

PALEONTOLOGICAL ASSESSMENT FOR THE 2411 NORTH GLASSEL STREET PROJECT

**CITY OF ORANGE,
ORANGE COUNTY, CALIFORNIA**

APNs 374-381-01 and -02

Prepared on Behalf of:

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Prepared for:

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February 19, 2025



BFSA Environmental Services
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Paleontological Database Information

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Report Date: February 19, 2025

Report Title: Paleontological Assessment for the 2411 North Glassel Street
Project, City of Orange, Orange County, California

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Assessor's Parcel Numbers: 374-381-01 and -02

USGS Quadrangle: Unsectioned area of Township 4 South, Range 9 West, on the
USGS *Orange, California* (7.5-minute) Quadrangle

Study Area: Approximately 12 acres

Key Words: Paleontological assessment; Pleistocene old alluvial fan deposits;
high sensitivity; monitoring recommended.

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I. INTRODUCTION AND LOCATION

A paleontological resource assessment has been completed for the 2411 North Glassell Street Project to comply with California Environmental Quality Act (CEQA) and City of Orange environmental requirements. The project is located at 2411 North Glassell Street southeast of the intersection of North Glassell Street and East Fletcher Avenue in the city of Orange, California (Figures 1 and 2). The approximately 12-acre project consists of two parcels (Assessor's Parcel Numbers [APNs] 374-381-01 and -02) and is situated within an unsectioned area of Township 4 South, Range 9 West, as shown on the United States Geological Survey *Orange, California* (7.5-minute) topographic quadrangle map (see Figure 2). A new development is being considered for the project parcels. Currently, the parcels are occupied by an existing business park (Figure 3).

As the lead agency, the City of Orange has required the preparation of a paleontological assessment to evaluate the project's potential to yield paleontological resources. The paleontological assessment of the project included a review of paleontological literature and fossil locality records in the area, a review of the underlying geology, and, if necessary, recommendations to mitigate impacts to potential paleontological resources. A paleontological survey of the project was not performed, since the parcels are completely developed.

