

APPENDIX C

PALEONTOLOGICAL RESOURCES MEMORANDUM

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MEMORANDUM

DATE: December 5, 2025

To: Brett Cannon, AICP, Senior Planner

FROM: Kelly Vreeland, M.Sc., Senior Paleontologist

SUBJECT: Paleontological Resources Memorandum for the Our Lady of Peace Project
(LSA Project No. 20241645)

INTRODUCTION

This memorandum documents the results of the paleontological analysis conducted for the proposed Our Lady of Peace Project (project) in Irvine, Orange County, California. This analysis was conducted to determine the potential for the project to impact paleontological resources in compliance with all applicable State and City of Irvine (City) regulations and requirements regarding paleontological resources, as well as the standards of the Society of Vertebrate Paleontology (SVP, 2010). The applicable regulations and requirements include the California Environmental Quality Act (CEQA): Public Resources Code (PRC) Division 13, Chapter 2.6; the *State CEQA Guidelines*: California Code of Regulations, Title 14, Chapter 3, Appendix G; PRC Section 5097.5; and the Resources Element from the County of Orange General Plan (County of Orange, 2015). Information from this paleontological memorandum is intended for incorporation into the Environmental Impact Report (EIR) being prepared for this project.

INTRODUCTION

The project is an approximately 6-acre area located on the southeast corner of Trabuco Road and Remington in Irvine. Roosevelt is south of the project area, and residences on Cartier Aisle are situated on the east. The project area is one-third of a mile east of Interstate (I) 5.

The rectangular project area measures 450 feet in the northwest-southeast direction and 550 feet in the southwest-northeast direction. Elevation ranges from 151 to 163 feet with slope in the west-southwest direction. The project area is depicted on the *Tustin, California* 7.5-minute United States Geological Survey (USGS, 1981) quadrangle map in Township 5 South, Range 9 West in the northeast corner of Section 36 (Figure 1 provided in Attachment B). The parcel lies in the southwest corner of the *Rancho Lomas de Santiago* Mexican Period Land Grant.

Currently, approximately 2.5 acres on the western side of the project area is developed with a Korean Catholic Church building, an asphalt parking lot, and landscaped areas. The remaining portion of the project area is undeveloped grassy area. The project proposes to replace the existing church building with a permanent Our Lady of Peace Korean Catholic Church building and to construct a new parish hall building and a new rectory building, all in the north half of the project

area. Additionally, the project proposes to construct 68 new multifamily residential units in the southern portion of the project area.

METHODS

To assess the impacts of the project with respect to paleontological resources, LSA reviewed geologic maps of the project site and relevant geological and paleontological literature to determine which geologic units are present within the project site and whether fossils have been recovered within the project site or from those or similar geologic units elsewhere in the region. In addition, a fossil locality search was conducted through the Natural History Museum of Los Angeles County (NHMLA) to determine the status and extent of previously recorded paleontological resources within and surrounding the project site. On November 11, 2025, LSA conducted a pedestrian field survey of the project area. The purpose of the field survey was to document and collect any paleontological resources that may have been present, as well as to note the sediments at the surface.

RESULTS

Setting

Results of the literature review indicate that the project area is within the Peninsular Ranges Geomorphic Province, a 900-mile-long northwest-southeast trending structural block with similarly trending faults that extends from the Transverse Ranges in the north to the tip of Baja California in the south and includes the Los Angeles Basin (California Geological Survey, 2002; Norris and Webb, 1976). The total width of this province is 225 miles, extending from the Colorado Desert in the east, across the continental shelf, to the southern Channel Islands (Santa Barbara, San Nicolas, Santa Catalina, and San Clemente) in the west (Sharp, 1976). This province is characterized by a series of mountain ranges and valleys that trend in a northwest-southeast direction roughly parallel to the San Andreas Fault Zone (Norris and Webb, 1976; Sharp, 1976). It contains extensive pre-Cenozoic (more than 66 million years ago [Ma]) igneous and metamorphic rocks covered by Cenozoic (less than 66 Ma) sedimentary deposits (Norris and Webb, 1976).

Geologic mapping by Morton and Miller (2006) shows that the project site is underlain by Holocene to Late Pleistocene (less than 129,000 years ago) Young Alluvial Fan Deposits. Although not mapped by Morton and Miller (2006), Artificial Fill is present from the prior construction of the area and was noted during the field survey. These geologic units and their paleontological sensitivities are described in more detail below. Dates for the geologic time intervals referenced in this report are derived from the *International Chronostratigraphic Chart* published by the International Commission on Stratigraphy (Cohen et al., 2024).

