

Appendix I
Paleontological Technical Study

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**PALEONTOLOGICAL TECHNICAL STUDY:
SAN DIEGO GAS AND ELECTRIC COMPANY TL674A
RECONFIGURATION & TL666D REMOVAL PROJECT, SAN
DIEGO COUNTY, CALIFORNIA**

Non-Confidential Document

Prepared for:

AECOM

401 West A Street, Suite 1200
San Diego, CA 92101

CC:

SAN DIEGO GAS & ELECTRIC

Prepared by:

PALEO SOLUTIONS, INC.

911 S. Primrose Ave., Unit N
Monrovia, CA 91016
Geraldine@paleosolutions.com
(562) 818-7713

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

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Table of Contents

1.0	EXECUTIVE SUMMARY	6
2.0	INTRODUCTION.....	8
2.1	Project Description.....	8
3.0	DEFINITION AND SIGNIFICANCE OF PALEONTOLOGICAL RESOURCES	15
4.0	LAWS, ORDINANCES, REGULATIONS AND STANDARDS	16
4.1	State Regulatory Setting	16
4.1.1	California Environmental Quality Act (CEQA).....	16
4.1.2	State of California Public Resources Code	16
4.1.3	San Diego County	17
4.2	Permits.....	17
5.0	METHODS.....	17
6.0	GEOLOGY AND PALEONTOLOGY	18
6.1	Mapped Geology.....	18
6.1.1	Artificial Fill (af).....	18
6.1.2	Quaternary Younger Deposits (Qya, Qpe, Qmb, Qw)	18
6.1.3	Landslide Deposits (Qls).....	18
6.1.4	Old Paralic Deposits (Qop2, Qop3, Qop4, Qop5, Qop6).....	18
6.1.5	Very Old Paralic Deposits (Qvop6, Qvop9, Qvop10, Qvop10a, Qvop11, Qvop12).....	19
6.1.6	Scripps Formation (Tsc).....	19
6.1.7	Ardath Shale (Ta).....	19
6.1.8	Delmar Formation (Td).....	19
6.1.9	Torrey Sandstone (Tt)	19
6.2	Paleontological Records Search Results	20
7.0	RECONNAISSANCE SURVEY RESULTS	35
7.1	Geology.....	35
7.2	Paleontology	36
8.0	RESOURCE ASSESSMENT	54
8.1	San Diego County Paleontological Resources Guidelines.....	54
8.2	Sensitivity of Geological Units.....	55
9.0	IMPACTS TO PALEONTOLOGICAL RESOURCES.....	56
10.0	RECOMMENDATIONS.....	56
	REFERENCES.....	57
	APPENDIX A	59
	APPENDIX B	64
	APPENDIX C	70

Figures

Figure 1.	Proposed Project Location Map.....	13
Figure 2.	Proposed Project Overview Map.	14
Figure 3a.	Proposed Project Geology Map.	22
Figure 3b.	Proposed Project Geology Map.	23
Figure 3c.	Proposed Project Geology Map.	24
Figure 3d.	Proposed Project Geology Map.	25
Figure 3e.	Proposed Project Geology Map.	26
Figure 3f.	Proposed Project Geology Map.	27
Figure 3g.	Proposed Project Geology Map.	28
Figure 3h.	Proposed Project Geology Map.	29
Figure 3i.	Proposed Project Geology Map.	30

Figure 3j. Proposed Project Geology Map.....	31
Figure 3k. Proposed Project Geology Map.....	32
Figure 3l. Proposed Project Geology Map.....	33
Figure 3m. Proposed Project Geology Map.....	34
Figure 4. Moderate relief hills with scarce to moderate sediment exposures. Mapped as Delmar Formation (Td). View Southwest.....	37
Figure 5. Moderate relief hills with scarce to moderate sediment exposures. Mapped as Delmar Formation (Td) and old paralic deposits (Qop6). View west.....	37
Figure 6. Sediment exposure consisting of silt and fine-grained sand. Mapped as Delmar Formation (Td). View south.....	38
Figure 7. View of alignment showing exposed sediments in road-cut and disturbed and developed flat low-lying area. Mapped as Delmar Formation (Td). View west.....	38
Figure 8. Sediment outcrop consisting of silt and fine-grained sand and displaying erosional dissection scars. Mapped as Delmar Formation (Td). View north.....	39
Figure 9. Road-cut displaying exposed sediments consisting of silt and fine-grained sand. Mapped as Delmar Formation (Td). View north.....	39
Figure 10. Outcrop of well-lithified sandstone among less-resistant and softer silt and sand sediments. Mapped as Delmar Formation (Td). View west.....	40
Figure 11. Outcrop of well-lithified fine- to medium-grained sandstone. Mapped as Torrey Sandstone (Tt). View northwest.....	40
Figure 12. Younger alluvial deposits (Qya) exposed in drainage adjacent to Torrey Sandstone (Tt). View east.....	41
Figure 13. Flat low-lying broad valley areas comprise younger alluvial deposits (Qya). View southwest.....	41
Figure 14. Coastal bluffs comprising moderately sorted sandstone. Mapped as very old paralic deposits (Qvop10) and Torrey Sandstone (Tt). View northwest.....	42
Figure 15. Coastal bluffs comprising moderately sorted sandstone (Qvop10). Mapped as very old paralic deposits (Qvop10) and Torrey Sandstone (Tt). View north.....	42
Figure 16. Erosional dissected sediment outcrops of very old paralic deposits (Qvop10). View northwest.....	43
Figure 17. Erosional dissected sediment outcrops of very old paralic deposits (Qvop10). View northwest.....	43
Figure 18. Small pebble-size rounded sandstone concretions within moderately sorted sandstone. Mapped as very old paralic deposits (Qvop10). View northwest.....	44
Figure 19. Small pebble-size rounded sandstone concretions within moderately sorted sandstone. Mapped as very old paralic deposits (Qvop10). View northwest.....	44
Figure 20. Small pebble-size rounded sandstone concretions, weathered out from very old paralic deposits (Qvop10). View down.....	45
Figure 21. Eroding coastal bluffs consisting of moderately sorted sandstone. Mapped as very old paralic deposits (Qvop10) and Torrey Sandstone (Tt). View south.....	45
Figure 22. Flat low-lying lagoon area. Mapped as water and young estuarine deposit (Qpe). View northeast.....	46
Figure 23. Disturbed and developed hills and adjacent developed flat low-lying areas. Mapped as Torrey Sandstone (Tt), old paralic deposits (Qop6), and young alluvial deposits (Qpe). View northwest.....	46
Figure 24. Disturbed sediments on slope adjacent to school. Mapped as very old paralic deposits (Qvop10) overlying Torrey Sandstone (Tt). View west.....	47
Figure 25. Clasts of moderately consolidated silt and sand. Mapped as very old paralic deposits (Qvop10). View down.....	47
Figure 26. Sediment outcrop of sandstone with dense vegetation cover. Mapped as Torrey Sandstone (Tt). View north.....	48

Figure 27. Overview of valley area with adjacent bluffs. Bluff area is mapped as very old paralic deposits (Qvop10) overlying Torrey Sandstone (Tt). Valley area comprises mostly young alluvial deposits (Qya). White sediments of Torrey Sandstone (Tt) are eroding out.	48
Figure 28. Coarse cobble-size rounded conglomerate deposit interbedded with finer silt and sandstone sediments. Mapped as old paralic deposits (Qop6) overlying Torrey Sandstone (Tt) overlying Delmar Formation (Td). View northeast.	49
Figure 29. Coarse cobble-size rounded conglomerate deposit interbedded with finer silt and sandstone sediments. Mapped as old paralic deposits (Qop6) overlying Torrey Sandstone (Tt) overlying Delmar Formation (Td). View northeast.	49
Figure 30. Pebble- to cobble-size rounded clasts eroding out of conglomerate deposit. Mapped as old paralic deposits (Qop6) overlying Torrey Sandstone (Tt) overlying Delmar Formation (Td). View down.	50
Figure 31. Sediment outcrop consisting of massive to laminar bedded silt and sandstone. More resistant sandstone beds outcrop more than the surrounding softer material. Mapped as Torrey Sandstone (Tt) overlying Delmar Formation (Td). View northeast.	50
Figure 32. Disturbed and developed area. Mapped as Torrey Sandstone (Tt – hills) and young alluvial deposits (Qya – flat area). View southeast.	51
Figure 33. Sample of well-lithified, fine- to medium-grained sandstone. Mapped as Torrey Sandstone (Tt). View down.	51
Figure 34. Fossilized invertebrate shells, fragments, and molds discovered in sandstone clasts at F161026-16-01. Mapped as Delmar Formation (Td). View down.	52
Figure 35. Fossilized invertebrate shells, fragments, and molds discovered in sandstone clasts and loose slope sediments at F161026-16-01. Mapped as Delmar Formation (Td). View down.	52
Figure 36. Fossilized invertebrate shells discovered in slope sediments. Mapped as Delmar Formation (Td). View down.	53
Figure 37. Fossilized invertebrate shell fragment discovered in slope sediments. Mapped as Delmar Formation (Td). View down.	53
Figure 38. Fossilized invertebrate shell fragments with intact hinge. Mapped as Delmar Formation (Td). View down.	54

Tables

TABLE 1. SDG&E TL674A RECONFIGURATION & TL666D REMOVAL PROJECT SUMMARY	10
TABLE 2. SURVEY FOSSIL LOCALITY SUMMARY	36

1.0 EXECUTIVE SUMMARY

This report presents the results of the paleontological technical study conducted by Paleo Solutions, Inc. (Paleo Solutions), under contract to AECOM in support of the San Diego Gas and Electric (SDG&E) TL674A Reconfiguration and TL666D Removal Project (Proposed Project). This work was required by the California Public Utilities Commission (CPUC) to meet their requirements as the lead agency under the California Environmental Quality Act (CEQA). All paleontological work was completed in compliance with CEQA and San Diego County guidelines. The Proposed Project area is located in the west central portion of San Diego County, California, in the cities of San Diego and Del Mar. The Proposed Project extends from the north side of San Dieguito Valley to Soledad Valley along Interstate-5 (I-5), to north of the I-5/Interstate-805 (I-805) junction (see Figures 1 and 2).

The paleontological study for the Proposed Project included a geologic map review, literature search, institutional records search, reconnaissance survey, and analysis of the paleontological potential of geologic units within the Proposed Project area. Geologic mapping of the Proposed Project indicates that the site is primarily underlain by Eocene-, Pleistocene- and Holocene-age deposits (Kennedy and Tan, 2008). The units mapped within the Proposed Project area include Holocene-age artificial fill, young alluvial floodplain deposits, paralic estuarine deposits, wash deposits, marine beach deposits; Pleistocene-age old and very old paralic deposits; and Eocene-age Ardath Shale, Delmar Formation, Torrey Sandstone, Scripps Formation, and undivided Eocene deposits. According to the records search, there are 215 fossil localities recorded within a one-mile radius of the Proposed Project. Fossils recorded from Eocene-age deposits include trace fossils, plant impressions, marine invertebrates, and marine and freshwater vertebrates from the Delmar Formation; trace fossils, plant impressions, marine and terrestrial invertebrates, and marine and terrestrial vertebrates from the Torrey Sandstone; trace fossils, plant impressions, marine invertebrates, and marine vertebrates from the Ardath Shale; and trace fossils, plant impressions, and marine invertebrates from the Scripps Formation. Additionally, Pleistocene deposits from the Baypoint Formation, mapped as old paralic deposits by Kennedy and Tan (2008), produced trace fossils, marine and terrestrial invertebrates, and marine and terrestrial vertebrates. Pleistocene-age deposits from the Lindavista Formation, mapped as very old paralic deposits by Kennedy and Tan (2008), produced trace fossils. The remaining localities yielded by the records search are from Eocene-age Friar Formation, which is not mapped in the Proposed Project area. Several fossil localities were recorded during the reconnaissance survey, and they include fossilized invertebrate shells and molds. All fossils documented during the survey were all discovered within sediments mapped as Delmar Formation.

Due to the prevalence of geologic units with high paleontological potential within the Proposed Project area, implementation of measures to reduce the potential adverse impacts resulting from construction-related ground disturbance is recommended. Prior to the start of construction, a paleontological resources monitoring plan should be prepared and implemented by a qualified paleontologist. That plan should include specific locations and construction activities requiring monitoring, procedures to follow for monitoring and fossil discovery, and a curation agreement with the San Diego Natural History Museum. Monitoring is recommended for all ground-disturbing activities, except for augering of less than three-foot diameter holes, within native sediments of the Eocene-age Ardath Shale, Delmar Formation, Torrey Sandstone, Scripps

Formation, undivided Eocene deposits, and Pleistocene-age old and very old paralic deposits. Full-time monitoring (i.e., monitoring of all ground disturbance) is not recommended for excavations into young alluvial floodplain deposits, paralic estuarine deposits, and marine beach deposits, since these units are considered too young to contain in-situ significant paleontological resources. However, excavations impacting depths greater than five feet into these sediments should be periodically spot-checked, since older geologic units with high paleontological potential may shallowly underlie younger surficial sediments. No monitoring is recommended for excavations into artificial fill and landslide deposits, since these materials do not harbor in-situ paleontological resources. See Table 1 for a summary of the paleontological study.

2.0 INTRODUCTION

This report presents the results of the paleontological technical study conducted by Paleo Solutions, under contract to AECOM in support of the SDG&E TL674A Reconfiguration and TL666D Removal Project (Proposed Project). This work was required by the CPUC to meet their requirements as the lead agency under CEQA. All paleontological work was completed in compliance with CEQA as amended (Public Resources Code §21000 et seq.) and pursuant to the *Guidelines for Implementation of the California Environmental Quality Act* (California Code of Regulations, Title 14 §15000 et seq.), and San Diego County guidelines.

SDG&E proposes to reconfigure 69 kilovolt (kV) transmission line TL674A (renamed as TL6973) and extend it to the Del Mar Substation, remove approximately 6 miles of existing overhead 69 kV power line TL666D from service, and convert the existing 12 kV overhead distribution lines C510 and C738 to underground configurations. The primary objective of the Proposed Project is to remove TL666D from service, thereby eliminating the need for ongoing operations and maintenance (O&M) work within environmentally sensitive areas, including San Dieguito Lagoon, Los Peñasquitos Lagoon, and the Torrey Pines State Natural Reserve Extension Area.

The geologic units and formations that are mapped in the vicinity of the Proposed Project alignment include Holocene-age artificial fill, young alluvial floodplain deposits, paralic estuarine deposits, wash deposits, marine beach deposits; Pleistocene-age old and very old paralic deposits; and Eocene-age Ardath Shale, Delmar Formation, Torrey Sandstone, Scripps Formation, and undivided Eocene deposits. A summary of the paleontological study is provided in Table 1.

2.1 PROJECT DESCRIPTION

The Proposed Project is located in the northwestern portion of the City of San Diego and in the City of Del Mar (Figures 1 and 2). It is located approximately 14 miles north of downtown San Diego and 2 miles south of San Elijo Lagoon. It extends from the northwest quadrant of I-5 and continues south along the west side of I-5, just south of Carmel Mountain Road, where it turns east and crosses I-5.

The primary activity associated with the Proposed Project involves the removal of approximately 6 miles of existing overhead 69 kV power line (TL666D) between the existing Del Mar Substation (located northwest of the intersection of I-5 and Via de la Valle in the City of San Diego) and an existing steel pole (located near the intersection of Vista Sorrento Parkway and Pacific Plaza Drive in the City of San Diego) (Figure 1 and 2). In order to remove TL666D from service, a 69 kV tie line (TL674A) will be reconfigured, extended to the Del Mar Substation, and renamed as TL6973. In addition, portions of two separate existing 12 kV distribution circuits will be converted from an overhead to underground configuration. A portion of the first circuit (C510) will be removed from San Dieguito Lagoon and placed underground within San Dieguito Drive and Racetrack View Drive in the Cities of Del Mar and San Diego. A portion of the second circuit (C738) will be removed from Los Peñasquitos Lagoon and placed underground within the Sorrento Valley Pedestrian/Multi-Use Path.

The Proposed Project includes the following three major and one minor components:

- TL674A Reconfiguration – Includes removal of an approximately 700-foot-long overhead 69 kV tap and the installation of approximately 1.1 miles of new underground duct bank to connect TL674A (renamed TL6973) to the Del Mar Substation.
- TL666D Removal – Includes removal of approximately 6 miles of overhead 69 kV power line between the Del Mar Substation and the intersection of Vista Sorrento Parkway and Pacific Plaza Drive.
- C510 Conversion – Includes conversion of approximately 3,900 feet of existing overhead 12 kV distribution line to an underground configuration.
- C738 Conversion – Involves conversion of approximately 630 feet of 12 kV distribution line in an underground configuration

TABLE 1. SDG&E TL674A RECONFIGURATION & TL666D REMOVAL PROJECT SUMMARY

Project Name	SDG&E TL674A Reconfiguration & TL666D Removal Project			
Project Description	the Proposed Project involves the removal of approximately 6 miles of existing overhead 69 kV power line (TL666D) between the existing Del Mar Substation and an existing steel pole. In order to remove TL666D from service, a 69 kV power line (TL674A) will be reconfigured, extended to the Del Mar Substation, and renamed as TL6973. In addition, portions of two separate existing 12 kV distribution circuits will be converted from an overhead to underground configuration. A portion of the first circuit (C510) will be removed from San Dieguito Lagoon and placed underground within San Dieguito Drive and Racetrack View Drive in the Cities of Del Mar and San Diego. A portion of the second circuit (C738) will be removed from Los Peñasquitos Lagoon and placed underground within the Sorrento Valley Pedestrian/Multi-Use Path.			
Project Area	The Proposed Project area is located in the west central portion of San Diego County, California, in the cities of San Diego and Del Mar.			
Location (PLSS*)	Quarter-Quarter	Section	Township	Range
	SWSW	6	T14S	R3W
	NWNW, NENW, NWNE, NENE, SWNW, SENW, SWNE, SENE	7	T14S	R3W
	SWSW	30	T14S	R3W
	NWNW, NENW, NWNE, NENE, SWNW, SENW, SWNE, SENE, NWSW, NESW, NWSE, NESE, SWSW, SESW, SWSE, SESE	31	T14S	R3W
	NWSW, NESW, NWSE, NESE, SWSW, SESW, SWSE, SESE	1	T14S	R4W
	SESE	2	T14S	R4W
	NWNE, NENE, SWNE, SENE, NWSE, NESE, SWSE, SESE	11	T14S	R4W
	NWNW, NENW, SWNW, SENW, NWSW, NESW, SWSW, SESW	12	T14S	R4W
	NWNW, NENW, NWNE, NENE, SWNW, SENW, SWNE, SENE, NWSW, NESW, NWSE, NESE, SWSW, SESW, SWSE, SESE	13	T14S	R4W
	NENE	14	T14S	R4W
	NWNW, NENW, NWNE, NENE, SWNW, SENW, SWNE, SENE, NWSW, NESW, NWSE, NESE, SWSW, SESW, SWSE, SESE	24	T14S	R4W
	NWNW, NENW, NWNE, NENE, SWNW, SENW, SWNE, SENE, NWSW, NESW, NWSE, NESE, SWSW, SESW, SWSE, SESE	25	T14S	R4W
Land Owner(s)	Surface Management Agency	Acres		
	State (Fish and Wildlife)	37.5		
	State (Parks and Recreation)	52.7		
	Undetermined	228.5		
Topographic Map(s)	USGS Del Mar, California 7.5’ Quadrangle			
Geologic Map(s)	Geologic Map of the San Diego 30' x 60' quadrangle, California (Kennedy and Tan, 2008)			
Mapped Geologic Formation(s) and Age	Formation	Map Symbol	Age	Paleontological Potential
	Artificial fill	af	Late Holocene	Low
	Young alluvial	Qya	Holocene to	Low

	floodplain deposits		Late Pleistocene	
	Paralic estuarine deposits	Qpe	Late Holocene	Low
	Marine beach deposits	Qmb	Late Holocene	Low
	Landslide deposits	Qls	Holocene to Pleistocene	Low
	Wash deposits	Qw	Holocene to Pleistocene	Low
	Old paralic deposits, Units 2-4	Qop2-4	Late to Middle Pleistocene	High
	Old paralic deposits, Unit 6	Qop6	Late to Middle Pleistocene	High
	Very old paralic deposits, Unit 9	Qvop9	Middle to Early Pleistocene	High
	Very old paralic deposits, Unit 10	Qvop10	Middle to Early Pleistocene	High
	Very older paralic deposits, Unit 10a	Qvop10a	Middle to Early Pleistocene	High
	Very old paralic deposits, Unit 11	Qvop11	Middle to Early Pleistocene	High
	Very old paralic deposits, Unit 12	Qvop12	Middle to Early Pleistocene	High
	Ardath Shale	Ta	Middle Eocene	High
	Delmar Formation	Td	Middle Eocene	High
	Torrey Sandstone	Tt	Middle Eocene	High
	Scripps Formation	Tsc	Middle Eocene	High
	Undivided Eocene rocks	Teo	Eocene	High
Surveyor(s)	Joey Raum, B.S. and Chelsea Sheets-Harris, B.S.			
Date Surveyed	October 26, 2016			
Permits	A state park paleontological investigations/collections permit was obtained to survey Proposed Project components within the Torrey Pines State Natural Reserve (expiration: October 18, 2017)			
Formations Surveyed	Delmar Formation, Torrey Sandstone, old paralic deposits, and very old paralic deposits			
Previously Documented Fossil Localities within the Project area	The San Diego Natural History Museum (SDNHM) records search yielded 215 recorded fossil localities within a one-mile radius of the Proposed Project alignment. The Friars Formation (not mapped within Proposed Project area) and Scripps Formation produced 39 localities, and the Bay Point Formation (mapped as Qop), Lindavista Formation (mapped as Qvop), Ardath Shale, Torrey Sandstone, and Delmar Formation produced 176 localities (Appendix A).			

Paleontological Results	Four non-significant fossil localities were recorded during the survey. All localities consist of invertebrate shell fossils exhibiting poor to good preservation.
Disposition of Fossils	No fossils were collected during the survey.
Recommendation(s)	Due to the prevalence of geologic units with high paleontological potential within the Proposed Project area, implementation of measures to reduce the mitigation of potential adverse impacts resulting from construction-related ground disturbance is recommended. Prior to the start of construction, a paleontological resources monitoring plan should be prepared and implemented by a qualified paleontologist. That plan should include specific locations and construction activities requiring monitoring, procedures to follow for monitoring and fossil discovery, and a curation agreement with the San Diego Natural History Museum. Monitoring is recommended for all construction ground-disturbing activities, except for augering of less than three-foot diameter holes, within native sediments of the Eocene-age Ardath Shale, Delmar Formation, Torrey Sandstone, Scripps Formation, undivided Eocene deposits, and Pleistocene-age old and very old paralic deposits. Full-time monitoring (i.e., monitoring of all ground disturbance) is not recommended for excavations into young alluvial floodplain deposits, paralic estuarine deposits, and marine beach deposits, since these units are considered too young to contain in-situ significant paleontological resources. However, excavations impacting depths greater than five feet into these sediments should be periodically spot-checked, since older geologic units with high paleontological potential may shallowly underlie younger surficial sediments. No monitoring is recommended for excavations into artificial fill and landslide deposits, since these materials do not harbor in-situ paleontological resources.

*PLSS = Public Land Survey System

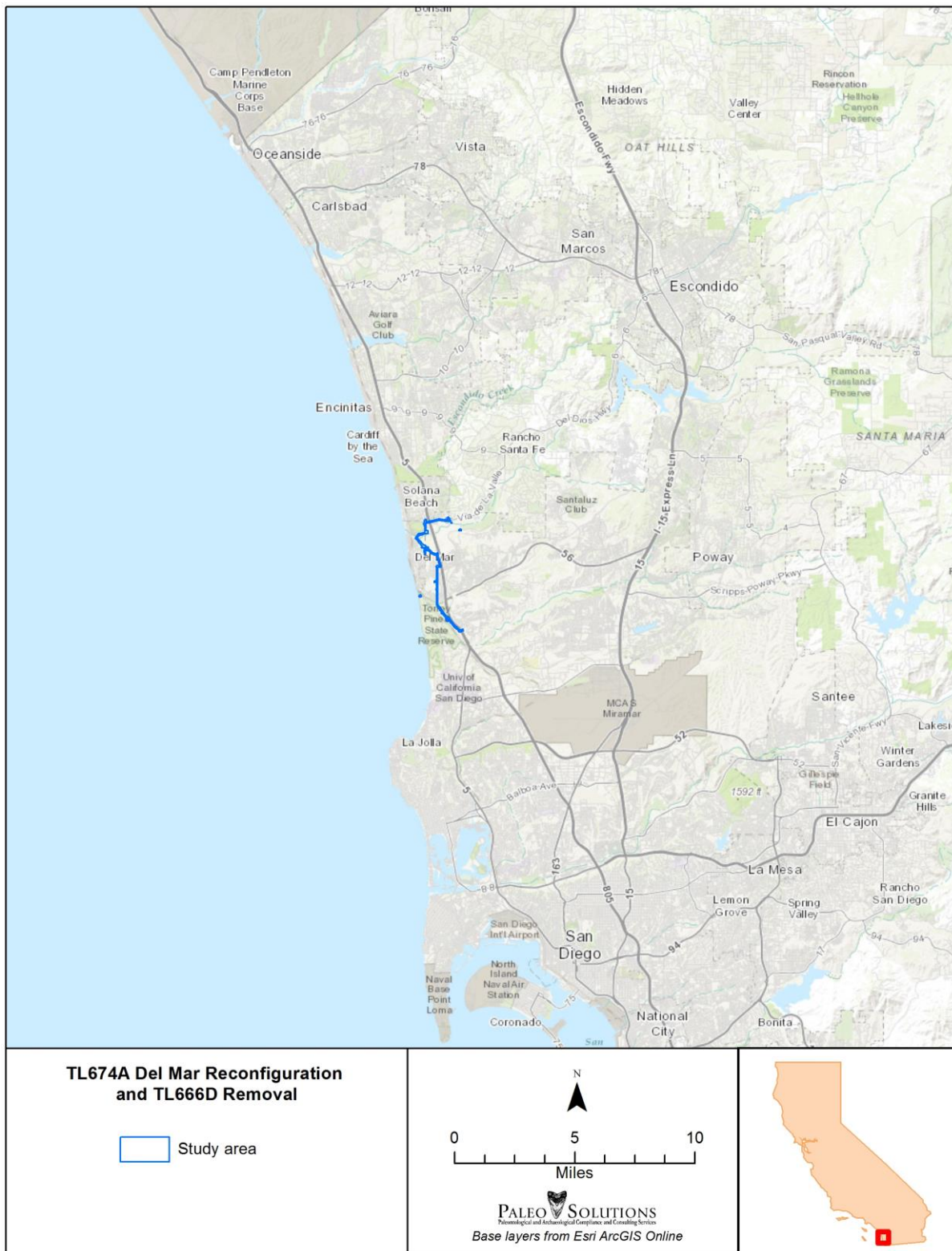


Figure 1. Proposed Project Location Map.



Figure 2. Proposed Project Overview Map.

3.0 DEFINITION AND SIGNIFICANCE OF PALEONTOLOGICAL RESOURCES

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

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

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

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

"Any paleontological resource that is considered to be of scientific interest, including most vertebrate fossil remains and traces, and certain rare or unusual invertebrate and plant fossils. A significant paleontological resource is considered to be of scientific interest if it is a rare or previously unknown species, it is of high quality and well-preserved, it preserves a previously unknown anatomical or other characteristic, provides new information about the history of life on earth, or has an identified educational or recreational value. Paleontological resources that may be considered not to have scientific

significance include those that lack provenience or context, lack physical integrity due to decay or natural erosion, or that are overly redundant or are otherwise not useful for research. Vertebrate fossil remains and traces include bone, scales, scutes, skin impressions, burrows, tracks, tail drag marks, vertebrate coprolites (feces), gastroliths (stomach stones), or other physical evidence of past vertebrate life or activities" (BLM, 2008).

