COMBINED PALEONTOLOGICAL IDENTIFICATION AND PALEONTOLOGICAL EVALUATION REPORT

Interstate 10 Corridor Project

San Bernardino and Los Angeles Counties

07-LA-10 PM 44.9/48.3
08-SBD-10 PM 0.0/R37.0

EA 0C2500
EFIS ID 0800000040

December 2014

Submitted to:
Kurt Heidelberg, Branch Chief Environmental Studies D
California Department of Transportation District 8
464 West 4th Street, 6th Floor, MS 825, San Bernardino, California 92401-1400

COMBINED PALEONTOLOGICAL IDENTIFICATION AND PALEONTOLOGICAL EVALUATION REPORT

INTERSTATE 10 CORRIDOR PROJECT

San Bernardino and Los Angeles Counties

07-LA-10 PM 44.9/48.3; 08-SBD-10 PM 0.0/R37.0

EA 0C2500
EFIS ID 0800000040

Approved by: _____ date 12/16/14
Kurt Heidelberg, Branch Chief,
Environmental Studies D, California Department of Transportation, District 8
464 West 4th Street, 6th Floor, MS 825, San Bernardino, California 92401-1400

Reviewed by: _____ date 12/16/14
Bahram Karimi, Associate Environmental Planner/Paleontologist
Environmental Studies D, California Department of Transportation, District 8
464 West 4th Street, 6th Floor, MS 825, San Bernardino, California 92401-1400

Submitted by: _____ date 12/5/2014
Sherri M. Gust, M.S. PQS: Qualified Principal Paleontologist
Cogstone Resource Management Inc., 1518 W. Taft Avenue, Orange, CA 92865

Authors: Kim Scott, Sherri Gust, and Courtney Richards

Under subcontract to: Parsons Transportation Group, Inc., 100 West Walnut Street, Pasadena, California 91124

December 2014

For individuals with sensory disabilities this document is available in alternate formats. Please call or write to California Department of Transportation, Public Affairs, 464 West 4th Street, San Bernardino, CA 92401-1400; District 8, TTY (909) 383-6300 or 1(800) 753-2929TTY.

Keywords: 40 linear miles, 6,616 acres; San Dimas, Ontario, Guasti, Fontana, San Bernardino South, Redlands, and Yucaipa 7.5-minute USGS Topographic Maps; No fossil localities; Keywords: Pleistocene, Holocene, alluvium, alluvial fan, Mesozoic granitoid

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

LIST OF ACRONYMS and ABBREVIATIONS

BLM – Bureau of Land Management
Caltrans - California Department of Transportation
CEQA – California Environmental Quality Act
CFR - Code of Federal Regulations
FHWA – Federal Highway Administration
HOV – High Occupancy Vehicle
I-10 – Interstate 10
M.S. – Master's of Science
NEPA – National Environmental Policy Act
PEAR - Preliminary Environmental Analysis Report
PER – Paleontological Evaluations Report
PES – Preliminary Environmental Study
PFYC – Potential Fossil Yield Classification
PL – Public Law
PM – Post Mile
PRC – Public Resources Code
Project Excavation Parameters – Excavation Limits
ROW-Right of Way
SANBAG – San Bernardino Associated Governments
SBCM – San Bernardino County Museum
UCMP – University of California Museum of Paleontology
USC – Unites States Code
USGS – United States Geological Survey

EXECUTIVE SUMMARY

The purpose of this document is to assess the potential for impacting fossil resources along Interstate 10 (I-10) during proposed work to widen the freeway. Specifically the Project Excavation Parameters extend from western San Bernardino County into eastern Los Angeles County. The project limits, including transition areas, extend from approximately 0.4 mile west of White Avenue in Pomona at Post Mile (PM) 44.9 to Live Oak Canyon Road in Yucaipa at PM 37.0. This report incorporates pertinent portions of Scott and Gust (2009) which reviewed a significant portion of the Project Excavation Parameters covered within this study. Construction activities include widening I-10; widening or reconstruction of interchange ramps; removal and construction of retaining walls and sound walls; installation of overhead signs, lighting, closed-circuit television (CCTV), and changeable message signs (CMS); excavation for drainage channels and roadside ditches; utility relocation, and bridge work. The vertical Project Excavation Parameters will be between 2 feet and 70 feet below the current ground surface.

Geologic mapping indicates that virtually the entire project is mapped as various types of Quaternary alluvium including valley fill, eolian deposits and river deposits. These deposits are between early Pleistocene and latest Holocene (less than 2.6 million years old) in age. In the eastern portion of the Project Excavation Parameters however, there is also a Mesozoic granitoid between 252 and 66 million years old. A search for paleontological records was completed at the San Bernardino County Museum (SBCM) in 2008 and 2014 and in published materials. The Project Excavation Parameters and a ten-mile radius were searched for resources. Ten fossil localities have been previously collected from within a 1½- mile radius of the Project Excavation Parameters.

Kim Scott conducted the initial paleontological reconnaissance on February 9, 2009 covering the Project Excavation Parameters from Haven Avenue in Ontario to Ford Street in Redlands. The newly added portions of the Project Excavation Parameters were surveyed July 6, 2014. As this was intended to be a ground truthing survey to confirm geologic mapping of the area and to assess the visible sediments for fossil bearing potential, the survey consisted of a windshield survey with pedestrian survey of open ground surface areas. A majority of the central portion of the Right of Way (ROW) was surveyed in 2009 and these areas were not surveyed again for this report. The 40-mile Project Excavation Parameters are highly urbanized thus open ground surface was not common. The mapped geology was confirmed throughout the Project Excavation Parameters. No fossils were observed during the survey.

Paleontological sensitivity analysis determined that the San Timoteo Formation is highly sensitive for paleontological resources and is ranked PFYC 4. Quaternary old alluvial fan, very old alluvial fan, very old axial channel sediments all are ranked PFYC 3a and have potential to produce significant vertebrate fossils. The Quaternary old eolian, young alluvial fan, and young eolian deposits are assigned a PFYC value of 3b and have an undemonstrated potential for containing fossils although the sediments are old enough. The young axial channel deposits and all of the very young deposits assigned a PFYC 2 or low sensitivity as they are too young to contain fossils, however they do overlie older deposits which are fossiliferous. Both the artificial fill and the Mesozoic foliated granitoid rocks are assigned a PFYC 1 or very low sensitivity.

Grading, excavation and other surface and subsurface excavation in defined areas of the proposed project have the potential to impact significant nonrenewable fossil resources of Pleistocene age. All excavations in areas mapped as San Timoteo Formation have the potential to encounter significant paleontological resources and should be monitored full time. Excavations deeper than 5 feet in the Quaternary old alluvial fan, very old alluvial fan, very old axial channel deposits, and old eolian deposits should be monitored full time. Excavations more than 10 feet in depth into young alluvial fan, young eolian, young axial channel and very young deposits should be spot checked periodically for the presence of older, paleontologically sensitive sediments. Should sediments conducive to fossil preservation be encountered, monitoring should be implemented in those areas. Areas mapped as Mesozoic foliated granitoid rocks do not require monitoring. Drilling activities are also exempt from monitoring as recovered fossil fragments would not meet significance criteria. A Paleontological Mitigation Plan (PMP) shall be prepared by a qualified paleontologist prior to the start of construction.

INTRODUCTION

PURPOSE OF STUDY

The purpose of this document is to assess the potential for impacting fossil resources along Interstate 10 (I-10) during proposed work to widen the freeway. Specifically the Project Excavation Parameters extend from western San Bernardino County into eastern Los Angeles County (Figure 1). The project limits, including transition areas, extend from approximately 0.4 mile west of White Avenue in Pomona at Post Mile (PM) 44.9 to Live Oak Canyon Road in Yucaipa at PM 37.0. This report incorporates pertinent portions of Scott and Gust (2009) which reviewed a significant portion of the Project Excavation Parameters covered within this study.

PROJECT DESCRIPTION

The California Department of Transportation (Caltrans), in cooperation with the San Bernardino Associated Governments (SANBAG), proposes to add freeway lanes through all or a portion of the 33-mile stretch of Interstate 10 (I-10) from the Los Angeles/San Bernardino (LA/SB) County Line to Ford Street in San Bernardino County. The project limits including transition areas extend from approximately 0.4 miles west of White Avenue in the City of Pomona at Post Mile (PM) 44.9 to Live Oak Canyon Road in the City of Yucaipa at PM 37.0.

ALTERNATIVES

Alternative 1: No Build

Alternative 1 (No Build) would maintain the existing lane configuration of I-10 within the project limits with no additional mainline lanes or associated improvements to be provided.

Alternative 2: One High Occupancy Vehicle Lane (HOV) in Each Direction

Alternative 2 (One High Occupancy Vehicle Lane in Each Direction) would extend the existing High Occupancy Vehicle (HOV) lane in each direction of I-10 from the current HOV terminus near Haven Avenue in the City of Ontario to Ford Street in the City of Redlands, a distance of approximately 25 miles.

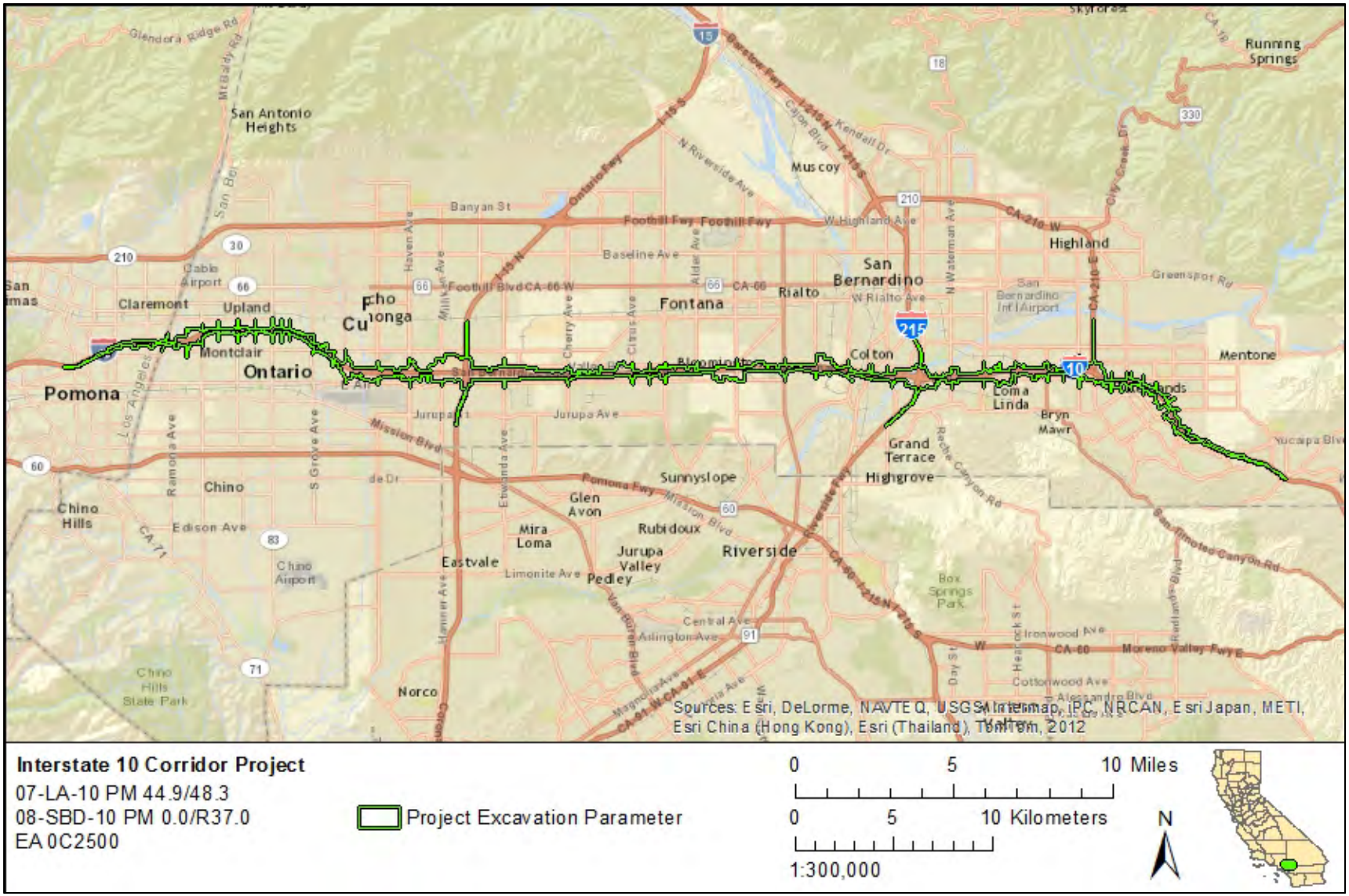

Figure 1. Project Vicinity

Alternative 3: Two Express Lanes in Each Direction

Alternative 3 (Two Express Lanes in Each Direction) would provide two Express Lanes in each direction of I-10 from the LA/SB County Line to California Street (near SR-210) in the City of Redlands and one Express Lane in each direction from California Street to Ford Street in the City of Redlands, a total of 33 miles. The Express Lanes would be priced managed lanes in which vehicles not meeting the minimum occupancy requirement would pay a toll. West of Haven Avenue, a single new lane would be constructed and combined with the existing HOV lane to provide two Express Lanes in each direction; east of Haven Avenue all Express Lanes would be constructed by the project.

PROJECT EXACVATION PARAMETER

The Project Excavation Parameters are mapped on the San Dimas, Ontario, Guasti, Fontana, San Bernardino South, Redlands, and Yucaipa 7.5' United States Geological Survey topographic maps, within the San Bernardino Base Meridian (Table 1, Figure 2). The project includes approximately 40-linear miles of potential alterations to I-10 and areas abutting the Right of Way (ROW) to each side of I-10.

The vertical Project Excavation Parameters are between 2 feet and 70 feet below the current ground surface. Depth of construction will typically be 3 to 5 feet for widening I-10 and widening or reconstruction of interchange ramps. Removal of existing retaining walls and construction of new retaining walls will have impacts up to 20 feet in depth where located on piles. Removal and construction of sound walls will have impacts of up to 16 feet in depth for cast-in-drilled-hole (CIDH) piles. CIDH piles for overhead signs, lighting, closed-circuit television (CCTV), and changeable message signs (CMS) will be up to 25 feet deep. Excavation for drainage channels and roadside ditches varies from 2 feet to 15 feet below the surface. Excavation depths for removal and relocation of existing utilities will vary. The deepest utility excavations are anticipated for the aqueduct and large water line and will be up to 20 feet deep. Footing for bridge work may require excavations up to 10 feet in depth in addition to driven steel piles or CIDH piles that will range from 30 to 70 feet below grade.

Table 1. USGS 7.5' maps, Township Ranges, and Sections

7.5' Topographic Quadrangle	Township	Range	Section(s)
San Dimas, California	1 South	8 West	19
Ontario, California	1 South	8 West	14, 15, 16, 17, 20, 22, 23
		7 West	7, 13, 16, 17, 18, 20, 21
Guasti, California	1 South	7 West	13, 15, 16, 21, 23, 24, 25, 26,
	1 South	6 West	18, 19, 20, 21, 25, 26, 28, 29, 30, 31
	1 South	5 West	19, 20, 21, 22, 27, 29, 30
Fontana, California	1 South	6 West	22, 23, 24, 26, 27, 28
	1 South	5 West	19, 20, 22, 21, 28
South San Bernardino, California	1 South	5 West	24
	1 South	4 West	15, 16, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 32, 33
Redlands, California	1 South	4 West	24, 25
	1 South	3 West	16, 19, 20, 21, 22, 23, 25, 26, 27, 28, 29, 30, 35, 36
	2 South	3 West	1
	2 South	2 West	6
Yucaipa, California	2 South	2 West	4, 5, 6, 9

