

---

## **Appendix E-3**

### Paleontological Resources Review Memorandum



## MEMORANDUM

---

**To:** Chris Peregrin, Department of Parks and Recreation, San Diego Coast District  
**From:** Sarah Siren, M.S., GISP, Senior Paleontologist  
**Subject:** Paleontological Resources Review – Nelson Sloan Quarry Restoration Project  
**Date:** 4/11/19  
**cc:** Joshua Saunders, AICP, Dudek  
**Attachment(s):** Paleontological Records Search Results Letter

---

Dudek is providing this memo after completing a review of the potential for impacts to paleontological resources during construction activities for the Nelson Sloan Quarry Restoration Project located within the Tijuana River Valley Community Planning Area of the City of San Diego, San Diego County, California. The project site is relatively undeveloped and underlain by the following geological units (listed from youngest to oldest): Quaternary landslide deposits, Bay Point Formation, Lindavista Formation, and San Diego Formation (Kennedy and Tan, 1977; 2008). According to the San Diego County guidelines for paleontology (City of San Diego, 2016; Deméré and Walsh, 1993), and the records search results received from the San Diego Natural History Museum on April 1, 2019, the Pleistocene age Bay Point Formation and the Pliocene and Pleistocene age San Diego Formation have high potential to yield paleontological resources (i.e. high resource importance), whereas the Pleistocene age Lindavista Formation has moderate potential to yield paleontological resources (McComas, 2019; see attached Paleontological Records Search Results Letter). Quaternary landslide deposits have low potential to yield paleontological resources (McComas, 2019).

According to the records search conducted at the San Diego Natural History Museum (SDNHM), no paleontological localities are documented within a one-mile radius of the project boundaries (McComas, 2019). Localities are documented elsewhere in the City of San Diego from the same geological units that occur beneath portions of the project site; specifically, the Bay Point Formation and the San Diego Formation, and to a lesser extent, the Lindavista Formation. These sedimentary deposits have the potential to yield scientifically significant vertebrate fossils.

The Quaternary (in general, < 750,000 years old; McComas, 2019) landslide deposits mapped within the project area contain sediments that no longer have their original stratigraphic context. For this reason, these landslide deposits have low paleontological resource sensitivity.

The Pleistocene age (~750,000-10,000 years old; McComas, 2019) Bay Point Formation is known to produce paleontological resources (Hertlein and Grant, 1939; Deméré, 1981; Deméré and Streif, 1982; Kennedy and Browne, 2007). Within the Bay Point Formation, the Broadway Faunal Horizon has produced one of the most complete mammoth skeletons within downtown San Diego's East Village neighborhood, as well as the skeleton of a gray whale. The characteristically brown sandstone beds have yielded Pleistocene megafauna throughout the City of San Diego, such as horse, camel, and mammoth. Important collections of marine invertebrates are also typical of the Bay Point Formation. Less common are the marine vertebrates which have been recovered, and include the

Memorandum

Subject: *Paleontological Resources Review – Nelson Sloan Quarry Restoration Project*

---

following taxa: sharks, rays, and bony fishes (McComas, 2019). The Bay Point has high paleontological resource sensitivity.

The Pleistocene age Lindavista Formation is known to produce marine invertebrates, and to a lesser extent, marine vertebrate remains (McComas, 2019). The Lindavista Formation is generally a conglomeratic red bed. The Lindavista Formation has moderate paleontological resource sensitivity in this region of the City of San Diego.

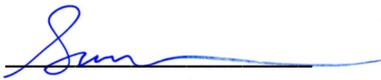
The Pliocene and Pleistocene age San Diego Formation is known to produce diverse assemblages of marine invertebrates, marine vertebrates, and lesser amounts of terrestrial plants and mammals (McComas, 2019). These yellow sandstone beds are common in the southern portion of the City of San Diego. The San Diego Formation has high paleontological resource sensitivity.