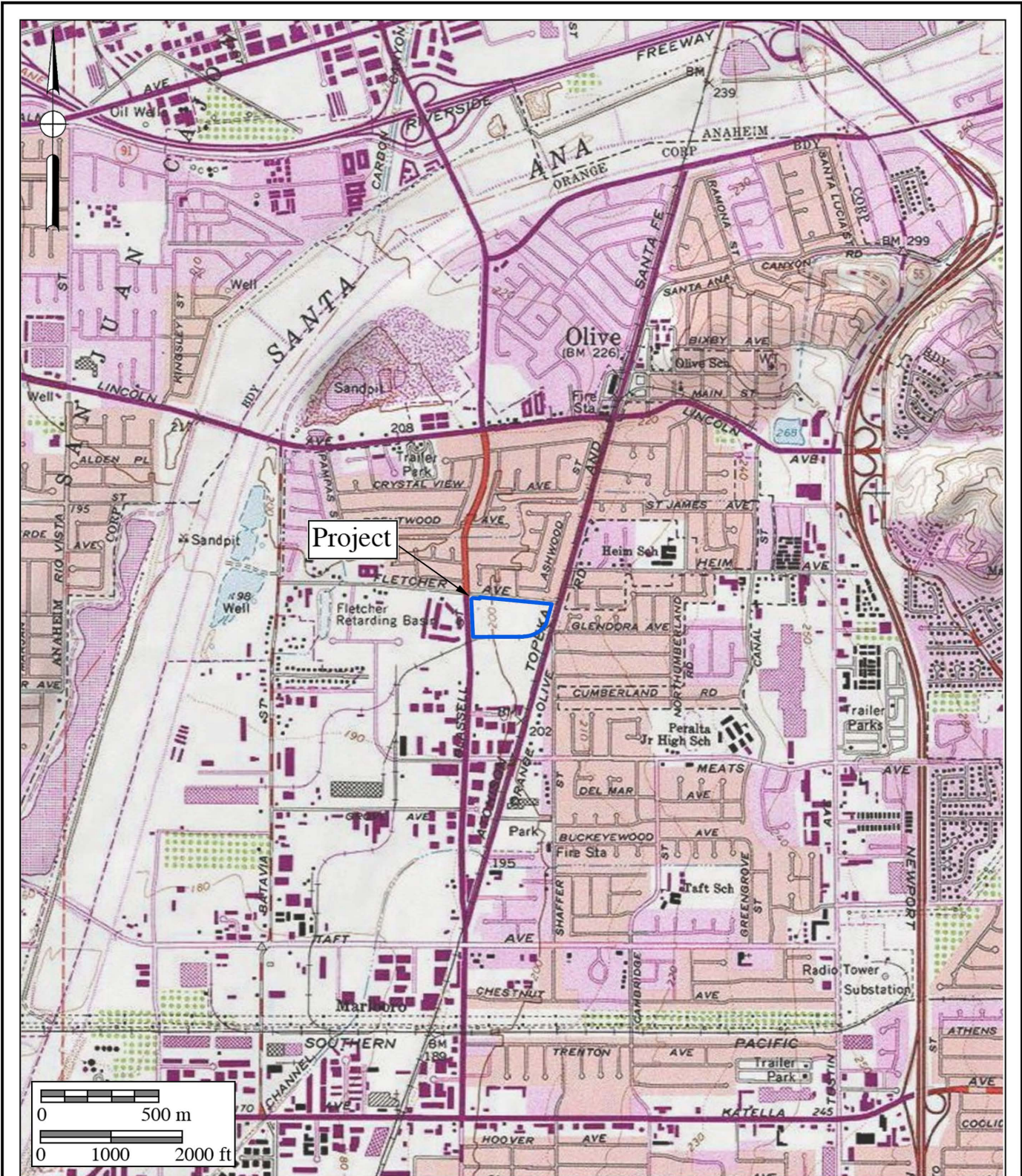
II. REGULATORY SETTING

CEQA, which is patterned after the National Environmental Policy Act, is the overriding regulation that sets the requirement for protecting California's cultural and paleontological resources. CEQA does not establish specific rules that must be followed but mandates that governing permitting agencies (lead agencies) set their own guidelines for the protection of nonrenewable paleontological resources under their jurisdiction.

Under "Guidelines for Implementation of the California Environmental Quality Act," as amended in December 2018 (California Code of Regulations [CCR] Title 14, Division 6, Chapter 3, Sections 15000 et seq.), procedures define the types of activities, persons, and public agencies required to comply with CEQA. Section 15063 of the CCR provides a process by which a lead agency may review a project's potential impact on the environment, assess whether the impacts are significant, and if necessary, provide recommendations.



Figure 1
General Location Map
The 2411 North Glassell Street Project
Esri World Topographic Map