Figure 2a. Project Location

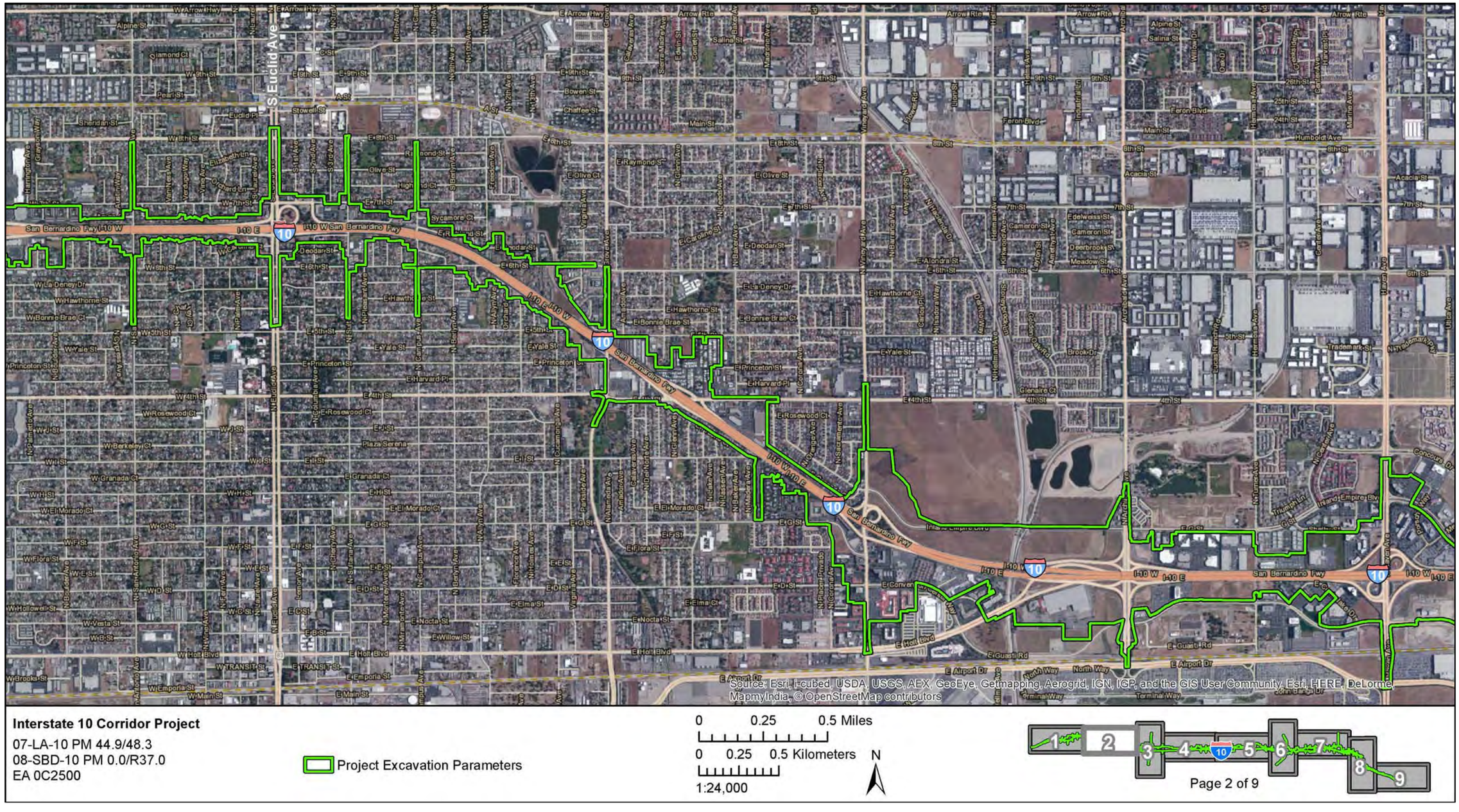

Figure 2b. Project Location

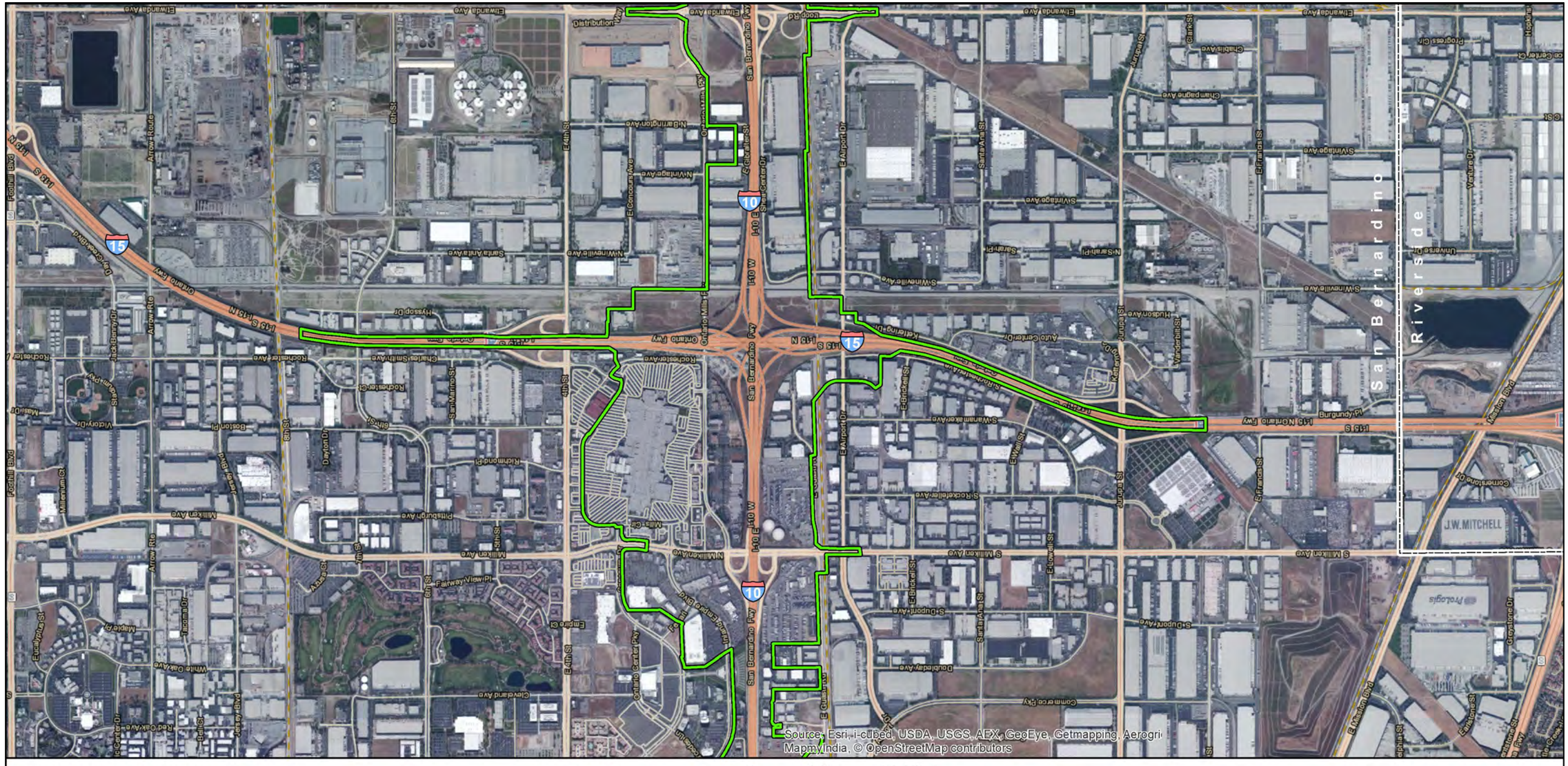

Figure 2c. Project Location

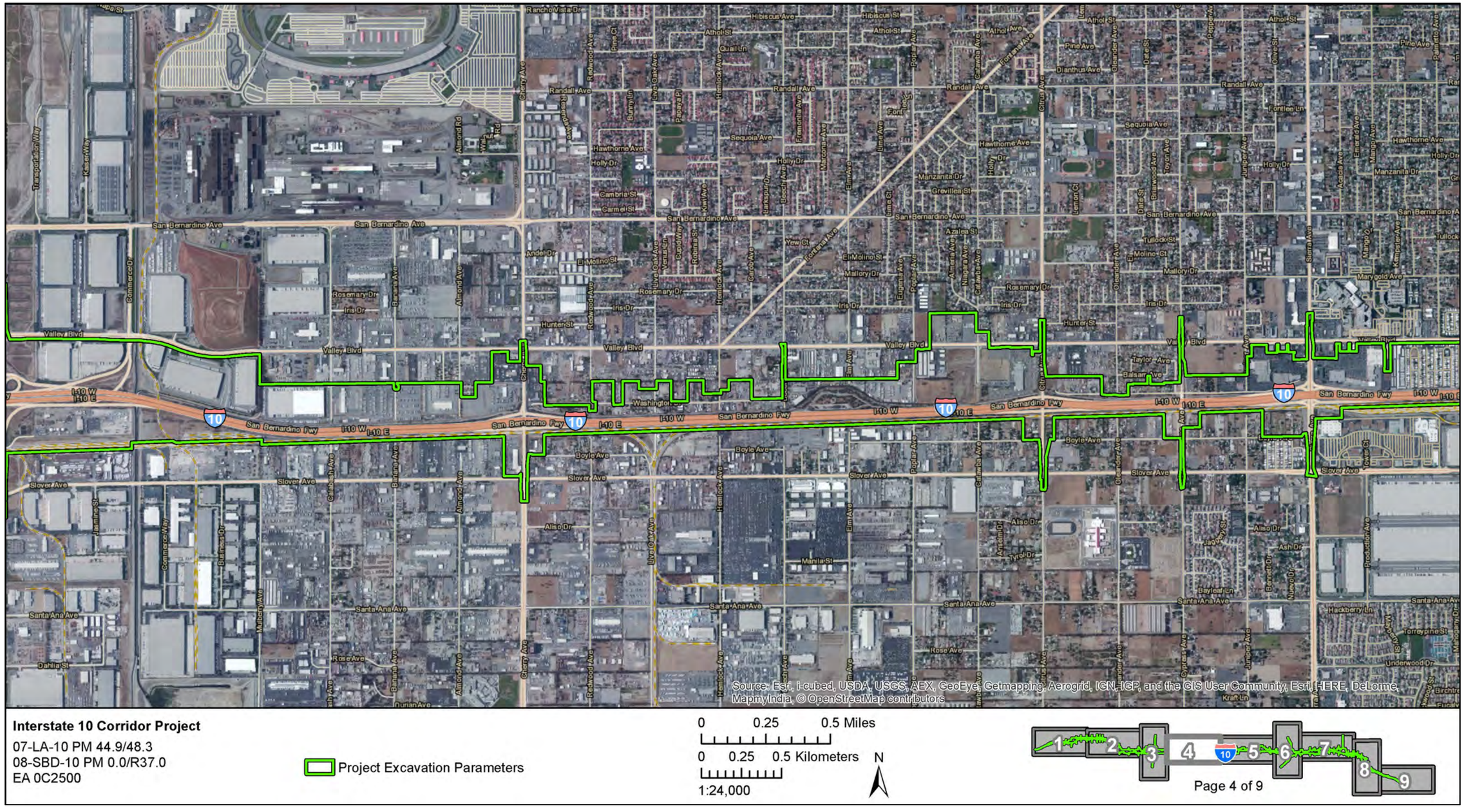

Figure 2d. Project Location

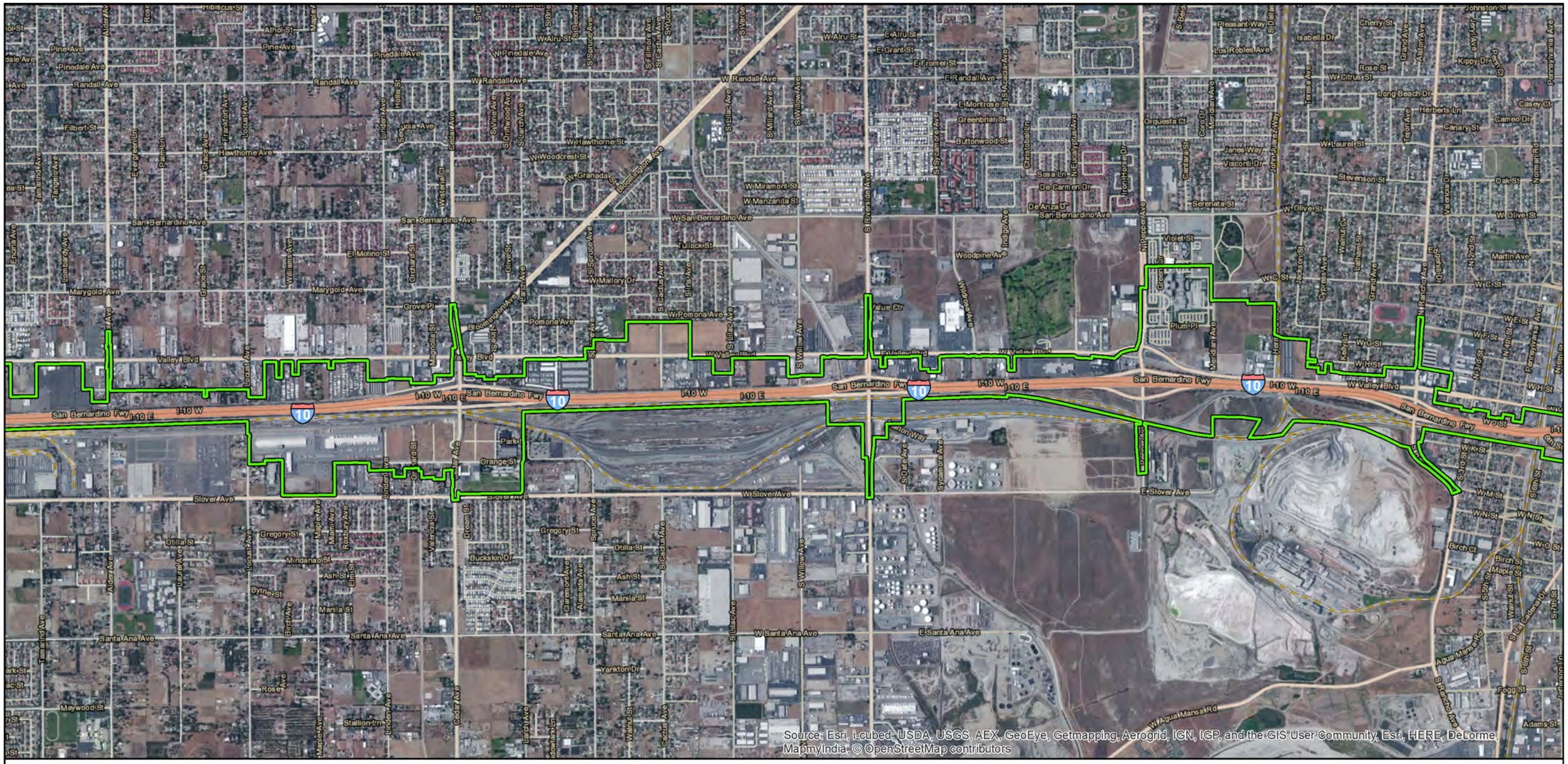

Figure 2e. Project Location

Figure 2f. Project Location

Figure 2g. Project Location

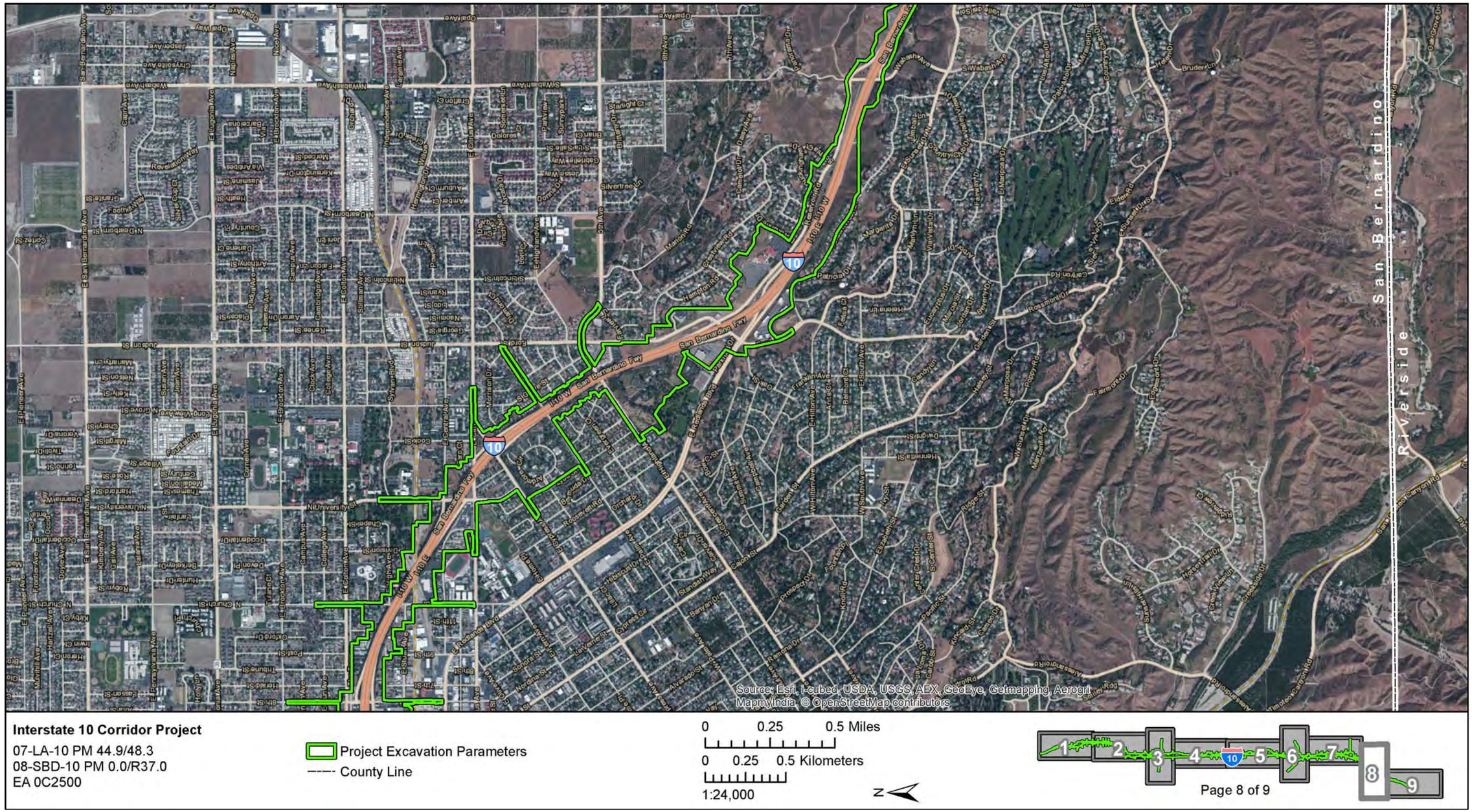

Figure 2h. Project Location

Figure 2i. Project Location

REGULATORY ENVIRONMENT

The following discussion of applicable laws has been excerpted and reordered from the Caltrans Standard Environmental Reference, Volume 1, Chapter 8 on Paleontology (Caltrans 2003, updated 2012). This project is subject to federal and state legislation regarding paleontological resources.

FEDERAL LAWS AND REGULATIONS

A variety of Federal statutes specifically address paleontological resources. Only those applicable due to federal funding apply to this project.

FEDERAL-AID HIGHWAY ACT

Section 305 of the Federal Aid Highway Act of 1956 (20 USC 78, 78a) gives the Federal Highway Administration (FHWA) authority to use Federal funds to salvage archaeological and paleontological sites affected by highway projects.

NATIONAL ENVIRONMENTAL POLICY ACT

The National Environmental Policy Act (NEPA; 42 USC 4321-4347) mandates the protection of cultural resources within its general policy for environmental protection. It requires the preservation of important historic, cultural, and natural aspects of our national heritage, and the maintenance, wherever possible, of an environment that supports diversity and a variety of individual choice. Regulations promulgated by the Advisory Council on Historic Preservation provide for the coordination of NEPA and National Historic Preservation Act (NHPA) compliance, under 36 CFR Part 800.14(a). Regulations for implementing the procedural provisions of NEPA are available at 40 Code of Federal Regulations (CFR) Part 1500-1508.

If the presence of a significant environmental resource is identified during the scoping process, Federal agencies and their agents must take the resource into consideration when evaluating project effects. Consideration of paleontological resources may be required under NEPA when a project is proposed for development on Federal land, or land under Federal jurisdiction. The level of consideration depends upon the Federal agency involved.

STATE LAWS AND REGULATIONS

Paleontological resources are protected by state law. This protection covers all vertebrate fossils (animals with backbones) and any unique paleontological locality.

CALIFORNIA ENVIRONMENTAL QUALITY ACT

California Environmental Quality Act (CEQA) states that: It is the policy of the state that public agencies should not approve projects as proposed if there are feasible alternatives or feasible mitigation measures available which would substantially lessen the significant environmental effects of such projects, and that the procedures required are intended to assist public agencies in systematically identifying both the significant effects of proposed projects and the feasible alternatives or feasible mitigation measures which will avoid or substantially lessen such significant effects.

CEQA Guidelines state that CEQA is intended to: Prevent significant, avoidable damage to the environment by requiring changes in projects through the use of alternatives or mitigation measures when the governmental agency finds the changes to be feasible.

If paleontological resources are identified during the Preliminary Environmental Analysis Report (PEAR), or other initial project scoping studies (e.g., Preliminary Environmental Study (PES)), as being within the proposed project area, the sponsoring agency (Caltrans or local) must take those resources into consideration when evaluating project effects. The level of consideration may vary with the importance of the resource.

PUBLIC RESOURCES CODE

Public Resources Code (PRC) Section 5097.5 states that no person shall knowingly and willfully excavate upon, or remove, destroy, injure or deface any historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological site, including fossilized footprints, inscriptions made by human agency, or any other archaeological, paleontological or historical feature, situated on public lands, except with the express permission of the public agency having jurisdiction over such lands. Violation of this section is a misdemeanor. As used in this section, "public lands" means lands owned by, or under the jurisdiction of, the state, or any city, county, district, authority, or public corporation, or any agency thereof.

COUNTY LAWS AND REGULATIONS

Paleontological resources are protected by county ordinances. The County of San Bernardino (Development Code §82.20.040) defines a qualified paleontologist as meeting the following criteria:

> Education: An advanced degree (Masters or higher) in geology, paleontology, biology or related disciplines (exclusive of archaeology).
>
> Professional experience: At least five years professional experience with paleontologic (not including cultural) resources, including the collection, identification and curation of

the resources.

The County of San Bernardino (Development Code §82.20.030) requires that paleontologic mitigation programs include, but not be limited to:

(a) All paleontological work will be supervised by a qualified paleontologist.

(b) Field survey before grading. In areas of potential but unknown sensitivity, field surveys before grading shall be required to establish the need for paleontologic monitoring.

(c) Monitoring during grading. A project that requires grading plans and is located in an area of known fossil occurrence, or that has been demonstrated to have fossils present in a field survey, shall have all grading monitored by trained paleontologic crews working under the direction of a qualified paleontologist, so that fossils exposed during grading can be recovered and preserved. Paleontologic monitors shall be equipped to salvage fossils as they are unearthed, to avoid construction delays, and to remove samples of sediments that are likely to contain the remains of small fossil invertebrates and vertebrates. Monitors shall be empowered to temporarily halt or divert equipment to allow removal of abundant or large specimens. Monitoring is not necessary if the potentially-fossiliferous units described for the property in question are not present, or if present are determined upon exposure and examination by qualified paleontologic personnel to have low potential to contain fossil resources.

(d) Recovered specimens. Qualified paleontologic personnel shall prepare recovered specimens to a point of identification and permanent preservation, including washing of sediments to recover small invertebrates and vertebrates. Preparation and stabilization of all recovered fossils is essential in order to fully mitigate adverse impacts to the resources.

(e) Identification and curation of specimens. Qualified paleontologic personnel shall identify and curate specimens into the collections of the SBCM Division of Geological Sciences, an established, accredited museum repository with permanent retrievable paleontologic storage. These procedures are also essential steps in effective paleontologic mitigation and CEQA compliance. The paleontologist must have a written repository agreement in hand prior to the initiation of mitigation activities. Mitigation of adverse impacts to significant paleontologic resources is not considered complete until curation into an established museum repository has been fully completed and documented.

(f) Report of findings. Qualified paleontologic personnel shall prepare a report of findings with an appended itemized of specimens. A preliminary report shall be submitted and approved before granting of building permits, and a final report shall be submitted and approved before granting of occupancy permits. The report and inventory, when submitted to the appropriate Lead Agency along with

confirmation of the curation of recovered specimens into the collections of the SBCM, will signify completion of the program to mitigate impacts to paleontologic resources.

RESOURCE CONTEXT

GEOLOGIC SETTING

This portion of the I-10 corridor travels through one of the most tectonically active regions of North America. To the north of the project, the San Andreas Fault Zone travels up Cajon Pass where it is the boundary between the Pacific Plate and the North American Plate. The Transverse Ranges are a result of these two plates grinding past each other and "catching" along the bend in the San Andreas. The Pacific Plate is composed of numerous blocks that can move independently.

The Transverse Range Province are an east-west trending series of steep mountain ranges and valleys, oblique to the normal northwest trend of coastal California, hence the name "Transverse." The province extends offshore to include San Miguel, Santa Rosa, and Santa Cruz islands. Its eastern extension, the San Bernardino Mountains, has been displaced to the south along the San Andreas Fault. Intense north-south compression is squeezing the Transverse Ranges, and as a result this is one of the most rapidly rising regions of the earth (Wagner 2002).

STRATIGRAPHY

Virtually the entire project is mapped as various types of Quaternary alluvium including valley fill, eolian deposits and river deposits. These deposits are between early Pleistocene and latest Holocene (less than 2.6 million years old) in age (Morton and Miller 2006; Figure 3). In the eastern portion of the Project Excavation Parameters however, there is also a Mesozoic granitoid between 252 and 66 million years old. All geologic units and locations within the Project Excavation Parametesr are discussed below.

MESOZOIC ROCKS

Mesozoic foliated granitoid rocks (M_zfg)

These primarily granodiorite to tonalite, fine to coarse grained, foliated Mesozoic (252-66 million year old) rocks also range in to monzogranite and quartz diorite (Morton and Miller 2006). Within the Project Excavation Parameters these rocks only appear within Reservoir Canyon between Ford Street in Redlands and Yucaipa Boulevard in Yucaipa (Figures 3h, 3i).

