

Appendix H

Paleontological Resources Assessment



Public Version

**Crooked Creek Residential Subdivision Project,
City of Diamond Bar, California**
Paleontological Resources Assessment

Prepared for
City of Diamond Bar
21810 Copley Drive
Diamond Bar, CA 91765

December 2020



Public Version

**Crooked Creek Residential Subdivision Project,
City of Diamond Bar, California**
Paleontological Resources Assessment

Prepared for

City of Diamond Bar
21810 Copley Drive
Diamond Bar, CA 91765

December 2020

Project Director:

Monica Strauss, M.A., RPA

Project Manager:

Candace Ehringer, M.A., RPA

Principal Investigator:

Joe D. Stewart, Ph.D.

Authors:

Joe D. Stewart, Ph.D.
Fatima Clark, B.A.

Project Location:

Yorba Linda (CA) USGS 7.5-minute Topographic Quad
Township 2 South, Range 9 West, Section
29

Acreage: Approx. 12.9 acres

626 Wilshire Boulevard
Suite 1100
Los Angeles, CA 90017
213.599.4300
www.esassoc.com



Irvine	Sacramento
Los Angeles	San Diego
Oakland	San Francisco
Orlando	Santa Monica
Pasadena	Seattle
Petaluma	Tampa
Portland	Woodland Hills

D201800195.00

OUR COMMITMENT TO SUSTAINABILITY | ESA helps a variety of public and private sector clients plan and prepare for climate change and emerging regulations that limit GHG emissions. ESA is a registered assessor with the California Climate Action Registry, a Climate Leader, and founding reporter for the Climate Registry. ESA is also a corporate member of the U.S. Green Building Council and the Business Council on Climate Change (BC3). Internally, ESA has adopted a Sustainability Vision and Policy Statement and a plan to reduce waste and energy within our operations. This document was produced using recycled paper.

TABLE OF CONTENTS

Crooked Creek Residential Subdivision Project – Paleontological Resources Assessment

	<u>Page</u>
Executive Summary.....	ES-1
Introduction	1
Project Location	1
Project Description	6
Regulatory Framework.....	6
State.....	6
Local	7
Environmental Setting.....	10
Natural Setting	10
Geologic Setting	10
Archival Research	11
Geological Map Review	11
Geotechnical Investigations Review	11
LACM Database Search.....	15
Literature Review.....	16
Paleontological Resources Survey	16
Summary and Recommendations.....	20

Appendices

- A Personnel
- B LACM Database Search
- C Map of Geotechnical Investigations

List of Figures

1	Regional Location.....	2
2	Local Vicinity	3
3	Project Location.....	4
4	Site Plan	5
5	Geologic Map	12
6	Survey Coverage.....	18
7	Overview of southern portion of Project Site (View East).....	19
8	Overview of northeastern portion of Project Site (View South)	19

List of Tables

1	LGC Valley Geotechnical Borings.....	13
2	GeoSoils Consultants Geotechnical Borings	14
3	Pacific Soils Engineering Test Pits	14
4	LACM Fossil Localities	15

EXECUTIVE SUMMARY

Crooked Creek Residential Subdivision Project – Paleontological Resources Assessment

Environmental Science Associates (ESA) has been retained by the City of Diamond Bar (City) to conduct a paleontological resources assessment for the Crooked Creek Residential Subdivision Project (Project) in support of a Mitigated Negative Declaration (MND). The Project would be located on a 12.9-acre vacant site (Project Site). The Project would consist of the development of seven single-family residences and associated infrastructure, including a southward extension of the existing Crooked Creek Drive, on approximately 2.5 acres. (referred to as the Proposed Development Area). The remaining 10.4 acres would not be developed (referred to as the undeveloped area). The Project would require approval of a Vesting Tentative Tract Map, Conditional Use Permit, Tree Permit, and Development Review for the seven single-family homes. The City is the lead agency pursuant to the California Environmental Quality Act (CEQA).

No paleontological resources were identified within the Project Site. However, the geologic map review, literature review, and the paleontological resources records search revealed that the Project Site has exposures of the following fossiliferous geological formation/units: Quaternary alluvium, the La Vida Shale Member of the Puente Formation (or Monterey Formation) and the Soquel Sandstone Member of the Puente Formation (or Monterey Formation). However, only the Quaternary alluvium and the La Vida Shale Member of the Puente Formation fall within the Proposed Development Area, while the Soquel Sandstone Member of the Puente Formation falls within areas proposed to be left as undeveloped space. The Quaternary alluvium and the La Vida Shale Member of the Puente Formation are known to have produced paleontological resources in the vicinity of the Project Site, and are assigned a low-to-high paleontological potential increasing with depth, and high paleontological potential, respectively.

Based on the fossiliferous geologic formations that have been mapped within the Project Site and the abundance of fossil localities in the vicinity of the Project Site, the potential to encounter fossiliferous deposits within the Project Site is considered high. As a result, ESA recommends Mitigation Measures PALEO-1 through PALEO-4. These measures include retention of a qualified paleontologist, construction worker paleontological resources sensitivity training, paleontological monitoring of excavations exceeding 5 feet in Quaternary alluvium and all excavations in the La Vida Member of the Puente Formation regardless of depth, procedures to follow in the event of the discovery of paleontological resources, salvage and curation of significant fossil discoveries, and final reporting. With implementation of these measures, impacts to paleontological resources would be less than significant under CEQA.

CROOKED CREEK RESIDENTIAL SUBDIVISION PROJECT

Paleontological Resources Assessment

Introduction

Environmental Science Associates (ESA) has been retained by the City of Diamond Bar (City) to conduct a paleontological resources assessment for the Crooked Creek Residential Subdivision Project (Project) in support of a Mitigated Negative Declaration (MND). The Project would consist of the development of seven single-family residences and associated infrastructure, including a southward extension of the existing Crooked Creek Drive, on approximately 2.5 acres (referred to as the Proposed Development Area). The remaining 10.4 acres would not be developed (referred to as the undeveloped area). The Project would require approval of a Vesting Tentative Tract Map, Conditional Use Permit, Tree Permit, and Development Review for the seven single-family homes. The City is the lead agency pursuant to the California Environmental Quality Act (CEQA).

ESA personnel involved in the preparation of this assessment include: Monica Strauss, M.A., RPA, Project Director; Candace Ehringer, M.A., RPA, Project Manager; Joe D. Stewart, Ph.D., Paleontological Principal Investigator, surveyor, and author; Fatima Clark, B.A., report contributor; and Stephan Geissler, GIS Specialist. Resumes of key personnel are provided in **Appendix A**.

Project Location

The 12.9-acre Project Site is located in the City of Diamond Bar and within the eastern portion of Los Angeles County (**Figure 1**). The Project includes Assessor Parcel Number (APN) 8714-028-003. It is located north of Chino Hills, east of State Route 57 (SR 57), a flood control channel, and residences, and south and west of residences (**Figure 2**). Specifically, the Project is located in Section 29 of Township 2 South, Range 9 West on the Yorba Linda, CA U.S. Geological Survey (USGS) 7.5-minute topographic quadrangle (**Figure 3**). The Proposed Development Area would be within the western portion of the Project Site and the undeveloped area would be within the eastern portion of the Project Site (**Figure 4**).



SOURCE: ESRI

Crooked Creek Residential Subdivision Project

Figure 1
Regional Location Map

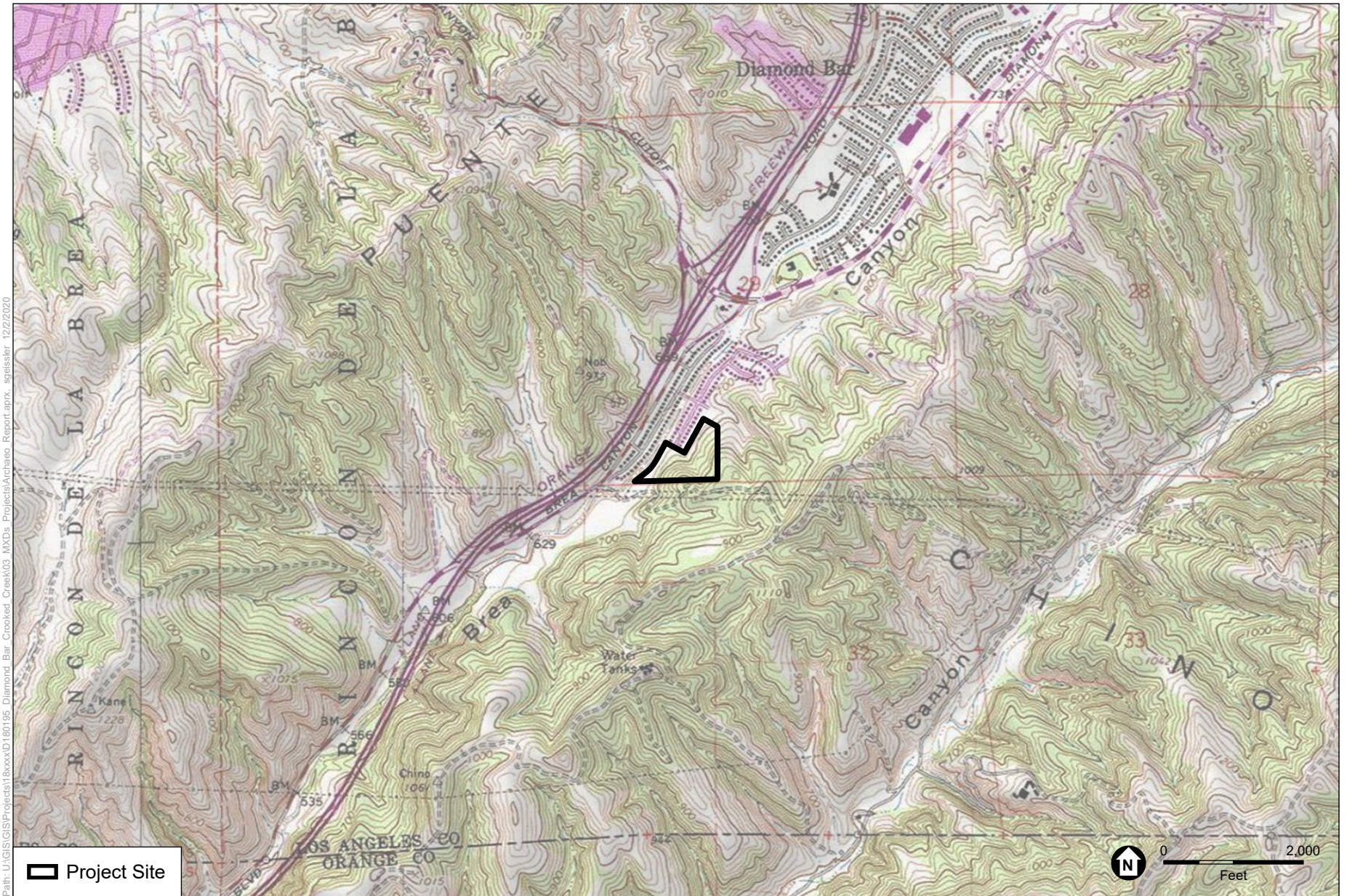


SOURCE: Mapbox, 2020.

