleontological resources.

## 3.2 Geological Map and Literature Review

Published geological maps (Kennedy 1975; Kennedy and Tan 2008) and published and unpublished reports were reviewed to identify geological units on the site and determine their paleontological sensitivity.

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# 4 Results

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This section presents the results of the records search.

## 4.1 Museum Records Search Results

The record search results conducted by the SDNHM were received on February 5, 2019 and no records were found of fossil localities within the boundaries of the proposed project area. However, 11 fossil localities are located within a one-mile radius of the study area. Of these, 11 fossil localities are from the same deposits that underlie the study area at depth (the Friars Formation) and have yielded Eocene-age fossils throughout the City (Appendix A). The following paragraphs summarize the records search results.

The Holocene young alluvial floodplain deposits area generally too young to yield significant paleontological resources, and thus, no fossil localities from this geological unit was reported by the SDNHM. Old alluvial floodplain deposits, which are similar to young alluvial floodplain deposits, but are Pleistocene-age, have produced significant paleontological resources in western San Diego County. However, the SDNHM did not report any fossil localities from this geological unit within the proposed project boundaries or within the one-mile buffer (McComas 2019 – Appendix A). Fossils collected from this geological unit outside the one-mile buffer include reptiles, birds, and small and large mammals. The large mammals are typical Pleistocene (Ice-Age) megafauna such mammoth, bison, horse, and camel.

The middle Eocene Friars Formation likely partially or entirely underlies the proposed project at unknown depths, and the SDNHM has 11 fossil collection localities from this formation within a one-mile radius of the proposed project (McComas 2019 - Appendix A). Fossils recovered from the Friars Formation within the one-mile buffer include a coprolite (fossilized feces), an internal mold of a freshwater or terrestrial snail, and fossil terrestrial vertebrates including frogs, turtles, crocodylians, lizards, birds, marsupials, rodents, insectivores, bats carnivores, artiodactyls, brontotheres, rhinoceroses, and primates (McComas 2019; Appendix A).

## 4.2 Paleontological Resource Sensitivity

The surface geological mapping (Kennedy 1975; Kennedy and Tan 2008) details the underlying geology within the study area into Holocene young alluvial floodplain deposits, Pleistocene old alluvial floodplain deposits, and the Eocene Friars Formation underlying the younger deposits.

A review of the records search results letter provided by the SDNHM indicates that the study area is underlain by geological units of low, moderate, and high paleontological potential (Table 2) (County of San Diego 2009). The SDNHM identified 11 fossil localities from the Friars Formation within a one-mile radius of the study area (Appendix A).

Numerous construction projects within sedimentary deposits throughout the City have produced scientifically significant paleontological resources (Appendix A). The potential, or sensitivity, of a given geological unit to produce scientifically significant paleontological resources is based on past fossil discoveries within the unit. The Friars Formation is considered to have high paleontological potential, the old alluvial floodplain deposits are considered to have moderate paleontological potential, and Holocene age alluvium are considered as having low paleontological potential.

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# 5 Analysis

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Dudek's review of record search data, geological mapping, and geological and paleontological literature did not identify any existing paleontological resources within the study area. Based on the records search results, the study area has low to high potential to produce paleontological resources during planned construction activities. A qualified paleontologist should be retained for the proposed project in accordance SVP (2010) guidelines.

A paleontological records search performed by the SDNHM did not identify any known fossil localities in the study area, but there are 11 localities within a one-mile radius of the study area boundary from geological units underlying the proposed project. The 11 localities are all from the Friars Formation which is considered to have high paleontological sensitivity in San Diego County. Geological mapping also indicates that the study area is chiefly underlain by old alluvial floodplain deposits, which has produced considerable scientifically significant fossils in the region and is considered to have moderate potential to contain significant paleontological resources. The small portions of the project area underlain by young alluvial floodplain deposits along the San Diego River and I-15 are considered to have low paleontological sensitivity on the surface, increasing to moderate or high with depth.

Although there are no known existing paleontological resources within the study area, there is the potential for significant impacts to paleontological resources given the proposed construction activities; therefore, prior to excavations in paleontologically sensitive areas, the following mitigation program would be required. Implementation of the paleontological mitigation program (**MM-PAL-1**) would reduce any potential impacts to below a level of significance for paleontological resources.

## Mitigation Measures

Based on the paleontological records search and geological map and paleontological literature review, the project site is considered to have low paleontological sensitivity in areas mapped as young alluvial floodplain deposits, moderate paleontological sensitivity in areas mapped as old alluvial floodplain deposits, and high paleontological sensitivity at depth where the Friars Formation lies. The following mitigation is recommended to reduce construction related impacts to paleontological resources to a less than significant level:

**PAL-1** Prior to the commencement of any grading activity, CSU/SDSU should retain a qualified paleontologist to ensure the implementation of a paleontological monitoring program. The Society of Vertebrate Paleontology (SVP, 2010) defines a qualified paleontologist as having:

- “1. A graduate degree in paleontology or geology, and/or a publication record in peer reviewed journals; and demonstrated competence in field techniques, preparation, identification, curation, and reporting in the state or geologic province in which the project occurs. An advanced degree is less important than demonstrated competence and regional experience.
2. At least two full years professional experience as assistant to a Project Paleontologist with administration and project management experience; supported by a list of projects and referral contacts.
3. Proficiency in recognizing fossils in the field and determining significance.
4. Expertise in local geology, stratigraphy, and biostratigraphy.
5. Experience collecting vertebrate fossils in the field.”

The qualified paleontologist should attend any preconstruction meetings, present a worker environmental training to construction personnel, and manage the paleontological monitor(s) if he or she is not doing the monitoring. A paleontological monitor should be on-site during all excavations below the depth of previously disturbed sediments. The SVP (2010) defines a qualified paleontological monitor as having:

- “1. BS or BA degree in geology or paleontology and one year experience monitoring in the state or geologic province of the specific project. An associate degree and/or demonstrated experience showing ability to recognize fossils in a biostratigraphic context and recover vertebrate fossils in the field may be substituted for a degree. An undergraduate degree in geology or paleontology is preferable, but is less important than documented experience performing paleontological monitoring, or
2. AS or AA in geology, paleontology, or biology and demonstrated two years experience collecting and salvaging fossil materials in the state or geologic province of the specific project, or
3. Enrollment in upper division classes pursuing a degree in the fields of geology or paleontology and two years of monitoring experience in the state or geologic province of the specific project.
4. Monitors must demonstrate proficiency in recognizing various types of fossils, in collection methods, and in other paleontological field techniques.”

The paleontological monitor shall be equipped with necessary tools for the collection of fossils and associated geological and paleontological data. The monitor shall complete daily logs detailing the day's excavation activities and pertinent geological and paleontological data. In the event that paleontological resources (e.g., fossils) are unearthed during grading, the paleontological monitor will temporarily halt and/or divert grading activity to allow recovery of paleontological resources. The area of discovery will be roped off with a 50-foot radius buffer. Once documentation and collection of the find is completed, the monitor will remove the rope and allow grading to recommence in the area of the find.

Following the paleontological monitoring program, a final monitoring report shall be submitted to CSU for approval. The report should summarize the monitoring program and include geological observations and any paleontological resources recovered during paleontological monitoring for the proposed project.

## 6 References

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# Appendix A

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## Museum Records Search Results



young geologic age and lack of recorded fossil collection localities. However, these deposits commonly overlie geologic units of high or moderate paleontological sensitivity that could be impacted by construction where the contact is relatively shallow.

**old alluvial flood plain deposits** – Pleistocene-age (approximately 2.6 million to 10,000 years old) old alluvial flood plain deposits underlie the majority of the Project site. The SDNHM does not have any fossil localities from old alluvial deposits within a 1-mile radius of the Project. However, fossils are known from these deposits elsewhere in western San Diego County. Recovered fossils include scientifically significant terrestrial vertebrate fossils (e.g., reptiles, birds, small mammals, and large-bodied “Ice-Age” mammals such as mammoth, bison, horse, and camel). Old alluvial flood plain deposits are assigned a moderate paleontological sensitivity.

**Friars Formation** – The fluvial deposits of the middle Eocene-age (approximately 47 to 46 million years old) Friars Formation may partially or wholly underlie the Project site at unknown depths. The SDNHM has 11 fossil collection localities from the Friars Formation within a 1-mile radius of the Project site, which yielded a coprolite, an internal mold of a freshwater or land snail, and fossil remains of terrestrial vertebrates (e.g., frogs, turtles, crocodiles, lizards, birds, marsupials, insectivorans, carnivorans, bats, primates, rodents, artiodactyls, rhinoceroses, and brontotheres). The Friars Formation is rich in vertebrate fossils, particularly terrestrial mammals, and has also yielded well-preserved marine microfossils and macroinvertebrates, as well as fossil leaves. The Friars Formation is assigned a high paleontological sensitivity on the basis of the recovery of diverse and well-preserved assemblages of both marine invertebrates and terrestrial vertebrates from these deposits.