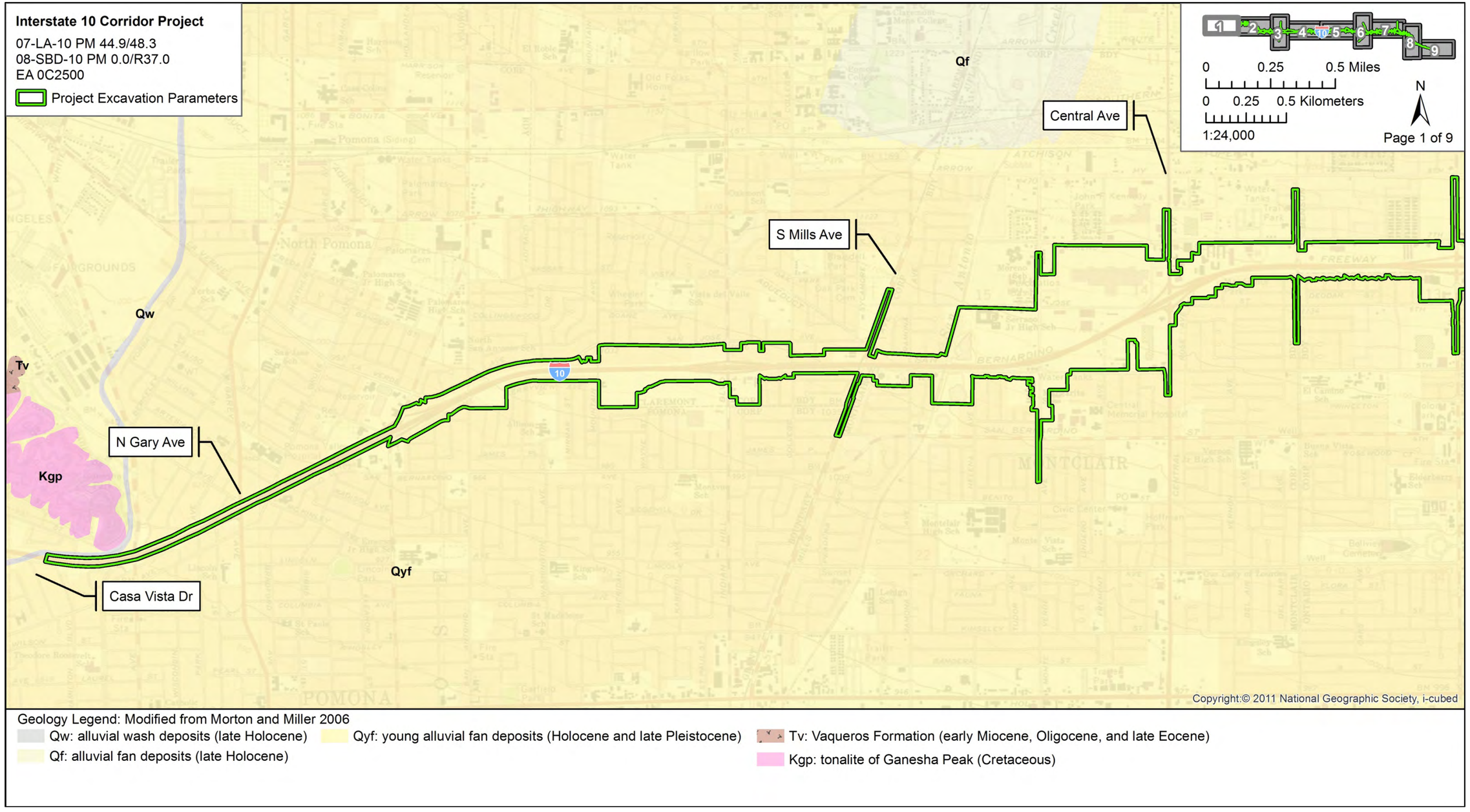

Figure 3a. Geology Map

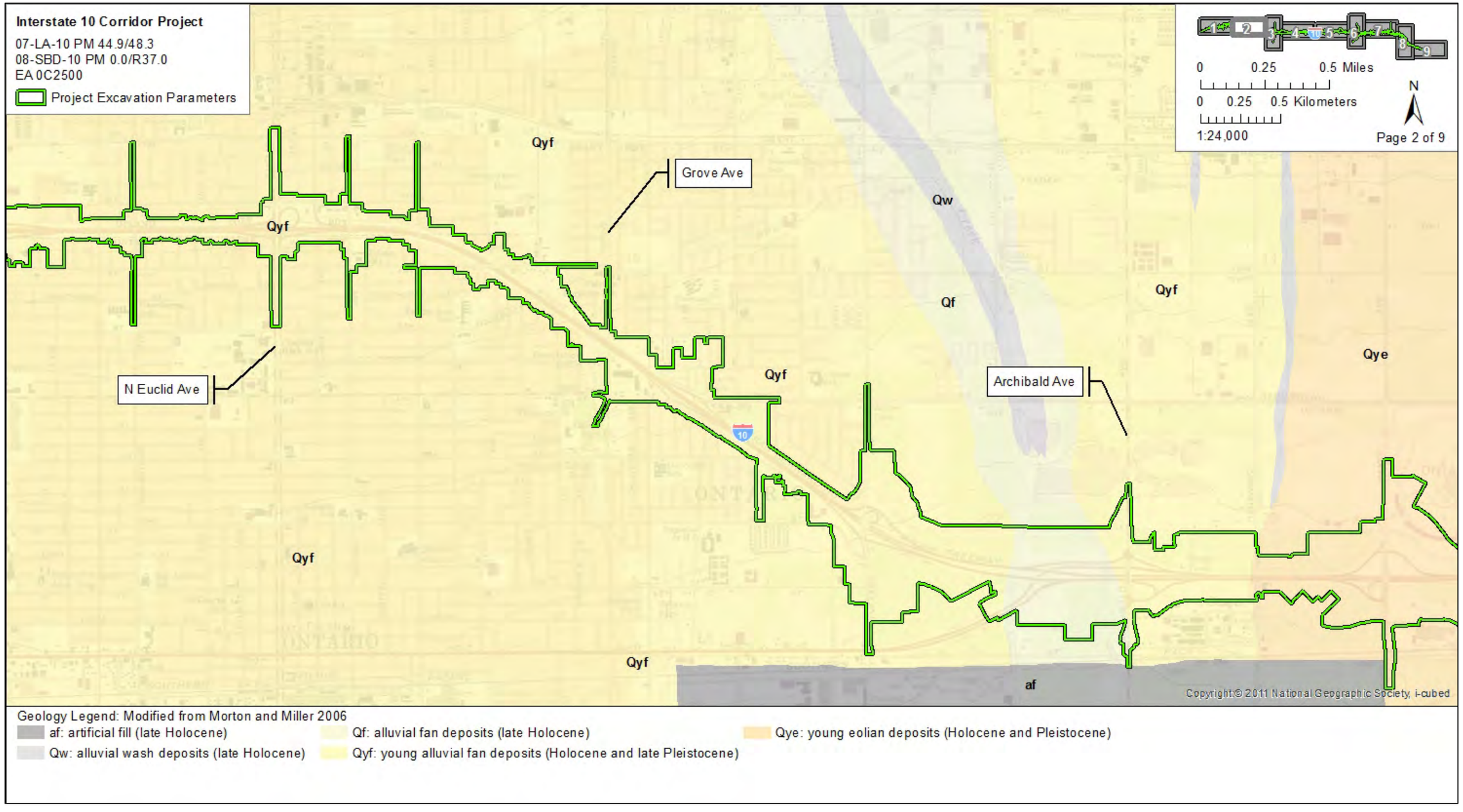

Figure 3b. Geology Map

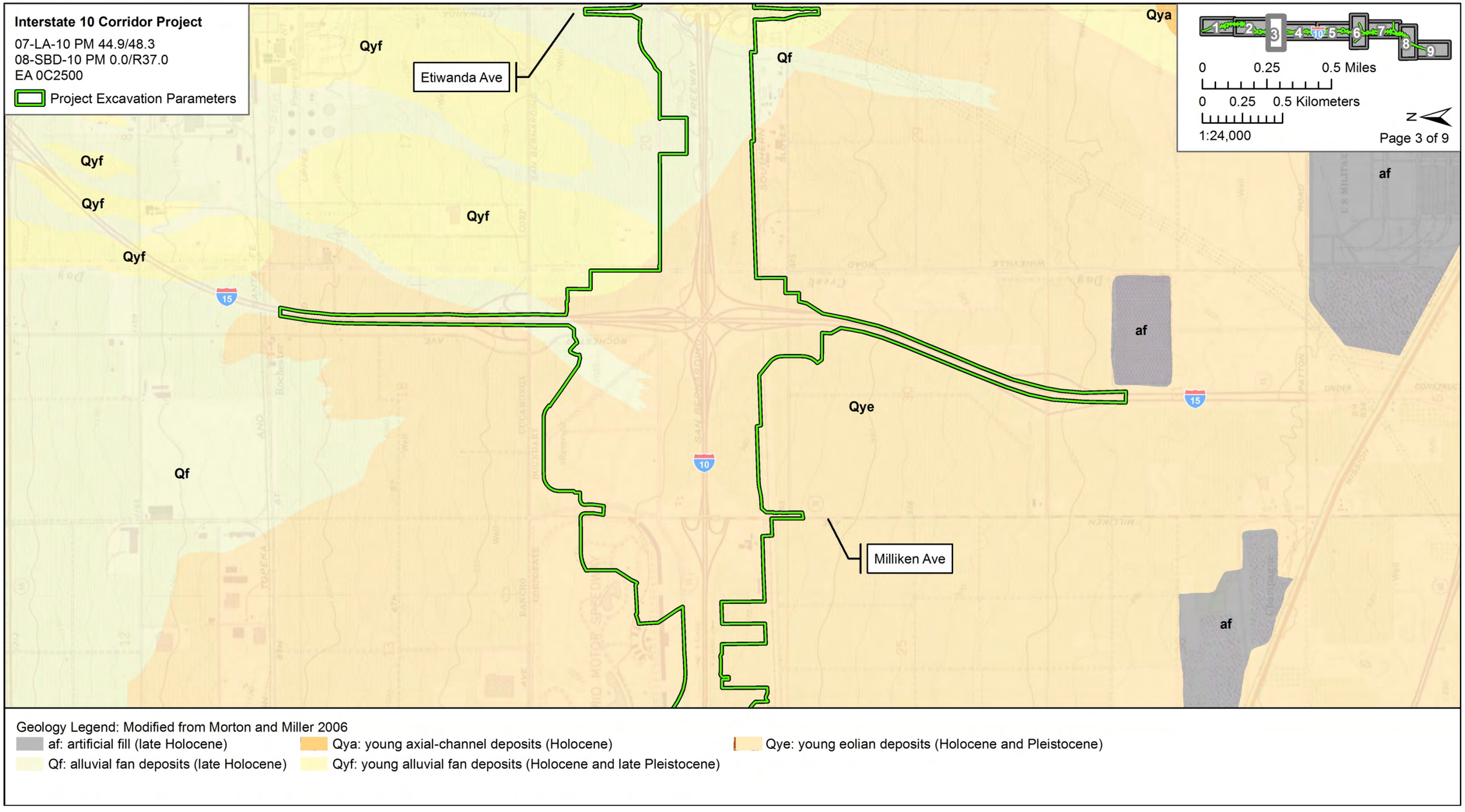

Figure 3c. Geology Map

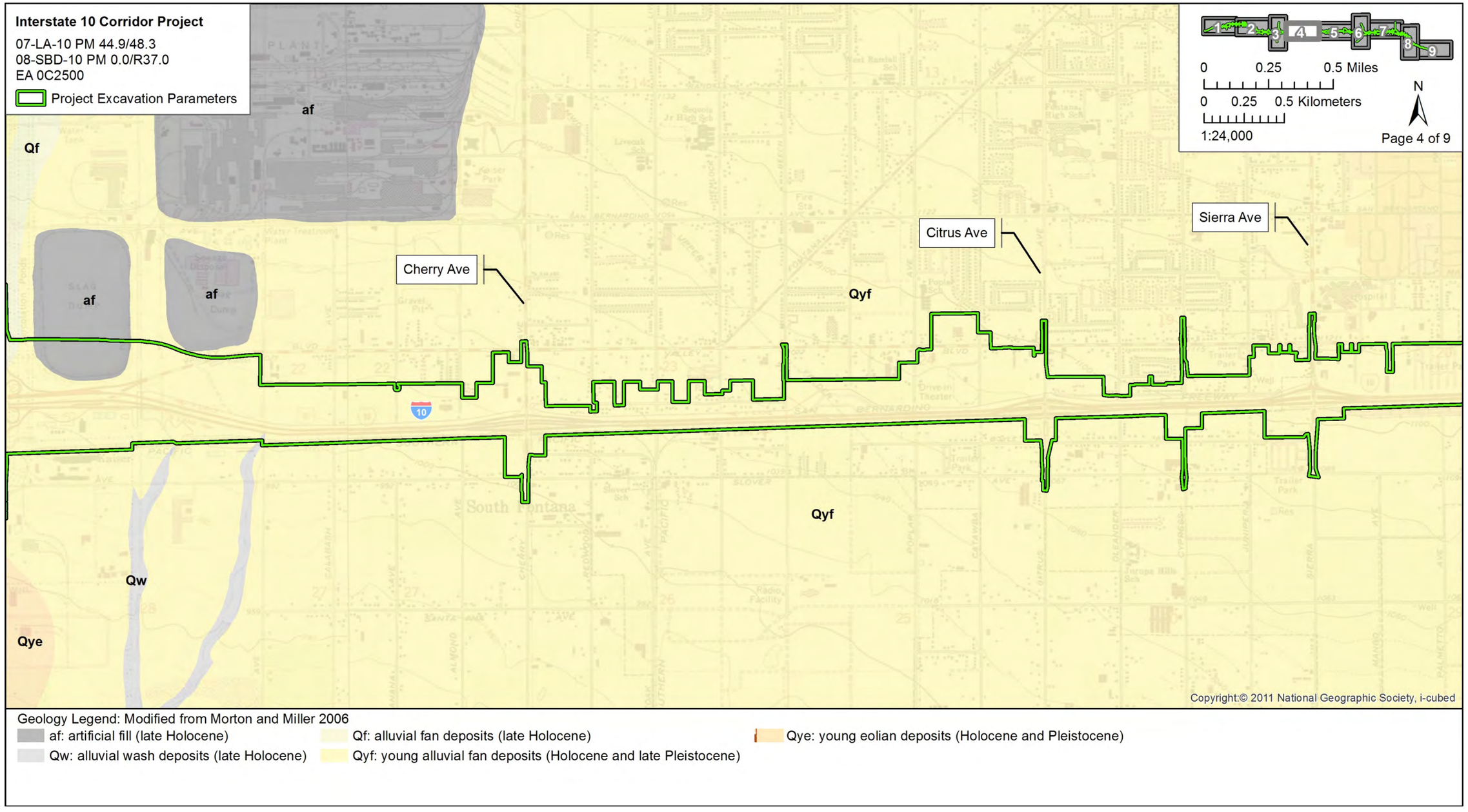

Figure 3d. Geology Map

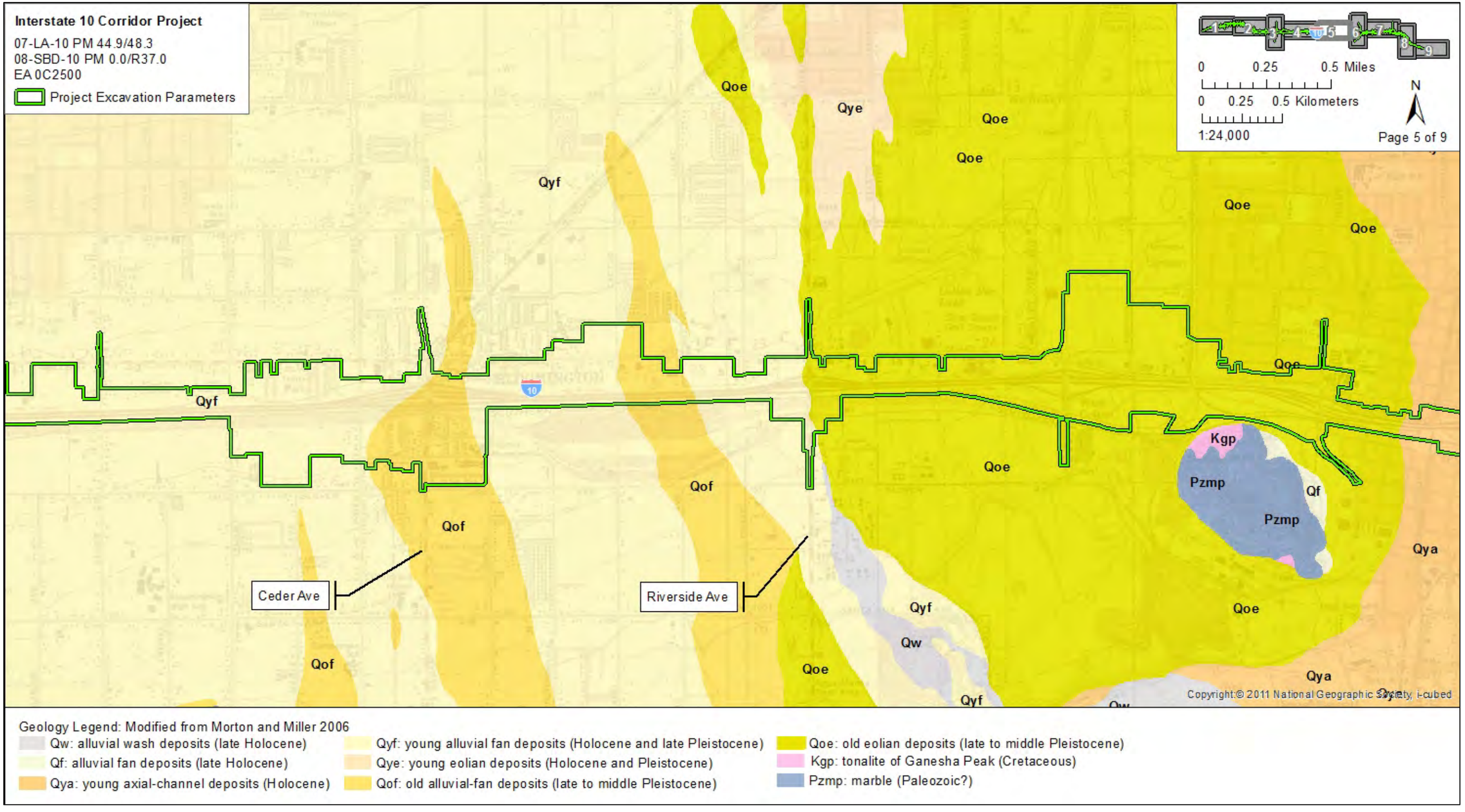

Figure 3e. Geology Map

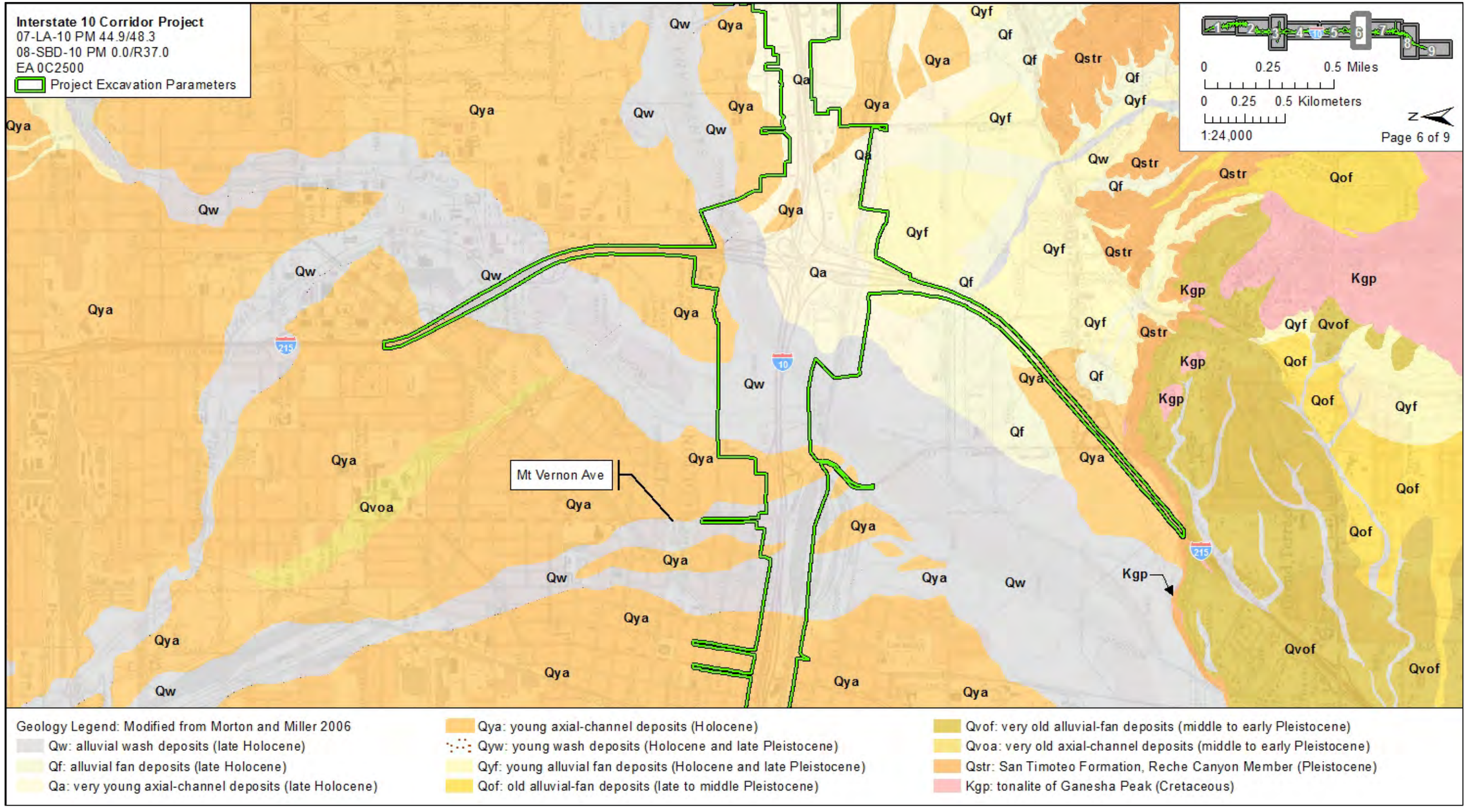

Figure 3f. Geology Map

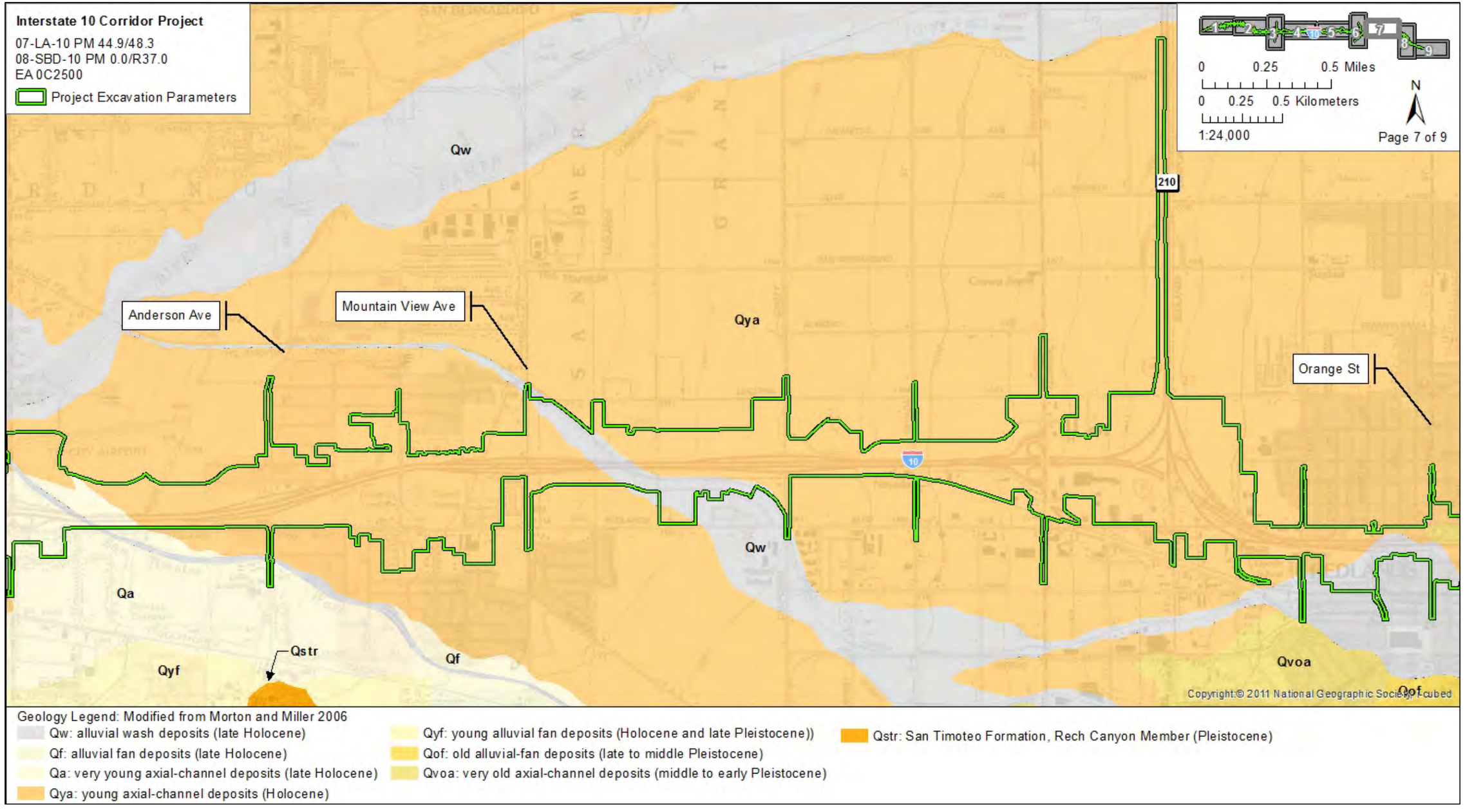

Figure 3g. Geology Map

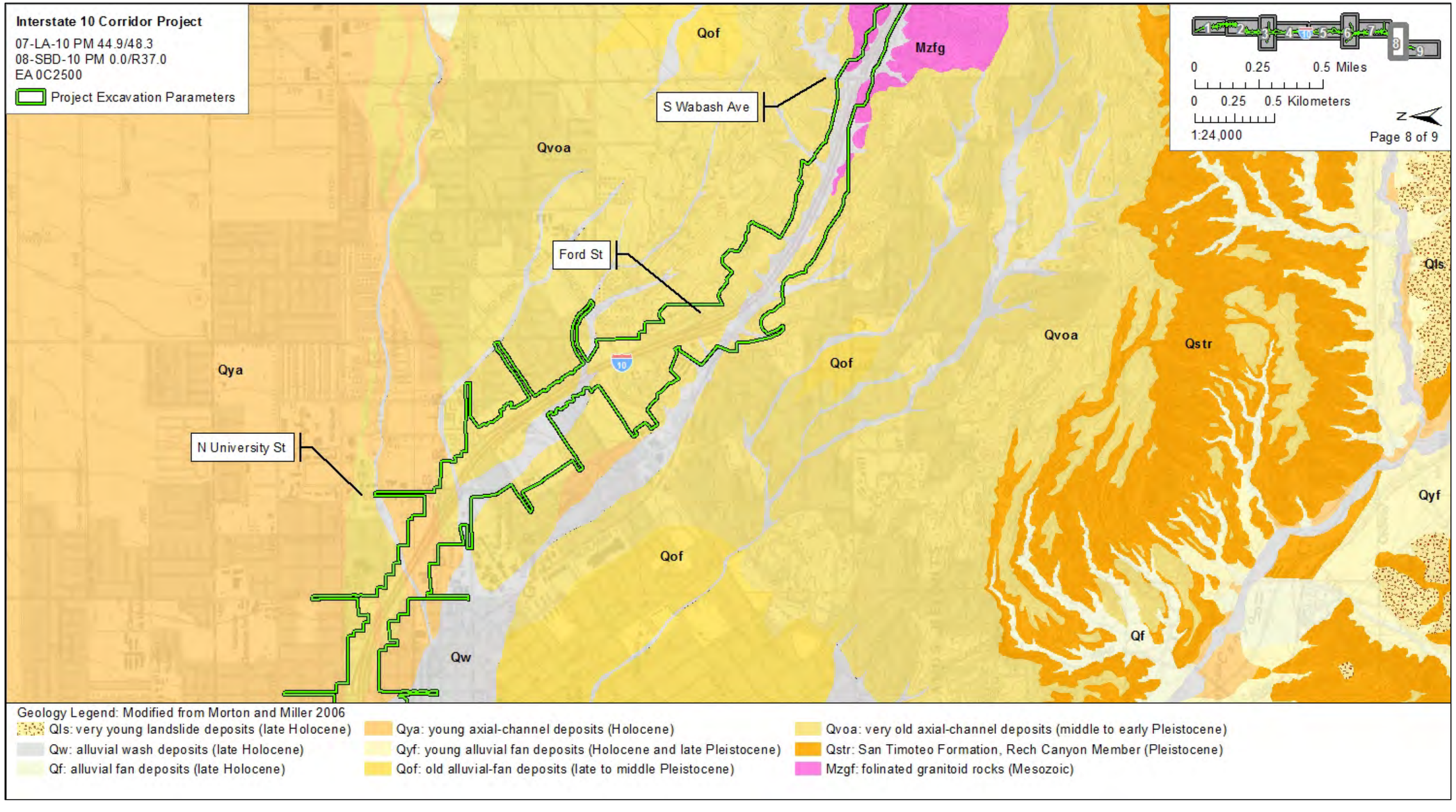

Figure 3h. Geology Map

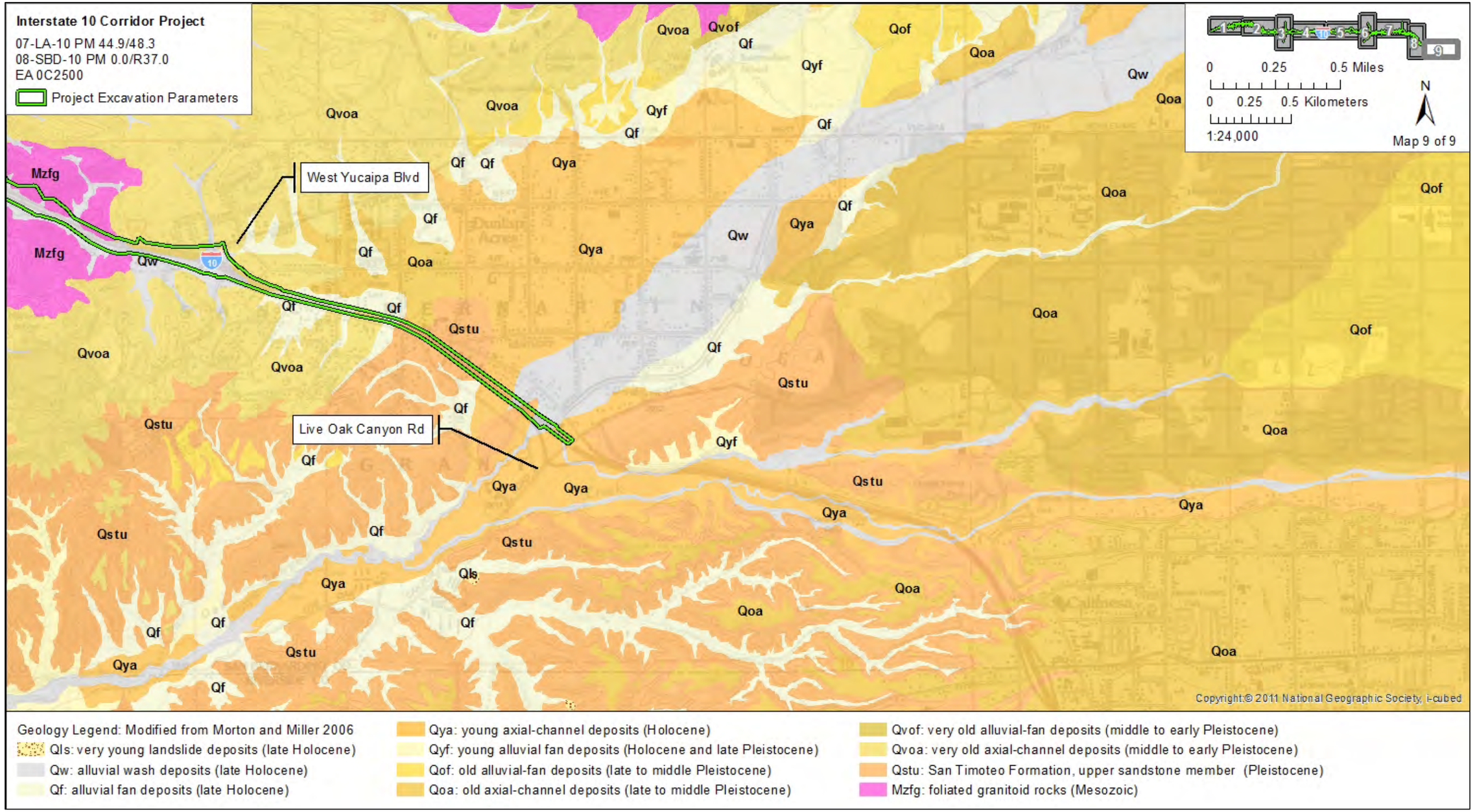

Figure 3i. Geology Map

PLEISTOCENE SEDIMENTS

These rock units are entirely within the Pleistocene Epoch dating between 2.6 million and 11 thousand years ago.

San Timoteo Formation, upper member (Qstu)

These primarily fluvial deposits of light grey to light yellowish brown sandstones interbedded with pebble to cobble conglomerates are found on the eastern end of the Project Excavation Parameter from Yucaipa Boulevard to Live Oak Canyon Road in Yucaipa (Figure 3i). Conglomerates consist of subangular to subrounded clasts of nearby basement rocks. Fossils of the Irvingtonian I and II North American Land Mammal Ages (NALMA) from the upper part of this unit indicate that these sediments are middle Pleistocene ranging from approximately 1.8 million to 780,000 years old (Repenning 1987; Albright 1997, 1999a, 1999b; Morton and Miller 2006).

San Timoteo Formation, Reche Canyon member (Qstr)

An informal unit of the upper member of the San Timoteo Formation, the Reche Canyon member is characterized by pebbly, coarse grained, arkosic sandstone (Morton and Miller 2006). This unit is found south of Mount Vernon Avenue at the southern extent of the Project Excavation Parameter near Grand Terrace (Figure 3f).

Very old axial channel deposit, unit 3 (Qvoa)

These middle Pleistocene (1.8 million to 126,000 year old) channel deposits and pedogenic soils cover the San Timoteo Formation in eastern Redlands, east of Orange Street (Figures 3h, 3i). Sediments are yellow-tan to reddish-brown, well consolidated and dissected beds of silts to sands with pebble and cobble conglomerates (Morton and Miller 2006).

Very old alluvial fan deposit, unit 3 (Qvof)

These Quaternary very old alluvial fan deposits are middle Pleistocene in age based on the presence of the 780,000 year old Brunhes-Matuyama paleomagnetic boundary at 9.8 feet (3 meters) below ground surface in March Air Force Base, Moreno Valley (Morton et al. 1997). Sediments are described as moderately well consolidated, massive to moderately well bedded yellowish-brown arkosic sands and silts with some gravels and conglomerates (Morton and Miller 2006). This unit is found south of Mount Vernon Avenue at the southern extent of the Project Excavation Parameter near Grand Terrace (Figure 3f).

Old eolian deposit (Qoe)

These middle to late Pleistocene (126,000 to 11,000 years old) sands are slightly to moderately consolidated, yellow-brown silts and sands in Colton and Rialto between Riverside and Pennsylvania Avenues (Figure 3e). The sands form north trending longitudinal dunes with

massive to laminated structures. Gravels also occur in the dune sands between Hermosa and Riverside Avenues.

Old alluvial fan deposit, unit 3 (Qof)

These middle to late Pleistocene (126,000 to 11,000 years old) alluvial fan deposits are composed of reddish-brown, moderately consolidated, soils, sands, and gravels. The deposits are located between Cedar and Lilac Avenues in Bloomington and Rialto (Morton and Miller 2006; Figure 3e).

PLEISTOCENE-HOLOCENE SEDIMENTS

These sediments range from the late Pleistocene to Holocene about 130,000 to 5,000 years ago.

Young eolian deposit (Qye)

These late Pleistocene to Holocene (less than 126,000 years old), eolian silts and sands are mapped in Ontario between Turner Avenue and just east of Interstate 15 (I-15) (Figure 3b, 3c). Some portions of the unit include dune structures, but these are mostly known from along the Mojave River (Morton and Miller 2006).

Young alluvial fan deposit, units 1, 3, 5 (Qyf)

These late Pleistocene to late Holocene (from 126,000 to less than 5,000 years old), slightly to moderately consolidated alluvial fan deposits consist of silts, sands, and conglomerates off the San Bernardino and San Gabriel mountains. These sediments form a major portion of the alluvium from Pomona to Riverside Avenue in Rialto (Figures 3a, 3b, 3c, 3d, 3e, 3f; Morton and Miller 2006).

HOLOCENE SEDIMENTS

These sediments are entirely Holocene and are less than 10 thousand years old.

Young axial channel deposit, units 3, 5 (Qya)

These Holocene (between 7,500 and 2,500 years old), axial channel deposits are terraces adjacent to the local river channels. The entire unit is likely less than ~15 feet thick and the terraces rise only 3-6 feet above the channels they parallel. Sediments are unconsolidated, pale-brown, sands and pebble conglomerates occasionally mixed with and organic rich layers. Along the Project Excavation Parameters, these sediments are mapped in Colton, San Bernardino, Loma Linda, Redlands and Yucaipa (Figures 3e, 3f, 3g, 3h, 3i; Morton and Miller 2006).

Very young axial channel deposit (Qa)

Similar to the Qya sediments above, these late Holocene (less than 5,000 years old) axial channel deposits are associated with modern river channels. Along the Project Excavation Parameter,