Crooked Creek Residential Subdivision Project

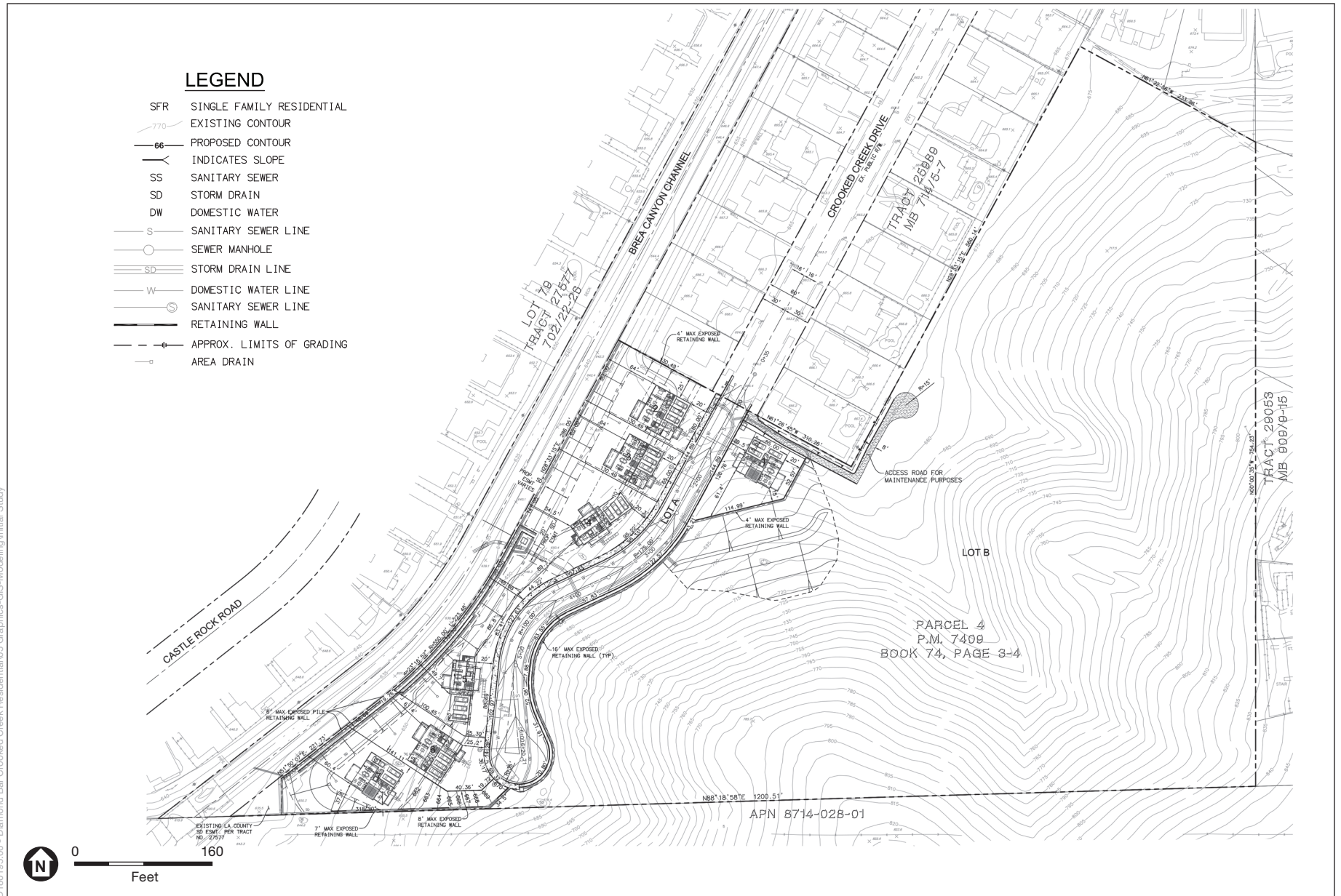


Figure 2
Local Vicinity Map



SOURCE: USGS Topographic Series (Yorba Linda, CA); ESA, 2020.

Crooked Creek Residential Subdivision Project
Figure 3
 Project Location Map



SOURCE: Michael Baker International, 2020

Crooked Creek Residential Subdivision Project

Figure 4
Site Plan

Project Description

Proposed Development Area

The 2.5-acre Proposed Development Area would be developed with seven single-family residences and associated infrastructure, including a southward extension of the existing Crooked Creek Drive. The seven residential lots would range in size from 7,757 square feet to 16,826 square feet. The single-family residences would range in size from 3,893 to 4,810 square feet and up to 33 to 10 feet in height. Six of the residential lots would be located on the western side of the expansion of Crooked Creek Drive with the one residential lot (Lot 1) located on the eastern side. The maintenance access road and turnaround area would be constructed at the northeastern portion of the Project Site.

Excavation depths on Lot 1 would be at least 25 feet within the existing slope. Excavation depths for the remainder of the lots (including the southward expansion of Crooked Creek Drive and excavation for utilities) could range from 15 to 20 feet in depth. The Project would include approximately 15,510 cubic yards of cut and 21,270 cubic yards of fill resulting in 5,760 cubic yards of imported soil.

Undeveloped Area

Approximately 0.6 acres of the 10.4-acre undeveloped area would be disturbed. Disturbances would include hillside grading with 8-foot terrace drains and retaining walls. The remaining 9.8 acres of undeveloped area would not be subject to disturbances.

Regulatory Framework

Paleontological resources are limited, nonrenewable resources of scientific, cultural, and educational value that are afforded protection under state laws and regulations. The following section summarizes the applicable state and local laws and regulations, as well as professional standards.

State

California Environmental Quality Act

The State CEQA Guidelines (Title 14, Chapter 3 of the California Code of Regulations, Section 15000 *et seq.*), define the procedures, types of activities, individuals, and public agencies required to comply with CEQA. As part of CEQA's Initial Study process, one of the questions that must be answered by the lead agency relates to paleontological resources: "Will the proposed project directly or indirectly destroy a unique paleontological resource or site or unique geologic feature?" (State CEQA Guidelines, Appendix G, Section VII, Part f).

The loss of a significant paleontological resources which includes any identifiable fossil that is unique, unusual, rare, uncommon, diagnostically or stratigraphically important, and/or those that add to an existing body of knowledge in specific areas – stratigraphically, taxonomically, and/or regionally, would be a significant environmental impact. Direct impacts to paleontological resources primarily concern the potential destruction of nonrenewable paleontological resources

and the loss of information associated with these resources. This includes the unauthorized collection of fossil remains. If potentially fossiliferous bedrock or surficial sediments are disturbed, the disturbance could result in the destruction of paleontological resources and subsequent loss of information.

The CEQA threshold of significance for a significant impact to paleontological resources is reached when a project is determined to “directly or indirectly destroy a significant paleontological resource or unique geologic feature” (State CEQA Guidelines Appendix G, Section VII, Part f). In general, for project sites that are underlain by paleontologically sensitive geologic units, the greater the amount of ground disturbance, the higher the potential for significant impacts to paleontological resources.

Public Resources Code Section 5097.5 and Section 30244

Other state requirements for paleontological resource management are included in PRC Section 5097.5 and Section 30244. These statutes prohibit the removal of any paleontological site or feature from public lands without permission of the jurisdictional agency, define the removal of paleontological sites or features as a misdemeanor, and require reasonable mitigation of adverse impacts to paleontological resources from developments on public (state, county, city, district) lands.

Local

City of Diamond Bar General Plan

On December 17, 2019, the City Council adopted the updated Diamond Bar General Plan 2040. The updated General Plan Resources Conservation Element includes the following policies for paleontological resources:

- RC-P-47** Establish a procedure for the management of paleontological materials found on-site during a development, including the following provisions:
- a. If materials are found on-site during grading, require that work be halted until a qualified professional evaluates the find to determine if it represents a significant paleontological resource, and makes a recommendation for the preservation in place or recovery of the resource.
 - b. If the resource is determined to be significant, the paleontologist shall supervise removal of the material and determine the most appropriate archival storage of the material.
 - c. Appropriate materials shall be prepared, catalogued, and archived at the applicant’s expense and shall be retained within Los Angeles County if feasible.

This policy consists of measures that must be take should paleontological resources be found on a construction site. It does not contemplate a situation where paleontological resource monitoring has been mandated of a project as a condition of approval.