Although no vertebrate fossils are documented within the project area, the undeveloped nature of the site and the geological units present would be conducive to preserve such remains. If encountered during construction, moderate sensitivity Lindavista Formation would require part-time paleontological monitoring, in addition to the full-time monitoring conducted during any excavations within the Bay Point Formation and San Diego Formation. No monitoring is required during excavation within artificial fill or landslide deposits.

A paleontological resources mitigation program is recommended for excavation within moderate to high sensitivity geological units (e.g., Bay Point Formation and San Diego Formation) and moderate sensitivity geological units (e.g., Lindavista Formation) should be implemented in accordance with the mitigation measures included at the end of this report. Excavation within lower sensitivity units (e.g, Quaternary landslide deposits) does not require mitigation.

If you have any questions regarding this memo, please feel free to contact me (760.846.9326 or [ssiren@dudek.com](mailto:ssiren@dudek.com)).

Sincerely,



Sarah A. Siren, M.S., GISP

Senior Paleontologist, Dudek

Enc. Paleontological Records Search Results Letter

**Recommendations and Mitigation Measures:**

Prior to implementation of the mitigation measures identified below, adverse impacts to paleontological resources due to project activities, where excavation would exceed the City's thresholds in sensitive areas, as determined during activity review (PDF-PAL-1), could result in would be potentially significant impacts, and the following mitigation measures would be required (MM-PAL-1 through MM-PAL-4), pursuant Land Development Code (LDC) 142.0151, as reproduced below from Appendix P of the Land Development Manual. Prior to the issuance of grading permits, the Applicant shall provide written confirmation to the City that a qualified paleontologist has been retained to carry out an appropriate mitigation program, as outlined below.

**MM-PAL-1 Prior to Permit Issuance or Bid Opening/Bid Award**

A. Entitlements Plan Check

Prior to issuance of any construction permits, including but not limited to, the first Grading Permit, Demolition Plans/Permits and Building Plans/Permits or a Notice to Proceed for Subdivisions, but prior to the first preconstruction meeting, whichever is applicable, the City Engineer (CE) and/or Building Inspector (BI) shall verify that the requirements for Paleontological Monitoring have been noted on the appropriate construction documents.

1. The applicant shall submit a letter of verification to Resident Engineer (RE) and/or Building Inspector (BI) identifying the qualified Principal Investigator (PI) for the project and the names of all persons involved in the paleontological monitoring program. A qualified PI is defined as a person with a Ph.D. or M.S. or equivalent in paleontology or closely related field (e.g., sedimentary or stratigraphic geology, evolutionary biology, etc.) with demonstrated knowledge of southern California paleontology and geology, and documented experience in professional paleontological procedures and techniques.

**MM-PAL-2 Prior to Start of Construction**

A. Verification of Records Search

1. The PI shall provide verification to RE and/or BI that a site specific records search has been completed. Verification includes, but is not limited to a copy of a confirmation letter from the San Diego Natural History Museum, or another relevant institution that maintains paleontological collections recovered from sites within the City of San Diego.
2. The letter shall introduce any pertinent information concerning expectations and probabilities of discovery during trenching and/or grading activities.

B. PI Shall Attend Preconstruction Meetings

1. Prior to beginning any work that requires monitoring, the Applicant shall arrange a Preconstruction Meeting that shall include the PI, Construction Manager (CM) and/or Grading Contractor, RE, and BI, as appropriate. The qualified paleontologist (PI) shall attend any grading/excavation related Preconstruction Meetings to make comments and/or suggestions concerning the Paleontological Monitoring program with the Construction Manager and/or Grading Contractor.
  - a. If the PI is unable to attend the Preconstruction Meeting, the Applicant shall schedule a focused Preconstruction Meeting with the PI, RE, CM or BI, if appropriate, prior to the start of any work that requires monitoring.

