Appendix E3

Paleontological Resources Assessment

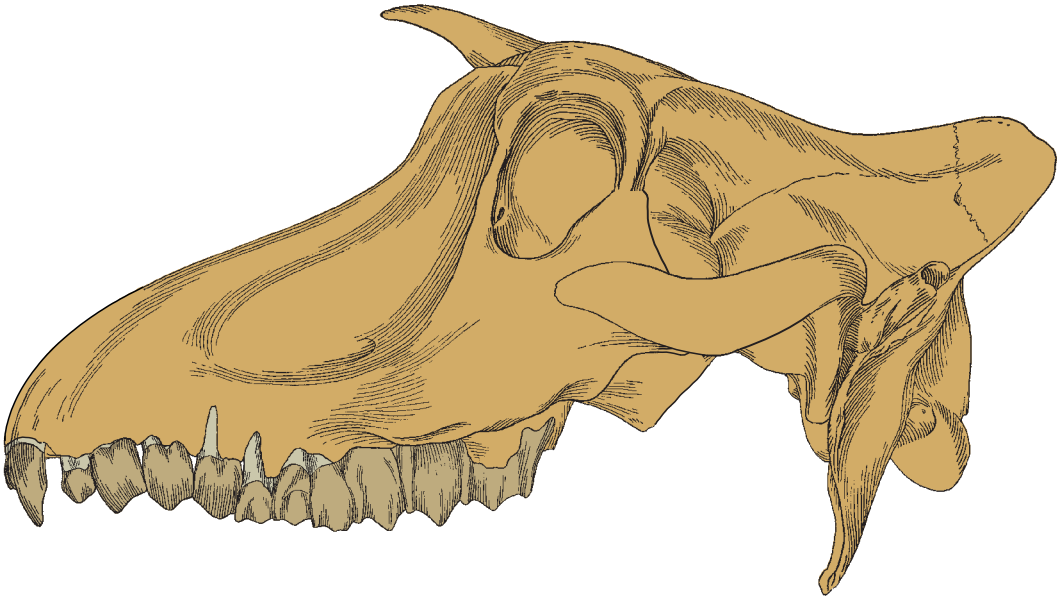
REDONDO BEACH WATERFRONT REDEVELOPMENT PROJECT
REDONDO BEACH, LOS ANGELES COUNTY, CALIFORNIA

Submitted to:

Greenwood and Associates
725 Jacon Way
Pacific Palisades, California 90272-2830

On Behalf of:

CDM Smith
111 Academy Way, Suite 150
Irvine, California 92617



Submitted by:

E. Bruce Lander, Ph.D.
Paleo Environmental Associates, Inc.
2248 Winrock Avenue
Altadena, California 91001-3205
626/797-9895
paleo@earthlink.net

July 2015

PEAI
PALEO ENVIRONMENTAL ASSOCIATES, INCORPORATED

2014-5
redondo beach-eir.doc

PALEO ENVIRONMENTAL ASSOCIATES

Introduction

Paleontologic resources include fossil remains and their respective fossil localities, associated fossil specimen data and corresponding geologic and geographic locality data, and the fossil-bearing rock units that immediately underlie the ground surface. Fossils are the remains or indications of once-living organisms and are considered an important scientific and educational resource. Such resources can be adversely affected by earth-moving activities.

A fossil specimen from the proposed Redondo Beach Waterfront Redevelopment Project site would be considered scientifically important if it were (1) identifiable to a low taxonomic level (e.g., genus or species) and by skeletal element, (2) relatively complete or (3) well preserved, (4) age diagnostic, (5) useful in environmental reconstruction, (6) a type or topotype specimen, (7) a member of a rare species, (8) a species that is part of a taxonomically diverse assemblage, or (9) a skeletal element different from, or a specimen more complete than, those now available for its respective species. For example, identifiable fossil marine mollusk or land mammal remains are considered scientifically important because of their potential use in providing accurate age determinations and environmental reconstructions for the rock units in which they occur. Moreover, the geologic ages of some fossil remains can be determined by carbon-14 radiometric dating analysis. Finally, some types of fossil remains, including those of marine fish and mammals, are comparatively rare in the fossil record.