Professional Standards

Society of Vertebrate Paleontology

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

Paleontological Resources Significance Criteria

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

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

Numerous paleontological studies have further developed criteria for the assessment of significance for fossil discoveries (e.g., Eisenstraut and Cooper, 2002; Murphey and Daitch, 2007; Scott and Springer, 2003, etc.). In general, these studies assess fossils as significant if one or more of the following criteria apply:

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

In summary, significant paleontological resources are determined to be fossils or assemblages of fossils that are unique, unusual, rare, uncommon, or diagnostically important (Eisenstraut and Cooper, 2002; Murphey and Daitch, 2007; Scott and Springer, 2003). Significant fossils can include remains of large to very small aquatic and terrestrial vertebrates or remains of plants and animals previously not represented in certain portions of the stratigraphy. Assemblages of fossils that might aid stratigraphic correlation, particularly those offering data for the interpretation of

tectonic events, geomorphologic evolution, and paleoclimatology are also critically important (Scott and Springer, 2003; Scott et al., 2004).

Paleontological Potential

Paleontological potential is defined as the potential for a geologic unit to produce scientifically significant fossils. This is determined by rock type, the past history of the geologic unit in producing significant fossils, and the fossil localities recorded from that unit. Paleontological potential is derived from the known fossil data collected from the entire geologic unit and not just from one specific survey. In its “Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources,” the SVP (2010) defines four categories of paleontological sensitivity (potential) for rock units: high, low, undetermined, and no potential.

- **High Potential.** Rock units from which vertebrate or significant invertebrate, plant, or trace fossils have been recovered are considered to have a high potential for containing additional significant paleontological resources. Rocks units classified as having high potential for producing paleontological resources include, but are not limited to, sedimentary formations and some volcanoclastic formations (e. g., ashes or tephros), and some low-grade metamorphic rocks which contain significant paleontological resources anywhere within their geographical extent, and sedimentary rock units temporally or lithologically suitable for the preservation of fossils (e. g., middle Holocene and older, fine-grained fluvial sandstones, argillaceous and carbonate-rich paleosols, cross-bedded point bar sandstones, fine-grained marine sandstones, etc.).
- **Low Potential.** Reports in the paleontological literature or field surveys by a qualified professional paleontologist may allow determination that some rock units have low potential for yielding significant fossils. Such rock units will be poorly represented by fossil specimens in institutional collections, or based on general scientific consensus only preserve fossils in rare circumstances and the presence of fossils is the exception not the rule, e. g. basalt flows or Recent colluvium. Rock units with low potential typically will not require impact mitigation measures to protect fossils.
- **Undetermined Potential.** Rock units for which little information is available concerning their paleontological content, geologic age, and depositional environment are considered to have undetermined potential. Further study is necessary to determine if these rock units have high or low potential to contain significant paleontological resources. A field survey by a qualified professional paleontologist to specifically determine the paleontological resource potential of these rock units is required before a paleontological resource impact mitigation program can be developed. In cases where no subsurface data are available, paleontological potential can sometimes be determined by strategically located excavations into subsurface stratigraphy.
- **No Potential.** Some rock units have no potential to contain significant paleontological resources, for instance high-grade metamorphic rocks (such as gneisses and schists) and plutonic igneous rocks (such as granites and diorites). Rock units with no potential require no protection nor impact mitigation measures relative to paleontological resources. [SVP, 2010; 1-2].

For geologic units with high potential, full-time monitoring is generally recommended during any project-related ground disturbance. For geologic units with low potential, monitoring will not generally be required. For geologic units with undetermined potential, field surveys by a qualified

vertebrate paleontologist should be conducted to specifically determine the paleontological potential of the rock units present within the study area.

Environmental Setting

Natural Setting

The Project Site consists of an undeveloped parcel situated on relatively flat to steep hillside terrain that supports nonnative grassland as well as coast live oak (*Quercus agrifolia*) and Southern California black walnut (*Juglans californica*) woodland. The Project Site is surrounded by existing low-density residential land uses to the north, east, and west, with undeveloped areas to the south. Much of the land in the Project vicinity was historically subject to longstanding livestock grazing and ranching activities, which continues on the land to the south of the Project Site. The Brea Canyon Channel is located adjacent to the western portion of the Project Site. Much of the alluvial cover shows ongoing bioturbation by pocket gophers (*Thomomys bottae*) and ground squirrels (*Spermophilus beecheyi*). The westernmost portion of the Project Site (within the Proposed Development Area) is relatively flat, with steep hilly terrain on the eastern portion of the Project Site and gently rolling terrain on the northern portion (within the undeveloped area). Elevations on the parcel range from approximately 645 to 835 feet above mean sea level (amsl).

Geologic Setting

The Project Site is situated at the northern end of the Peninsular Range province. The Peninsular Range is characterized by a well-defined geologic and physiographic unit which extends southeastward from Los Angeles to the southern tip of Baja California for a distance of 900 miles (Jahns, 1954). This province is described by a southeast to northwest structural grain that is best illustrated by a series of faults connected with the San Andreas fault system (consisting of the Whittier fault and the Newport-Inglewood fault in the Los Angeles basin) and by northwest-trending folds (made up of the Santa Ana Mountains and the Puente and Coyote Hills). The Project Site is also underlain by marine-derived sediments that are thousands of feet thick as part of the fossiliferous Puente Formation (City of Diamond Bar, 2013).

The Middle Miocene experienced the highest sea levels (Haq et al., 1987) and the warmest global temperatures in the last 23 million years (Zachose et al., 2001). The ocean covered coastal California as far east as Corona. There was also significant volcanic activity in the area, particular to the northwest of the Project Site (Glendora Volcanics) and possibly as old as 17.2 million years ago (Ma), and continuing to 15.1 Ma (McCulloh et al., 2002). Pillow lava in some exposures near San Dimas demonstrates that some of the volcanism was underwater. The La Vida Shale Member of the Puente Formation (Monterey Formation of Dibblee and Ehrenspeck, 2001) was deposited on the Glendora Volcanics, and dates to the end of the Miocene Climatic Optimum.

Yerkes et al. (1965) divided the geologic and structural evolution of the Los Angeles Basin into five phases: (1) predepositional phase, (2) prebasin phase of deposition, (3) basin inception phase, (4) principal phase of subsidence and deposition (upper Miocene to lower Pleistocene), and (5)

basin disruption (upper Pleistocene to Holocene). The deposition of the marine sediments that underlie the Project took place during phase 4.

Marine deposition of the middle to late Miocene Puente/Monterey followed the formation of the Glendora Volcanics. The Pliocene Sycamore Canyon Formation overlies the Puente/Monterey Formation. Just south of the Project Site, the Plio-Pleistocene Fernando Formation is mapped (Dibblee, 2001). Thus, we know that the ocean covered this area even into the Pliocene and perhaps the Pleistocene Epoch.

The mapping of Dibblee and Ehrenspeck (2001) indicates that the Monterey/Puente Formation in the Project Site has two members: the La Vida Shale Member and the Soquel Sandstone Member. Dibblee and Ehrenspeck (2001) describe these two members as:

Soquel Sandstone Member: The lithology of this rock unit is composed of a “Mostly bedded sandstone, light gray, weathers tan, mostly medium-grained, arkosic, locally coarse and pebbly; with minor biotite; includes minor silty clay shale.”

La Vida Shale Member: This member is categorized as “Similar to (the Yorba Shale Member), thin-bedded, cream-white weathering, platy siliceous to semi-siliceous shale, includes some layers of hard, yellow-gray dolomite; and some thin strata of sandstone.”

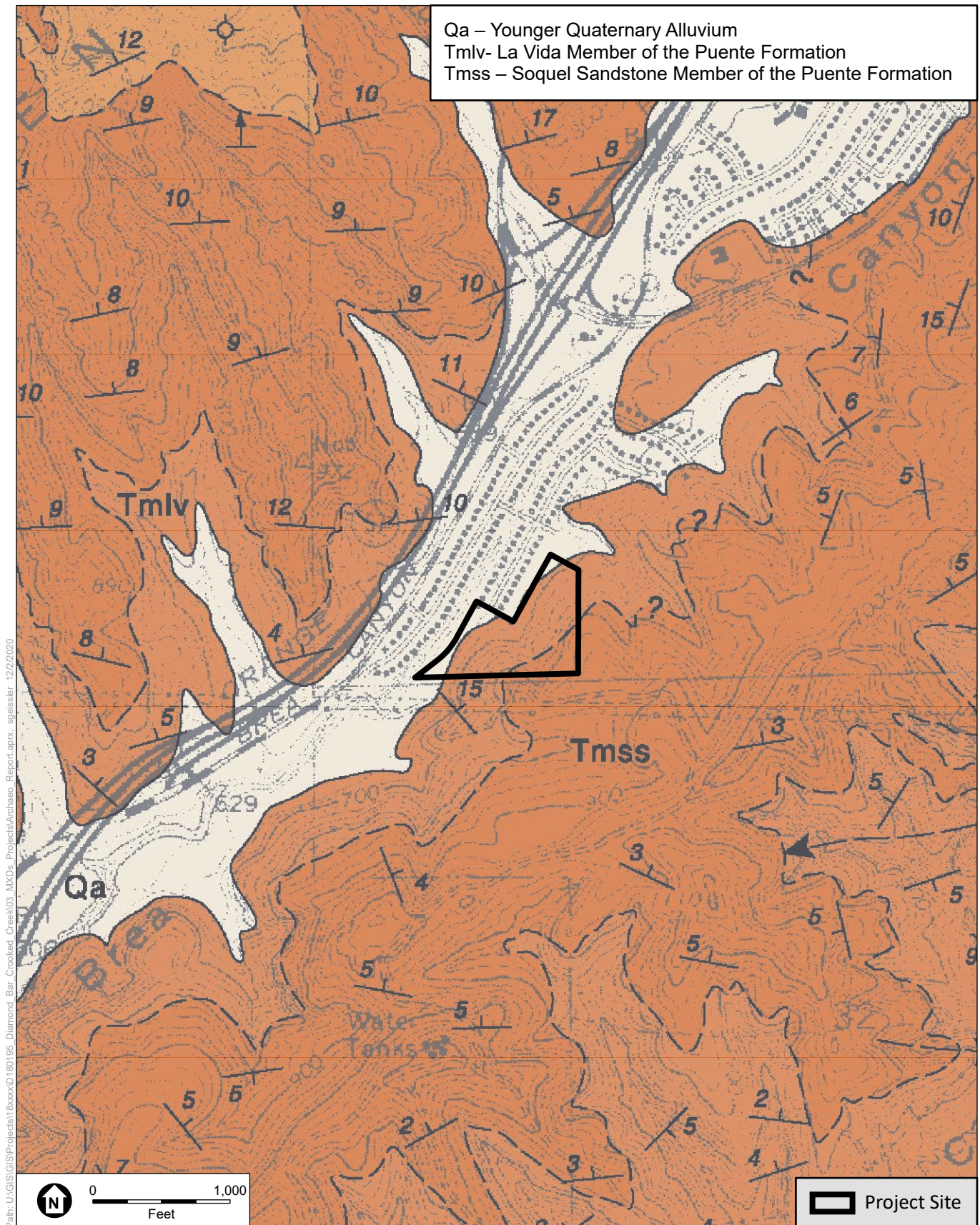
Archival Research

Geological Map Review

As shown on **Figure 5**, Dibblee (2001) mapped the Yorba Linda 7.5-minute quadrangle at a scale of 1: 24,000. It shows that the lower part of the Project footprint is in alluvial gravel, sand, and silt of valleys and floodplains (Qa). The bulk of the footprint lies on exposures of the La Vida Member of the Puente Formation (Tmlv) (Monterey Formation per Dibblee, 2001) with the very highest part mapped as lying on the Soquel Sandstone Member (Tmss).