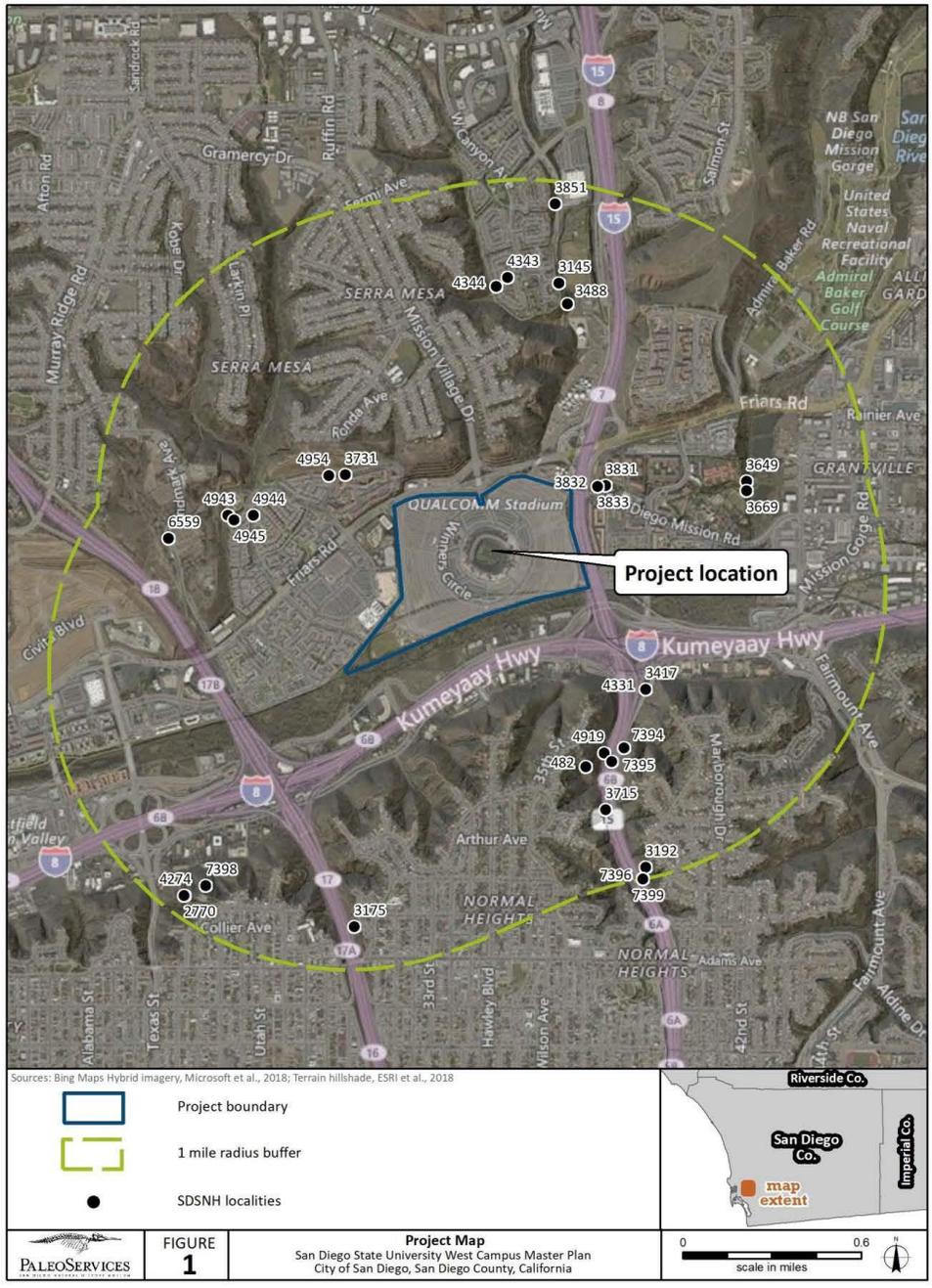
### Summary and Recommendations

The moderate paleontological sensitivity of Pleistocene-age old alluvial flood plain deposits, and the high paleontological sensitivity of the underlying Friars Formation, in San Diego County (Deméré and Walsh, 1993; Stephenson et al., 2009), as well as the presence of fossil collection localities in the vicinity of the Project site, suggests the potential for construction of the proposed Project to result in impacts to paleontological resources. Any proposed excavation activities that extend deep enough to encounter previously undisturbed deposits of these geologic units have the potential to impact the paleontological resources preserved therein. For these reasons, implementation of a complete paleontological resource mitigation program during ground-disturbing activities is recommended.

The fossil collection locality information contained within this paleontological records search should be considered private and is the sole property of the San Diego Natural History Museum. Any use or reprocessing of information contained within this document beyond the scope of the San Diego State University West Campus Master Plan project is prohibited.

If you have any questions concerning these findings please feel free to contact me at 619-255-0321 or [kmccomas@sdnhm.org](mailto:kmccomas@sdnhm.org).

APPENDIX A  
MUSEUM RECORDS SEARCH RESULTS



San Diego State University West Campus Master Plan - Paleontological Records Search

APPENDIX A  
MUSEUM RECORDS SEARCH RESULTS

**Appendix: Locality List**  
San Diego Natural History Museum  
Department of Paleontology

Locality Number	Locality Name	Location	Elevation (feet)	Geologic Unit	Era	Period	Epoch
482	40th St. Extension	City of San Diego, San Diego County, CA	360	San Diego Formation	Cenozoic	Quaternary	late Pleistocene
2770	Our Lady of Peace Academy	City of San Diego, San Diego County, CA	340	San Diego Formation	Cenozoic	Neogene	Pliocene
3192	40th Street	City of San Diego, San Diego County, CA	290	San Diego Formation	Cenozoic	Neogene	Pliocene
4274	Our Lady of Peace Academy	City of San Diego, San Diego County, CA	340	San Diego Formation	Cenozoic	Neogene	late Pliocene
7396	Caltrans Construct Commuter Bike Facility	City of San Diego, San Diego County, CA	295	San Diego Formation	Cenozoic	Paleogene	late Pliocene
7398	Caltrans Construct Commuter Bike Facility	City of San Diego, San Diego County, CA	302	San Diego Formation	Cenozoic	Paleogene	late Pliocene
7399	Caltrans Construct Commuter Bike Facility	City of San Diego, San Diego County, CA	300	San Diego Formation	Cenozoic	Paleogene	late Pliocene
3192 A	40th Street	City of San Diego, San Diego County, CA	290	San Diego Formation	Cenozoic	Neogene	Pliocene
3192 B	40th Street	City of San Diego, San Diego County, CA	290	San Diego Formation	Cenozoic	Neogene	Pliocene
3192 C	40th Street	City of San Diego, San Diego County, CA	290	San Diego Formation	Cenozoic	Neogene	Pliocene
3192 D	40th Street	City of San Diego, San Diego County, CA	290	San Diego Formation	Cenozoic	Neogene	Pliocene
3192 E	40th St. at I-15-North of Adams Ave. Bridge	City of San Diego, San Diego County, CA	290	San Diego Formation	Cenozoic	Neogene	Pliocene
3192 F	40th Street	City of San Diego, San Diego County, CA	290	San Diego Formation	Cenozoic	Neogene	Pliocene
3192 G	40th Street	City of San Diego, San Diego County, CA	290	San Diego Formation	Cenozoic	Neogene	Pliocene
3175	Adams Avenue Bridge - I-805	City of San Diego, San Diego County, CA	340	San Diego Formation, lower member	Cenozoic	Neogene	Pliocene
3417	I-8 and I-15	City of San Diego, San Diego County, CA	250	Mission Valley Formation	Cenozoic	Paleogene	middle Eocene
3715	I15/40th Street	City of San Diego, San Diego County, CA	240	Mission Valley Formation	Cenozoic	Paleogene	middle Eocene
4331	I-15 & 40th Street	City of San Diego, San Diego County, CA	225	Mission Valley Formation	Cenozoic	Paleogene	middle Eocene
4919	I15/40th Street	City of San Diego, San Diego County, CA	210	Mission Valley Formation	Cenozoic	Paleogene	middle Eocene
7395	Caltrans Construct Commuter Bike Facility	City of San Diego, San Diego County, CA	208	Mission Valley Formation	Cenozoic	Paleogene	middle Eocene
6559	SDG&E T1670 Reconnector	City of San Diego, San Diego County, CA	1596	Stadium Conglomerate	Cenozoic	Paleogene	middle Eocene
7394	Caltrans Construct Commuter Bike Facility	City of San Diego, San Diego County, CA	185	Stadium Conglomerate	Cenozoic	Paleogene	middle Eocene
3731	H.G. Fenton Quarry	City of San Diego, San Diego County, CA	200	Stadium Conglomerate, lower member	Cenozoic	Paleogene	middle Eocene
4943	Mission City North Site 3	City of San Diego, San Diego County, CA	200	Stadium Conglomerate, lower member	Cenozoic	Paleogene	middle Eocene
4945	Mission City North Site 3-E	City of San Diego, San Diego County, CA	200	Stadium Conglomerate, lower member	Cenozoic	Paleogene	middle Eocene
4954	Mission City North Site 1A+1B	City of San Diego, San Diego County, CA	193	Stadium Conglomerate, lower member	Cenozoic	Paleogene	middle Eocene
3145	Murphy Canyon	City of San Diego, San Diego County, CA	120	Friars Formation	Cenozoic	Paleogene	middle Eocene
3488	Unocal Cut Slope	City of San Diego, San Diego County, CA	100	Friars Formation	Cenozoic	Paleogene	middle Eocene
3649	San Diego Mission 1	City of San Diego, San Diego County, CA	90	Friars Formation	Cenozoic	Paleogene	middle Eocene
3669	San Diego Mission 2	City of San Diego, San Diego County, CA	9	Friars Formation	Cenozoic	Paleogene	middle Eocene
3831	Mission Terrace	City of San Diego, San Diego County, CA	89	Friars Formation	Cenozoic	Paleogene	middle Eocene
3832	Mission Terrace	City of San Diego, San Diego County, CA	93	Friars Formation	Cenozoic	Paleogene	middle Eocene