2. Identify Areas to be Monitored

Prior to the start of any work that requires monitoring, the PI shall submit a Paleontological Monitoring Exhibit (PME) based on the appropriate construction documents (reduced to 11x17) to RE and/or BI identifying the areas to be monitored including the delineation of grading/excavation limits. The PME shall be based on the results of a site specific records search as well as information regarding existing known geologic conditions (e.g., geologic deposits as listed in the Paleontological Determination Matrix below).

3. When Monitoring Will Occur

- a. Prior to the start of any work, the PI shall also submit a construction schedule to the RE and/or BI indicating when and where monitoring will occur.
- b. The PI may submit a detailed letter to RE and/or BI prior to the start of work or during construction requesting a modification to the monitoring program. This request shall be based on relevant information such as review of final construction documents and geotechnical reports which indicate conditions such as depth of excavation and/or thickness of artificial fill overlying bedrock, presence or absence of fossils, etc., which may reduce or increase the potential for resources to be present.

**MM-PAL-3      During Construction**

A. Monitor Shall be Present During Grading/Excavation/Trenching

1. The paleontological monitor shall be present full-time during grading/excavation/trenching activities as identified on the PME that could result in impacts to formations with high and moderate resource sensitivity. The Construction Manager is responsible for notifying the PI, RE, and/or BI of changes to any construction activities such as in the case of a potential safety concern within the area being monitored. In certain circumstances OSHA safety requirements may necessitate modification of the PME.

2. The PI may submit a detailed letter to the RE and/or BI during construction requesting a modification to the monitoring program when a field condition such as trenching activities that do not encounter previously undisturbed and paleontologically sensitive geologic deposits as previously assumed, and/or when unique/unusual fossils are encountered, which may reduce or increase the potential for resources to be present.
3. The paleontological monitor shall document field activity via the Consultant Site Visit Record (CSV). The CSV's shall be emailed by the CM to the RE and/or BI the first day of monitoring, the last day of monitoring, monthly (Notification of Monitoring Completion), and in the case of ANY discoveries.

**B. Discovery Notification Process**

1. In the event of a discovery, the paleontological monitor shall direct the contractor to temporarily divert trenching activities in the area of discovery and notify the RE and/or BI. The contractor shall also process a construction change for administrative purposes to formalize the documentation and recovery program, including modification to Mitigation Monitoring and Compliance (MMC).
2. The paleontological monitor shall notify the PI (unless paleontological monitor is the PI) of the discovery.
3. The PI shall immediately notify MMC of the discovery, and shall submit documentation to MMC within 24 hours by email with photos of the resource in context.

**C. Recovery of Fossils**

If a paleontological resource is encountered:

1. The paleontological monitor shall salvage unearthed fossil remains, including simple excavation of exposed specimens or, if necessary as determined by the PI, plaster-jacketing of large and/or fragile specimens or more elaborate quarry excavations of richly fossiliferous deposits.
2. The paleontological monitor shall record stratigraphic and geologic data to provide a context for the recovered fossil remains, including a detailed description of all paleontological localities within the project site, as well as the lithology of fossil-bearing strata within the measured stratigraphic section, and photographic documentation of the geologic setting.

**MM-PAL-4 Post Construction**

- A. Preparation and Submittal of Draft Paleontological Monitoring Report**

1. The PI shall submit two copies of the Draft Monitoring Report (even if negative), prepared to the satisfaction of the Development Services Department. The Draft Paleontological Monitoring Report shall describe the methods, results, and conclusions of all phases of the Paleontological Monitoring Program (with appropriate graphics) to MMC for review and approval within 90 days following the completion of monitoring.
  - a. For significant or potentially significant paleontological resources encountered during monitoring, as identified by the PI, the Paleontological Recovery Program shall be included in the Draft Monitoring Report.
  - b. The PI shall be responsible for recording (on the appropriate forms) any significant or potentially significant fossil resources encountered during the Paleontological Monitoring Program in accordance with the City's Paleontological Guidelines (revised November 2017), and submittal of such forms to the San Diego Natural History Museum and MMC with the Draft Paleontological Monitoring Report.
2. MMC shall return the Draft Paleontological Monitoring Report to the PI for revision or, for preparation of the Final Report.
3. The PI shall submit revised Draft Paleontological Monitoring Report to MMC for approval.
4. MMC shall provide written verification to the PI of the approved Draft Paleontological Monitoring Report.
5. MMC shall notify the RE and/or BI, of receipt of all Draft Paleontological Monitoring Report submittals and approvals.