these sediments are mapped along the Santa Ana River in Colton and San Bernardino between Mount Vernon Avenue to east of Waterman Avenue (Figures 3f, 3g). Sediments are sands intermixed with pebble conglomerates (Morton and Miller 2006).

Very young alluvial fan deposits (Qf)

Similar to the Qyf deposits above, these late Holocene (less than 2,500 years old) sediments are the unconsolidated, active portions of modern alluvial fans. Most areas lack soil development at the surface but can be capped by weak soils south of the San Bernardino Mountains. Along the Project Excavation Parameter, these sediments are mapped in Ontario, Fontana, San Bernardino, and Yucaipa (Figure 3b, 3c, 3d, 3f, 3i; Morton and Miller 2006).

Very young wash deposits (Qw)

These late Holocene (less than 2,500 years old) sediments are the unconsolidated, active portions of modern rivers and consist of sand to boulder clasts. Sediments are mapped intermittently throughout the Project Excavation Parameter (Figures 3a, 3d, 3f, 3g, 3h, 3i).

Artificial fill (af)

Sediments have been disturbed by modern human activities. Sediment description varies depending on the source material but pockets are found in Ontario and Fontana within the Project Excavation Parameters (Figures 3b, 3d)

RECORDS SEARCH RESULTS

A search for paleontological records was completed at the San Bernardino County Museum (SBCM) in 2008 and 2014 (Appendix B) and in published materials (Jefferson 1991a,b). The Project Excavation Parameters and a ten-mile radius were searched for resources. Ten fossil localities have been previously collected from within a 1½- mile radius of the Project Excavation Parameters (Scott 2008, 2014).

Extinct animals recovered from the ten localities in the Quaternary older alluvium near the Project Excavation Parameters include mammoth, mastodon, saber-toothed cat, bison, and camel (Table 2). Other localities in similar sediments in San Bernardino and Riverside counties have also produced ground sloths, short-faced bears, dire wolves, and horses. Fossils are also known from the San Timoteo Formation in the vicinity of the eastern portion of the Project Excavation Parameter. Recovered fossil mammals include mammoth, mastodon, horse, deer, camel, rodents,

and rabbit. Other vertebrate fossil material includes snakes, horned lizards, frogs, quails, doves, and crows. Invertebrate fossils and plants have also been recovered (Scott 2008, 2014).

Table 2. Fossils recovered within 1 ½ miles of the Project Excavation Parameters

Common Name	Taxon	Locality	Formation; Depth below surface
mammoth	*Mammuthus*	SBCM 5.1.8; 1.5 miles south of Haven and I-10	Quaternary older alluvium; 20 feet
mastodon, bison, camel	*Mammut*, *Bison*, Camelidae	SBCM 5.1.14 – SBCM 5.1.21; near intersection of Valley and I-10, less than 1 mile from the project	Quaternary older alluvium; as little as 5 feet
saber-toothed cat	*Smilodon*	SBCM 5.1.11; 1.25 miles south of the project	Quaternary older alluvium; unknown

PALEONTOLOGICAL FIELD RECONNAISSANCE

Kim Scott conducted the initial paleontological reconnaissance on February 9, 2009 covering the Project Excavation Parameters from Haven Avenue in Ontario to Ford Street in Redlands (Scott and Gust 2009). The newly added portions of the Project Excavation Parameters were surveyed July 6, 2014. As this was intended to be a ground truthing survey to confirm geologic mapping of the area and to assess the visible sediments for fossil bearing potential, the survey consisted of a windshield survey with pedestrian survey of open ground surface areas. A majority of the central portion of the ROW was surveyed in 2009 and these areas were not surveyed again for this report (Scott and Gust 2009). The project location and some detailed features were photographed to document the condition of the proposed Project Excavation Parameters.

The 40-mile Project Excavation Parameters are highly urbanized thus open ground surface was not common. Two of the older rock units, the old eolian dune deposits (Figures 3e, 4a) and very old axial channel deposits (Figures 3h, 4b) were present along the route and could be reviewed in areas of Bloomington, Colton and eastern Redlands in 2009. Portions of the additional areas were viewed as unpaved areas and outcrops were available (Figures 5, 6). The mapped geology was confirmed throughout the Project Excavation Parameter.

Throughout most of the Project Excavation Parameters the ROW was less than 4 feet below original ground surface (OGS). Within the Inland valleys, ground disturbances typically have to be greater than 10 feet deep before fossils are recovered from younger units. As such, areas where the ROW was already below OGS between Mountain and North Campus avenues in Ontario and between Cedar and Pepper avenues in Bloomington and Rialto have the potential for the highest impacts during ground disturbances. At the eastern end of the project however, all

impacts to the San Timoteo Formation have the potential to contain fossils as the older sediments are at the surface in this case (Figure 6). No fossils were observed during the survey.

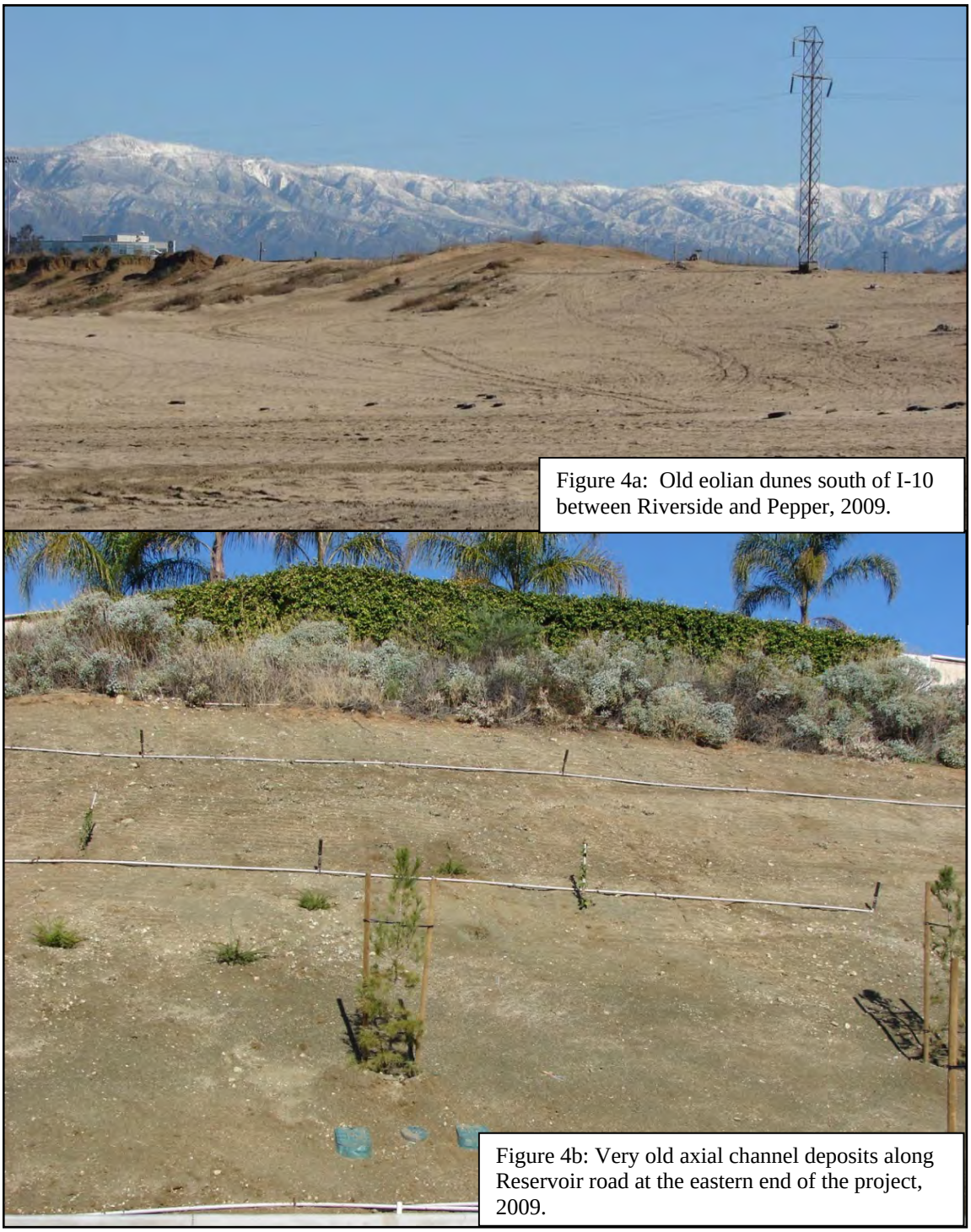

Figure 4a: Old eolian dunes south of I-10 between Riverside and Pepper, 2009.

Figure 4b: Very old axial channel deposits along Reservoir road at the eastern end of the project, 2009.