Artificial Fill

Artificial Fill consists of sediments that have been removed from one location and transported to another location by human activity, rather than by natural means. The transportation distance can vary from a few feet to many miles, and composition depends on the source and purpose. Artificial Fill will sometimes contain modern debris such as asphalt, wood, bricks, concrete, metal, glass, plastic, and even plant material.

Although Artificial Fill may contain fossils, these fossils have been removed from their original location and are thus out of stratigraphic context. Therefore, they are not considered important for scientific study, and Artificial Fill has no paleontological sensitivity.

Young Alluvial Fan Deposits

The Young Alluvial Fan Deposits are Holocene to late Pleistocene in age (less than 129,000 years ago) and consist of unconsolidated silt, sand, and gravel (Morton and Miller, 2006). Cobble- and boulder-size clasts are also present and become more abundant closer to the hills and mountains (Morton and Miller, 2006). These sediments were eroded from higher elevations, carried by flooding streams and debris flows, and deposited in a fan or lobe shape at the base of the hills. They show slight to moderate dissection by erosional gullies (Morton and Miller, 2006).

Although Holocene (less than 11,700 years ago) deposits can contain remains of plants and animals, only those from the middle to early Holocene (4,200 to 11,700 years ago; Cohen et al., 2024) are considered scientifically important (SVP, 2010), and fossils from this time interval are not very common. These Holocene deposits overlie older, Pleistocene deposits, which have produced scientifically important fossils elsewhere in the region (Jefferson 1991a, 1991b; Miller 1971; Reynolds and Reynolds 1991; Springer et al. 2009). These older, Pleistocene deposits span the end of the Rancholabrean North American Land Mammal Age (NALMA), which dates from 11,000 to 240,000 years ago (Sanders et al., 2009) and was named for the Rancho La Brea fossil site in central Los Angeles. The presence of Bison defines the beginning of the Rancholabrean NALMA (Bell et al. 2004), but fossils from this time also include other large and small mammals, reptiles, fish, invertebrates, and plants (Jefferson 1991a, 1991b; Miller 1971; Reynolds and Reynolds 1991; Springer et al. 2009). There is a potential to find these types of fossils in the older sediments of this geologic unit, which may be encountered below a depth of approximately 10 feet. Therefore, these deposits are assigned a low paleontological sensitivity above a depth of 10 feet and a high sensitivity below that mark.

Fossil Locality Search

According to the locality search conducted by the NHMLA, there are no known fossil localities within the boundaries of the project. However, this search noted two fossil localities nearby from similar sedimentary deposits that may occur in the project area. The closest locality, LACM VP 7867 from Pleistocene deposits at Great Park, produced Rodent (Rodentia) from 25 feet below ground surface. The next closest locality, LACM VP 7713 from City of Irvine south of Interstate 405 and northeast of San Canyon Reservoir which produced remains of Sloth (Mylodontidae) from Pleistocene deposits at an unknown depth. A copy of the NHMLA fossil locality search results letter is included in Attachment C.

Field Survey

The pedestrian field survey was completed by LSA archaeologist Ivan Strudwick, who is cross-trained in paleontology. The survey was conducted on November 11, 2025. No paleontological material was found during the survey.

The survey began in the northern portion of the project area and was conducted by walking northwest-southeast transects separated by 5–7 meters in the direction parallel to Trabuco Road. The survey did not cover the paved parking lot at the west end of the project along Remington.

The undeveloped portions of the project area comprise an open area northeast of the church building, between the building and Trabuco Road, as well as the entire southeastern half of the study area. These areas are level, except for a low earthen berm adjacent to the sidewalk along Trabuco Road. Undeveloped areas contain low grasses with excellent ground visibility of 80 percent or more. Ground visibility was 100 percent in many areas. Surface sediment was a yellow-brown to light-brown clay loam with some gravel. Visible native sediments were consistent with geologic mapping by Morton and Miller (2006).

SUMMARY AND RECOMMENDATIONS

Impact Analysis

The project site contains Artificial Fill, which has no paleontological sensitivity, and Young Alluvial Fan Deposits, which have low paleontological sensitivity from the surface to a depth of 10 feet and high paleontological sensitivity below a depth of 10 feet.

