

IV.D.1 Paleontological Resources

1.0 INTRODUCTION

This section addresses the potential direct and indirect impacts of the Proposed Project on paleontological resources, which include fossil remains, associated specimen data and corresponding geologic and geographic site data, the respective fossil sites, and the fossil-bearing strata. The analysis describes the rock units underlying the Proposed Project site and the corresponding potential for containing paleontological resources. It also identifies Proposed Project activities that might directly or indirectly affect resources, and methods for the recovery and evaluation of any resources encountered during construction. Information in this section is based on a technical report, *Paleontologic Resource Inventory and Impact Assessment Technical Report*, prepared by Paleo Environmental Associates, Inc., in February 2009 and included as **Appendix IV.D.1**.

2.0 REGULATORY FRAMEWORK

Paleontological resources are a limited, nonrenewable, and sensitive scientific and educational resource and, particularly with regard to fossil sites, are afforded protection under environmental legislation in California and the City of Los Angeles, including the following acts.

2.1 State Regulations

2.1.1 California Public Resources Code

The California Public Resources Code defines any unauthorized disturbance or removal of a fossil locality or remains on public land as a misdemeanor,¹ and requires reasonable mitigation of adverse environmental impacts that result from development of public land and affect paleontological resources.²

2.2 City Regulations

2.2.1 City of Los Angeles General Plan

Chapter II, Section 3 of the *City of Los Angeles General Plan Conservation Element* (adopted 2001) contains the following objective and policy applicable to the Proposed Project:

Objective: Protect the City's paleontological resources for historical, cultural, research, and/or educational purposes.

¹ California Public Resources Code, Sec. 5097.5 (Statute 1965, Chapter 1136, Paragraph 2792).

² California Public Resources Code, Section 30244.

Policy: Continue to identify and protect significant paleontological sites and/or resources known to exist or that are identified during land development, demolition, or property modification activities.

3.0 EXISTING CONDITIONS

3.1 Paleontological Resource Assessment Criteria

Paleontological resources include fossil remains, the respective fossil sites, associated specimen data and corresponding geologic and geographic site data, and the fossil-bearing strata. Paleontological resources also include rock units that underlie the ground surface and have a potential for yielding particular types of fossil remains because they have yielded similar remains at previously recorded sites in the area. A rock or stratigraphic unit is a lithologically homogeneous body of strata characterized by certain observable physical features, or by the dominance of a certain rock type or combination of rock types reflecting a particular depositional environment (e.g., marine or continental). Rock units include groups, formations, members, and beds. The paleontological importance (high, moderate, low, none, or undetermined) of a rock unit reflects (1) its potential paleontological productivity, and (2) the scientific importance of the fossils it has produced locally. The potential paleontological productivity of a rock unit exposed on the campus is based on the abundance or densities of fossil specimens and/or newly and previously recorded fossil sites in exposures of the unit in and near the campus. Exposures of a specific rock unit on the campus are most likely to yield fossil remains representing particular species in quantities or densities similar to those previously recorded from the unit on and near the campus.

A fossil specimen is considered scientifically highly important if it is (1) identifiable, (2) complete, (3) well preserved, (4) age diagnostic, (5) useful in environmental reconstruction, (6) a type or topotypic specimen, (7) a member of a rare species, (8) a species that is part of a diverse assemblage, and/or (9) a skeletal element different from, or a specimen more complete than, those now available for its respective species.

Based on the above factors, the paleontological or scientific importance of a rock unit that might be exposed on the campus during construction is assessed using the following criteria.

1. High importance: The rock unit has comparatively high potential for containing currently unrecorded fossil sites and for yielding scientifically important fossil remains on the campus similar to those previously recorded from a rock unit in and/or near the campus.
2. Moderate importance: The rock unit has relatively moderate potential for containing currently unrecorded fossil sites and for yielding scientifically important fossil remains on the campus similar to those previously recorded from a rock unit near the campus.