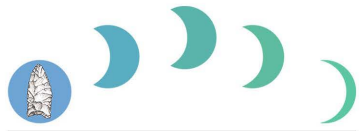
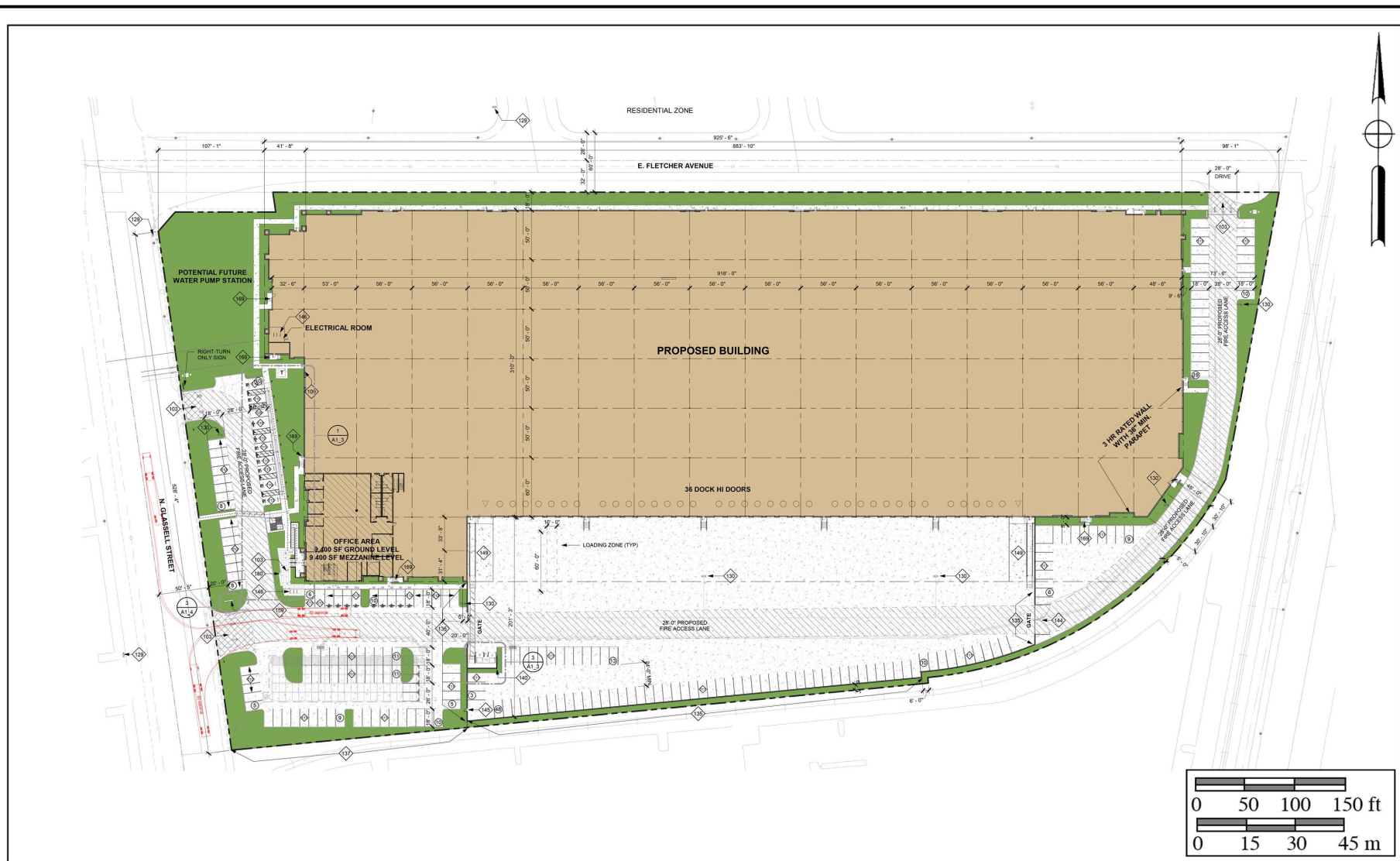
Project

Figure 2

Project Location Map

The 2411 North Glassell Street Project
 USGS Orange Quadrangle (7.5-minute series)





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Figure 3
Development Map

The 2411 North Glassell Street Project

The City of Orange

The Environmental Impact Report (EIR) for the City of Orange recognizes that paleontological resources may be adversely impacted as a result of earth disturbance activities during development projects (City of Orange 2010). The EIR indicates the potential to encounter paleontological resources exists and has proposed a mitigation measure (MM; MM 5.5-10) as a requirement to implement prior to development. The MM, while only indicating cultural and archeological resources, is positioned under a heading with paleontological resources in the EIR, and is stated below:

5.5-10 Require cultural resources inventories of all new development projects in areas identified with medium or high potential for archaeological or cultural resources. Where a preliminary site survey finds medium to high potential for substantial archaeological remains, the City shall require a mitigation plan to protect the resource before issuance of permits. Mitigation may include:

- Ensuring that a qualified archaeologist is present during initial grading or trenching (monitoring);
- Redesigning the project to avoid archaeological resources (this is considered the strongest tool for preserving archaeological resources);
- Capping the site with a layer of fill; and/or
- Excavating and removing the archaeological resources (recovery) and implementing curation in an appropriate facility under the direction of a qualified archaeologist (interpretation).

Alert applicants for permits within early settlement areas to the potential sensitivity. If significant archaeological resources are discovered during construction or grading activities, such activities shall cease in the immediate area of the find until a qualified archaeologist can determine the significance of the resource and recommend alternative mitigation.

III. GEOLOGY

The current path of the Santa Ana River lies approximately two-thirds of a mile west of the project. Geologically, most of the project is mapped as late to middle Pleistocene-aged old alluvial fan deposits, characterized as moderately- to well-consolidated silt, sand, and gravel (amber areas labeled “Qof” on Figure 4, after Morton and Miller 2006). At the westernmost portion of the project, the surficial sediments are mapped as Holocene and late Pleistocene young alluvial fan deposits (yellow areas labeled “Qyf_{sa}” on Figure 4), mostly consisting of unconsolidated, alluvial silty sands.

