FINAL

LAX MASTER PLAN
MITIGATION MONITORING & REPORTING PROGRAM

PALEONTOLOGICAL MANAGEMENT TREATMENT PLAN

Los Angeles World Airports
Environmental Management Division

Revised December 2005

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APE	Area of Potential Effect
ATP	Archaeological Treatment Plan
CEQA	California Environmental Quality Act
CTA	Central Terminal Area
EIR	Environmental Impact Report
EIS	Environmental Impact Study
GTC	Ground Transportation Center
ITC	Intermodal Transportation Center
LAWA	Los Angeles World Airports
LAX	Los Angeles International Airport
MMPA	Mitigation Measures for Paleontology
MMRP	Mitigation, Monitoring and Reporting Program
MTA	Los Angeles Metropolitan Transit Authority
PI	Principal Investigator
PM	Paleontological Monitor
PMTP	Paleontological Management Treatment Plan
PP	Project Paleontologist

Geologic Age Terms

Holocene. Period (epoch) of geologic time from about 10,000 years ago to the present.

Mesozoic. Period (era) of geologic time from about 245 million years ago to about 66 million years ago.

Miocene. Period (epoch) of geologic time from about 24 million years ago to about 5.3 million years ago.

Pleistocene. Period (epoch) of geologic time from about 1.6 million years ago to about 10,000 years ago.

Pliocene. Period (epoch) of geologic time from about 5.3 million years ago to about 1.6 million years ago.

Quaternary. Period of geologic time from about 1.6 million years ago to the present time.

EXECUTIVE SUMMARY

This Paleontological Management Treatment Plan (PMTP) has been prepared to fulfill a requirement of the Mitigation Monitoring and Reporting Program (MMRP) for the Los Angeles Airport Master Plan (LAX Master Plan). The LAX Master Plan Project involves the improvement of existing airport facilities at LAX, including land acquisition, relocation of runways, construction of new taxiways, passenger terminals, and surface transportation improvements. The purpose of this document is to achieve compliance with the California Environmental Quality Act (CEQA), and regulations and guidelines of local governmental agencies regarding the treatment of unexpected paleontological discoveries of federal, state, and/or local significance that might be encountered during construction activities.

The PMTP focuses on the identification, recovery, proper treatment, and long-term protection and archival conservation of expected and unexpected paleontological discoveries of federal, state, and/or local significance found within the Area of Potential Effect (APE). In order to achieve the goal of mitigating possible impacts to as yet undiscovered paleontological resources (i.e., fossils), this plan requires monitoring of construction in sensitive areas. In the event that paleontological deposits are encountered in the subsurface, the PMTP will be used as a guideline for the evaluation, recovery, treatment and archival conservation of such resources in a manner consistent with the generally accepted practices of the scientific paleontological community (e.g., guidelines established by the Society of Vertebrate Paleontology), as well as the general intent and specifications of CEQA.

Overall responsibility for implementation of the PMTP rests with the selected project paleontologist and LAWA. Field mitigation measures will be directed by the principal investigator within the framework of this plan and following consultation with LAWA. Excavation activities near known paleontological deposits will have a higher potential to uncover discoveries and will be monitored at a frequency to be determined by LAWA and the consulting paleontologist. Paleontological monitoring will be reduced or suspended in areas containing fill material or reworked soil as determined by the consulting paleontologist and LAWA. If paleontological resources are identified by the monitor or construction personnel, the construction supervisor shall be notified and the area secured. The discovery will be reported to LAWA and the consulting paleontologist so that appropriate investigation and treatment measures can be undertaken.

1.0 BACKGROUND INFORMATION

1.1 Project Location

Los Angeles International Airport (LAX) is the largest commercial airport serving metropolitan Los Angeles and southern California. LAX lies within the western portion of the Los Angeles Basin, adjacent to Santa Monica Bay and south of Ballona Creek (Figure 1.0–1). The airport is aligned in an east-west direction and covers approximately 3,651 acres. The project area (LAX Master Plan, Alternative D) is roughly bounded on the south by Imperial Highway, on the east by the Interstate 405 freeway, on the west by Vista del Mar, and on the north by Manchester Avenue and Lincoln Boulevard (Figure 1.0–2). Approximately 60 percent of the property is covered by buildings and paved areas, including runways (four), taxiways, aprons, roads, and parking lots.

1.2 Project Description

The LAX Master Plan is a modernization program to improve the efficiency and safety of airport services a LAX. The newly designed facilities will serve approximately 78.9 million passengers annually and include new airport security and efficiency improvements. The plan covers improvements in a number of areas, including increasing the quality of passenger service by adding new passenger and baggage facilities at public garages, relocating aircraft parking gates, and consolidating parking and curb-front areas at a new Ground Transportation Center (GTC). A new Intermodal Transportation Center (ITC) will provide a more efficient connection than currently exists between the existing MTA Green Line Station and the Central Terminal Area (CTA). LAWA will use the LAX Master Plan Final EIR as a broad policy statement regarding the conceptual strategic framework for future improvements at LAX and as working guidelines to be consulted by LAWA as it formulates and processes future site-specific projects under the LAX Master Plan Program.

1.3 Area of Potential Effect

The Area of Potential Effect (APE) for the project encompasses land presently owned by Los Angeles World Airports (LAWA), as well as parcels that will be acquired by LAWA as part of the LAX Master Plan (Alternative D). The APE, as it relates to paleontological resources, encompasses the physical footprint of the LAX Master Plan Alternative D, and is depicted in Figure 1.0–2. The APE is approximately bounded by Vista del Mar on the west, Imperial Highway on the south, the Interstate 405 freeway on the east, and Manchester Avenue and Lincoln Boulevard on the north. Figure 1.0–3 illustrates the areas within the APE subject to construction under LAX Master Plan Alternative D.

1.4 Purpose of Paleontological Management Treatment Plan

This PMTP has been prepared to fulfill a requirement of the Mitigation Monitoring and Reporting Program (MMRP) for the Los Angeles Airport Master Plan (LAX Master Plan). The LAX Master Plan Project involves the improvement of existing airport facilities at LAX, including land acquisition, relocation of runways, construction of new taxiways, passenger terminals, and surface transportation improvements. The purpose of this document is to achieve compliance with the requirements of CEQA, and with regulations and guidelines of local governmental agencies regarding the treatment of unexpected paleontological discoveries of federal, state, and/or local significance. Any discussion, summary, or paraphrasing of the conditions in the Paleontological Management Treatment Plan (PMTP) is intended as general guidance and as an aid to the user in understanding the conditions and their implementation. If there appear to be any discrepancies between the conditions and the way in which they have been summarized, described, or interpreted in the PMTP, the conditions, as written in the LAX Master Plan MMRP, supersede any interpretations of the conditions in the PMTP. A copy of the LAX Master Plan MMRP for paleontological resources is attached as an appendix (Appendix A**)** to this PMTP.

The paleontological investigation conducted for the LAX Master Plan Final EIR included archival research, museum collections and records searches, and field investigations. Both vertebrate and invertebrate fossil resources were identified within the project APE. Section 4.9.2 (Table F4.9.2-1) in the LAX Master Plan Final EIR identifies six fossil localities in the vicinity of LAX. Of these, two are within the study area, three are "very near" the study area, and the last is "near the study area," but not specifically located. The fossils include a variety of extinct terrestrial mammal remains (e.g., mammoth, bison, horse) from shallow depths, here attributable to the Lakewood Formation, that are correlative with the well known Rancho la Brean vertebrate faunas of the Los Angeles Basin (e.g., Miller, 1971; Langenwalter, 1975; Kurtén and Anderson, 1980; Stock, 1992). The marine mammals and invertebrates, mainly mollusks, are from greater depths and here attributable to the Palos Verdes Sand, included in the original description of the Lakewood Formation, but distinguished throughout the coastal Los Angeles Basin as a distinctive unit. In addition, there are very rich and well documented marine invertebrate fossil remains from the south side of Ballona Creek valley, along the escarpment on the south side (e.g., Willett, 1937; Hoskins, 1957; Valentine, 1961) near Lincoln Avenue. All of these fossil deposits meet the criteria for federal, state, and/or local significance and could potentially be impacted during excavations required for construction for the LAX Master Plan Project. As stated in Section 4.9.2 of the LAX Master Plan Final EIR, the implementation of Mitigation Measures MM-PA-1 through MM-PA-7 (Section 4.2 herein) addresses potential impacts to identified paleontological resources.

Due to the subsurface nature of paleontological deposits and resources, some areas of the APE have the potential for the discovery of previously unidentified paleontological resources. The PMTP focuses on the recovery, proper treatment, and long-term protection and archival conservation of those unexpected *paleontological* discoveries within the APE. Given the number of known paleontological sites and fossiliferous sedimentary units within or near the study area, there is a reasonable likelihood to discover additional, previously unknown subsurface paleontological deposits within the APE in the same units. Discoveries may be encountered during construction-related activities such as grading, excavation and trenching activities concomitant with construction activities expressed in LAX Master Plan Alternative D. The disturbance or destruction of potentially significant undiscovered fossil resources by these activities would be considered a significant impact.

The PMTP requires that construction monitoring be conducted in sensitive areas as a method of identifying undiscovered subsurface paleontological deposits. The designation of sensitive areas will be dependent on the distribution of paleontoloigcal resources and the locations of previously identified paleontological sites as revealed in the record search results. In addition, due to the continual potential for discovery of subsurface fossil deposits, random spot-check monitoring will be conducted by a qualified paleontologist in areas identified as exhibiting a low potential for subsurface resources. Should subsurface deposits be identified, the PMTP provides guidelines for the recordation, evaluation, recovery, and treatment of these resources as required by state and local governmental guidelines.