Mitigation

To ensure that potential impacts to undiscovered paleontological resources remain less than significant, preparation of a Paleontological Resources Impacts Mitigation Program (PRIMP), paleontological monitoring of construction activities, appropriate treatment of newly discovered resources, and preparation of a final paleontological monitoring report would be required, as outlined in the following Mitigation Measure (MM) PALEO-1.

MM PALEO-1

Paleontological Resources. Prior to the commencement of ground-disturbing activities, a qualified, professional paleontologist who meets the standards set by the Society of Vertebrate Paleontology (SVP) shall be retained to develop a Paleontological Resources Impact Mitigation Program (PRIMP) for this project. The PRIMP shall be consistent with the guidelines of the SVP and shall include the methods that will be used to protect paleontological resources that may exist within the project limits, as well as procedures for monitoring, fossil preparation and identification, curation into a repository, and preparation of a report at the conclusion of ground disturbance.

If ground-disturbing activities occur in deposits with high paleontological sensitivity (i.e. Young Alluvial Fan Deposits below a depth of 10 feet), those activities shall be monitored by a qualified paleontological monitor following the PRIMP. If paleontological resources are encountered during the course of ground disturbance, the paleontological monitor shall have the authority to temporarily redirect construction away from the area of the find in order to assess its significance. Once soils have been monitored during the excavation stage and determined to lack the presence of

paleontological resources, monitoring of these soils would no longer be necessary for the remainder of grading activities. In the event that paleontological resources are encountered when a paleontological monitor is not present, work in the immediate area of the find shall be redirected and the paleontologist or paleontological monitor shall be contacted to assess the find for scientific significance. If determined to be scientifically significant, the fossil shall be collected from the field.

Collected resources shall be prepared to the point of identification, identified to the lowest taxonomic level possible, cataloged, and curated into the permanent collections of a museum repository. At the conclusion of the monitoring program, a report of findings shall be prepared to document the results of the monitoring program.