3. Low importance: The rock unit has comparatively low potential for containing any currently unrecorded fossil site or for yielding any scientifically important fossil remains on the campus.
4. Undetermined importance: The rock unit for which too few data are available from the campus and vicinity to allow an accurate assessment of its potential for containing any currently unrecorded fossil site or for yielding any scientifically important fossil remains on the campus.
5. No importance: The unfossiliferous artificial fill and intrusive igneous and high-grade metamorphic rock units having no potential for containing any currently unrecorded fossil site or for yielding any fossil remains.

It should be noted that any fossil site containing identifiable fossil remains and the fossil-bearing strata are considered highly important paleontologically, regardless of the paleontological or scientific importance of the rock unit in which the site and strata occur.

3.2 Paleontological Resource Assessment by Rock Units

The following tasks were completed to establish the paleontological or scientific importance of each rock unit exposed on the campus:

1. The scientific importance of fossil remains recorded from a rock unit exposed on the campus was assessed.
2. The potential paleontological productivity of the rock unit was assessed, based on the density of fossil remains and/or previously recorded and newly documented fossil sites it contains on and/or near the campus.
3. The paleontological importance of the rock unit was assessed, based on its documented and/or potential fossil content on the campus.

The LMU campus is underlain by two Quaternary rock units undifferentiated Palos Verdes Sand and overlying non-marine terrace cover, and the Holocene dune sand rock unit. (A former ravine in the northeastern corner of campus contains fill and is developed with Parking Lot H.) Brief summaries of these rock units are provided below.

3.2.1 Undifferentiated Palos Verdes Sand and Non-Marine Terrace Cover

Small areas of undifferentiated Palos Verdes Sand and overlying non-marine terrace cover are found in the northeastern and northwestern corners of the LMU campus at varying depths below the surface. This rock unit is not exposed anywhere on top of the bluffs, but is exposed on the northern bluff face at various elevations. Construction of the William H. Hannon Library, which is sited on Leavey Campus

near the northwestern bluff face, necessitated excavation to depths more than 35 feet below the surface but did not encounter this rock unit.³

There are no documented records of fossil sites in the undifferentiated Palos Verdes Sand and non-marine terrace cover on the LMU campus, based on the literature review and archival search conducted for the Proposed Project. Several fossil sites are recorded in Palos Verdes Sand along the upper part of the bluff face less than 0.2 mile from the campus, according to maps prepared by the Natural History Museum of Los Angeles County Vertebrate Paleontology Section and Invertebrate Paleontology Section. These sites have yielded fossilized shells and other remains representing over 300 species of near-shore shallow-water marine invertebrate species, including moss animals (1 species of bryozoan), echinoids (3 species of sand dollars and sea urchins), crustaceans (28 species of barnacles, shrimps, and crabs), mollusks (256 species of tusk shells, snails, and clams), as well as fossilized bones and teeth representing marine vertebrates (at least 3 species of sharks and rays, fishes, seals, and porpoises), 10 species of birds, and a land mammal (gopher).

Five fossil sites mapped by the Natural History Museum of Los Angeles County Vertebrate Paleontology Section, presumably all in the non-marine terrace cover, have yielded fossilized bones and teeth of mostly extinct species of Pleistocene (Ice Age) land mammals, including rabbits, horses, mastodons, mammoths, and bison, less than 2.1 miles south and east-southeast of the LMU campus. The remains from these sites were recovered at depths as shallow as 13.5 feet below the surface. Two of the sites were in areas immediately underlain by dune sand and fossils were probably recovered from below the latter rock unit.

Based on these previously recorded fossil occurrences, scientifically important fossil remains could occur in the Palos Verdes Sand and terrace cover at presently unrecorded fossil sites on the campus. Therefore, the Palos Verdes Sand and terrace cover are considered to be paleontologically highly productive and, therefore, scientifically highly important.

3.2.2 Holocene Dune Sand

Dune sand underlies most of the LMU campus and overlies undifferentiated Palos Verdes Sand, in some places above the terrace cover. There are no recorded fossil sites within the dune sand rock unit on or near the campus, and it is likely too young to contain remains old enough to be considered fossilized. For these reasons, dune sand is considered to be of low paleontological productivity and, therefore, of low scientific importance.