Figure 4. Old eolian dunes and very old axial channel deposits

Figure 5. The effect of human action on sediment appearance

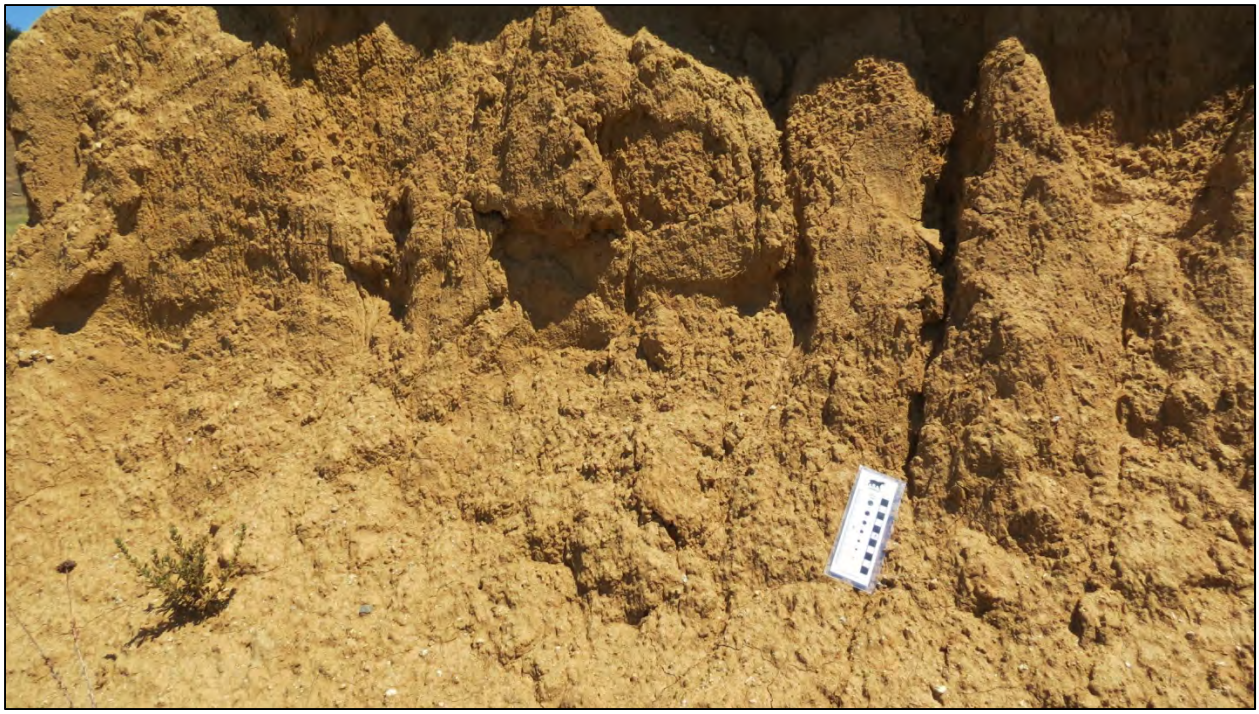

Figure 6. Upper member of the San Timoteo Formation just east of the Project in Calimesa

Figure 7. A new overpass and off-ramp for Citrus Avenue in Fontana

PALEONTOLOGICAL SENSITIVITY

Caltrans utilizes a tripartite scale to characterize paleontological sensitivity consisting of no, low and high (Caltrans 2012; Appendix C). A multilevel ranking system was developed by professional resource managers as a more practical tool, the Potential Fossil Yield Classification system (PFYC; BLM 2007; Appendix C). Using the PFYC system, geologic units are classified based on the relative abundance of vertebrate fossils or scientifically significant invertebrate or plant fossils and their sensitivity to adverse impacts. This ranking is not intended to be applied to specific paleontological localities or small areas within units. Although significant localities may occasionally occur in a geologic unit, a few widely scattered important fossils or localities do not necessarily indicate a higher PFYC value; instead, the relative abundance of localities is intended to be the major determinant for the value assignment.

San Timoteo Formation is highly sensitive for fossil resources and is assigned a PFYC ranking of 4. Quaternary old alluvial fan, very old alluvial fan, very old axial channel sediments all are ranked PFYC 3a and have potential to produce significant vertebrate fossils. Quaternary old eolian, young alluvial fan, and young eolian deposits are assigned a PFYC value of 3b and have an undemonstrated potential for containing fossils although the sediments are old enough. Young axial channel deposits and all of the very young deposits are assigned a PFYC 2 or low sensitivity as they are too young to contain fossils, however they do overlie older deposits which are fossiliferous. Both the artificial fill and the Mesozoic foliated granitoid rocks are assigned PFYC 1 or very low sensitivity (Table 3; Figure 8).

Table 3. Paleontological Sensitivity Rankings

Caltrans ranking	**high**			**low**		**no**
PFYC ranking	**5: very high**	**4: high**	**3a: moderate-patchy**	**3b: moderate-undemonstrated**	**2: low**	**1: very low**
Rock Units						
Artificial fill (af)						X
Very young wash deposits (Qw)					X	
Very young alluvial fan deposits (Qf)					X	
Very young axial channel deposit (Qa)					X	
Young axial channel deposit (Qya)					X	
Young alluvial fan deposit (Qyf)				X		
Young eolian deposit (Qye)				X		
Old alluvial fan deposit (Qof)			X			
Old eolian deposit, dune sand (Qoe)				X		
Very old alluvial fan deposit (Qvof)			X			
Very old axial channel deposit (Qvoa)			X			
San Timoteo Formation (Qstu, Qstr)		X				
Mesozoic foliated granitoid rocks ($M_z$fg)						X