APPENDIX A  
 MUSEUM RECORDS SEARCH RESULTS

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**Appendix: Locality List**  
 San Diego Natural History Museum  
 Department of Paleontology

Locality Number	Locality Name	Location	Elevation (feet)	Geologic Unit	Era	Period	Epoch
3833	Mission Terrace	City of San Diego, San Diego County, CA	77	Friars Formation	Cenozoic	Paleogene	middle Eocene
3851	Stonecrest Square site 11	City of San Diego, San Diego County, CA	170	Friars Formation	Cenozoic	Paleogene	middle Eocene
4343	Stonecrest Village, Phase II	City of San Diego, San Diego County, CA	200	Friars Formation	Cenozoic	Paleogene	middle Eocene
4344	Stonecrest Village, Phase 2	City of San Diego, San Diego County, CA	150	Friars Formation	Cenozoic	Paleogene	middle Eocene
4944	Mission City North Site 4	City of San Diego, San Diego County, CA	114	Friars Formation	Cenozoic	Paleogene	middle Eocene

# Appendix B

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## Qualifications of Key Personnel



## Michael Williams, PhD

### Paleontologist

Dr. Michael Williams is a paleontologist and crossed-trained archaeological field technician with more than 14 years' experience with fieldwork, fossil vertebrate specimen processing, and writing of reports for the U.S. Army Corps of Engineers (ACOE). Dr. Williams has project experience in all aspects of paleontological mitigation, including Phase I preconstruction surveys and report preparation and writing paleontological mitigation plans, initial studies (ISs)/mitigated negative declarations, and environmental impact reports (EIRs). He also has experience attending pre-grade meetings; preparing and presenting on-site Worker Environmental Awareness Programs (WEAPs); monitoring for paleontological resources and supervising paleontological monitoring; coordinating spot checks and monitoring with construction superintendents and foremen; collecting and processing sediments for vertebrate microfossils, writing final monitoring reports; and accessioning fossils to the Natural History Museum of Los Angeles County, San Bernardino County Museum and the Cooper Center in Orange County.

#### EDUCATION

Louisiana State University  
PhD, Geology and Geophysics, 2009  
BS, Zoology, 2002

#### CERTIFICATIONS

Qualified Paleontologist; Orange, Riverside,  
and San Diego Counties  
BLM California Paleontological Resource  
Use Permit

#### PROFESSIONAL AFFILIATIONS

Society of Vertebrate Paleontology

Mr. Williams has California Department of Transportation (Caltrans), Bureau of Land Management (BLM) and private company paleontological mitigation experience in San Diego, Imperial, Orange, Los Angeles, Riverside, San Bernardino, Ventura, Kern, Inyo, Fresno, San Francisco, and Alameda counties. In addition, he has worked as a cross-trained archaeological surveyor and monitor on several field projects.

### Project Experience

#### Development

**Double D Mine Project, Mitchell Chadwick, Blythe, California.** Co-wrote the paleontological resources survey report.

**Pacific Palisades Village 1 CAH Acquisitions Co. LLC, Los Angeles, California.** Presented the paleontological WEAP, provided senior paleontological support of paleontological monitors, and assisted in writing the final monitoring report.

**Vista Del Mar Project, VD Pacific Terrace LLC, Oceanside, California.** Co-wrote the Paleontological Resources Impact Mitigation Program and spot-checked project site for paleontological resources.

**Interim Ranch-Wide Management Plan, Tejon Ranch Corporation, Kern County, California.** Presented the WEAP and provided senior paleontological support to field monitors.

**Entitlement Contract, LLJ Orion PacificVista LLC, Vista, California.** Drafted the paleontological resources section of the EIR.

**Kettner Lofts, CVCM Kettner 106 LLC, San Diego, California.** Provided paleontological monitoring.

**Solana Highlands Multifamily Development, City of Solana Beach, California.** Provided information for Draft EIR.

MICHAEL WILLIAMS – CONTINUED

### Education

**San Diego State University New Student Housing Expansion, Gatzke, Dillon and Balance, California.** Wrote the paleontological resources section of the technical report.

**Fullerton College Master Plan Program EIR, North Orange County Community College District, Cypress, California.** Conducted paleontological resources survey and wrote the paleontological resources survey report.

**Chapman University Packinghouse EIR, Orange County, California.** Requested paleontological records search from the Natural History Museum of Los Angeles County and drafted paleontological resources section for the EIR.

### Energy

**California Flats Solar Project, McCarthy Building Companies Inc., San Luis Obispo County, California.** Conducted archaeological and paleontological monitoring, assisted in fossil evaluation, and wrote the final paleontological monitoring report.

**California Flats High Voltage, First Solar Electric Inc., San Luis Obispo County, California.** Conducted archaeological and paleontological monitoring, assisted in fossil evaluation, and wrote the final paleontological monitoring report.

**ISEC West Paleontological Services, Tenaska Inc., Imperial County, California.** Curated fossil invertebrate fauna, accessioned fossil invertebrates to the Natural History Museum of Los Angeles County, and co-wrote the final paleontological resources final report.

**FTHL Habitat Management Lands, Tenaska Inc., Imperial County, California.** Curated fossil invertebrate fauna, accessioned fossil invertebrates to the Natural History Museum of Los Angeles County, and co-wrote the final paleontological resources final report.

### Healthcare

**Specialty Medical Office Building, Kaiser Foundation Health Plan Inc., Irwindale, California.** Served as paleontological field lead. Co-wrote the Paleontological Resources Impact Mitigation Program, performed spot-check monitoring, supervision of paleontological monitors, and co-wrote the final paleontological monitoring report.

**Biology and Cultural Resource Review for Mapleton Park Centre Site Land Purchase, Kaiser Foundation Health Plan Inc., Murrieta, California.** Wrote the final paleontological monitoring report.

### Municipal

**Machado Lake Pipeline Project, City of Los Angeles, California.** Served as paleontological field lead. Monitored and supervised monitoring for archaeological and paleontological resources and co-wrote the final monitoring report.

**Van Norman Reservoir Well Drilling Project, City of Los Angeles, California.** Served as paleontological field lead. Monitored and supervised monitoring for archaeological and paleontological resources and co-wrote the final monitoring report.

**City Truck Line South-Unit 4, City of Los Angeles, California.** Served as paleontological field lead. Monitored and supervised monitoring for paleontological resources.

MICHAEL WILLIAMS – CONTINUED

**Dairy Fork Wetlands, City of Aliso Viejo, California.** Conducted archaeological resources monitoring.

**As-Needed Environmental Services, City of San Diego, California.** Conducted paleontological monitoring and wrote the final paleontological monitoring report.

**San Diego Association of Governments (SANDAG) Continuing Services Agreement, AECOM Technical Services, California.** Assisted with review of monitoring field logs.

**As-Needed Environmental Services, Department of General Services, Southern California.** Co-wrote the paleontological resources final monitoring report.

**Public Utilities Department As-Needed Environmental Services, City of San Diego, California.** Edited the paleontological resources table for the EIR/Environmental Impact Statement (EIS).

**SANDAG General On-Call Environmental Compliance, California.** Co-wrote the final paleontological resources monitoring report.

#### Resource Management

**As-Needed Projects, Habitat Restoration Sciences Inc., San Diego County, California.** Provided archaeological monitoring.

**San Jacinto Wildlife Area EIR, California Wildlife Foundation, Riverside County, California.** Reviewed the paleontological resources section of the EIR.

#### Transportation

**Construction Management Services for the Mid-Coast Corridor Projects, PGH Wong Engineering Inc., San Diego, California.** Conducted archaeological and paleontological resources monitoring.

**Gilman Drive Bridge Environmental Compliance, PGH Wong Engineering Inc., San Diego, California.** Provided paleontological resources monitoring, assisted with managing paleontological resources monitors, and evaluated fossil discoveries

**Confidential Transportation Project, San Pedro, California.** Reviewed project geology, wrote a paleontological records search summary, and assisted in drafting mitigation measures.

#### Water/Wastewater

**Interlake Tunnel and Spillway Modification Project, Horizon Water and Environment LLC, San Luis Obispo County, California.** Conducted the paleontological resources survey, assisted in the archaeological resources survey and drafted the paleontological resources section of the EIR.

**Sewer Master Plan, Rincon del Diablo Municipal Water District, Escondido, California.** Drafted paleontological resources section of EIR.

**Palm Springs Wastewater Treatment Plant Expansion, W.M. Lyles Co. Southern District, California.** Conducted paleontological resources monitoring.