Geotechnical Investigations Review

A number of geotechnical investigations have been conducted within the Project Site. The most recent study was conducted by LGC Valley in August 2020 (LGC Valley, 2020). A total of five borings, ranging from an elevation of 676 feet to 593.5 feet amsl, were conducted within the Proposed Development Area (**Table 1**). Three (B-LGC-1 through B-LGC-3) were placed on the lower elevations of the Project where most of the housing is proposed and two (B-LGC-4 and B-LGC-5) were placed on the lower elevations of the slope near the proposed extension of Crooked



SOURCE: Dibblee Geologic Map, 2001; Mapbox, 2020.

Crooked Creek Residential Subdivision Project

Figure 5
Geologic Map

TABLE 1
LGC VALLEY GEOTECHNICAL BORINGS

Boring No.	Type	Diameter	Depth	Top Elevation (amsl)	Bottom Elevation (amsl)	Soil Observations
B-LGC-1	Hollow stem	8 in	46.5 ft	650	604.5	0-25 ft: Quaternary alluvium (carbonate noted at 5 ft) 25-46.5 ft: Puente Formation
B-LGC-2	Hollow stem	8 in	56.5 ft	652	595.5	0-37.5 ft: Quaternary alluvium 37.5-56.5 ft: Puente Formation
B-LGC-3	Hollow stem	8 in	51.5 ft	645	593.5	0-31 ft: Quaternary alluvium (carbonate noted at 10 ft) 31-51.5 ft: Puente Formation
B-LGC-4	Auger	24 in	55 ft	665	610	0-30 ft: Quaternary deposits (colluvium and landslide debris) 30-55 ft: Puente Formation
B-LGC-5	Auger	24 in	31 ft	676	645	0-1 ft: Colluvium 1-31 ft: Puente Formation

Creek Drive and Lot 1. A map depicting the boring locations is included in **Appendix C**.

Generally, the borings indicate that there are less than 2 feet of surface soils overlying Quaternary deposits and the Puente Formation. None of the borings exceeded 56.5 feet below ground surface. Borings B-LGC-1 through B-LGC-3 recorded Quaternary alluvium from the surface grade down to approximately between 25 and 37.5 feet below ground surface. Weathered bedrock of the Puente Formation was found beneath the Quaternary alluvium from depths of between 25 and 56.5 feet below ground surface (the terminal depth of geotechnical borings). Boring B-LGC-4 recorded approximately 30 feet of Quaternary sediments, followed by weathered or unweathered Puente Formation. Boring B-LGC-5 recorded only 1 foot of Quaternary sediments, followed by weathered or unweathered Puente Formation (Monterey Formation per Dibblee, 2001). The alluvium consists of sandy/silty clays, clayey sands, with minor gravels and contain carbonate nodules. This suggests that the lower part of this unit could be upwards of 10,000 years in age.

A number of other geotechnical borings were conducted by GeoSoils Consultants, Inc. in 2007, 2011, and 2015. These borings are depicted on the map in Appendix C, and are referred to in the report by the identifier provided on the LGC Valley map. Of these, six overlap the Proposed Development Area (**Table 2**). The borings indicate that 12 to 50 feet of Quaternary alluvium overlying the Puente Formation. The depth of alluvium does not appear to be homogenous across the site based on this data.

TABLE 2
GEOISOILS CONSULTANTS GEOTECHNICAL BORINGS

Date of Boring	Boring No.	LGC Valley Map ID No.	Type	Diameter	Depth	Soil Observations
03/22/2007	B-3-07	GCS3-07	Hollow stem	8 in	12 ft	0-12 ft: Quaternary alluvium 12 ft: Puente Formation
12/11/2011	B-4-11	GCS4-11	Hollow stem	8 in	35 ft	0-31 ft: Quaternary alluvium 31-35 ft: Puente Formation
10/02/2011	B-5-11	GSC5-11	Hollow stem	8 in	35 ft	0-30 ft: Quaternary alluvium 3-35 ft: Puente Formation
06/23/2015	B-1-15	GSC1-15	Hollow stem	8 in	55 ft	0-50 ft: Quaternary alluvium 50-55 ft: Puente Formation
06/23/2015	B-2-15	GSC2-15	Hollow stem	8 in	27 ft	0-12.5 ft: Quaternary alluvium 12.5-27 ft: Puente Formation
06/23/2015	B-3-15	GSC3-15	Hollow stem	8 in	50 ft	0-25 ft: Quaternary alluvium 25-50 ft: Puente Formation

In 1991, Pacific Soils Engineering excavated a number of test pits, four of which overlap areas where ground disturbance would occur (**Table 3**). These test pits are depicted on the map in Appendix C. The test pits indicate that the slope that will be graded (near Lot 1) is underlain by 4.5 to 6.5 feet of colluvium overlying Quaternary landslide deposits up to 13 feet in depth. The test pits also indicate that southern end of the Crooked Creek Drive extension is underlain by 9 feet of Quaternary alluvium followed by the Puente Formation.

TABLE 3
PACIFIC SOILS ENGINEERING TEST PITS

Test Pit No.	Depth	Soil Observations
T-3	10 ft	0-9 ft: Quaternary alluvium 9-10 ft: Puente Formation
T-7	11 ft	0-4.5 ft: Colluvium 4.5-11 ft: Quaternary sediments (landslide debris)
T-8	13 ft	0-6.5 ft: Colluvium 6.5-13 ft: Quaternary sediments (landslide debris)
T-9	12.5 ft	0-2 ft: Soil 2-12.5 ft: Quaternary sediments (landslide debris)

LACM Database Search

A paleontological resources database search was conducted by the Natural History Museum of Los Angeles County (LACM) on September 20, 2020. The search entailed an examination of current geologic maps and known fossil localities within the Project Site and vicinity. The purpose of the records search was to: (1) determine whether any previously recorded fossil localities occur in the Project Site or vicinity; (2) assess the potential for disturbance of these localities during construction; and (3) assist in evaluating the paleontological sensitivity of the Project Site.

The paleontological resources database search results indicate that no fossil localities exist within the Project Site, but that numerous fossil localities (LACM IP 17597-17600; LACM IP 4919, 5674, 31237 and LACM VP 6907; LACM VP 6908; and LACM VP 6170) exist nearby (approximately between 1 and 4 miles away from the Project Site) within the same sedimentary deposits (Puente Formation) that occur in the Project Site, either at surface or at depth (**Table 4**) (Bell, 2020).

TABLE 4
LACM FOSSIL LOCALITIES

Locality Number	Formation	Taxa	Depth
LACM IP 17597-17600	Puente Formation	Invertebrates	Unknown
LACM IP 4919, 5674, 31237 LACM VP 6907	Puente Formation (White diatomaceous earth interbedded with soft grey siltstone)	Invertebrates, including Goose necked barnacles (Pedunculata); Unspecified vertebrates	Unknown
LACM VP 6908	Puente Formation (White diatomaceous earth interbedded with soft grey siltstone)	Vertebrates	Surface, collected in stream bed
LACM VP 6170	Puente Formation (white diatomites)	Fish (Osteichthyes)	Unknown

Localities LACM IP 17597-17600 yielded unspecified invertebrates at an unknown depth. Localities LACM IP 4919, 5674, 31237, and LACM VP 6907 yielded numerous fish fossils, as well as a cetacean, and invertebrate fossils including Goose-necked barnacles (Pedunculata). The fossils were found in white diatomaceous earth interbedded with soft grey siltstone (Yorba Member according to Huddleston and Takeuchi, 2006). Locality LACM VP 6908 produced unspecified vertebrate fossils (in white diatomaceous earth interbedded with soft grey siltstone) at the surface of a stream bed. LACM VP 6170 yielded a fossil fish (Actinopterygii) in white diatomite at an unknown depth (Bell, 2020). The paleontological resources database search results from the LACM does not specify from which member(s) of the Puente Formation these fossil localities are from.

Literature Review

ESA conducted a literature review of published sources to determine whether paleontological resources have been identified in the particular geologic units that are mapped within the Project Site. The results of the literature review are provided below and are listed by their respective geologic unit.

Paleontology of Quaternary deposits: Paleontological literature rarely distinguishes between Quaternary alluvium, Younger Quaternary alluvium and Older Quaternary alluvium. If the organisms are older than about 10,000 radiocarbon years or if the fauna includes species known to have become extinct at the end of the Pleistocene, then the deposit or fauna is considered to belong to the Pleistocene Epoch. Neither of Jefferson's compilation of Pleistocene vertebrate localities (Jefferson, 1991a, b) list any localities near the Project Site. Nonetheless, there are many sites in the eastern Los Angeles Basin where Quaternary alluvium has produced Pleistocene vertebrate fossils. It not known at what depth the Quaternary alluvium at the Project exceeds 5,000 radiocarbon years before present (SVP age threshold).