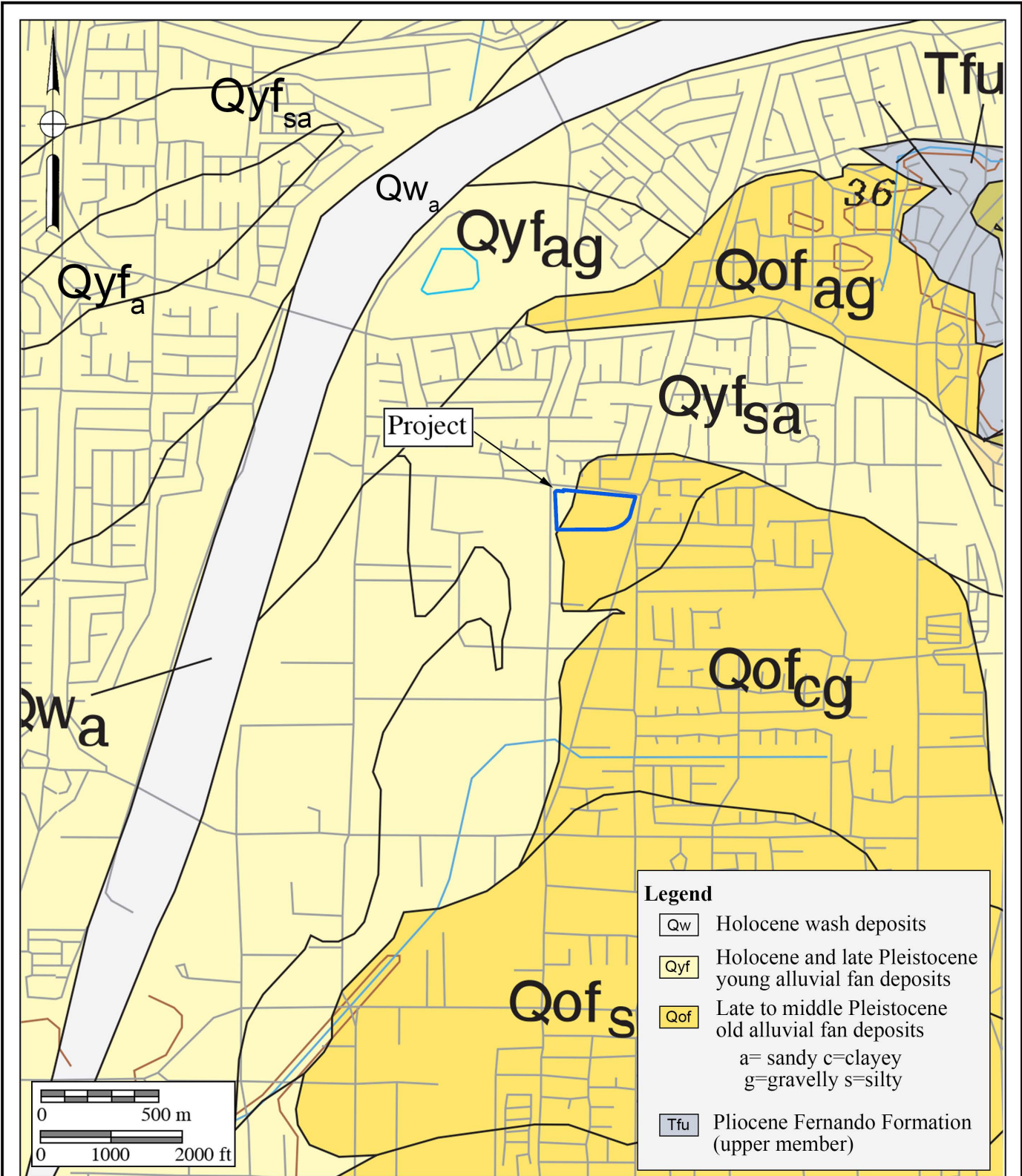


Figure 4
Geologic Map

The 2411 North Glassell Street Project
Geology after Morton and Miller (2006)



IV. PALEONTOLOGICAL RESOURCES

Definition

Paleontological resources are the remains of prehistoric life that have been preserved in geologic strata. These remains are called fossils and include bones, shells, teeth, and plant remains (including their impressions, casts, and molds) in the sedimentary matrix, as well as trace fossils such as footprints and burrows. Fossils are considered older than 5,000 years of age (Society of Vertebrate Paleontology 2010) but may include younger remains (subfossils) when viewed in the context of local extinction of the organism or habitat. Fossils are considered a nonrenewable resource under state and local guidelines (see Section II of this report).