³ Paleo Environmental Associates, Inc., *Paleontologic Resource Inventory and Impact Assessment Technical Report Prepared in Support of Loyola Marymount University's Proposed Master Plan, Los Angeles, California, (2009)*. (Provided in **Appendix IV.D.1**.)

4.0 ENVIRONMENTAL IMPACT ANALYSIS

4.1 Methodology

To assess the scientific importance of the paleontological resources of the LMU campus, a paleontological resource inventory and impact assessment was prepared by Paleo Environmental Associates, Inc., (PEAI) in February 2009 for LMU's Westchester campus.⁴ Published and unpublished geologic and paleontological literature was reviewed to document the number and locations of previously recorded fossil sites in and/or near the campus from each rock unit exposed therein, and the types of fossil remains the rock unit has produced locally. The literature review was supplemented by an archival search conducted at the Natural History Museum of Los Angeles County Vertebrate Paleontology Section for additional information regarding the occurrences of fossil sites and remains in and/or near the campus. Because paleontological resources are present below the surface at varying depths and because the LMU campus is developed, it is impossible to determine the exact locations and depths of such resources on campus. However, even though a complete field survey of the LMU campus has not been conducted, some excavation monitoring was conducted in 2008 during construction of the William H. Hannon Library, providing anecdotal evidence regarding the locations and depths of paleontological resources on the LMU campus. Based on the potential occurrences of paleontological resources in the subsurface, impacts on such resources were evaluated, based on the extent to which they might be disturbed by earthmoving activities or lost to unauthorized collecting during construction of the Proposed Project.

This methodology complies with Society of Vertebrate Paleontology (1995) guidelines and the *L.A. CEQA (California Environmental Quality Act) Thresholds Guidelines* for assessing the scientific importance of the paleontological resources in an area of potential environmental effect. The results of the inventory, records search, and impact assessment are contained in the technical report in **Appendix IV.D.1**.

4.2 Significance Thresholds

The *Los Angeles CEQA Thresholds Guide* indicates that the determination of significance with respect to paleontological resources should be made on a case-by-case basis, considering the following factors:

- Whether, or the degree to which, the project might result in the permanent loss of, or loss of access to, a paleontological resource; and
- Whether the paleontological resource is of regional or statewide significance.

⁴ Paleo Environmental Associates, Inc., *Paleontological Resource Inventory and Impact Assessment Technical Report*.

Appendix G of the *State CEQA Guidelines* provides sample questions for use in an initial study to determine a project's potential for environmental impacts. According to the sample questions⁵ included in Appendix G under Section V, Cultural Resources, a project would have a potentially significant impact if it would:

- V.c) Directly or indirectly destroy a unique paleontological resource or site or unique geologic feature.

The factors used in the *Los Angeles CEQA Thresholds Guide* to determine significant paleontological impacts are inclusive of those provided in Appendix G of the *State CEQA Guidelines*. Therefore, based on these factors, the Proposed Project would have a significant impact on paleontological resources if:

- PALEO-1 The Proposed Project would result in the permanent loss of, or loss of access to, a paleontological resource of regional or statewide significance.

4.3 Project Design Features

Approximately 10 acres of the LMU campus bluff face is designated in the proposed LMU Specific Plan as open space, significantly limiting the potential for any construction activity in that area.

4.4 Project Impacts

- PALEO-1 Would the Proposed Project result in the permanent loss of, or loss of access to, a paleontological resource of regional or statewide significance?