Vertebrate fossils, whether preserved remains or track ways, are classified as significant by most state and federal agencies and professional groups (and are specifically protected under Division 1 of the California Public Resources Code, Section 5020.1 [b]). In some cases, fossils of plants or invertebrate animals are also considered significant and can provide important information about ancient local environments. Assessment of significance is also subject to the CEQA criterion that the resource constitutes a "unique paleontological resource or site."

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

4.0 LAWS, ORDINANCES, REGULATIONS AND STANDARDS

4.1 STATE REGULATORY SETTING

4.1.1 California Environmental Quality Act (CEQA)

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

4.1.2 State of California Public Resources Code

The State of California Public Resources Code (Chapter 1.7), Sections 5097.5 and 30244, includes additional state level requirements for the assessment and management of paleontological resources. These statutes require reasonable mitigation of adverse impacts to paleontological resources resulting from development on state lands, define the removal of paleontological "sites" or "features" from state lands as a misdemeanor, and prohibit the removal of any paleontological "site" or "feature" from State land without permission of the jurisdictional agency. These protections apply only to State of California land, and thus apply only to portions of the project, if any, which occur on State land.

4.1.3 San Diego County

The San Diego County General Plan, Conservation and Open Space Element (2011) Goal COS-9 is to conserve paleontological resources and unique geologic features for educational and/or scientific purposes. Paleontological resources are specifically protected under Policy COS-9.1, which requires “the salvage and preservation of unique paleontological resources when exposed to the elements during excavation or grading activities or other development processes”, and Policy COS-9.2, which requires “development to minimize impacts to unique geological features from human related destruction, damage, or loss.” The San Diego County General Plan, California Coastal Act (2016) requires mitigation for any adverse impacts on archaeological, cultural, and paleontological resources.

4.2 PERMITS

A state park paleontological investigations/collections permit was required to perform paleontological work within the Torrey Pines Natural Reserve (Appendix C). The permit expiration date is October 18, 2017.

5.0 METHODS

This paleontological study included a geologic map review, literature search, institutional records search, and reconnaissance survey. The goal of this report is to identify the level of paleontological potential of the Proposed Project area, and make recommendations for the implementation of measures to reduce the potential adverse impacts on paleontological resources that may occur as a result of the proposed construction. Joey Raum, B.S. and Chelsea Sheets-Harris, B.S. conducted the paleontological reconnaissance survey. Joey Raum, B.S. performed background research and authored this report. Geraldine Aron, M.S. oversaw all aspects of the study as the Paleontological Principal Investigator. Courtney Richards, M.S. performed the technical review of this report. GIS maps were prepared by Barbara Webster, M.S.

Paleo Solutions reviewed geologic mapping of the Proposed Project area by M.P. Kennedy and S.S. Tan (2008). The literature reviewed included published and unpublished scientific papers. A paleontological records search was conducted at the San Diego Natural History Museum (SDNHM). Katie McComas performed the search. The results of the records search (dated October 3, 2016) are attached as Appendix A.

The field survey was conducted by Paleo Solutions staff members Joey Raum, B.S. and Chelsea Sheets-Harris, B.S. on October 26 2016. The paleontological survey was performed in order to determine the paleontological potential of the geologic deposits underlying the survey areas. The survey was conducted after a review of aerial photographs indicated the survey sections were within areas of native sediment and vegetation. The pedestrian survey included thorough transects of the Proposed Project alignment with the majority of focus occurring along areas with little previous disturbance and prominent outcrops of native sedimentary units with high paleontological potential. Methodologies included close inspection of sediment and bedrock outcrops. Rock exposures as well as the surrounding areas were photographed and documented. Reference points were acquired using a Trimble GPS unit. Sediment and bedrock lithologies

were recorded and analyzed and used to better interpret the Proposed Project's paleontological potential, and thus better understand the Proposed Project's potential impact.

6.0 GEOLOGY AND PALEONTOLOGY

The Proposed Project area is located within the Peninsular Ranges Geomorphic Province, a region characterized by northwest-trending fault-bounded mountain ranges, broad intervening valleys, and low-lying coastal plains (Yerkes et al., 1965). The Peninsular Ranges extend approximately 920 miles from Los Angeles Basin to the southern tip of Baja California, and vary in width from approximately 30 to 100 miles. Bedrock units in the Peninsular Ranges include Jurassic-age igneous rocks of the Southern California Batholith. The Proposed Project lies in the Coastal Plain Region of the Peninsular Ranges, which is underlain by a layered sequence of marine and non-marine sedimentary rock units that date back 140 million years (City of San Diego, 2008). The Proposed Project alignment is underlain primarily by Holocene-age, Pleistocene-age, and Eocene-age sedimentary deposits.

6.1 MAPPED GEOLOGY

6.1.1 Artificial Fill (*af*)

Artificial fill is Holocene-age and consists of previously disturbed and/or imported materials. These sediments underlie the Proposed Project along the San Dieguito and Soledad valleys, in the north and south ends of the alignment (Figure 3).

6.1.2 Quaternary Younger Deposits (*Qya, Qpe, Qmb, Qw*)

Holocene-age deposits include young alluvial (*Qya*), paralic estuarine (*Qpe*), marine beach (*Qmb*), and wash deposits (*Qw*). Alluvial floodplain sediments consist of permeable unconsolidated to slightly consolidated sand and gravel deposited in active washes and flood plains. Paralic estuarine deposits comprise unconsolidated fine-grained sand and clay, and marine beach deposits consist of unconsolidated fine- to medium-grained sand. Wash deposits consist of unconsolidated sand to boulder alluvium associated with active drainages. Holocene-age deposits occur in modern canyons, floodplains, and estuaries along the San Dieguito and Soledad valleys, and they occur throughout the Proposed Project alignment (Kennedy and Tan, 2008; Figure 3).

6.1.3 Landslide Deposits (*Qls*)

Holocene- to Pleistocene-age landslide deposits (*Qls*) consist of highly fragmented to coherent displaced land masses and corresponding detachment scarps. Sediments are unconsolidated to moderately well consolidated and can preserve original sedimentary structures. Many Pleistocene age landslides were reactivated in part or entirely during late Holocene (Kennedy and Tan, 2008). These deposits are mapped adjacent to the north and south ends of the Proposed Project alignment (Figure 3).

6.1.4 Old Paralic Deposits (*Qop2, Qop3, Qop4, Qop5, Qop6*)

Old paralic deposits are Pleistocene-age and consist of moderately to well consolidated, and moderately to well dissected sediments. These deposits generally consist of poorly sorted, moderately permeable, reddish-brown siltstone, sandstone and conglomerate and represent

interfingered strandline, beach, estuarine, and colluvial facies (Kennedy and Tan, 2008). Old paralic sediments typically occur at lower elevations along modern drainages and waterways and are mapped throughout the Proposed Project alignment (Kennedy and Tan, 2008; Figure 3).

6.1.5 Very Old Paralic Deposits (*Qvop6, Qvop9, Qvop10, Qvop10a, Qvop11, Qvop12*)

Very old paralic deposits are Pleistocene-age and consist of moderately to well consolidated, and moderately to well dissected sediments. These deposits generally consist of poorly sorted, moderately permeable, reddish-brown siltstone, sandstone and conglomerate and represent interfingered strandline, beach, estuarine, and colluvial facies (Kennedy and Tan, 2008). Very old paralic sediments rest on wave-cut abrasion platforms preserved by regional uplift and are mapped throughout the Proposed Project alignment (Kennedy and Tan, 2008; Figure 3).

6.1.6 Scripps Formation (*Tsc*)

The Scripps Formation is Eocene-age and consists of beach-bar deposits comprised of pale yellowish brown, medium-grained sandstone and interbedded cobble-conglomerate (Kennedy and Peterson, 1975). The Scripps Formation interfingers with the Ardath Shale, and both units overlie the Torrey Sandstone. (Kennedy and Peterson, 1975). The Scripps Formation is mapped adjacent to the southern end of the Proposed Project alignment (Figure 3).

6.1.7 Ardath Shale (*Ta*)

The Eocene-age Ardath Shale comprises outer continental shelf deposits consisting of olive-grey to yellow-brown colored, weakly fissile thin-bedded silty shale and medium-grained sandstone with some clay (Kennedy and Peterson, 1975). The Ardath Shale is exposed in a very small area at the southern end of the Proposed Project alignment (Kennedy and Tan, 2008; Figure 3).

6.1.8 Delmar Formation (*Td*)

The Eocene-age Delmar Formation comprises lagoonal to estuarine deposits. Sediments consist of yellow, greenish-grey, fine-grained rocks and interbedded muddy coarse-grained sandstone (Lomar et al., 1979; Kennedy and Tan, 2008). The Delmar Formation is mapped within the Proposed Project alignment along the north end, and near the north and south ends (Figure 3).

6.1.9 Torrey Sandstone (*Tt*)

The Eocene-age Torrey Sandstone comprises near shore deposits consisting of white to light-brown to buff-tan, medium- to coarse- grained, moderately well indurated, massive and broadly cross-bedded, arkosic sandstone (Kennedy and Tan, 2008). The Torrey Sandstone is typically exposed across mesa tops and underlies the majority of the Proposed Project alignment (Kennedy and Tan, 2008; Figure 3).

6.1.10 Undivided Eocene Rocks (*Teo*)

Undivided Eocene-age sedimentary rocks (*Teo*) include marine deposits mapped offshore. These comprise well indurated, massive arkosic sandstone with interbedded claystone, siltstone, and conglomerate (Kennedy and Tan, 2008). These units occur west of the coastline and west of the Proposed Project alignment (Figure 3).

6.2 PALEONTOLOGICAL RECORDS SEARCH RESULTS

Paleo Solutions requested a paleontological search of records maintained by SDNHM (McComas, 2016). The records search yielded 215 recorded fossil localities from within a one-mile radius of the Proposed Project alignment (Appendix A).

There are 39 localities recorded from the Scripps and Friar Formations, the latter of which is not mapped within the alignment. Fossils recorded from the Friar Formation include trace fossils, impressions of plants, and fossils of marine invertebrates (e.g., snails, urchins, slugs, clams, oysters, and tusk shells) (McComas, 2016).

The Eocene-age Ardath Shale produced 75 recorded fossil localities within a one-mile radius of the proposed alignment including trace fossils (e.g., burrows and sponge borings), plant impressions (e.g., willows and flowering plants), marine invertebrates (e.g., foraminifers, corals, bryozoans, worms, snails, clams, mussels, oysters, tusk shells, crabs, sea stars, and heart urchins), and marine vertebrates (e.g., sharks, rays, and bony fish) (McComas, 2016).

The Eocene-age Torrey Sandstone has 17 fossil localities recorded from within a one-mile radius of the proposed alignment, and they include trace fossils (e.g., burrows and sponge borings), plant impressions (e.g., ferns, horsetails, and a wide variety of trees and flowering plants), marine invertebrates (e.g., sponges, corals, worms, brachiopods, snails, clams, mussels, oysters, tusk shells, crabs, barnacles, and heart urchins), terrestrial invertebrates (e.g., insects), marine vertebrates (e.g., sharks, rays, and bony fish), and terrestrial vertebrates (e.g., lizards, turtles, birds, and rodents) (McComas, 2016).

The Eocene-age Delmar Formations has 54 fossil localities recorded within a one-mile radius of the proposed alignment, and they include trace fossils (e.g., burrows, sponge borings, and coprolites), plant impressions (e.g., tracheophytes), marine invertebrates (e.g., bryozoans, corals, snails, clams, mussels, oysters, ostracods, decapods, and heart urchins), marine vertebrates (e.g., sharks, skates, rays, and bony fish), and freshwater or terrestrial vertebrates (e.g., softshell turtles, lizards, crocodiles, rodents, brontotheres, and rhinos) (McComas, 2016).

The Pleistocene-age Lindavista Formation, which is synonymous with very old paralic deposits (Kennedy and Tan, 2008), produced a single locality within a one-mile radius of the proposed alignment, which yielded trace fossils (e.g., pholad burrows) (McComas, 2016). The Pleistocene-age Bay Point Formation, which is synonymous with old paralic deposits (Kennedy and Tan, 2008), produced 29 fossil localities, which include trace fossils (e.g., sponge and worm borings), plant impressions, fossilized marine invertebrates (e.g., foraminifers, corals, bryozoans, polychaete worms, chitons, marine snails, clams, mussels, oysters, tusk shells, ostracods, isopods, shrimp, crabs, barnacles, sand dollars, and sea urchins), freshwater invertebrates (e.g., freshwater snails), marine vertebrates (e.g., rays and bony fish), and terrestrial vertebrates (e.g., amphibians, lizards, birds, rodents, rabbits, bison, horses, mammoths, and ground sloths) (McComas, 2016).

The museum records search yielded no fossil localities recorded within one mile of the Proposed Project alignment from younger Quaternary sediments including young alluvial floodplain,

paralic estuarine, marine beach, and wash deposits (McComas, 2016). Additionally, no fossil localities are recorded from artificial fill or Holocene to Pleistocene-age landslide deposits (McComas, 2016).

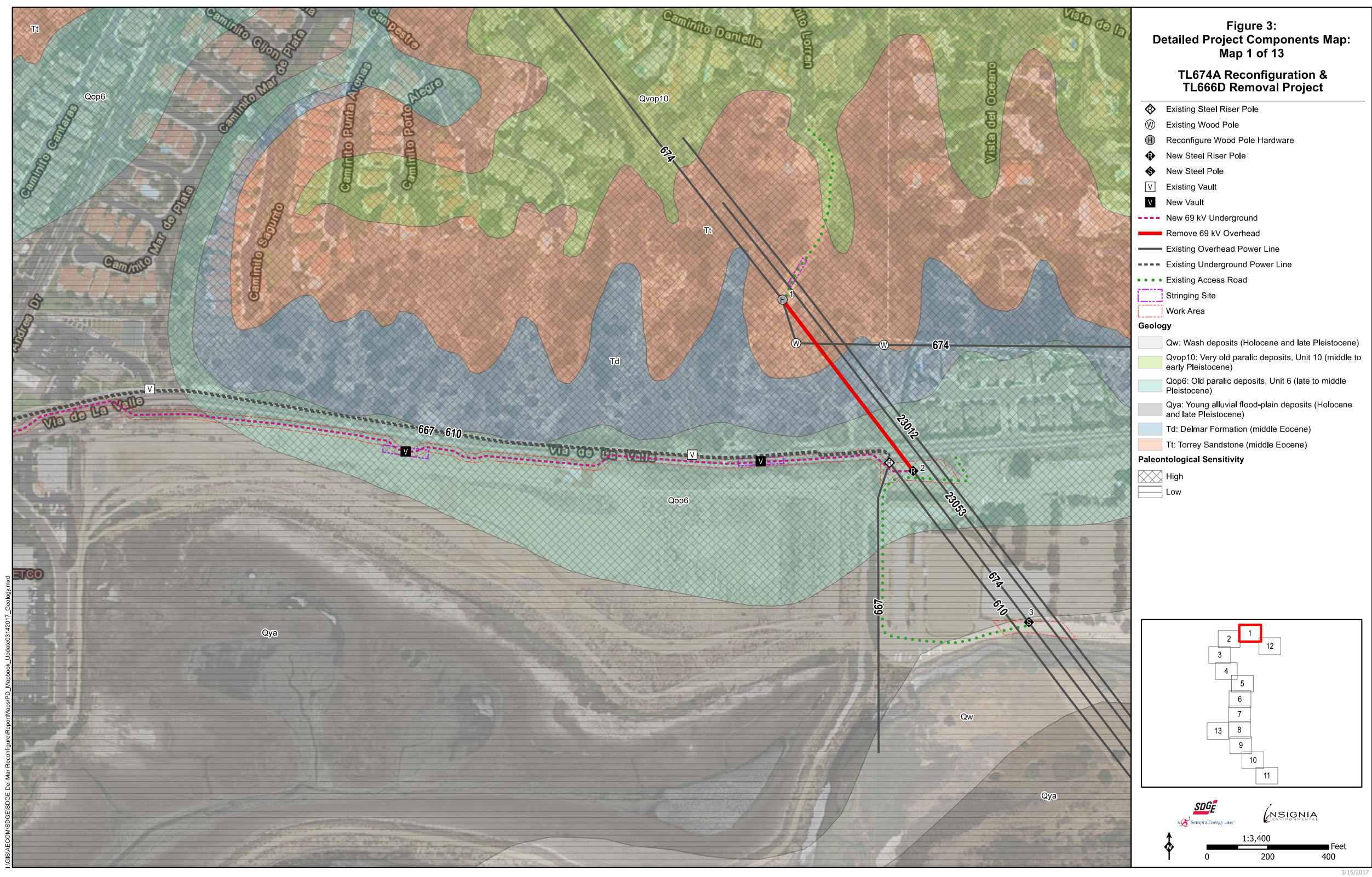


Figure 3a. Proposed Project Geology Map.

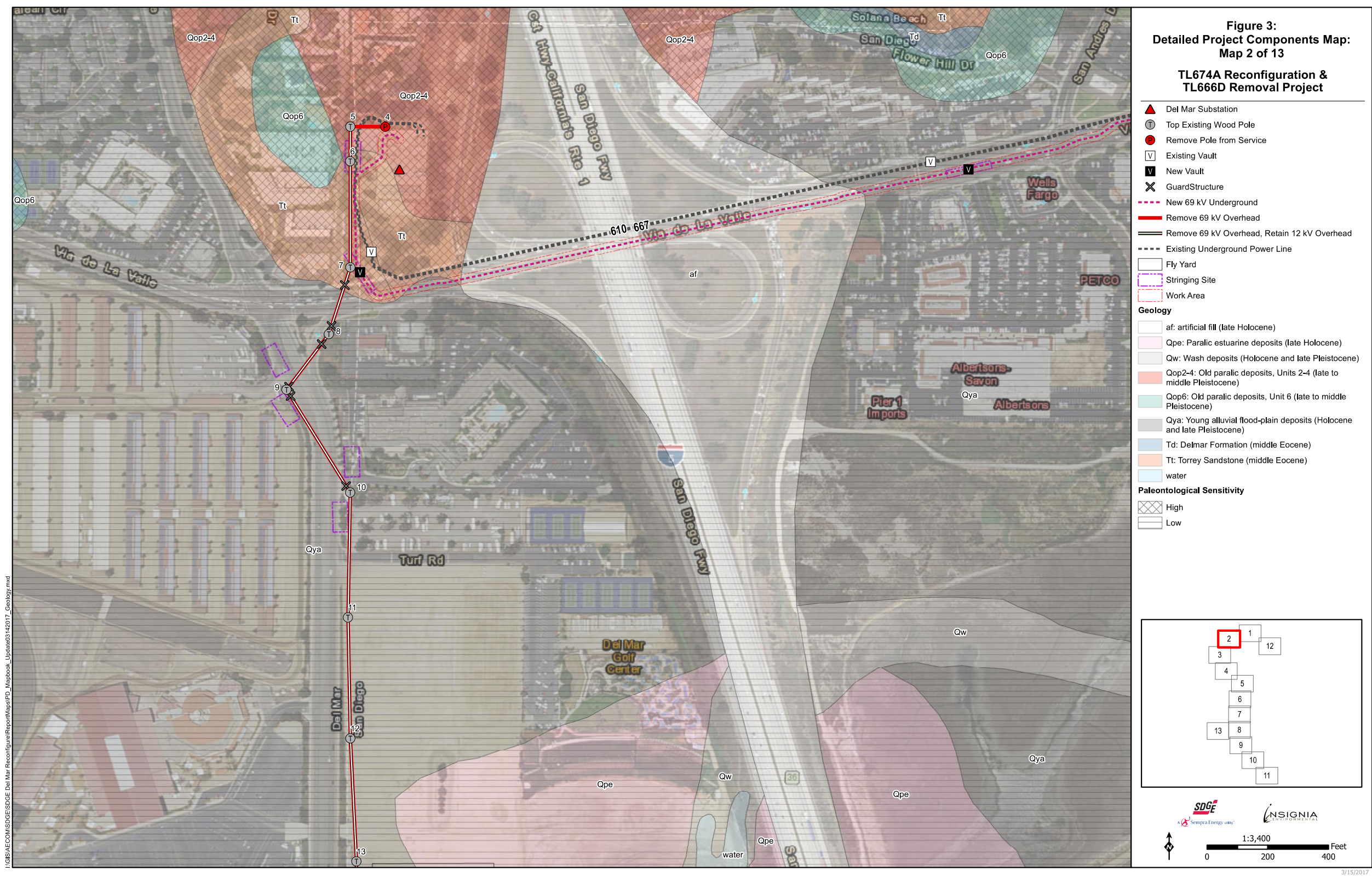


Figure 3b. Proposed Project Geology Map.

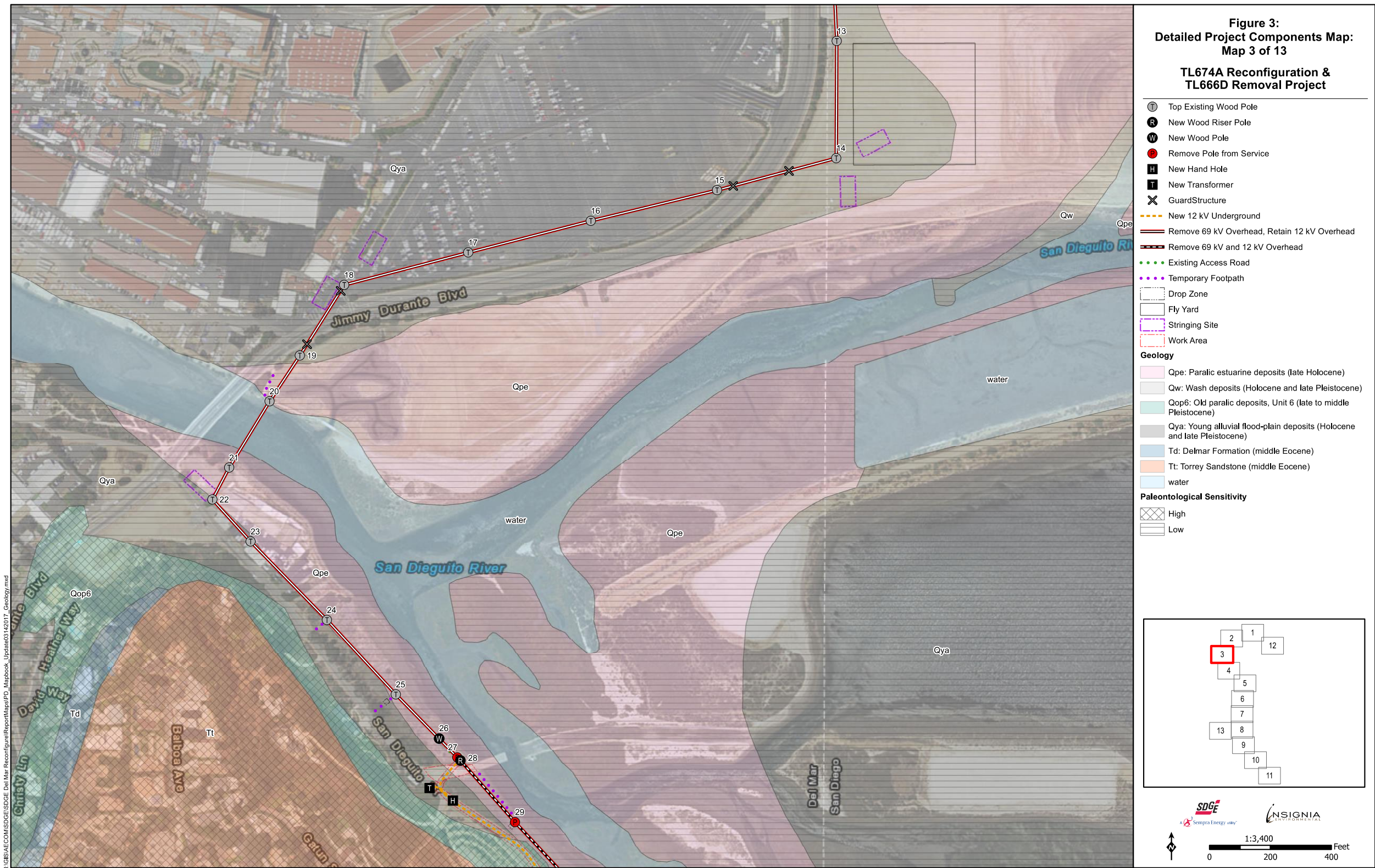


Figure 3c. Proposed Project Geology Map.

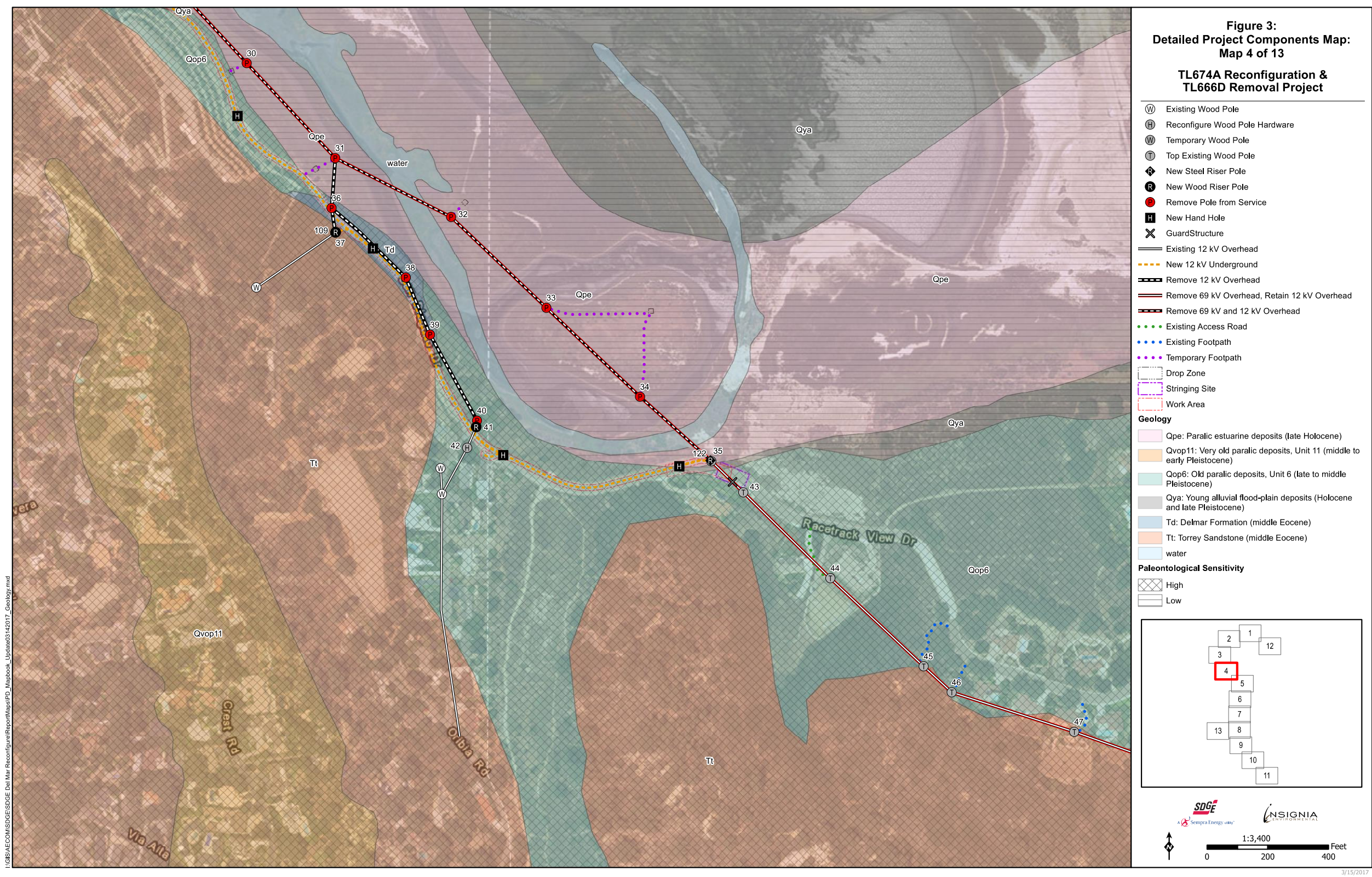


Figure 3d. Proposed Project Geology Map.