Existing Environmental Conditions

This section was prepared in compliance with Society of Vertebrate Paleontology (SVP 2010) standard procedures for evaluating the potential of a rock unit for producing fossil remains. As part of that task, (1) a surficial geologic map of the proposed project site was studied to determine if a potentially fossil-bearing rock unit underlay the site, (2) paleontologic and geologic literature was reviewed to document the occurrence of any previously recorded fossil locality in that rock unit at or near the project site, and (3) an archival search was conducted at the Natural History Museum of Los Angeles County Department of Vertebrate Paleontology (LACM) on December 9, 2014, for additional information on any such fossil locality and to document the occurrence of any unpublished fossil locality from the same rock unit in the project site vicinity. Those tasks were all completed by the author.

As mapped by Dibblee (1999), the project site is immediately underlain by four rock units, all of which are exposed at the surface (Figure 1). In order of increasing geologic age or decreasing stratigraphic position, those units include (1) historic artificial fill, (2) Holocene beach sediments, (3) Holocene younger dune sand, and (4) older dune sand. However, in the subsurface, lagoonal deposits lie between the artificial fill and beach deposits, whereas Pleistocene marine deposits underlie the beach deposits (GeoDesign, Inc. 2014:figs. 5–7, 9–10). On the other hand, finished floor elevations for the two new parking structures will not lie below elevations of 12 and 10 feet in the north and south, respectively (GeoDesign, Inc. 2014). However, excavation for parking structure floors and footings, overexcavation for compaction, and trenching for subfloor drains or pipelines, would extend to lower elevations. Consequently, excavation and other earth-moving activities at the project site will probably encounter artificial fill, beach deposits, and younger and older dune sand in the northern part of the project site, but might also encounter lagoonal deposits below artificial fill at the respective parking structure site (Figure 1; see GeoDesign, Inc. 2014:figs. 6, 9). Such activities in the southern portion of the project site will likely encounter artificial fill and beach sediments, but might also encounter Pleistocene marine deposits at the corresponding parking structure site (Figure 1; see GeoDesign, Inc. 2014:figs. 7, 10).

Artificial fill (unit af in Figure 1) consists of unconsolidated historic sediments and debris that have been substantially disturbed by human activity. Artificial fill underlies much of the western portion of the project site west of North Harbor Drive, Pacific and North Pacific Avenues, and West Torrance Boulevard (Figure 1; Dibblee 1999). The unit is up to about 15 feet thick in the northern part of the project site (GeoDesign, Inc. 2014:fig. 9). Any fossil remains encountered in artificial fill would lack their original geologic and geographic contexts. For that reason, there would be no potential for any scientifically important fossil remains or previously unrecorded fossil locality being encountered in this rock unit as a result of project-related earth-moving activities. Consequently, artificial fill is of no paleontologic importance. Excavation to an elevation of about 7 feet for the northern parking structure would encounter only artificial fill (GeoDesign, Inc. 2014:fig. 9).

Holocene beach sediments (unit Qs in Figure 1) are present as a narrow strip in the northeastern portion of the project site immediately west of North Harbor Drive (Figure 1; Dibblee 1999), but are also present to the west,