Paleontology of the Puente Formation (Monterey Formation fide Dibblee and Ehrenspeck, 2001): The Puente Formation of Eldridge and Arnold (1907) contains three Members. Dibblee and Ehrenspeck (2001) recognizes these members, but assigns them to the Monterey Formation. Only the lowest of the three, the La Vida Member, will be impacted by the Project. The Soquel Sandstone occurs at the very highest elevation of the Project. The Yorba Member, the uppermost of the three, does not occur in the Project Site. The paleontological resources database search results (Bell, 2020) are not very useful as the localities mentioned are not from the La Vida Member. There are not many publications that focus on fossils of the La Vida Member of the Puente Formation. Stewart and Hakel (2018) identified teeth of the surgeonfish genus *Prionurus* in the La Vida Member in Bonelli Park in San Dimas. The LACM has fossils of two sharks, *Isurus hastalis* and *Isurus planus*, from Puddingstone Dam in Bonelli Park (JDS, pers. obs.). Fossils found during the construction of a housing development in the Via Verde neighborhood of San Dimas produced fossils of several types of fishes, including *Etringus* and *Ganolytes*, as well as terrestrial plants (JDS, pers. obs.). A housing development in Baldwin Park produced fossils from the La Vida Member. These include teleosts *Etringus* and *Thyrsoles*, the pecten *Delectopecten peckhami*, and the argonaut *Mizuhobaris lepta* (JDS, pers. obs.). Saul and Stadum (2005) named the argonaut species and included a specimen from the Baldwin Hills site; however, they incorrectly assigned that locality to the Yorba Member.

Paleontological Resources Survey

Methods

On October 20, 2020, ESA paleontologist J.D. Stewart, Ph.D. conducted a paleontological resources pedestrian survey of the Project Site in order to identify surface evidence of paleontological resources and to assist in assessing the potential for the Project Site to contain buried resources. Survey methodology varied by terrain. Flat and open areas with visible ground surface were subject to systematic pedestrian survey using transects spaced between 5 and 10 meters apart. Areas located along accessible slopes with visible ground surface were subject to an

opportunistic survey. Areas located on steep and heavily vegetated slopes were not surveyed due to safety hazards.

Approximately 35 percent of the Project was subject to survey (25 percent systematic survey and 10 percent opportunistic survey). The remaining 65 percent could not be surveyed due to safety hazards (slopes and heavy vegetation). Surveyed and unsurveyed areas are shown in **Figure 6**. Ground surface visibility in the areas surveyed ranged from approximately 0 to 10 percent, due to grass coverage, leaf litter, and trees.

The Project Site consists of an undeveloped parcel that is located on a steep hillside (situated on the eastern portion), which covers a large portion of the Project Site, and flat terrain to the west (encompassing approximately 2 acres). Vegetation in the Project Site is made up of nonnative grasses, coast live oak (*Quercus agrifolia*) and southern California black walnut (*Juglans californica*) woodland. A dirt road crosses the western portion of the Project Site on a north-to-south axis. The Brea Canyon Channel is located immediately adjacent to the western portion of the Project Site. Soils observed within the Project Site consist of soft sandy clay and bedrock (sandstones, siltstones, and claystones) of the Puente Formation. Much of the alluvial cover shows ongoing bioturbation by *Thomomys bottae* and *Spermophilus beecheyi*. The existing conditions of the Project Site at the time of ESA's pedestrian survey are shown on **Figure 7** and **8**. No paleontological resources were observed within the Project Site during the survey.



SOURCE: Mapbox, 2020.

Crooked Creek Residential Subdivision Project

Figure 6
Survey Coverage Map



Crooked Creek Residential Subdivision Project

SOURCE: ESA

Figure 7

Overview of southern portion of Project Site (View East)



Crooked Creek Residential Subdivision Project

SOURCE: ESA

Figure 8

Overview of northeastern portion of Project Site (View South)

Paleontological Sensitivity Analysis

The review of the scientific literature, geologic mapping, record search results from the LACM, and the pedestrian survey were used to assign paleontological sensitivity to the geologic units present at the surface and in the subsurface of the Project Site, following the guidelines of the SVP (2010) and are as follows:

- **Younger Quaternary Alluvium (Qa)** – Surficial sediments: low-to-high potential, increasing with depth. The exact depth at which the transition from low to high potential occurs is unknown in the Project Site, but depths of 5 to 10 feet are common in the region. Dibblee and Ehrenspeck (2001) indicates that there are carbonate nodules in the gravels of this unit. This would indicate that the lower part of this unit is older than 10,000 radiocarbon years.
- **Puente Formation (Monterey Formation fide Dibblee and Ehrenspeck, 2001), La Vida Member (Tmlv)** – Thin-bedded, cream-white weathering, platy, siliceous to semi-siliceous shale, includes some layers of hard, yellow-gray dolomite; and some thin strata of sandstone. The numerous sites where the La Vida Member has produced vertebrate, invertebrate, and plant fossils justify rating this unit as having high paleontological potential.

Summary and Recommendations

ESA has identified two potentially fossiliferous geologic units within the Project Site, including younger Quaternary alluvium (which is assigned low-to-high paleontological sensitivity, increasing with age and potential at depth) and La Vida Member of the Puente Formation (which is assigned a high paleontological sensitivity). Older Quaternary alluvium sediments and La Vida Member of the Puente Formation both have a history of preserving significant Pleistocene fossil resources in the eastern Los Angeles Basin. Therefore, any Project excavations in Quaternary alluvium that exceed 5 feet in depth (shallowest depth at which carbonate nodules were noted) or any excavations in the La Vida Member of the Puente Formation have the potential to encounter buried paleontological resources.

Since Project-related excavation is expected to extend to 25 feet below existing surface, ESA recommends Mitigation Measures PALEO-1 through PALEO-4. These measures include retention of a qualified paleontologist, construction worker paleontological resources sensitivity training, paleontological monitoring of excavations exceeding 5 feet in Quaternary alluvium and all excavations in the La Vida Member of the Puente Formation regardless of depth, procedures to follow in the event of the discovery of paleontological resources, salvage and curation of significant fossil discoveries, and final reporting. With implementation of these measures, impacts to paleontological resources would be less than significant under CEQA.

Recommended Mitigation Measures

Mitigation Measure PALEO-1: The Applicant shall retain a paleontologist who meets the Society of Vertebrate Paleontology's (SVP, 2010) definition for qualified profession paleontologist (Qualified Paleontologist) to carry out all mitigation related to paleontological resources. Prior to the start of ground-disturbing activities, the Qualified Paleontologist or their designee shall conduct construction worker paleontological

resources sensitivity training for all construction personnel. Construction personnel shall be informed on how to identify the types of paleontological resources that may be encountered, the proper procedures to be enacted in the event of an inadvertent discovery of paleontological resources, and safety precautions to be taken when working with paleontological monitors. The City shall ensure that construction personnel are made available for and attend the training and retain documentation demonstrating attendance.

Mitigation Measure PALEO-2: Paleontological monitoring shall be conducted during ground-disturbing activities below 5 feet in Quaternary alluvium and at all depths within the La Vida Member of the Puente Formation. Monitoring shall be conducted by a qualified paleontological monitor (SVP, 2010) working under the direct supervision of the Qualified Paleontologist. Monitoring shall consist of visually inspecting fresh exposures of rock for larger fossil remains and, where appropriate, collecting sediment samples to wet or dry screen to test promising horizons for smaller fossil remains. If the Qualified Paleontologist determines that full-time monitoring is no longer warranted, based on the specific geologic conditions at the surface or at depth, the Qualified Paleontologist may recommend that monitoring be reduced to periodic spot-checking or cease entirely.

Mitigation Measure PALEO-3: If a potential fossil is found, the paleontological monitor shall be allowed to temporarily divert or redirect grading and excavation activities in the area of the exposed fossil to facilitate evaluation of the discovery. An appropriate buffer area shall be established around the find where construction activities shall not be allowed to continue. Work shall be allowed to continue outside of the buffer area. At the monitor's discretion, and to reduce any construction delay, the grading and excavation contractor shall assist in removing rock/sediment samples for initial processing and evaluation. If a fossil is determined to be significant, the Qualified Paleontologist shall implement a paleontological salvage program to remove the resources from their location, following the guidelines of the SVP (2010). Any fossils encountered and recovered shall be prepared to the point of identification, catalogued, and curated at a public, non-profit institution with a research interest in the material and with retrievable storage, such as the Natural History Museum of Los Angeles County, if such an institution agrees to accept the fossils. If no institution accepts the fossil collection, they shall be donated to a local school in the area for educational purposes. Accompanying notes, maps, and photographs shall also be filed at the repository and/or school.

If construction personnel discover any potential fossils during construction while the paleontological monitor is not present, regardless of the depth of work or location, work at the discovery location shall cease in a 50-foot radius of the discovery until the Qualified Paleontologist has assessed the discovery and recommended and implemented appropriate treatment as described earlier in this measure.

Mitigation Measure PALEO-4: At the conclusion of paleontological monitoring and prior to the release of the grading bond, the Qualified Paleontologist shall prepare a report summarizing the results of the monitoring and salvage efforts, the methodology used in these efforts, as well as a description of the fossils collected and their significance. The report shall be submitted by the Applicant to the City, the Natural History Museum of Los Angeles County, and representatives of other appropriate or concerned agencies to signify the satisfactory completion of the project and required mitigation measures.