1.5 Organization of Paleontological Management Treatment Plan

This PMTP is organized as follows: Section 1.0 provides an introduction to the PMTP and includes background information; Section 2.0 provides the regulatory context responsible for the creation of the PMTP; Section 3.0 discusses the environmental setting, geologic context, and information on paleontological resources of the project area; Section 4.0 discusses the treatment plan goals and objectives; Section 5.0 discusses management coordination, and how the PMTP is to be implemented; and Section 6.0 contains references cited in the PMTP.


Brian F. Smith & Associates
Scale in Miles
Los Angeles International Airport
CALIFORNIA
Riverside County
General Location Map
Paleontological Management Treatment Plan
City of Los Angeles
Figure 1.0–1

1.0–4

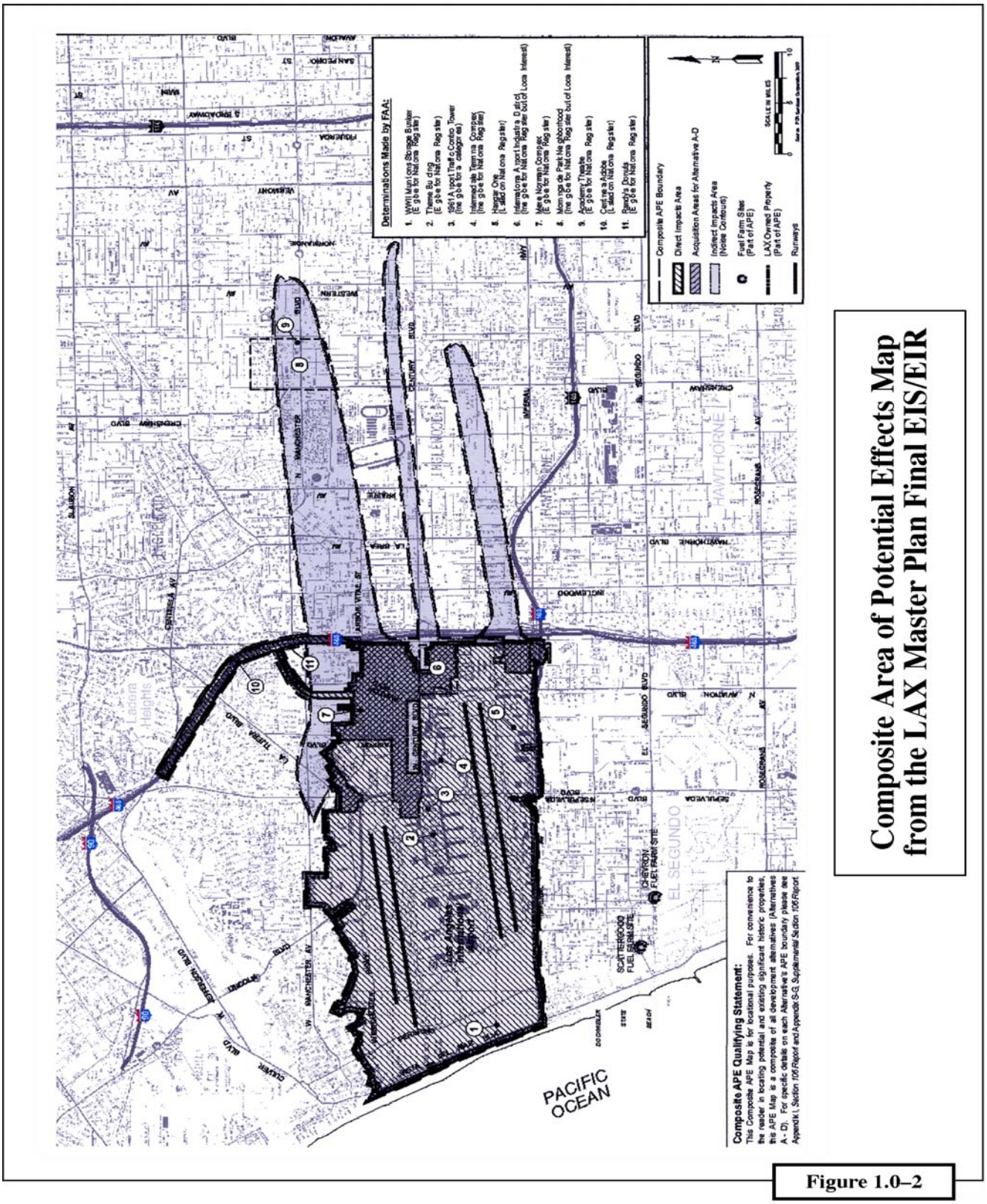
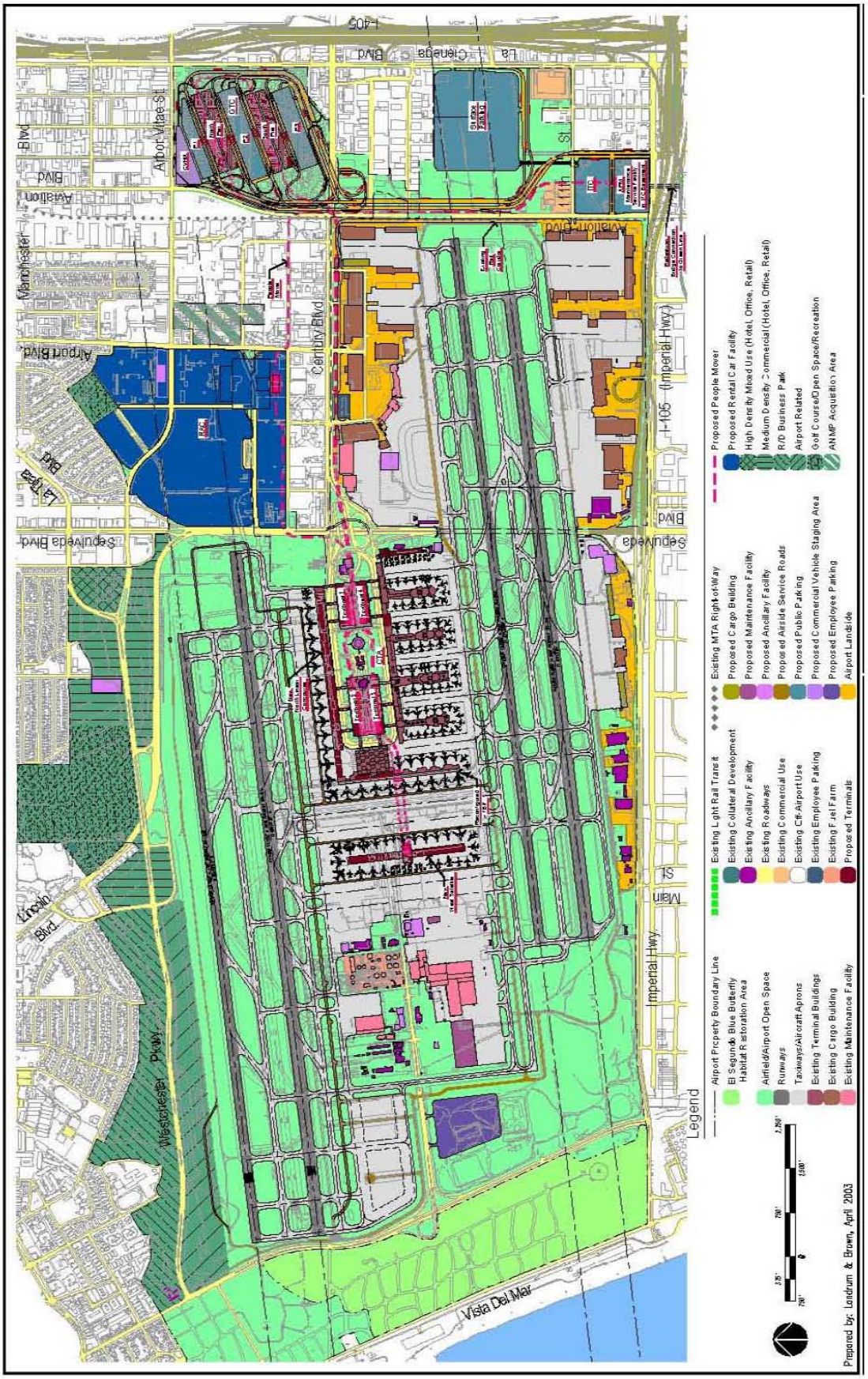

Composite Area of Potential Effects Map
from the LAX Master Plan Final EIS/EIR
Determinations Made by FAA:
1. WWII Munitions Storage Bunker (Eligible for National Register Listing)
2. Theme Building (Eligible for National Register Listing)
3. 1961 Airport Traffic Control Tower (Ineligible for a Category Listing)
4. Internal Airline Terminal Complex (Ineligible for National Register Listing)
5. Hangar One (Listed on National Register)
6. Intermodal Airport Industrial District (Ineligible for National Register Listing and Out of Local Interest)
7. Marie Norman Complex (Eligible for National Register Listing)
8. Monrovia Park Neighborhood (Ineligible for National Register Listing and Out of Local Interest)
9. Academy Theatre (Eligible for National Register Listing)
10. Centinela Adobe (Listed on National Register)
11. Randy's Donuts (Eligible for National Register Listing)
Composite APE Boundary
Direct Impacts Area
Acquisition Areas for Alternative A-D
Indirect Impacts Area (Noise Contours)
Fuel Farm Sites (Part of APE)
LAX Owned Property (Part of APE)
Runways
SCALE IN MILES
Composite APE Qualifying Statement:
This Composite APE Map is for locational purposes. For convenience to the reader in locating potential and existing significant historic properties, this APE Map is a composite of all development alternatives (Alternatives A - D). For specific details on each Alternative's APE boundary please see Appendix I, Section 106 Report and Appendix S-G Supplemental Section 106 Report
PACIFIC OCEAN
EL SEGUNDO
HAWTHORNE
INGLEWOOD
CHEVRON FUEL FARM SITE
SCATTERGOOD FUEL FARM SITE

Figure 1.0–2



Alternative D – 2005 Enhanced Safety and Security Plan from the LAX Master Plan Final EIS/EIR

Figure 1.0-3

2.0 REGULATORY CONTEXT

The LAX Master Plan Final EIR identifies possible impacts to identified resources within the project area that are of federal, state, and/or local significance. Section 4.9.2 of the LAX Master Plan Final EIR addresses the mitigation of potential impacts to paleontological resources. In order to mitigate potential impacts to as yet *undiscovered* paleontological resources (i.e., fossils and/or fossiliferous deposits), in accordance with state and local governmental guidelines, the LAX Master Plan MMRP requires that a Paleontological Management Treatment Plan (PMTP) be generated. In order to accomplish the goal of identification, evaluation, recovery, treatment and long-term conservation of unexpected paleontological resource discoveries identified during construction-related grading and excavation activities, monitoring will be required in sensitive areas, or those areas identified as exhibiting a reasonable potential for revealing subsurface paleontological deposits. The PMTP also provides guidelines for the documentation, evaluation, salvage, treatment, curation, and archival conservation (storage) of identified resources.