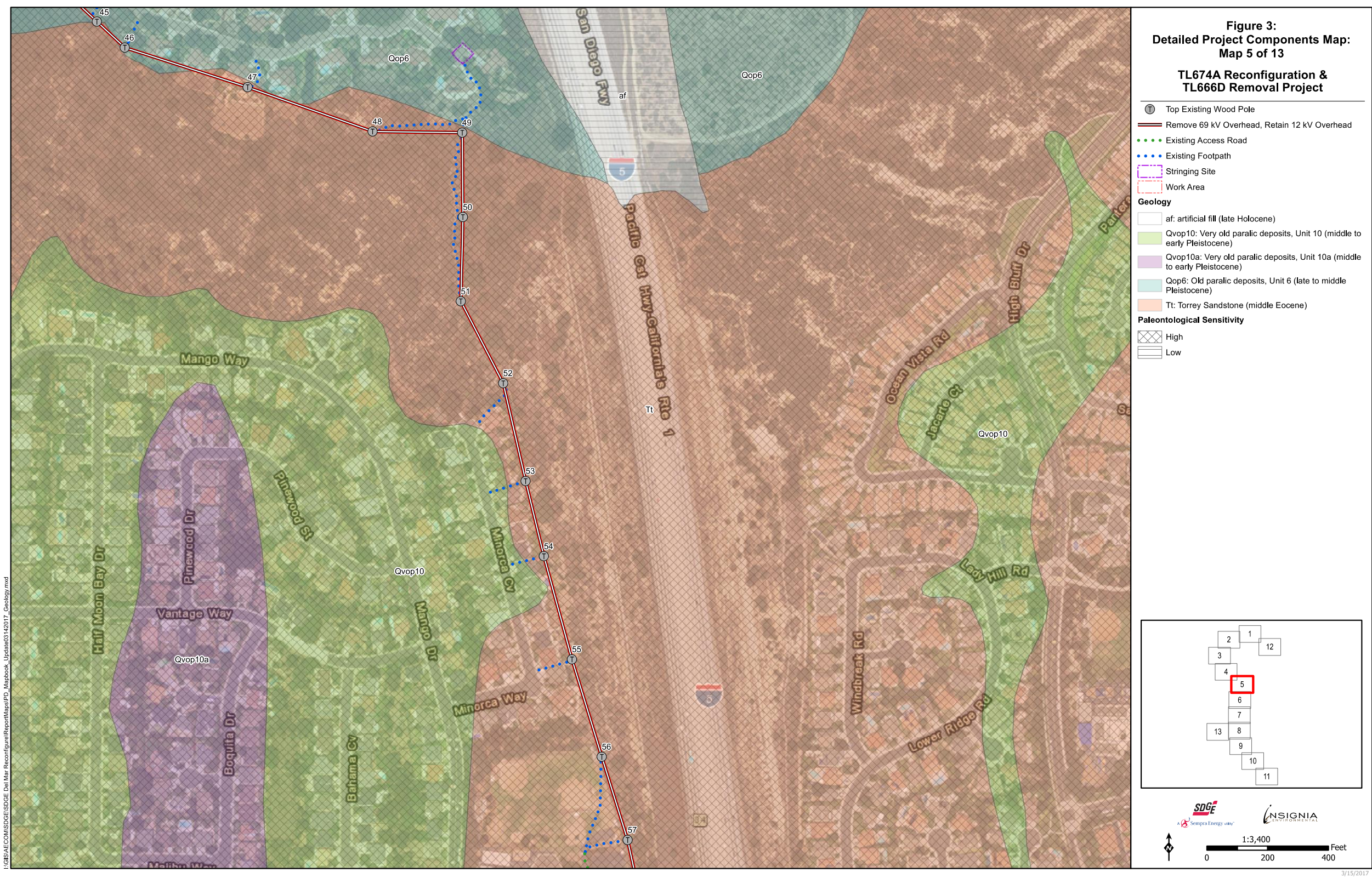


Figure 3e. Proposed Project Geology Map.

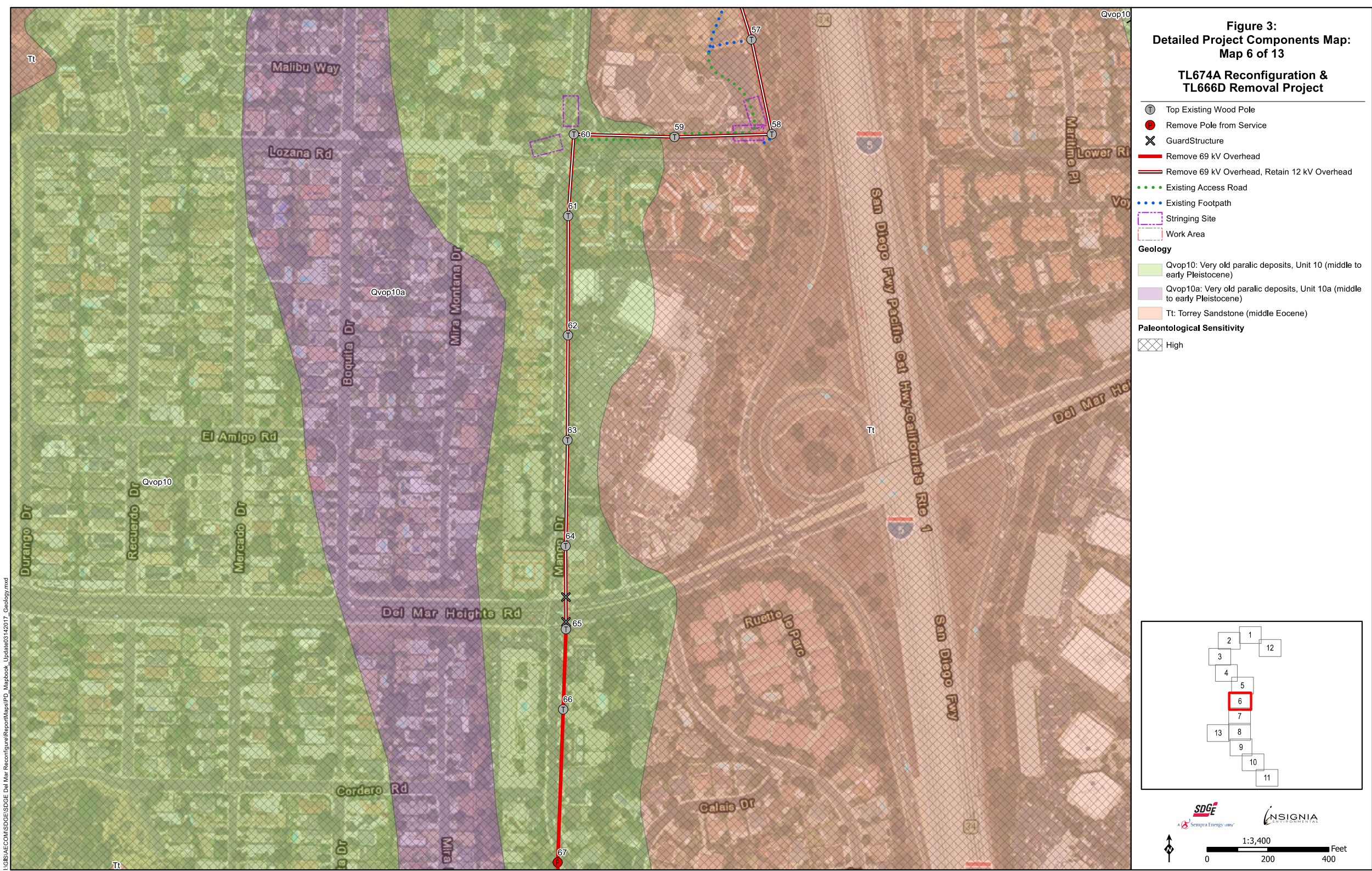


Figure 3f. Proposed Project Geology Map.

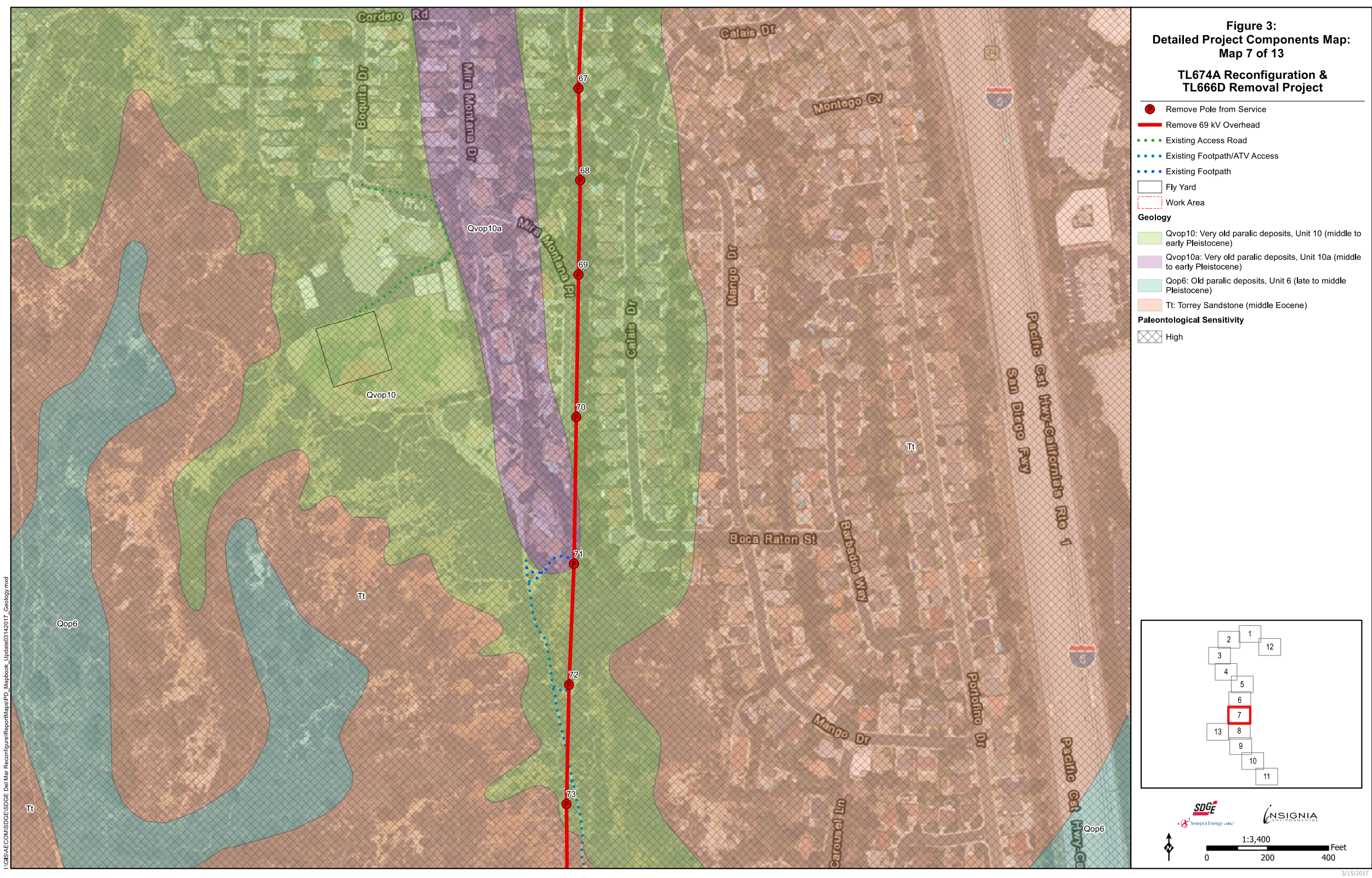


Figure 3g. Proposed Project Geology Map.

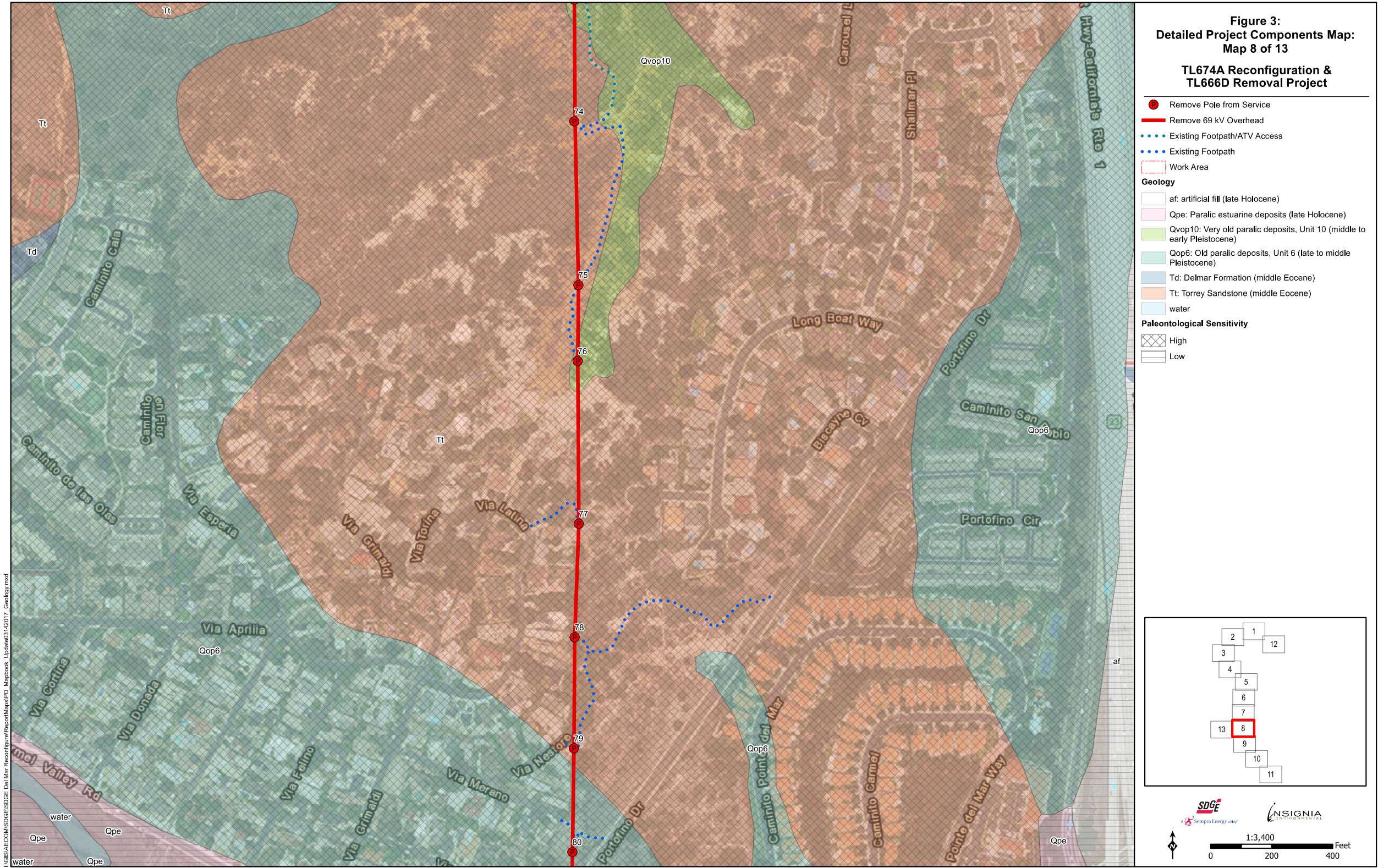


Figure 3h. Proposed Project Geology Map.

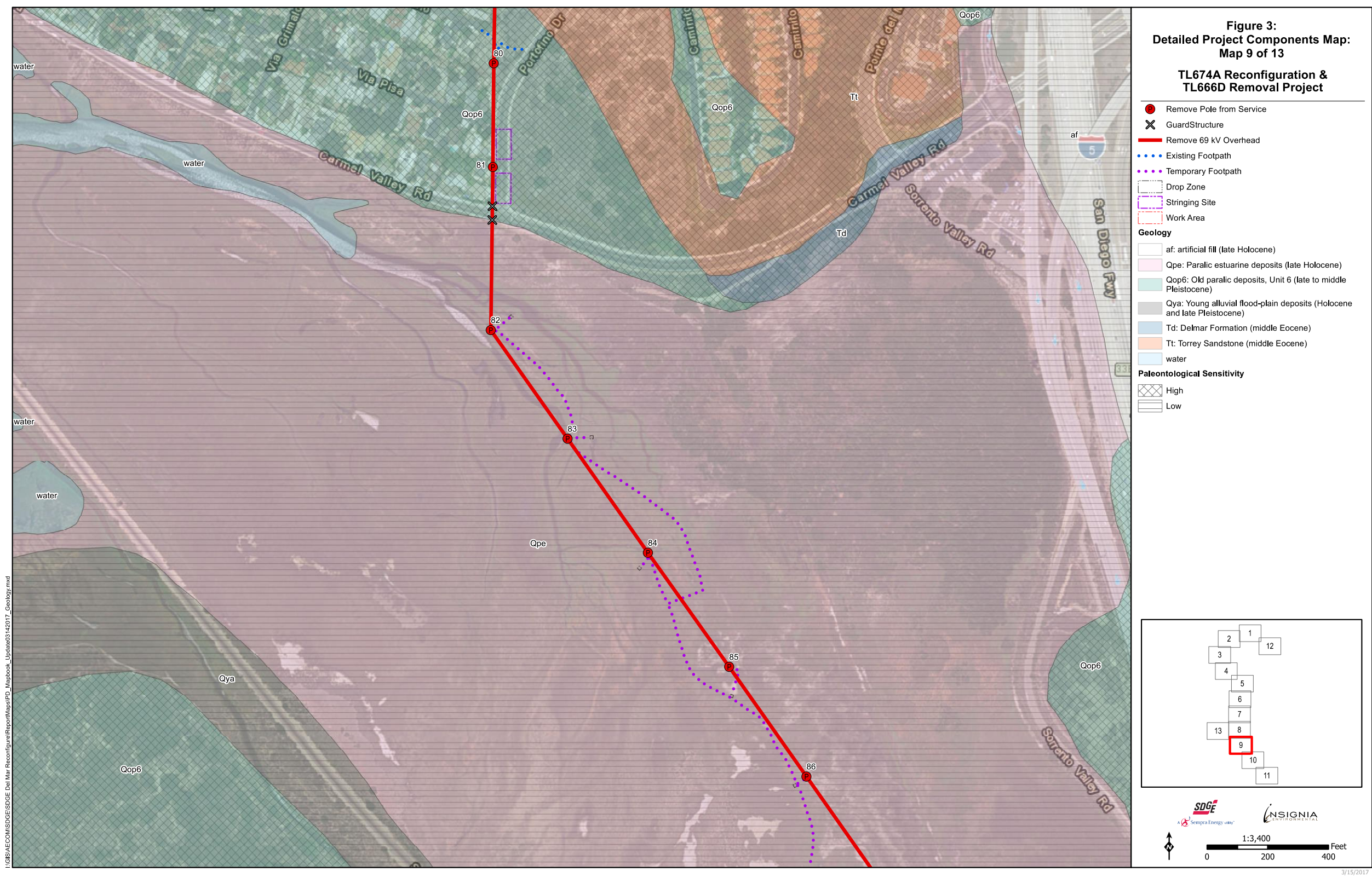


Figure 3i. Proposed Project Geology Map.

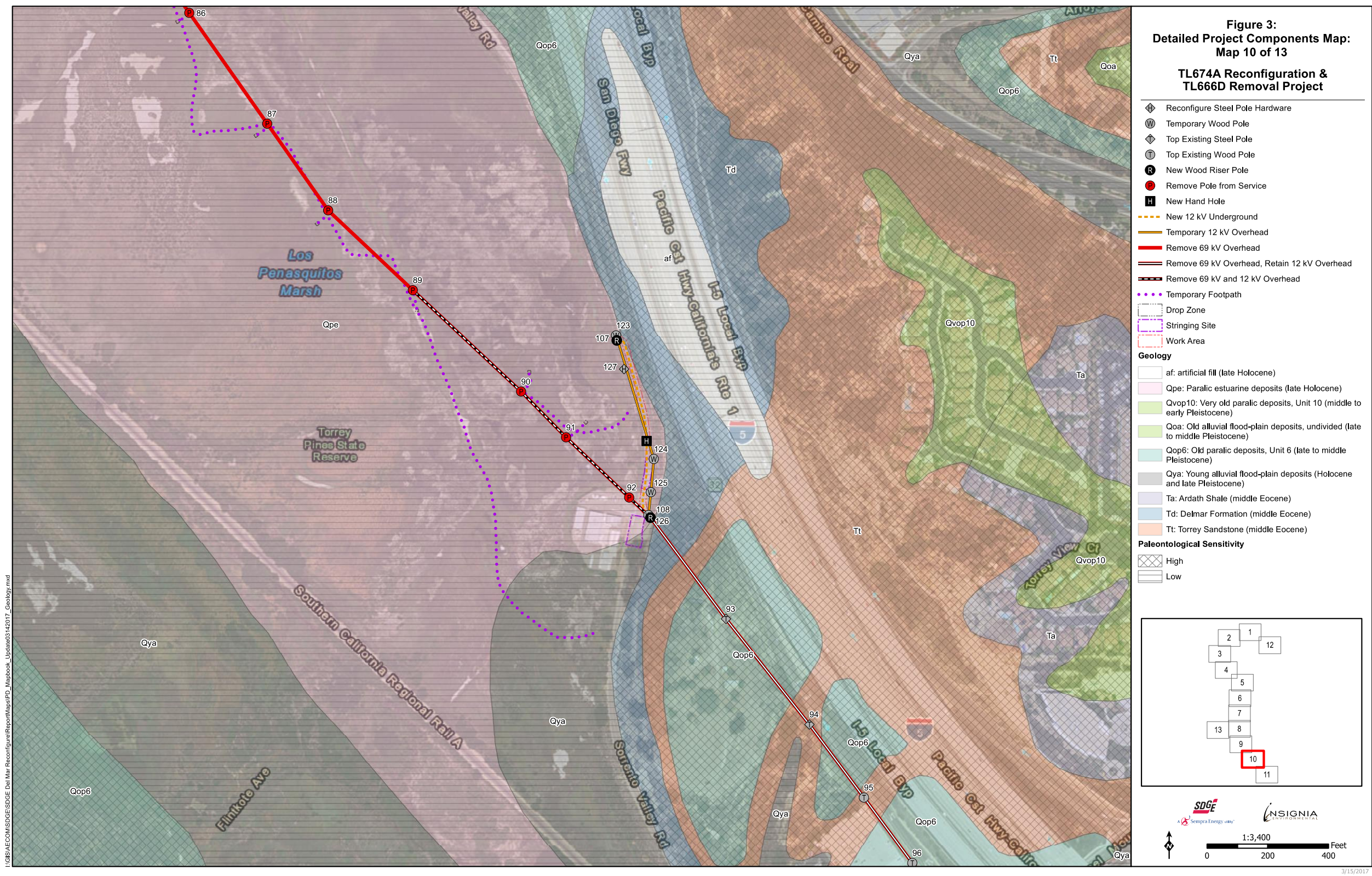


Figure 3j. Proposed Project Geology Map.

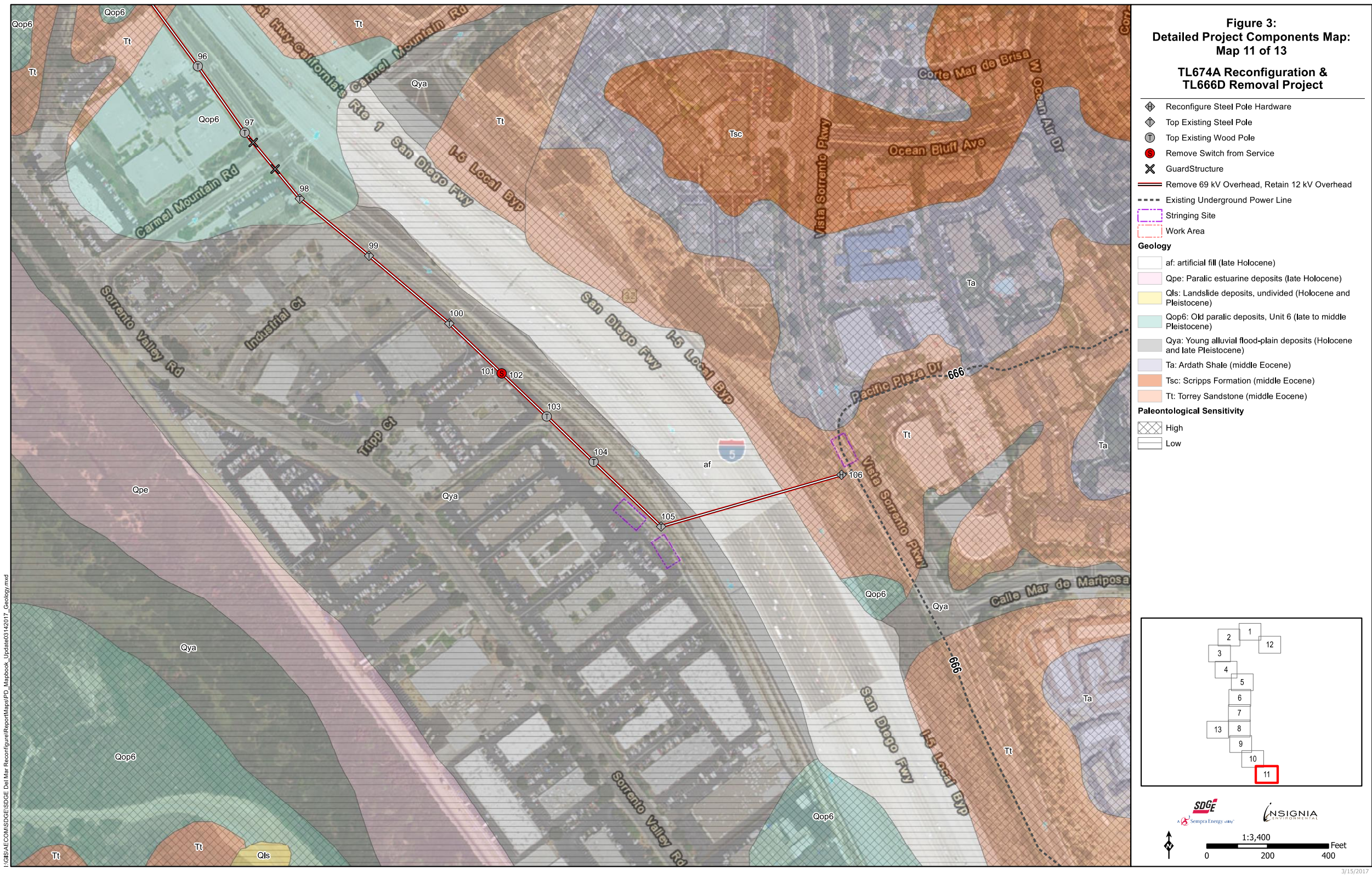


Figure 4k. Proposed Project Geology Map.