References

- Bell, Alyssa. 2020. Paleontological resources for the Crooked Creek Project. Prepared by the Natural History Museum of Los Angeles County.
- City of Diamond Bar. 2013. Draft Environmental Impact Report, General Plan and Zoning Amendment No. PL2013-227.
- Dibblee, T. H., Jr., and H. E. Ehrenspeck. 2001. Geologic map of the Yorba Linda and Prado Dam quadrangles (eastern Puente Hills), Los Angeles, Orange, San Bernardino and Riverside counties, California. Dibblee Geological Foundation Map DF-75. Scale 1:24,000.
- Eldridge, G. H., and Arnold, Ralph, The Puente Hills oil district, southern California: U. S. Geol. Survey Bull. 309, p. 103, 1907.
- Haq, B. U., J. Hardenbol, and P. R. Vail. 1987. Chronology of Fluctuating Sea Levels Since the Triassic. *Science* 235:1156-1167.
- Huddleston, R. W., and G. T. Takeuchi. 2006. A New late Miocene Species of Sciaenid Fish, Based Primarily on an *in situ* Otolith from California. *Bulletin of the Southern California Academy of Sciences* 105:20-42.
- Jahns, R. H. 1954. Geology of the peninsular Range Province, Southern California and Baja California. p. 29-53 in: Jahns, R. H. (ed.) *Geology of Southern California*. California Division of Mines Bulletin 170.
- Jefferson, G.T. 1991a. A catalogue of Late Quaternary Vertebrates from California: Part One, nonmarine lower vertebrate and avian taxa. Natural History Museum of Los Angeles County Technical Reports No. 5.
- Jefferson, G.T. 1991b. A catalogue of Late Quaternary Vertebrates from California: Part Two, Mammals. Natural History Museum of Los Angeles County Technical Reports No. 7.
- LGC Valley, Inc. 2020. Geotechnical Report, Tract 54081, City of Diamond Bar, California. Prepared for: Newbridge Homes, 500 Newport Center Drive, Suite 570, Newport Beach, California 92868. Prepared by: LGC Valley, Inc., 28532 Constellation Road, Valencia, CA 9155.
- McCulloh, T. H., R. J. Fleck, R. E. Denison, L. A. Beyer, and R. G. Stanley. Age and tectonic Significance of Volcanic Rocks in the Northern Los Angeles Basin, California. U.S. Geological Survey Professional Paper 1669:1-24.
- Murphey, P. C., and D. Daitch. 2007. Paleontological overview of oil shale and tar sands areas in Colorado, Utah and Wyoming. Scale 1:500,000. U.S. Department of Energy, Argonne National Laboratory. Report prepared for the U.S. Department of Interior Bureau of Land Management.
- Scott, E. and Springer, K. 2003. CEQA and fossil preservation in southern California. *The Environmental Monitor* 2003: 4-10.

- Scott, E., K. Springer, and J. C. Sagebiel. 2004. Vertebrate paleontology in the Mojave Desert: the continuing importance of “follow-through” in preserving paleontologic resources. In *The human journey and ancient life in California’s deserts: Proceedings from the 2001 Millennium Conference*. Ridgecrest: Maturango Museum Publication 15: 65-70.
- Society of Vertebrate Paleontology (SVP). 1995. Assessment and mitigation of adverse impacts to nonrenewable paleontologic resources: standard guidelines. *Society of Vertebrate Paleontology News Bulletin* 163:22-27.
- . 2010. Standard procedures for the assessment and mitigation of adverse impacts to paleontological resources. Electronic document. http://vertpaleo.org/The-Society/Governance-Documents/SVP_Impact_Mitigation_Guidelines.aspx, accessed 2020.
- Stewart, J. D., and M. E. Hakel. 2018. Surgeon fish fossils as paleoclimatic indicators in California Neogene sediments. *Paleobios* 35 Supplement: 15-16.
- Schoellhamer, J.E; Vedder, J.G; and R.F. Yerkes. 1954. Geology of the Los Angeles Basin – an Introduction. U.S. Geological Survey Professional Paper 420-A.
- Yerkes, R.F., T. H. McCulloh, J. E. Schoellhamer, and J. G. Vedder. 1965. Geology of the Los Angeles basin, California—An Introduction: U.S. Geological Survey Professional Paper 420-A, 57 p.
- Zachos, J., M. Pagani, L. Sloan, E. Thomas, and K. Billups. 2001. Trends, rhythms, and aberrations in global climate 65 Ma to present. *Science* 292:686–693.

Appendix A

Personnel



Monica Strauss, RPA

Director, Southern California Cultural Resources Group

EDUCATION

M.A., Archaeology,
California State
University, Northridge

B.A., Anthropology,
California State
University, Northridge

AA, Humanities, Los
Angeles Pierce College

19 YEARS EXPERIENCE

SPECIALIZED EXPERIENCE

Treatment of Historic
and Prehistoric Human
Remains

Archaeological
Monitoring

Complex Shell Midden
Sites

Groundstone Analysis

PROFESSIONAL AFFILIATIONS

Register of Professional
Archaeologists (RPA),
#12805

Society for California
Archaeology (SCA)

Society for American
Archaeology (SAA)

QUALIFICATIONS

Exceeds Secretary of
Interior Standards

CA State BLM Permitted

Monica has successfully completed dozens of cultural resources projects throughout California and the greater southwest, where she assists clients in navigating cultural resources compliance issues in the context of CEQA, NEPA, and Section 106. Monica has extensive experience with archaeological resources, historic buildings and infrastructure, landscapes, and Tribal resources, including Traditional Cultural Properties. Monica manages a staff of cultural resources specialists throughout the region who conduct Phase 1 archaeological/paleontological and historic architectural surveys, construction monitoring, Native American consultation, archaeological testing and treatment, historic resource significance evaluations, and large-scale data recovery programs. She maintains excellent relationships with agency staff and Tribal representatives. Additionally, Monica manages a general compliance monitoring team who support clients and agencies in ensuring the daily in-field compliance of overall project mitigation measures.

Relevant Experience

County of Los Angeles, Department of Public Works, Rancho Los Amigos South Campus EIR, Downey. CA. *Project Manager.* The County of Los Angeles (County) proposes redevelopment of a portion of the Rancho Los Amigos (RLA) South Campus which is located in the City of Downey. The 74-acre RLA South Campus was the home of the “Los Angeles County Poor Farm” that was established in 1880s to provide room and board to indigent citizens in exchange for agricultural labor, then served as an infirmary and later evolved into a hospital facility in 1932. The RLA South Campus functioned as a major hospital complex from 1956 to the 1990s, when it was abandoned. The RLA South Campus is currently unoccupied and has been designated as the RLA Historic District in the National Register of Historic Places. The County is proposing redevelopment of a 21-acre portion of the RLA South Campus with County uses, including a Sheriff’s Station Crime Laboratory, Internal Services Department Headquarters, and Probation Department Headquarters. The project will include supporting parking and installation of utilities and other features on a site that has been abandoned for nearly 30 years. Building demolition and/or repurposing or relocation of existing buildings will be required. ESA is leading the CEQA process on behalf of the County, including preparation of all technical studies in support of a full-scope EIR for the RLA South Campus Project. This includes a Historic District Evaluation, archaeological surveys, traffic, water supply, arborist services, and all other CEQA-required topics. ESA is also serving in an Executive Consultant role to the County, to advise on other potential future projects at the RLA Campus.

County of Los Angeles, Department of Public Works, Arroyo Seco Bike Path Phase I Cultural Resources Evaluation, Los Angeles, CA. *Project Director.* Working for the County of Los Angeles, Department of Public Works in connection with a project to make improvements to the Arroyo Seco Channel, Monica

managed all aspects of Section 106 review in accordance with Caltrans Cultural Resources Environmental guidelines. Monica and her team evaluated the Arroyo Seco Channel, identified character-defining features, informed the design of channel improvements to retain such features, and addressed the channels' potential for eligibility as part of a larger Los Angeles County water management district. She developed the research strategy, directed the field teams, and prepared cultural resources assessment documentation for approval by Caltrans and FHWA, as well as the cultural resources section for a Mitigated Negative Declaration.

Los Angeles Department of Water and Power La Kretz Innovation Campus, Los Angeles County, CA. *Project Director.* The project involved the rehabilitation of the 61,000-square-foot building located at 518-524 Colyton Street, demolition of the building located at 537-551 Hewitt Street, and construction of an open space public plaza and surface parking lot, and involved compliance with Section 106 of the National Historic Preservation Act and consultation with the California State Historic Preservation Officer. ESA is providing archaeological monitoring and data recovery services and is assisting LADWP with meeting their requirements for Section 106 of the National Historic Preservation Act. Monica is providing oversight to archaeological monitors and crew conducting resource data recovery and laboratory analysis, and is providing guidance to LADWP on meeting Section 106 requirements.

Los Angeles Unified School District (LAUSD) Florence Nightingale Middle School Historic Architectural Review, Los Angeles County, CA. *Cultural Resources Project Director.* Monica managed the historical analysis of the LAUSD Florence Nightingale Middle School. The analysis included a cultural resources survey that photo-documented buildings that would be affected by the project. The project includes HVAC replacement to a 1967 Classroom Buildings, kitchen upgrades within the 1937 Domestic Science/Cafeteria Building, and improvements to the 1965 chiller yard. Florence Nightingale Middle School was previously recommended eligible for listing in the California Register.

Viewpoint School, Tennis Courts and Park, Calabasas, CA. *Cultural Resources Project Director.* ESA is working with the City of Calabasas to prepare an IS/MND to support the development of the proposed Viewpoint School Tennis Courts and Parking Lots project, which includes the development of three sites (Peters, Brown, and Castle Oak) that would become part of the school campus property. Improvements entail installation of six tennis courts (including an accessory building), additional campus parking in three areas, and the renovation of two existing residential structures, one to accommodate offices for school administration and the second to provide a primary residence to the school principal. The project would remove the Peter's property building and appurtenant structures, redevelop the interior of the Castle Oaks property to accommodate the administrative offices, and update the Brown residence to accommodate the principal's primary residence. ESA is preparing three technical studies to support the IS/MND, including air quality, cultural resources, greenhouse gas emissions, and noise. ESA peer reviewed the biological resource reports and traffic study that were prepared to support the document. Monica provided technical and compliance oversight to the cultural resources staff.