Paleontological Resource Records Search

A paleontological resource (fossil) records search was performed for the project by the Natural History Museum of Los Angeles County (LACM) (Bell 2025; Appendix B). According to Bell (2025), no fossil localities are known within the project. The closest locality is located just over one mile northwest of the project, south of Lincoln Avenue along Rio Vista Avenue, consisting of wild sheep remains in Pleistocene deposits (LACM locality [loc.] 1652). Between two and three miles to the northeast, proboscidean bones were found in Pleistocene terrace deposits (LACM loc. 3292). A third locality, with Pleistocene rodent remains, is several miles away at the former El Toro marine base (LACM loc. 7867).

A review of published and unpublished literature was conducted for potential paleontological resources that are known in the vicinity of the project. Data reported in Miller (1971) indicate there are no nearby fossil localities; however, Jefferson (1991) lists a late Pleistocene-aged specimen of horse located at “Glassell [Street] and Fletcher [Avenue]” in Orange (LACM locality 4943), which would place this locality at or adjacent to the project. Dr. Alyssa Bell (personal communication 2025) of the LACM indicated this specimen “has been assessed as a modern specimen since Jefferson’s publication and so is no longer included in records searches.” The geology at this intersection is mapped as young alluvial fan deposits (Figure 4).

V. PALEONTOLOGICAL SENSITIVITY

Overview

The degree of paleontological sensitivity of any particular area is based upon a number of factors, including the documented presence of fossiliferous resources on a site or in nearby areas, the presence of documented fossils within a particular geologic formation or lithostratigraphic unit, and whether or not the original depositional environment of the sediments is one that might have been conducive to an accumulation of organic remains that may have become fossilized over time. Holocene alluvium is generally considered to be geologically too young to contain significant nonrenewable paleontological resources (*i.e.*, fossils) and is therefore typically assigned a low paleontological sensitivity. Pleistocene (greater than 11,700 years old) alluvial and terrace

deposits in the Orange County region, however, often yield important Ice Age terrestrial vertebrate fossils such as extinct mammoths, mastodons, giant ground sloths, extinct species of horse, bison, and camel, saber-toothed cats, and others (Jefferson 1991). Therefore, these Pleistocene sediments are accorded a high paleontological resource sensitivity.

Professional Standards

The Society of Vertebrate Paleontology (2010) has drafted guidelines that include four categories of paleontological sensitivity for geologic units (formations) that might be impacted by a proposed project, as paraphrased below:

- *High Potential:* Rock units from which vertebrate or significant invertebrate, plant, or trace fossils have been recovered.
- *Undetermined Potential:* Rock units for which little information is available concerning their paleontological content, geologic age, and depositional environment, and that further study is needed to determine the potential of the rock unit.
- *Low Potential:* Rock units that are poorly represented by fossil specimens in institutional collections or based on a general scientific consensus that only preserve fossils in rare circumstances.
- *No Potential:* Rock units that have no potential to contain significant paleontological resources, such as high-grade metamorphic rocks and plutonic igneous rocks.

Based upon these criteria, the Pleistocene deposits mapped at the project have a high potential to contain paleontological resources. The Holocene to late Pleistocene-aged young alluvial fan deposits have a low potential at/near the surface. With depth, the deposits increase in age to late Pleistocene and thus will have a high paleontological sensitivity.

VI. CONCLUSIONS AND RECOMMENDATIONS

The Pleistocene old alluvial fan deposits have the potential to yield significant paleontological resources, based upon age, depositional environment, and regional fossil records. Therefore, paleontological monitoring is recommended during earth disturbance activities within undisturbed old alluvial fan deposits, starting at the surface. These deposits are overlain by Holocene to late Pleistocene young alluvial fan deposits along the western side of the project. These deposits have a low to high potential to yield fossils, based upon increasing depth. While the depth of the age transition from Holocene to Pleistocene within the young alluvial fan deposits at the project is not known, a starting depth of five feet below the surface is recommended for full-time monitoring where these deposits are mapped (see Figure 4). Monitoring of artificial fill or disturbed deposits that may be present is not required.

Based upon the conclusions and recommendations above, a Paleontological Resource Impact Mitigation Program (PRIMP) is warranted. The following PRIMP is suggested and, when approved by the City of Orange and implemented, would reduce adverse impacts to potential paleontological resources to a level below significant.