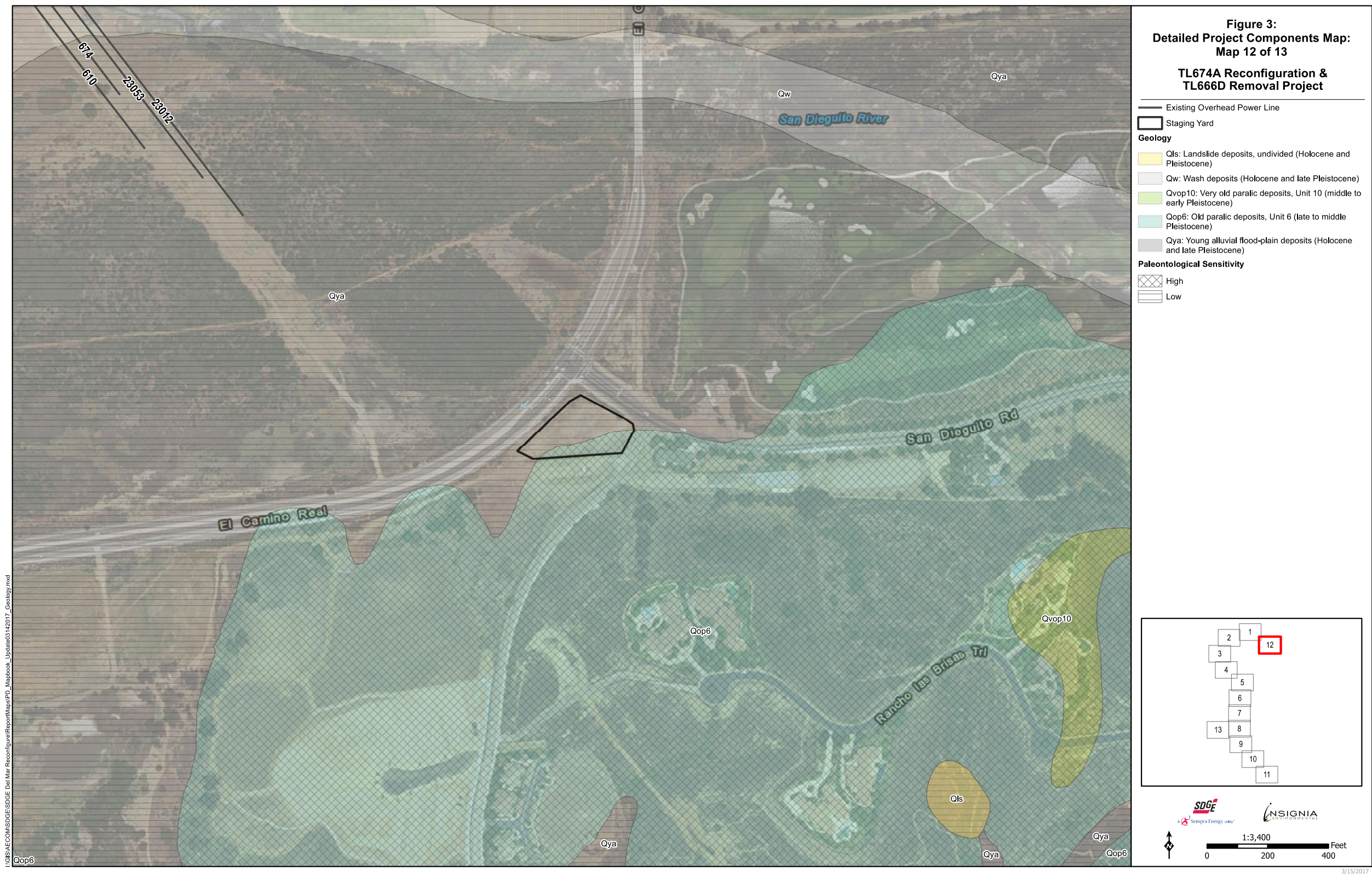


Figure 3I. Proposed Project Geology Map.

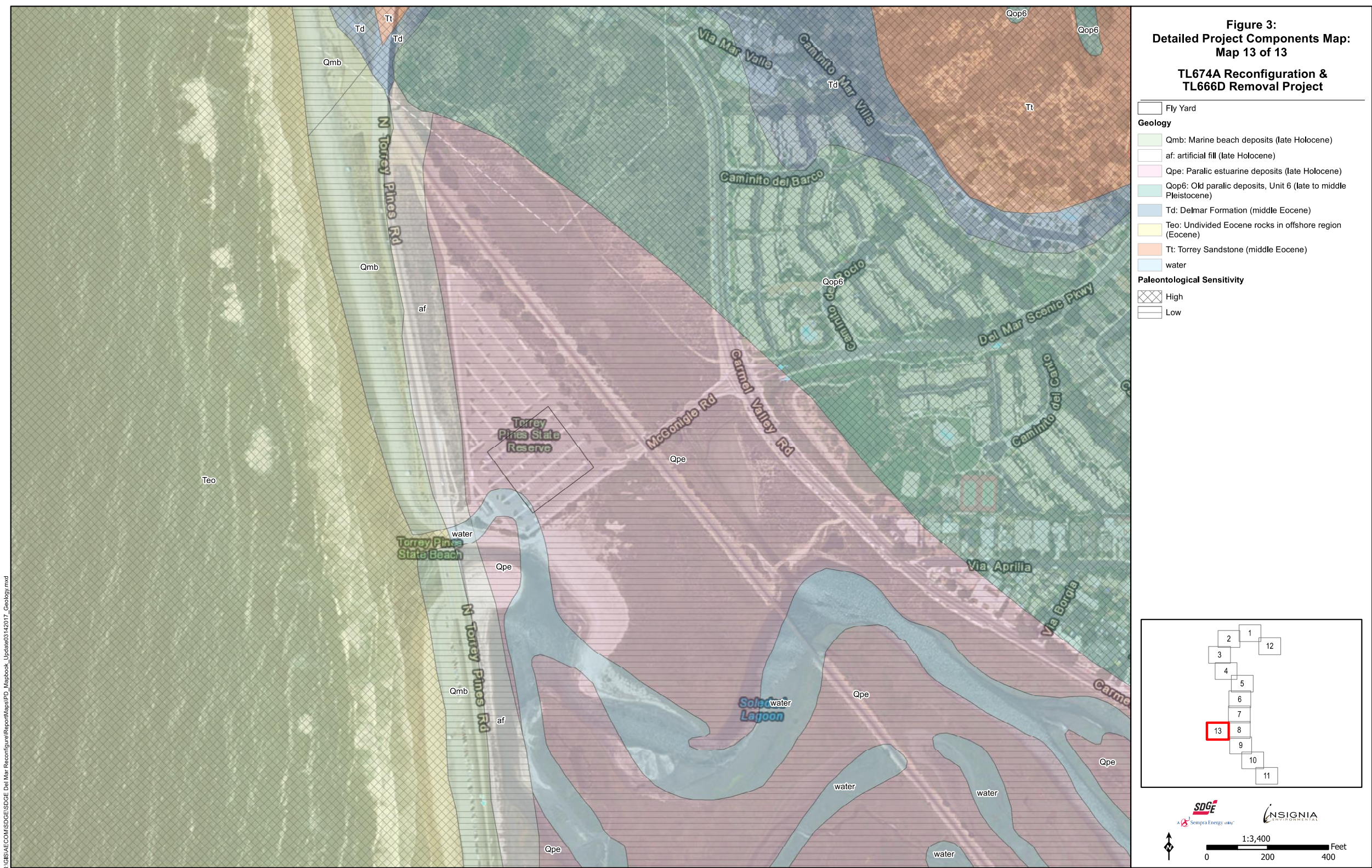


Figure 3m. Proposed Project Geology Map.

7.0 RECONNAISSANCE SURVEY RESULTS

The survey alignment spans approximately eight miles and trends generally north to south, roughly paralleling the I-5 freeway. The terrain comprises moderate to moderate-high relief hills and bluffs and relatively flat and low-lying broad valleys (Figures 4, 5, 13, 21, 22, 23, and 27). Much of the alignment has been previously disturbed and/or developed. Existing infrastructures include paved roads, the I-5 freeway, power lines, commercial and residential buildings, and schools (Figures 7, 9, 13, 22, 23, 24, 27, 28, and 32). Vegetation density ranges from low in more developed areas to moderate and high in less developed areas of the survey alignment. Several areas are entirely obscured by vegetation cover. Sediment exposures are confined primarily to road-cuts, coastal bluffs, and undeveloped hills/slopes with low to moderate vegetation density. The survey focused on inspecting areas of the alignment that contain native sediment outcrops of geologic units with high paleontological sensitivities. Areas of the alignment that are developed and/or mapped as low paleontological potential were omitted during the survey.

7.1 GEOLOGY

Sediments observed during the survey consist primarily of moderately to well consolidated sand deposits with varying amounts of silt and gravel. These include the younger paralic deposits, which are generally more poorly sorted, and the older Delmar Formation and Torrey Sandstone units, which are generally well-sorted and finer-grained.

Paralic deposits consist of reddish-brown to tan-brown, moderately to well consolidated, poorly to moderately sorted, medium- to coarse-grained sandstone with silt and rounded gravel of small pebble- to cobble-size (Figures 14-21, 24, 25, 27-30). One area of the survey alignment contains a clast-supported, rounded, cobble-size conglomerate deposit, interfingered with finer-grained sediments (Figures 28, 29, and 30). Paralic sediments have massive structure and generally outcrop as steep and mostly vertical bluffs, while displaying scars of erosional dissection (Figures 14-17 and 21). Small pebble-size rounded sandstone concretions were observed within and weathering out of paralic deposits (Figures 18, 19, and 20). These deposits are mapped throughout the alignment but were exposed primarily in the central portion of the survey alignment.

The Delmar Formation was observed in the northern and southern ends of the survey alignment and consists of greenish-grey, massive to laminar bedded, moderately consolidated to well lithified, well sorted, silt and fine- to medium-grained sandstone (Figures 4-10, 28, 29, and 31). These sediments contain both softer and more resistant bedding units and stratigraphically underlie the Torrey Sandstone. They outcrop competently in vertical exposures and often contain a thin veneer of sluff sediments that are dissected by slope washes (Figures 8 and 10).

The Torrey Sandstone was observed in the northern, central, and southern ends of the survey alignment. Sediments observed were primarily white to light-grey, massive, well lithified, well-sorted, blocky fine- to medium-grained sandstone (Figures 11, 26-29, 31, and 37). In the central area of the alignment, these sediments were observed eroding out of outcrops as softer more

desiccated material (Figure 27). Torrey Sandstone exposures within the survey alignment are generally low elevation outcrops and are limited due to disturbances and vegetation cover.

Sediments from the Scripps Formation and the Ardath Shale were not observed during the survey. These units are mapped near the southern end of the survey alignment; however, sediment and bedrock exposure is limited in this area. Additionally, no undivided Eocene rock units were observed during the survey. These units are confined to off coastal areas, adjacent to but not occurring within the survey alignment.

7.2 PALEONTOLOGY

Four non-significant fossil localities were recorded during the survey. All localities consist of invertebrate shells and shell fragments. Fossil preservation ranges from poor to good, and several specimens contain preserved hinges, which are diagnostic features (Figures 34-38). All fossils were recorded from sediments of the Delmar Formation. Although sediments from other units did not yield fossil discoveries during the survey, the observed sediments are conducive to fossil preservation. No resources were collected from the survey area. Localities F161026-16-01, F161026-16-02, and F161026-16-03 were all recorded within the survey alignment, in areas of potential impact. Locality F161026-16-04 was recorded outside of, but adjacent to, the survey alignment. A summary of the paleontological survey results is provided in Table 2. The fossil locality forms are also included as Appendix B.

TABLE 2. SURVEY FOSSIL LOCALITY SUMMARY

Field Locality Number	Formation	Taxa	Significant?		Collected? Yes or No
			SFL*	NFO*	
F161026-16-01	Td	Invertebrate		NFO	No
F161026-16-01	Td	Invertebrate		NFO	No
F161026-16-01	Td	Invertebrate		NFO	No
F161026-16-01	Td	Invertebrate		NFO	No

*SFL = Significant Fossil Locality; NFO = Non-Significant Fossil Observation



Figure 4. Moderate relief hills with scarce to moderate sediment exposures. Mapped as Delmar Formation (Td). View Southwest.



Figure 5. Moderate relief hills with scarce to moderate sediment exposures. Mapped as Delmar Formation (Td) and old paralic deposits (Qop6). View west.



Figure 6. Sediment exposure consisting of silt and fine-grained sand. Mapped as Delmar Formation (Td). View south.



Figure 7. View of alignment showing exposed sediments in road-cut and disturbed and developed flat low-lying area. Mapped as Delmar Formation (Td). View west.



Figure 8. Sediment outcrop consisting of silt and fine-grained sand and displaying erosional dissection scars. Mapped as Delmar Formation (Td). View north.



Figure 9. Road-cut displaying exposed sediments consisting of silt and fine-grained sand. Mapped as Delmar Formation (Td). View north.



Figure 10. Outcrop of well-lithified sandstone among less-resistant and softer silt and sand sediments. Mapped as Delmar Formation (Td). View west.



Figure 11. Outcrop of well-lithified fine- to medium-grained sandstone. Mapped as Torrey Sandstone (Tt). View northwest.



Figure 12. Younger alluvial deposits (Qya) exposed in drainage adjacent to Torrey Sandstone (Tt). View east.



Figure 13. Flat low-lying broad valley areas comprise younger alluvial deposits (Qya). View southwest.



Figure 14. Coastal bluffs comprising moderately sorted sandstone. Mapped as very old paralic deposits (Qvop10) and Torrey Sandstone (Tt). View northwest.



Figure 15. Coastal bluffs comprising moderately sorted sandstone (Qvop10). Mapped as very old paralic deposits (Qvop10) and Torrey Sandstone (Tt). View north.



Figure 16. Erosional dissected sediment outcrops of very old paralic deposits (Qvop10). View northwest.



Figure 17. Erosional dissected sediment outcrops of very old paralic deposits (Qvop10). View northwest.



Figure 18. Small pebble-size rounded sandstone concretions within moderately sorted sandstone. Mapped as very old paralic deposits (Qvop10). View northwest.



Figure 19. Small pebble-size rounded sandstone concretions within moderately sorted sandstone. Mapped as very old paralic deposits (Qvop10). View northwest.



Figure 20. Small pebble-size rounded sandstone concretions, weathered out from very old paralic deposits (Qvop10). View down.



Figure 21. Eroding coastal bluffs consisting of moderately sorted sandstone. Mapped as very old paralic deposits (Qvop10) and Torrey Sandstone (Tt). View south.



Figure 22. Flat low-lying lagoon area. Mapped as water and young estuarine deposit (Qpe). View northeast.



Figure 23. Disturbed and developed hills and adjacent developed flat low-lying areas. Mapped as Torrey Sandstone (Tt), old paralic deposits (Qop6), and young alluvial deposits (Qpe). View northwest.



Figure 24. Disturbed sediments on slope adjacent to school. Mapped as very old paralic deposits (Qvop10) overlying Torrey Sandstone (Tt). View west.



Figure 25. Clasts of moderately consolidated silt and sand. Mapped as very old paralic deposits (Qvop10). View down.



Figure 26. Sediment outcrop of sandstone with dense vegetation cover. Mapped as Torrey Sandstone (Tt). View north.



Figure 27. Overview of valley area with adjacent bluffs. Bluff area is mapped as very old paralic deposits (Qvop10) overlying Torrey Sandstone (Tt). Valley area comprises mostly young alluvial deposits (Qya). White sediments of Torrey Sandstone (Tt) are eroding out.



Figure 28. Coarse cobble-size rounded conglomerate deposit interbedded with finer silt and sandstone sediments. Mapped as old paralic deposits (Qop6) overlying Torrey Sandstone (Tt) overlying Delmar Formation (Td). View northeast.



Figure 29. Coarse cobble-size rounded conglomerate deposit interbedded with finer silt and sandstone sediments. Mapped as old paralic deposits (Qop6) overlying Torrey Sandstone (Tt) overlying Delmar Formation (Td). View northeast.



Figure 306. Pebble- to cobble-size rounded clasts eroding out of conglomerate deposit. Mapped as old paralic deposits (Qop6) overlying Torrey Sandstone (Tt) overlying Delmar Formation (Td). View down.



Figure 31. Sediment outcrop consisting of massive to laminar bedded silt and sandstone. More resistant sandstone beds outcrop more than the surrounding softer material. Mapped as Torrey Sandstone (Tt) overlying Delmar Formation (Td). View northeast.



Figure 32. Disturbed and developed area. Mapped as Torrey Sandstone (Tt – hills) and young alluvial deposits (Qya – flat area). View southeast.



Figure 33. Sample of well-lithified, fine- to medium-grained sandstone. Mapped as Torrey Sandstone (Tt). View down.



Figure 34. Fossilized invertebrate shells, fragments, and molds discovered in sandstone clasts at F161026-16-01. Mapped as Delmar Formation (Td). View down.



Figure 35. Fossilized invertebrate shells, fragments, and molds discovered in sandstone clasts and loose slope sediments at F161026-16-01. Mapped as Delmar Formation (Td). View down.



Figure 36. Fossilized invertebrate shells discovered in slope sediments. Mapped as Delmar Formation (Td). View down.



Figure 37. Fossilized invertebrate shell fragment discovered in slope sediments. Mapped as Delmar Formation (Td). View down.



Figure 38. Fossilized invertebrate shell fragments with intact hinge. Mapped as Delmar Formation (Td). View down.

8.0 RESOURCE ASSESSMENT

The paleontological potential rankings for each geologic unit within the Proposed Project area has been pre-determined by the County of San Diego.

8.1 SAN DIEGO COUNTY PALEONTOLOGICAL RESOURCES GUIDELINES

The San Diego County paleontological resource classification guidelines is a predictive resource management tool that classifies geologic units on their likelihood to contain paleontological resources on a scale of no potential to high potential. The sensitivity levels are the same as the resource potential ratings. The resource potential ratings and geologic formation sensitivity levels, as determined by the San Diego County Paleontological Resources Guidelines (2009) are described below.

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 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.

Low

Low resource potential and low sensitivity are assigned to geologic formations that are unlikely to produce unique fossil remains, due to their relatively young age. 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. These younger units can also overlie older more paleontologically sensitive units.

Marginal

Marginal resource potential and marginal sensitivity are assigned to geologic formations that are composed either of volcanoclastic or metasedimentary rocks, which both 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 volcanic debris and also ash mixed sediments within fluvial systems. Metasedimentary rocks may also contain fossils, if the original sedimentary units from which they are derived contained fossils. Although, fossilization is possible within these types of units, the probability remains limited and so 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. These units do not have any potential for producing fossil remains. These formations have no paleontological resource potential and are no sensitivity.

8.2 SENSITIVITY OF GEOLOGICAL UNITS

According to the records search conducted by SDNHM, there are 215 previously recorded fossil localities from the Pleistocene-age and Eocene-age units in the Proposed Project area. Pleistocene-age units with recorded fossils include old and very old paralic deposits. Eocene-age units with recorded fossils include the Scripps Formation, Ardath Shale, Delmar Formation, and Torrey Sandstone (McComas, 2016). No fossils are recorded from within Holocene-age younger deposits, landslide deposits, and artificial fill.

Based on San Diego County Paleontological Resources Guidelines (2009), the Scripps Formation, Ardath Shale, Delmar Formation, and Torrey Sandstone are all considered to have high paleontological potential. Additionally, old and very old paralic deposits are considered to have a high paleontological potential. Holocene-age alluvial, paralic, marine beach, and wash deposits are generally less than 10,000 years old, and are considered to have a low paleontological potential. Fossils that are discovered in artificial fill and landslide deposits will lack stratigraphic context, and so these units are also considered to have a low paleontological potential.

9.0 IMPACTS TO PALEONTOLOGICAL RESOURCES

Ground disturbance in geologic units and geographic areas known to contain scientifically significant fossils may produce adverse impacts to nonrenewable paleontological resources (State CEQA Guidelines, 14 CCR Sections 15064.5[3] and 15023; State CEQA Guidelines Appendix G, Section V, Part C).

Direct impacts to paleontological resources concern the physical destruction of fossils, usually by human-caused ground disturbance. Indirect impacts to paleontological resources typically concern the loss of resources to theft and vandalism resulting from increased public access to paleontologically sensitive areas. Cumulative impacts to paleontological resources concern the incremental loss of these nonrenewable resources to society as a whole.

Surface grading or shallow excavations in the uppermost few feet of the younger Quaternary deposits (Qya, Qpe, Qmb, Qw) in the Proposed Project area are unlikely to uncover significant fossil vertebrate remains. However, deeper excavations in the Proposed Project area that extend down into older sedimentary deposits, as well as any excavations into old and very old paralic deposits (Qop2-4, Qop6; Qvop9, Qvop10, Qvop10a, Qvop11, Qvop12), Ardath Shale (Ta), Delmar Formation (Td), Torrey Sandstone (Tt), Scripps Formation (Tsc), and undivided Eocene-age rocks (Teo) may well encounter significant vertebrate fossils (McComas, 2016). Excavations into artificial fill (af) and landslide deposits (Qls) are unlikely to uncover significant fossil vertebrate remains; furthermore, any recovered resources will lack stratigraphic context. These deposits may, however, overlie older in-situ sedimentary deposits. Therefore, grading and other earthmoving activities may potentially result in significant direct impacts to paleontological resources throughout the entirety of the Proposed Project site.

10.0 RECOMMENDATIONS

Due to the prevalence of high paleontological potential of the geologic units within the Proposed Project area, implementation of measures to reduce the potential adverse impacts resulting from ground-disturbing activities groundis recommended. Prior to the start of construction, a paleontological resources monitoring plan should be prepared and implemented by a qualified paleontologist. That plan should include specific locations and construction activities requiring monitoring, procedures to follow for monitoring and fossil discovery, and a curation agreement with SDNHM. Monitoring is recommended for all ground-disturbing activities, except for augering of less than three-foot diameter holes, impacting native sediments of Ardath Shale, Delmar Formation, Torrey Sandstone, Scripps Formation, undivided Eocene deposits, and old and very old paralic deposits. Full-time monitoring is not recommended for excavations into young alluvial floodplain deposits, paralic estuarine deposits, and marine beach deposits, since these units are considered too young to contain in-situ significant paleontological resources. However, excavations impacting depths greater than five feet into these sediments should be periodically spot-checked, since older geologic units with high paleontological potential may shallowly underlie younger surficial sediments. No monitoring is recommended for excavations into artificial fill and landslide deposits, since these materials do not harbor in-situ paleontological resources.

REFERENCES

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APPENDIX A

SAN DIEGO NATURAL HISTORY MUSEUM RECORDS SEARCH RESULTS

Confidential Appendix Removed

APPENDIX B

SURVEY FOSSIL LOCALITY FORMS

Confidential Appendix Removed

APPENDIX C

STATE PARK PERMIT

APPLICATION AND PERMIT TO CONDUCT PALEONTOLOGICAL INVESTIGATIONS/COLLECTIONS

Instructions: Application must be TYPEWRITTEN with original signatures. USGS topographic map and other maps showing precise location of proposed work must be attached.

DPR USE ONLY	
APPLICATION NO.	
DATE RECEIVED	
DISTRICT	
CEQA	
PHONE NO.	

ORGANIZATION APPLICANT NAME

Geraldine Aron, Paleo Solutions Inc.

ADDRESS

911 S. Primrose Avenue, Unit N, Monrovia, CA 91016

The above applicant hereby applies to the Department of Parks and Recreation for a Permit under the Public Resources Code 5097.5 to conduct paleontological investigations on lands of the State of California as follows:

STATE PARK SYSTEM UNIT

San Diego Coast District- Torrey Pines State Natural Preserve

COUNTY

San Diego

GEOLOGICAL FORMATION

Holocene Marine beach deposits, old paralic deposits, Ardath Shale, Mission Valley Formation, Scripps Formation, and Torrey Sandstone

USGS QUADRANGLE(S)

7.5 Del Mar 1953/1975

SECTION	TOWNSHIP	RANGE	BASE AND MERIDIAN	UTMS
Unsectioned Pueblo lands	14S	4W	See attached map	

1. The aims, purposes, and methods of this investigation will be as follows (Attach continuation sheets as necessary. For excavations, provide a research design and an outline of the report to be provided.):

To conduct an intensive pedestrian survey of the components within Torrey Pines State Natural Reserve and to identify previously

known or unknown paleontological fossil localities. All localities will be documented and a final report provided to State Parks,

SDG&E, and San Diego Natural History Museum. We will also verify the geology mapped.

2. Approximate amount of material to be collected (number of specimens, weight, etc.)

We are not collecting fossils, but recommendations will be made.

3. Expected duration of the project (Specify dates of field investigations, laboratory study, and report completion):

The survey will last 1-2 days and based on when we receive a notice to proceed from State Parks.

4. General scope and nature of applicant organization's activities and goals:

The areas proposed for the paleontological survey are part of a project that is proposing to remove existing structures. The survey will consist of confirming the geologic formation as mapped, re-evaluation of previously recorded fossil localities, and recordation of any new fossil localities discovered during the survey. The paleontological survey will not involve any ground disturbing activities, and vehicle use will be restricted to existing roads. No fossils will be collected during the survey.

5. Name, title, address, telephone, and affiliation of principal investigator (Attached resume or curriculum vitae):

Geraldine Aron, M.S., Paleo Solutions

Monrovia, CA 91016

911 S. Primrose Avenue, Unit N

6. Name, address, affiliation and telephone number of person in actual direct charge of field work (Attach resume and curriculum vitae if different from No. 4):

Geraldine Aron, M.S.; Joey Raum; Courtney Richards of Paleo Solutions, 911 S. Primrose Avenue, Unit N, Monrovia, CA 91016
562-818-7713

7. Names and titles of field and laboratory assistants:

Joey Raum and Kathy Gonzales, Paleontological Field Technicians

8. Laboratory work will take place at (institution, address, phone numbers, person to contact):

No laboratory work is anticipated.

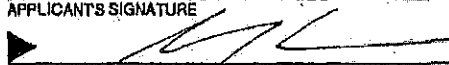
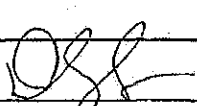
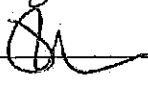

9. Name and location of facility that has agreed to curate materials collected under this permit (must meet requirements under Standard Conditions and Restrictions):

No fossils will be collected. If collection is recommended a new permit application will be submitted.

10. List previous and currently held permits with the Department of Parks and Recreation.

San Mateo State Park and Crystal Cove State Park.

I have read and agree to adhere to the Standard Conditions and Restrictions attached to this Application and Permit.

APPLICANT'S SIGNATURE 	APPLICANT'S NAME (Print or type) Geraldine Aron	DATE 09/06/2016
REVIEWED BY	SIGNATURE	DATE
RESOURCE ECOLOGIST OR PALEONTOLOGIST		9/6/16
DISTRICT SUPERINTENDENT		10/6/16
SENIOR GEOLOGIST		
NATURAL HERITAGE SECTION SUPERVISOR'S APPROVAL SIGNATURE 	EPM-I	DATE 10-19-16

APPLICANT MUST CARRY THIS PERMIT AT ALL TIMES WHILE COLLECTING

PERMIT VALID FROM 10/18/2016 TO 10/18/2017

PERMIT CONDITIONS: See attached

PERMIT CONDITIONS

Provide final report and any related maps and or GIS shapefiles to District Archaeologist Nicole Turner (Nicole.Turner@parks.ca.gov).

Notify District Archaeologist 48 hours prior to site visit.

(Archaeological):

1) Any and all potential ground disturbance requires review by San Diego Coast District Archaeologist, Nicole Turner.

(Natural):

Survey and construction work should not be conducted within bird breeding season (~February 15-September 15).

STANDARD CONDITIONS AND RESTRICTIONS (PALEONTOLOGICAL PERMITS)

Only paleontological material may be collected under issuance of this permit. *All specimens collected remain the property of the State of California, Department of Parks and Recreation (DPR).* The applicant is responsible for arranging for the curation, accession, safeguarding and preservation of all materials collected in accordance with accepted museum standards. These arrangements must address the continuing availability of the collection for public observation, scientific study and display if curated (on loan) to institutions outside of DPR facilities. It is the responsibility of the permit holder to provide DPR with three (3) copies of all catalogs, field notes, photographs and reports, even if curation is arranged in a facility not under the control of DPR. Collection should be accomplished by methods that conserve resources and must be of some tangible benefit to the State Park System. The collections shall be used for scientific and educational purposes dedicated to public benefit only and shall in no case be used for commercial purposes or personal profit.