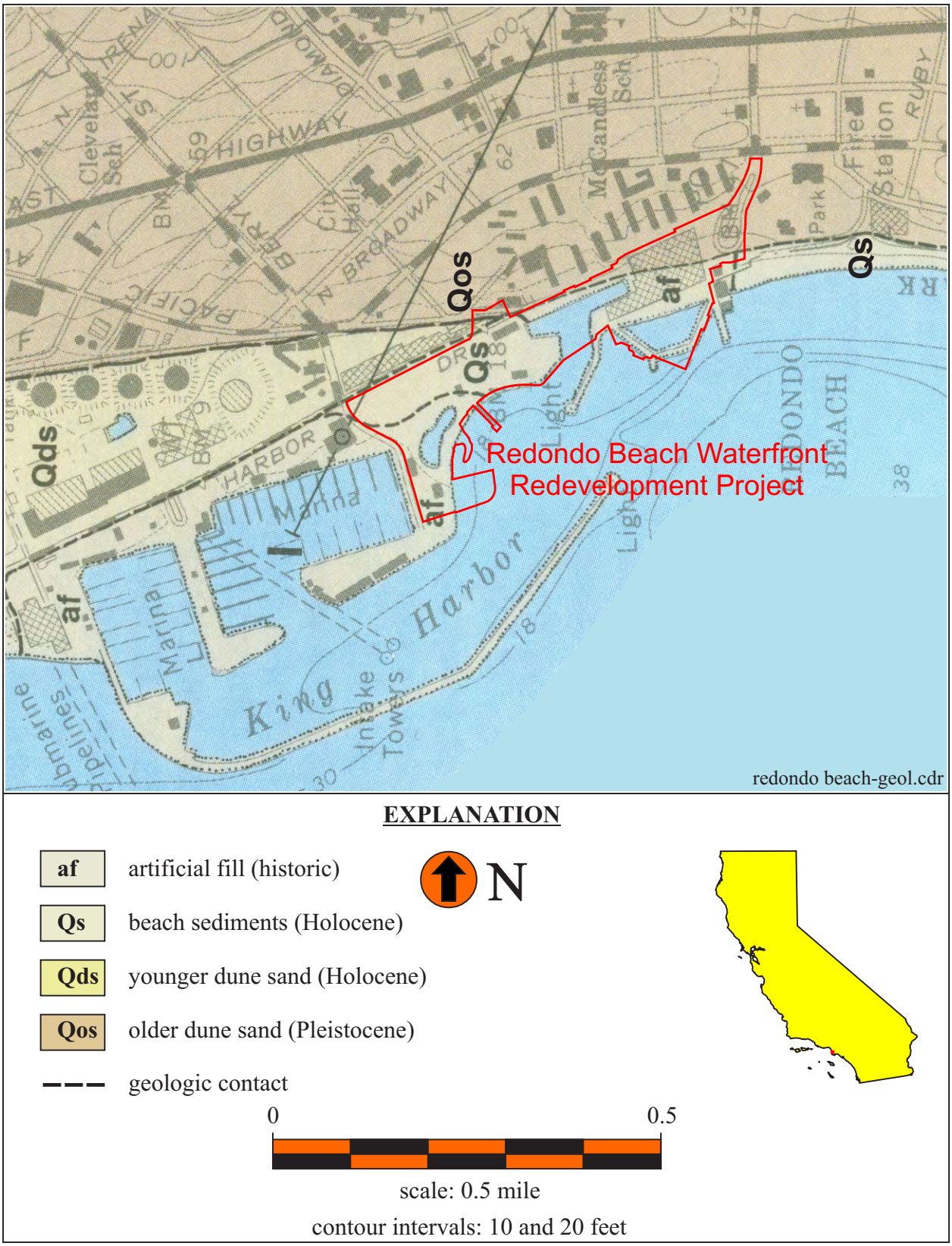


Figure 1.—Topographic and surficial geologic map, Redondo Beach Waterfront Redevelopment Project site, Redondo Beach, Los Angeles County, California. Surficial geologic from Dibblee (1999). Base map: United States Geological Survey Redondo Beach Quadrangle, California—7.5-Minute Series (Topographic) (1963, photorevised 1981).

where they underlie artificial fill in the subsurface (GeoDesign, Inc. 2014:fig. 9), and in a small area at the southwestern corner of the site (Figure 1). The beach sediments consist of unconsolidated sand with common shell fragments (GeoDesign, Inc. 2014), presumably of marine mollusks. At and very near the surface, such sediments are normally too young to contain remains old enough to be considered fossilized. For that reason, the potential for scientifically important fossil remains or a previously unrecorded fossil locality in this rock unit being encountered by excavation at shallow depths at the project site is low. On the other hand, a stratigraphic sequence becomes progressively older with increasing depth below the surface. Consequently, the potential for fossil remains or a previously unrecorded fossil locality being encountered in this rock unit by excavation at greater depths at the project site is undetermined pending the availability of additional resource data.

Holocene younger dune sand (unit Qds in Figure 1) is present as a small wedge very near the northeastern margin of the project site between and immediately north of the intersection of North Harbor Drive and North Pacific Avenue (Figure 1; Dibblee 1999). At and very near the surface, such sediments are normally too young to contain remains old enough to be considered fossilized. Moreover, no fossil remains and no previously recorded fossil locality are definitely documented from dune sand in the vicinity of the project site. Therefore, the potential for scientifically important fossil remains or a previously unrecorded fossil locality in this rock unit being encountered by excavation in the northern part of the project site is low.