**B. Handling of Fossil Remains**

1. The PI shall ensure that all fossil collected are cleaned to the point of curation (e.g., removal of extraneous sediment, repair of broken specimens, and consolidation of fragile/brittle specimens) and catalogued as part of the Paleontological Monitoring Program.
2. The PI shall ensure that all fossils are analyzed to identify stratigraphic provenance, geochronology, and taphonomic context of the source geologic deposit; that faunal material is taxonomically identified; and that curation has been completed, as appropriate.

**C. Curation of Fossil Remains: Deed of Gift and Acceptance Verification**

1. The PI shall be responsible for ensuring that all fossils associated with the paleontological monitoring program for this project are permanently curated with an accredited institution that maintains paleontological collections (such as the San Diego Natural History Museum).

2. The PI shall include an acceptance verification from the curation institution in the Final Paleontological Monitoring Report submitted to the RE and/or BI, and MMC.

D. Final Monitoring Report(s)

1. The PI shall submit two copies of the Final Monitoring Report to MMC (even if negative), within 90 days after notification from MMC of the approved report.
2. The RE shall, in no case, issue the Notice of Completion until receiving a copy of the approved Final Monitoring Report from MMC which includes the Acceptance Verification from the curation institution.

**References Cited:**

City of San Diego, 2016. *California Environmental Quality Act, Significance Determination Thresholds*. Development Services Department, 84 p.

Deméré, T.A., 1981. *A newly recognized late [middle] Pleistocene marine fauna from the City of San Diego, San Diego County, California*. In, Abbott, P. L., and O'Dunn, S. A., eds., *Geologic investigations of the San Diego coastal plain*. Field trip guidebook prepared for San Diego Association of Geologists, Field Trip, April, 1981. San Diego Association of Geologists, San Diego. Pp. 1-10, fig. 1, pl. 1, table 1.

Deméré, T.A., and Streiff, D.W., 1982. *Recognition of middle and upper Pleistocene marine deposits in downtown San Diego, California* [abstract]. *American Association of Petroleum Geologists, AAPG Bulletin*, 66(10): 1687.

Deméré, T.A., and S.L. Walsh. 1993. *Paleontological Resources, County of San Diego*: Prepared for the Department of Public Works, County of San Diego, p. 1-60.

Hertlein, L.G., and Grant, U.S., IV., 1939. *Geology and oil possibilities of southwestern San Diego County*. In Report XXXV, of the [California] State Mineralogist. *California Journal of Mines and Geology*, 35(1): 57-78, figs. 1-8.

Kennedy, G.L., and I.D. Browne, 2007. *Paleontology and geochronology of the middle and upper Pleistocene marine record in the downtown San Diego area, San Diego County, southern California*. *Western Society of Malacologists, Annual Report* [for 2003], 36:13-34, fig. 1, tables 1-2.

Kennedy, M.P. and S.S. Tan, 2008. *Geologic map of the San Diego 30' X 60' Quadrangle, California*. California Geologic Survey, Regional Geologic Map Series, Map No. 3.

Memorandum

Subject: *Paleontological Resources Review – Nelson Sloan Quarry Restoration Project*

---

Kennedy, M.P. and Tan. S.S. 1977. *Geology of National City, Imperial Beach and Otay Mesa Quadrangles, Southern San Diego Metropolitan Area, California*. California Division of Mines and Geology, Map Sheet 29.