4.4.1 Construction

Paleontological resources would be potentially affected by direct and indirect impacts resulting from earthmoving activities associated with implementation of the Proposed Project. The loss of some fossil remains, currently unrecorded fossil sites, associated specimen data and site data, or fossil-bearing strata might result from earthmoving activities (e.g., excavation for foundations, basement structures, subterranean parking, or other structures, and trenching for pipelines) in previously undisturbed strata. Direct impacts might also be caused by any earthmoving activity that buried previously undisturbed strata, thereby rendering the strata and associated paleontological resources unavailable for future scientific investigation. Indirect impacts might result from easier access to fresh exposures of fossiliferous strata and the accompanying potential for unauthorized fossil collecting. The regional or statewide

⁵ The remainder of the Appendix G Cultural Resources sample questions (V.a, -b, and -d) pertain to archaeological and historic resources and are addressed in **Sections IV.D.2, Archaeological Resources, and IV.D.3, Historical Resources**, respectively.

significance of a given paleontological resource would be based on the quality and integrity of the resource, remaining supply, feasibility of recovery, or scientific and public importance.⁶

The occurrence of a number of previously recorded fossil sites only 0.2 mile to 2.1 miles from the campus suggests that there is high potential for currently unrecorded fossil sites being encountered during earthmoving activities in areas of campus immediately underlain by the Palos Verdes Sand or non-marine terrace cover, or where earthmoving activities would extend to a depth sufficient to encounter these rock units below the Holocene dune sand elsewhere on campus. However, as discussed above and as indicated by excavation at the William H. Hannon Library site, the Palos Verdes Sand and terrace cover do not immediately underlie the LMU campus on the bluffs where construction is anticipated under the Proposed Project. In fact, the Palos Verdes Sand and terrace cover rock units are more than 35 feet below the surface at the new William H. Hannon Library. More information regarding potential impacts on each rock unit is provided below.

4.4.1.1 Palos Verdes Sand and Non-Marine Terrace Cover, Undifferentiated

As previously stated, undifferentiated Palos Verdes Sand and non-marine terrace cover possess high potential for containing fossil remains. Research and field studies indicate that while these rock units are not exposed at the surface in any area of campus on top of the bluffs, they underlie the campus at varying depths below the surface and are exposed at varying elevations below the bluff top along the northern and western edges of campus. The bluff face is designated in the proposed Specific Plan as Buffer/Open Space and no development or disturbance is planned in this area. However, earthmoving activities in other areas of the campus, where Palos Verdes Sand and terrace cover are present at varying depths below the surface, might result in the loss of scientifically important fossil remains, currently unrecorded fossil sites, and associated specimen data and corresponding geologic and geographic site data. This potential loss would be considered a significant impact. However, implementation of mitigation measures **MM-PALEO-1** through **MM-PALEO-5**, which require construction monitoring by a certified paleontologist and recovery and evaluation of any fossil remains encountered during construction, would reduce this impact to a less than significant level.

4.4.1.2 Holocene Dune Sand

Holocene dune sand immediately underlies the surface of most of the campus, and, consequently, Proposed Project development would occur in areas underlain by this rock unit. Since dune sand is

⁶ City of Los Angeles, Department of Planning, *Los Angeles CEQA Threshold Guide*, D.1 Paleontological Resources, (2006) D.1-4.

considered to have a low paleontological potential, Proposed Project-related disturbance of this rock unit would have a less than significant impact on paleontological resources.

4.4.2 Operation

Because the rock units underlying the campus would not be disturbed following completion of construction activities, no impacts on paleontological resources are anticipated during Proposed Project operation.

4.5 Project Design Features and Mitigation Measures

PDF-PALEO-1 The Proposed Project shall be consistent with the open space land use regulations established by the proposed LMU Specific Plan.

The following mitigation measures would address potential impacts to paleontological resources and reduce impacts to less than significant levels:

MM-PALEO-1 Retention of Paleontologist. Prior to the initiation of construction-related earthmoving activities and excavation at depths of 5 feet below the surface of campus, the services of a qualified paleontological consulting firm approved by the City and the Natural History Museum of Los Angeles County Vertebrate Paleontology Section shall be retained and consulted. Using field observations, bore logs, geologic reports, and construction plans, the paleontologist shall determine when and where any monitoring of earthmoving activities will be required.