2.1 Criteria for Evaluation

Unlike the fields of prehistoric and historic archaeology, there are no established administrative guidelines for the evaluation of newly discovered or recovered paleontological resources (i.e., fossils or fossiliferous deposits). Evaluation of such finds are generally made by professional paleontologists using sound scientific judgment and following established standards of their profession, but without administrative guidelines. The Society of Vertebrate Paleontology has, however, proposed a set of guidelines for "Assessment and Mitigation of Adverse Impacts to Nonrenewable Paleontologic Resources: Standard Guidelines" (attached as Appendix B).

2.2 Regulatory context

American Antiquities Act of 1906

The American Antiquities Act of 1906 as amended (16 USC 431-433), when broadly interpreted, protects paleontological resources ("any object of antiquity") on U.S. governmental lands or lands under U.S. government control. There is no federal legislation that provides more specific protection, and attempts at passing bills, such as the "Paleontological Resources Preservation Act," or the "Vertebrate Paleontological Resources Protection Act," have not been successful. Although many National Monuments, National Parks, National Recreation Areas, and National Forests, etc., have established guidelines to manage, control, or prohibit the collecting of fossils under their jurisdiction, no general federal policy exists for the protection of paleontological resources.

California Environmental Quality Act

Paleontological resources are afforded protection by environmental legislation set forth under the California Environmental Quality Act (CEQA). Although paleontological resources are not specifically identified in the statute, Appendix G to the CEQA Guidelines provides guidance relative to significant impacts on paleontological resources, indicating that a project would have a significant impact on paleontological resources if it would disturb or destroy a unique paleontological resource, site, or unique geologic feature. The *Draft CEQA Thresholds* for the City of Los Angeles state that a determination of significance should be made on a case-by-case basis, considering 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.

California Coastal Act of 1976

The California Coastal Act of 1976 was enacted to provide a broad range of environmental protections to areas along the California coastline within the coastal zone. At LAX, the coastal zone extends from Santa Monica Bay to the east (inland) side of Pershing Drive. Any development within the coastal zone, such as development within the Los Angeles/El Segundo Dunes, is subject to planning and management policies of the California Coastal Act. The California Coastal Act requires that reasonable mitigation measures be provided where development would adversely impact archaeological or paleontological resources, as identified by the State Historic Preservation Officer. Cal. Pub. Res. Code Section 30244.

- Where development would adversely impact archaeological or paleontological resources as identified by the State Historic Preservation Officer, reasonable mitigation measures shall be required.

City of Los Angeles General Plan

The Conservation Element of the Los Angeles General Plan recognizes that Los Angeles is rich in paleontological sites. These sites are at risk due to development, unauthorized removal, and vandalism. The General Plan states, "the City has a primary responsibility in protecting significant archaeological and paleontological resources." Accordingly, it is the policy of the City of Los Angeles to identify and protect significant archaeological and paleontological sites and/or resources known to exist of that are identified during land development, demolition, or property modification activities. Los Angeles General Plan, Conservation Element, at II-3 to II-6.

- Site protection. Pursuant to CEQA, if a land development project is within a potentially significant paleontological area, the developer is required to contact a bona fide paleontologist to arrange for assessment of the potential impact and mitigation of potential disruption of or damage to the site. If significant paleontological resources are uncovered during project execution, authorities are to be notified and the designated paleontologist may

order excavations stopped, within reasonable time limits, to enable assessment, removal or protection of the resources. For Los Angeles city, the Natural History Museum of Los Angeles County, provides advice concerning paleontological resources.

- Conclusion. The city has a primary responsibility in protecting significant archaeological and paleontological resources.
- Continuing issues: Loss of or damage to archaeological and paleontological sites due to development, unauthorized removal and vandalism.
- Objective: Protect the city's archaeological and paleontological resources for historical, cultural, research and/or educational purposes.
- Policy: Continue to identify and protect significant archaeological and paleontological sites and/or resources known to exist or that are identified during land development, demolition or property modification activities.
- Program: Permit processing, monitoring, enforcement and periodic revision of regulations and procedures.

3.0 ENVIRONMENTAL SETTING AND GEOLOGIC CONTEXT

The environmental setting consists of physical and biological conditions that exist within the project area, as well as cultural aspects related to prehistoric and historic human activities in the general area. An understanding of these elements is necessary for the accurate identification, evaluation, and treatment of paleontological resources that might be discovered during the LAX Master Plan Project.

3.1 Environmental Setting

3.1.1 Climate

The climate within the project area is warm-temperate and sub humid and is modified strongly by marine influences. The mean annual precipitation ranges between 12 to 20 inches, predominantly in the form of rain, but fog is common in the summer months. The mean annual temperature for the area is 58 to 64 degrees Fahrenheit and the area rarely experiences freezing temperatures.

3.1.2 Flora and Fauna

The original vegetation (i.e., predating Spanish colonizations in the mid to late 1700s) was comprised predominantly of California sagebrush, buckwheat and salt-tolerant dune species. Although the area is now predominantly urban, pre-development animal species would have included mule deer, coyote, bobcat, fox, skunk, raccoon, opossum, ground squirrel, a wide variety of birds, snakes, lizards, and salamanders and frogs. Marine species present along the coast would have included sea lions, seals, brown pelicans, gulls, cormorants, terns, and various shore birds.

3.1.3 Physiography and Geology

Los Angeles International Airport (LAX) lies within the northwestern coastal portion of the Los Angeles Basin Physiographic Province, and more specifically within the Torrance Plain and the El Segundo Sand Hills. The general geologic and structural setting of these areas have been discussed in a number of reports on the geology of the Los Angeles Basin (e.g., Reed, 1926; Reed and Hollister, 1936; Sharp, 1976; Norris and Webb, 1990; Lajoie et al., 1991). The subsurface stratigraphy is addressed in several publications (e.g., Reed, 1926; Yerkes et al., 1965; Ponti, 1989; Norris and Webb, 1990). The geology and subsurface stratigraphy in the vicinity of LAX are summarized in Figures 3.1–1 and 3.1–2 (after Camp Dresser and McKee Inc., 2001, figs. 1 and 2).

Based on geophysical data and detailed logs of numerous deep wells in the western Los Angeles Basin, a generalized stratigraphic section can be compiled. The deepest basement rocks are composed of Catalina Schist, probably of Mesozoic age, which in turn are overlain by

Miocene, Pliocene and Pleistocene sedimentary rocks. The Pliocene and Pleistocene sediments alone amount to several thousand feet of section (Yerkes et al., 1965; Norris and Webb, 1990). The sedimentary rocks of concern (i.e., those likely to be encountered in any paleontological monitoring efforts) thus are very young geologically, and would represent only the youngest Pleistocene sediments in the vicinity of the LAX Master Plan APE.

Locally, the El Segundo Sand Hills consist of a three to six mile-wide belt of relatively young (Holocene) and relatively older (upper Pleistocene) sand dune complexes that extend along the coast from the Ballona escarpment and southward to the Palos Verdes Hills. The El Segundo Sand Hills overlie the Torrance Plain, which is present to the east. The area is characterized by nearly level, ancient floodplain surfaces that have been periodically cut into by high sea levels during interglacial periods, forming the marine terrace platforms that are now covered by alluvial (surficial) and dune deposits. Very gently sloping alluvial fans extend westward from the topographic high areas along the uplifted segments of the Newport-Inglewood fault zone east of the project area. Sand dunes dominate the coastal area, with alluvial materials covering Quaternary deposits farther east beyond the limit of the existing dune fields.

The near surface geologic units within the project area (Figure 3.1–1) consist of modern (Holocene) sand dunes ("Qdr" on Figure 3.1–1) along the coast and on the edge of the lowest (youngest) marine terrace, older (upper Pleistocene) sand dune complexes (sand and silty sand; "Qdo" on Figure 3.1–1) on the higher terrace edges, and the upper and middle Pleistocene Lakewood Formation (a catchall formational name for alternating layers of dense to very dense sand, silty sand, and very stiff to hard silty to sandy clay and clayey silt) ("Qlw" on Figure 3.1–1). The Lakewood Formation, as originally defined, included the previously named Palos Verdes Sand, a marine unit that dates to the peak of the last interglacial period about 120,000 years ago. The Palos Verdes Sand is often abundantly fossiliferous, and is the fossiliferous formation that is exposed on the southern Ballona escarpment along Lincoln Boulevard. Most of the project area is overlain by the older dune deposits, whereas the Lakewood Formation underlies the older dunes, but is exposed in the eastern portion of the project area. Holocene ("modern" or "Recent") dune sand is present between the beach and Pershing Drive.