All work to be accomplished shall be discussed with the District Superintendent or designee prior to beginning field work. The District Superintendent may specify additional restrictions or conditions due to site sensitivity, natural hazards in the area, visitor traffic patterns, etc. Field work shall be scheduled with the District Superintendent or designee, who shall be contacted immediately upon arrival in the park unit. Should unanticipated changes in conditions occur during the course of the field work, additional restrictions may be required for reasons of health, safety and resource protection. Direct any questions regarding this permit to the District Resource Ecologist. This permit may be cancelled by the District Superintendent.

Plant life and other features shall not be disturbed without permission of DPR staff. After excavation, restore the area to as near its former condition as possible. Park unit staff should be consulted before and after backfilling, for suggestions and approval.

Permits are issued for one year or a portion thereof. Within six months of permit expiration and at least thirty (30) days prior to filing final reports with any other agency, permittee agrees to provide DPR with three (3) copies of all site survey records, survey and excavation reports, photographs, and specimen catalogs for review. A final report is required within a year. One (1) set of the above specified documents will be sent to the District Resource Ecologist and two to the Natural Heritage Supervisor. Copies of any materials published shall be submitted to DPR and should include an acknowledgment of the Department of Parks and Recreation. For continuing studies, submit a new application with four (4) copies of a progress report.

Applicant agrees to indemnify, save harmless, and defend the State of California, its officers, agents, and employees against any and all claims, demands, damages, losses or liability of its officers, agents, and employees due or incident to, either in whole or in part, whether indirectly or directly connected with, the activities described in this permit or arising out of or in any way connected with or incident to the permit issued from this application. In the event State is named as codefendant under the provisions of Government Code Sections 895 et seq., the Permittee shall notify State of such fact and shall represent State in such legal action unless State undertakes to represent itself as codefendant in such legal action, in which event State shall bear its own litigation costs, expenses, and attorney's fees. The applicant, its officers, agents, employees, or others holding permits under this application, acting in the performance of this agreement, are not officers, agents or employees of the State.

Unit	Geology Description (very preliminary version)
Qmb	Marine beach deposits (late Holocene) – Unconsolidated beach deposits consisting mostly of fine and medium-grained sand.
Qop2-4	Old paralic deposits, Units 2 - 4 undivided (late to middle Pleistocene) – Poorly sorted, moderately permeable, reddish-brown, interfingering strandline, beach, estuarine and colluvial deposits composed of siltstone, sandstone and conglomerate. In much of the area, marine terraces and their paralic deposits cannot be divided as they merge with and are alternately covered by one another. Their physical and temporal relationships are diagrammatically illustrated in Plate 2.
Qop6	Old paralic deposits, Unit 6 (late to middle Pleistocene) – Poorly sorted, moderately permeable, reddish-brown, interfingering strandline, beach, estuarine and colluvial deposits composed of siltstone, sandstone and conglomerate. These deposits rest on the 22-23 m Nestor terrace (Plate 2).
Qpe	Paralic estuarine deposits (late Holocene) – Unconsolidated estuarine deposits. Composed mostly of finegrained sand and clay.
Qvop10	Qvop10 Very old paralic deposits, Unit 10 (middle to early Pleistocene) – Poorly sorted, moderately permeable, reddish-brown, interfingering strandline, beach, estuarine and colluvial deposits composed of siltstone, sandstone and conglomerate. These deposits rest on the 104-106 m Tecolote terrace (Plate 2).
Qvop10a	Very old paralic deposits, Unit 10a (middle to early Pleistocene) – Poorly sorted, moderately permeable, reddish-brown, dune and back beach "beach ridge" deposits composed of cross-bedded sandstone. The ridge is a conspicuous linear topographic high that has formed along a strandline, on and as a part of Qvop10.
Qvop11	Qvop11 Very old paralic deposits, Unit 11 (middle to early Pleistocene) – Poorly sorted, moderately permeable, reddish-brown, interfingering strandline, beach, estuarine and colluvial deposits composed of siltstone, sandstone and conglomerate. These deposits rest on the 92-94 m Claremont terrace (Plate 2).
Ta	Ardath Shale (middle Eocene) – Mostly uniform, weakly fissile olivegray silty shale. The upper part contains thin beds of mediumgrained sandstone, similar to thicker ones in the overlying Scripps Formation, and concretionary beds with molluscan fossils. The type section of the Ardath Shale is on the east side of Rose Canyon, 800 m south of the Ardath Road intersection with Interstate 5 (Kennedy and Moore, 1971).
Tmv	Mission Valley Formation (middle Eocene) – Predominantly lightolive-gray, soft and friable, fine- to medium-grained marine and nonmarine sandstone containing State Highway 163 (Kennedy and Moore, 1971).cobble conglomerate tongues. Contains a diverse late Uintan mammal fauna (Walsh and others, 1996) and a robust molluscan fauna assigned to the Tejon stage (Givens and Kennedy, 1979). A bentonite bed within the upper part of the Mission Valley Formation yielded a single crystal $^{40}\text{Ar}/^{39}\text{Ar}$ date of 42.83 ± 0.24 Ma (reported in Walsh and others, 1996). The Mission Valley Formation has a maximum thickness of 60 m and was named for exposures along the south wall of Mission Valley on the west side of
Tsc	Scripps Formation (middle Eocene) – The Scripps Formation (Tsc) is mostly pale-yellowish-brown, medium-grained sandstone containing occasional cobble- conglomerate interbeds. It contains a middle Eocene Molluscan fauna (Givens and Kennedy, 1979). The Scripps Formation is 56 m thick at its type section, which is 1 km north of Scripps Pier, on the north side of the mouth of Blacks Canyon (Kennedy and Moore, 1971). Both the basal contact with the Ardath Shale and the upper contact with the Friars Formation are conformable. In upper Carroll Canyon, a tongue of the Scripps Formation (Tscu) exists above an intervening part of the Stadium Conglomerate. This "upper" tongue is difficult to separate from the main body of the Scripps Formation where the Stadium Conglomerate is absent.
Tt	Torrey Sandstone (middle Eocene) – White to light-brown, medium- to coarse-grained, moderately well indurated, massive and broadly cross-bedded, arkosic sandstone. This unit is the Torrey Sand Member of Hanna (1926) and was named for exposures at Torrey Pines State Park. It is now considered a formation of the La Jolla Group (Kennedy and Moore, 1971).

Torrey Pines Paleo Survey Abstract

Once a State Park permit has been received, Paleo Solutions, Inc. (Paleo Solutions) proposes to conduct a pedestrian paleontological survey in support of the SDG&E Del Mar Reconfigure Project. The SDG&E Project proposes to remove and reconfigure existing transmission lines, which will involve the removal of existing transmission line structures within the Torrey Pines State Natural Preserve. The purpose of the paleontological survey is to assist in evaluating the potential impact of the SDG&E Project on significant paleontological resources pursuant to the California Environmental Quality Act (CEQA).

The paleontological survey will be completed by two Paleo Solutions paleontologists over the course of 1 to 2 days. The survey will consist of confirming the geological formations as mapped, re-evaluation of previously recorded fossil localities identified during the records search completed by the San Diego Natural History Museum (SDNHM), and recordation of any new fossil localities discovered during the survey. Only areas with undetermined, moderate, and high paleontological potential will be inspected, which is anticipated to include outcrops of old paralic deposits, Ardath Shale, Mission Valley Formation, Scripps Formation, and Torrey Sandstone. Areas obscured by built environments, including landscaping and hardscaping, as well as areas covered by thick vegetation will not be surveyed, regardless of sensitivity. The survey will include documentation of the surficial geology of each quarter-quarter section surveyed. All new fossil localities described in terms of stratigraphic position within the enclosing geologic rock unit. Geographic data will be collected using appropriate field equipment (e.g., Trimble GeoXT units or mobile devices equipped with esri's Collector for ArcGIS application). Additional field data recorded will include types of fossils discovered, mode of preservation, field identifications (taxonomic and morphological), location in UTM coordinates (NAD 83 datum), rock type, stratigraphic position, depositional environment and taphonomic observations. The paleontological survey will not involve any ground disturbing activities and vehicle use will be restricted to existing roadways. Fossils will not be collected during the survey, but recommendations will be made in a final technical report to deal with the disposition of these fossils. Should fossil collection be recommended, a new permit application will be submitted. The final technical report will be provided to the State Park, SDNHM, and project proponent (SDG&E).

TL666D/
674A Project
Pre-Planning Phase
(Archaeological Resources)



0 2,000
Feet
1 inch = 2,000 feet

Project Structure



Study Area



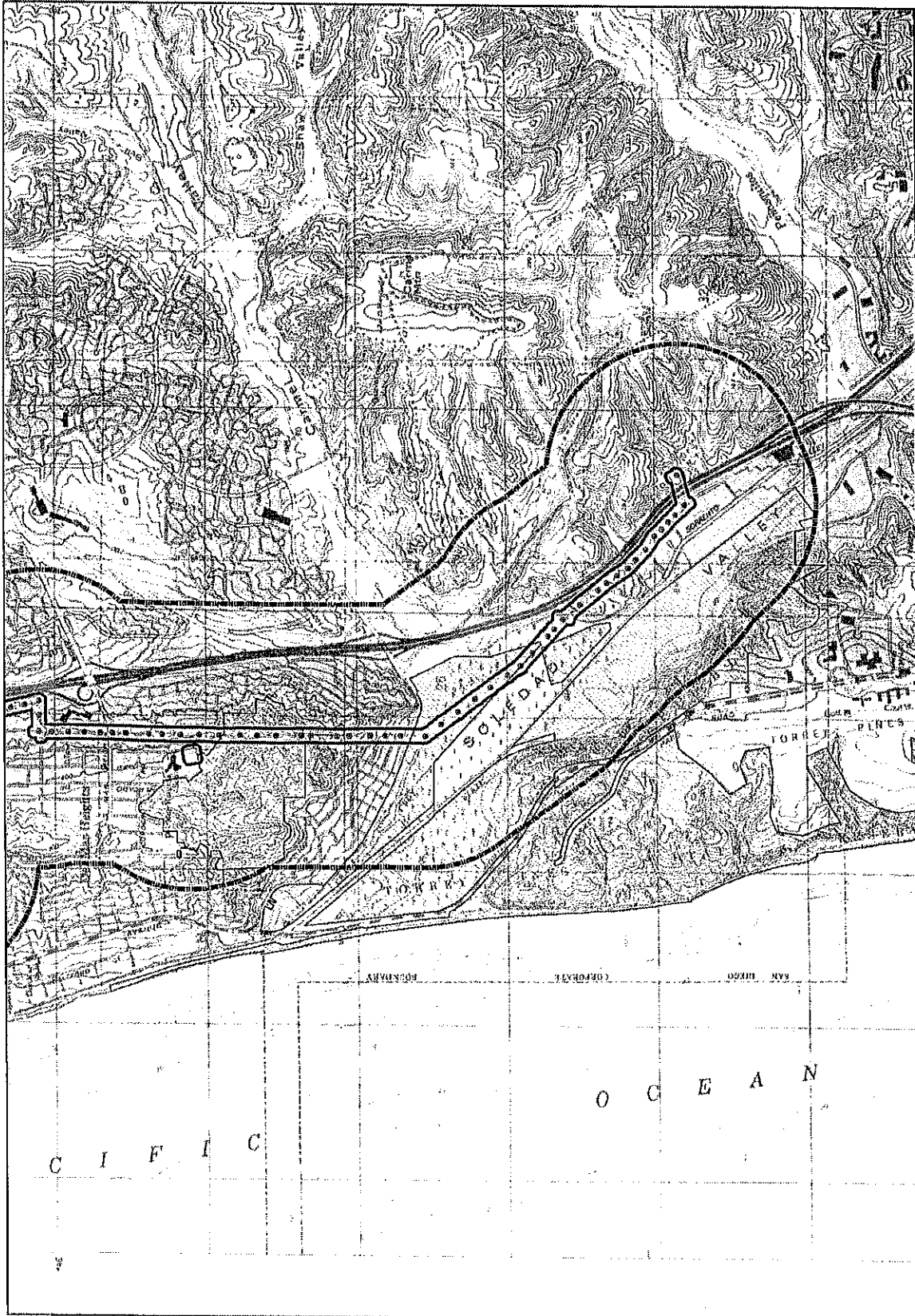
0.5 mile Buffer



State Parks



Legend





Geraldine Aron, MS

Principal Paleontologist

SUMMARY

YEARS OF EXPERIENCE

18 Total Years

EDUCATION

MS Geological Sciences
CSU Long Beach, 2008

BS Geological Sciences
CSU Long Beach, 2000

CERTIFICATIONS

BUREAU OF LAND MANAGEMENT

Paleontological Permit - CA
Paleontological Permit - AZ
Paleontological Permit - NV

UNITED STATES FOREST SERVICE

Permit - Angeles National Forest

CARTOGRAPHY & GIS SYSTEMS

CSU Long Beach, 2000

QUALIFIED PALEONTOLOGIST

Orange County
Riverside County
County of San Diego
City of San Diego

AFFILIATIONS

Society of Vertebrate Paleontology
Geological Society of America
Association for Women Geoscientists
Society for Sedimentary Geology (SEPM)

PROFILE

Geraldine is President and a Principal Investigator at Paleo Solutions, Inc. (PSI). She has more than 18 years of experience as a professional paleontologist in natural resources management. She meets the professional standards as a paleontological Principal Investigator for the Society of Vertebrate Paleontologists, BLM, USFS, San Bernardino County, Orange County, San Luis Obispo County, San Diego County, and other agencies that retain a professional list for qualified paleontologists. Geraldine has produced hundreds of technical reports, which include paleontological assessments, DEIRs, EIR/EIS, Paleontological Mitigation and Monitoring Plans, document reviews, and survey reports for CEQA/NEPA compliance. Geraldine has worked on dozens of transportation projects from San Diego County to Humboldt County. She is responsible for maintaining the overall scientific integrity and oversight of all paleontological projects for PSI. Her areas of expertise include: Paleontological resources project scoping and management; compliance with Federal and State of California laws; Federal and California State agency consultation; preparing and implementing research designs; serving as Principal Investigator for surveys, significance evaluations and data recovery excavations; development of Paleontological Resources Management Plans and Treatment Plans; public outreach and involvement.

PROJECT EXPERIENCE

SDG&E ETS 31138 Install Cathodic Protection San Diego Gas & Electric | San Diego County, CA

Principal Investigator/Project Manager. Ms. Aron oversaw paleontological monitoring services in sensitive sediments for an improvement project within the SDG&E Instl Cathodic Protection, L-3010, Fallbrook project in Fallbrook, CA.

SDG&E Margarita Storage Yard Erosion San Diego Gas & Electric | San Diego County, CA

Principal Investigator/Project Manager. Ms. Aron oversaw paleontological monitoring and authored the Monitoring Compliance Report at the SDG&E Margarita Storage Yard Erosion Repair Project located in southern Orange County, east of Ladera Ranch and two miles north of Ortega Highway (State Route 74). The project involved the following construction activities: over excavation beyond the visible erosion, addition of a sub-drain with trench dams buried within the eroded area; and, connection to an energy dissipater.

SDG&E Pendleton Energy Park San Diego Gas & Electric | San Diego County, CA

Principal Investigator/Project Manager. Ms. Aron performed a desktop level review for a High Level Constrains Analysis to be incorporated into an EIR section for the Energy Park Project within currently developed San Onofre Nuclear Generating Station (SONGS) Mesa Site on Marine Corps Base Camp Pendleton. This included overlaying the geology, record search and literature search, analyzing aerial photos, and summarized in a technical report. While conducting paleontological monitoring for geotechnical work, Paleo Solutions recommended to reduce monitoring efforts since the auger size was not conducive for paleontological resources.

SDG&E Talega Substation - Synchronous Condenser Facility Project San Diego Gas & Electric | Orange County, CA

Principal Investigator/Project Manager. Ms. Aron oversaw a records search at the Los Angeles County Museum of Natural History and the San Diego Natural History Museum in order to determine whether planned excavation to remove existing 230 kV capacitor banks and install a +450/240MVAR synchronous

condenser facility at Talega Substation will encroach on previously investigated fossil localities.

SDG&E Transmission Line 13833 Project
San Diego Gas & Electric | Orange County, CA

Principal Investigator/Project Manager. Ms. Aron oversaw paleontological monitoring during construction services for replacement of Tie Line 13833 - a 138 kV single-circuit transmission line. The replacement started at the San Mateo Substation in the City of San Clemente, CA and ended on lands leased to the California State Parks within Marine Corps Base Camp Pendleton, San Diego, CA. The project components included replacing 17 existing wood poles with steel poles, installing two additional steel poles along the alignment, top four existing wooden transmission poles and utilizing one staging yard - SONGS parking lot. She co-authored the Final Paleontological Mitigation Compliance Report.

Interstate 805 North HOV/BRT Design Build
Caltrans & San Diego Association of Governments | San Diego County, CA

Principal Investigator/Project Manager. Ms. Aron co-authored the Paleontological Mitigation Plan and is overseeing paleontological construction monitoring as part of the I-805 North project, which is a critical element of the San Diego Regional Transportation Plan's corridor of projects to increase capacity on the I-805.

Ocotillo Wind Express Facility Project
Pattern Energy | Bureau of Land Management | Imperial County, CA

Principal Investigator/Project Manager. Ms. Aron conducted all paleontological related services. This included proper BLM authorization and permitting to conduct surveying and a research design for field reconnaissance related to EIS/EIR documentation for 15,000 acres in Ocotillo. A specific protocol was developed as a practical tool for managing compliance with laws relating to paleontological resources, among which are CEQA and NEPA compliance. This included the oversight of third party monitoring for archaeological and paleontological resources, once construction was underway.

United States Gypsum Well Project
Bureau of Land Management | Ocotillo, CA

Principal Investigator/Project Manager. Ms. Aron provided an analysis of existing data for paleontological resources for the proposed United States Gypsum well project. USGS is proposing to drill two test wells on a one-acre site on lands administered by the Bureau of Land Management.

Aliso Canyon Turbine Replacement Project
Southern California Gas | Los Angeles County, CA

Principal Investigator/Project Manager. As field manager and principal investigator, Ms. Aron is responsible for surveying and developing and implementation of the field mitigation monitoring program for the project. Additionally, Paleo Solutions performed a Paleontological Records Search, Monitoring and Treatment Plan. Routinely provided submittals to the California Public Utilities Commission to reduce monitoring efforts where possible. She is also overseeing both paleontological and archaeological monitoring during ground-disturbing activities.

Astoria Solar Project
Recurrent Energy | Kern County, CA

Principal Investigator/Project Manager. Ms. Aron co-authored a Paleontological Resource Survey Report in order to evaluate the paleontological resource potential for the Recurrent Energy Astoria Solar Project that will produce a total of 175 MW of electricity from approximately 2,300,000 solar PV panels on 2,060 acres of land in southern unincorporated Kern County. The goal of the report was to identify the paleontological sensitivity of the Project area and develop recommendations for the mitigation of adverse affects on paleontological resources that may result from the proposed construction. The study was performed in accordance with the California Environmental Quality Act (CEQA) (Public Resources Code, §21000 et seq.), State CEQA Guidelines (California Code of Regulations, Title 14, §15000 et seq.), and County of Kern (2009) Archaeological, Paleontological, Cultural, and Historical Preservation Policy.

Catalina Solar Photovoltaic Generating Facility Project
EDF Renewable Energy | Kern County, CA

Principal Investigator/Project Manager. Ms. Aron developed the Survey Strategy, Paleontological Mitigation Monitoring Resource Plan, oversaw all monitoring during construction, and wrote the final paleontological monitoring report. The Catalina Project site was found to have minimal potential for scientifically significant paleontological resources that could be impacted by construction-related ground disturbance. The purpose of the Paleontological Resource Mitigation Plan (PRMP) was to outline the procedures that should be followed during to construction in order to reduce adverse impacts on paleontological resources within the Project area to below the level of significance. The mitigation program was designed to comply with the California Environmental Quality Act (CEQA), the California Code of Regulations, Title 14, Division 3, Chapter 1, Sections 4307 and 4309, and the Public Resources Code Section 5097.5, and Kern County Guidelines.

Contra Costa-Moraga 230 kV Reconductoring Project
Pacific Gas & Electric | Contra Costa County, CA

Principal Investigator/Project Manager. Ms. Aron established the database of a very complex paleontological survey which had approximately 29 different rock formations over 32 miles. She was able to shorten an extensive survey that could have taken 2-3 weeks to 5 days by strategizing which rock formations to focus survey on. This investigation was conducted in compliance with CEQA. The tasks required to accomplish the inventory include pre-field research, GIS and geologic mapping tasks, published literature research, paleontological surveys, and preparation of the technical report.

Coolwater-Lugo Transmission Line Project Southern California Edison
Southern California Edison | San Bernardino County, CA

Principal Investigator/Project Manager. Ms. Aron oversaw cultural and paleontological investigations of the alternative routes and substation locations identified by Southern California Edison for the construction of approximately 47-52 miles double-circuit 220 kV transmission lines, approximately 15-20 miles of single-circuit 550 kV transmission lines, removal of approximately 15-6 corridor miles of existing 220 kV transmission lines, and construction of a new 500/220/115 kV substation for completion of a Programmatic Environmental Assessment (PEA) required by the CPUC and an Environmental Impact Report/Environmental Impact Statement. Ms. Aron was the leader author on the facilitation of production of the paleontology sections in support of the EIR/EIS and PEA. Ms. Aron was also the permit holder for a BLM authorization and permit to conduct surveying and a research design for field reconnaissance related to the preparation of a Proponent's Environmental Assessment (PEA), as well as EIS/EIR documentation for the proposed transmission line.

Desert Sunlight Solar Farm
First Solar | Riverside County, CA

Principal Investigator/Project Manager. Ms. Aron is the Principal Investigator/PM for all aspects of paleontological resources for the DSSF Project. This includes proper BLM authorization and permitting to conduct surveying and a research design for field reconnaissance and documentation for 4,000 acres in the Desert Center near Palm Springs. The Protocol was developed as a practical tool for managing compliance with laws relating to paleontological resources, among which are CEQA and NEPA compliance. Ms. Aron was responsible for developing a paleontological mitigation plan, field survey, and coordinating all monitors for fieldwork. Several significant ice age fossils have been recovered, identified, and curated from this project.

Devers-Palo Verdes No. 2 500 kV Transmission Line
Southern California Edison | Riverside County, CA

Principal Investigator/Project Manager. Ms. Aron oversaw all paleontological project management and compliance monitoring for this project, including surveying, recordation, and mitigation procedures. Daily reporting in FRED was required to comply with CPUC and BLM requirements. During monitoring in the highly sensitive Palm Springs unit, a bed of finely preserved leaf impressions were discovered, in the vicinity of another fossiliferous layer containing small rodent-sized bones. After consultation with SCE, a representative sample of this unit, approximately 2000 pounds, was retrieved and taken back to the Paleo Solutions laboratory for analysis. Portions of this sediment were soaked in water to break it down, then the resulting sediments were finely screened and sorted under a microscope to retrieve potentially scientifically significant microfossils including rodent bones and teeth that will help constrain the exact age of the sediments. Other portions were carefully split in order to reveal the leaf impressions, and preserved in a fashion so that a paleobotanist will be able to identify the plant species. Proper monitoring of the earthmoving in this highly sensitive formation ensured that these specimens were safely retrieved with no construction down time. These specimens will be identified, catalogued, and deeded to the Western Science Center so their scientific value will not be lost, and to provide new data points for a formation that is not well studied in the Project area, and add to the scientific literature about the paleoenvironmental history of this Pliocene-aged formation.

El Casco System Transmission Line
Southern California Edison | Riverside County, CA

Principal Investigator/Project Manager. Ms. Aron oversaw all project management and compliance monitoring, which included salvaging small and large fossils, screen washing, sorting fossils, including stratigraphic and fossils documentation. Our rapid fossil techniques allowed us to keep construction projects on track. This project includes the proposed El Casco Substation site, upgrades to the Zanja and Banning Substations and the SCE's Mill Creek Communications Site, upgrades to a total of 15.4 miles of existing 115 kV sub-transmission line and associated structures, and the installation of fiber optic cables within existing conduits in public streets and on existing SCE structures between the Cities of Redlands and Banning. All portions of the Proposed Project are located within Riverside and San Bernardino Counties, California. Daily reporting via an electronic portal was required to comply with the CPUC requirements.

Gates I and II Solar Projects
Pacific Gas & Electric | Fresno County, CA

Principal Investigator/Project Manager. Ms. Aron was the project manager and principal investigator who oversaw the paleontological inventory

reviews for both the Gates I and Gates II Solar Projects in Fresno County, California. Paleontological work for this project met an aggressive planning and execution schedule. The report was written in accordance with CEQA, and Fresno County requirements.

Grid Reliability and Maintenance, Seawolf 12 kV, Argonaut 12 kV, Thresher 12 kV, Alligator 12 kV Distribution Substation Planning
Southern California Edison | Temecula, CA

Principal Investigator/Project Manager. Ms. Aron oversaw paleontological monitoring during grading and excavating for the Seawolf, Argonaut, Thresher, and Alligator 12 kV lines. A Final Paleontological Monitoring report was completed in accordance with CEQA, as well as Riverside county requirements and was consistent with the recommendations made in the Paleontological Resources Treatment Plan for Triton Substation Project located adjacent to the four Distribution Substation Planning (DSP) circuits.

Haskell Canyon Interim Road and Switching Station Project
Los Angeles Department of Water and Power | Los Angeles County, CA

Principal Investigator/Project Manager. Ms. Aron provided project management during excavation activities within paleontologically sensitive portions of the project area on a full-time basis since 2013. Excavations within the Castaic Formation produced 96 fossil specimens from four localities.

Horsetown Substation Project
Southern California Edison | Riverside County, CA

Principal Investigator/Project Manager. Ms. Aron oversaw the coordination of the preparation of compliance and environmental documentation including a paleontological inventory for this project in Riverside County, utilizing CEQA and Riverside County paleontological guidelines.

Jefferson to Stanford No. 2 60 kV Feasibility Project
Pacific Gas & Electric | San Mateo County, CA

Principal Investigator/Project Manager. Ms. Aron oversaw the preparation of the paleontological resources review, including the paleontological inventory report (PIR) and Proponent's Environmental Assessment (PEA) for the project. Several potential routes were assessed for this project, and the feasibility and paleontological potential was determined for this project. The report and PIR were prepared according to CEQA guidelines.

Line 107/131 Projects
Pacific Gas & Electric | Alameda County, CA

Principal Investigator/Project Manager. Ms. Aron was the project manager and principal investigator who oversaw the preparation of mitigation recommendations, a paleontological inventory report, managed planned survey of proposed pipeline locations, and oversaw construction monitoring including WEAP training. The work conducted for these projects was completed in accordance with CEQA and Alameda County requirements.

Line 300A/MP 147.7 and 180.8 Projects
Pacific Gas & Electric | San Bernardino County, CA

Principal Investigator/Project Manager. Ms. Aron managed the preparation of mitigation recommendations and a paleontological inventory report for this project, as well as managing planned surveys on BLM and United States Marine Corps lands, along with production of technical reports. All project related work was in accordance with CEQA, San Bernardino County and Federal requirements. This project was located in several locations throughout the Mojave Desert extending from Rosamond to Adelanto. Part of the project required gaining security clearances to access Edwards Air Force Base.

Manzana Wind Express Project
Iberdrola Renewables | Kern County, CA

Principal Investigator/Project Manager. Ms. Aron developed the Paleontological Mitigation Monitoring Resource Plan, oversaw all monitoring during construction, and wrote the final paleontological monitoring report. The Manzanita Wind Energy Project site was found to have the potential for scientifically significant paleontological resources that could be impacted by construction-related ground disturbance. Project construction consisted of the installation of 107 to 300 wind energy turbines, aligned along approximately 26 rows, on the 6,275-acre proposed site. The limits of project surface disturbance included staging, access and temporary construction easements, as well as temporary construction signage. The purpose of the Paleontological Resource Mitigation Plan (PRMP) was to outline the procedures that will be followed during to construction in order to reduce adverse impacts on paleontological resources within the Project area to below the level of significance. The mitigation program was designed to comply with the California Environmental Quality Act (CEQA), the California Code of Regulations, Title 14, Division 3, Chapter 1, Sections 4307 and 4309, the Public Resources Code Section 5097.5 and Kern County Guidelines.