**Zone E Recycled Water System Expansion Archaeological and Native American Monitoring, Santa Margarita Water District, Orange County, California.** Co-managed the project and provided

MICHAEL WILLIAMS – CONTINUED

archaeological monitoring.

**Capital Project Funding and Environmental Clearance Assistance, San Elijo Joint Powers Authority, San Diego County, California.** Co-wrote the geological context section.

## Relevant Previous Experience

### Development

**Palatino Little Italy Apartments Project, Kirkham Road and McMillin, San Diego, California.** Served as principal paleontologist and provided oversight for paleontological monitoring.

**South Pointe West Project, JCCL-South Pointe West LLC, Diamond Bar, California.** Served as principal paleontologist and paleontological monitor. Managed monitoring of excavations for paleontological resources, stabilized and prepared fossils, and processed sediments for vertebrate microfossils.

**Sixth and Virgil (Next on Sixth) Streets Multifamily Residential Development Projects, Century West Partners, Los Angeles, California.** Served as principal paleontologist. Coordinated and conducted paleontological monitoring and collected, stabilized, and prepared fossil fishes.

**Northwest Village Creek Phase 2 Project, Jacobs Center for Neighborhood Innovation, San Diego, California.** Served as principal paleontologist. Provided senior paleontological oversight for paleontological monitoring.

**Treasure Island and Yerba Buena Island Major Phase 1, City and County of San Francisco, California.** Served as principal paleontologist. Wrote the paleontological resources mitigation monitoring and reporting program.

**Altair Development Project, Ambient Communities, Temecula, California.** Served as principal paleontologist and wrote the paleontological resources section of the EIR.

**Berendo and New Hampshire Streets Multifamily Residential Development Projects, Fifield Companies, Los Angeles, California.** Served as principal paleontologist. Supervised paleontological monitoring, collected and processed sediment samples for microvertebrates, and accessioned fossils into the Natural History Museum of Los Angeles County.

**San Juan Capistrano Medical Office, Edward Almanza and Associates, San Juan Capistrano, California.** Served as principal paleontologist and supervised paleontological monitoring.

**Lifetime Fitness Construction Project, Lifetime Fitness Inc., Laguna Niguel, California.** Served as principal paleontologist. Monitored excavations for paleontological resources; accessioned fossils into the Cooper Center at California State University, Fullerton; and wrote the final monitoring report.

**Orange County Great Park Paleontological Monitoring, City of Irvine, California.** Served as staff paleontologist. Developed and presented the WEAP. Monitored construction activities for former underground storage tank 240b and pond excavations for paleontological resources, accessioned fossils into the Natural History Museum of Los Angeles County, and wrote the final monitoring reports.

MICHAEL WILLIAMS – CONTINUED

**Anaheim Henning View Terrace Home Construction Project, KTK Construction Inc., Anaheim Hills, California.** Served as principal paleontologist. Supervised paleontological monitoring and co-wrote the final monitoring report.

**College Park Home Construction Project, Lennar Corporation, Chino, California.** Served as principal paleontologist and supervised paleontological monitoring.

**Whisler Ridge Home Construction Project, KB Homes, Lake Forest, California.** Served as principal paleontologist. Surveyed construction site for paleontological resources. Monitored and supervised monitoring of grading activities.

**Cahuilla Gold Project, Consolidated Goldfields Corporation, Imperial County, California.** Served as staff paleontologist and participated in survey for paleontological resources.

### Education

**Rancho Campana High School, Oxnard Union High School District, Camarillo, California.** Served as principal paleontologist. Supervised paleontological monitoring, collected and processed sediments for microfossils, and contributed to the final monitoring report.

**Browning High School, Long Beach Unified School District, Signal Hill, California.** Served as principal paleontologist. Spot-checked paleontological monitoring; collected and processed sediments for microfossils; accessioned fossils to the Natural History Museum of Los Angeles County, Invertebrate Paleontology Division; and contributed to the final monitoring report.

**Long Beach Unified School District Project, Long Beach, California.** Conducted an inventory of paleontological resources within the Long Beach Unified School District for use in the formulation of preservation guidelines and during future development and redevelopment of multiple school sites.

### Energy

**Scattergood Transmission Line Project, Los Angeles Department of Water and Power (LADWP), Los Angeles County, California.** Served as paleontological and archaeological monitor. Monitored excavations for paleontological and archaeological resources.

**Path 46 Clearances Project, LADWP, San Bernardino County, California.** Served as principal paleontologist and archaeological surveyor. Surveyed for paleontological and archaeological resources and wrote the paleontological resources assessment.

**Haskell Canyon Substation, LADWP, Santa Clarita, California.** Served as principal paleontologist. Monitored excavations for paleontological resources and reviewed the final paleontological monitoring report.

**Glenarm Power Plant Project, City of Pasadena, California.** Served as paleontological and archaeological monitor. Coordinated and monitored excavations for paleontological and archaeological resources.

**Marsh Landing Generating Station, California Energy Commission (CEC), Contra Costa County, California.** Served as staff paleontologist. Assisted in managing daily monitoring activities, writing monthly reports, and writing the final report.

MICHAEL WILLIAMS – CONTINUED

**Plains Exploration and Production Company Project, Kern County, California.** Served as staff paleontologist. Surveyed for paleontological resources and co-wrote the paleontological resource assessments.

**Rio Mesa Solar Project, BrightSource Energy Inc., Blythe, California.** Served as staff paleontologist. Participated in paleontological survey on both BLM and private lands. Assisted with writing the paleontological resources section for the Application for Certification and final report.

**Sonoran West Solar Project, BrightSource Energy Inc., Blythe, California.** Served as staff paleontologist. Participated in paleontological survey on both BLM and private lands. Assisted with writing the final report.

**Proposed Oasis Date Gardens Development, Golden Sands Properties, Thermal, California.** Served as principal paleontologist. Conducted paleontological survey and wrote paleontological resources assessment.

**Proposed Cascade Solar Project, Cascade Solar LLC/Axio Power Holdings LLC, San Bernardino County, California.** Served as principal paleontologist. Conducted paleontological survey and co-wrote the paleontological resources assessment.

**Pio Pico Energy Center, CEC, Otay Mesa, California.** Served as staff paleontologist and participated in survey for paleontological resources.

**Calico Solar Project, San Bernardino County, California.** Served as staff paleontologist and participated in survey for paleontological resources.

#### Military

**Legislative EIS for Renewal of the Chocolate Mountain Aerial Gunnery Range Land Withdrawal, U.S. Department of the Navy (DON), California.** Served as staff paleontologist. Contributed to paleontological resource sections of Legislative EIS for extension of the DON aerial munitions gunnery range and test ground.

**Sites TVOR SE and TVOR S Paleofaunal and Paleoenvironmental Research, ACOE/Prewitt and Associates Inc., Fort Polk, Louisiana.** Served as paleontological technician. Participated in field and laboratory work, research, and writing of final report.

**Site TVOR SE Paleofaunal and Paleoenvironmental Research, ACOE/Prewitt and Associates Inc., Fort Polk, Louisiana.** Served as paleontological technician. Participated in field and laboratory work, research, and writing of report.

#### Municipal

**Proboscidean Recovery Effort, LADWP, Lone Pine, California.** Served as principal paleontologist. Organized and led the field crew in the recovery of a proboscidean tusk found in a borrow pit at the Lone Pine Landfill and wrote the final report.

**Calabasas Landfill Project, County of Los Angeles, California.** Served as principal paleontologist and wrote the paleontological resources technical report.

MICHAEL WILLIAMS – CONTINUED

**Mountain View Acres Drainage Improvement Project, San Bernardino Associated Governments (SANBAG), Victorville, California.** Served as principal paleontologist and paleontological monitor. Monitored excavations for paleontological resources and wrote the final monitoring report.

#### **Transportation**

**Mid Coast Rail Project, PGH Wong Engineering, San Diego, California.** Served as archaeological and paleontological monitor and supervisor during extension of the trolley service to University City. Daily activities included working closely with biologists, Native American monitors, and construction personnel to complete the project in compliance with all mitigation measures and state and federal regulations. In addition, salvaged, collected associated data, and curated fossils discovered during construction.

**Livermore Extension Project, Bay Area Rapid Transit, Alameda County, California.** Served as principal paleontologist. Contributed to the paleontological resources section of the EIR.

**Merced to Fresno Project, California High Speed Rail Authority (CHSRA), Fresno County, California.** Served as principal paleontologist. Administered the WEAP and monitored for paleontological resources.

**SR-91 Corridor Improvement Project, Riverside County Transportation Commission/Caltrans, Corona, California.** Served as paleontological monitor. Monitored geotechnical drilling for paleontological resources, collected and processed sediment samples for microvertebrates, and assisted in the recovery of a fossil bison.

**I-15/I-215 Interchange Improvement Project, Caltrans, Devore, California.** Served as paleontological monitor and monitored excavations for paleontological resources.

**Palmdale to Los Angeles Union Station Project, CHSRA, Los Angeles County, California.** Served as staff paleontologist. Participated in survey for paleontological resources and writing of EIR/EIS and technical report.