Although some portions of the project area still exhibit the characteristics of the original sand dune topography, the original coastal slope and undulating dune complexes were subjected to substantial grading and infilling in the 1950s and 1960s during the development of LAX. Most of these alterations occurred east of Pershing Drive. Specific descriptions of the thickness of the artificial fill, often not well documented, are provided in Technical Report 12, *Earth/Geology Technical Report,* of the LAX Master Plan EIR (Camp Dressor and McKee, 2001). Few areas within the project area remain undisturbed by urban development.

3.2 Paleontological Resources

The Holocene (young) dune sand as well as the older, upper Pleistocene dunes of the El Segundo Sand Hills, probably have a low to moderate potential for yielding fossils, although the recorded terrestrial vertebrate fossils (mainly mammals; LAX Master Plan Final EIR, Section 4.9.2, Table F4.9.2-1) may have come either from the dune deposits or from the underlying, mainly continentally derived, sediments of the Lakewood Formation. The terrestrial vertebrate fossils are probably from the Lakewood Formation, and potentially would represent the same assemblage of fossil animals as preserved at the La Brea "tar pits" in downtown Los Angeles and elsewhere in the Los Angeles Basin (cf. Miller, 1971; Langenwalter, 1975; Kurtén and Anderson, 1980; Stock, 1992).

The marine vertebrate fossils reported at greater depths (65 to 70 feet) (LAX Master Plan Final EIR, Section 4.9.2, Table F4.9.2-1) probably were derived from the Palos Verdes Sand or underlying middle Pleistocene marine sediments (Lakewood Formation). The Palos Verdes Sand is a richly fossiliferous unit that overlies the marine terrace surface cut approximately 120,000 years ago during the peak of the last interglacial period and recognized from the Pacific Palisades area southward, around the Palos Verdes Peninsula, to the Upper Newport Bay area in Orange County (e.g., Valentine, 1956; Woodring et al., 1946; Kennedy, 1975; Kanakoff and Emerson, 1959). Exposures of the Palos Verdes Sand on the southern escarpment of the Ballona Creek drainage at about the 50 foot elevation level have yielded extensive collections of fossil invertebrates that are dominated by bivalve and gastropod mollusks (~300 species), as well as two species of marine mammals, ten species of birds, two species of sharks, numerous sting ray teeth and stingers, and numerous specimens of bony fish (bones, teeth, and ear stones) (Willett, 1937; Hoskins, 1957; Valentine, 1961; and collection records of the Invertebrate Paleontology Section of the Natural History Museum of Los Angeles County). Thus the potential for encountering paleontological resources in the Palos Verdes Sand, which underlies the entire LAX APE (LAX Master Plan Final EIR, Section 4.9.2) at depth (50 foot elevation level), would be very high if excavation activities reached this level.

3.3 Paleontological Resource Potential

The assignment of levels of paleontological resource potential is typically based on the recorded presence or abundance of nearby fossil localities, or the known abundance of fossils in the same lithologic unit as exposed in the area of concern. In the case of the APE for the LAX Master Plan Final EIR Alternative D, several fossil localities are documented (LAX Master Plan, Section 4.9.2, Table F4.9.2–1) within the APE as well as very nearby. The terrestrial mammal remains were all collected from shallow depths (13 to 25 feet), and record the presence of fossils within deposits that are likely to be reached by excavations associated with developments proposed in LAX Master Plan Alternative D. Because none of the reported fossil localities is assigned to a named formational unit in the collection records of the Vertebrate Paleontology Section of the Natural History Museum of Los Angeles County, the entire APE is assigned a

High Paleontological Resource Potential. Areas with documented fill materials that will not see excavation or boring activities that extend below the fill can be assigned a low resource potential and need not be monitored. The reported marine invertebrate fossils and marine mammal bones are most likely to have been derived from the Palos Verdes Sand, a unit that is typically abundantly fossiliferous. Areas of future construction as proposed in LAX Master Plan Alternative D that might be excavated (including borings) to the appropriate depths (to the 50 foot elevation level) are very likely to yield numerous fossils. Because this marine unit extends below the entire APE, based on exposures of the formation on the south side of the Ballona escarpment and to the east in the Baldwin Hills, a High Paleontological Resource Potential is also supported for the entire APE, but would only be applicable to those construction projects that would approach this level during boring or excavation activities.

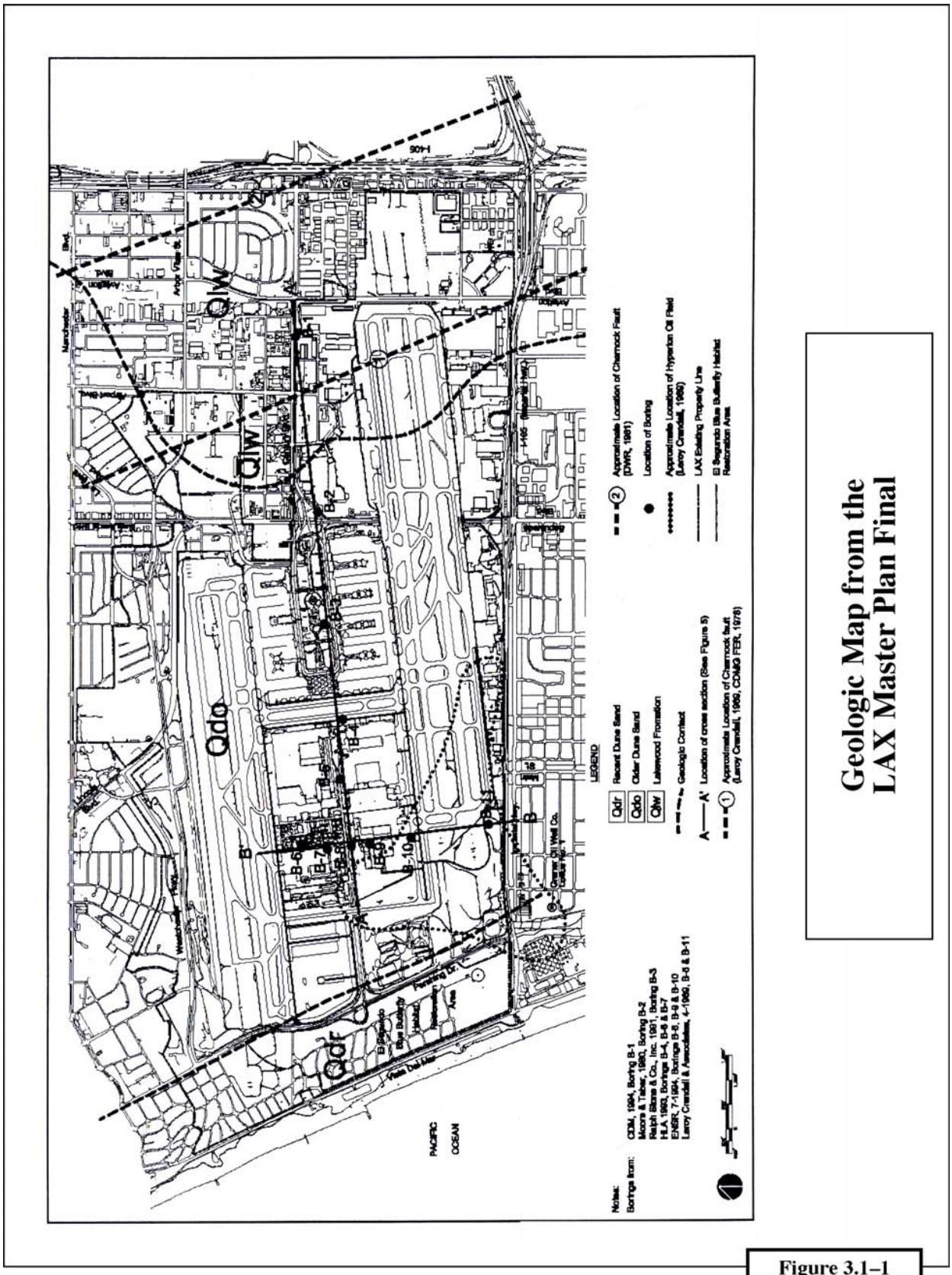
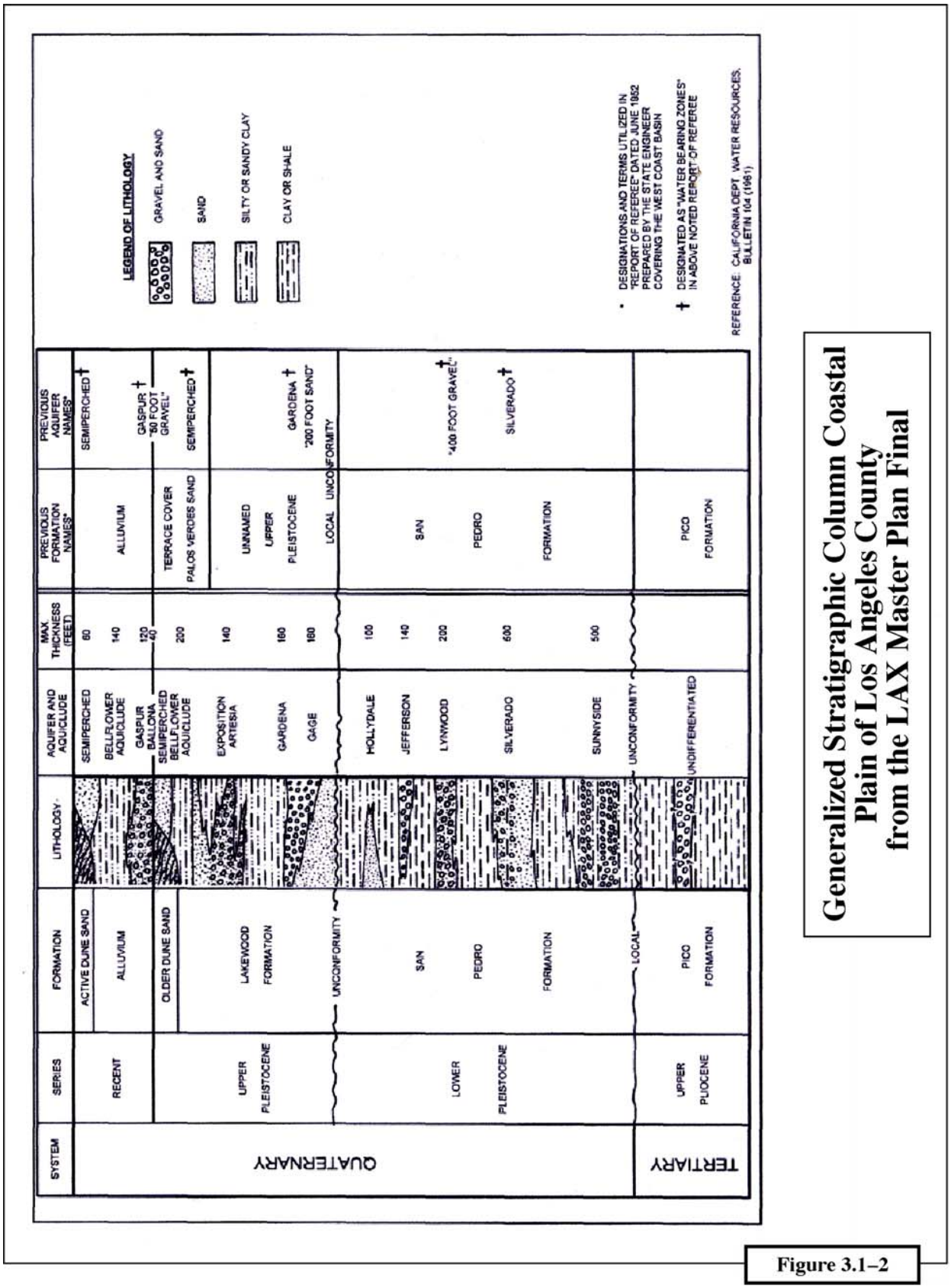