Suggested Paleontological Resource Impact Mitigation Program

1. All mitigation programs shall be performed by a qualified professional (project) paleontologist, defined as an individual with a master's or doctorate in paleontology or geology who has proven experience and who is knowledgeable in professional paleontological procedures and techniques. Fieldwork may be conducted by a qualified paleontological monitor, defined as an individual who has experience in the collection and salvage of fossil materials. The paleontological monitor shall always work under the direction of a qualified paleontologist.
2. Starting at the surface, monitoring shall be conducted full-time in areas of grading or excavation in undisturbed Pleistocene old alluvial fan deposits, as shown in Figure 4. In undisturbed Holocene to late Pleistocene alluvial fan deposits, monitoring shall be conducted full-time in areas of grading or excavation starting at a depth of five feet. Monitoring of artificial fill or disturbed deposits that may be present is not required.
3. Paleontological monitors will be equipped to salvage fossils as they are unearthed to avoid construction delays. The monitor must be empowered to temporarily halt or divert equipment to allow removal of abundant or large specimens in a timely manner. Monitoring may be reduced if the potentially fossiliferous units are not present in the subsurface, or, if present, are determined upon exposure and examination by qualified paleontological personnel to have low potential to contain fossil resources. The monitor shall notify the project paleontologist, who will then notify any concerned parties of the discovery.
4. Paleontological salvage during trenching and boring activities is typically from the generated spoils and will not delay trenching or drilling activities. Fossils will be collected and placed in cardboard flats or plastic buckets and identified by field number, collector, and date collected. Before the site is vacated and the fossils are moved to a safe place, notes are taken on the map location and stratigraphy of the site. On mass grading projects, discovered fossil sites are protected by flagging to prevent them from being overrun by earthmovers (scrapers) before salvage begins. Fossils will be collected in a similar manner, with notes and photographs being taken before removing the fossils. Precise location of the site is determined through use of handheld Global Positioning System units. If a large terrestrial vertebrate that is too large to be easily removed by a single monitor, such as a large bone or a mammoth tusk, a fossil recovery crew shall excavate around the find(s), encase the find(s) within a plaster and burlap jacket, and remove the find(s) after the plaster is set. For large fossils, use of the contractor's construction equipment may be solicited to help move the jacket to a

- safe location.
5. In alluvial deposits, small invertebrate fossils typically represent multiple specimens of a limited number of species, and a scientifically suitable sample can be obtained from one to several five-gallon buckets of fossiliferous sediment. If it is possible to dry screen the sediment in the field, a concentrated sample may consist of one or two buckets of material to check for the presence of invertebrates.
 6. In accordance with the “Microfossil Salvage” section of the Society of Vertebrate Paleontology guidelines (2010:7), bulk sampling and screening of fine-grained sedimentary (alluvial) deposits (including carbonate-rich paleosols) must be performed if the deposits are identified to possess indications of producing fossil “microvertebrates” to test the feasibility of the deposit to yield fossil bones and teeth. If indicators of potential microvertebrate fossils are found, screening of a test sample (approximately 600 pounds) is recommended, according to the Society of Vertebrate Paleontology guidelines. If feasible, wet screening shall be conducted on the project site. If screening yields significant fossils, then removing and processing a “standard sample” of 6,000 pounds shall be performed.
 7. In the laboratory, individual fossils will be cleaned of extraneous matrix, any breaks will be repaired, and the specimen, if needed, will be stabilized by soaking in an archivally approved acrylic hardener (*e.g.*, a solution of acetone and Paraloid B-72).
 8. Recovered specimens will be prepared to a point of identification and permanent preservation (not display), including screen-washing sediments to recover small invertebrates and vertebrates. Preparation of individual vertebrate fossils is often more time consuming than for accumulations of invertebrate fossils.
 9. Identification and curation of specimens into a professional, accredited public museum repository with a commitment to archival conservation and permanent retrievable storage (*e.g.*, the Los Angeles County Museum of Natural History or the Orange County Parks’ Cooper Center) shall be conducted. The paleontological program should include a written repository agreement prior to initiating mitigation activities. Prior to curation, the lead agency (the City of Orange) will be consulted on the repository/museum to receive the fossil material.
 10. A final report of findings and significance will be prepared, including lists of all fossils recovered and necessary maps and graphics to accurately record their original location(s). The report, when submitted to and accepted by the appropriate lead agency, will signify satisfactory completion of the project program to mitigate impacts to any potential nonrenewable paleontological resources (*i.e.*, fossils) that might have been lost or otherwise adversely affected without such a program in place.