Pleistocene older dune sand (unit Qos in Figure 1) is present as a small wedge along the northeastern margin of the project site immediately east of North Pacific Avenue and north of its intersection with North Harbor Drive, but also underlies the southeastern portion of the project site (Figure 1; Dibblee 1999). No fossil remains and no previously recorded fossil locality are definitely documented from older dune sand in the vicinity of the project site. Thus, the potential for scientifically important fossil remains or a previously unrecorded fossil locality in this rock unit being encountered by excavation at the project site is low.

Lagoonal deposits consist of silt and clay, and occur only in the subsurface at elevations below 7 feet in the northern portion of the project site (GeoDesign, Inc. 2014:fig. 9). No fossil remains and no previously recorded fossil locality are definitely documented from lagoonal deposits, perhaps because the unit is not exposed in the vicinity of the project site. Correspondingly, the potential for scientifically important fossil remains or a previously unrecorded fossil locality in this rock unit being encountered by excavation for the northern parking structure is undetermined pending the availability of additional resource data.

Pleistocene marine deposits comprise fine-grained sand and occur only in the shallow subsurface of the southern portion of the project site at elevations less than 9 feet (GeoDesign, Inc. 2014:fig. 10). Although no shell fragments have been reported from this unit at the project site, the unit contains noticeably fewer shell fragments in the project site vicinity than the Holocene beach sediments (GeoDesign, Inc. 2014). Consequently, the potential for scientifically important fossil remains or a previously unrecorded fossil locality in this rock unit being encountered by excavation for the southern parking structure is high.

Regulatory Framework

Paleontologic resources, including fossil remains, associated specimen data and corresponding geologic and geographic site data, fossil localities, and the fossil-bearing rock units, are a limited, nonrenewable, and very sensitive scientific and educational resource. In California, such resources, particularly fossil localities, are afforded protection under the following federal and state environmental legislation.

> National Environmental Policy Act of 1969 (NEPA) (P.L. 91-190; 31 Stat. 852, 42 U.S.C. 4321-4327).—Requires that important natural aspects of our national heritage be considered in assessing the environmental consequences of a proposed project.
>
> Archaeological and Historic Data Preservation Act of 1974 (P.L. 86-253, as amended by P.L. 93-291; 88 Stat. 174, U.S.C. 469).—Provides for the survey, recovery, and preservation of significant paleontologic data when such data might be destroyed or lost due to a federal, federally licensed, or federally funded project.

National Environmental Policy Act of 1969 (NEPA) (P.L. 91-190; 31 Stat. 852, 42 U.S.C. 4321-4327).—Requires that important natural aspects of our national heritage be considered in assessing the environmental consequences of a proposed project.
California Environmental Quality Act of 1970 (CEQA) (13 Public Resources Code: 21000 *et seq.*).—Requires that public agencies and private interests identify the environmental consequences of their proposed projects on any object or site of significance to the scientific annals of California (Division I, Public Resources Code: 5020.1 [b]).

Guidelines for the Implementation of CEQA, as amended May 10, 1980 (14 California Administrative Code: 15000 *et seq.*).—Define procedures, types of activities, persons, and public agencies required to comply with CEQA, and include definitions of significant impacts on a fossil locality (Section 15023, Appendix G [5c]).

In response to CEQA and other legislation, many local agencies in California have developed guidelines for protecting paleontologic resources in areas under their respective jurisdictions. Under its own guidelines, an agency can require that the project proponent (1) compile a paleontologic resource inventory of an area of potential effect and evaluate the scientific importance of those resources, (2) assess the potential for fossil remains and fossil localities being encountered and adversely affected by project-related earth-moving activities, and (3) develop measures for mitigating any such impact to a less-than-significant level.

Thresholds of Significance

Appendix G(5c) of CEQA requires that an impact be considered potentially significant if it would "directly or indirectly destroy a unique paleontological resource or site." However, few fossil localities would be considered "unique" if the latter term were too narrowly defined (Scott and Springer 2003). For example, after the first specimen of a mammoth had been found, neither the second specimen of that species nor the fossil locality that yielded the specimen would be considered unique, even if the first specimen or the locality that produced the specimen no longer existed. On the other hand, a fossil locality is considered a cultural resource under CEQA (California Public Resources Code [PRC] section 15064.5) and, therefore, would be considered "historically significant" if it "has yielded, or may be likely to yield, information important to prehistory" (Scott and Springer 2003). Under CEQA, the City of Redondo Beach, the lead agency for the proposed project, would ensure the implementation of any measure mitigating the impact of project-related ground-disturbing activities on the paleontologic resources of the project site.