Geologic Map from the
LAX Master Plan Final
Qdr
Qdo
Qlw
LEGEND
Recent Dune Sand
Older Dune Sand
Lakewood Formation
Geologic Contact
Location of cross section (See Figure 5)
Approximate Location of Chemock fault (Leroy Crandall, 1996; COMG FER, 1978)
Approximate Location of Chemock Fault (DWR, 1961)
Location of Boring
Approximate Location of Hyperion Oil Field (Leroy Crandall, 1988)
LAX Existing Property Line
El Segundo Blue Butterfly Habitat Restoration Area
PACIFIC OCEAN
Notes:
Borings from:
CDM, 1994, Boring B-1
Moore & Taber, 1980, Boring B-2
Ralph Stone & Co., Inc. 1991, Boring B-3
H.A. 1992, Borings B-4, B-5 & B-7
ENGR, 7-1994, Borings B-6, B-9 & B-10
Leroy Crandall & Associates, 4-1989, B-8 & B-11

Figure 3.1–1



Generalized Stratigraphic Column Coastal Plain of Los Angeles County from the LAX Master Plan Final

Figure 3.1–2

4.0 TREATMENT PLAN GOALS AND OBJECTIVES

4.1 Paleontological Management Treatment Plan

The organization of the PMTP complies with the stated mitigation measures presented in Section 4.9.2.8 (Mitigation Measures) of the LAX Master Plan Final EIR and set forth in the MMRP. Specifically, the PMTP addresses mitigation measures MM-PA-1 through MM-PA-7 of the LAX Master Plan Alternative D (Appendix A). The overall goal of the PMTP is the protection and treatment of paleontological deposits that are discovered during the grading and construction process for the LAX Master Plan, in accordance with the requirements of the California Environmental Quality Act (CEQA), guidelines of local governmental agencies throughout the southern California region, and with the "Standard Guidelines for the Assessment and Mitigation of Adverse Impacts to Nonrenewable Paleontologic Resources" prepared by the Society of Vertebrate Paleontology (Appendix B). Paleontological sites that have been disturbed by ground moving activities such as mass grading, excavation, or trenching are more likely to lack the integrity (geographic, geologic, or stratigraphic data) desired to initiate mitigation procedures and, upon consultation with the Principal Investigator and LAWA, may not need to be monitored.

4.2 LAX Master Plan Mitigation Measures

The LAX Master Plan MMRP includes and addresses seven mitigation measures, MM-PA-1 through MM-PA-7, listed below. Implementation of these mitigation measures are treated in Section 5.0, following.

4.2.1 MM-PA-1.

Paleontological Qualification and Treatment Plan: A qualified paleontologist shall be retained by LAWA to develop an acceptable monitoring and fossil remains treatment plan (that is, a Paleontological Management Treatment Plan – PMTP) for construction-related activities that could disturb potential unique paleontological resources within the project area. This plan shall be implemented and enforced by the project proponent during the initial phase and full phase of construction development. The selection of the paleontologist and the development of the monitoring and treatment plan shall be subject to approval by the Vertebrate Paleontology Section of the Natural History Museum of Los Angeles County to comply with paleontological requirements, as appropriate. Implementation of mitigation measure MM-PA-1 is discussed in Section 5.0.

4.2.2 MM-PA-2.

Paleontological Authorization: The paleontologist shall be authorized by LAWA to halt, temporarily divert, or redirect grading in the area of an exposed fossil to facilitate evaluation and, if necessary, salvage. No known or discovered fossils shall be destroyed without the written consent of the project paleontologist. Implementation of mitigation measure MM-PA-2 is discussed in Section 5.3.

4.2.3 MM-PA-3.

Paleontological Monitoring Specifications: Specifications for paleontological monitoring shall be included in construction contracts for all LAX projects involving excavation activities deeper than six feet. Implementation of mitigation measure MM-PA-3 is discussed in Section 5.4.

4.2.4 MM-PA-4.

Paleontological Resources Collection: Because some fossils are small, it will be necessary to collect sediment samples of promising horizons discovered during grading or excavation monitoring for processing through fine mesh screens. Once the samples have been screened, they shall be examined microscopically for small fossils. Implementation of mitigation measure MM-PA-4 is discussed in Section 5.5.

4.2.5 MM-PA-5.

Fossil Preparation: Fossils shall be prepared to the point of identification and catalogued before they are donated to their final repository. Implementation of mitigation measure MM-PA-5 is discussed in Section 5.6.

4.2.6 MM-PA-6.

Fossil Donation: All fossils collected shall be donated to a public, nonprofit institution with a research interest in the materials, such as the Natural History Museum of Los Angeles County. Implementation of mitigation measure MM-PA-6 is discussed in Section 5.7.

4.2.7 MM-PA-7.

Paleontological Reporting: A report detailing the results of these efforts, listing the fossils collected, and naming the repository shall be submitted to the lead agency at the completion of the project. Implementation of mitigation measure MM-PA-7 is discussed in Section 5.8.

5.0 CREATION AND IMPLEMENTATION OF PMTP

The LAX Master Plan includes seven paleontological mitigation measures (Appendix A), the first being the preparation of a Paleontological Management Treatment Plan (PMTP).

This PMTP has been assembled by paleontologists of the environmental consulting firm of Brian F. Smith and Associates under subcontractual arrangements with Earth Tech and LAWA. The lead paleontologists responsible for this PMTP are Dr. George L. Kennedy and Dr. J. D. Stewart, who collectively have 65 years of professional experience with the fossil record of central and coastal southern California, including 14 years and 18 years, respectively, with the Invertebrate Paleontology and Vertebrate Paleontology Sections of the Natural History Museum of Los Angeles County. The PMTP and the lead personnel have been approved by the Vertebrate Paleontology Section of the Museum.

This PMTP is to be implemented and enforced by the project proponent, LAWA, working with the Principal Investigator (PI) and/or Project Paleontologist (PP) and the prime contractor. This PMTP should be included in the contract documents for any proposed construction projects that will result from implementation of the LAX Master Plan. The initial step of any mitigation program will be to obtain an up to date compilation of recorded and/or known fossil localities within a two mile radius of the APE, including lists of recovered fossils, from the Invertebrate Paleontology and Vertebrate Paleontology Sections of the Natural History Museum of Los Angeles County [formerly the Los Angeles County Museum of Natural History] in order to better understand the possible types of fossils that might be encountered in any paleontological monitoring programs. It is also important for all parties to understand the stated philosophy and requirements of the mitigation measures as established in the PMTP. To this end, these items should be discussed in a preconstruction meeting prior to beginning of any construction project that will occur in an area of high potential for paleontological deposits, as defined later in this Plan. Such preconstruction meeting should include a representative of LAWA, the prime contractor, representatives for subcontractors responsible for all excavation activities, and the PI or PP. The PI or PP will be responsible for adequately describing the nature of potential fossil discoveries or fossil deposits, and the procedures that will be used in their timely salvage and removal from the construction site, as well as the nature of any institutional charges that might accrue with depositing the fossils in a local museum. The Project Paleontologist should also be provided with copies of any geologic or geotechnical reports, and with copies of all construction/excavation and shoring plans (full size and half size) for documenting the precise location of any fossil collecting sites, and for archiving a set of the locality maps with the collection when it is deposited in a scientific institution.

5.1 Management Coordination

5.1.1 Consultant Qualifications

The following monitoring qualifications are created utilizing generally accepted practices and unwritten standards of the paleontological community involved in paleontological mitigation and monitoring in the southern California area. Some local governmental agencies have established their own guidelines governing the minimum qualifications for paleontologists and paleontological monitors, but none is universally accepted. These qualifications define minimum education and experience levels required to perform identification, evaluation, registration, and treatment activities. In some cases, additional areas or levels of expertise may be needed, depending upon the complexity of the task and the nature of the geology, stratigraphy, or paleontological resources involved. In the following definitions, a year of full-time professional experience need not consist of a continuous year of full-time work but may be made up of discontinuous periods of full-time or part-time work adding up to the equivalent of a year of full-time experience.