**I-10/Cherry Avenue Interchange Improvement Project, SANBAG/Caltrans, Fontana, California.** Served as principal paleontologist. Supervised paleontological monitoring, processed sediment samples, and participated in writing the final monitoring report.

**I-10/Citrus Avenue Interchange Improvement Project, SANBAG/Caltrans, Fontana, California.** Served as principal paleontologist and supervised the paleontological monitor. Collected and processed sediment samples for vertebrate microfossils, and co-wrote the final paleontological mitigation report.

**I-215 Murrieta Hot Springs Road to Scott Road, Caltrans, Murrieta, California.** Served as staff paleontologist. Participated in survey for paleontological resources, monitored excavations for paleontological resources, and wrote the final monitoring report.

**I-215 Scott Road to Nuevo Road, Caltrans, Riverside County, California.** Served as staff paleontologist and wrote the paleontological mitigation plan.

**I-215 Newport Overcrossing Bridge Reconstruction Project, Caltrans, Grand Terrace, California.** Served as principal paleontologist. Conducted paleontological survey and wrote combined Paleontological Identification Report (PIR)/Paleontological Evaluation Report (PER).

MICHAEL WILLIAMS – CONTINUED

**I-405 from SR-73 to I-605 Improvement Project PIR/PER, Parsons/Caltrans, Orange County, California.** Served as staff paleontologist and participated in survey for paleontological resources.

**Water/Wastewater**

**Eastern Recycled Water System Project, Escondido, California.** Served as archaeological surveyor and participated in a survey for archaeological resources.

**Peters Canyon Water Capture and Reuse Project, Irvine Ranch Water District, Irvine and Tustin, California.** Served as principal paleontologist. Coordinated and conducted paleontological monitoring, and collected and processed sediments for microfossil recovery.

**Cadiz Valley Water Conservation Recovery and Storage Project, Cadiz Inc./Santa Margarita Water District, Cadiz, California.** Served as principal paleontologist. Conducted paleontological monitoring and wrote the paleontological mitigation and monitoring plan.

**Hauled Water Project, County of Los Angeles, California.** Served as principal paleontologist and geologist. Wrote the geology and soils IS, the technical report, and the paleontological section of the EIR.

**Enhanced Watershed Management Programmatic EIR, County of Los Angeles, California.** Served as principal paleontologist. Wrote the paleontological section of the programmatic EIR.

**Publications**

Bonett, R.M., A.L. Trujano-Alvarez, M.J. Williams, and E.K. Timpe. 2013. "Biogeography and Body Size Shuffling of Aquatic Salamander Communities on a Shifting Refuge." *Proceedings of the Royal Society. B*: 1–8.

Stewart, J. D., M. Williams, M. Hakel, and S. Musick. 2012. "Was it Washed In? New Evidence for the Genesis of Pleistocene Fossil Vertebrate Remains in the Mojave Desert of Southern California." *2012 Desert Symposium Field Guide and Proceedings*: 140–143.

Williams, M.J. 2009. "Miocene Herpetofaunas from the Central Gulf Coast, USA: Their Paleocology, Biogeography, and Biostratigraphy." [http://etd.lsu.edu/docs/available/etd-11132009\\_034120/](http://etd.lsu.edu/docs/available/etd-11132009_034120/).

Williams, M.J. 2009. "Neogene Herpetofaunas from Louisiana, USA and their Biogeographical and Paleoenvironmental Significance." *Bulletin, Southern California Academy of Sciences*. 108, 89–136, Abstract No. 97.

Schiebout, J.A., Wrenn, J.H., Ting, S., Hill, J.L., Hagge, M.D., Williams, M.J., Boardman, G.S., and Ellwood, B.B. 2006. "Miocene Vertebrate Fossils Recovered from the Pascagoula Formation in Southeastern Louisiana." *Gulf Coast Association of Geological Societies Transactions*. 56, 745–760.

Schiebout, J.A. S. Ting, J. L. Hill, M. D. Hagge, M. J. Williams, and G. S. Boardman. 2006. "Quarrying in the Pascagoula Formation: First Miocene (Hemphillian) Fauna of Terrestrial Mammals from the Central Gulf Coast East of the Mississippi." *Journal of Vertebrate Paleontology, Abstracts of Papers*. 26, supplement to No. 3.

## APPENDIX B

### QUALIFICATIONS OF KEY PERSONNEL

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#### MICHAEL WILLIAMS – CONTINUED

- Williams, M.J. 2005. "A New Late Miocene (Late Barstovian) Herpetofauna from Fort Polk, Louisiana." *Journal of Vertebrate Paleontology, Abstracts of Papers*. 25, supplement to No. 3
- Schiebout, J. A., S. Ting, Williams, M.J., Boardman, G., Wulf Gose, Wilhite, D. R., White, P.D., and Kilbourne, B. 2004. "Paleofaunal and Environmental Research on Miocene Fossil Sites TVOR SE and TVOR S on Fort Polk, Louisiana, With Continued Survey, Collection, Processing, and Documentation of other Miocene Localities." ACOE, Fort Worth District. Open-File Report.
- Williams, M.J. and Schiebout, J.A., 2003. "Miocene Lower Vertebrates from Fort Polk, Louisiana: A Preliminary Report." *Transactions, Gulf Coast Association of Geological Societies and Gulf Coast Section of SEPM*. 53, 856–863.
- Williams, M.J., Boardman, G., Schiebout, J.A., Kilbourne, B., Nguyen, H., 2003. "Miocene of Fort Polk, Western Louisiana." *Journal of Vertebrate Paleontology, Abstracts of Papers*. 23. Supplement to No. 3.

#### Conference Presentations

- "Miocene Amphibians and Reptiles from Fort Polk, Louisiana: Evaluating their Usefulness in Paleoenvironmental Reconstruction and Biostratigraphy." 2011. Presented at Geological Society of America South Central Section 45th Annual Meeting. New Orleans, Louisiana.

## Sarah Siren

### Senior Paleontologist

Sarah Siren is a senior paleontologist with 18 years' experience as a paleontological resources consultant. Ms. Siren has served as paleontologist for numerous projects throughout California, with extensive experience in Imperial, Orange, Riverside, Los Angeles, San Bernardino, and San Diego Counties. These projects involved multiple agencies, public and private sector clients, a variety of resources, and multidisciplinary staff supervision. She specializes in California Environmental Quality Act (CEQA) and Bureau of Land Management (BLM) compliance standards. She taught at Saddleback Community College in Mission Viejo, California as an associate geology professor, and worked as a curatorial assistant with the Natural History Museum of Los Angeles County and, more recently, as a field manager with the San Diego Natural History Museum.

While in college pursuing her degrees, she conducted studies at both the Smithsonian Institution and Badlands National Park, and supervised as lead research scientist for various field activities, curation projects, and laboratory preparations. Her diverse experience includes recovering, identifying, mapping, and preparing fossils. Ms. Siren is able to effectively manage projects and complete deliverables from assessments to final technical reports in a timely manner.

#### EDUCATION

South Dakota School of Mines and Technology  
MS, Paleontology, 2002

George Washington University  
BS, Geology, 1999  
BA, French Language and Literature, 1999

#### CERTIFICATIONS

Geologist-in-Training, No. 167 California, 2007

Certified GIS Professional (GISP), 2013

40-hour HAZWOPER Training, 2008

Qualified Paleontologist, City of San Diego and  
Counties of Kern, Los Angeles, Orange,  
Riverside, San Diego, and San Luis Obispo

#### AFFILIATIONS

Natural History Museum of Los Angeles  
County, Museum Associate

Society of Vertebrate Paleontology

### Project Experience

#### Development

**Sea Summit (Marblehead Coastal), Taylor Morrison, City of San Clemente, California.** Served as paleontologist responsible for a paleontological assessment of the 266-acre property and oversight of paleontological resource monitoring during rough grading. Designed and implemented an archaeological survey in consultation with the California Coastal Commission (CCC) and local Native Americans. Survey methods were tailored in response to specific CCC concerns regarding ground surface visibility, historical land use, previously recorded archaeological traces, and diverse development impacts. Successfully developed a detailed archaeological, Native American, and paleontological monitoring and discoveries treatment plan to address CCC, Native American, and City of San Clemente concerns. Prepared final technical report for submittal to the City of San Clemente as a condition of occupancy.

**Patton State Hospital Project, California Department of General Services, County of San Bernardino, California.** As project manager and principal investigator, supervised the cultural and paleontological resources mitigation program during construction improvements to the facility in accordance with the mitigation measures and treatment plan for the project.

**Tejon Mountain Village, Tejon Mountain Village LLC, County of Kern, California.** Responsible for paleontological resources monitoring during geotechnical drilling within a portion of this 28,000-acre master planned community.

## APPENDIX B QUALIFICATIONS OF KEY PERSONNEL

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### SARAH SIREN – CONTINUED

**Kettner Lofts Project, Citymark Development, City of San Diego, California.** As project manager and principal investigator, responsible for cultural resources construction monitoring during construction of this residential complex located in Little Italy.

**Heather Lane Corti Residence, City of Del Mar, California.** As project manager and principal investigator, responsible for cultural and paleontological resources construction monitoring for residential development located in the City of Del Mar.

**1902 Grandview Street, City of Oceanside, California.** Provided a paleontological resources review for the tentative tract map location, including management considerations and recommendations.