McComas, K. 2019. *Paleontological Record Search – Nelson Sloan Quarry Restoration Project*. Unpublished letter report by the San Diego Natural History Museum. April 1, 2019.



# Attachment A

---

Paleontological Records Search Results Letter

# SAN DIEGO NATURAL HISTORY MUSEUM

1 April 2019

Ms. Sarah Siren  
Dudek  
605 Third Street  
Encinitas, CA 92024

RE: Paleontological Records Search – Nelson Sloan Quarry Restoration Project (**Dudek PN 11618**)

Dear Ms. Siren:

This letter presents the results of a paleontological records search conducted for the Nelson Sloan Quarry Restoration Project (Project), located in the south central portion of the Tijuana River Valley Neighborhood and Community Planning Area of the City of San Diego, San Diego County, California. The Project site lies south and west of Monument Road, and north of the United States/México Border.

A review of published geological maps covering the Project site and surrounding area was conducted to determine the specific geologic units underlying the Project. Each geologic unit was subsequently assigned a paleontological resource sensitivity following City of San Diego and County of San Diego guidelines (City of San Diego, 2011; Deméré and Walsh, 1993; Stephenson et al., 2009). Published geological reports (e.g., Kennedy and Tan, 2008) covering the Project area indicate that the proposed Project has the potential to impact Quaternary-age landslide deposits, the Pleistocene-age Bay Point Formation, the early to middle Pleistocene-age Lindavista Formation, and the late Pliocene- to early Pleistocene-age San Diego Formation. These geologic units and their paleontological sensitivity are summarized in detail in the following section.

In addition, a search of the paleontological collection records housed at the San Diego Natural History Museum (SDNHM) was conducted in order to determine if any documented fossil collection localities occur at the Project site or within the immediate surrounding area (Figure 1). The SDNHM does not have any recorded fossil localities within 1 mile of the Project site.

## **Geologic Rock Units Underlying the Project Area**

**Quaternary landslide deposits** – Landslide deposits of Pleistocene and Holocene age (generally less than 750,000 years old) underlie the westernmost portion of the Project site. The SDNHM does not have any fossil localities from these deposits within a 1-mile radius of the Project. The landslide deposits underlying the Project appear to be derived from the San Diego Formation, which is assigned a high paleontological sensitivity, and it is therefore possible that fossils originally contained within these units have been redeposited within the landslide deposits. However, without their original contextual stratigraphic data, fossil remains may be of little scientific value. Accordingly, landslide deposits are generally assigned a low paleontological sensitivity.

**Bay Point Formation** – The nearshore marine deposits of the Pleistocene-age (approximately 750,000 to 10,000 years old) Bay Point Formation underlie the northeastern portion of the Project site. More specifically, these deposits rest on the Nestor terrace (approximately 120,000 years old) of Kern

and Rockwell (1992), and are equivalent to Unit 6, old paralic deposits, of Kennedy and Tan (2008). The SDNHM does not have any fossil collection localities from the Bay Point Formation within a 1-mile radius of the Project site. Elsewhere in western San Diego County, the Bay Point Formation has yielded large and diverse assemblages of marine invertebrate fossils, as well as less common fossilized remains of marine invertebrates (e.g., sharks, ray, and bony fish) and land mammals (e.g., horse, camel, and mammoth). The Bay Point Formation has been assigned a high paleontological sensitivity for the diverse and well-preserved fossils of marine invertebrates and marine vertebrates that have been recovered from these deposits.