Principal Investigator—The Principal Investigator (PI) must have the following minimum qualifications:

- At least 10 years of experience as a Principal Investigator conducting research studies and/or mitigation investigations in California.
- A Bachelors degree in Geology or Paleontology as well as a graduate degree (Masters or Doctorate) in Geology, Paleontology or Biology, or other closely related field.
- The range of projects overseen and completed by the PI should include small to large scale mitigation monitoring programs, literature searches, museum records and collections searches, preservation plan implementations, and large-scale data recovery (salvage excavation) mitigation programs.
- Experience in the implementation of directed surveys, salvage recovery efforts, and preparation of detailed technical reports.
- Can also serve as the Project Paleontologist for small and medium-scale projects.
- Can also serve as a Paleontological Monitor when specialized expertise or more extensive experience may be necessary.

Project Paleontologist—The Project Paleontologist (PP) must have the following minimum qualifications:

- At least five years of experience conducting paleontological research or resource mitigation investigations in southern California.
- A Bachelors degree in Geology or Paleontology, or closely related field, as well as a graduate degree (Masters or Doctorate) in Geology, Paleontology, Biology, or other closely related field.
- Performed small- to large-scale paleontological resource surveys, assessments, and mitigation of resources through salvage recovery programs.

- Have conducted paleontological research, completed paleontological site documentation, and authored or contributed to the completion of technical reports.
- Experience with site documentation, detailed mapping, salvage procedures, including plaster jacketing of larger vertebrates, development of screen-washing programs for microvertebrates, and cataloging and curation procedures.
- Can also serve as a Paleontological Monitor when specialized expertise or more extensive experience may be necessary.

Paleontological Monitor—The Paleontological Monitor (PM) must have the following minimum qualifications:

- More than two years experience in paleontological resources monitoring in southern California, or have a combination of one year of monitoring experience working under an experienced paleontologist (qualified PI or PP) *and* have completed (passed) the Paleontological Certification Program offered by the California State Park System (at Anza Borrego Desert State Park).
- A Bachelors degree in Geology, Paleontology, Biology or Archaeology, or a closely related field.
- Conducted surveys, excavations, and construction monitoring projects in the southern California region.
- Experience with site documentation, detailed mapping, laboratory preparation and curation procedures, and cataloging of specimens.

5.1.2 Specific Duties and Roles

All paleontological resource-related tasks in the PMTP will be performed under the supervision of the PI. The PI will make sure that the project, at all phases, is in full regulatory compliance with all applicable laws. It will be the responsibility of the PI to inform LAWA of any instances of non-compliance.

All salvage operations and recovery will be performed under the supervision of the Principal Investigator or the Project Paleontologist (Salvage refers to the expedited recovery of fossils or fossiliferous deposits when circumstances, such as construction scheduling, impose limitations on the available time to adequately recover the resources.) All onsite activities will be coordinated and supervised by a Project Paleontologist. While resource recovery occurs, the PP will also ensure that standard paleontological procedures are followed as outlined in this PMTP.

All paleontological monitoring will be conducted under the direction of the designated Principal Investigator (PI) or Project Paleontologist (PP), who will also oversee and manage the project's monitoring and compliance with the Paleontological Management Treatment Plan (PMTP), as well as all applicable laws. The PI or PP will ensure that the monitoring is performed as well as training completed per requirements.

The Paleontological Monitor (PM) will be present during grading and excavation

activities within areas determined to have high potential for subsurface paleontological deposits, as determined by the PI/PP and approved by LAWA. During these activities the monitor will observe if any paleontological resources are discovered. If discovered, the applicable procedures will be followed as outlined in this PMTP.

5.2 Paleontological Monitoring

5.2.1 Monitoring

The following plan for paleontological monitoring ensures that known fossil resources and any previously unidentified resources located within the APE that are exposed during ground-disturbing construction activities for the LAX Master Plan are treated in compliance with CEQA, and any regulations and/or guidelines of local governmental agencies. The plan describes where and when monitoring should take place, and the procedures that should be followed in order to ensure proper treatment of paleontological resources. Monitoring for paleontological resources is specifically called for in Mitigation Measure MM-PA-3 of the LAX Master Plan.

All areas within the APE with high potential for subsurface paleontological deposits will be under the direction of a professional paleontologist (PI or PP) as defined in Section 5.1.1 of this PMTP. The paleontological monitor (PM) should be supplied with a construction schedule and any construction, grading, excavation and/or shoring plans prior to the initiation of ground-disturbing activities. Although the entire area of the APE is available for paleontological monitoring, not all areas of the project may be considered equally as likely to yield additional subsurface deposits. Therefore, emphasis should be placed on the specific portions of the project area identified as exhibiting a high potential for subsurface resources. Areas of high potential for paleontological deposits are identified on the basis of the location of known paleontological localities and/or resources and the identification of areas in which no known disturbances have occurred. The Identification of areas of high potential that should be subjected to paleontological monitoring (based on the locations of known paleontological localities and/or resources, and areas in which no known disturbances have occured) will be made by the on-site PM, and will be made in consultation with the appropriate LAWA representative, construction supervisor, and/or geologist.

Areas of low potential for subsurface paleontological deposits are those areas that are documented by geotechnical reports, or other technical sources, to be underlain by fill materials, or areas that exhibit a high degree of previous disturbance, based on soil testing. Because the likelihood for buried paleontological resources or deposits in these areas is relatively low, areas of low potential for subsurface deposits need not be monitored. If excavation activities are scheduled to go below the documented level of fill materials, paleontological monitoring should be initiated when formational sediments are expected to be reached by earthmoving activities.

Paleontological personnel should determine whether any exposed deposit uncovered due to grading and other ground disturbing activity associated with the LAX Master Plan is a

previously known paleontological resource. In addition to protecting as yet undiscovered paleontological deposits, the paleontological monitor will ensure that the previously identified significant resource is avoided and protected. If potentially significant resources are identified, the monitoring paleontologist shall be empowered to halt construction activities around the identified resource. If previously unknown fossil deposits are identified during the construction activity, the processes described below should be followed.

Procedures for paleontological monitoring in the APE for the LAX Master Plan project are as follows:

- Excavation and any other ground-disturbing activity near (within 150 feet of) a previously documented fossil locality will be monitored at all times.

- Excavation and any other ground-disturbing activity in areas designated as high potential for subsurface paleontological deposits will be monitored full time when excavation levels reach a depth of six feet.

- Excavation and any other ground-disturbing activity in areas designated as having a low potential for subsurface paleontological deposits need not be monitored.

- All monitors will check in with the Resident Engineer or Job Superintendent prior to engaging in monitoring activities in the construction area. All monitoring activity will be reported on a daily basis by the completion of a daily LAWA Paleontological Resources Monitoring Record. Copies of monitoring record forms will be submitted to LAWA on a weekly basis.

- The number of monitors on any given day will be based on the level of effort proposed for excavation and other ground-disturbing activities. Any activity in areas designated as having a high potential for subsurface paleontological deposits is more likely to require additional paleontological monitors.

- Monitors will examine all exposed soil profiles and cut faces for paleontological deposits, as safety conditions permit.

- If paleontological resources of any kind are discovered by the paleontological monitor, by any other monitor, or by construction personnel, the Resident Engineer should be notified immediately and all construction activity diverted from the immediate vicinity (25 to 50 feet, depending on the nature of the resource). The find should be reported to the Project Paleontologist or Principal Investigator so that the appropriate treatment measures can be planned and implemented. Every effort should be made to ensure these procedures are conducted in a timely and efficient manner, so as to reduce impacts to the construction schedule.

- If the paleontologist has determined that excavations are needed in order to further evaluate the significance of the identified paleontological deposit, the site should be flagged off with

temporary flagging or fencing and construction activity diverted away from the area. The flagging will serve to mark the extent of the resource and to keep construction equipment away from the fossil or fossil deposit.

- In order to ensure the safety of the paleontological monitor, safety vests, hard hats, long pants and boots will be worn at all times within the construction zones.

Briefing of Construction Personnel

The potential for the discovery of subsurface paleontological deposits in areas where a paleontological monitor is not present is a possible outcome of the ground-disturbing process for a large-scale project such as the LAX Master Plan Project. The prioritizing of those areas most likely to yield subsurface deposits is one way to mitigate this potential. Another important factor is the briefing or education of construction personnel in the identification of fossils or fossiliferous deposits and in the correct procedures for notifying the relevant individuals should such a discovery occur.

For all Master Plan projects, construction personnel, including project engineers, project inspectors, construction forman, drillers and heavy equipment operators, will be briefed by the consulting paleontologist(s) on issues that might affect the discovery or recovery of paleontological resources (i.e., fossils or fossiliferous deposits). Issues that should be covered in the briefing session include the following:

- General Information:
  - Geological history of the project area (e.g., marine or nonmarine deposition).
  - Project overview, including the relationship of LAWA, as the responsible agency, and required compliance issues.
- Paleontological Resources Procedures:
  - Explanation of the potential resources (i.e., types of fossils) that may be encountered, including fossil vertebrates, invertebrates, and plants.
  - Duties and responsibilities of the paleontological monitors.
  - Procedures to be employed upon the discovery of paleontological resources during construction, including the immediate termination of ground-disturbing activity in the immediate area and notification of responsible person(s).
  - Paleontological resource evaluation and methods of recovery (salvage collecting).

5.2.2 Identification of Resources

In the event that paleontological resources are discovered by the paleontological monitor, or any other person, construction activity will be immediately diverted away from the area. The area, including a buffer zone around the deposit, should be flagged off with temporary flagging or fencing, and the area avoided by all construction activity until released for construction by the consulting paleontologist. Because at this point in the discovery process the extent of the deposit may not be clearly established, the buffer zone around the discovered deposit should be on the order of 20 to 25 feet. Once the extent of the deposit has been established, the buffer zone around

the identified area can be reduced. The buffer zone around the resource (fossil or fossilifersous deposits) should be wide enough to provide a level of security and safety for both the resource and for personnel investigating the resource.