Mesa 500 kV Substation Project
Southern California Edison | Los Angeles County, CA

Principal Investigator/Project Manager. Ms. Aron oversaw a paleontological investigation to evaluate the expansion, upgrade, and loop-in of existing

substation and associated facilities with respect to the paleontological resource potential of the Mesa 500 kV Substation project. Upgrading the existing Mesa Substation and connecting existing transmission lines to the substation will address future reliability concerns related to the projected retirement of older coastal power plants and the previous retirement of the San Onofre Nuclear Generating Station (SONGS), without requiring new transmission lines or substations. The existing Mesa Substation is approximately 202-acres and is located in Monterey Park, Los Angeles County, California.

Natural Substation Project

Southern California Edison | Los Angeles County and Ventura County, CA

Principal Investigator/Project Manager. Ms. Aron is responsible for surveying and developing and implementation of the field mitigation monitoring program for the project. Additionally, performed Paleontological Records Search, Monitoring and Treatment Plan. The California Public Utilities Commission has approved all of our monitoring mitigation plans.

Pacific Wind Express Project

EDF Renewable Energy | Kern County, CA

Principal Investigator/Project Manager. Ms. Aron developed the Paleontological Mitigation Monitoring Resource Plan, oversaw all monitoring during construction, and wrote the final paleontological monitoring report. The Pacific Wind Express Project site was found to have the potential for scientifically significant paleontological resources that could be impacted by construction-related ground disturbance. The purpose of the Paleontological Resource Mitigation Plan (PRMP) was to outline the procedures that will be followed during to construction in order to reduce adverse impacts on paleontological resources within the Project area to below the level of significance. The mitigation program is designed to comply with the California Environmental Quality Act (CEQA), the California Code of Regulations, Title 14, Division 3, Chapter 1, Sections 4307 and 4309, and the Public Resources Code Section 5097.5, and Kern County Guidelines.

Path 46 Transmission Line

Los Angeles Department of Water and Power | Los Angeles County, CA to Clark County, NV

Principal Investigator/Project Manager. Ms. Aron oversaw all paleontological services, including identifying and analyzing possible effects to scientifically important paleontological resources resulting from the implementation of the LADWP Path 46 project. This included obtaining California and Nevada Bureau of Land Management paleontological permits, a pre-survey paleontological analysis of existing data, field surveys of 15 of the 16 grading locations-to-date on approximately 507 acres of the project (additional sites remain to be surveyed in Nevada), preparation of a Paleontological Monitoring and Mitigation Plan (PMMP), construction monitoring and technical reports.

Palermo-East Nicolaus 115 kV Transmission Line

Pacific Gas & Electric | Butte, Sutter, Yuba Counties, CA

Principal Investigator and Project Manager. PG&E proposes to construct about 314 new poles and/or metal lattice tower supporting a 115-kV transmission line along an approximately 40-mile transmission line segment. The project route would follow the existing Palermo-East Nicolaus 115-kV Transmission Line between PG&E's Palermo and East Nicolaus substations within unincorporated areas of Butte, Sutter, and Yuba Counties. Ms. Aron conducted a desktop level review of the Paleontological Monitoring Plan (PMP), including geologic maps and taking into account PG&E's Paleontological Resource Standards and Procedures. The review was conducted to determine if additional studies are needed for the project.

Petaluma Line 021 Pipeline Replacement Project

Pacific Gas & Electric | Sonoma County, CA

Principal Investigator/Project Manager. Ms. Aron was the project manager and principal investigator who oversaw the preparation of mitigation recommendations, a paleontological inventory report, and managed planned survey of proposed pipeline locations. She also oversaw construction monitoring and WEAP training. This project was completed in accordance with CEQA and Sonoma County requirements.

San Joaquin Cross Valley Loop Project

Southern California Edison | Tulare County, CA

Principal Investigator/Project Manager. Ms. Aron was responsible for coordination of all surveying, preparation of compliance and environmental documentation for this project, and co-authored the final Paleontological Monitoring Plan for this project in Tulare County, in accordance with CEQA requirements. Once construction commenced, Geraldine oversaw all archaeological and paleontological monitoring, and coordinated with tribal monitors. She also co-authored the monitoring report. She routinely provided submittals to the California Public Utilities Commission to reduce monitoring efforts where possible.

Scattergood-Olympic Line 1 Project

Los Angeles Department of Water and Power | Los Angeles County, CA

Principal Investigator/Project Manager. Ms. Aron managed all paleontological monitoring during potholing investigations to identify locations where

underground maintenance vaults would be placed. When fossils were discovered during excavation, Ms. Aron aided in determining significance and identifying the fossils.

Soda Mountain Solar Project

Bechtel Development Company | San Bernardino County, CA

Principal Investigator/Project Manager. Ms. Aron oversaw a fully comprehensive resources section for the Draft Environmental Impact Statement/Environmental Impact Report for the proposed Soda Mountain Solar project that will generate and deliver solar generated power to the California electric grid through an interconnect to the Market Place-Adelanto 500 kV transmission line owned by Los Angeles Department of Water and Power (LADWP).

Springbok 1 Solar Farm and Oryx Solar Farm

8minutenergy | Bureau of Land Management | Kern County, CA

Principal Investigator/Project Manager. Ms. Aron completed paleontological desktop level review conducted for the 8minutenergy Oryx Solar Project, Springbok Solar Project, and potential Gen-Tie Routes. The scope of the paleontological analysis includes reviews of published geologic mapping, similar projects that fall within close proximity, and relevant regional scientific literature. She is currently overseeing paleontological monitoring during construction grading for the 951-acre Springbok 1 Solar Farm Facility and Springbok 2 Solar Farm Facility covering approximately 1,350 acres.

Stateline Solar Farm Project

First Solar | Bureau of Land Management | San Bernardino County, CA

Project Manager/Principal Investigator. Ms. Aron is the Paleontological Use Permit holder for this project through the BLM Needles Field Office. Initially, she oversaw a pre-construction field survey and analyzed possible effects to paleontological resources resulting from the construction and operation of the project in order to reduce potential adverse impacts on scientifically important fossils. After the survey was completed, she co-authored the Paleontological Monitoring and Mitigation Plan (PMMP), which described the paleontological potential of the project area and provided construction monitoring procedures and locations as originally outlined in the BLM's Record of Decision. Ms. Aron is currently overseeing paleontological field monitors during grading/excavation activities and is responsible for maintaining compliance with the mitigation measures to reduce potential adverse impacts during construction to a level below significance.

Tehachapi Renewable Transmission Project

Southern California Edison | California Public Utilities Commission | Los Angeles, Kern, and San Bernardino Counties, CA

Principal Investigator/Project Manager. Geraldine Aron is the Principal Investigator/PM for all aspects of paleontological resources for Southern California Edison's (SCE) Tehachapi Renewable Transmission project (TRTP), and other associated Areas of Potential Effects (APE's) including but not limited to areas in the counties of Los Angeles, Kern, and San Bernardino, California. The APE's include but are not limited to surveying and grading for access roads, pulling and splicing locations, marshaling and staging yards, shoo-flies, and tower erection sites. Our services are conducted in order to ensure SCE meets compliance responsibilities under California Environmental Quality Act (CEQA), National Environmental Policy Act (NEPA) and federal paleontology guidelines, using Society for Vertebrate Paleontology (SVP), and Bureau of Land Management's Potential Fossil Yield Classification System (PFYC) systems and guidelines. Ms. Aron is in charge of project staffing and scheduling needs, permits (BLM and USFS), developing research designs for unique situations, developing and updating monitoring procedures and monitoring plans, and interaction between our client and the lead agencies which allows us to properly mitigate paleontological resources. We have numerous monitors covering multiple areas. Communication and safety on large-scale multi-year, multi-component projects such as this is essential. All of Paleo Solutions documents are reviewed by the CPUC (California Public Utilities Commission) on a regular basis and the Angeles National Forest, as needed.

Topock Compressor Station

Pacific Gas & Electric | San Bernardino County, CA

Principal Investigator/Project Manager. Ms. Aron provided a memorandum summarizing the results that included the understanding of CERCLA. Paleo Solutions provided third party review of Paleontological documents to ensure adequacy of use in preparation of environmental documents. Documents included a report titled Paleontological Resources Management Plan, Topock Groundwater Remediation Project, San Bernardino County California and Mohave County, Arizona, prepared for Pacific Gas and Electric.

Valley-Auld-Triton 115kV Subtransmission Line

Southern California Edison | Riverside County, CA

Principal Investigator/Project Manager. Ms. Aron oversaw a paleontological field survey and records search and co-authored a Paleontological Resources Technical Report and paleontological section of the Programmatic Environmental Assessment (PEA) for SCE's proposal to upgrade the region's electrical infrastructure and improve its overall electrical reliability. The project is over 15 miles in length and involves the construction of a new 115 kV subtransmission line from Edison's existing Valley Substation in Menifee and its existing Auld Substation in Murrieta.

West of Devers Transmission Line Project
Southern California Edison | Riverside County, CA

Principal Investigator/Project Manager. Ms. Aron oversaw all project management and paleontological related services, including paleontological monitoring for fault trenching and geotechnical drilling. This included proper BLM authorization, and permitting to conduct surveying and a research design for field reconnaissance related to the preparation of a Proponent's Environmental Assessment, EIS/EIR documentation for the proposed transmission line. She was in charge of managing documentation with laws relating to paleontological resources including CEQA and NEPA compliance. The project scope changed several times which allowed for thorough tracking of all field and technical procedures and budget documentation.

Westwind Repowering Project
Tetra Tech & New Dimension Energy Company, LLC | Riverside County, CA

Principal Investigator/Project Manager. Ms. Aron managed all paleontological services, including co-authoring a Paleontological Inventory Report for New Dimension Energy Company's proposed project to replace 12 existing wind turbines with ten FloDesign Model 100 wind turbines at the Westwind Wind Energy across 375 acres.

Crenshaw/LAX Mass-Transit Light Rail Line
Los Angeles County Metropolitan Transportation Authority | Los Angeles, CA

Principal Investigator/Project Manager. Ms. Aron is overseeing Paleo Solutions scope as the lead paleontologist firm for Metro's 8.5-mile light rail line through southwest Los Angeles. She is also overseeing as-needed archaeological support and Native American monitoring. The line will run generally north-south and will connect the Crenshaw District and Leimert Park to Inglewood and Los Angeles International Airport (LAX). The line will be a part of the Los Angeles County Metro Rail System. Ms. Aron is overseeing all paleontological monitoring during construction excavation in sensitive sediments.

French Valley Parkway Interchange
California Department of Transportation District 8 | Temecula, CA

Principal Investigator/Project Manager. The French Valley Parkway Interchange is designed to reduce congestion and improve safety by relieving the I-15/Winchester Road Interchange and minimizing weaving movements on I-15 between Winchester Road and the I-15/I-215 Junction. Ms. Aron oversaw paleontological construction monitoring during earth-moving activities, including trenching, grading, and drilling due to the project's proximity to moderately sensitive paleontological formations. This work was conducted in accordance with the California Environmental Quality Act (CEQA), as well as Caltrans SER and Riverside County requirements. During construction monitoring, a partial horse jaw was discovered and salvaged along with a poorly preserved mammoth tusk fragment. Due to Paleo Solutions salvaging methods, construction was not affected. Specimens were prepared to the point of identification and curation at the Paleo Solutions laboratory using industry standard paleontological methods, including utilizing an air abraded, dental tools and preserved with PaleoBond. The specimens were deeded to the Natural History Museum of Los Angeles. A Final Paleontological Monitoring Report was completed in accordance with CEQA, as well as Caltrans Standard Environmental Reference (SER) and Riverside County requirements.

Laguna Niguel to San Juan Capistrano Passing Siding Project
Orange County Transportation Authority | Orange County, CA

Principal Investigator/Project Manager. Ms. Aron oversaw archaeological monitoring in potentially sensitive sediments during site clearing, grading, and excavation activities for OCTA's, in association with the Southern California Regional Rail Authority (SCRRA), proposed 1.8-mile new passing siding project on the LOSSAN rail corridor. She also oversaw and coordinated with the Gabrieleno-Tongva Nation Native American monitor on-site.

Northbound State Route 55 Improvement Project from Interstate 5 to State Route 91
Orange County Transportation Authority | Orange County, CA

Principal Investigator/Project Manager. Ms. Aron will oversee the completion of a Paleontological Identification Report (PIR) and Paleontological Evaluation Report (PER) to identify paleontological resources and to evaluate the significance of those resources. The paleontology study will be undertaken, consistent with CEQA, and following the Caltrans SER, Environmental Handbook, Volume I, Chapter 8 to determine the presence/absence of paleontological resources within the Area of Potential Effect (APE).

Orange Line Bus Enhancement to North Hollywood Red Line
Los Angeles County Metropolitan Transportation Authority | Los Angeles, CA

Principal Investigator/Project Manager. Ms. Aron was responsible for overseeing HAZWOPER-certified archaeological and paleontological monitors during excavation and tunneling for the project. Paleo Solutions qualified archaeologist led one-hour worker training meetings for all personnel participating in project ground-disturbing activities. Consultation to Metro staff to support on-going Native American consultation between Metro and

Interested Native American parties was also be provided. At the completion of the Project, Ms. Aron co-authored a final monitoring report.

Palo Alto Highway 101 Overcrossing Project
California Department of Transportation District 4 | Santa Clara County

Principal Investigator/Project Manager. Ms. Aron was the lead author of a Paleontological Inventory Report (PIR) to provide general guidance for development paleontological monitoring efforts in compliance with the Standard Environmental Reference for this Caltrans District 4 project to replace an existing seasonal underpass at Adobe Creek, which currently provides access under the highway via a Santa Clara Valley Water District maintenance road.

Regional Connector Transit Corridor
Los Angeles County Metropolitan Transportation Authority | Los Angeles, CA

Principal Investigator/Project Manager. Ms. Aron is overseeing paleontological, archaeological, and Native American monitoring of preconstruction and construction ground-disturbing work conducted by Metro's contractors in association with the Regional Connector Transit Corridor – a light rail subway corridor through Downtown Los Angeles to connect the Blue and Expo lines to the current Gold Line and Union Station.

Universal City Pedestrian Bridge
Los Angeles County Metropolitan Transportation Authority | Los Angeles, CA

Principal Investigator/Project Manager. Ms. Aron was responsible for overseeing the Archaeological and Paleontological Worker Awareness Training and monitoring services during construction at the Universal City Pedestrian Bridge. Paleo Solutions provided as-needed archaeological and paleontological monitoring for a total of eight weeks. To acquire cost-savings, monitors were cross-trained in paleontological and archaeological monitoring. Paleo Solutions provided 40-hour HAZWOPER monitor(s), when ground disturbing activities encountered contaminated soils or water.

Van Duzen-Peanut State Route 36 Highway Project
Caltrans District 1 | Humboldt County, CA

Principal Investigator and Project Manager. Caltrans proposed to improve State Route 36 from MP36.1 to MP40.5 adjacent to the Van Duzen River in Humboldt County, CA. Cooperating agencies included the FHWA, CFLHD and Caltrans. Ms. Aron coauthored a Paleontological Inventory Report (PIR) to determine the relative levels of paleontological sensitivity in geological formations that will be encountered during construction of the project.

Abajo to Resolute Transmission Line Upgrade Project
Rocky Mountain Power | San Juan County, UT

Paleontologist. Ms. Aron took part in fossil salvaging of approximately 100 bone fragments and one significant fossil locality for Rocky Mountain Power's project to expand the existing Resolute Greater Aneth Substation in addition to other upgrades of transmission towers between this facility and the Abajo Substation covering approximately 171.34 acres of BLM lands.

Basin Gardens Play Area Project
Bureau of Land Management | Big Horn County, WY

Paleontologist. Ms. Aron participated in the paleontological survey for the project, located in northern Wyoming east of the town of Basin, encompassing approximately 4,421 acres of BLM land.

Los Angeles Regional Interoperable Communications System Authority (LA-RICS)
LA-RICS Joint Powers Authority | Los Angeles County, CA

Principal Investigator. Ms. Aron co-authored a Paleontological Resource Impact Evaluation Report (PRIMP) and the paleontological resources section for the Environmental Impact Report in order to evaluate the paleontological resource potential of 78 discrete sites located throughout Los Angeles County. The proposed project will provide improved radio and broadband communication for the public safety providers of the greater Los Angeles region.

Mira Loma Union Pacific Railroad (UPRR) Project
SBA Communications Corporation | Jurupa Valley, CA

Principal Investigator. Ms. Aron co-authored the Final Paleontological Monitoring Compliance Report for this project consisting of the installation of a new 70'-0" II Monopine Tower for multiple carriers and being developed by Union Pacific Railroad.

Bella Linda Residential Project
Coyne Development Corporation | Temecula, CA

Principal Investigator/Project Manager. Coyne Development Corporation proposed to construct a two phase residential project in Temecula, CA. The

first phase will consist of 325 apartment units totaling 462,622 square feet. Phase two of the project will consist of creating lots for 49 senior single family units. In accordance with the City of Temecula, an Environmental Impact Report for the project was required by the Temecula City Council. Ms. Aron co-authored a Paleontological Resources Assessment for the Bella Linda Residential Project for inclusion in the Environmental Impact Report in accordance with Riverside County Guidelines.

Columbia Square Redevelopment Project
Kilroy Realty Corporation | Hollywood, CA

Principal Investigator/Project Manager. Ms. Aron oversaw the paleontological monitoring program during construction activities for the Columbia Square Project located in the community of Hollywood within the City of Los Angeles, Los Angeles County, CA. Columbia Square is a mixed-use development, including a 21-story residential tower, four 2-6 story office/retail buildings, and a 4-5 level subterranean parking garage covering approximately 4.7-acres. The paleontological monitoring program consisted of examinations of previously undisturbed deposits of older alluvium. Monitoring consisted of on-site inspections of exposed older alluvium and spoils piles for any contained paleontological resources between October 2013 and April 2014. Construction excavations impacted Quaternary age older alluvium deposits up to 62 feet in depth. One non-significant fossil locality was observed during excavation.

Gateway Village Phase IV
Casa-Treh IX, LLC | Chino Hills, CA

Principal Investigator/Project Manager. Ms. Aron provided oversight of paleontological monitoring and authored the Final Paleontological Monitoring Report for this 14,950 square foot multi-tenant commercial building project located north of the existing Gateway Village shopping center and west of State Route 71 and the concrete drainage channel.

Glenwood at Aliso Project, Phase I and II, Tract 16969
Shea Homes | Aliso Viejo, CA

Principal Investigator/Project Manager. Ms. Aron provided and oversaw paleontological monitoring and mitigation services during earth moving operations at the Glenwood at Aliso project - a 502 residential dwelling unit, community conference, aquatic center with three pools, and a clubhouse facility with parks and hiking trails. The project included grading of an approximately two million cubic yards of previously disturbed bedrock and soil. Paleontological monitoring occurred over a period of 14 months between 2006 and 2008. Vertebrate fossils were located during earth moving equipment while in undisturbed bedrock. At each fossil locality, the lithology of the fossil-bearing strata were recorded along with UTM (NAD 83) coordinates and elevation. Fossils were salvaged employing the "pluck and run" method for smaller fossils, quarrying and plaster for jacketing of larger fossils, and dry screening of matrix for microfossils. The recovery of the assemblage of Micoene-age fossils collected from Glenwood represents an important contribution to the study of the geologic and biologic history of southern California.

Laguna Woods Village GP802 Drainage Improvement Project
Golden Rain Foundation of Laguna Woods | Laguna Woods, CA

Principal Investigator/Project Manager. Ms. Aron co-authored a Phase I Cultural Resources Assessment prior to construction grading, which included a field survey, records search and a report summarizing the finding for Laguna Woods Village two-story starter building/golf building project located adjacent to Laguna Woods Village Senior Community. Ms. Aron oversaw archaeological and paleontological monitoring during grading activity and co-authored separate Final Paleontological and Archaeological reports.

Newkirk Alumni Project
University of California, Irvine | Orange County, CA

Principal Investigator/Project Manager. Ms. Aron was responsible for managing all archaeological and paleontological monitoring of the 12,500 square foot center on the campus of the University of California, Irvine. As co-author, separate final paleontological and archaeological construction monitoring reports were completed in accordance with CEQA and Orange County requirements.

Parkmerced Vision Plan
Parkmerced Investors, LLC | San Francisco, CA

Principal Investigator/Project Manager. Ms. Aron oversaw and co-authored the preparation and submission of a Paleontological Resources Monitoring and Mitigation Program (PRMMP) for this proposed project, which seeks to demolish 1,538 existing units and construct 5,679 new residences, retail and commercial establishments, and open spaces. Project construction will involve substantial soil disturbance related to demolition of existing structures and excavation for new structure foundations, and a subterranean parking garage. The project, located in southwest San Francisco, will consist of transforming an existing neighborhood over the next 20 to 30 years. Ms. Aron will also oversee the paleontological mitigation monitoring program when construction begins for this project.

Polo Ranch Project

Lennar Communities | Santa Cruz County, CA

Principal Investigator/Project Manager. Ms. Aron is overseeing paleontological monitoring, fossil salvage, laboratory preparation, and will co-author the final monitoring report upon conclusion of the project for a 113.5-acre parcel known as the Polo Ranch, which will include approximately 40 single-family homes. While monitoring grading activities in compliance with the City of Scott's Valley conditions of approval, an approximately 25 foot long mysticete (baleen) whale was discovered that met conditions of being scientifically significant. While excavating and jacketing the fossils, an additional whale was unearthed approximately 2.5 feet underneath the original discovery. Ms. Aron mobilized fossil salvage and determined best practices to preserve the fossils integrity and transport to Paleo Solutions lab in Los Angeles County where it is being prepared for curation and eventual transportation to an approved repository.

Sandia Vineyard, De Luz Vineyards, Project 3 - Walker Basin Projects

Walker Basin Holding Properties | Temecula, CA

Principal Investigator/Project Manager. Ms. Aron co-authored the Paleontological Assessments for three projects in Temecula, CA. The De Luz Vineyards property is an approximately 64-acre site located north of the Cross Creek Golf Club in Temecula, CA. Project 3 is an approximately 73-acre site located north of the Cross Creek Golf Club in Temecula, CA. The Sandie Vineyards property is an approximately 59-acre site located west of Interstate 15 and the Cross Creek Golf Club in Temecula, CA. The proposed development includes construction of five-acre residential lots, each including a single acre graded pad for house construction. Requisite improvements to existing infrastructure, such as road expansion and inclusion of preservation areas, will also accommodate the new development.

Summit Phase V

Parker Properties | Aliso Viejo, CA

Principal Investigator/Project Manager. Ms. Aron oversaw paleontological and archaeological compliance services in conjunction with the City of Aliso Viejo's mitigation measures for the Site Specific Plan for Parker Properties Summit Phase V project, which included 20 Enterprise - a 117,856 square foot, four-story LEED building; 30 Enterprise - a 136,596 square foot, four-story LEED building; and 50 Enterprise - a 174 room hotel. During paleontological monitoring, a vertebrate mammal fossil (Baleen whale), a Boney Fish, and one shark were collected. All fossils were recovered from the project site by stabilizing the matrix in the field and transporting to the Paleo Solutions lab for further preparation. All fossils collected during the paleontological mitigation program were offered to the San Diego Natural History Museum for accessioning into the museums paleontological curation facility for permanent storage and research. A Final Technical Report was submitted to Parker Properties upon conclusion of grading and laboratory analysis.

Tapestry Project

Shea Homes | La Habra, CA

Principal Investigator/Project Manager. Ms. Aron provided paleontological mitigation services for Shea Homes 112 single-family residential development project in the City of La Habra, Orange County, CA. The paleontological mitigation included monitoring the site during excavations for significant fossil resources, salvaging exposed fossils, and collecting pertinent geologic and stratigraphic data. Collected specimens were stabilized and removed from the site and prepared to the point of identification. The fossils discovered at the Tapestry Project represent a variety of taxa. Fossils from the Tapestry site included vertebra from both horse and camel, which are not uncommon in the La Habra Formation of Orange County. The final paleontological report was submitted to Shea Homes and the City of La Habra upon conclusion of grading and laboratory identification.

Temecula Valley Hospital

Universal Health Services, Inc. | Temecula, CA

Principal Investigator/Project Manager. Ms. Aron oversaw paleontological and archaeological monitoring during grading and excavating activities for Universal Health Services, Inc. and Turner Construction's approximately 566,160 square foot facility, which included a hospital, medical office, cancer center and fitness rehabilitation center and a helipad space on 35.1 acres in Temecula, CA. Representatives of the Pechanga tribe were also present when excavations impacted native sediment. Excavation in the project area occurred for building footings, infrastructure, and parking lots and involved the systematic inspection of trenches, scrapings and excavations, including spoils piles, within the project.

Vantis Parking Structure

Shea Properties | Aliso Viejo, CA

Principal Investigator/Project Manager. Ms. Aron oversaw paleontological monitoring and mitigation services during earth moving operations conducted at the Vantis Parking Structure 122 Development in the City of Aliso Viejo, CA. The Vantis Parking Structure included grading of an approximately 10,000 square foot lot along the east side of Aliso Viejo Parkway. Paleontological monitoring took place over 9 months and over a hundred fossil invertebrates were collected from one locality in the Monterey Formation on the project site. All fossils recovered from the project were stabilized in matrix in the field and transported to the laboratory for further preparation. A relative dating technique was undergone for the analysis of the microfossils present in the sample collected from the site. A Final Monitoring Report was submitted to Shea Properties and the City of Aliso Viejo upon completion of grading and laboratory procedures.

The Village at Calabasas

The New Home Company | Calabasas, CA

Principal Investigator/Project Manager. Ms. Aron co-authored a Paleontological Monitoring and Treatment Plan in compliance with CEQA, Los Angeles County, the City of Calabasas regulations, and the project Final Environmental Impact Report. The Village at Calabasas is a new community involving the construction of seven four-story buildings containing 80 condominiums, a commercial component, and underground parking. For nearly two years, Ms. Aron managed the paleontological mitigation program during ground disturbing activities, including paleontological monitoring, salvaging of unearthed fossils, laboratory preparation and analysis, and curation of all recovered fossils determined to be scientifically significant. Excavations within the Modelo Formation produced specimens of baleen whale, porpoise and plant material. Upon conclusion of paleontological mitigation, Ms. Aron co-authored the Paleontological Monitoring Report.

Anderson Dam Seismic Retrofit Project - Phase 1B

Santa Clara Valley Water District | Santa Clara County, CA

Principal Investigator/Project Manager. Ms. Aron oversaw paleontological monitoring and co-authored the Paleontological Technical Report for this major project to retrofit and strengthen Anderson Dam, which included excavation and reconstruction of embankments, mining of rocks from nearby borrow areas, and raising the dam crest.

Baker Water Treatment Plant Project

Irvine Ranch Water District | Orange County, CA

Principal Investigator/Project Manager. Ms. Aron was the project manager and principal investigator who oversaw the preparation of mitigation recommendations, a paleontological inventory report, and managed planned survey of proposed pipeline locations. She also oversaw construction monitoring and WEAP training. This project was completed in accordance with CEQA and Sonoma County requirements.

Cantua Creek Stream Group Improvement Project

California Department of Water Resources | Fresno County, CA

Principal Investigator/Project Manager. Ms. Aron co-authored a Paleontological Memorandum Report, which included a literature review at the Natural History Museum of Los Angeles County and the University of California Museum of Paleontology, Berkeley and the development of paleontological sensitivity maps. The project includes improving storage in the ponding basins through flood easement acquisition and raising the Canal embankment and adjacent roads.