**Winchester 1800 Project, City of Temecula, California.** Project manager and principal investigator responsible for a paleontological resources survey and report prepared for this development located in the City of Temecula. Also provided editorial comments on the cultural resources report for the same project.

**Mira Loma Commerce Center, County of Riverside, California.** Project manager and principal investigator, responsible for cultural and paleontological resources monitoring during the construction of two commercial buildings on 31 acres and completion of a final technical report.

**Palm Avenue Distribution Center, IDS Real Estate Group, City of San Bernardino, California.** Project manager and principal investigator, responsible for preparation of a field survey report, cultural and paleontological resources monitoring program, and final report for this warehouse/distribution center construction.

**Otay Ranch, Parcels B (Village 8 West) and C (Village 9), Otay Land Company, City of Chula Vista, California.** As field manager and co-principal investigator, conducted the pedestrian field survey of an approximately 600 acre site in the City of Chula Vista. Ms. Siren also co-authored the paleontological assessment for the project.

**Olympic Pointe (East and West) Project, Alta Geotechnical Inc., City of Chula Vista, California.** As field manager and co-principal investigator, responsible for oversight of field studies conducted as part of the paleontological mitigation program for the project. The findings of this paleontological mitigation program were included in a final technical report co-authored by Ms. Siren.

**Beaumont Four Seasons, K. Hovnanian, Beaumont, California.** As project manager and principal investigator, responsible for paleontological resources mitigation program on this approximately 600-acre residential community.

**Terranea, Lowe Destination Development, City of Rancho Palos Verdes, California.** As project manager, provided comprehensive archaeological and paleontological consultation services for this planned resort property located on the Palos Verdes Peninsula. This project site was known to be both archaeologically and paleontologically sensitive and yielded fossils and artifacts. Responsible for overseeing the cultural and paleontological resource management, and co-authored the final report.

**Portola Springs (Planning Area 6), The Irvine Company, City of Irvine, California.** As project manager, provided comprehensive paleontological consultation services for a large-scale development. This project yielded fossils that dated from the Cretaceous age (over 65 million years ago) deposits through the Pleistocene age (until 11,000 years ago). Responsible for overseeing the paleontological

## APPENDIX B QUALIFICATIONS OF KEY PERSONNEL

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SARAH SIREN – CONTINUED

resource management, including large fossil salvages and monitoring during rough grading. Evaluation studies are in progress and large-scale mitigation efforts are ongoing.

**Orchard Hills (Planning Area 1), The Irvine Company, City of Irvine, California.** As project manager, responsible for archaeological and paleontological services provided during rough grading at Fire St. #55 for Irvine Community Development Company (ICDC).

**607 Kings Road, City of Newport Beach, California.** Served as paleontologist for fossil salvage of a Pleistocene baleen whale skull from a private residence for the City of Newport Beach. Was instrumental in coordinating with the City, the property owner, and the Los Angeles Times journalists who covered the breaking news story.

**Pelican Hill, The Irvine Company, City of Newport Beach, California.** Managed the on-site paleontological mitigation program operated by Stantec for the Pelican Hill Project in Newport Beach, Orange County, California. In accordance with local and state guidelines, supervised the recovery of over 200 fish fossils from the middle to late Miocene marine Monterey Formation, and both terrestrial and marine specimens from the overlying Pleistocene age terrace deposits.

**The Preserve at Mystic Ridge, City of Moreno Valley, California.** This project consists of approximately 700 lots ranging from condos to large single-family estates within the existing Quail Ranch Golf Club. Project entitlements will include an EIR, Change of Zone, and Tentative Tract Map through the City of Moreno Valley concurrently with an annexation application including a Plan of Services through LAFCO and a land exchange with California Department of Fish and Wildlife. Mrs. Siren was responsible for a paleontological assessment of the 200-acre property, and oversight during paleontological resource monitoring of geotechnical bore hole drilling and trenching.

**Shady Canyon, The Irvine Company, City of Irvine, California.** Assumed supervisory role of a 4-year monitoring project during mass grading for the Shady Canyon residential community. During that time, the majority of the fossils salvaged by paleontological monitors were from the Vaqueros Formation. These marine sediments yielded a relatively complete skull of a new species of primitive baleen whale, in addition to mollusks, echinoderms, sharks, fishes, a marine bird, and mammals that lived in the early Miocene ocean, approximately 20 to 23 million years ago. The collection has been reported on and placed in the Natural History Museum of Los Angeles County at Exposition Park.

**Turtle Ridge, The Irvine Company, City of Irvine, California.** Supervised paleontological monitoring during rough grading for this large residential community. Monitoring personnel collected a variety of marine fossils during the course of the project. Most notable was the complete skull of a primitive tusked sea cow (*Dioplotherium*) from the Topanga Formation; this skull was prepared in the Stantec paleontological laboratory, reported on, and placed at the Smithsonian Institution, Washington, DC, for further research.

**Vellano Project, Chino Hills Land West LLC, City of Chino Hills, California.** Supervised paleontological monitoring services for this 570-acre property during mass grading. Over 2,000 fossil fish specimens were collected, which expanded the known species recorded from the Puente Formation. This residential community project afforded the rare opportunity to monitor Miocene sediments for the presence of marine fossils. Also collected on this project were Ice Age mega fauna remains, most notably the best-preserved Shasta ground sloth skull outside Rancho La Brea and a large bison femur. The most complete

SARAH SIREN – CONTINUED

dolphin skeleton ever recovered from the Pacific region was collected during the course of this project and is described as a newly discovered species of kentriodontid dolphin by Dr. Barnes of the Natural History Museum of Los Angeles County. A replica of this animal is currently on display at the City of Chino Hills City Hall. The collection was placed at the Natural History Museum of Los Angeles County.

**Planning Areas 18 and 39 (Verizon Amphitheater and Wild Rivers) City of Irvine, California.** Stantec performed historical, archaeological, and paleontological technical studies for the EIRs prepared in accordance with CEQA Guidelines. Records research, Native American consultation, archaeological surveys, and paleontological assessments were conducted to identify and evaluate cultural and paleontological resources within and near two adjacent project sites. Three 20th century historical resource sites, four prehistoric Native American archaeological sites, and three paleontologically sensitive geologic formations were identified and evaluated. The technical reports analyzed proposed project impacts and provided mitigation measures.

**Planning Area 9A – Woodbury, The Irvine Company, City of Irvine, California.** Planning Area 9A – Woodbury, Irvine, California (Project Paleontologist) Responsible for providing services including monitoring and collection of any archaeological or paleontological material found at Planning Area 9A – Phase I and Phase II (Woodbury). Fossils collected were discovered within Ice Age deposits, and included specimens of bison, camel, tapir, horse, sloth, and mammoth. All work was designed to comply with the California Environmental Quality Act, County Guidelines, and City Mitigation Measures.

**Aliso Creek, County of Orange, California.** Responsible for field survey and analysis of surface fossils exposed in the creek noted in a newspaper article. The fossil whale skull pictured in the article was that of a right whale preserved within the Oso Sandstone Member of the Capistrano Formation. Other fossils included a jawbone from a small baleen whale (*Herpetocetinae*). These specimens were later jacketed and airlifted by helicopter for transport to the Orange County facility for storage.

### Education

**Fullerton College Master Plan Program EIR, North Orange County Community College District, Cypress, California.** Paleontologist for the Facilities Master Plan Program EIR. Issues include historic building preservation, traffic, and parking, and adjacent neighbor concerns associated with noise, traffic, parking, and growth inducement.

**Coast Community College District, County of Orange, California.** As project manager and co-principal investigator, conducted the field surveys and prepared the paleontological resources assessments for Orange Coast College, Golden West College, and Coastline Community College for submittal to Dudek.

**Thomas Jefferson School of Law Project, Thomas Jefferson School of Law, City of San Diego, California.** As field manager, conducted multiple fossil salvages for this East Village project site. A mammoth skull, tusks, and partial skeleton were recovered and are currently awaiting preparation. In addition, a partial gray whale (*Eschrichtius robustus*) skeleton was discovered at the site and is housed at the museum's storage facility.

**San Ysidro School District (SYSD) Vista Del Mar School, RBF, County of San Diego, California.** As field manager and co-principal investigator, responsible for preconstruction WEAP training and supervision of paleontological monitoring program for the project. A series of fossil producing strata were discovered

SARAH SIREN – CONTINUED

and collected from approximately 2–3 million year old San Diego Formation consisted of significant fossil remains of marine invertebrates.

### Energy

**California Flats Solar Project, First Solar/NextEra, Counties of Monterey and San Luis Obispo, California.** As project manager and principal investigator, supervised the cultural and paleontological resources mitigation program in accordance with the mitigation measures and treatment plan for the project.

**McCoy Solar Project, First Solar, County of Riverside, California.** Managed cultural and paleontological resource staff during construction of this 250-megawatt (MW) solar photovoltaic facility located in easternmost Riverside County. As the BLM-permit holder, served as principal investigator for paleontology and paleontological resources compliance manager.