Attachments: A: References
B: Figure
C: Fossil Locality Search Results Letter

ATTACHMENT A

REFERENCES

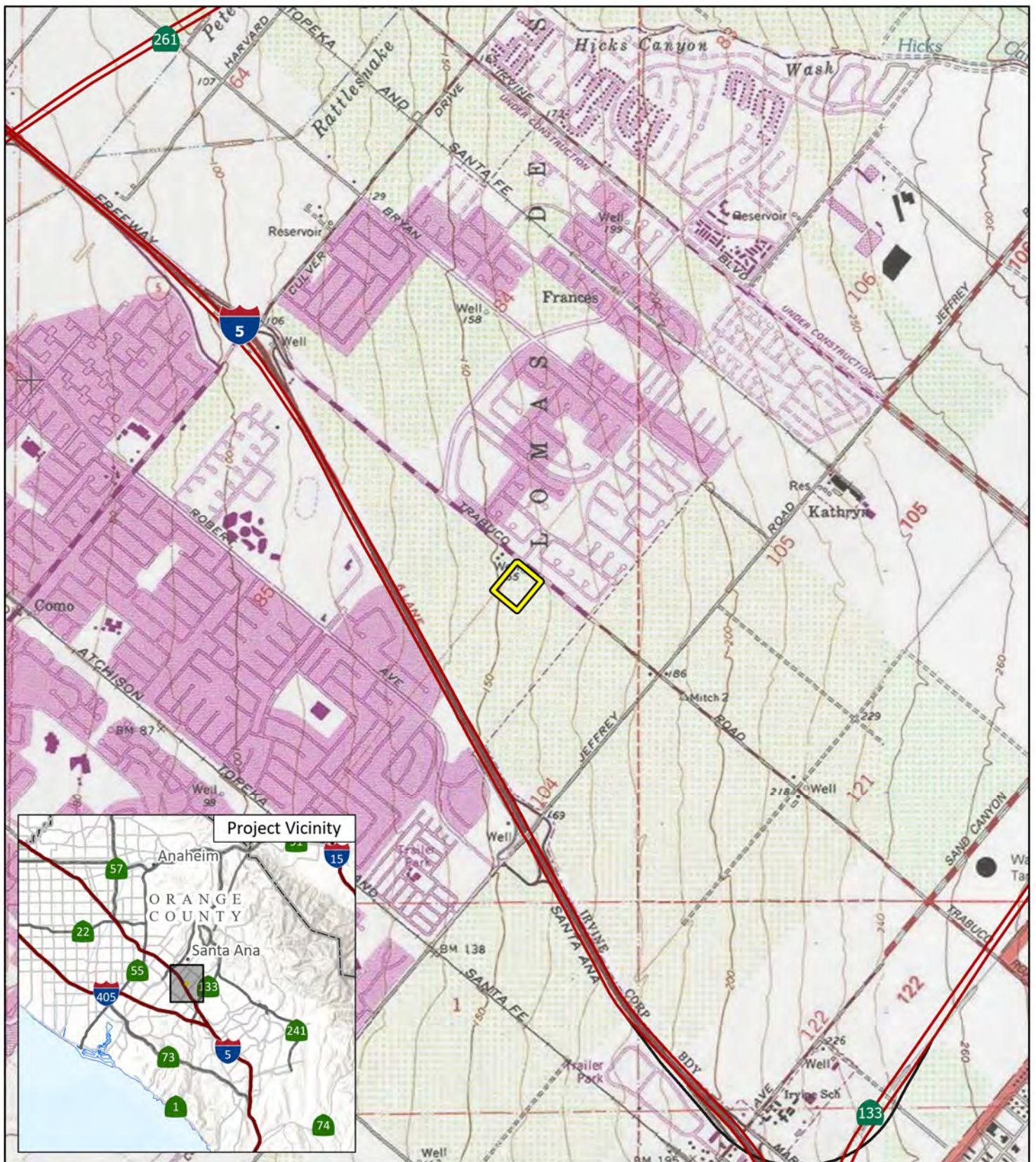
- Bell, C.J., E.L. Lundelius Jr., A.D. Barnosky, R.W. Graham, E.H. Lindsay, D.R. Ruez Jr., H.A. Semken Jr., S.D. Webb, and R.J. Zakrzewski. 2004. The Blancan, Irvingtonian, and Rancholabrean Mammal Ages, p. 232–314. In M.O. Woodburne (ed.), *Late Cretaceous and Cenozoic Mammals of North America: Biostratigraphy and Geochronology*. Columbia University Press, New York.
- California Geological Survey. 2002. California Geomorphic Provinces. *California Geologic Survey Note* 36. California Department of Conservation.
- Cohen, K.M., S.C. Finney, P.L. Gibbard, and J.-X. Fan. 2024. The ICS International Chronostratigraphic Chart. Updated December 2024. Episodes 36: 199-204.
- County of Orange. 2015. Resources Element of the County of Orange General Plan. Available online at <https://ocds.ocpublicworks.com/sites/ocpwoocds/files/import/data/files/40235.pdf>. Accessed November 2025.
- Jefferson, George T. 1991a. A Catalogue of Late Quaternary Vertebrates from California: Part One: Non-marine Lower Vertebrate and Avian Taxa. *Natural History Museum of Los Angeles County Technical Reports* No. 5, Los Angeles.
- _____. 1991b. A Catalogue of Late Quaternary Vertebrates from California: Part Two: Mammals. *Natural History Museum of Los Angeles County Technical Reports* No. 7, Los Angeles.
- Miller, Wade E. 1971. Pleistocene Vertebrates of the Los Angeles Basin and Vicinity (Exclusive of Rancho La Brea). *Los Angeles County Museum of Natural History Bulletin, Science*: No. 10.
- Morton, Douglas M., and Fred K. Miller. 2006. Geologic Map of the San Bernardino and Santa Ana 30-minute by 60-minute quadrangles, California. Digital preparation by Pamela M. Cosette and Kelly R. Bovard. Prepared by the United States Geological Survey (USGS) in cooperation with the California Geological Survey. USGS Open File Report 2006-1217. Map Scale 1:100,000.
- Norris, R.M., and R.W. Webb. 1976. *Geology of California*. John Wiley and Sons, Inc., Santa Barbara.
- Reynolds, R.E., and R.L. Reynolds. 1991. The Pleistocene Beneath our Feet: Near-surface Pleistocene Fossils in Inland Southern California Basins. In M.O. Woodburne, R.E. Reynolds, and D.P. Whistler, eds., *Inland Southern California: The Last 70 Million Years. San Bernardino County Museum Special Publication* 38(3 and 4): 41–43. Redlands, California.