Site Security

In order to ensure the protection of any paleontological deposits identified within the APE during the monitoring process, all construction activity should be immediately discontinued in the vicinity of the deposit. The area should be flagged off or fenced with temporary fencing material as soon as possible following the discovery of the deposit. Until the extent of the resource can be established with testing procedures, a 20 to 25 foot buffer zone around the identified deposit should be flagged off. If this buffer zone is not feasible due to construction activities, a mutually agreeable buffer zone should be established. All flagging of paleontological deposits should be monitored by a qualified paleontologist. Temporary flagging should remain in place until the resource has been released by the Principal Investigator or Project Paleontologist.

The above description of paleontological site protection procedures applies to resources identified during paleontological monitoring within the APE.

5.2.3 Cultural Resources

If historic archaeological resources, or prehistoric archaeological resources of concern to Native Americans, are discovered during paleontological monitoring, the consulting archaeologist should be contacted. The consulting archaeologist will be responsible for further contact(s) with the established Native American representative(s) and implementation of any existing Archaeological Treatment Plan (ATP), if necessary.

5.3 Paleontological Authorization

Pursuant to Mitigation Measure MM-PA-2 (*Paleontological Authorization*), the paleontologist or paleontological monitor on site shall be authorized to halt, temporarily divert, or redirect grading activities in the area of an exposed fossil or fossil deposit. Most fossils or fossil deposits can be collected in a timely fashion, and should not necessarily slow down any construction job. In the rare instance of, for example, an articulated mammal skeleton, a field crew should be brought in to excavate around, jacket, and remove any larger specimen. Assistance by construction personnel using heavy equipment on site will speed up and facilitate the recovery and reduce any "down time." The cooperation of all parties is to be encouraged. It is the aim of the PMTP that no fossils are destroyed in the field. It should be understood, however, that fossil marine shell beds such as are present in the coastal areas of the Los Angeles Basin, may contain millions of shells and shell fragments. In such cases, the Paleontologist should determine an adequate-sized sample, which may also include bulk materials beyond those that are to be fully processed, sorted, and curated into a scientific collection. Decisions about the size and acceptability of collections should only be made by the competent paleontologist(s) with

museum curatorial experience with fossil invertebrate, vertebrate, or botanical specimens.

5.4 Paleontological Monitoring Specifications

Pursuant to Mitigation Measure MM-PA-3 (*Paleontological Monitoring Specifications*), specifications for paleontological monitoring shall be included in construction contracts for all LAX projects involving excavation activities deeper than six feet.

5.4.1 Monitoring Parameters and Specifications

Paleontological monitoring, and the salvage collection of discovered fossils or fossiliferous units, constitutes the onsite field aspects of the paleontological monitoring and mitigation plan. Monitoring is to be conducted by a qualified paleontologist or paleontological monitor, defined as a person with experience in the recognition and collection of fossiliferous materials, under the supervision of the Project Paleontologist.

A determination as to the necessity for paleontological monitoring must be made whenever excavation activities exceed a six-foot threshold, taking into account the nature of the materials to be excavated (i.e., disturbed artificial fill vs. fossiliferous formations). Paleontological monitoring should be limited to in-place formational sediments, and is not required in documented artificial fill. Documentation of fill materials by the geotechnical report should be satisfactory evidence to suspend monitoring activities until formational sediments are reached. Note that in previously developed areas, excavation activities may already have removed more than six feet of sedimentary cover. In such cases, the question of monitoring should be directed to LAWA, in consultation with the Project Paleontologist. Activities that warrant paleontological monitoring may include, but not necessarily be limited to, utility trenching, boring activities for dewatering wells, soldier-beam emplacements, and elevator hydraulic rams, excavation for building footings, basements and subterranean parking levels, and mass grading operations.

5.4.2 Safety Issues

All onsite paleontological monitors should attend all daily and/or weekly safety meetings. They should familiarize themselves with the types and pieces of heavy equipment (excavators, bulldozers, earthmovers, etc.), as well as their traffic patterns, when applicable. All monitors onsite should be properly attired (boots, long pants, safety vest and hard hat). When working around moving equipment (bulldozers, earthmovers), monitors should carry a flagpole for greater visibility. All collecting and salvage activities in the vicinity of moving equipment should be staked and flagged off, allowing ample distance around the fossil site for safety of personnel who may be concentrating more on fossil recovery than on the presence of approaching/encroaching equipment.

5.5 Paleontological Resources Collection

Mitigation Measure MM-PA-4 (*Paleontological Resources Collection*) states that, because some fossils are small, it will be necessary to collect sediment samples of promising horizons discovered during grading or excavation monitoring for processing through fine mesh screens. Once the samples have been screened, they shall be examined microscopically for small fossils.

5.5.1 Records Search

The nature of the local geology (lithology and stratigraphic setting) will likely dictate the types of fossil organisms that may be present. An up to date records search of the locality collection records in the Invertebrate Paleontology and Vertebrate Paleontology Sections of the Natural History Museum of Los Angeles County will further clarify the types of fossils that have previously been recovered from the area, and thus might also be recovered during monitoring in the project area. A records search should be completed before initiation of the first monitoring project.

5.5.2 Fossil Types

The types of fossils that might be recovered are dictated by the geologic setting of the area. The Los Angeles Basin has received thousands of feet of sediment during the past million or so years. In the coastal region represented by the LAX Master Plan project area, the sediments are geologically young (less than two million years old), and consist of Holocene and Pleistocene interglacial marine units intercalated with sediments deposited in terrestrial environments (including fluvial and aquatic habitats) during intervening glacial episodes. The most common marine invertebrate fossils will be bivalve and gastropod mollusks. Megafossils from the terrestrial sedimentary units are rare, but include a wide variety of small and large mammals, as well as amphibians, reptiles and birds, similar to those recorded from the “tar pits” of Rancho la Brea in downtown Los Angeles.

5.5.3 Field Collection and Removal

The nature of any construction activity (drilling, trenching, excavating, or mass grading) as well as the nature of the sedimentary units that are being monitored for paleontological resources will dictate the methods of fossil recovery. Microfossil samples, for example, are very small and easily contained in a gallon-size bag or smaller, and easily carried off the site. Marine sediments, such as those of the Palos Verdes Sand, are typically rich in invertebrate fossils such as bivalve and gastropod mollusks. When encountered in drilling spoils (for dewatering wells, elevator ram shafts, etc.), marine shell deposits are typically screened onsite, the screenings placed in five-gallon buckets. Two to four buckets of screened shell hash is more than sufficient to obtain an adequate sample for scientific purposes. This size sample can be obtained in an hour or two. Trenching and excavation activities will expose a greater abundance of material, but the time needed to process them onsite will be the same. In areas undergoing mass grading, exposed

fossil sites can often be left undisturbed for hours, giving the paleontologist more than ample time to collect. When collecting is completed, any temporary flagging is removed, and the area turned back to construction personnel. The buckets can then be carried or driven offsite before being returned to the laboratory for processing.

Many of the previously recorded fossil discoveries in and around LAX (LAX Master Plan Final EIR, Section 4.9.2, Table F4.9.2–1) are of terrestrial mammals from sediments probably attributable to the Lakewood Formation. Because fossil bones are often larger, and more fragile, than molluscan shell material, they need a greater amount of care in their collection. Small to medium-size isolated bones can often be excavated around and covered by a plaster jacket, before the entire jacket is removed from the ground. Smaller specimens may take one to several hours to properly jacket and remove. However, because of the weight of these jackets, vehicular access must be available, or the assistance of heavy construction equipment (fork lift, back hoe, or front end loader) must be obtained. The jacketed specimen is then loaded onto a truck and returned to the lab. The most serious delays in construction may occur with the discovery of any articulated skeletons of larger terrestrial mammals. In such a case, the excavation and jacketing process may take several days, and need to be moved offsite using heavy equipment. Such an occurrence is not expected, based on the limited number of fossils previously obtained from the area of LAX, but the possibility of such a discovery should not be discounted.

5.5.4 Microfossils

Size is not an indication of importance or significance of any particular fossil, although the lay public is likely to be more impressed by large individuals (e.g., bones of mammoths or dinosaurs) than they are with smaller ones (e.g., most marine mollusks). Marine sediments are likely to contain fossils of marine microorganisms (microfossils), such as foraminifera (single-celled “shelled amoebae”) and ostracods (bivalved crustaceans). Sediments deposited in terrestrial settings, including fluvial or ponded bodies of water, may contain freshwater ostracods, diatoms, spores, pollen, plant phytoliths, as well as bones and teeth of microvertebrates (such as small mammals, birds, lizards, and fish, etc.).

5.5.5 Sample Size

Sample sizes for marine or aquatic microinvertebrates and plants (phytoliths, pollen and spores) are typically small, but need to be collected with care to prevent contamination. Without the presence of larger fossils, aquatic microfossils may be the only indication of the age or paleoecological environment of deposition of the sediments. Marine microfossil groups, such as foraminifera and ostracods, can be tested for using standard microfossil sieves (100 or 200 mesh), or be sent to a dedicated microfossil laboratory for washing, identification, and interpretation. Samples containing calcareous nannoplankton (e.g., coccoliths) and plant spores and pollen are typically forwarded to a dedicated microfossil laboratory for processing,

identification, and interpretation.