**Imperial Solar Energy Center West Project, First Solar, County of Imperial, California.** Managed cultural and paleontological resource staff during construction of this 250-MW solar photovoltaic facility located in Imperial County. Mitigation was conducted in accordance with the Conditional Use Permit (CUP) for the project, including screenwashing of sediment samples collected during excavation.

**Jacumba Solar, County of San Diego, California.** As senior paleontologist, provided paleontological resources recommendations and guidelines during the design phase of this project, and oversight during mitigation monitoring.

**San Joaquin Cross Valley Loop Project, Southern California Edison (SCE), City of Visalia, California.** As project manager, co-authored the final technical report on paleontological resources for the San Joaquin Cross Valley Loop Project in Tulare County, California. The final report was written in compliance with CEQA and Tulare County guidelines for approval by the California Public Utilities Commission (CPUC).

**Valley South Subtransmission Line Project, SCE, County of Riverside, California.** As project manager, conducted a field survey and co-authored the paleontological resources survey report in advance of proposed construction along the approximately 17.76 miles of subtransmission line in Riverside County, California. The final preliminary environmental assessment (PEA) was written in compliance with CEQA and Riverside County guidelines for approval by the CPUC.

**Stateline Solar Farm Project, First Solar, County of San Bernardino, California.** As project manager and co-principal investigator, prepared the paleontological resources plan and provided technical review and editorial comments on the field survey report for this project located on BLM-managed land.

**Antelope Valley Solar Ranch Project, Sun Power, Counties of Los Angeles and Kern, California.** As field manager and co-principal investigator, supervised the paleontological mitigation program in accordance with the paleontological monitoring and treatment plan for the project.

**California Valley Solar Ranch Project, NRG/Sun Power, County of San Luis Obispo, California.** As field manager and co-principal investigator, supervised the paleontological mitigation program in accordance with the paleontological monitoring and treatment plan for the project.

**Sunrise Powerlink, San Diego Gas and Electric (SDG&E), Counties of San Diego and Imperial, California.** As field manager and co-principal investigator, responsible for implementation of the field mitigation program for the project. Additionally, aided in the preparation of the SDG&E Sunrise Powerlink

APPENDIX B  
QUALIFICATIONS OF KEY PERSONNEL

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SARAH SIREN – CONTINUED

Paleontological Records Search, Monitoring and Treatment Plan, and co-authored Final Technical Report on paleontological resources for submittal to the BLM.

**Paleontological Services On-Call Contract, SDG&E, Counties of San Diego and Imperial, California.** As field manager investigator, responsible for oversight of paleontological monitoring being conducted as part of several work orders for SDG&E. Over thirty work orders ongoing or completed under the on-call contract. Also responsible for co-authoring final project reports (both mitigation and assessment).

**Ocotillo Express Wind Project, Insignia Environmental, County of Imperial, California.** As field manager and co-principal investigator, responsible for obtaining the BLM permit and assisting the Project Manager in preparation of a Paleontological Monitoring and Treatment Plan for the project. Additionally responsible for oversight of paleontological monitoring by another consultant during construction related activities on the project.

**SDG&E East County (ECO) Substation Project, Insignia Environmental, County of San Diego, California.** As field manager and co-principal investigator, co-authored the paleontological resources mitigation plan which was accepted by the BLM. She was also responsible for supervising the paleontological monitoring on this project located in eastern San Diego County, California.

**Tehachapi Renewable Transmission Project (TRTP), Pacific Legacy, Counties of Kern, Los Angeles, and San Bernardino County, California.** As project manager and principal investigator, evaluated paleontological resource discoveries during construction for this multiyear SCE project. Excavation activities within the Miocene-age Puente Formation in Los Angeles and San Bernardino counties had the potential to yield scientifically significant fossils during construction on this large-scale project.

**CSE Centinela Solar Farm, kp environmental, County of Imperial, California.** As field manager and co-principal investigator, responsible for obtaining the BLM permit and assisting in review of the assessment and paleontological monitoring and treatment plan for the project. A series of fossil producing strata were discovered and collected from ~14,000 to 7,000 year old lacustrine sedimentary rocks ancient Lake Cahuilla. Recovered fossils consisted of significant fossil remains of late Pleistocene- to early Holocene-age marine invertebrates.

**Simbol Calipatria Plant I Project, Ecology and Environment, County of Imperial, California.** As field manager and co-principal investigator, responsible for oversight of field studies conducted on Energy Source LLC's property within the Salton Sea Known Geothermal Resource Area. She also co-authored the paleontological assessment for the project.

**Hudson Ranch II Geothermal Project, Ecology and Environment, County of Imperial, California.** As field manager and co-principal investigator, responsible for oversight of field studies conducted as part of the paleontological assessment of the project. The paleontological assessment program included completion of a paleontological records search and literature review, completion of a field survey, and preparation of a final report summarizing findings and proposing appropriate mitigation measures to reduce potential adverse impacts to a level below significance. The findings of this paleontological assessment report indicated that the potential adverse impacts to a variety of marine and non-marine sedimentary rocks could be avoided.

**Imperial Irrigation District (IID) Imperial to Dixieland 230 kilovolt Transmission Line and Expansion of Dixieland Substation, AECOM, County of Imperial County, California.** As field manager and co-

SARAH SIREN – CONTINUED

principal investigator, responsible for field studies oversight and preparation of the paleontological assessment report. The paleontological assessment program included completion of a paleontological records search and literature review, completion of a field survey, and preparation of a final report summarizing findings and proposing appropriate mitigation measures to reduce potential adverse impacts to a level below significance. The findings of this paleontological assessment report indicated that the potential adverse impacts to a variety of marine and non-marine sedimentary rocks could be avoided.

**SCG Imperial Valley Loop, Insignia Environmental, City of Brawley, California.** As field manager, responsible for oversight of monitoring and fossil salvage being conducted on site by another consultant. Mitigation efforts consisted of monitoring during mass grading activities, recovery of fossils discovered, laboratory preparation and curation of fossils, and preparation of the final report. A series of fossil producing strata were discovered and collected from ~14,000 to 7,000 year old lacustrine sedimentary rocks ancient Lake Cahuilla. Recovered fossils consisted of significant fossil remains of late Pleistocene- to early Holocene-age marine invertebrates.

### **Municipal**

**Block 4N (North Encanto) Project, City of San Diego, California.** As project manager and principal investigator, responsible for archaeological and paleontological monitoring for underground conduit system installation by SDG&E for the City of San Diego in the neighborhood of Encanto. A marine mollusk and vertebrate assemblage was recovered from the San Diego Formation. Ms. Siren served as the primary author of the report. Specimens were prepared and curated according to the City of San Diego and the San Diego Natural History Museum's guidelines for paleontology.

### **Transportation**

**Mid-Coast Corridor Transit Project, City of San Diego, California.** As project manager and principal investigator, responsible for cultural and paleontological resources construction monitoring during excavation for this San Diego Association of Governments (SANDAG) project.

**San Elijo Lagoon Double Track Project, AECOM, City of Encinitas, California.** As project manager and principal investigator, responsible for cultural and paleontological resources construction monitoring during excavation on this SANDAG project.

**Keller Road and I-215 Interchange Project, Jacobs Engineering and California Department of Transportation (Caltrans), City of Murrieta, California.** As project manager and principal investigator for cultural and paleontological resources on this interchange project for the City of Murrieta, conducted the field survey and drafted a report in accordance with the Caltrans Standard Environmental Reference.

**California High-Speed Rail Project Construction Package 2-3, Fresno to Bakersfield, Dragados/Flatiron Joint Venture, Fresno to Bakersfield, California.** Managed cultural and paleontological resource staff on the Fresno to Bakersfield Section of the project. Responsible for Worker Environmental Awareness Program (WEAP) training and Paleontological Resources Mitigation and Monitoring Plan (PRMMP) consistent with the Final Environmental Impact Report (EIR)/Environmental Impact Statement (EIS) created for the project.

**Old Otay Mesa Road Improvement Project, City of San Diego, California.** As project manager and principal investigator, responsible for cultural and paleontological resources construction monitoring during excavation on this City of San Diego project.

SARAH SIREN – CONTINUED

**Mid-City Bus Rapid Transit Project, City of San Diego, California.** Co-authored the paleontological evaluation report for the Caltrans District 11. Completed the field survey for the study, and made recommendations for future mitigation monitoring in accordance with the Standard Environmental Reference for Paleontology. Responsible for WEAP training preconstruction and paleontological resources monitoring during excavation by Granite Construction on this SANDAG project.

**Paleontological Services On-Call Contract, Caltrans, Counties of San Diego and Imperial, California.** As field manager investigator, responsible for oversight of paleontological monitoring being conducted as part of Caltrans road improvement projects along the SR-52, SR-76, SR-78, SR-94, SR-805, SR-905, and I-15 freeways. Numerous concurrent work orders were issued and completed under the on-call contract. Also responsible for co-authoring final project reports (both mitigation and assessment).

**SR-210 Mixed Flow Lane Addition from Highland Avenue to San Bernardino Avenue, County of San Bernardino, California.** Conducted field survey and co-authored the Paleontological Identification and Evaluation Report for submittal to Caltrans District 8.

**I-15/Limonite Avenue Interchange Improvements Project, County of Riverside, California.** Conducted field survey and co-authored the Paleontological Identification and Evaluation Report for submittal to the California Department of Transportation (Caltrans) District 8.