VII. CERTIFICATION

I hereby certify that the statements furnished above and in the attached exhibits present the data and information required for this paleontological report, and that the facts, statements, and information presented are true and correct to the best of my knowledge and belief and have been compiled in accordance with CEQA criteria.



February 19, 2025

Todd A. Wirths, M.S., P.G.
Principal Paleontologist
California Professional Geologist No. 7588

Date

VIII. REFERENCES

Bell, A. 2025. Paleontological resources records search for the 2411 North Glassell Street Project. Unpublished letter for BFSAs Environmental Services, Poway, California, by the Natural History Museum of Los Angeles County, Los Angeles, California. (Appendix B)

City of Orange. 2010. Program Environmental Impact Report, City of Orange General Plan, State Clearinghouse # 2006031117. Prepared for the city of Orange, California, by EDAW, Inc., San Diego, California.
<https://www.cityoforange.org/home/showpublisheddocument/240/637698173340500000>.

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: i-v + 1-129.

Miller, W.E. 1971. Pleistocene vertebrates of the Los Angeles Basin and vicinity (exclusive of Rancho La Brea). Bulletin of the Los Angeles County Museum of Natural History; Science, Number 10, 124 pp.

Morton, D.M. and Miller, F.K. 2006. Geologic map of the San Bernardino and Santa Ana 30' x 60' quadrangles, California: U.S. Geological Survey Open-File Report 06-1217, scale 1:100,000.

Society of Vertebrate Paleontology. 2010. Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources; by the SVP Impact Mitigation Guidelines Revision Committee: https://vertpaleo.org/wp-content/uploads/2021/01/SVP_Impact_Mitigation_Guidelines.pdf.

APPENDIX A

Qualifications of Key Personnel

Todd A. Wirths, MS, PG No. 7588

Senior Paleontologist

BFSAE nvironmental Services, A Perennial Company

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Phone: (858) 679-8218 • Fax: (858) 679-9896 • E-Mail: twirths@bfsa.perennialenv.com



Education

Master of Science, Geological Sciences, San Diego State University, California **1995**

Bachelor of Arts, Earth Sciences, University of California, Santa Cruz **1992**

Professional Certifications

California Professional Geologist #7588, 2003
Riverside County Approved Paleontologist
San Diego County Qualified Paleontologist
Orange County Certified Paleontologist
OSHA HAZWOPER 40-hour trained; current 8-hour annual refresher

Professional Memberships

Board member, San Diego Geological Society
San Diego Association of Geologists; past President (2012) and Vice President (2011)
South Coast Geological Society
Southern California Paleontological Society

Experience

Mr. Wirths has more than a dozen years of professional experience as a senior-level paleontologist throughout southern California. He is also a certified California Professional Geologist. At BFSAE nvironmental Services, Mr. Wirths conducts on-site paleontological monitoring, trains and supervises junior staff, and performs all research and reporting duties for locations throughout Los Angeles, Ventura, San Bernardino, Riverside, Orange, San Diego, and Imperial Counties. Mr. Wirths was formerly a senior project manager conducting environmental investigations and remediation projects for petroleum hydrocarbon-impacted sites across southern California.

Selected Recent Reports

- 2019 *Paleontological Assessment for the 10575 Foothill Boulevard Project, City of Rancho Cucamonga, San Bernardino County, California.* Prepared for T&B Planning, Inc. Report on file at Brian F. Smith and Associates, Inc., Poway, California.
- 2019 *Paleontological Assessment for the MorningStar Marguerite Project, Mission Viejo, Orange County, California.* Prepared for T&B Planning. Report on file at Brian F. Smith and Associates, Inc., Poway, California.