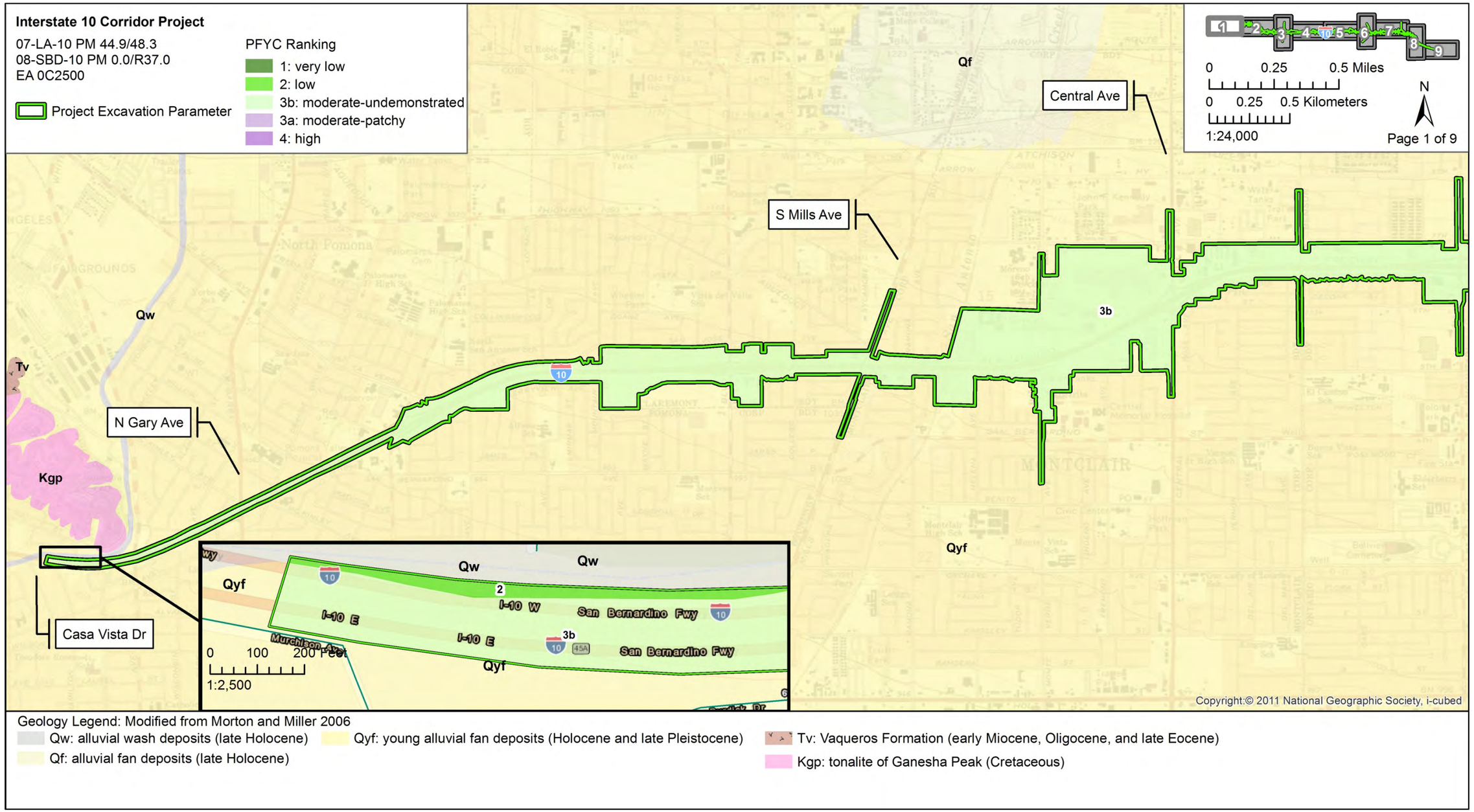

Figure 8a. Paleontological Sensitivity Map

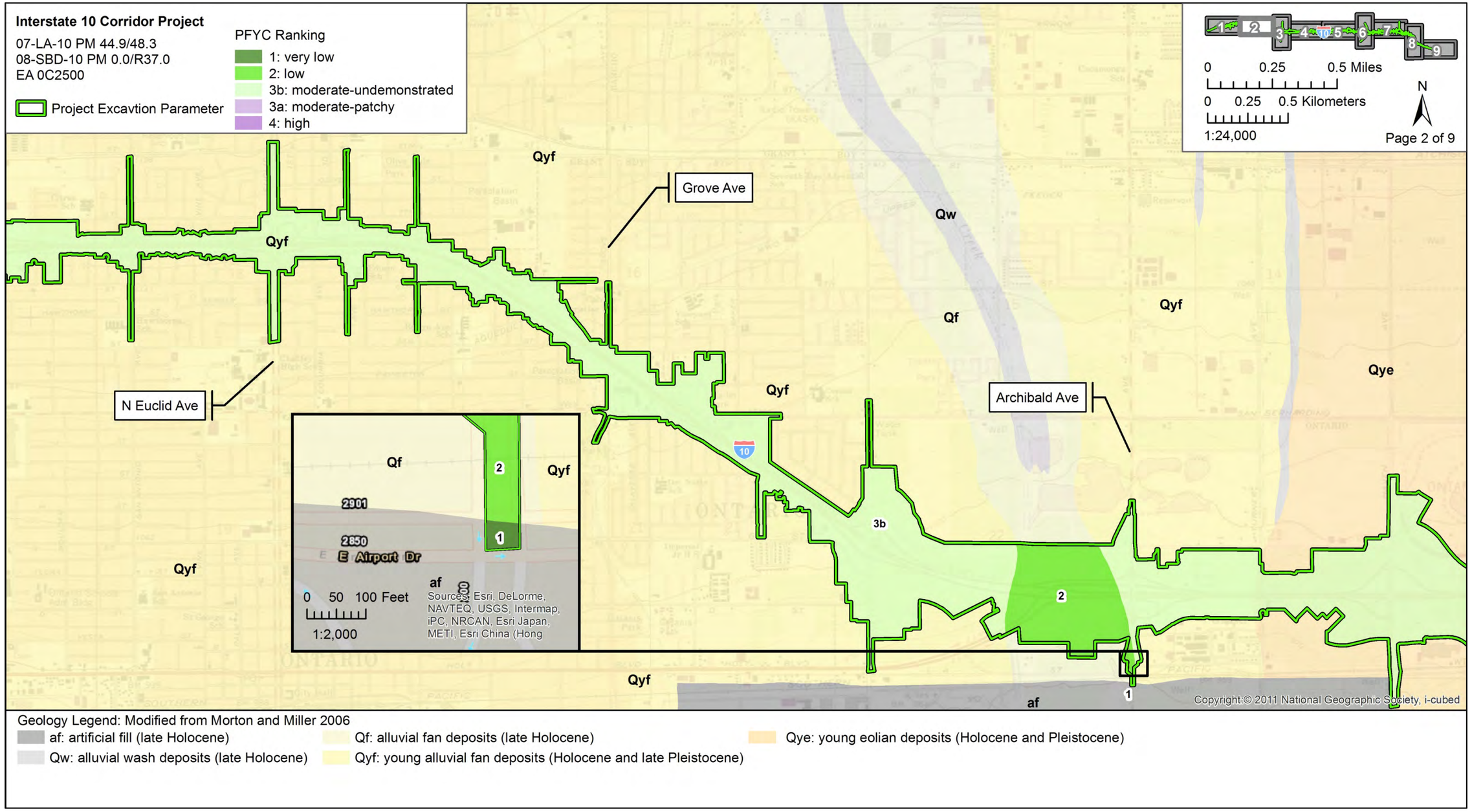

Figure 8b. Paleontological Sensitivity Map

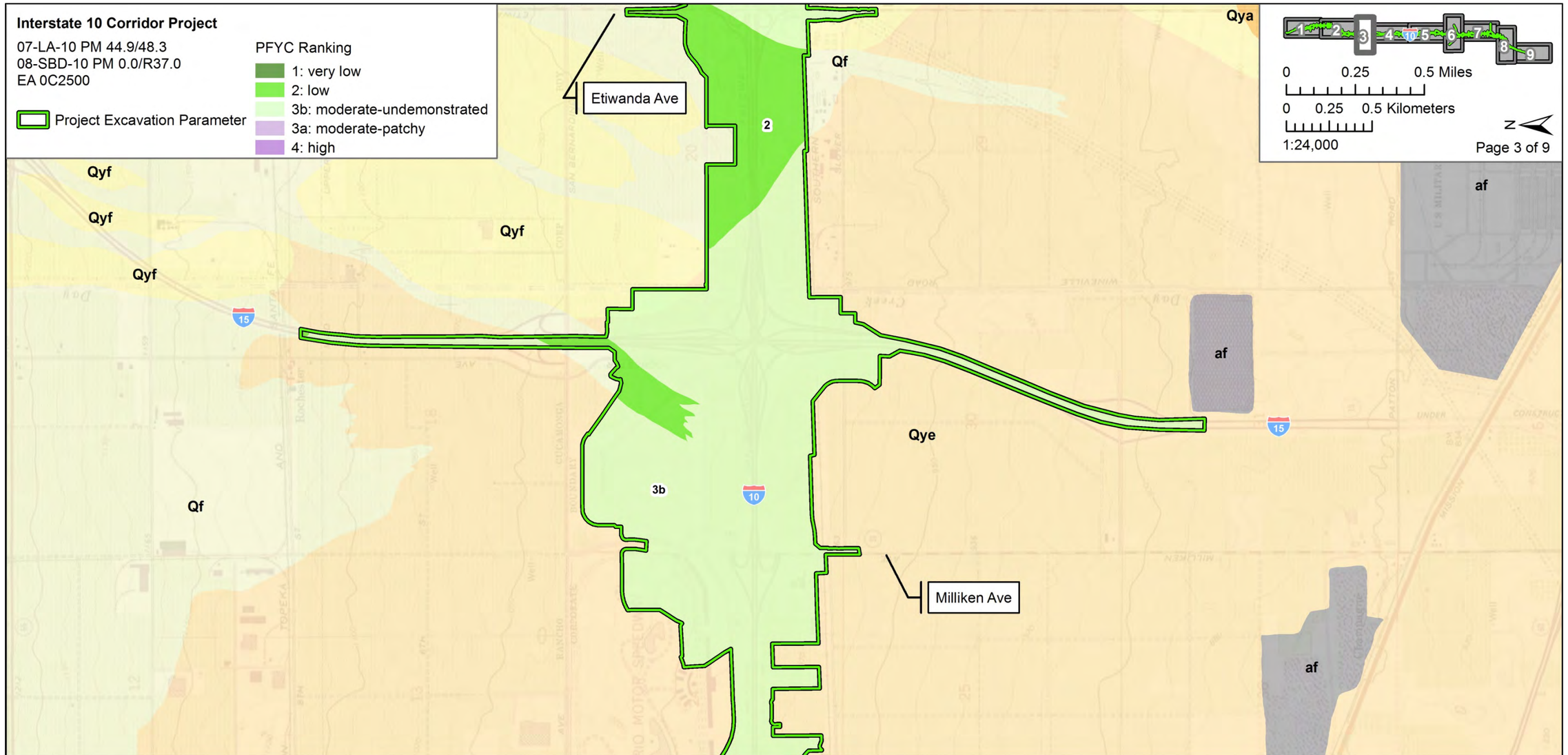

Figure 8c. Paleontological Sensitivity Map

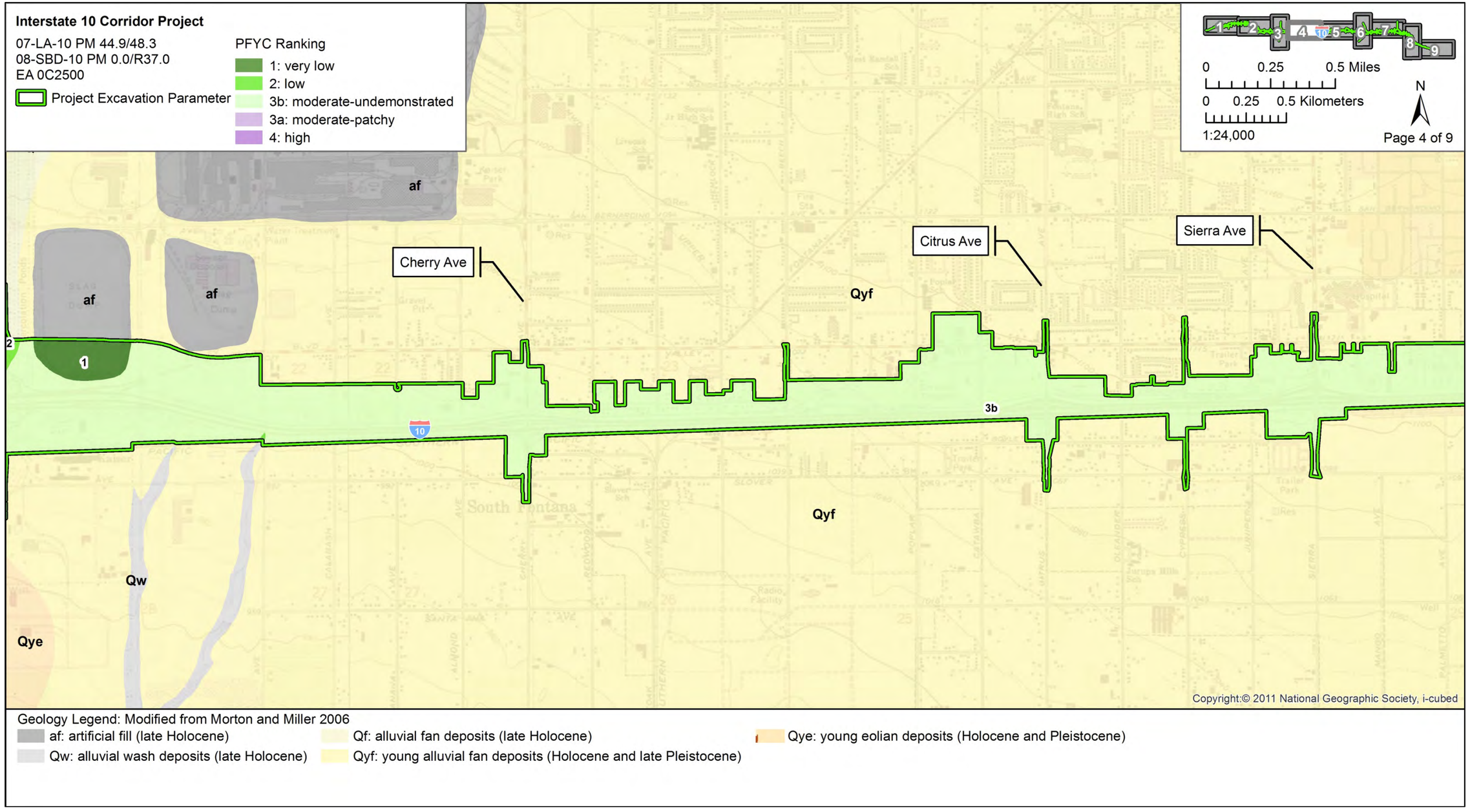

Figure 8d. Paleontological Sensitivity Map

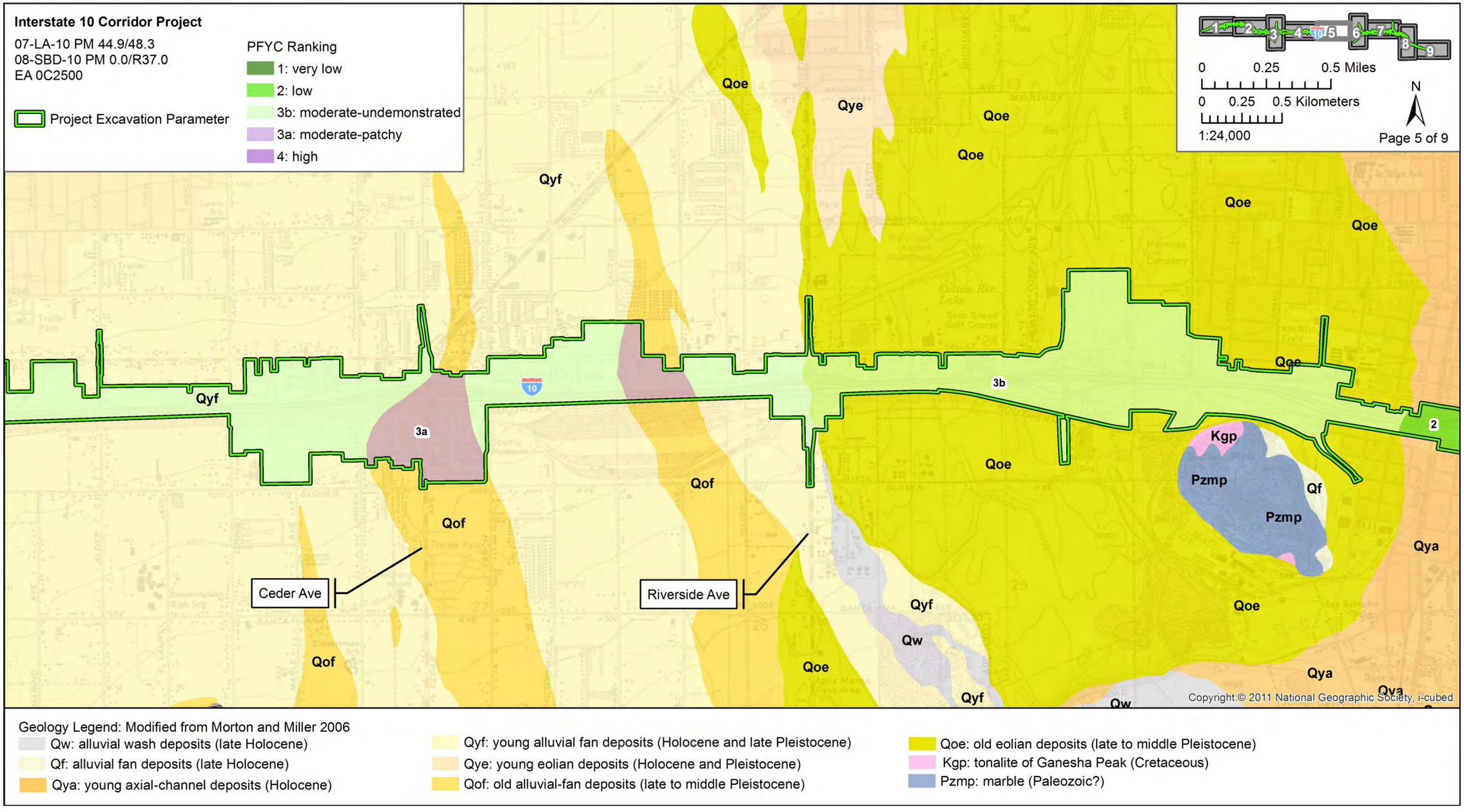

Figure 8e. Paleontological Sensitivity Map

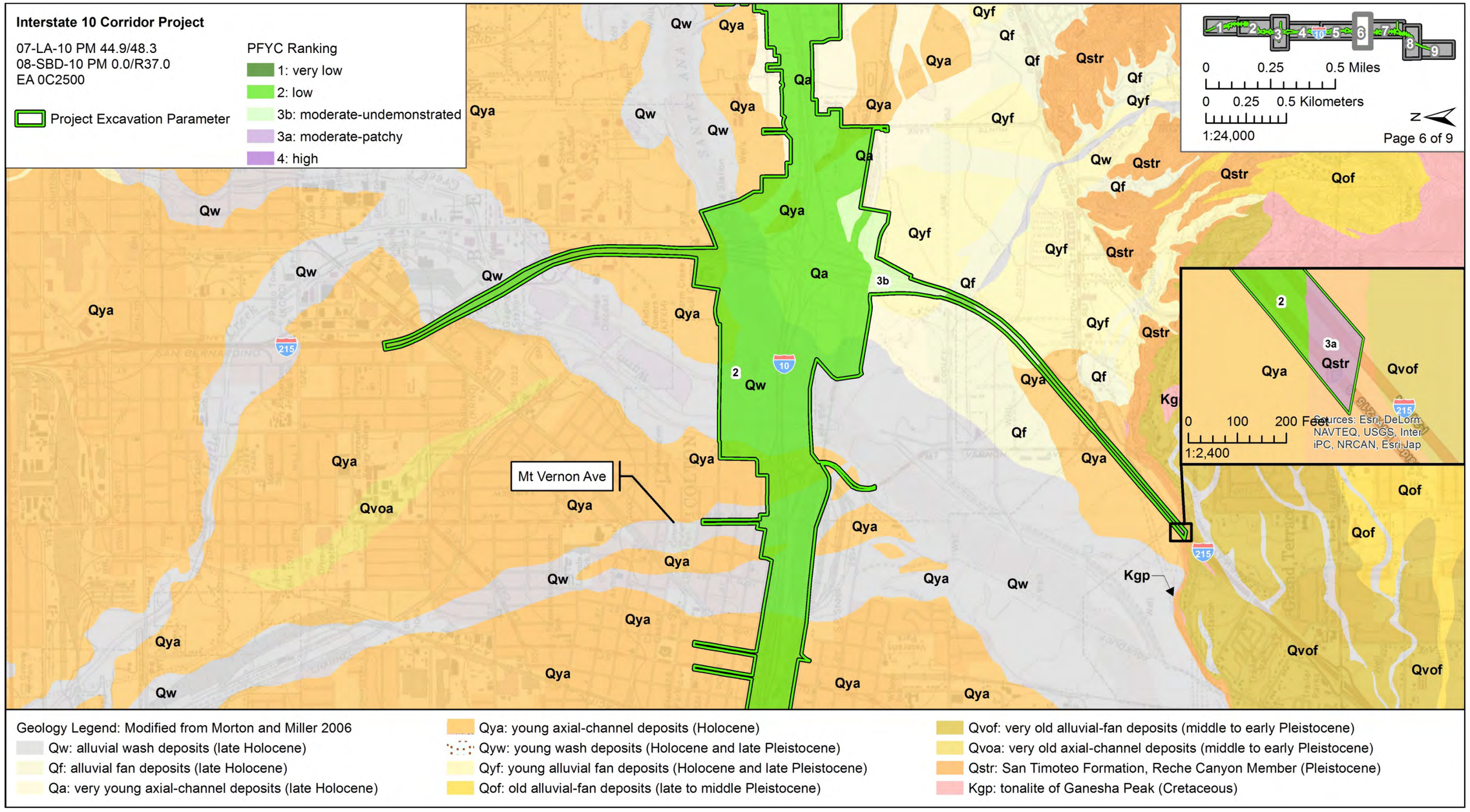

Figure 8f. Paleontological Sensitivity Map

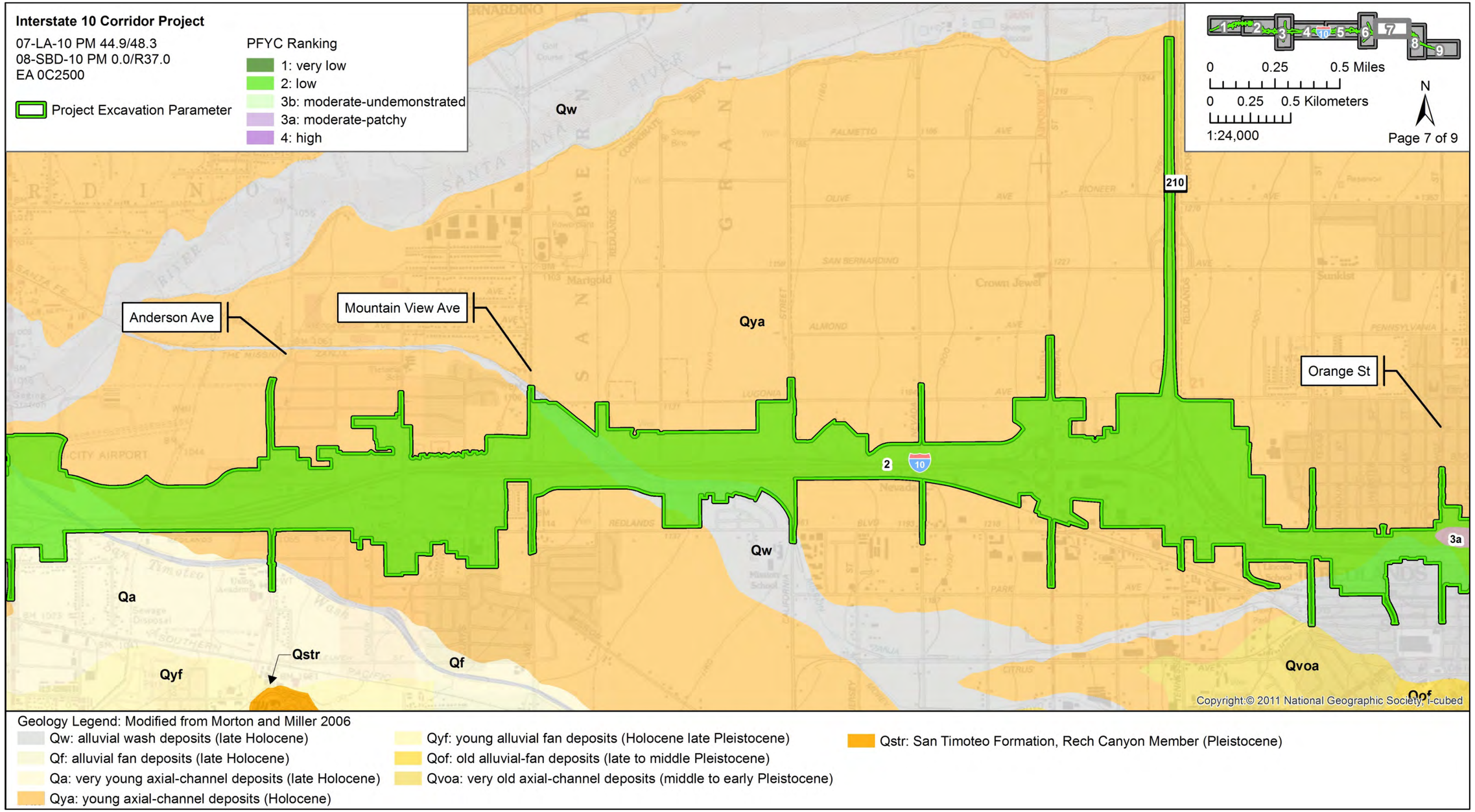

Figure 8g. Paleontological Sensitivity Map

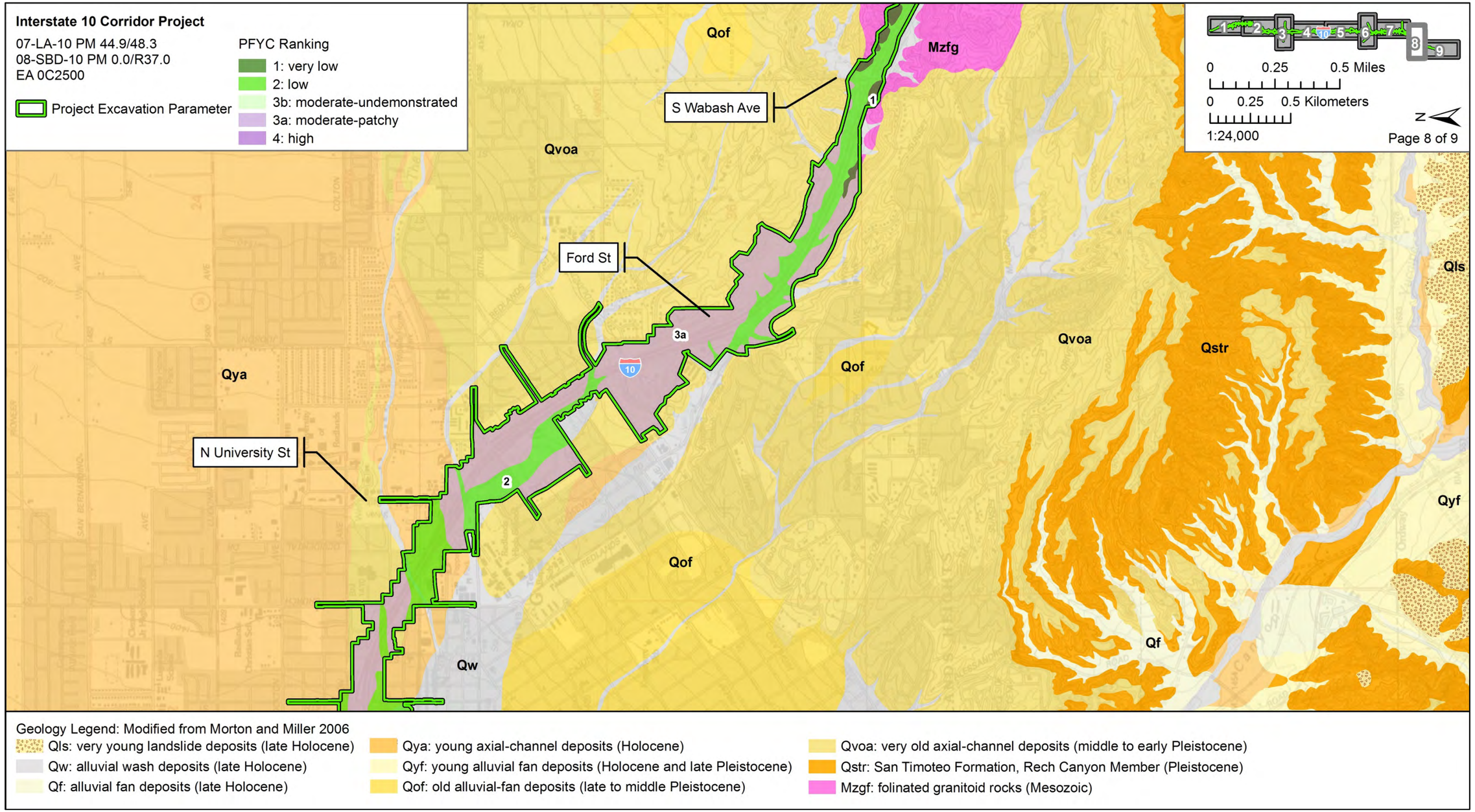

Figure 8h. Paleontological Sensitivity Map

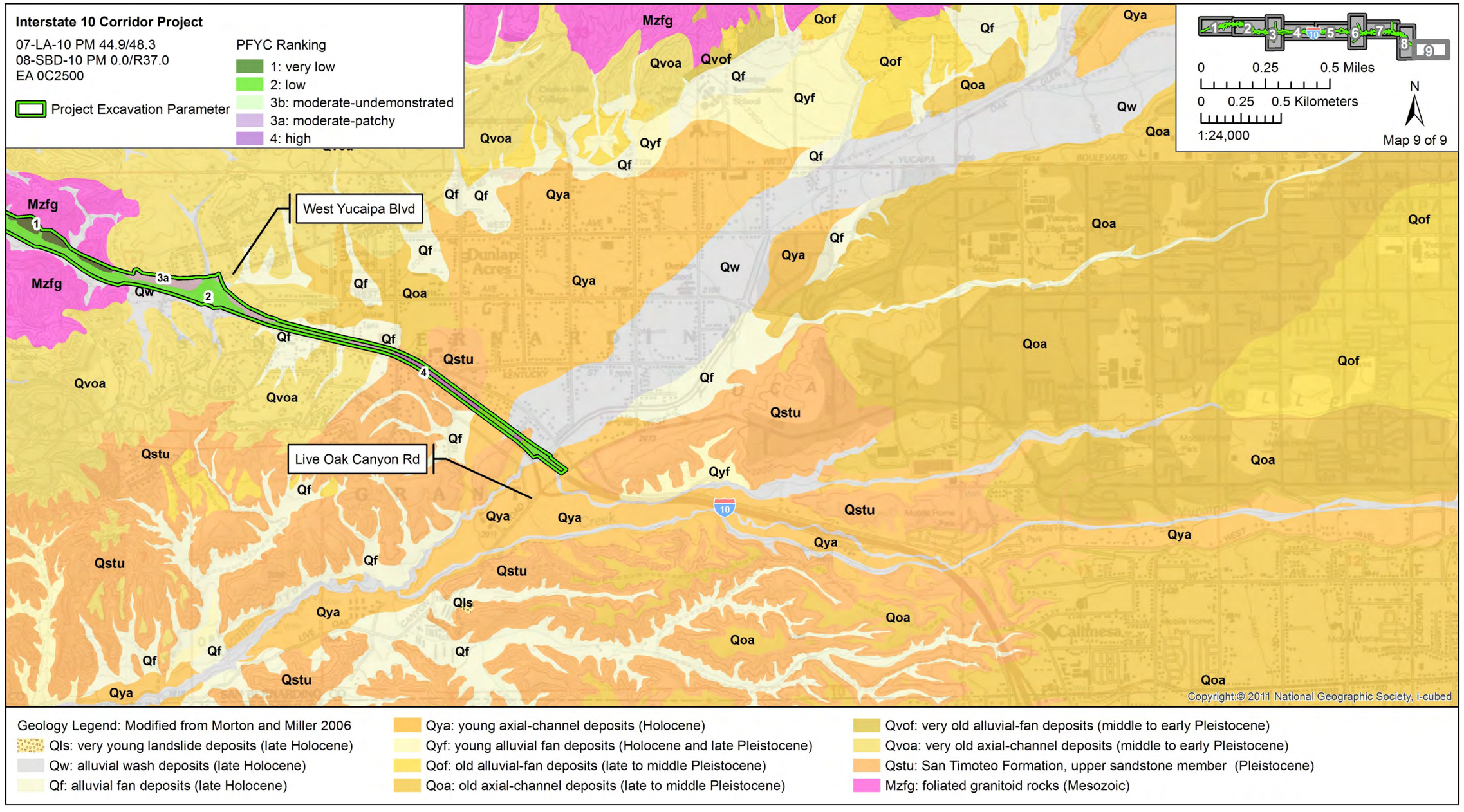

Figure 8i. Paleontological Sensitivity Map

IMPACT ANALYSIS

BASELINE CONSIDERATIONS

Quaternary old alluvial fan, very old alluvial fan, very old axial channel deposits, and San Timoteo Formation sediments all have potential to produce significant vertebrate fossils. The Quaternary old eolian, young alluvial fan, and young eolian deposits have an undemonstrated potential for containing fossils although the sediments are old enough. These units have the potential to be paleontologically sensitive sediments within the Project Excavation Parameters that may be affected by project activities. Young axial channel deposits and all of the very young deposits are too young to contain fossils; however they do overlie older deposits which are fossiliferous. Caltrans guidance for evaluating fossil deposits and sensitivity of resources states:

> Regardless of the format used by a paleontologist to rank formations, the importance of any rock unit must be explicitly stated in terms of specific fossils known or suspected to be present (and if the latter, why such fossils are suspected), and why these fossils are of paleontological importance. Some land-managing agencies may require the use of specific guidelines to assess significance whereas others may defer to the expertise of local paleontologists and provide little guidance. Because each situation may differ, it is important that there is a clear understanding between project staff (Caltrans or local), consultants, and personnel from other agencies as to exactly what criteria will be used to assess the significance of rock units affected by a particular project.
>
> As a practical matter, no consideration is generally afforded paleontological sites for which scientific importance cannot be demonstrated. If a paleontological resource assessment results in a determination that the site is insignificant or of low sensitivity, this conclusion should be documented in a Paleontological Evaluation Report (PER) and in the project's environmental document in order to demonstrate compliance with applicable statutory requirements.
>
> If a paleontological resource is determined to be significant, of high sensitivity, or of scientific importance, and the project impacts it, a mitigation program must be developed and implemented. Mitigation can be initiated prior to, and/or during, construction. The latter is more common for Caltrans projects. It should be pointed out, however, that mitigating during construction poses a greater risk of construction delays. Mitigation is an eligible federal project cost, in accordance with 23 U.S.C. 305, only if acceptable significance documentation is submitted. Thus, coordination between Caltrans, FHWA, and all jurisdictional agencies is critical to formally establishing the significance of a resource. [PER Instructions, Chapter 8, Vol. 1, SER, http://www.dot.ca.gov/ser/vol1/sec3/physical/Ch08Paleo/chap08paleo.htm, accessed August 14, 2012]

DEFINITION OF SIGNIFICANCE FOR PALEONTOLOGICAL RESOURCES

Only qualified, trained paleontologists with specific expertise in the type of fossils being evaluated can determine the scientific significance of paleontological resources. Fossils are considered to be significant if one or more of the following criteria apply:

1. The fossils provide information on the evolutionary relationships and developmental trends among organisms, living or extinct;

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

As so defined, significant paleontological resources are determined to be fossils or assemblages of fossils that are unique, unusual, rare, uncommon, or diagnostically important. Significant fossils can include remains of large to very small aquatic and terrestrial vertebrates or remains of plants and animals previously not represented in certain portions of the stratigraphy. Assemblages of fossils that might aid stratigraphic correlation, particularly those offering data for the interpretation of tectonic events, geomorphologic evolution, and paleoclimatology are also critically important (Scott and Springer 2003; Scott et al. 2004).

SIGNIFICANCE EVALUATION

The potential to affect any fossils varies with depth of impacts, previous disturbance and presence of non-fossiliferous sediments. Logistics of excavation also affect the possibility of recovering scientifically significant fossils since, as outlined above, information on exact location, vertical elevation, rock unit of origin, and other aspects of context are critical.

The no action alternative would create no surface or subsurface impacts and thus would not create adverse impacts to potential paleontological resources. Both of the build alternatives have the potential to impact significant paleontological resources during construction. Depth of construction will typically be 3 to 5 feet for widening I-10 and widening or reconstruction of interchange ramps. Removal of existing retaining walls and construction of new retaining walls will have impacts up to 20 feet in depth where located on piles. Removal and construction of sound walls will have impacts of up to 16 feet in depth for CIDH piles. CIDH piles for overhead signs, lighting, CCTV, and CMS will be up to 25 feet deep. Excavation for drainage channels and roadside ditches varies from 2 feet to 15 feet below the surface. Excavation depths for removal and relocation of existing utilities will vary. The deepest utility excavations are anticipated for the aqueduct and large water line and will be up to 20 feet deep. Footing for bridge work may require excavations up to 10 feet in depth in addition to driven steel piles or CIDH piles that will range from 30 to 70 feet below grade.

All excavations in areas mapped as San Timoteo Formation have the potential to encounter significant paleontological resources due to the age of the surficial sediments. Excavations deeper

than 5 feet have the potential to impact fossils in the Quaternary old alluvial fan, very old alluvial fan, very old axial channel deposits, and old eolian deposits based on the shallow depth that mastodon, bison, and camel fossils have been recovered in the project vicinity (Scott 2008). Within the Inland valleys, ground disturbances typically have to be greater than 10 feet deep before fossils are recovered from younger units. Within the Project Excavation Parameters this includes young alluvial fan, young eolian, young axial channel and very young deposits.

Drilling for piles may rotate out fossil bones or other materials from any of the sensitive sediments identified in the project area. However, the specimens will lack context, depth/elevation, formation identification and other elements that are critical to scientific significance. These types of unprovenanced fossils will only be significant if they result in identification of new species that are currently not known in the area. If they are identified as already-known species, they will be suitable for educational uses.

RECOMMENDATIONS

Grading, excavation and other surface and subsurface excavation in defined areas of the proposed project have the potential to impact significant nonrenewable fossil resources of Pleistocene age. All excavations in areas mapped as San Timoteo Formation have the potential to encounter significant paleontological resources and should be monitored full time. Excavations deeper than 5 feet in the Quaternary old alluvial fan, very old alluvial fan, very old axial channel deposits, and old eolian deposits should be monitored full time. Excavations more than 10 feet in depth into young alluvial fan, young eolian, young axial channel and very young deposits should be spot checked periodically for the presence of older, paleontologically sensitive sediments. Should sediments conducive to fossil preservation be encountered, monitoring should be implemented in those areas. Areas mapped as Mesozoic foliated granitoid rocks do not require monitoring. Drilling activities are also exempt from monitoring as recovered fossils would not meet significance criteria.

A Paleontological Mitigation Plan (PMP) should be prepared by a qualified paleontologist and should include the following elements:

(1) Required preconstruction paleontological sensitivity training for earthmoving personnel to include documentation of training (sign in sheets, hardhat stickers).

(2) A signed repository agreement.

(3) Field and laboratory methods proposed (must be consistent with repository requirements).

(4) All elements under reporting: PMP Format (Caltrans 2012).

(5) Required Paleontological Mitigation Report (PMR) upon completion of project earthmoving.

PROJECT PERSONNEL

Cogstone Resource Management Inc. prepared this document. Sherri Gust was the Principal Paleontologist. She supervised all work and prepared impact analysis, conclusions and recommendations. She has an M.S. in Anatomy (Evolutionary Morphology) from the University of Southern California, a B.S. in Anthropology from the University of California, Davis and over thirty years of experience in California. Kim Scott directed the survey and wrote the Resources Consulted, Survey and Sensitivity sections of the report. Scott has a M. S. in Biology with an emphasis in paleontology from California State University, San Bernardino and over 18 years of experience in California paleontology and geology. Courtney Richards assisted with the survey. Richards has an M.S. in Biology with a paleontology emphasis, and more than eight years of experience in west coast geology and paleontology. Andre Simmons prepared the GIS maps throughout this report. Simmons has a B.A. in Anthropology, cross-training in paleontology and more than four years of GIS experience. Short resumes are provided (Appendix A).