Carmel River Floodplain Restoration and Environmental Enhancement Project

Monterey County Resource Management Agency (MCRMA) & Big Sur Land Trust | Monterey County, CA

Principal Investigator/Project Manager. Through a cooperative agreement with Caltrans District 5, MCRMA & Big Sur Land Trust have partnered to improve flood control and to enhance native riparian and floodplain habitat and hydrologic function to a portion of the lower floodplain along the Carmel River. Ms. Aron was a co-author of a Paleontological Memorandum Report, which concluded that the preparation of a formal Caltrans Paleontological Identification and Evaluation Report (PIR/PER) was required. Currently, Ms. Aron is overseeing the completion of the PIR/PER conforming to Caltrans SER Volume 1 Chapter 8.

City Trunk Line South, Unit 3

Los Angeles Department of Water and Power | Los Angeles County, CA

Principal Investigator/Project Manager. Ms. Aron provided a paleontological archival map and paleontological technical report to document paleontological resources for analysis within a CEQA document for LADWP's proposed project to construct approximately 10,250 linear feet of new 60-inch welded steel pipe to serve as a potable water line in an urban portion of the North Hollywood-Valley Village area.

Dola and Lanzit Ditch Bridge Replacement

San Bernardino County Flood Control District | San Bernardino County, CA

Principal Investigator/Project Manager. Ms. Aron oversaw the completion of a Technical Report/Initial Study of paleontological resources for the Donnell Basin project. The scope of the paleontological analysis included a review of geologic maps, relevant scientific literature, and museum records. The report was prepared in accordance with San Bernardino County General Plan recommendations and California Environmental Quality Act requirements. Paleo Solutions recommended five mitigation measures to reduce any potential negative impacts on paleontological resources to a less than significant level and meet San Bernardino County requirements.

Griffith Park South Water Recycling Project

Los Angeles Department of Water and Power | Los Angeles County, CA

Principal Investigator/Project Manager. Ms. Aron managed an archival-level paleontological investigation and resource study in support of an initial

study of the Griffith Park project.

Nacimiento Water Project

San Luis Obispo County Flood Control District | San Luis Obispo, CA

Principal Investigator/Project Manager. Ms. Aron oversaw paleontological resources monitoring services during the construction phase of project. The purpose of the monitoring was to reduce potential adverse effects to paleontological resources resulting from construction to below the level of significance. The project area contains 16 mapped geological formations, five of which have high paleontological sensitivity. Seven fossil localities were discovered during monitoring. Fossils collected in the field were transferred to the Paleo Solutions laboratory where protective wrapping and plaster jackets were removed and the fossils were cleaned of encrusting matrix in order to evaluate their scientific significance.

Owens Lake Master Project

Los Angeles Department of Water and Power | Inyo County, CA

Principal Investigator/Project Manager. Ms. Aron oversaw all project management and review of the technical studies and museum record searches, including development of a paleontological sensitivity map for future construction of the Owens Lake Project.

Perris Dam Remediation Program

California Department of Water Resources | Riverside County, CA

Principal Investigator/Project Manager. Ms. Aron authored an update to the Paleontological Resource Monitoring and Mitigation Plan (PRMMP) to assist with compliance with mitigation measures in the Draft Environmental Impact Report, California State requirements, and Riverside County General Plan requirements for DWRs proposed project to remediate Lake Perris, replace the outlet tower, and construct an outlet conveyance to connect with the Perris Valley Storm Drain.

Recycled Water Storage Pond No. 5 Project

Rancho California Water District | Temecula, CA

Principal Investigator/Project Manager. Ms. Aron oversaw paleontological and archaeological monitoring during grubbing, grading, trenching, excavations, and other earth-moving operations in the immediate area adjacent to a known archaeological site, as well as areas of excavations identified as likely to contain paleontological resources for this project, which included the construction of an additional storage pond, one 16-inch diameter inlet pipeline, one 24-inch diameter outlet pipeline, paving the existing access road along Elm Street, lining the existing Pond No. 4, and constructing access ramps with turnarounds in Ponds No. 1/2 and 3.

Rehabilitation of Western Regional Sewers

Orange County Sanitation District | Orange County, CA

Principal Investigator/Project Manager. Ms. Aron co-authored a Cultural Resources Constraints Report for the Initial Study and provided a Cultural Resources Assessment Report for the Environmental Impact Report for Orange County Sanitation District's proposed project to rehabilitate or reconstruct the entire length of the Orange Western Sub-trunk, Los Alamitos Sub-trunk, and the Westside Relief Interceptor located in western Orange County.

Silver Lake Reservoir Complex Storage Replacement Project and the River Supply Conduit Unit 1A Project

Los Angeles Department of Water and Power | Los Angeles County, CA

Principal Investigator/Project Manager. Ms. Aron oversaw all project aspects associated to paleontology and archaeology including scheduling and implementation of the monitoring mitigation plan. Paleontological resources were discovered in the Castaic Formation.

Composite Linear System-Phase 6: Puente Hills Landfill

County Sanitation Districts of Los Angeles County | Los Angeles County, CA

Principal Investigator/Project Manager. Ms. Aron was the co-author of the Final Paleontological and Archaeological Monitoring and Mitigation Report and conducted paleontological and archaeological monitoring during grading of approximately 250,000 cubic yards of bedrock. She recovered significant fossils and cultural remains, prepared and identified fossil specimens to the lowest taxonomic level, and prepared them for curation.

The Tustin Legacy Project

City of Tustin | Tustin, CA

Principal Investigator/Project Manager. Ms. Aron oversaw archaeological and paleontological monitoring compliance services for a 1,600-acre planned community in Tustin, California being developed on the former Marine Corp Air Station Base (MCASB). She co-authored multiple reports relating to various segments of the project. Numerous archaeological artifacts were discovered and collected including one prehistoric site and one historic site.

RESUME



Courtney Richards, MS

Principal Paleontologist

SUMMARY

YEARS OF EXPERIENCE

12 Years

EDUCATION

MS Biological Sciences (Paleontology)
Marshall University, 2011

BS Earth and Space Science (Geology/
Paleontology)
University of Washington, 2006

CERTIFICATIONS

WINE SAFETY & HEALTH ADMINISTRATION

24-hr New/Inexperienced Metal/Non-Metal Surface
Miners Certification

FIRST AID/CPR CERTIFIED

THE PRINCIPAL ACADEMY 2.0, ZWEIGWHITE

AFFILIATIONS

Society of Vertebrate Paleontology

SELECT PUBLICATIONS

Murphey, P.C., Zubin-Stathopoulos, K.D., Richards, C.D., and Fontana, M.A., 2015, Paleontological resource overview of the Royal Gorge Field Office Planning Area, Colorado: U.S. Department of Interior Bureau of Land Management Report, 178 p., and standalone confidential fossil locality geodatabase.

Richards, C. D., 2011. Plesiosaur Body Shape and its Impact on Hydrodynamic Properties: Master's thesis, Marshall University, 68 pp.

O'Keefe, F. R., H. Street, B. Wilhelm, C. Richards, and H. Zhu, 2011. A new skeleton of the cryptoclidid plesiosaur *Tatenectes laramiensis* reveals a novel body shape among plesiosaurs. *Journal of Vertebrate Paleontology* 31(2):330-339.

PROFILE

Ms. Richards is a qualified Principal Paleontologist with extensive research, field, and laboratory experience across the western United States. She has extensive experience with supervision of field crews; paleontological surveys; construction monitoring; geologic mapping; fossil salvage; and fossil preparation for transportation, water, energy, and land development projects. Ms. Richards maintains a comprehensive understanding of CEQA and NEPA regulations as they relate to paleontology, including Caltrans Standard Environmental Reference - Chapter 8, FHWA, FTA, BLM, and other various laws and regulations governing paleontological resources. Her master's thesis research focused on plesiosaur body shape and its influence on hydrodynamic properties. She has conducted paleontological field work in Mesozoic, Eocene, and Oligocene rock units in Montana, Utah, and Wyoming, and Pliocene, Miocene, and Pleistocene surficial deposits throughout California. Her previous professional experiences includes appointments as the vertebrate paleontology collection assistant at the Burke Museum of Natural History and Culture and field director at a cultural resources firm in southern California.

PROJECT EXPERIENCE

Grid Communication System - Basilone, Las Pulgas, and Stuart Substations, Camp Pendleton
San Diego Gas & Electric | County of San Diego | unincorporated San Diego County, CA

Principal Paleontologist. Ms. Richards oversaw paleontological monitoring and co-authored the final monitoring compliance report for this project that consisted of the installation of new structures, foundations, microwave electronics equipment, and under cable and conduit routes to support substation communications. The paleontological mitigation program was completed in compliance with NEPA, CEQA, and County of San Diego guidelines.

Transmission Line 13831 Pole Replacement
San Diego Gas & Electric | San Clemente, CA

Principal Paleontologist. Ms. Richards oversaw a paleontological records search, paleontological monitoring, and co-authored the final memo report for SDG&E's improvement project to replace pole Z101553 with a steel weatherized pole and install new distribution pole P23423.

Elvira to Morena Double Track
San Diego Association of Governments SANDAG | San Diego, CA

Paleontologist. Ms. Richards was crucial in completing a paleontological resources sensitivity assessment and completed chapters of the final Paleontological Resources Report addressing potential impacts and mitigation measures as required by SANDAG and North County Transit District to meet their responsibilities as lead agencies under CEQA and NEPA. The project study areas covers 3.1 linear miles along the LOSSAN corridor adjacent to Interstate 5 and an additional 0.3-miles along the LOSSAN corridor to Rose Creek near Universal City.

Vue on 5th: Banker's Hill Residential Development
ColRich Communities | San Diego, CA

Principal Paleontologist. Ms. Richards co-authored the Final Paleontological Monitoring Compliance Report in accordance with the City of San Diego regulations for ColRich Communities seven-story, luxury residence building on .46-acres one block from Balboa Park.

San Luis Rey Substation Modification Synchronous Condenser Project
San Diego Gas & Electric | Oceanside, CA

Principal Paleontologist. Ms. Richards attended the pre-construction meeting and is overseeing

paleontological monitoring during grading activity for construction of a new wall that will support the weight of a synchronous condenser for SDG&E's construction of a new synchronous condenser facility along with 230 kV Gas Insulated Switchgear that will be used to connect the condensers to SDG&E's 230 kV transmission system.

San Mateo Substation Landslide Evaluation Project

San Diego Gas & Electric | San Clemente, CA

Principal Paleontologist. Ms. Richards provided quality control for paleontological monitoring and performed a technical review of the final paleontological monitoring report for SDG&E's geotechnical study of past landslide debris and slope stability of soils at the San Mateo Substation, Calle Bahia, San Clemente, CA. Paleontological monitoring was performed during drilling at three bore holes, which an initial geological review indicated that boring would impact paleontologically sensitive sediments of the Pliocene to Miocene aged San Mateo Formation. This project extended onto the Marine Corps Camp Pendleton Base and required Department of Defense security badges, in addition to California State Park permits.

San Diego River Bridge Double Track

San Diego Association of Governments SANDAG | San Diego, CA

Paleontologist. Ms. Richards conducted a pedestrian survey of project alignment along a 1.1-mile long segment of the LOSSAN corridor and authored sections of the subsequent Paleontological Identification Report in accordance with CEQA and NEPA.

Woods Valley Ranch Reclamation Facility Phase 2 Expansion Project

Valley Municipal Water District | San Diego County, CA

Principal Paleontologist. Ms. Richards is overseeing paleontological monitoring associated with the implementation of the environmental compliance measures specified by the Mitigation Monitoring and Reporting Program (MMRP) Mitigation Measures No. 4.4-3 through 4.4-8 for this 200,000 gpd expansion from the existing 70,000 gpd facility.

Aliso Canyon Turbine Replacement

Southern California Gas | California Public Utilities Commission | Los Angeles County, CA

Paleontologist. Ms. Richards assists with oversight of paleontological monitoring, authors fossil discovery letters, and revised the Paleontological Monitoring and Treatment Plan for SoCalGas's project to construct and operate major project components at the Aliso Canyon Storage Field, including a central compression station, a 12 kV plant power line, new access roads, rough grading of SCE's Natural Substation, a new main office and crew-shift buildings, and a new guardhouse.

Alpine Interconnection

Southern California Edison | California Public Utilities Commission | Los Angeles County, CA

Paleontologist. Ms. Richards prepared the Workers' Environmental Awareness Program (WEAP) for paleontological resources to present to construction crew for earth-moving activities associated with the replacement of power poles.

Basin to Lovell 115 kV Transmission Line Rebuild Project

Western Area Power Administration | Bureau of Land Management | Big Horn County, WY

Paleontologist. Ms. Richards performed portions of the paleontological field survey and construction monitoring in the Eocene Willwood Formation for WAPA's project to update the existing Lovell to Yellowtail phase I and II and the Basin to Lovell 115 kV transmission lines within WAPA's existing Right-of-Way (ROW). The paleontological work was a Bureau of Land Management requirement, and took place entirely on BLM managed lands.

Contra Costa-Moraga 230 kV Reconductoring Project

Pacific Gas & Electric | Contra Costa County, CA

Principal Investigator/Project Manager. Ms. Richards authored a Paleontological Reconnaissance Survey Report for Crossing Structure 81F, Pull Site 57, Work Area 81, and Pull Site 96 for PG&E's Contra Costa-Moraga 230 kV Reconductoring Project in Contra Costa County. A pedestrian examination of newly added work areas was conducted in order to locate any fossil localities within the work areas and to search for paleontological resources and determine the paleontological sensitivity of the geological deposits underlying the new sites.

Desert Sunlight Solar Farm

First Solar | Bureau of Land Management | Riverside County, CA

Principal Investigator. Ms. Richards assisted with overseeing paleontological monitoring and co-authored the Final Paleontological Monitoring Report for this 550 MW photovoltaic power station in the Mojave Desert spanning over 6-square miles of creosote bush-dominated desert habitat next to Joshua Tree National Park.

Eldorado-Ivanpah Transmission Line

Southern California Edison | California Public Utilities Commission | Eldorado, NV to Ivanpah, CA

Paleontologist. Ms. Richards attended the Workers' Environmental Awareness Program and Safety Training in preparation to respond in the event of a fossil find during monitoring of a 71-mile transmission line and telecommunication installation project.

Fogarty Substation

Southern California Edison | Riverside County, CA

Paleontologist. Ms. Richards prepared representative invertebrate fossils that were collected during monitoring and sent them to experts for identification.

Longboat Solar Photovoltaic Project

EDF Renewable Energy | San Bernardino County, CA

Paleontologist. Ms. Richards wrote the paleontology sections of the Phase I and Extended Phase I cultural resources report to support the Mitigated Negative Declaration (MND) for this 235-acre site.

Mesa 500 kV Substation Project

Southern California Edison | California Public Utilities Commission | Los Angeles County, CA

Principal Investigator. Ms. Richards co-authored the Final Paleontological Resource Survey Report that addressed the results of the paleontological investigation to evaluate the expansion, upgrade, and loop-in of existing substation and associated facilities with respect to the paleontological resource potential of the project.

Natural Substation

Southern California Edison | California Public Utilities Commission | Los Angeles County, CA

Principal Investigator/Project Manager. Ms. Richards is responsible for identifying fossils, managing field crews, and composing monthly letters that address archaeological and paleontological activities occurring on-site for this project that includes construction of a new 56-megavolt-ampere, 66/12kV, Natural Substation at the Aliso Canyon Gas Storage Facility, modification of the existing 66kV electrical line, and the installation of new equipment and replacement of three existing towers with three new tubular steel poles within SCE's existing San Fernando Substation.

North Sky Wind River

Southern California Edison | California Public Utilities Commission | Kern County, CA

Paleontologist. Ms. Richards prepared key project information, including project background, for monitors to utilize during paleontological monitoring for the construction of transmission tower foundations, road construction and augering for the placement of transmission towers located on a 35-acre parcel.

Parkway and Commerce Center Drive & Saugus-Elizabeth Lake Fillmore 66 kV

Southern California Edison | California Public Utilities Commission | Los Angeles County, CA

Principal Investigator. Ms. Richards co-authored the Paleontological Survey Report that addressed the results of the paleontological inventory for the planned relocation of a section of the Saugus-Elizabeth Lake-Fillmore 66 kV, which present traverses private property within the town of Castaic. A paleontological assessment was required to support the G0131D assessment.

Programmatic SPANS

Pacific Gas & Electric | Tulare County, CA

Paleontologist. Ms. Richards oversaw and took part in a pedestrian survey to check for the presence of significant paleontological resources and to confirm the project geology as mapped on Bureau of Land Management land. She was the co-author of the Final Paleontological Resources Report.

Rio Hondo-Saugus 220 kV Idle Line Removal

Southern California Edison | Los Angeles County, CA

Paleontologist. Ms. Richards conducted a paleontological assessment that included a records search and recommendation for mitigation monitoring during removal of ~2.5-miles of idle transmission line and 13 towers along with associated foundations and hardware.

San Joaquin Cross Valley Loop Project

Southern California Edison | California Public Utilities Commission | Tulare County, CA

Principal Investigator. Ms. Richards co-authored the final Paleontological Monitoring Report for this 23-mile double-circuit 220 kV transmission line in Tulare County. The project included the drilling of 37 construction tower locations as part of the east-west trending portion of the Project. The route included excavations within orange and almond groves, and cattle grazing fields adjacent to the foothills of the Sierra Nevada Mountains.

Sentinel Power Plant

Southern California Edison | Palm Springs, CA

Paleontologist. Ms. Richards oversaw paleontological and archaeological monitoring during construction of a 37-acre power plant site, 14 acre construction laydown area, 3,250 feet of transmission lines, and 2.5 miles of natural gas pipeline located north of Palm Springs.

South of Palermo 115 kV Reinforcement Project

Pacific Gas & Electric | Butte, Yuba, and Sutter Counties, CA

Principal Investigator. Ms. Richards authored a stand-alone Proponent's Environmental Assessment (PEA) for Paleontological Resources for this proposed project by PG&E consisting of upgrading approximately 60-miles of existing 115 kV double-circuit (21 miles) and single-circuit (39 miles) power lines.

Springbok 1 Solar Farm Project

8minutenergy Renewables, LLC | Kern County, CA

Principal Investigator. Ms. Richards will oversee paleontological monitoring and co-author the final Paleontological Technical Report for this 951-acre solar farm facility in the western Mojave desert in the vicinity of California City. She completed a paleontological Workers' Environmental Awareness Training that was presented to construction workers prior to breaking ground on construction.

Springbok 2 Solar Farm Project

8minutenergy Renewables, LLC | Kern County, CA

Principal Investigator. Ms. Richards will oversee paleontological monitoring and co-author the final Paleontological Technical Report for this 1,350-acre 350 MW solar photovoltaic electrical generating facility in Kern County.

Stateline Solar Farm Project

First Solar | Bureau of Land Management | San Bernardino County & Primm, NV

Principal Investigator. Ms. Richards is overseeing paleontological monitoring, conducts site visits, and drafts paleontological discovery letters for a 300 MW solar photovoltaic energy generation project and its ancillary facilities on 1,999 acres of public land.

Tehachapi Renewable Transmission Project

Southern California Edison | California Public Utilities Commission | Kern, San Bernardino, Los Angeles Counties, CA

Assistant Project Manager. Ms. Richards has conducted paleontological monitoring, field supervision, and is the co-author for the Final Paleontological Monitoring Compliance Report for one of the largest green-energy projects in North America, involving the reconstruction of existing transmission facilities and new construction of 500 kV transmission lines to carry electricity from wind generation sites in the Tehachapi Mountains to the greater Los Angeles area, Kern County, and San Bernardino County covering more than 250 miles.

Tehachapi Renewable Transmission Project - Antelope Transmission Project Segment 3B

Southern California Edison | California Public Utilities Commission | Los Angeles and Kern Counties, CA

Principal Investigator. Ms. Richards co-authored the Paleontological Compliance Report for this project that involved construction of a new 9.6-mile 220 kV transmission line (Segment 3B) and construction of a new substation (Highwind Substation).

Valley South 115 kV Subtransmission Project

Southern California Edison | Riverside County, CA

Paleontologist. Ms. Richards assisted with a supplemental paleontological resources survey report for the proposed project to construction the Valley South 115 kV Subtransmission in portions of the cities of Murrieta, Menifee, Temecula, and the unincorporated communities of Winchester and Romoland.

Winters Gas Training Facility

Pacific Gas & Electric | Yolo County, CA

Paleontologist. Ms. Richards authored the Paleontological Technical Study performed background research, record searches, and sensitivity analysis to determine the potential project-related effects on paleontological resources during construction of the proposed PG&E Gas Training Facility - an approximately 50-acre site near Interstate 505 and Putah Creek in the City of Winters.

California High Speed Rail Project: Bakersfield to Palmdale Segment EIR/EIS

California High Speed Rail Authority | Los Angeles County and Kern County, CA

Paleontologist. Ms. Richards conducted a five-day paleontological survey of the project study area that was determined to be sensitive for fossils.

The survey aided the preparation of the paleontology section of the Bakersfield to Palmdale Segment EIR/EIS. This assessed the potential environmental effects associated with the construction, operation, and maintenance of the High Speed Track system, including track and ancillary facilities along the State Route 58/14 corridor from Bakersfield to Palmdale.

California High Speed Rail Project: Palmdale to Burbank Segment EIR/EIS
California High Speed Rail Authority | Los Angeles County, CA

Principal Investigator. Ms. Richards is overseeing all paleontological resources related services in conjunction with the Palmdale to Burbank Section. As the Paleontology Lead, she is managing the completion of a CEQA/NEPA level paleontology study to support development of the EIR/EIS. To date, she has co-authored a Paleontological Memo Report which assessed the current work and recommendations for additional paleontological tasks.

Caltrans FOSIL Sensitivity Mapping for Central California
Caltrans Districts 6, 9, & 10 | Central California, CA

Paleontologist. Ms. Richards evaluated geological rock units for paleontological resources with a 0.5-mile buffer on either side of the major highways and conducted comprehensive research on geological maps available, fossil localities and types of fossils known for over 3,000 miles of proposed construction activities. A comprehensive GIS based paleontology database application using ESRI's ArcGIS software was created. A sensitivity ranking, using a federally defined system, for each rock unit was then linked to the GIS map layer for the buffer.

Crenshaw/LAX Mass-Transit Light Rail Line
Los Angeles County Metropolitan Transportation Authority | Los Angeles, CA

Principal Investigator. Ms. Richards coordinates with field technicians while overseeing paleontological monitoring and laboratory preparation, completing weekly and monthly reports, and corresponds with agencies regarding fossil discoveries for Metro's 8.5-mile light rail line through southwest Los Angeles. The line will run generally north-south and will connect the Crenshaw District and Leimert Park to Inglewood and Los Angeles International Airport (LAX). The line will be a part of the Los Angeles County Metro Rail System. She is also overseeing laboratory preparation of matrix samples for collection and screening to test for the presence of microvertebrate fossils.

Eastside San Fernando Valley Transit Corridor
Los Angeles Metropolitan Transportation Authority | Los Angeles County, CA

Paleontologist. Ms. Richards conducted a paleontological survey and co-authored the paleontological assessment and existing conditions reports for this Metro and the Federal Transit Administration project, in coordination with the Cities of Los Angeles and San Fernando, for improving north-south transit service in the East San Fernando Valley along Van Nuys Blvd. and San Fernando Rd.

Exposition Light Rail Transit Phase II
Exposition Rail Construction Authority | Los Angeles County, CA

Paleontologist. Ms. Richards prepared fossil shell material that was collected during paleontological and archaeological monitoring during construction for an 8-mile extension of the Expo Light Rail System from Culver City to Santa Monica.

Gene Autry Way/Interstate 5 Interchange Improvement
City of Anaheim | Orange County, CA

Paleontologist. Ms. Richards monitored excavations at depths exceeding 8 feet and processed soil samples recovered during monitoring for this improvement project to create an important east-west link within the City of Anaheim's Resort Area and provided direct access to the I-5 freeway for motorists entering and leaving the area during special events.

Gilman Road Curve Realignment
Riverside County Transportation Commission | Riverside County, CA

Paleontologist. Ms. Richards contributed to a combined Paleontological Identification Report (PIR) and Paleontological Evaluation Report (PER) to assess the potential for impacting significant paleontological resources within the proposed alignment that included flattening the curvature and relocating utilities on Gilman Springs Road in the Moreno Valley.

Interstate 205 & Chrisman New Interchange
City of Tracy | San Joaquin County, CA

Paleontologist. Ms. Richards conducted a record search, background search, and prepared a Paleontological Identification Report (PIR) to identify any sensitive resources that may be impacted by construction activities in support of the project-related Project Approval-Environmental Document (PA-ED) for the I-205/Chrisman Road New Interchange Project between MacArthur Drive and I-5 based on the direction of an approved Project Study Report/Project Development Support document. The PA&ED required close consultation with the City, as well as the City's engineering department, Caltrans District 10, FHWA, City of Lathrop, and the San Joaquin Council of Governments.

Interstate 605 & Katella Avenue Interchange Constraints Analysis

Orange County Transportation Authority/Caltrans D12 | Los Angeles County, CA

Paleontologist. Ms. Richards conducted an initial assessment of paleontological resources constraints for the proposed project in support of the Preliminary Environmental Analysis Report (PEAR) that included recommendations for the Standard Environmental Reference-compliant document. The project area consists of the PEAR project area and the Future City project area.

Kettleman City Rehabilitation Improvement Project

Caltrans District 6 | Kings County, CA

Paleontologist. Ms. Richards prepared and identified fossils recovered from construction monitoring of this project funded by the State Highway Operation and Protection Program, including grinding, cold planning, and shoulder widening of the existing asphalt concrete of approximately nine miles of existing roadway from Kettleman City at Quail Avenue to south of Interstate 5 at Utica Avenue.

Kings River Overflow Bridge Replacement

Caltrans District 6 | Tulare County, CA

Paleontologist. Ms. Richards prepared sections of the Paleontological Mitigation Plan to Caltrans District 6 requirements and conducted paleontological resources sensitivity training for construction personnel.

McCall Boulevard Interstate 215 Interchange Improvement

Caltrans District 8 | Menifee, CA

Paleontologist. Ms. Richards prepared the geology and paleontology sections of a Preliminary Environmental Analysis Report (PEAR) to support development of the Project Study Report-Project Development Study for Caltrans clearance on behalf of the City of Menifee.

Purple Line Extension (Westside Subway Exploratory Shaft)

Los Angeles Metropolitan Transportation Authority | Los Angeles County, CA

Paleontologist. Ms. Richards provided field supervision, conducted paleontological monitoring, and recorded stratigraphy during pre-construction drilling and excavation to a depth of 75' for a 36' by 18' for an exploratory test shaft located at the Fairfax Station in the La Brea Zone. During construction, she supervised and conducted paleontological monitoring, fossil and data recovery, and stratigraphic column recordation. She co-authored the monitoring compliance report for the exploratory shaft phase of the project.

Purple Line Extension Third-Party PRMMP Review

Los Angeles Metropolitan Transportation Authority | Los Angeles County, CA

Paleontologist. Ms. Richards conducted a third-party review of the Paleontological Resources Monitoring and Mitigation Plan for the Purple Line Extension Project.

Ranchero Road and BNSF Grade Separation

City of Hesperia | San Bernardino County, CA

Paleontologist. Ms. Richards processed paleontological samples recovered from mitigation monitoring for the Ranchero Road Grade Separation involving the installation of a new crossing under the Burlington North Santa Fe (BNSF) Railroad at the extension of Ranchero Road. This project will directly benefit the entire High Desert area of San Bernardino County by providing a new east-west corridor that will insure a second access for emergency personnel from one half of town to the other, as well as alleviate traffic congestion along Bear Valley Road and Main Street.

Regional Express Lanes Network Phase I Project Approval/Environmental Document

Metropolitan Transportation Commission | Alameda, Contra Costa, and Santa Clara Counties, CA

Paleontologist. Ms. Richards prepared portions of a Paleontological Identification Report (PIR) for a 2,472-acre HOV lane to toll lane conversion project along portions of Interstates 580, 680, and 880 that aims to close gaps within the existing HOV lane system to increase travel time savings and reliability for carpools and buses in those corridors. The Express Lanes Network converts existing carpool lanes to express lanes and uses the revenue generated to finance completion of the carpool/express lane system.