**SR-76/I-15 Interchange Improvement Project, Caltrans, City of San Diego, California.** During grading by Flatiron Construction for the Caltrans District 11 roadway improvements to the SR-76/I-15 interchange, field manager responsible for recovery of a nearly complete skull and postcrania of a long-horned bison (*Bison latifrons*).

#### **Water/Wastewater**

**North City Pure Water Conveyance Project, City of San Diego, California.** Served as project manager and principal investigator on this public works project. Responsible for managing cultural and paleontological resources studies for a new underground pipeline with improvements to existing infrastructure.

**Cultural Resources Support for Master Stormwater System Maintenance Program (MSWSMP), County of San Bernardino, California.** As project manager and principal investigator for paleontology, responsible for the review and edit of the paleontological resources assessment of approximately 500 flood control facilities within San Bernardino County. The scope of services included providing a mitigation monitoring plan should monitoring and collection of paleontological resources be necessary.

**Little Lake Line B Town Drain System Construction Project, Riverside County Flood Control and Water Conservation District, California.** Served as project manager and principal investigator on this public works project. Responsible for managing cultural and paleontological resources monitoring for a new underground pipeline.

**North Broadway Pipeline, City of Escondido, California.** Served as principal investigator and paleontologist on this project. Managed mitigation monitoring project for this water pipeline project traversing Quaternary older alluvial deposits within the City of Escondido.

**Los Angeles Department of Power and Water (LADWP) Path 46 Transmission Line Project, Environmental Science Associates (ESA), County of San Bernardino County, California, and Clark**

SARAH SIREN – CONTINUED

**County, Nevada.** As project manager and principal investigator, reviewed the final survey report for submittal to the client. Co-authored annual report for submittal to the BLM.

**San Vicente Dam Raise Project, San Diego County Water Authority (SDCWA), County of San Diego, California.** As field manager and co-principal investigator, Ms. Siren conducted the field survey and co-authored the paleontological resources assessment report.

**South Orange County Water Authority (SOCWA) Coastal Treatment Plant, County of Orange, California.** As field manager and co-principal investigator, Ms. Siren conducted the field survey and co-authored the paleontological resources assessment report.

**Otay Water Treatment Plant, ICF International Inc., County of San Diego, California.** As field manager and co-principal investigator, Ms. Siren co-authored the paleontological resources final technical report which was accepted by the Otay Water District. She was also responsible for supervising the paleontological monitoring on this project located in eastern San Diego County, California.

**Holly Hills Storm Drain Project, Los Angeles Department of Public Works, Los Angeles County, California.** As project manager and paleontologist, responsible for providing on-call paleontological monitoring. The scope of services included providing on-site monitoring and collection of archaeological or paleontological resources found. Evaluated and prepared salvaged fossils in compliance with CEQA guidelines. Wrote quarterly reports on the findings.

### Relevant Previous Experience

**Paleo Solutions Inc., City of Monrovia, California.** Served as project manager/principal investigator of paleontology responsible for managing projects and report preparation for private and public sector projects located throughout California. (2013–2014)

**San Diego Natural History Museum, City of San Diego, California.** Served as paleontological field manager responsible for managing field operations and preparing reports for the Department of PaleoServices projects in Central and Southern California. (2008–2013)

**Natural History Museum of Los Angeles County, City of Los Angeles, California.** Served as curatorial assistant responsible for assisting collections manager with curation; is well versed in the latest preparation and casting and molding techniques. (2007–2008)

**Saddleback College, City of Mission Viejo, California.** Served as associate professor responsible for teaching fossil preparation techniques in addition to leading lecture classes for the Department of Geology. (2004–2008)

**Stantec Consulting Inc., City of Irvine, California.** Served as project manager/paleontologist responsible for managing field operations for multiple projects throughout Southern California. (2003–2008)

**South Dakota School of Mines and Technology, Rapid City, South Dakota.**

- Served as research scientist I. Assisted the collections manager/preparatory in several field activities, curation projects, and laboratory preparation. (Summer 2002)
- Served as graduate research assistant. Prepared, identified, mapped, and curated fossils from new bone beds located during the 2000 and 2001 summer field seasons of the Natural Resources Preservation Program (NRPP) Project. (Fall 2001 and Spring 2002; Fall 2000 and Spring 2001)

## APPENDIX B

### QUALIFICATIONS OF KEY PERSONNEL

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#### SARAH SIREN – CONTINUED

- Served as fossil resource monitor. Monitored potentially fossiliferous areas in the Badlands National Park for construction crews. (May 2001 and 2002)
- Served as co-principal investigator. Assisted with the NRPP 2001 project in the Badlands National Park by filling administrative duties, mapping using aerial photos and GPS unit, and collecting and preparing fossils for transport to the Museum of Geology in Rapid City, South Dakota. (Summer 2001)
- Served as paleontological supervisor. Interpreted fossil remains for tourists visiting an ongoing excavation site in the Badlands National Park, filled administrative duties, and collected and prepared fossils for transport to the Museum of Geology (Summer 2001).
- Served as research assistant at the Badlands National Park for Museum of Geology Bone Bed Project. (Summer 2000)
- Served as fossil interpreter/paleontologist at the Pig Dig, Badlands National Park. (Summer 1999 and 2000)
- Served as graduate research assistant at the Museum of Geology/Department of Geology and Geological Engineering. (Fall 1999 and Spring 2001)
- Attended field paleontology course. (2000)

**National Museum of Natural History, Smithsonian Institution, Invertebrate Paleobiology Department, Washington, DC.** Served as a contract employee. Identified microfossil species for stable isotope analysis and sorted microfossils based on morphology for population studies. (1998–1999)

**Disability Services, George Washington University, Washington, DC.** Served as a tutor to students in Physical and Historical Geology. (1998–1999)

**Field Paleontology in the Bahamas.** *Cerion* snail fossil collection and documentation on various islands such as Cat Island and Long Island, for Stephen J. Gould. (1998)

**National Science Foundation Research Experience for Undergraduates, Green River, Wyoming.** Served as field participant. Prospected and collected fossils for the Natural Science Museum, Michigan. Prepared a report on the results of activities and presented it to her peers. (1997)

**Vertebrate Paleontology Laboratory, National Museum of Natural History, Smithsonian Institution, Washington, DC.** Served as a volunteer in the department and prepared fossil samples of vertebrates for study. (1997)

#### Specialized Training

- Geology field course, Lehigh University, 1999.

#### Publications

Black, S.A., C.L. Herbel, and R.C. Benton. 2001. "Bone Beds in the Lower Scenic Member, Brule Formation (*Oligocene*), Badlands National Park, South Dakota." Abstract. Poster presentation at the Sixty-First Annual Society of Vertebrate Paleontology Meeting, Bozeman, Montana.

Deering, M.R., L.G. Barnes, S.A. Siren, S.A. McLeod, M.O. Walsh, and K.R. Rice. 2007. "A Fossil Ziphiid Whale (*Cetacea: Odontoceti*) from the Latest Miocene Capistrano Formation in Southern Orange County, California." Los Angeles, California: Southern California Academy of Sciences.

## APPENDIX B QUALIFICATIONS OF KEY PERSONNEL

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SARAH SIREN – CONTINUED

- Deering, M.R., M.L. Kearin, S.A. Black, and L.G. Barnes. 2004. "An Archaic Baleen-Bearing Mysticete Whale Resembling *Eomysticetus* from the Lower Miocene Vaqueros Formation in Southern California." Abstract. Western Association of Vertebrate Paleontologists, Annual Meeting, Occidental College. February 14, 2004.
- Deméré, T.A., K.A. Randall, B.O. Riney, and S.A. Siren.<sup>1</sup> 2013. Forthcoming. "Discovery of remains of an extinct giant bison (*Bison latifrons*) in Upper Pleistocene (*Rancholabrean*) fluvial strata in the San Luis Rey River Valley, San Diego County, California, USA." In *Alternative Rocks: The Geology and Natural Resources Above and Below the San Luis Rey River Valley, Northern San Diego County, California*, edited by B. Olson. San Diego, California: San Diego Association of Geologists Field Trip Guide.
- Herbel, C.L., R.C. Benton, and S.A. Black. 2002. "Bone Bed Surveys: Making Use of the Data." Abstract. Geological Society of America Annual Meeting, Abstracts with Programs 34, no. 6, paper no. 237–5.
- Santos, Comer, K. S. Siren, A. Nouri, T. Deméré, and Randall, K. 2010. "Paleontological Sensitivity Map for San Diego County: A Categorical Risk Analysis." ESRI Users Conference, Map Gallery Poster.
- Siren, S.A. 2006. "Site Analysis of the Buffalo Alley Bone Bed Located in the Lower Scenic Member of the Brule Formation (*Oligocene*), Badlands National Park, South Dakota." Abstract. Poster presentation at the Sixty-Sixth Annual Society of Vertebrate Paleontology Meeting, Ottawa, Ontario, Canada.

### Awards

- SDNHM Staff Appreciation Award, 2012.
- SDSM&T Award for Outstanding Contributions to Campus Leadership, April 2001 and 2002.

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<sup>1</sup> Née S.A. Black.