Impact Analysis

The impact sensitivity of a rock unit underlying the proposed project site reflects the potential for fossil remains being encountered by project-related earth-moving activities involving that unit. Those activities would include excavation for two parking structures. Such activities might result in the loss of paleontologic resources, particularly fossil remains and previously unrecorded fossil localities. The loss of scientifically important fossil remains and associated data from the project site as a result of earth-moving activities would be considered a significant impact under CEQA.

Artificial fill does not contain any fossil remains retaining their original geologic or geographic context. For that reason, there would be no potential for any scientifically important fossil remains or previously unrecorded fossil locality in this rock unit being lost to project-related earth-moving activities. Therefore, artificial fill has no paleontologic sensitivity and there would be no significant impact accompanying such activities.

At and very near the surface, Holocene beach sediments are probably too young to contain remains old enough to be considered fossilized. For that reason, there would be only a low potential for any scientifically important fossil remains or previously unrecorded fossil locality in this rock unit being lost as a result of project-related earth-moving activities at shallow depths below the present ground surface. Consequently, beach deposits are of only low paleontologic sensitivity and any impact accompanying such activities at shallow depths would be of low significance. However, at greater depths, there would be an undetermined potential for remains old enough to be considered fossilized being lost to those activities. Correspondingly, beach sediments are of undetermined paleontologic sensitivity at those depths and the impact accompanying such activities, particularly excavation for the southern parking structure, would be of undetermined significance pending additional resource data.

No fossil remains or previously recorded fossil locality are recorded from Holocene younger dune sand or Pleistocene older dune sand in the project site vicinity. Thus, there would be only a low potential for any scientifically important fossil remains or previously unrecorded fossil locality in either rock unit being lost as a result of project-related earth-moving activities. Therefore, dune deposits are of only low paleontologic sensitivity and any impact accompanying such activities would be of low significance.

No fossil remains or previously recorded fossil locality are recorded from the lagoonal deposits in the project site vicinity, perhaps because the unit is not exposed there. Consequently, there would be an undetermined potential for any scientifically important fossil remains or previously unrecorded fossil locality in this rock unit being lost as a result of project-related earth-moving activities. Correspondingly, lagoonal deposits are of undetermined paleontologic sensitivity and the impact accompanying such activities, particularly excavation for the northern parking structure, would be of undetermined significance pending additional resource data.

Although not definitely recorded from this unit at the project site, fossil shell fragments are recorded from the Pleistocene marine deposits in the project site vicinity. For that reason, there would be a high potential for scientifically important fossil remains and previously unrecorded fossil localities in this rock unit being lost as a result of project-related earth-moving activities. Therefore, marine deposits are of high paleontologic sensitivity and the impact accompanying such activities, particularly excavation for the southern parking structure, would be highly significant.

Mitigation Measures

If implemented, the following paleontologic resource impact mitigation measures would provide for the preservation of a representative sample of any scientifically important fossil remains that might be exposed by excavation at the proposed project site. In so doing, the measures would substantially reduce the impact of excavation on the paleontologic resources of the project site to a less-than-significant level by allowing for the recovery of fossil remains and associated data that, otherwise, would have been lost to excavation. Moreover, with mitigation, excavation might result in beneficial effects, including the exposure of fossil remains that would not have been available for recovery without the project. The measures provided below would be in compliance with SVP (2010) standard measures for reducing the impact of construction on paleontologic resources and for the transfer of a paleontologic mitigation program fossil collection to a museum repository for permanent storage and maintenance, and with those measures recommended by Scott and Springer (2003).