**Lindavista Formation** – The marine and/or non-marine terrace deposits of the early to middle Pleistocene-age (approximately 1.5 to 0.5 million years old) Lindavista Formation (broadly equivalent to very old paralic deposits of Kennedy and Tan, 2008) are exposed in the central and western portions of the Project site. The SDNHM does not have any fossil localities from these deposits within a 1-mile radius of the Project. The Lindavista Formation has produced remains of nearshore marine invertebrates (e.g., clams, scallops, snails, barnacles, and sand dollars), as well as sparse remains of marine vertebrates (e.g., sharks and baleen whales). Fossils have primarily been recovered from localities in Tierrasanta and Mira Mesa where the Lindavista Formation is assigned a high paleontological sensitivity; elsewhere in San Diego County, including in the vicinity of the Project site, the Lindavista Formation is assigned a moderate paleontological sensitivity.

**San Diego Formation** – Marine sedimentary deposits of the late Pliocene to early Pleistocene-age (approximately 3 to 1.5 million years old) San Diego Formation are exposed throughout most of the Project site, and underlie the Lindavista Formation. The SDNHM does not have any fossil localities from these deposits within a 1-mile radius of the Project. The San Diego Formation has yielded diverse assemblages of marine invertebrates (e.g., clams, scallops, snails, crabs, barnacles, and sand dollars) and marine vertebrates (e.g., sharks, rays, bony fish, sea birds, walrus, fur seals, sea cows, dolphins, and baleen whales), and rarely also produces remains of terrestrial mammals (e.g., cats, wolves, skunks, peccaries, camels, antelope, deer, horses, and gomphotheres) and terrestrial plants (e.g., fossil wood and leaves of pine, oak, laurel, cottonwood, and avocado). Based on the important fossil remains of marine mammals, sea birds, and mollusks recovered from this geologic unit, the San Diego Formation has been assigned a high paleontological sensitivity.

## **Summary and Recommendations**

The high paleontological sensitivity of the Bay Point Formation and San Diego Formation and the moderate paleontological sensitivity of the Lindavista Formation in San Diego County (Deméré and Walsh, 1993; Stephenson et al., 2009) suggest the potential for construction of the Project to result in impacts to paleontological resources. Any proposed excavation activities that extend deep enough to encounter previously undisturbed deposits of these geologic units have the potential to impact the paleontological resources preserved therein. For these reasons, implementation of a complete paleontological resource mitigation program during ground-disturbing activities is recommended.

If you have any questions concerning these findings please feel free to contact me at 619-255-0321 or kmccomas@sdnhm.org.

Sincerely,



Katie McComas, M.S.  
Paleontological Report Writer & GIS Specialist  
San Diego Natural History Museum

*Enc: Figure 1: Project map  
Appendix: List of SDNHM fossil localities in the vicinity of the Project*

### **Literature Cited**

- City of San Diego. 2011. California Environmental Quality Act, Significance Determination Thresholds. Development Services Department, 84 p.
- Deméré, T.A., and S.L. Walsh. 1993. Paleontological Resources, County of San Diego. Unpublished technical report prepared for the San Diego County Department of Public Works: 1–68.
- Kennedy, M.P., and Tan, S.S. 2008. Geologic Map of the San Diego 30' x 60' Quadrangle, California. California Geological Survey, Regional Geologic Map Series 1:100,000 scale, map no. 3.
- Kern, J.P., and Rockwell, T.K. 1992. Chronology and deformation of Quaternary marine shorelines, San Diego County, California. In, Quaternary Coasts of the United States: Marine and Lacustrine Systems. Society of Economic Paleontologists and Mineralogists, Special Publication 48: 377–382.
- San Diego Natural History Museum (SDNHM), unpublished paleontological collections data.
- Stephenson, B., and seven others. 2009. County of San Diego Guidelines for determining significance, paleontological resources. Land Use and Environment Group, Department of Planning and Land Use, Department of Public Works, 46 p.



Sources: Bing Maps Hybrid Imagery, Microsoft et al., 2019; Terrain Hillshade, Esri et al., 2019



Project location  
1 mile radius buffer



**FIGURE 1**

**Project Map**  
Nelson Sloan Quarry Restoration  
City of San Diego, San Diego County, California