REFERENCES CITED

Albright, L. B. III
1997 Geochronology and vertebrate paleontology of the San Timoteo Badlands, southern California: Riverside, California PhD dissertation, 328 p.
1999a Magnetostratigraphy and biochronology of the San Timoteo Badlands, southern California with implications for local Plio –Pleistocene tectonic and depositional patterns. Geological Society of America Bulletin 111:1265-1293.
1999b Biostratigraphy and vertebrate paleontology of the San Timoteo Badlands, southern California. Berkeley, California, University of California Publications, Geological Sciences, 144 p.

BLM
2007 Paleontological Resources Preservation Act. Online at: http://www.blm.gov/pgdata/etc/medialib/blm/wo/Planning_and_Renewable_Resources/coop_agencies/paleontology_library/paleon_legis.Par.45651.File.dat/PL-111-011-prpa.pdf

California Department of Transportation District 8 (Caltrans)
2012 Paleontology, Online Environmental Handbook, vol. 1, chapter 8. http://www.dot.ca.gov/ser/vol1/sec3/physical/Ch08Paleo/chap08paleo.htm

Jefferson, G.T.
1991a A Catalogue of late Quaternary Vertebrates from California: Part one, nonmarine lower vertebrate and avian taxa. *Natural History Museum of Los Angeles, Technical Report* #5.
1991b A Catalogue of late Quaternary Vertebrates from California: Part two, Mammals. *Natural History Museum of Los Angeles, Technical Report* #7.

Morton, D. M., B. F. Cox, J. C. Matti, J. W. Hillhouse, and R. C. Jachens
1997 Regional geology and structure in the area of March Air Force Base, southern California. USGS Administrative Report to March Air Force Base, 97-013A , 31 p., 9 maps, scale 1:24,000 (for informal agency use only). This report can be examined at the March Air Force office or at the USGS office located in the Department of Earth Sciences at the University of California, Riverside.

Morton, D. M. and F. K. Miller
2006 Geology map of the San Bernardino and Santa Ana 30' x 60' quadrangles, California; Geology and description of map units, version 1.0. Digital preparation by Cossette, P. M. and K. R. Bovard. USGS Open File Report 2006-1217, scale 1:100,000.

Repenning, C.A.
1987 Biochronology of the microtine rodents of the United States, in Woodburne, M. O. ed. Cenozoic mammals of North America: Geochronology and biostratigraphy: Berkeley and Los Angeles, California, University of California Press, p. 236-268.

Reynolds, R. E. and R. L. Reynolds
1991 The Pleistocene beneath our feet: Near surface Pleistocene fossils in Inland Southern California basins *in* Woodburne, M. O., Reynolds, R. E., and D. P. Whistler (eds.) Inland Southern California: the last 70 million years. San Bernardino County Museum Association Quarterly 38(3-4), p. 41-43.

Scott, E.
2008 Paleontology literature and records review, Interstate 10 High Occupancy Vehicle Lane Project, Haven Avenue to Ford Street, San Bernardino County, California. Submitted to Applied EarthWorks, Inc., November 2008.
2014 Paleontology literature and records review, Interstate 10 High Occupancy Vehicle Lane Project, San Bernardino County, California. July 2014.

Scott, E. and K. Springer
2003 CEQA and fossil preservation in southern California. *The Environmental Monitor*, Winter: 4-10, 17.

Scott, E., K. Springer, and J.C. Sagebiel
2004 Vertebrate paleontology in the Mojave Desert: the continuing importance of 'follow through' in preserving paleontologic resources, p. 65-70, in M. W. Allen and J. Reed (eds.), *The human journey and ancient life in California's Deserts: Proceedings from the 2001 Millennium Conference*. Maturango Museum Publication No. 15, Ridgecrest, California, USA.

Scott, K. and S. Gust
2009 Paleontological Identification Report and Paleontological Evaluation Report Interstate 10 High Occupancy Vehicle Lane Addition Project from Haven Avenue to Ford Street, San Bernardino County, California. (08-SBD-10; PM 8.00/33.80) EA 0C2500. On file with Caltrans District 8.

Wagner, D.L.
2002 California Geomorphic Provinces. *California Geologic Survey Note* 36. Website: http://www.consrv.ca.gov/cgs/information/

APPENDIX A. QUALIFICATIONS

SHERRI GUST
Project Manager & Principal Paleontologist

EDUCATION

1994 M. S., Anatomy (Evolutionary Morphology), University of Southern California, Los Angeles
1979 B. S., Anthropology (Physical), University of California, Davis

SUMMARY QUALIFICATIONS

Gust has more than 34 years of experience in California, acknowledged credentials for meeting national standards, and is a certified/qualified principal paleontologist in all California cities and counties that maintain lists. She is a Member of the Society of Vertebrate Paleontology, Society for Economic Sedimentology and Paleontology, and others. Gust holds current statewide BLM paleontology permits in California and Nevada. She has special expertise in the identification and analysis of human, animal and fossil bone.

SELECTED PROJECTS

Regional Express Lanes Network Phase I Project Approval/Environmental Document Project, Caltrans District 4, Metropolitan Transportation Commission, Alameda, Contra Costa, and Santa Clara Counties, CA. Project Manager and Principal Paleontologist. Identified paleontological resources and sensitive sediments within the proposed 2,472 acre project area. Services included a paleontological record search, background research, impact analysis, and GIS constraints mapping. Prepared a Draft and Final Paleontological Identification Report (PIR). 2012-2013

US 101 Express Lanes Project, Caltrans District 4, Santa Clara County, CA. Project Manager and Principal Paleontologist. The 37-mile linear project entails freeway widening and HOV lane conversion along US 101 and SR 85 (North). Prepared Paleontological Evaluation Report and Mitigation Plan. Performed quality control on Archaeological Survey Report and Data Recovery Plan prepared by Cogstone. 2012-ongoing

Savage Way Rehabilitation, Caltrans District 10, San Joaquin and Calaveras counties. Project Manager and Principal Paleontologist. Prepared a revised Paleontological Mitigation Plan and supervised paleontological monitoring during construction. No fossils were observed or recovered. Prepared Paleontological Monitoring Report. 2012-2013

Arboleda Drive Freeway Project, Caltrans District 10, Merced. Project Manager and Principal Paleontologist. Paleontological Monitoring for 5 mile segment of State Route 99 south of Merced. Some 128 localities and 1667 fossils recovered in five months of excavation for detention basins. 2012.

Plainsburg Interchange Project, Caltrans District 10, Chowchilla. Project Manager and Principal Paleontologist. Paleontological Mitigation Plan with updated assessment for 5.5 mile new road segment and interchange on State Route 99 between Chowchilla and Merced. 2012.

SR 99 Widening, Caltrans District 10, South Stockton. Project Manager and Principal Paleontologist. Paleontological Mitigation Plan for project that involves widening SR 99 from four-lanes to six lanes and improvements to multiple interchanges. 2012

KIM SCOTT
Field & Lab Director for Paleontology

EDUCATION

2013 M.S., Biology with a paleontology emphasis, California State University, San Bernardino
2000 B.S., Geology with paleontology emphasis, University of California, Los Angeles

SUMMARY QUALIFICATIONS

Scott has more than 18 years of experience in California paleontology. She is a qualified geologist and field paleontologist with extensive survey, monitoring and fossil salvage experience. In addition, she has special skills in fossil preparation (cleaning and stabilization) and preparation of stratigraphic sections and other documentation for fossil localities. Scott serves as company safety officer and is the author of the company safety and paleontology manuals.

SELECTED PROJECTS

Ranchero Road-BNSF Grade Separation, City of Hesperia, Hesperia. Directed paleontological resources monitoring for the duration of all ground disturbing activities in native sediments greater than five feet deep. Field Director and Report Co-author. 2011-2013

Merced Freeway Project, Caltrans District 10, Merced. Alternated 2 week rotations performing direction of fossil recovery and field preparation of fossils for 5 mile segment of State Route 99 south of Merced. Some 128 localities and 1667 fossils recovered in five months of excavation for detention basins. Contributed to final report. Field / Lab Director and Report Contributor. 2012

HECTF, Southern California Edison, Daggett. Conducted paleontological Survey and authored report for training facility in San Bernardino County, CA. Field and Lab Director. 2011-2012

SR 41 Widening, Caltrans District 6, near Kettleman City. Directed monitoring for widening and rehabilitating of an 8.5 mile segment of Highway 41 near Kettleman City. Supervised preparation of about 800 vertebrate, invertebrate and plant fossils recovered, prepared stratigraphic columns and contributed to preparation of Paleontological Monitoring Report. Field / Lab Director and Report Contributor. 2012

Devers-Mirage 115 KV System Split Project, Southern California Edison, Riverside County. Performed preconstruction paleontological survey, directed paleontological monitoring during construction activities and co-authored monitoring compliance report associated with electrical systems upgrade in of Cathedral City, Indian Wells, Palm Desert, Palm Springs, Rancho Mirage, Thousand Palms and unincorporated Riverside County. Field and Lab Director. 2011

Geospatial Paleontology Database, Caltrans District 6, 9, and 10. Conducted paleontological research for 15 counties in central and eastern California for paleontological screening tool. Paleontology Researcher. 2011-2012

Tehachapi Renewable Transmission Project, Segments 1-3, Southern California Edison, Los Angeles and Kern counties. Co-authored paleontological resources management plans and directed paleontological monitoring for construction of new electrical transmission facilities. Paleontology Field and Lab Director and Report Co-author. 2007-2009

El Casco Substation Project, Southern California Edison, Riverside County. Performed preconstruction mitigation measures and prepared portions of Paleontological Resources Treatment Plan. Field and Lab Director and Report co-author. 2009

COURTNEY RICHARDS
Paleontologist

EDUCATION

2011 M.S., Biological Sciences, Marshall University
2006 B.S., Earth and Space Science, University of Washington

SUMMARY QUALIFICATIONS

Richards is a qualified paleontologist with research, field, and laboratory experience. She earned her Bachelor's degree in Earth and Space Science at the University of Washington and her Master's degree in Biological Sciences with a paleontology focus at Marshall University. Richards has published papers on dinosaur and marine reptile paleontology research. Richards has personal expertise in fossil salvage, stratigraphy, fossil preparation, database analysis and identification. She has two years of professional experience in California.

SELECTED PROJECTS

Pioneer High School Project. Report Contributor. Prepared paleontology and geology sections of a combined archaeological and paleontological resources assessment report for a stadium improvement project at Pioneer High School in Whittier, Los Angeles County. 2013.

Merced Freeway Project, Caltrans District 10. Assistant Field and Lab Director. Alternated 2 week rotations performing direction of fossil recovery and field preparation of fossils for 5 mile segment of State Route 99 south of Merced. Some 128 localities and 1667 fossils recovered in five months of excavation for detention basins. Prepared fossils in lab and supervised matrix washing and microfossil sorting. Contributed to final report including preparation of stratigraphic columns. 2012.

Los Angeles International Airport (LAX) Northside Plan Update. Paleontology Technician. Performed a pedestrian survey and co-authored the subsequent paleontological resources assessment used to update regulations for future development within the Northside area of the LAX Specific Plan. 2012.

Westside Exploratory Test Shaft. Paleontology Technician. Provided paleontological monitoring during drilling of test shafts for a subway project located in the La Brea Zone. Used a Trimble unit to map tar seeps within a 1 mile radius of the project area. 2012-present.

Rancho Malibu Hotel Project. Paleontology Technician. Conducted a pedestrian survey and co-authored the subsequent paleontological assessment report for a 28 acre hotel construction project in Malibu. 2012.

Geospatial Paleontology Database, Caltrans District 6, 9, and 10. Paleontology Researcher. Conducted paleontological research for 15 counties in central and eastern California. Delivered detailed information about potential fossil yield, geological units, prior fossils and other information at cursor click. 2011-2012.

State Route 91 Project, Caltrans District 8. Paleontology Technician. Performed paleontological monitoring of sensitive sediments during HOV lane construction along a 6 mile segment of SR-91 in Riverside County. 2011-2012.

East San Fernando Valley Transit Corridor. Paleontology Technician. Conducted a paleontological survey and co-authored paleontological assessment and existing condition reports for a Metro project located in the cities of Los Angeles and San Fernando. 2011-present.

Jackson Valley Road Widening Project, Caltrans District 10. Paleontology Technician. Performed paleontological monitoring of sensitive sediments during road widening in near Ione, CA. 2011-present.

ANDRE-JUSTIN C. SIMMONS
Archaeologist and Cross-trained Paleontologist

EDUCATION

2010 B.A., Anthropology and History, California State University, Fullerton, graduated *cum laude*

SUMMARY QUALIFICATIONS

Mr. Simmons is a qualified archaeologist and cross-trained paleontologist with field experience in survey, monitoring, faunal analysis, and excavation. Simmons also has expertise in laboratory preparation and analysis gathered from internships at CSUF and volunteer experience at the Page Museum at the La Brea Tar Pits. His key research interests include architecture and use of space among Paleoindians, the American Southwest, early historic and prehistoric California, and historical Mexico. Simmons is currently completing his Master's Degree in Anthropology at California State University, Fullerton. He has more than 24 hours of paleontology training and two years of experience as a paleontological monitor.

SELECTED PROJECTS

WECC Path 42, Southern California Edison, Riverside County, CA. Conducted a cultural resources records search and field survey for a 14.5 mile transmission line segment near Thousand Palms. Archaeological/ Paleontological Technician. 2011-2012

Eldorado-Ivanpah Transmission Project, Southern California Edison, Eldorado, NV to Ivanpah, CA. Performed paleontological monitoring for project that involves construction of 195 miles of new transmission lines and associated fiber optic lines across BLM and private lands. Paleontological Monitor. 2012-2013

Devers-Mirage 115 KV System Split Project, Southern California Edison, Riverside County, CA. Performed archaeological and paleontological monitoring during construction activities associated with maintaining and upgrading the electrical systems of Cathedral City, Indian Wells, Palm Desert, Palm Springs, Rancho Mirage, Thousand Palms and unincorporated Riverside County. Archaeological/Paleontological Monitor. 2011-2012

Leatherneck Substation Project, Southern California Edison, San Bernardino County, CA. Prepared GIS maps for a cultural resources survey and subsequent survey report for ten pulling stations near Twenty-Nine Palms. GIS Technician. 2012

Equinox DSP – Rush Project, Southern California Edison, Riverside County, CA. Performed archaeological and paleontological monitoring during ground disturbing activities associated with construction of a power pole line near Menifee. Archaeological/Paleontological Monitor. 2011

Fogarty Substation, Southern California Edison, Riverside County, CA. Performed archaeological and paleontological monitoring during ground disturbing activities in Lake Elsinore. A historic glass fragment and prehistoric shells were recovered. Archaeological/Paleontological Monitor. 2010-2011

Daggett II, Southern California Edison, San Bernardino County, CA. Conducted archaeological and paleontological monitoring of construction activities of transmission towers and associated access roads for the 225-acre Human External Cargo Helicopter Training Facilities Project in Daggett. Archaeological/Paleontological Monitor. 2011

SR 99 Arboleda Drive Freeway Project, Caltrans District 10, Merced County, CA. Conducted paleontological resources monitoring, fossil recovery, and fossil preparation for a 5-mile segment. Prepared GIS report maps. Some 128 localities and 1,667 fossils recovered in five months of excavation for detention basins. Paleontology & GIS Technician. 2012

APPENDIX B. RECORDS SEARCHES

SAN BERNARDINO COUNTY MUSEUM
2024 Orange Tree Lane • Redlands, California USA 92374-4560
(909) 307-2669 • Fax (909) 307-0539 • www.sbcountymuseum.org
TDD (909) 792-1462

COUNTY OF SAN BERNARDINO
PUBLIC AND SUPPORT
SERVICES GROUP

ROBERT L. McKERNAN
Director

13 November 2008

Applied EarthWorks, Inc.
attn: Melinda Horne
3292 E. Florida Avenue, Suite A
Hemet, CA 92544-4941

re: **PALEONTOLOGY LITERATURE AND RECORDS REVIEW, INTERSTATE 10 HIGH OCCUPANCY VEHICLE LANE PROJECT, HAVEN AVENUE TO FORD STREET, SAN BERNARDINO COUNTY, CALIFORNIA**

Dear Melinda,

The Division of Geological Sciences of the San Bernardino County Museum (SBCM) has completed a literature review and records search for the above-named linear project alignment in southern San Bernardino County, California. The proposed study alignment traverses portions of: sections 21, 35, and 36, Township 1 South, Range 3 West, San Bernardino Base and Meridian; section 19, T 1S, R 4W, SBB&M; sections 19, 20, 21, 22, 23, and 24, T 1S, R 5W, SBB&M; sections 19, 20, 21, 22, 23, and 24, T 1S, R 6W, SBB&M; and section 24, T 1S, R 7W, SBB&M. The proposed project study corridor crosses the following United States Geological Survey 7.5' topographic quadrangle maps: Fontana, CA (1967 edition, photorevised 1980); Guasti, CA (1966 edition, photorevised 1981); Redlands, CA (1967 edition, photorevised 1988); and San Bernardino South, CA (1967 edition, photorevised 1980).

Previous geologic mapping (Bortugno and Spittler, 1986; Morton and Miller, 2003) indicates that the proposed project alignment traverses numerous surface exposures of alluvial deposits dating to the Pleistocene and Holocene Epochs. These include (in order, from oldest to youngest): early to middle Pleistocene alluvial valley deposits (= unit **Qvoa$_3$**);middle to later Pleistocene eolian sands (= **Qoed$_3$**, **Qoes$_3$**); Holocene eolian deposits (= **Qye**); middle Holocene alluvial valley deposits (= **Qya$_3$**); late Holocene alluvial valley deposits (= **Qa**); late Holocene alluvial fan deposits (= **Qyf$_5$**); late Holocene alluvial fan deposits (= **Qf**, **Qf$_2$**); and recent wash sediments (= **Qw**). Of these, the Holocene sediments have low potential to contain significant fossils, and are assigned low paleontologic sensitivity. In contrast, surface and subsurface older Pleistocene sediments have high potential to contain significant nonrenewable paleontologic resources, depending upon their lithology, and so are assigned high paleontologic sensitivity. Pleistocene alluvium elsewhere throughout inland Riverside and San Bernardino Counties and the Inland Empire has been repeatedly demonstrated to have high paleontologic sensitivity (Jefferson, 1991; Reynolds and Reynolds, 1991; Woodburne, 1991; Springer and Scott, 1994; Scott, 1997; Springer and others, 1998, 1999, 2007;

Anderson and others, 2002). Fossils recovered from these Pleistocene sediments represent extinct taxa including mammoths, mastodons, ground sloths, dire wolves, sabre-toothed cats, large and small horses, large and small camels, and bison (Jefferson, 1991; Reynolds and Reynolds, 1991; Woodburne, 1991; Springer and Scott, 1994; Scott, 1997; Springer and others, 1998, 1999, 2007).

For this review, I conducted a search of the Regional Paleontologic Locality Inventory (RPLI) at the SBCM. The results of this records search indicated that no paleontologic localities are recorded from within the proposed project corridor. However, several localities are recorded in the RPLI from the near vicinity of the proposed project alignment, particularly towards the west. Locality SBCM 5.1.8, situated roughly 1½ miles south of the western extent of the alignment, yielded fossil remains of extinct mammoth (*Mammuthus*) from depths of approximately 20' below the existing ground surface. Additionally, localities SBCM 5.1.14 - 5.1.21, situated within one mile of the proposed project alignment near the intersection of the Interstate 10 and Valley Boulevard, yielded remains of extinct mastodon, bison, and camel from as little as 5 feet below the existing ground surface. Finally, locality SBCM 5.1.11, located in southern Fontana and situated approximately 1¼ miles south of the proposed project alignment, yielded fossil remains of the extinct sabre-toothed cat, *Smilodon*, from Pleistocene older alluvium similar to that present at the surface and at depth within the study area. The proximity of all of these localities to the study area demonstrates the high potential of Pleistocene older alluvium in this area to contain significant vertebrate fossils.

Recommendations

The results of the literature review and the search of the RPLI at the SBCM demonstrate that the proposed Interstate 10 High Occupancy Vehicle Lane Project encompasses surface and subsurface sediments of Pleistocene age with high potential to contain paleontologic resources. Excavation into surface and subsurface Pleistocene alluvium in this region will require qualified vertebrate paleontologists to develop programs to mitigate impacts to significant nonrenewable paleontologic resources, including full curation of recovered significant resources (see Scott and others, 2004). Such mitigation programs must be consistent with the provisions of the California Environmental Quality Act (Scott and Springer, 2003), as well as with regulations currently implemented by the County of San Bernardino and the proposed guidelines of the Society of Vertebrate Paleontology.

The County of San Bernardino (Development Code §82.20.040) defines a qualified vertebrate paleontologist as meeting the following criteria:

Education: An advanced degree (Masters or higher) in geology, paleontology, biology or related disciplines (exclusive of archaeology).

Professional experience: At least five years professional experience with paleontologic (not including cultural) resources, including the collection, identification and curation of the resources.

The County of San Bernardino (Development Code §82.20.030) requires that paleontologic mitigation programs include, but not be limited to:

(a) Field survey before grading. In areas of potential but unknown sensitivity, field surveys before grading shall be required to establish the need for paleontologic monitoring.

(b) Monitoring during grading. A project that requires grading plans and is located in an area of known fossil occurrence, or that has been demonstrated to have fossils present in a field survey, shall have all grading monitored by trained paleontologic crews working under the direction of a qualified professional, so that fossils exposed during grading can be recovered and preserved. Paleontologic monitors shall be equipped to salvage fossils as they are unearthed, to avoid construction delays, and to remove samples of sediments that are likely to contain the remains of small fossil invertebrates and vertebrates. Monitors shall be empowered to temporarily halt or divert equipment to allow removal of abundant or large specimens. Monitoring is not necessary if the potentially-fossiliferous units described for the property in question are not present, or if present are determined upon exposure and examination by qualified paleontologic personnel to have low potential to contain fossil resources.

(c) Recovered specimens. Qualified paleontologic personnel shall prepare recovered specimens to a point of identification and permanent preservation, including washing of sediments to recover small invertebrates and vertebrates. Preparation and stabilization of all recovered fossils is essential in order to fully mitigate adverse impacts to the resources.

(d) Identification and curation of specimens. Qualified paleontologic personnel shall identify and curate specimens into the collections of the Division of Geological Sciences, San Bernardino County Museum, an established, accredited museum repository with permanent retrievable paleontologic storage. These procedures are also essent al steps in effective paleontologic mitigation and CEQA compliance. The paleontologist must have a written repository agreement in hand prior to the initiation of mitigation activities. Mitigation of adverse impacts to significant paleontologic resources is not considered complete until curation into an established museum repository has been fully completed and documented.