Candace R. Ehringer, RPA

Cultural Resources Program Manager

EDUCATION

MA, Anthropology,
California State
University, Northridge

BA, Anthropology, East
Carolina University

22 YEARS OF EXPERIENCE

AREAS OF EXCELLENCE

CEQA, NEPA, Section
106, and AB 52
proficient

Manages multi-
disciplinary CRM
projects

Strong historic
resources research skills

QUALIFICATIONS

Register of Professional
Archaeologists, No.
15146

Meets Caltrans PQS for
Co-Principal
Investigator

Meets Secretary of the
Interior's PQS for
Archaeology and
History

Orange County Certified
Archaeologist

CA State BLM
Permitted

HAZWOPER Certified

Candace is a cultural resources project manager with 22 years of experience in California. She provides technical and compliance oversight for archaeological survey, evaluation, and treatment; built environment studies, including the documentation and evaluation of buildings, structures, and districts; Tribal resources consultations; and paleontological resources survey and sensitivity assessments. Candace also has experience working with agencies and Tribes to identify Traditional Cultural Properties and tribal cultural resources. She is skilled in the evaluation, analysis of effects, and development of measures to avoid, minimize, or mitigate adverse effects for tribal, archaeological, historic, and paleontological resources under Section 106 and CEQA.

Candace manages multi-disciplinary cultural resources projects and is adept at building teams of specialists that are uniquely qualified for the project at hand. Her project work includes experience in every county in Southern California, as well as many in the Central Coast, Central Valley, and Northern California regions. She is proficient in the areas of CEQA, NEPA, Section 106, and AB 52 compliance, and routinely provides planning and strategic guidance to clients on complex projects within the larger scope of state and federal regulations.

Relevant Experience

California Department of Water Resources, Cantua Creek Stream Group Improvements Project, Fresno County, CA. *Project Manager.* Candace managed the preparation of a Cultural Resource Inventory and Evaluation Report, Finding of Effect, and Paleontological Resources Report in compliance with Section 106 of the National Historic Preservation Act and CEQA. The California Department of Water Resources (DWR) proposes to implement the Cantua Creek Stream Group (CCSG) Improvements Project (Project). The CCSG is composed of five major creeks: Arroyo Hondo, Cantua, Salt, Martinez, and Domengine. The CCSG drains a portion of the Coast Range, located west of the Project area. Presently, floodwaters from the CCSG terminate at four locations (Basins 1-4) along an approximately 13-mile stretch of the San Luis Canal; Martinez Creek flows into Salt Creek about 3 miles upstream of the San Luis Canal.

Irvine Ranch Water District (IRWD), Syphon Reservoir Geotechnical Investigations MND, Orange County, CA. *Cultural Resources Manager.* Candace managed paleontological and archaeological monitoring of geotechnical work in compliance with the project's mitigation measures. IRWD is conducting geotechnical investigations to support potential future enlargement of the existing Syphon Reservoir. Additionally, geotechnical explorations would verify the characteristics of the Center Valley Fault, which previously has been documented as inactive. The project has used exploratory test pits, borings, and geophysical surveys to characterize the subsurface conditions of the soil and bedrock at each exploration location.

Irvine Ranch Water District (IRWD), Tustin Wells MND/EA, Orange County, CA. *Cultural Resources Project Manager.* Candace conducted a Phase I cultural resources study for the Tustin Wells Project. She led the cultural resources survey and authored a technical report. The project will recover and treat impaired groundwater to augment local water supplies and increase water supply reliability.

Eastern Municipal Water District Local Groundwater Banking Project, San Jacinto, CA. *Project Director.* Candace directed the cultural resources component of the project, including historic, archaeological, and paleontological resources studies. ESA prepared an EIR for the proposed project, which would develop a water bank with storage capacity up to 128,000 acre feet. ESA is currently providing cultural resources monitoring during project construction.

Los Angeles Department of Water and Power (LADWP), East Hollywood District Yard Demolition, Los Angeles, CA. *Cultural Resources Project Director.* Candace directed the preparation of historic, archaeological, and paleontological studies and provided senior review of all deliverables. The project includes re-development of LADWP's East Hollywood District Yard. The results of the analyses were incorporated into the IS/MND.

Corona-Keith 1220 Zone Potable Water Tank City of Corona, Keith 1220-Zone Potable Water Tank MND, City of Corona, CA. *Cultural Resources Project Manager.* Candace managed the preparation of cultural resources and paleontological resources assessments, which included archival research, survey, and preparation of technical reports. The project includes the construction of a tank on approximately 0.9 acre owned by the City of Corona on the southeast corner of the intersection of Nelson Street and Keith Street. The project also included proposed utility lines (potable water, reclaimed water and drainage lines) that would extend from the proposed tank site along Nelson Street to Courtney Lane, east along Courtney Lane and north within Howe Street to Duncan Way.

County of Los Angeles Department of Public Works (County), Rancho Los Amigos South Campus EIR, Downey, CA. *Cultural Resources Project Manager.* Candace managed cultural resources studies in support of the EIR, including re-evaluation of the historic district, archaeological and paleontological assessments, and assistance with AB 52 consultation. The County proposes redevelopment of a portion of the Rancho Los Amigos (RLA) South Campus which is located in the City of Downey. The 74-acre RLA South Campus was the home of the "Los Angeles County Poor Farm" that was established in 1880s to provide room and board to indigent citizens in exchange for agricultural labor, then served as an infirmary and later evolved into a hospital facility in 1932. The RLA South Campus functioned as a major hospital complex from 1956 to the 1990s, when it was abandoned. The RLA South Campus is currently unoccupied and houses a National Register-eligible historic district. The County is proposing redevelopment of a 21-acre portion of the RLA South Campus with County uses, including a Sheriff's Station Crime Laboratory, Internal Services Department Headquarters, and Probation Department Headquarters. The project will include supporting parking and installation of utilities and other features on a site that has been abandoned for nearly 30 years. Building demolition and/or repurposing or relocation of existing buildings will be required.



Joseph D. Stewart, PhD

Qualified Paleontologist

EDUCATION

Ph.D., Systematics & Ecology, University of Kansas

M.A., Systematics and Ecology, University of Kansas

B.A. Degree, Biology, University of Kansas

40 YEARS EXPERIENCE

QUALIFICATIONS

Meets Society of Vertebrate Paleontology definition of qualified professional paleontologist

Orange County Certified Paleontologist

SPECIALIZED SKILLS

Identification of fossil fish and Pleistocene microvertebrate fauna

PROFESSIONAL AFFILIATIONS

Society of Vertebrate Paleontology

Research Associate, Natural History Museum of Los Angeles County

Joseph D. Stewart has more than 40 years of experience in the field of paleontology, with 30 years of experience in California. He has authored or co-authored 40 peer-reviewed articles for scientific journals and books. Within these, he has authored or co-authored descriptions of three new genera and three new species. He is a recognized authority on fossil fishes of Cretaceous rocks of North America and Cenozoic rocks of the western coast of North America. As a result, Dr. Stewart is often called upon to identify paleontological and archaeological specimens. He has served as expert witness for the U.S. Department of Justice.

Dr. Stewart has extensive experience finding and excavating fossils for county, state, and provincial institutions. His field work includes projects in cooperation with the U.S. Bureau of Land Management, National Parks Service, U.S. Army Corps of Engineers, U.S. Navy, U. S. Department of Energy, Federal Aviation Administration, California Energy Commission, Caltrans, and California State Parks. The Bureau of Land Management's national website features one of his excavations from 2004. He has supervised monitoring of construction activity in numerous California counties and municipalities. In addition to fieldwork, he has experience in the supervision of preparators, surveyors, curatorial assistants, and excavators. He also has extensive experience preparing fossils, and has processed, recovered, and identified thousands of microvertebrate fossils.

Relevant Experience

Crestavilla Retirement and Assisted Living Community Project, Laguna Niguel, CA. *Principal Paleontologist.* Dr. Stewart supervised paleontological monitoring during the construction of a new 224-unit retirement and assisted living facility and an approximately 1,870 square-foot Spiritual Resource Center (Shepherd of the Hills Church) within a four-story structure located over a one-level subterranean parking structure. The monitoring led to the identification of a remarkable collection of vertebrate fossils, including the first record of a gulper shark (*Centrophorus*) from any Neogene sediments of coastal California and the first reported specimens of the cookie-cutter shark (*Isistius*) from the Capistrano Formation. Additionally, the project yielded the most complete fossil tuna ever found in California and it probably represents a species new to science.

Palos Verdes Peninsula Water Reliability Project, Palos Verdes Peninsula, CA. *Principal Paleontologist.* Dr. Stewart supervised paleontological monitoring during construction of new potable water pipelines and a new booster pump station to replace the current water distribution system serving the Palos Verdes Peninsula. The monitoring led to the identification and salvage of numerous fossils from Altamira Shale deposits of the Monterey Formation, including fossils of leaf imprints, sardine scales, fish parts (vertebrae, dentary, mandible) and the fossil appendage (dactyl) of a type of Mantis shrimp (Stomatopod). The Mantis

shrimp specimen is believed to be the only second known occurrence in southern California of *Angelosquilla altamierensis*, and the only one with a known precise locality and provenience.

Syphon Reservoir Improvement Project, Orange County, CA. *Principal Paleontologist.* Dr. Stewart supervised paleontological monitoring during geotechnical explorations (including borings, exploratory test pits, and abutment/seismic trenches) at the Syphon Reservoir, as the project is located within geologic formations (Silverado and Sespe/Vaqueros) that have a high paleontological potential for yielding paleontological resources. Sediment sampling was conducted to identify the presence/absence of microvertebrate fossils.