Regional Connector Transit Corridor

Los Angeles County Metropolitan Transportation Authority | Los Angeles, CA

Principal Investigator. Ms. Richards is overseeing paleontological monitoring of preconstruction and construction ground-disturbing work that could potentially affect the Puente Formation, Fernando Formation, and Quaternary older alluvium conducted by Metro's contractors in association with the Regional Connector Transit Corridor – a light rail subway corridor through Downtown Los Angeles to connect the Blue and Expo lines to the current Gold Line and Union Station.

Road 80 Widening, Construction Phase I

Tulare County Resource Management Agency | Tulare County, CA

Paleontologist. Ms. Richards conducted paleontological resources monitoring and prepared portions of the subsequent Paleontology Mitigation Report to Caltrans 6 requirements for the 16-mile segment of Road 80 from Avenue 416 in the City of Dinuba to Airport Drive in the City of Visalia, in cooperation with the County of Tulare, Caltrans District 6, and the Federal Highway Administration, improving an interchange, widening an overcrossing, and upgrading drainage.

State Route 12 & State Route 88 Improvements near Jackson Creek

Caltrans District 10 | Amador County, CA

Paleontologist. The California Department of Transportation, in cooperation with the San Joaquin Council of Governments and San Joaquin County, proposed a major improvement project in the Lockeford and Clements areas. The project was proposed to relieve existing and projected traffic congestion on State Route 12/88. Ms. Richards attended a pre-construction field meeting and prepared portions of a revised Paleontological Mitigation Plan.

State Route 57 Northbound Widening

Orange County Transportation Authority | Orange County, CA

Paleontologist. Ms. Richards performed paleontological monitoring, sample processing, sorting and identifying of microfossils recovered from the State Route 57 Northbound Widening Project sponsored by the Orange County Transportation Authority, in partnership with Caltrans, to add a northbound lane from north of State Route 91 near Orangethorpe Avenue in Placentia to Lambert Road in Brea.

State Route 91 HOV Lane Addition

Caltrans District 8 | Riverside, CA

Paleontologist. Ms. Richards performed paleontological monitoring of sensitive sediments during HOV lane construction along a 6-mile segment between the I-60/SR 91/SR 215 interchange to the Adams Street Bridge in the city of Riverside.

State Route 99 & Arboleda Drive Freeway Project

Caltrans District 10 | Merced, CA

Paleontologist. The California Department of Transportation constructed a new interchange on State Route 99 at Arboleda Drive and converted a four-lane expressway to a six-lane freeway from Buchanan Hollow Road to the Miles Creek Overflow. This project supported Caltrans State Route 99 Corridor Enhancement Master Plan. Upon project construction in 2012, Ms. Richards supervised up to six on-site cross-trained paleontological monitors at a time. During paleontological monitoring, fossils were discovered at 128 locations. Per the PMP, fossils were recovered and documented. Ms. Richards assisted in leading the fossil recovery of 1,667 fossils and the subsequent laboratory work until the fossils were sent for permanent curation at the University of California, Merced. Finally, she prepared stratigraphy portions of the Paleontological Monitoring Report (PMR).

State Route 99 San Joaquin Freeway/Bridge Widening

Caltrans District 6 | San Joaquin County, CA

Paleontologist. Ms. Richards assisted in preparing a Paleontological Mitigation Plan (PMP), conducted paleontological resources awareness training for construction personnel, paleontological monitoring, and assisted in authoring a Paleontological Mitigation Report (PMR) for a 2.9-mile long freeway expansion project along SR 99.

State Route 178 Morning Drive Interchange Improvement

Thomas Road Improvements Program | Bakersfield, CA

Paleontologist. Ms. Richards contributed to a combined Paleontological Identification and Evaluation Report (PIR/PER), a Preliminary Paleontological Mitigation Plan (PMP), and a safety plan for a six-mile road widening and interchange development project east of Bakersfield. She developed a paleontological resources awareness training and conducted mitigation monitoring during ground-disturbing activities.

Universal City Station Pedestrian Bridge

Los Angeles Metropolitan Transportation Authority | Hollywood, CA

Paleontologist. Ms. Richards performed quality control and quality assurance on the final monitoring compliance report for Metro's project to develop a pedestrian bridge connecting the Universal City Metro Rail Station to the Universal City Tower Plaza over the intersection of Lankershim Boulevard and Universal Hollywood Drive. The elevated pedestrian bridge will allow Metro passengers exiting the Red Line Universal City Station to cross above vehicle traffic to access an entrance to the Universal Studios entertainment complex, located diagonally across the intersection, thereby reducing congestion and increasing safety.

University Drive Widening
City of Irvine | Orange County, CA

Paleontologist. Ms. Richards prepared geology and paleontology sections of a Technical Report to support a restraints analysis within the 26-acre project Area of Potential Effect for the University Drive Widening project, which aimed to add a third travel lane and sidewalk in both directions on University Drive between State Route 73, MacArthur Boulevard, and Campus Drive, adjacent to the University of California, Irvine campus and the San Diego Creek.

Los Alamitos General Plan Update
City of Los Alamitos | Orange County, CA

Paleontologist. Ms. Richards prepared the paleontology sections to support an update of the General Plan environmental documents for the 2,617-acre city and adjacent unincorporated community of Rossmore.

Pasadena General Plan Update Program EIR
City of Pasadena | Los Angeles County, CA

Paleontologist. Ms. Richards prepared the paleontology sections of an update to the City of Pasadena's General Plan to ensure that it meets California Code requirements for a general plan, including the consolidation of optional elements: cultural and recreational, historic and cultural, public facilities, scenic highways, social development and economic development and employment) into required elements of the General Plan. The General Plan Update and specific plan amendments will allow for approximately 12,312 net-new housing units and 10,988,959 net-new square feet of non-residential development.

Uptown Newport Beach Village EIR
City of Newport Beach | Orange County, CA

Paleontologist. Ms. Richards co-authored the Cultural Resources Programmatic Assessment in support of the amendment to the City of Newport Beach 2006 General Plan Land Use Element.

Paleontological Resource Overview of the Royal Gorge Field Office Planning Area
Bureau of Land Management | Central and eastern Colorado

Paleontologist. Ms. Richards conducted research and assisted in the preparation of a paleontological resources overview report and compiled an accompanying fossil locality geodatabase in support of the Eastern Colorado Resource Management Plan for the BLM's Royal Gorge Field Office, which encompasses more than 35 million acres of central and eastern Colorado. The information about the areas paleontological resources will aid the agency in its consideration in resource management planning and decision making associated with revision of the Eastern Colorado Management Plan. More than 94 named and unnamed geologic units within the RGFO Planning Area, and then re-arranged, combined, and/or further subdivided them according to the USGS stratigraphic lexicon into 16 igneous and metamorphic rock units, 72 bedrock sedimentary rock units, and 14 surficial sedimentary deposits for more thorough paleontological analysis and PFYC assignment evaluation.

Vedder Pipeline Project
Aera Energy, LLC/Bureau of Land Management | Kern County, CA

Principal Paleontologist. Ms. Richards co-authored the Paleontological Resources Report for Aera Energy's proposed development of a new area on the Vedder Lease within the Midway-Sunset Oil Field, including clean up of an existing oil field prior to development, construction of a fluids pipeline, a steam line, and a power transmission line to a tie-in to existing infrastructure.

Los Angeles Regional Interoperable Communications System Authority (LA-RICS)
LA-RICS Joint Powers Authority | Los Angeles County, CA

Principal Investigator. Ms. Richards co-authored a Paleontological Resource Impact Evaluation Report (PRIMP) and the paleontological resources section for the Environmental Impact Report in order to evaluate the paleontological resource potential of 78 discrete sites located throughout Los Angeles County. The proposed project will provide improved radio and broadband communication for the public safety providers of the greater Los Angeles region.

Mira Loma Union Pacific Railroad (UPRR) Project
SBA Communications Corporation | Jurupa Valley, CA

Principal Investigator. Ms. Richards oversaw paleontological monitoring and co-authored the Final Paleontological Monitoring Compliance Report for this project consisting of the installation of a new 70'-0" II Monopine Tower for multiple carriers and being developed by Union Pacific Railroad.

100 W. Walnut Planned Development Project (the "Parsons" Site)
Morgan Stanley | Pasadena, CA

Principal Paleontologist. Ms. Richards prepared a Paleontological Monitoring Plan (PMP) following SVP guidelines and other industry standards

outlining all paleontological tasks and procedures that will be required in order to reduce potential impacts to paleontological resources that will be required in order to reduce potential impacts to paleontological resources to a less than significant level pursuant to CEQA for this project which plans to convert the 22.67-acre project site from a single-function office complex with over 900,000 square feet, which features the 12 story Parsons Corporation tower, to a mixed-use office campus and residential community. At the start of construction, Ms. Richards will assist in overseeing paleontological monitoring compliance in accordance with the PMP.

11281 Washington Place

B Raeen Construction Inc. | Culver City, CA

Paleontologist. Ms. Richards prepared paleontology sections of a combined Archaeological and Paleontological Assessment for a proposed commercial space development project.

Bernard Street Pacific Gateway Residences

Fairfield Residential | Costa Mesa, CA

Paleontologist. Ms. Richards provided archaeological and paleontological monitoring of a 2.6-acre site and co-authored the Final Monitoring Compliance Report.

Hidden Crossing Residential Development

Cardno Entrix | Roseville, Placer County, CA

Paleontologist. Ms. Richards developed and presented a paleontological workers environmental awareness program training, mitigation monitoring, and spot-checking during grading and trenching activities on a 28.6-acre parcel for development of 78 residences.

Montclair Place Subdivision

B Raeen Construction Inc. | Culver City, CA

Paleontologist. Ms. Richards prepared paleontology sections of a combined Archaeological and Paleontological Assessment for a proposed commercial space development project.

Paradise Valley Specific Plan

Glorious Land Company | Riverside County, CA

Paleontologist. Ms. Richards prepared portions of a draft Paleontological Assessment Report for the construction of a resort community, which will include a variety of residential developments, recreational opportunities, commercial and industrial facilities and associated infrastructures. Of the 5,411-acre project area, 2,151 acres are slated for development (planned development area), leaving the remaining 3,260 acres as open space.

Stonehill Estates Tract No. 31644 Wheelock 206 Project

Pulte Group | Jurupa Valley, CA

Paleontologist. Ms. Richards drafted a retention letter demonstrating Pulte retained a qualified paleontologist prior to commencing grading activities. After evaluating the site paleontological sensitivity, Paleo Solutions provided the Jurupa Valley Planning Department -Development Review Division the results of an initial consultation, which included details of the fossil recovery plan, if recovery was deemed necessary. Paleo Solutions is providing a paleontological field technician when mass-grading activities impact older alluvium with Ms. Richards overseeing quality control and assurance.

Carmel River Floodplain Restoration & Environmental Enhancement (CRFREE)

Monterey County Resource Management Agency | Monterey County, CA

Principal Investigator. Ms. Richards co-authored a Paleontological Technical Memorandum and impact analysis to determine the potential for the project to result in adverse effects/impacts to paleontological resources for Monterey County and the Big Sur Land Trust project to improve flood control, enhance native riparian and floodplain habitat, and hydrologic function to a portion of the lower floodplain along the Carmel River.

Dola and Lanzit Ditch Bridge Replacement

County of San Bernardino Public Works | San Bernardino County, CA

Principal Investigator. Ms. Richards conducted a quality control and assurance review of a technical report/initial study of paleontological resources for two bridge replacements (County Local Bridge No. 81 and Bridge No. 82) on U.S. Highway 66/National Trails Highway (Route 66). The report was prepared in accordance with San Bernardino County General Plan recommendations and California Environmental Quality Act (CEQA) requirements.

Elysian Reservoir Water Quality Improvement Project

Los Angeles Department of Water and Power | Los Angeles, CA

Principal Paleontologist. As part of an Environmental Assessment and Air Quality On-Call with LADWP, Ms. Richards is administering and implementing paleontological monitoring in compliance with mitigation measures found within the FEIR during rough grading construction activities

that impact sensitive formations. The project includes the installation of a floating cover over the open water surface of the existing Elysian Reservoir, replacing the reservoir liner, and other supporting facilities, installation of new large diameter pipelines to supply and bypass the reservoir to meet current and future flow demands, and improve infrastructure reliability as the existing pipes are composed of riveted steel built in the 1940's.

Gilman Home Channel Lateral A, Stage 3

Riverside County Flood Control and Conservation District | Banning, CA

Paleontologist. Ms. Richards prepared a Paleontological Mitigation Plan (PMP) that provided an evaluation of the potential to impact significant paleontological resources for a project that is part of the Riverside County Flood Control and Conservation District's program to replace existing flood control facilities with larger facilities able to collect and convey the tributary 100-year storm flows.

Groundwater Regional Replacement and Recharge Project R^3

Mojave Water Agency | San Bernardino County, CA

Paleontologist. Ms. Richards prepared portions of a Monitoring Compliance Report after completion of archaeological and paleontological monitoring for water conveyance, groundwater recharge, and groundwater extraction facilities in the Mojave Water Agency's service area.

Integrated Facilities Master Plan Update

Camrosa Water District | Ventura County, CA

Paleontologist. Ms. Richards prepared the paleontology sections of a technical study report in support of an Environmental Impact Report (EIR) that involved evaluation of potential impact, sensitivity mapping, and mitigation measures for the 19,300-acre district. Proposed projects included potable water reservoirs, pump stations, pipelines and recharge ponds; non-potable water reservoirs, pump stations, pressure regulating stations, and pipelines; and sanitary service facilities including pipelines and a water reclamation facility.

Recycled Water Transmission Main, Southwest Quadrant, Project SW1A

City of Fresno | Fresno, CA

Principal Paleontologist. Ms. Richards authored a Paleontological Monitoring and Mitigation Plan (PMMP) and is overseeing paleontological monitoring during excavations for this project that will consist of the installation of 8 to 54-inch diameter recycled water distribution lines to convey recycled water for use in the City of Fresno's Southwest Quadrant.

Borrego Wash Maintenance and Trail Repair Project

Whiting Ranch Wilderness Park | Orange County, CA

Paleontologist. Ms. Richards authored the paleontology sections of a combined Archaeological and Paleontological Resources Assessment for a 43-acre project involving restoring entrance access and repairing multiple trail and road washouts.

Northside Plan Update

Los Angeles World Airports | Los Angeles County, CA

Paleontologist. Ms. Richards performed a pedestrian survey and co-authored the subsequent paleontological resources assessment for the Northside Plan Update to provide new regulations for future development occurring on the approximately 340-acre site within the LAX northside sub-area of the LAX Specific Plan.

RESUME



Joseph "Joey" Raum, BS

Paleontologist

SUMMARY

YEARS OF EXPERIENCE

3 Total Years

EDUCATION

BS Geology

University of Maryland, College Park 2008

Geology Field Mapping

University of Miami, Oxford, OH 2007

CERTIFICATIONS

10-HOUR HAZWOPER

FIRST AID/CPR CERTIFIED

ANZA-BORREGO DESERT STATE PARK

PALEONTOLOGY CERTIFICATION PROGRAM

PROFILE

Mr. Raum has more than five years of paleontological and geological experience including mitigation consulting in Fresno, Humboldt, Kern, Los Angeles, Orange, Riverside, San Bernardino, San Diego, Santa Cruz, and Sonoma Counties, California. His consulting experience includes construction monitoring, fossil salvaging and excavating, curation preparing, micro-fossil sorting, and performing paleontological surveys and data collection on private and public lands. He has extensive paleontological monitoring experience on transmission lines, gas pipelines, telecommunication lines, solar farms, wind farms, substations, and housing, commercial and transportation projects in the southern and central California region. He has experience drafting paleontological survey and monitoring reports and has co-authored several scientific abstracts.

PROJECT EXPERIENCE

SDG&E Caltrans Road Widening State Route 74/Interstate 5 Project

San Diego Gas & Electric | Orange County, CA

Field Paleontologist. Mr. Raum provided paleontological monitoring during excavation for underground utility relocation on the west side of the SR-74 and Interstate 5 interchange and bridge feeder conduit work on either side of the interchange. He also assisted with the technical report at the conclusion of monitoring.

SDG&E C1243 AES Installation at Quest Diagnostics Project

San Diego Gas & Electric | Orange County, CA

Field Paleontologist. Mr. Raum conducted paleontological monitoring during geotechnical and construction-related activities within previously undisturbed Quaternary alluvium and the Cretaceous Ladd Formation impacted during construction of this project for an Advanced Energy Storage installation on Quest Diagnostic property to support circuit 1243 overload conditions associated with oncoming load additions at Quest facilities.

SDG&E Caltrans Road Widening State Route 74/Interstate 5 Project

San Diego Gas & Electric | Orange County, CA

Field Paleontologist. Mr. Raum provided paleontological monitoring during excavation for underground utility relocation on the west side of the SR-74 and Interstate 5 interchange and bridge feeder conduit work on either side of the interchange. He also assisted with the technical report at the conclusion of monitoring.

SDG&E TL 13835 & TL 13837 Laguna Niguel Underground Project

San Diego Gas & Electric | Orange County, CA

Field Paleontologist. Mr. Raum provided paleontological monitoring during earthwork in which subsurface excavation would impact sedimentary units during trenching on Park Road, Bear Brand Road, Camino Del Avion, and Street of the Golden Lantern and trenching and construction of the foundations for new cable poles for SDG&E's project to enhance the efficiency and reliability of the 138 kV transmission system in the City of Laguna Niguel service area.

SDG&E Transmission Line 13833 Project

San Diego Gas & Electric | Orange County, CA

Field Paleontologist. Mr. Raum performed paleontological monitoring during construction services during replacement of a portion of a Tie Line that started at the San Mateo Substation in the City of San Clemente, Orange County to lands leased to California State Parks within marine Corps Base Camp

Pendleton, San Diego County.

Vedder Pipeline Project

Area Energy, LLC | Bureau of Land Management | Kern County, CA

Paleontology Supervisor. Mr. Raum served as the paleontology supervisor for the proposed development of a new area of the Vedder Lease within the Midway-Sunset Oil Field. He completed Passport Safety Training, led a two-person paleontological survey, and co-authored the Paleontological Survey Report. The paleontological study was completed in compliance with Federal Land Management Policy and Management Act (FLPMA), Paleontological Resource Preservation Act (PRPA), and all other federal regulations and policies. All paleontological work on BLM land was conducted under California Cultural Use Permit CA 13-01P.

Desert Sunlight Solar Farm Project

First Solar | Bureau of Land Management | Riverside County

Field Technician. Mr. Raum served as a field technician for the paleontological resource mitigation program for the installment of a solar farm and associated facilities. He participated in fossil salvage operations and data recordation using Trimble GPS and data collection tablets. The construction work took place in Pleistocene non-marine alluvium and Quaternary alluvium. Mr. Raum also prepared the technical report for this project.

Stateline Solar Farm Project

First Solar | Bureau of Land Management | San Bernardino County, CA & Clark County, NV

Field Technician. Mr. Raum served as a field technician for the paleontological resource mitigation program for the installment of a solar farm and associated facilities. He participated in data recordation using Trimble GPS and data collection tablets. The construction work took place in Quaternary lacustrine deposits and pediment alluvium. All paleontological work is being conducted under Paleo Solutions California Paleontological Use Permit.

Palen Solar Electric Generating System Geotechnical Investigation

BrightSource | Bureau of Land Management | Riverside County, CA

Field Technician. Mr. Raum served as a field technician for the paleontological resources program that was implemented during geotechnical investigations for development of the proposed Palen Solar Electric Generating System, a 500 MW concentrated solar power energy generating facility, on lands administered by the BLM Palm Springs-South Coast Field Office. The geotechnical investigations included the drilling of eight exploratory borings, conducting eight electrical conductivity tests, and excavation of three thermal resistivity pits in order to collect subsurface data and information about the soils and foundation conditions on the site.

Coolwater-Lugo Transmission Project (South of Kramer)

Southern California Edison | Bureau of Land Management & California Public Utilities Commission | San Bernardino County, CA

Paleontologist. Mr. Raum performed a literature search and review, conducted background research, completed a paleontological survey, and assisted with the paleontological technical report for Southern California Edison's proposed construction of approximately 47-52 miles of double-circuit 220 kV transmission lines, approximately 15-20 miles of single-circuit 500 kV transmission lines, removal of approximately 15-16 corridor miles of existing 220 kV transmission lines (two sets of towers), and construction of a new 500/220/115 kV substation. The CPUC required a Proponent's Environmental Assessment (PEA) for the project and is the lead agency for the project's Environmental Impact Report (EIR). The federal lead agency for the Environmental Impact Statement (EIS) is the Bureau of Land Management (BLM).

Devers-Paleo Verde No. 2 500 kV Transmission Line Project

Southern California Edison | Bureau of Land Management & California Public Utilities Commission | Riverside County, CA

Paleontologist. Mr. Raum carried out paleontological monitoring during all earth-moving activities that had the potential to impact paleontologically sensitive sediments, particularly in the Maniobra Formation, Palm Springs Group/Formation, Pliocene non-marine, Mount Eden Formation, San Timoteo Formation, and Quaternary older sediments on BLM administered lands. He also was an integral part of the laboratory fossil preparation team for fossils recovered on-site.

West of Devers Upgrade Transmission Line Project

Southern California Edison | Bureau of Land Management & California Public Utilities Commission | Riverside & San Bernardino County

Paleontologist. Mr. Raum was a paleontological monitor during construction of the West of Devers 220 kV transmission line between Devers, El Casco, Vista, and San Bernardino substations. Initially, the project area consisted of only 56 linear miles, but was later increased to 64 linear miles encompassing approximately 3,000, of which 100 acres are managed by the Palm Springs Office of the Bureau of Land Management (BLM), approximately 300 acres by the Bureau of Indian Affairs-Morongo Band of Mission Indians, and the remainder comprised of private or SCE-owned/leased land.

Basin Gardens Play Area Project
Bureau of Land Management | Big Horn County, WY

Paleontologist. Mr. Raum was part of the paleontological survey team for the Basin Gardens Play Area Project for the Bureau of Land Management Worland Field Office, located in northern Wyoming east of the town of Basin. The project area encompassed approximately 4,421 acres of BLM land. The field survey included a systematic pedestrian examination of bedrock exposures of the Frontier and Cody formations that were located within the study area boundaries. Twenty-two new fossil localities were discovered during the field survey.

SDG&E Transmission Line 690C Wood to Steel Replacement Project
San Diego Gas & Electric | San Diego County, CA

Field Paleontologist. During construction excavation, Mr. Raum provided paleontological monitoring at all of the transmission/distribution structure locations to replace wood pole structures on a 69 kV transmission line located on Marine Corps Base Camp Pendleton. The project also added one new 12 kV circuit from Stuart Mesa Substation to Z21098 for Camp Pendleton's Naval Hospitals. He monitored the replacement of approximately 31 wood pole structures with steel pole structures, one distribution pole; utilizing nine temporary stringing sites and two temporary staging yards.

Tehachapi Renewable Transmission Project
Southern California Edison | Los Angeles County, Kern County, San Bernardino County, CA

Field Technician. Mr. Raum served as a field technician for the paleontological resource mitigation program for the transmission line upgrade and associated facilities. He participated in fossil salvage operations and data recordation using Trimble GPS and data collection tablets. The construction work took place in Miocene Puente Formation, Pliocene Fernando Formation, Pleistocene non-marine alluvium and Quaternary alluvium. Mr. Raum also prepared the technical report for this project.

SDG&E Transmission Line 690C Wood to Steel Replacement Project
San Diego Gas & Electric | San Diego County, CA

Field Paleontologist. During construction excavation, Mr. Raum provided paleontological monitoring at all of the transmission/distribution structure locations to replace wood pole structures on a 69 kV transmission line located on Marine Corps Base Camp Pendleton. The project also added one new 12 kV circuit from Stuart Mesa Substation to Z21098 for Camp Pendleton's Naval Hospitals. He monitored the replacement of approximately 31 wood pole structures with steel pole structures, one distribution pole; utilizing nine temporary stringing sites and two temporary staging yards.

Aliso Canyon Turbine Replacement and Natural Substation Project
Southern California Edison | Los Angeles County, CA

Field Paleontologist. Mr. Raum conducted a pre-construction paleontological resource survey for the installment of gas plant facilities, a substation, and replacement of existing transmission structures on and adjacent to the Southern California Gas plant. He performed fossil prospecting operations and data recordation using Trimble GPS and data collection tablets. The field survey was conducted in Cretaceous Chatsworth Formation, Miocene Topanga Formation, Miocene Modelo Formation, Pliocene Pico Formation, Pliocene-Pleistocene Saugus Formation, and Quaternary alluvium.

Commerce Center Survey
Southern California Edison (Los Angeles County, CA)

Field Paleontologist. Mr. Raum conducted a pre-construction paleontological resource survey for installation of new transmission structures and facilities associated with existing transmission lines. He performed fossil prospecting operations and data recordation using Trimble GPS and data collection tablets. The field survey was conducted in Pliocene Pico Formation, Pliocene-Pleistocene Saugus Formation, Pleistocene alluvium, and Quaternary alluvium. He also prepared the technical report for this survey.

Mesa Substation Project
Southern California Edison | Los Angeles County, CA

Field Paleontologist. Mr. Raum conducted a pre-construction paleontological resource survey of the new impact areas for this existing substation and transmission line. He performed fossil prospecting operations and data recordation using Trimble GPS and data collection tablets. The field survey was conducted in Pleistocene alluvium and Quaternary alluvium. He also prepared the technical report for this survey.

Tehachapi Renewable Transmission Project
Southern California Edison | Los Angeles County, Kern County, San Bernardino County, CA

Field Technician. Mr. Raum served as a field technician for the paleontological resource mitigation program for the transmission line upgrade and associated facilities. He participated in fossil salvage operations and data recordation using Trimble GPS and data collection tablets. The construction work took place in Miocene Puente Formation, Pliocene Fernando Formation, Pleistocene non-marine alluvium and Quaternary

alluvium. Mr. Raum also prepared the technical report for this project.

Moorpark-Newbury 66 kV Subtransmission Line Project
Southern California Edison | Ventura County

Field Paleontologist. Mr. Raum conducted a pre-construction paleontological resource survey for the installation of transmission structures and associated facilities. He performed fossil prospecting operations and data recordation using Trimble GPS and data collection tablets. The field survey was conducted in Oligocene Sespe Formation, Pliocene-Pleistocene Saugus Formation, Pleistocene Los Posas Sand Formation, Pleistocene alluvium, and Quaternary alluvium. Mr. Raum also prepared the technical report for this survey.

El Casco Substation Project
Southern California Edison | Riverside County

Field Paleontologist. Mr. Raum served as a field technician for the paleontological resource mitigation program for the installation of a substation and associated facilities. He participated in fossil salvage operations and data recordation using Trimble GPS and data collection tablets. The construction work took place in the Pliocene-Pleistocene San Timoteo Formation and Quaternary alluvium.

Contra Costa-Moraga 230 kV Reconductoring Project
Pacific Gas & Electric | Contra Costa County

Field Paleontologist. Mr. Raum conducted a pre-construction paleontological resource survey for the construction and replacement of transmission structures and associated facilities. He performed fossil prospecting operations and data recordation using Trimble GPS and data collection tablets. The field survey was conducted in Eocene Point of Rocks Formation, Miocene Temblor Formation, Miocene Monterey Formation, Pliocene-Pleistocene Tulare Formation and Quaternary alluvium.

Albion Polo Ranch Project
Lennar Homes | Santa Cruz County

Field Paleontologist. Mr. Raum served as a field technician for the paleontological resource mitigation program for the construction of a housing development. He performed data recordation using Trimble GPS and data collection tablets. The construction work took place in Pliocene Purisima Formation and Pleistocene-Holocene terrace and alluvial deposits.