- Sanders, A.E., R.E. Weems, and L.B. Albright. 2009. Formalization of the Middle Pleistocene “Ten Mile Beds” in South Carolina with Evidence for Placement of the Irvingtonian-Rancholabrean Boundary. *Museum of Northern Arizona Bulletin* 64:369–375.
- Sharp, R.P. 1976. *Geology: Field Guide to Southern California. Second Edition*. Kendall/Hunt Publishing Company. p. 181.
- Society of Vertebrate Paleontology (SVP). 2010. Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources. Society of Vertebrate Paleontology. Impact Mitigation Guidelines Revision Committee. p. 11.
- Springer, Kathleen, Eric Scott, J. Christopher Sagebiel, and Lyndon K. Murray. 2009. The Diamond Valley Lake Local Fauna: Late Pleistocene Vertebrates from Inland Southern California. In L.B. Albright, III, ed. *Papers in Geology, Vertebrate Paleontology, and Biostratigraphy in Honor of Michael O. Woodburne. Museum of Northern Arizona Bulletin* 65:217–23.

ATTACHMENT B

FIGURE

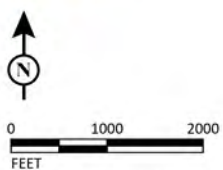
Figure 1: Project Location and Vicinity



LSA

 Project Site

FIGURE 1



SOURCE: USGS 7.5' Quad - Tustin (1981), CA

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Our Lady of Peace Project
Project Location and Vicinity

ATTACHMENT C

FOSSIL LOCALITY SEARCH RESULTS LETTER



CARLSBAD
CLOVIS
IRVINE
LOS ANGELES
PALM SPRINGS
POINT RICHMOND
RIVERSIDE
ROSEVILLE
SAN LUIS OBISPO

October 10, 2025

Alyssa Bell, Ph.D.
Natural History Museum of Los Angeles County
900 Exposition Boulevard
Los Angeles, CA 90007

Subject: Fossil Locality Search for the Our Lady of Peace Project in the City of Irvine, Orange County

Dear Dr. Bell:

LSA is requesting the Natural History Museum of Los Angeles County conduct a fossil locality search for the Our Lady of Peace Project (project) in the City of Irvine, Orange County. The project proposes to construct 68 new multi-family residential units and replace the temporary church building occupied by the Our Lady of Peace Korean Catholic Church with a new permanent church building. The attached figure (Records Search Map) depicts the project area on the Tustin, California 7.5-minute United States Geological Survey (USGS) topographic map in Township 5 South, Range 9 West, and Section 36, San Bernardino Baseline and Meridian (USGS, 1982).

LSA is interested in knowing the location of fossil localities within an approximately 1-mile radius around the project area. In addition, LSA would like to know what specimens have been found from those localities. If there are no known fossil localities within a 1-mile radius, please provide the location of the closest localities within sediments similar to those found within the project area, as well as information on the fossils recovered.

Please send an invoice to my attention, including a reference to LSA project number **20241645**.