MM-PALEO-2 Preconstruction Coordination and Environmental Awareness Training. If monitoring is required, the paleontologist or another mitigation program staff member shall coordinate with appropriate construction contractor personnel to provide information regarding applicable requirements concerning the protection of paleontological resources. Contractor personnel, particularly heavy-equipment operators, shall also be briefed on procedures to be followed in the event that fossil remains and a currently unrecorded fossil site are encountered by earthmoving activities, particularly if a paleontological construction monitor is not on site. The briefing shall be presented to new contractor personnel as necessary. Names and telephone numbers of the monitor and other appropriate mitigation program personnel shall be provided to appropriate contractor personnel.

MM-PALEO-3 Paleontological Monitoring and Fossil Specimen and Sample Recovery. When required, monitoring shall consist of visually inspecting debris piles and freshly exposed strata to allow for the discovery and recovery of larger fossil remains, and periodically dry test screening rock, sediment, and debris to allow for the discovery and recovery of smaller fossil remains. As soon as practicable, the monitor shall recover all larger vertebrate fossil remains, a representative sample of invertebrate or plant fossil specimens, or any fossiliferous rock or sediment sample that can be recovered easily. If recovery of a large or unusually productive fossil occurrence is warranted, earthmoving activities shall be diverted temporarily around the fossil site and a recovery crew shall be mobilized as necessary to remove the occurrence as quickly as possible. If not on site when a fossil occurrence is uncovered by such activities, the activities shall be diverted temporarily around the fossil site and the monitor called to the site to evaluate and, if warranted, recover the occurrence. If the paleontologist or monitor determines that the fossil site is too unproductive or the fossil remains not worthy of recovery by the monitor, no further action will be taken to preserve the fossil site or remains, and earthmoving activities shall be allowed to proceed through the site immediately. The location and proper geologic context of any recovered fossil occurrence or rock or sediment sample shall be documented.

Any recovered rock or sediment sample from the Palos Verdes Sand or non-marine terrace cover shall be processed to allow for the recovery of smaller fossil remains that normally are too small to be observed by the monitor. Pursuant to Society of Vertebrate Paleontology (1995) standard measures, no more than 6,000 pounds (12,000 pounds total) of the rock or sediment shall be processed from either the Palos Verdes Sand or terrace cover.

MM-PALEO-4 Final Laboratory Tasks. All fossil specimens recovered from the Proposed Project area as a result of mitigation, including those recovered as the result of processing rock or sediment samples, will be treated (i.e., prepared, identified, curated, catalogued) in accordance with designated museum repository requirements. Rock or sediment samples will be submitted to commercial laboratories for microfossil, pollen, radiometric dating, or other analysis, as appropriate.

MM-PALEO-5 Reporting. The monitor shall maintain daily monitoring logs that include the particular tasks accomplished, the earthmoving activity monitored, the location where monitoring was conducted, the rock unit(s) encountered, the fossil specimens recovered, and associated specimen data and corresponding geologic and geographic site data. A final

technical report of results and findings shall be prepared by the paleontologist in accordance with any City requirement and archived at the museum repository.

4.6 Level of Impact After Mitigation

With implementation of mitigation measures **MM-PALEO-1** through **MM-PALEO-5**, impacts of the Proposed Project on paleontological resources would be less than significant. Therefore, no unavoidable significant impact on paleontological resources would result from implementation of the Proposed Project.

4.7 Cumulative Impacts

Cumulative impacts on paleontological resources would occur if the Proposed Project, in combination with related projects identified in **Section III, General Description of Environmental Setting**, would lead to a cumulative loss of such resources contained within the Palos Verdes Sand or non-marine terrace cover rock unit. This loss might occur as a result of earthmoving activities and unauthorized fossil collecting, or the loss of access to these resources where they are covered by new buildings. However, all proposed projects in the City of Los Angeles are subject to CEQA requirements for protecting paleontological resources. Because subsurface paleontological resources would be protected upon discovery, as required by law, impacts on these resources would be reduced to a less than significant level. In compliance with CEQA, mitigation measures **MM-PALEO-1** through **MM-PALEO-5** would reduce impacts of the Proposed Project on paleontological resources to a less than significant level. Accordingly, implementation of the Proposed Project is not expected to result in a significant cumulative impact on paleontological resources.