- 2019 *Paleontological Monitoring Report for the Nimitz Crossing Project, City of San Diego.* Prepared for Voltaire 24, LP. Report on file at Brian F. Smith and Associates, Inc., Poway, California.
- 2019 *Paleontological Resource Impact Mitigation Program (PRIMP) for the Jack Rabbit Trail Logistics Center Project, City of Beaumont, Riverside County, California.* Prepared for JRT BP 1, LLC. Report on file at Brian F. Smith and Associates, Inc., Poway, California.
- 2020 *Paleontological Monitoring Report for the Oceanside Beachfront Resort Project, Oceanside, San California.* Prepared for S.D. Malkin Properties. Report on file at Brian F. Smith and Associates, Inc., Poway, California.
- 2020 *Paleontological Resource Impact Mitigation Program for the Nakase Project, Lake Forest, Orange County, San California.* Prepared for Glenn Lukos Associates, Inc. Report on file at Brian F. Smith and Associates, Inc., Poway, California.
- 2020 *Paleontological Resource Impact Mitigation Program for the Sunset Crossroads Project, Banning, Riverside County.* Prepared for NP Banning Industrial, LLC. Report on file at Brian F. Smith and Associates, Inc., Poway, California.
- 2020 *Paleontological Assessment for the Ortega Plaza Project, Lake Elsinore, Riverside County.* Prepared for Empire Design Group. Report on file at Brian F. Smith and Associates, Inc., Poway, California.
- 2020 *Paleontological Resource Record Search Update for the Green River Ranch III Project, Green River Ranch Specific Plan SP00-001, City of Corona, California.* Prepared for Western Realco. Report on file at Brian F. Smith and Associates, Inc., Poway, California.
- 2020 *Paleontological Assessment for the Cypress/Slover Industrial Center Project, City of Fontana, San Bernardino County, California.* Prepared for T&B Planning, Inc. Report on file at Brian F. Smith and Associates, Inc., Poway, California.
- 2020 *Paleontological Monitoring Report for the Imperial Landfill Expansion Project (Phase VI, Segment C-2), Imperial County, California.* Prepared for Republic Services, Inc. Report on file at Brian F. Smith and Associates, Inc., Poway, California.
- 2021 *Paleontological Assessment for the Manitou Court Logistics Center Project, City of Jurupa Valley, Riverside County, California.* Prepared for Link Industrial. Report on file at Brian F. Smith and Associates, Inc., Poway, California.
- 2021 *Paleontological Resource Impact Mitigation Program for the Del Oro (Tract 36852) Project, Menifee, Riverside County.* Prepared for D.R. Horton. Report on file at Brian F. Smith and Associates, Inc., Poway, California.
- 2021 *Paleontological Assessment for the Alessandro Corporate Center Project (Planning Case PR-2020-000519), City of Riverside, Riverside County, California.* Prepared for OZI Alessandro, LLC. Report on file at Brian F. Smith and Associates, Inc., Poway, California.
- 2021 *Paleontological Monitoring Report for the Boardwalk Project, La Jolla, City of San Diego.* Prepared for Project Management Advisors, Inc. Report on file at Brian F. Smith and Associates, Inc., Poway, California.

APPENDIX B

Paleontological Resource Records Search Letter

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

tel 213.763.DINO
www.nhm.org

Research & Collections

e-mail: paleorecords@nhm.org

February 2, 2025

BFSA Environmental Services
Attn: Todd A. Wirths

re: Paleontological resources records search for the 2411 North Glassell Street Project (BFSA Project No. 25-019)

Dear Todd:

I have conducted a thorough search of our paleontology collection records for the locality and specimen data for proposed development at the 2411 North Glassell Street project area as outlined on the portion of the Orange USGS topographic quadrangle map that you sent to me via e-mail on January 22, 2025. We do not have any fossil localities that lie directly within the proposed project area, but we do have fossil localities nearby from the same sedimentary deposits that may occur in the proposed project area, either at the surface or at depth.

The following table shows the closest known localities in the collection of the Natural History Museum of Los Angeles County (NHMLA).

Locality Number	Location	Formation	Taxa	Depth
LACM VP 1652	Rio Vista Avenue south of Lincoln Avenue	Alluvium (Pleistocene)	Sheep (<i>Ovis</i>)	Unknown (excavations for housing project)
LACM VP 3292	Richfield, CA (south of Yorba Linda)	Terrace deposits (Pleistocene)	Elephant clade (Proboscidae)	Unknown
LACM VP 7867	former El Toro Marine Base	Unknown formation (Pleistocene)	Rodent (rodentia)	25 ft bgs

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

This records search covers only the records of the NHMLA. It is not intended as a paleontological assessment of the project area for the purposes of CEQA or NEPA. Potentially fossil-bearing units are present in the project area, either at the surface or in the subsurface. As such, NHMLA recommends that a full paleontological assessment of the project area be conducted by a paleontologist meeting Federal (43 Code of Federal Regulations Part 49.110) or Society of Vertebrate Paleontology standards.

Sincerely,

A handwritten signature in black ink that reads "Alyssa Bell". The signature is written in a cursive style and is set against a light beige rectangular background.

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