(e) Report of findings. Qualified paleontologic personnel shall prepare a report of findings with an appended itemized of specimens. A preliminary report shall be submitted and approved before granting of building permits, and a final report shall be submitted and approved before granting of occupancy permits. The report and inventory, when submitted to the appropriate Lead Agency along with confirmation of the curation of recovered specimens into the collections of the San Bernardino County Museum, will signify completion of the program to mitigate impacts to paleontologic resources.

References

Anderson, R.S., M.J. Power, S.J. Smith, K.B. Springer and E. Scott. 2002. Paleoecology of a Middle Wisconsin deposit from southern California. Quaternary Research 58(3): 310-317.

Bortugno, E.J. and T. E. Spittler, 1986. Geologic map of California. San Bernardino sheet, scale 1:250,000. California Division of Mines and Geology Regional Geologic Map Series, Map 3A.

Jefferson, G.T., 1991. A catalogue of late Quaternary vertebrates from California: Part Two, mammals. Natural History Museum of Los Angeles County Technical Reports, No. 7.

Morton, D.M. and F.K. Miller, 2003. Preliminary digital geologic map of the San Bernardino 30' x 60' quadrangle, California, version 1.0. United States Geological Survey Open-File Report 03-293. Digital preparation by P.M. Cossette and K.R. Bovard. 189 p.

Reynolds, S.F.B. and R.L. Reynolds, 1991. The Pleistocene beneath our feet: near-surface Pleistocene fossils in inland southern California basins, *in* Inland Southern California: the last 70 million years, M.O. Woodburne, S.F.B. Reynolds, and D.P. Whistler, eds. Redlands, San Bernardino County Museum Special Publication 38(3&4), p. 41-43.

Scott, E., 1997. A review of *Equus conversidens* in southern California, with a report on a second, previously-unrecognized species of Pleistocene small horse from the Mojave Desert. Journal of Vertebrate Paleontology 17(3): 75-A.

Scott, E. and K. Springer, 2003. CEQA and fossil preservation in southern California. The Environmental Monitor, Fall 2003, p. 4-10, 17.

Scott, E., K. Springer and J.C. Sagebiel, 2004. Vertebrate paleontology in the Mojave Desert: the continuing importance of "follow-through" in preserving paleontologic resources. In M.W. Allen and J. Reed (eds.) The human journey and ancient life in California's deserts: Proceedings from the 2001 Millennium Conference. Ridgecrest: Maturango Museum Publication No. 15, p. 65-70.

Springer, K.B. and E. Scott, 1994. First record of late Pleistocene vertebrates from the Domenigoni Valley, Riverside County, California. Journal of Vertebrate Paleontology 14 (3): 47A.

Springer, K.B., E. Scott, L.K. Murray and W.G. Spaulding, 1998. Partial skeleton of a large individual of *Mammut americanum* from the Domenigoni Valley, Riverside County, California. Journal of Vertebrate Paleontology 18(3): 78-A.

Springer, K., E. Scott, J.C. Sagebiel, and L.K. Murray, 2007. The Diamond Valley Lake Local Fauna: late Pleistocene vertebrates from inland southern California. Journal of Vertebrate Paleontology 27(3): 151A.

Springer, K.B., E. Scott, J.C. Sagebiel and K.M. Scott, 1999. A late Pleistocene lake edge vertebrate assemblage from the Diamond Valley, Riverside County, California. Journal of Vertebrate Paleontology 19(3): 77-A.

Woodburne, M.O., 1991. The Cajon Valley, *in* Inland Southern California: the last 70 million years, M.O. Woodburne, S.F.B. Reynolds, and D.P. Whistler, eds. Redlands, San Bernardino County Museum Special Publication 38(3&4), p. 41-43.

Please do not hesitate to contact us with any further questions you may have.

Sincerely,

Eric Scott, Curator of Paleontology
Division of Geological Sciences
San Bernardino County Museum

SAN BERNARDINO COUNTY MUSEUM
COUNTY OF SAN BERNARDINO
2024 Orange Tree Lane • Redlands, California USA 92374-4560
(909) 307-2669 • Fax (909) 307-0539 • www.sbcountymuseum.org
TDD (909) 792-1462
Leonard Hernandez
Interim Director

22 July 2014

Cogstone Resource Management
attn: Courtney Richards
1518 W. Taft Avenue
Orange, CA 92865

re: **PALEONTOLOGY LITERATURE AND RECORDS REVIEW, INTERSTATE 10 HIGH OCCUPANCY VEHICLE LANE PROJECT, SAN BERNARDINO COUNTY, CALIFORNIA**

Dear Ms. Richards,

The Division of Geological Sciences of the San Bernardino County Museum (SBCM) has completed a literature review and records search for portions of the above-named linear project alignment in southern San Bernardino County, California. The proposed study alignment sections traverse portions of sections 4, 5, and 9 (all projected), Township 2 South, Range 2 West, as well as sections 7, 13, 16, 17, 18, 20, 21, 22, 23, 24, 25, 26, and 27, Township 1 South, Range 7 West, and sections 14, 15, 16, 17, 19, 20, 22, and 23, Township 1 South, Range 8 West, San Bernardino Base and Meridian, as shown on the following United States Geological Survey 7.5' topographic quadrangle maps: Guasti, California (1966 edition, photorevised 1981); Ontario, California (1967 edition, photorevised 1981); San Dimas, California (1966 edition, photorevised 1981); and Yucaipa, California (1967 edition, photorevised 1973).

Previous geologic mapping (Matti and others, 2003; Morton and Miller, 2003) indicates that the areas of concern along the proposed project alignment traverse numerous surface exposures of alluvial deposits dating to the Pleistocene and Holocene Epochs. These include (in order, from oldest to youngest): surface exposures of the upper member of the fossiliferous San Timoteo Formation (= unit **QTstu**); early to middle Pleistocene alluvial valley deposits (= **$Qvoa_3$**); middle to later Pleistocene alluvial valley deposits (= **Qoa_3**); Holocene aeolian deposits (= **Qye**); middle Holocene alluvial valley deposits (= **Qya_3**, **Qya_5**); late Holocene alluvial valley deposits (= **Qa**); late Holocene alluvial fan deposits (= **$Qyf_{1,3,4,5}$**); latest Holocene alluvial fan deposits (= **Qvyf**); and latest Holocene wash sediments (= **Qvyw**). Of these, the Holocene sediments have low potential to contain significant fossils, and are assigned low paleontologic sensitivity. In contrast, the San Timoteo Formation and Pleistocene older alluvial sediments have high potential to contain fossil resources throughout their extent, and so are assigned high paleontologic sensitivity.

The San Timoteo Formation has repeatedly been demonstrated to be highly fossiliferous, as determined by numerous previous geologic and paleontologic investigations in the area, including

those by Frick (1921, 1933), May and Repenning (1982), Axelrod (1937, 1950, 1966) Reynolds and Reeder (1986, 1991), Morton and Matti (1993) Albright and Woodburne (1993) and Albright (1997, 2000). Fossil mammals recovered from the San Timoteo Formation include mastodon, horse, camel, antelope, dog, bear, rodent and rabbit. These vertebrate fossils are Pliocene or early Pleistocene Epoch in age, and are referable to the Blancan North American Land Mammal Age (Savage and Russell, 1983) and the early Irvingtonian NALMA (Savage and Russell, 1983; Reynolds and Reeder, 1986, 1991; Repenning, 1987; Albright and Woodburne, 1993; Albright, 1997, 2000). These fossils may have been deposited between 1.3 million years ago (my) and 4.0 my.

Older Pleistocene alluvial sediments elsewhere throughout the Inland Empire and much of Riverside and San Bernardino Counties have been reported to yield significant fossils of extinct animals from the Ice Age (Jefferson, 1991; Reynolds, 1991; Scott and Cox, 2008; Springer and others, 2009, 2010; Scott, 2010), as well as fossil plants (Reynolds and Reynolds, 1991; Anderson and others, 2002). Fossils vertebrates recovered from these Pleistocene sediments represent extinct taxa including mammoths, mastodons, ground sloths, dire wolves, short-faced bears, sabre-toothed cats, large and small horses, large and small camels, and bison (Jefferson, 1991; Reynolds, 1991; Scott and Cox, 2008; Springer and others, 2009, 2010; Scott, 2010). These sediments are therefore assigned high paleontologic sensitivity.

As noted, some areas within the proposed project area may also consist of surface deposits of Holocene younger alluvium. This alluvium has low potential to contain significant nonrenewable paleontologic resources subject to adverse impact by development-related excavation, and so is assigned low paleontologic sensitivity. However, these sediments likely overlie subsurface sediments of the San Timoteo Formation and/or Pleistocene older alluvium. Should such older sediments be present at depth within study area, they would have high potential to contain significant nonrenewable paleontologic resources.

For this review, which by request examined select areas associated with the proposed project alignment rather than with the project in its entirety, I conducted a search of the Regional Paleontologic Locality Inventory (RPLI) at the SBCM. The results of this records search indicated that no paleontologic localities are recorded from along the proposed project alignment within the specified areas of consideration. However, several localities are recorded in the RPLI from the near vicinity of the proposed project alignment, particularly towards the west. Locality SBCM 5.1.8, situated roughly 1½ miles south of the alignment in the Montclair region, yielded fossil remains of extinct mammoth (*Mammuthus*) from depths of approximately 20' below the existing ground surface. Additionally, localities SBCM 5.1.14 - 5.1.21, situated ~3 miles east of the proposed project alignment near the intersection of the Interstate 10 and Valley Boulevard, yielded remains of extinct mastodon, bison, and camel from as little as 5 feet below the existing ground surface. The proximity of all of these localities to the study area demonstrates the high potential of Pleistocene older alluvium in this area to contain significant vertebrate fossils.

Additionally, numerous paleontologic resource localities are recorded in the RPLI from the San Timoteo Formation in the vicinity of the eastern portion of the proposed project alignment. These

localities yielded fossil remains of *?Abies* sp., *Magnolia grandiflora*, *?Platanus* sp., *Quercus chrysolepis*, *Salix* sp., cf. *Washingtonia* sp., Ostracoda, *Succinea* sp., Anura, cf. *Phrynosoma* sp., cf. *Masticophis* sp. or *Coluber* sp., *Crotalus* sp., *Callipepla* sp., *Zenedia asiatica*, Icteridae, Corvidae, *Mammut americanum*, *Mammuthus* sp., Soricidae, *Sylvilagus* sp., *Lepus* sp., *Spermophilus* sp., *Thomomys bottae*, *Thomomys* sp. cf. *T. gidleyi*, *Dipodomys* sp., *Prodipodomys* sp. cf. *P. idahoensis*, *Perognathus* sp., *Peromyscus* sp. cf. *P. truei*, *Microtus* sp., *Neotoma* sp., *Equus* sp. cf. *E. scotti*, *Equus* sp. (small), *?Hemiauchenia* sp., and *Odocoileus* sp. The relative proximity of these localities to the proposed project area demonstrates the high paleontologic sensitivity of the San Timoteo Formation in this region.

Recommendations

The results of the literature review and the search of the RPLI at the SBCM demonstrate that the proposed Interstate 10 High Occupancy Vehicle Lane Project encompasses surface and subsurface sediments of Pleistocene age with high potential to contain paleontologic resources. Excavation into surface and subsurface sediments of the San Timoteo Formation, as well as surface and subsurface Pleistocene older alluvium, will require qualified vertebrate paleontologists to develop programs to mitigate impacts to significant nonrenewable paleontologic resources, including full curation of recovered significant resources (see Scott and others, 2004). Such mitigation programs must be consistent with the provisions of the California Environmental Quality Act (Scott and Springer, 2003), as well as with regulations currently implemented by the County of San Bernardino.

The County of San Bernardino (Development Code §82.20.040) defines a qualified vertebrate paleontologist as meeting the following criteria:

Education: An advanced degree (Masters or higher) in geology, paleontology, biology or related disciplines (exclusive of archaeology).

Professional experience: At least five years professional experience with paleontologic (not including cultural) resources, including the collection, identification and curation of the resources.

The County of San Bernardino (Development Code §82.20.030) requires that paleontologic mitigation programs include, but not be limited to:

(a) Field survey before grading. In areas of potential but unknown sensitivity, field surveys before grading shall be required to establish the need for paleontologic monitoring.

(b) Monitoring during grading. A project that requires grading plans and is located in an area of known fossil occurrence, or that has been demonstrated to have fossils present in a field survey, shall have all grading monitored by trained paleontologic crews working under the direction of a qualified professional, so that fossils exposed during grading can be recovered and preserved. Paleontologic monitors shall be equipped to salvage fossils as they are unearthed, to avoid construction delays, and to remove samples of sediments that are likely to contain the remains of small fossil invertebrates

and vertebrates. Monitors shall be empowered to temporarily halt or divert equipment to allow removal of abundant or large specimens. Monitoring is not necessary if the potentially-fossiliferous units described for the property in question are not present, or if present are determined upon exposure and examination by qualified paleontologic personnel to have low potential to contain fossil resources.

(c) Recovered specimens. Qualified paleontologic personnel shall prepare recovered specimens to a point of identification and permanent preservation, including washing of sediments to recover small invertebrates and vertebrates. Preparation and stabilization of all recovered fossils is essential in order to fully mitigate adverse impacts to the resources.

(d) Identification and curation of specimens. Qualified paleontologic personnel shall identify and curate specimens into the collections of the Division of Geological Sciences, San Bernardino County Museum, an established, accredited museum repository with permanent retrievable paleontologic storage. These procedures are also essential steps in effective paleontologic mitigation and CEQA compliance. The paleontologist must have a written repository agreement in hand prior to the initiation of mitigation activities. Mitigation of adverse impacts to significant paleontologic resources is not considered complete until curation into an established museum repository has been fully completed and documented.

(e) Report of findings. Qualified paleontologic personnel shall prepare a report of findings with an appended itemized of specimens. A preliminary report shall be submitted and approved before granting of building permits, and a final report shall be submitted and approved before granting of occupancy permits. The report and inventory, when submitted to the appropriate Lead Agency along with confirmation of the curation of recovered specimens into the collections of the San Bernardino County Museum, will signify completion of the program to mitigate impacts to paleontologic resources.

References

Albright, L.B., 1997. Geochronology and vertebrate paleontology of the San Timoteo Badlands, southern California. Ph.D. dissertation, University of California, Riverside. 328 p. Copy on file, Section of Geological Sciences, SBCM.

Albright, L.B. III, 2000. Biostratigraphy and vertebrate paleontology of the San Timoteo Badlands, southern California. University of California Publications, Geological Sciences, Volume 144. 121 p., 8 pl.

Albright, L.B. and M.O. Woodburne, 1993. Refined chronologic resolution of the San Timoteo Badlands, Riverside County, California, and tectonic implications: a prospectus. *In* S.F.B. and J. Reynolds (eds.), Ashes, faults and basins. Redlands: SBCM Association Special Publication 93-1, p. 104-105.

Anderson, R.S., M.J. Power, S.J. Smith, K.B. Springer and E. Scott, 2002. Paleoecology of a Middle Wisconsin deposit from southern California. Quaternary Research 58(3): 310-317.

Axelrod, D.I., 1937. A Pliocene flora from the Mount Eden beds, southern California. Carnegie Inst. Wash. Publ. 476: 125-183.

Axelrod, D.I., 1950. Further studies of the Mount Eden flora, southern California. Carnegie Inst. Wash. Publ. 590: 73-117.

Axelrod, D.I., 1966. The Pleistocene Soboba flora of southern California. Univ. Calif. Publications in Geological Sciences Number 60, 79 p.

Frick, C., 1921. Extinct vertebrate faunas of the badlands of Bautista Creek and San Timoteo Cañon, southern California. Univ. Calif. Publications in Geology 12(5): 277-424.

Frick, C., 1933. New remains of trilophodont - tetrabelodont mastodons. American Museum of Natural History Bulletin 59: 505-652.

Jefferson, G.T., 1991. A catalogue of late Quaternary vertebrates from California: Part Two, mammals. Natural History Museum of Los Angeles County Technical Reports, No. 7.

Matti, J.C., D.M. Morton, B.F. Cox, S.E. Carson and T.J. Yetter, 2003. Geologic map of the Yucaipa 7.5' quadrangle, San Bernardino and Riverside Counties, California, version 1.0. United States Geological Survey Open-File Report 03-301. Digital preparation by P.M. Cossette, B. Jones, M.C. Wright, S.A. Kennedy, M.L. Dawson and R.M. Hauser.

Morton, D.M. and F.K. Miller, 2003. Preliminary digital geologic map of the San Bernardino 30'x60' quadrangle, California, version 1.0. United States Geological Survey Open-File Report 03-293. Digital preparation by P.M. Cossette and K.R. Bovard. 189 p.

Repenning, C.A., 1987. Biochronology of the microtine rodents of the United States. *In* M.O. Woodburne (ed.), Cenozoic mammals of North America: geochronology and biostratigraphy. Berkeley: University of California Press, p. 236-268.

Reynolds, S.F.B. and W.A. Reeder, 1986. Age and fossil assemblages of the San Timoteo Formation, Riverside County, California. *In* M.A. Kooser and S.F.B. Reynolds (eds.), Geology around the margins of the eastern San Bernardino Mountains. Redlands: Inland Geological Society Publications 1:51-56.

Reynolds, S.F.B. and W.A. Reeder, 1991. The San Timoteo Formation, Riverside County, California. *In* M.O. Woodburne, S.F.B. Reynolds, and D.P. Whistler (eds.), Inland Southern California: the last 70 million years. Redlands: San Bernardino County Museum Special Publication 38(3&4): 44-48.

Reynolds, S.F.B. and R.L. Reynolds, 1991. The Pleistocene beneath our feet: near-surface Pleistocene fossils in inland southern California basins. *In* M.O. Woodburne, S.F.B. Reynolds, and D.P. Whistler (eds.), Inland Southern California: the last 70 million years. Redlands: San Bernardino County Museum Special Publication 38(3&4): 41-43.

Rogers, T.H., 1965. Geologic map of California, Santa Ana sheet, scale 1:250,000. California Division of Mines and Geology Regional Geologic Map Series.

Savage, D.E. and D.E. Russell, 1983. Mammalian paleofaunas of the world. Reading: Addison-Wesley. 432 p.

Scott, E., 2010. Extinctions, scenarios, and assumptions: changes in latest Pleistocene large herbivore abundance and distribution in western North America. *In* E. Scott and G. McDonald (eds.), Faunal dynamics and extinction in the Quaternary: Papers honoring Ernest L. Lundelius, Jr. Quaternary International 217: 225-239.

Scott, E. and S.M. Cox, 2008. Late Pleistocene distribution of Bison (Mammalia; Artiodactyla) in the Mojave Desert of southern California and Nevada. *In* X Wang and L.G. Barnes (eds.), Geology and Vertebrate Paleontology of Western and Southern North America, Contributions in Honor of David P. Whistler. Natural History Museum of Los Angeles County Science Series No. 41, p. 359 - 382.

Scott, E. and K. Springer, 2003. CEQA and fossil preservation in southern California. The Environmental Monitor, Fall 2003, p. 4-10, 17.

Scott, E., K. Springer and J.C. Sagebiel, 2004. Vertebrate paleontology in the Mojave Desert: the continuing importance of "follow-through" in preserving paleontologic resources. *In* M.W. Allen and J. Reed (eds.) The human journey and ancient life in California's deserts: Proceedings from the 2001 Millennium Conference. Ridgecrest: Maturango Museum Publication No. 15, p. 65-70.

Springer, K., E. Scott, J.C. Sagebiel, and L.K. Murray, 2009. The Diamond Valley Lake local fauna: late Pleistocene vertebrates from inland southern California. *In* L.B. Albright III (ed.), Papers on geology, vertebrate paleontology, and biostratigraphy in honor of Michael O. Woodburne. Museum of Northern Arizona Bulletin 65:217-235.

Springer, K., E. Scott, J.C. Sagebiel, and L.K. Murray, 2010. Late Pleistocene large mammal faunal dynamics from inland southern California: the Diamond Valley Lake local fauna. *In* E. Scott and G. McDonald (eds.), Faunal dynamics and extinction in the Quaternary: papers honoring Ernest L. Lundelius, Jr. Quaternary International 217: 256-265.

Please do not hesitate to contact us with any further questions you may have.

Sincerely,

Eric Scott, Curator of Paleontology
Division of Geological Sciences
San Bernardino County Museum

APPENDIX C. SENSITIVITY RANKING CRITERIA

Caltrans Rank	Caltrans Description	PFYC Description	PFYC Rank
No	Rock units of intrusive igneous origin, most extrusive igneous rocks, and moderately to highly metamorphosed rocks are classified as having no potential for containing significant paleontological resources	Very Low. The occurrence of significant fossils is non-existent or extremely rare. Includes igneous or metamorphic and Precambrian or older rocks. Assessment or mitigation of paleontological resources is usually unnecessary.	1
Low	This category includes sedimentary rock units that: 1) are potentially fossiliferous, but have not yielded significant fossils in the past; 2) have not yet yielded fossils, but possess a potential for containing fossil remains; or 3) contain common and/or widespread invertebrate fossils if the taxonomy, phylogeny, and ecology of the species contained in the rock are well understood.	Low. Sedimentary geologic units that are not likely to contain vertebrate fossils or scientifically significant nonvertebrate fossils. Includes rock units too young to produce fossils, sediments with significant physical and chemical changes (e.g., diagenetic alteration) and having few to no fossils known. Assessment or mitigation of paleontological resources is not likely to be necessary.	2
		Potentially Moderate but Undemonstrated Potential. Units exhibit geologic features and preservational conditions that suggest fossils could be present, but no vertebrate fossils or only common types of plant and invertebrate fossils are known. Surface-disturbing activities may require field assessment to determine appropriate course of action.	3b
High	Rock units which, based on previous studies, contain or are likely to contain significant vertebrate, significant invertebrate, or significant plant fossils	Moderate Potential. Units are known to contain vertebrate fossils or scientifically significant nonvertebrate fossils, but these occurrences are widely scattered and of low abundance. Common invertebrate or plant fossils may be found. Surface-disturbing activities may require field assessment to determine appropriate course of action.	3a
		High. Geologic units containing a high occurrence of significant fossils. Fossils must be abundant per locality. Vertebrate fossils or scientifically significant invertebrate or plant fossils are known to occur and have been documented, but may vary in occurrence and predictability. If impacts to significant fossils can be anticipated, on-the-ground surveys prior to authorizing the surface disturbing action will usually be necessary. On-site monitoring or spot-checking may be necessary during construction activities.	4
		Very High. Highly fossiliferous geologic units that consistently and predictably produce vertebrate fossils or scientifically significant invertebrate or plant fossils. Vertebrate fossils or scientifically significant invertebrate fossils are known or can reasonably be expected to occur in the impacted area. On-the-ground surveys prior to authorizing any surface disturbing activities will usually be necessary. On-site monitoring may be necessary during construction activities.	5