1) A qualified Principal Paleontologist approved by the City of Redondo Beach will be retained prior to the start of excavation to implement the following mitigation measures during or following excavation, as appropriate. The Paleontologist will have an M.S. or Ph.D. degree in paleontology or geology and be familiar with paleontologic salvage or mitigation procedures and techniques.
2) The Principal Paleontologist will examine construction plans and bore logs of the project site to determine if potentially fossiliferous strata underlying the site would be encountered by excavation and, if so, what level of paleontologic monitoring should be implemented during excavation.
3) If it is determined that such strata would be encountered by excavation, the Principal Paleontologist will develop a written storage agreement with a recognized museum repository such as the LACM regarding the permanent storage and maintenance of any remains that might be recovered as a result of implementing these mitigation measures.
4) If warranted, the Principal Paleontologist and/or his Field Supervisor will be present at a preconstruction meeting to consult with appropriate City of Redondo Beach and Construction Contractor staff. During the meeting, the Paleontologist and/or the Field Supervisor will conduct an employee environmental awareness training session for all personnel who will be involved with excavation.
5) If it is determined that monitoring is necessary, a Paleontologic Monitor, under the direction of the Principal Paleontologist or the Field Supervisor, will be on site to inspect new exposures created by excavation once that earth-moving activity has reached a depth 5 feet below the current ground surface in areas underlain by Holocene beach sediments, but at any depth when excavation involves lagoonal deposits or Pleistocene marine deposits. Monitoring will allow for the recovery of fossil remains that might be uncovered by excavation. Initial monitoring will be conducted on a part-time basis.
6) If fossil remains are discovered, the monitor will recover them and record associated specimen and locality data. If necessary, excavation at the fossil locality will be halted or diverted temporarily around the locality until the

remains have been recovered. The Paleontologic Monitor will be equipped to allow for the timely recovery of such remains. If necessary to reduce the potential for a delay of excavation, additional personnel will be assigned to the recovery of an unusually large or productive fossil occurrence. Following the discovery of the remains, monitoring will be raised to full time when excavation involves the fossil-bearing unit and full-time monitoring is not already in effect. On the other hand, if too few or no fossil remains have been found once 50 percent of the area comprising a particular rock unit has been excavated, the Principal Paleontologist can recommend that monitoring be reduced.

7) If appropriate, bulk samples of fine-grained sediment will be recovered and processed to allow for the recovery of microvertebrate and other small remains. The total weight of those samples will not exceed 6,000 pounds. As warranted, splits of the samples will be submitted to commercial laboratories for microfossil, radiometric dating, or other analysis.
8) Recovered fossil remains will be prepared to the point of identification, identified to the lowest taxonomic level possible by knowledgeable paleontologists, and curated and cataloged in compliance with designated museum repository requirements.
9) The entire fossil collection (along with associated specimen data and corresponding geologic and geographic locality data and copies of pertinent field notes, photos, and maps) will be transferred to the repository for permanent storage and maintenance. Associated specimen data and corresponding geologic and geographic locality data will be archived at the repository and, along with the fossil specimens, will be made available to paleontologists for future study.
10) A final report of findings that summarizes the results of the work conducted under these mitigation measures will be prepared by the Principal Paleontologist and submitted to the City of Redondo Beach. A copy of the report will be filed at the museum repository. Submission of the report will signify completion of the mitigation program.

Level of Significance after Mitigation

The impact of project-related earth-moving activities on the paleontologic resources of the proposed project site would be reduced to a less-than-significant level if the recommended mitigation measures were implemented.

Significant Unavoidable Adverse Impacts

There would be no residual impact on the paleontologic resources of the proposed project site as a result of project-related earth-moving activities if the recommended mitigation measures were implemented.

References

Dibblee, T.W., Jr. 1999. Geologic Map of the Palos Verdes Peninsula and vicinity, Redondo Beach, Torrance, and San Pedro Quadrangles, Los Angeles County, California. *Dibblee Geological Foundation Map* DF-70.

GeoDesign, Inc. 2014. Revised report of preliminary geotechnical engineering services, The Waterfront Redondo Beach Pier, Redondo Beach, California. GeoDesign, Inc., project no. CenterCal-17-04. Prepared for CenterCal Properties, LLC.

Scott, E. and K.B. Springer 2003. CEQA and Fossil Preservation in California. *The Environmental Monitor* Fall 2003:4–10, 17.

Society of Vertebrate Paleontology (Impact Mitigation Guidelines Revision Committee). 2010. Standard Procedures for the Assessment and Mitigation of Adverse Impacts to Paleontological Resources. 11 pages.