Oaks at Monte Nido, Santa Monica Mountains, Unincorporated Los Angeles County, CA. *Principal Paleontologist.* Dr. Stewart was in charge of the preparation of the Paleontological Resources Assessment Report, which included a pedestrian survey. The pedestrian survey yielded the identification of a sandstone boulder that contains a fossil impression of the skull of a small-toothed cetacean “dolphin” and the identification of fossilized shells of pelecypods (e.g., bivalves such as clams, mussels, oysters, and cockles) and gastropods (e.g., snails and slugs). The project proposes the development of 15 single-family residences on separate individual recorded parcels within the Monte Nido Community, along the scenic route of Piuma Road.

Path 15 500 kV Power Transmission Line Between Los Banos and Gates substations, Merced and Fresno Counties, CA. *Principal Paleontologist.* Dr. Stewart supervised paleontological monitoring during construction of an 80-mile, high-voltage transmission line in the San Joaquin Valley. Dr. Stewart’s team located an extensive bonebed in Middle Miocene sediments, dating back approximately 15 million years. Dr. Stewart and his team excavated and prepared over 1,200 vertebrate fossils, deposited them at the University of California Museum of Paleontology, and preserved the site for future research. They also discovered a smaller bonebed of late Miocene age (ca. 7 million years). As a result of his diligent analysis, the project schedule was maintained and there were no delays in construction.

Heritage Fields/Great Park Paleontological Review, Orange County, CA. *Principal Paleontologist.* Dr. Stewart conducted Phase I and II paleontological assessments at the Heritage Fields / Great Park in Orange County, California where he and his team discovered significant portions of a Miocene-aged (15 million years ago) whale fossil, and a Pleistocene microvertebrate fauna dating to before 28,000 years ago.

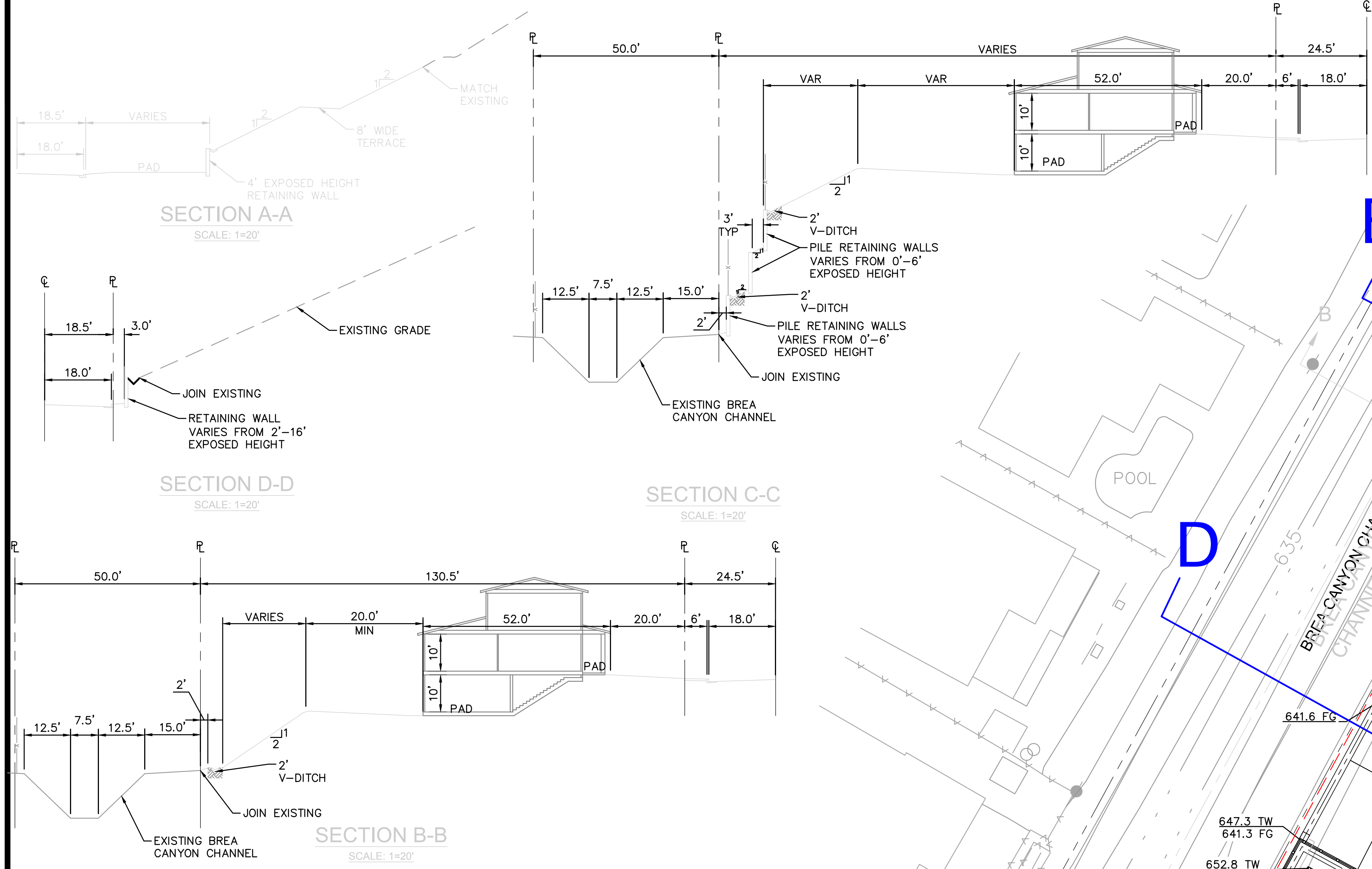
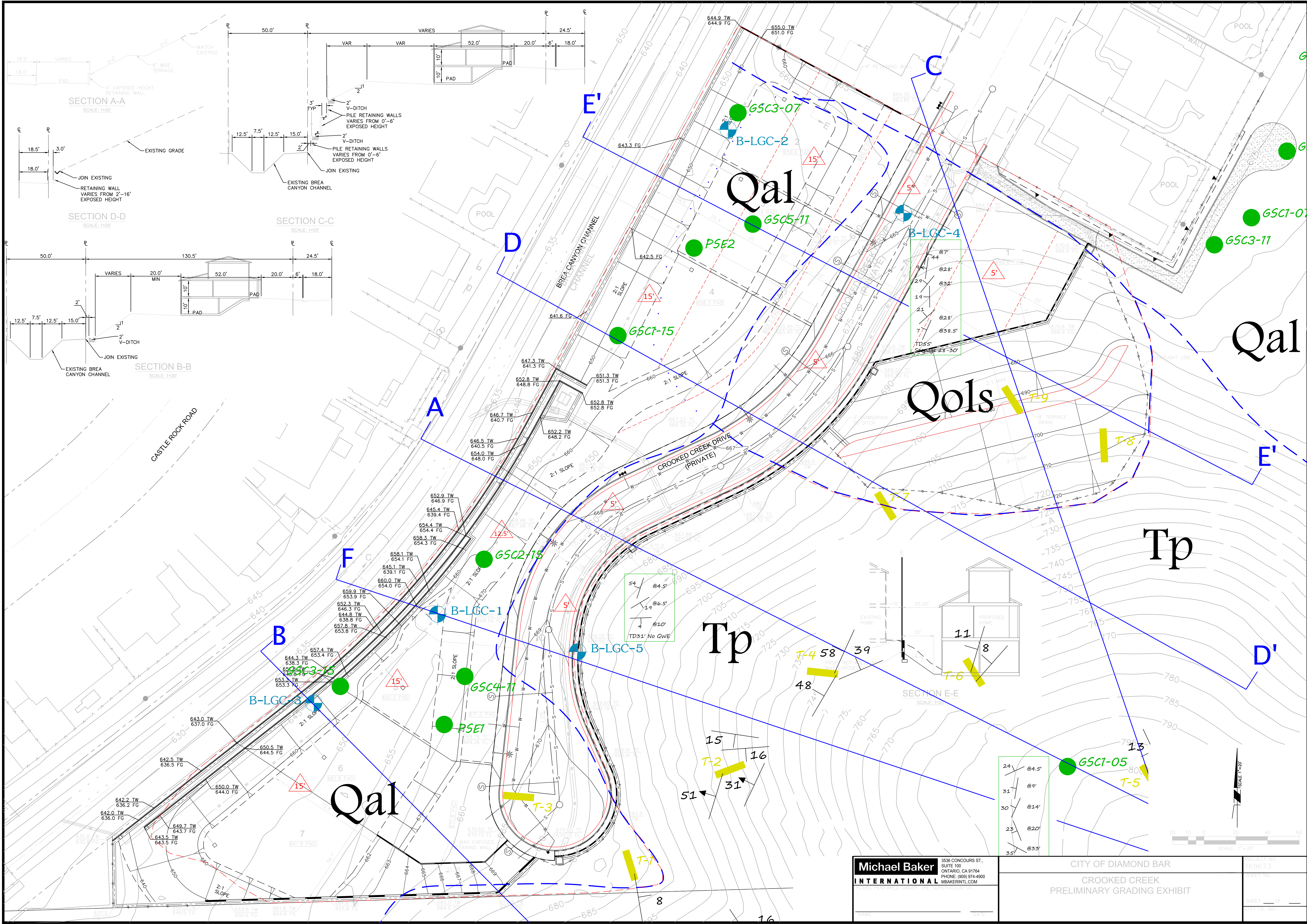
Calnev Pipeline Project, San Bernardino County, CA, and Clark County, NV. *Principal Paleontologist.* Dr. Stewart directed paleontological survey of a 234-mile-long project area in San Bernardino County, California and Clark County, Nevada and wrote the paleontological assessment.

Appendix B

LACM Database Search (Confidential)

Appendix C

Map of Geotechnical Investigations



Michael Baker INTERNATIONAL
3536 CONOURS ST., SUITE 100
ONTARIO, CA 91764
PHONE: (909) 974-4900
MBAKERINTL.COM

PLANS PREPARED UNDER THE SUPERVISION OF:
NAME: _____ DATE: _____

CITY OF DIAMOND BAR CROOKED CREEK PRELIMINARY GRADING EXHIBIT		PROJECT NO. 60673
SHEET NO. _____ OF _____		DATE: _____