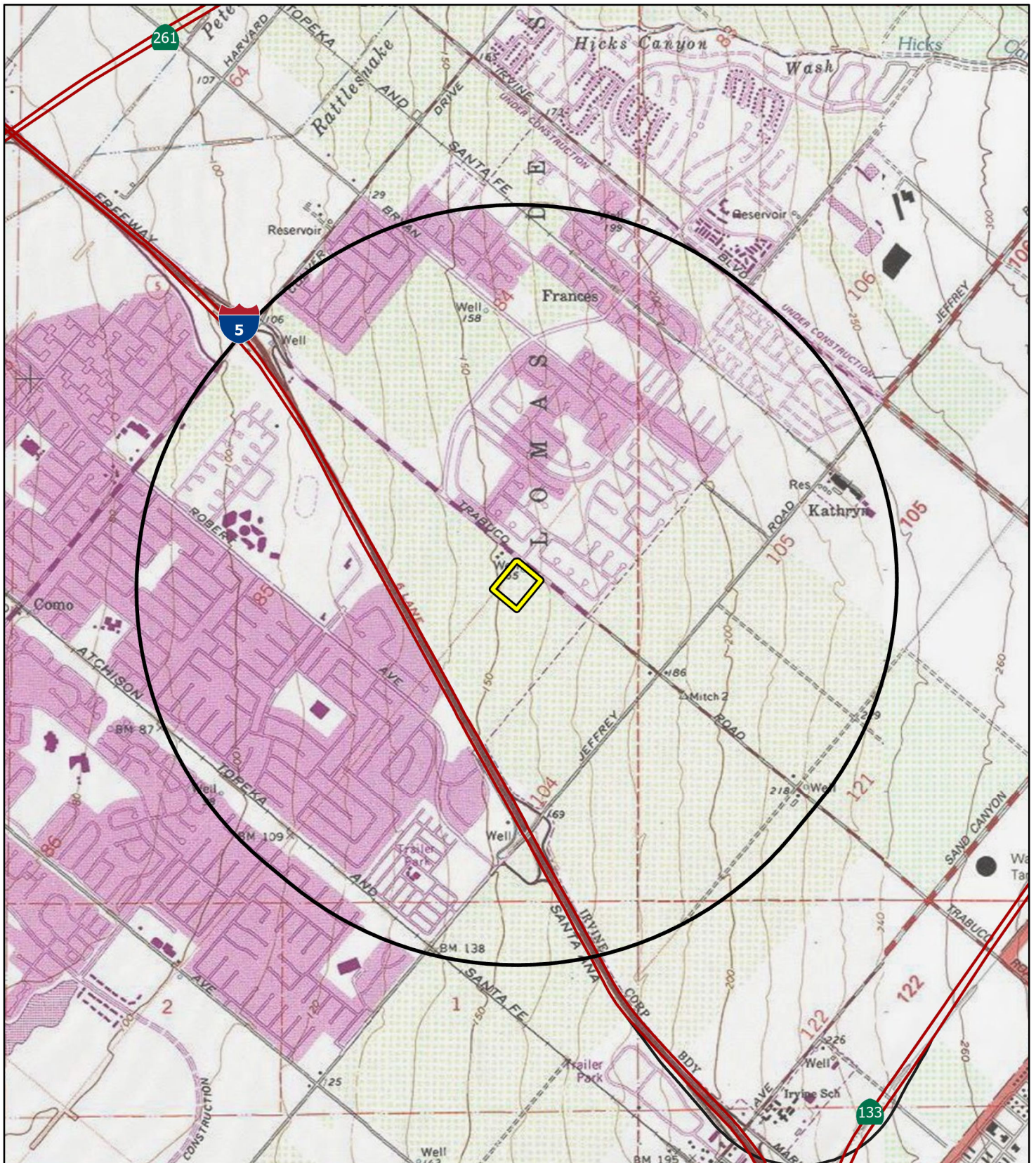
If possible, LSA is requesting receipt of the results by October 31, 2025. Please send the results via e-mail to Kelly.vreeland@lsa.net

Sincerely,

LSA Associates, Inc.

Kelly Vreeland, M.Sc.
Senior Paleontologist

Attachment: Records Search Map



LSA

- Project Site
- 1-mile Buffer of Project Site



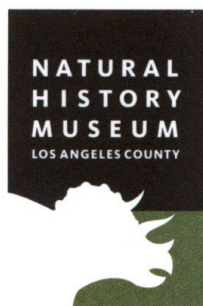
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FEET

SOURCE: USGS 7.5' Quad - Tustin (1981), CA

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FIGURE 1

Our Lady of Peace Project
Records Search Map



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

October 26, 2025

LSA Associates, Inc.
Attn: Kelly Vreeland

re: Paleontological resources records search for the Our Lady of Peace Project (LSA Proj# 20241645)

Dear Kelly:

I have conducted a search of our paleontology collection records for the proposed development at the Our Lady of Peace Project area as outlined on the portion of the Tustin USGS topographic quadrangle map that you sent to me via e-mail on October 10, 2025. We do not have fossil localities that have been recorded or georeferenced directly within the proposed project area, but we do have fossil localities nearby from similar 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 7867	Great Park (former El Toro Marine base)	Unknown formation (Pleistocene)	Rodent (Rodentia)	25 feet bgs
LACM VP 7713	City of Irvine south of I-405 & northeast of Sand Canyon Reservoir	Unknown formation (Pleistocene, reddish-brown alluvium)	Sloth (Mylodontidae?)	Unknown

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

This records search is limited to the records of the NHMLA. It is not intended as a paleontological assessment of the project for the purposes of California Environmental Quality Act (CEQA) or National Environmental Policy Act (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 paleontological assessment be conducted by a paleontologist meeting Federal (43 Code of Federal Regulations Part 49.110) or Society of Vertebrate Paleontology standards for compliance with applicable regulations, such as CEQA or NEPA.

Sincerely,

A handwritten signature in black ink on a light yellow rectangular background. The signature reads "Alyssa Bell" in a cursive, flowing script.

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