The likely presence of microvertebrate fossils is usually determined by the vertebrate paleontologist by careful examination of the enclosing sediments or sedimentary rocks for small pieces of bone or teeth. A test sample, consisting of approximately 200 pounds of sediment (equivalent to four 5-gallon buckets), may be screen-washed and, if necessary, further reduced by a heavy-liquid separation technique to reduce the final residue to a manageable size for microscopic examination and picking. If the test sample yields an appropriate concentration level as determined by the vertebrate paleontologist, a bulk-sediment collection may be warranted. Mitigation guidelines compiled by the Society of Vertebrate Paleontology (Appendix B, attached), and followed by many vertebrate paleontologists, suggest a sample size of approximately 120 5-gallon buckets (equivalent to about 6,000 pounds of sediment) would be appropriate to mitigate the potential loss of an important or significant microvertebrate assemblage. However, the concentration or abundance of material, as well as the nature and extent of the project excavation (utility trenches, building excavation, or mass grading project) or lithologic unit being sampled may come into play when determining the ultimate sample size. In salvage paleontology, when construction activities or scheduling preclude unlimited time to sample or collect, sample sizes are typically greatly reduced.

5.6 Fossil Preparation and Curation Procedures

Mitigation measure MM-PA-5 (*Fossil Preparation*) of the LAX Master Plan establishes that "Fossils shall be prepared to the point of identification and catalogued before they are donated to their final repository." In the scientific (museum) community of paleontology, this would encompass both physical preparation of specimens, and curation procedures, as outlined below.

5.6.1 Physical Preparation

Fossils rarely come out of the ground in a clean, pristine condition. Preparation techniques vary according to the size and nature of the fossils, their original composition, and the cumulative effects of their diagenetic history and taphonomy. Larger fossils (e.g., bones) may need to be stabilized with an archivally approved hardening agent (e.g., Paralloid B-72) and have any breaks or fractures glued or repaired. In coastal southern California, marine invertebrate fossils (e.g., shells of bivalve and gastropod mollusks) are the most common fossils, and rarely need any preparation beyond simple washing. Some fossils are embedded in a rock-hard sedimentary matrix, or exist only as impressions (internal and external molds) in the matrix. Vertebrate fossils typically need a greater amount of physical preparation than do invertebrate fossils.

5.6.2 Curation Procedures

The concept of simple "cataloguing" any specimen or group of specimens, as suggested in MM-PA-5, above, presupposes that the specimens have undergone a series of procedures that collectively are referred to as "curation" by museum curators and curatorial staff. Procedures, beyond simple cleaning or physical preparation, may include, but not be limited to, sorting of specimens from bulk washed residues by species (for invertebrates) or element (for vertebrates), identification of specimens or species lots, assigning specimen, species lot, and/or locality numbers to specimens or groups of specimens, physically painting and numbering specimens, preparation of labels with specimen, species lot, and/or locality numbers, placing of specimens in appropriate unit-sized specimen trays, organization of collections within cabinet drawers, and placement of the fossils in the proper part of the archival collection. Cataloguing will include, but not necessarily be limited to, recording of all locality and collection data in a serially numbered locality catalogue or computer database, and recording of specimen and/or species lot data in a serially numbered specimen/species lot catalogue or computer database. Curatorial procedures must be considered an integral part of the "preparation and cataloguing" mitigation measure (MM-PA-5), and be fully understood by all parties prior to monitoring and fossil collection (preferably at the preconstruction meeting or before). Some institutions will not accept collections that have not already been fully prepared and curated, whereas others may charge for these services, if indeed they have the time and manpower to work on collections not generated by their own staff. The Project Paleontologist(s) should work with the museum curators and fully understand the collection policies and requirements of the receiving institution.

5.7 Fossil Donation

Pursuant to Mitigation Measure MM-PA-6 (*Fossil Donation*), all fossils collected shall be donated to a public, nonprofit institution with a research interest in the materials, such as the Natural History Museum of Los Angeles County.

5.7.1 Purpose

The purpose of the mitigation and monitoring program is to prevent the loss or destruction of important paleontological resources, which includes not only the fossils themselves, but all of the supporting locality data. The ultimate responsibility for the long term care, conservation, and preservation rests with the public institutions, such as major museums or universities, in which the fossils are archived. All fossils should be accompanied by a complete copy of the final paleontological report, as well as copies of all field notes, appropriate sheets of the construction (and shoring) plans, maps, diagrams, stratigraphic sections and other graphics, photographic documentation of collected specimens and/or localities, history of specific preparation procedures (e.g., types of preservatives used), and any supplementary information as might be useful in the future comprehension of the geographic, geologic and stratigraphic setting. The fossils will form part of the paleontological archive that is the only record of past life

in this area. Thus it is incumbent on the responsible paleontologist to provide as much relevant data as possible to fulfill that goal.

5.7.2 Letter of Receipt

The final report should be accompanied by a letter from the receiving institution documenting the receipt of the fossils and accompanying data, and stating their commitment to the long term archival care and conservation of the collection and records. A copy of this letter should be appended to the Final Paleontological Report.

5.7.3 Deed of Gift

Paleontological departments of all public institutions are guided by their own collection policies. Among them is the need to establish ownership after their receipt. A deed of gift is typically prepared by the receiving institution, and should be signed by the project owner or responsible person or agency.

5.7.4 Institutional Charges

Charges for the permanent archival care and storage of collections are typically governed by the collection policies of the institutional departments, and may vary from institution to institution, or even from department to department within a single institution. Fees are typically charged for volume of case space or shelf space utilized (determined by cubic feet, or percentage of drawer space used), direct cost of the number (or percentage of) drawers used, curation costs (time and materials, such as individual specimen trays and vials, etc.), data entry time for computerized collection database for specimens and/or locality data, or other charges. Collection policies and a summary of typical charges and fees can be obtained from the Curator or Collection Manager of the paleontological department, or may even already be available online for downloading from an internet web site. Certainly a discussion with the Curator or Collection Manager of a relevant institution should be a part of any project management program prior to the point of curation of specimens for permanent archival care. Any paleontological program should consider including a written repository agreement with an institution prior to the initiation of mitigation activities.

5.8 Paleontological Reporting

A standard data recovery report will be prepared at the conclusion of all fieldwork pursuant to mitigation measure MM-PA-7 (*Paleontological Reporting*) in the LAX Master Plan. MM-PA-7 states that "A report detailing the results of these efforts, listing the fossils collected, and naming the repository shall be submitted to the lead agency at the completion of the project." The nature of the reporting program is expanded upon below.

5.8.1 Final Report

Evidence of satisfactory paleontological mitigation is incomplete without a final paleontological monitoring and mitigation report of findings and significance to accompany the fossil collection. The report should document the mitigation program and the results of the investigation. At a minimum it should contain an introduction, discussions or sections on the geographic and geologic settings, summary of the results of any records searches, previously published studies in the area, monitoring procedures and history, results (significance of discovered fossils, including lists of species from each locality), references cited, and supporting graphics and locality maps. The final report should contain a letter (or letters) of receipt from the institution(s) receiving the fossil collections.

5.8.2 Negative Report

Because of the nature of the sedimentary record, and the unequal distribution of fossils in those sediments, some project sites might be thoroughly monitored yet fails to yield any recognizable fossils. In such cases, a negative letter report should be considered satisfactory by the lead agency (LAWA), provided that such report contains an adequate summary of the project, a history of monitoring activities, and includes appropriate location maps and graphics.

5.8.3 Satisfactory Compliance

Compliance with the mitigation measures outlined in the PMTP will be considered fulfilled upon receipt by LAWA and approval of the final paleontological report.

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APPENDIX A

LAX MASTER PLAN ALTERNATIVE D
MITIGATION MONITORING & REPORTING PROGRAM

	Master Plan Commitments/ Mitigation Measures	Potential Impact Being Addressed	Timing of Implementation	Monitoring Frequency	Actions Indicating Compliance
	Paleontological Resources				
MM-PA-1 **Monitoring Agency:** **LAWA**	**Paleontological Qualification and Treatment Plan.** A qualified paleontologist shall be retained by LAWA to develop an acceptable monitoring and fossil remains treatment plan (that is, a Paleontological Management Treatment Plan - PMTP) for construction-related activities that could disturb potential unique paleontological resources within the project area. This plan shall be implemented and enforced by the project proponent during the initial phase and full phase of construction development. The selection of the paleontologist and the development of the monitoring and treatment plan shall be subject to approval by the Vertebrate Paleontology Section of the Natural History Museum of Los Angeles County to comply with paleontological requirements, as appropriate.	Loss or destruction of important paleontological resources	Prior to issuance of any excavation and grading permits for first Master Plan project	Once, upon retention of paleontologist and approval of the PMTP	Retention of paleontologist and approval of the PMTP by LAWA
MM-PA-2 **Monitoring Agency:** **LAWA**	**Paleontological Authorization.** The paleontologist shall be authorized by LAWA to halt, temporarily divert, or redirect grading in the area of an exposed fossil to facilitate evaluation and, if necessary, salvage. No known or discovered fossils shall be destroyed without the written consent of the project paleontologist.	Loss or destruction of important paleontological resources	Continued monitoring in accordance with the PMTP	On-going during excavation and grading activities as identified in the PMTP	Filing of periodic monitoring reports with LAWA, as stipulated in the PMTP
MM-PA-3 **Monitoring Agency:** **LAWA**	**Paleontological Monitoring Specifications.** Specifications for paleontological monitoring shall be included in construction contracts for all LAX projects involving excavation activities deeper than six feet.	Loss or destruction of important paleontological resources	Prior to finalization and approval of construction contracts for projects involving excavation deeper than six feet	Once, upon approval of each construction contract on a project-by-project basis	Review and approval of relevant construction contracts by project paleontologist and the filing of such contracts with LAWA
MM-PA-4 **Monitoring Agency:** **LAWA**	**Paleontological Resources Collection.** Because some fossils are small, it will be necessary to collect sediment samples of promising horizons discovered during grading or excavation monitoring for processing through fine mesh screens. Once the samples have been screened, they shall be examined microscopically for small fossils.	Loss or destruction of important paleontological resources	During excavation and grading activities, as stipulated in the PMTP	On-going during excavation and grading activities, as outlined in the PMTP	Filing of collection/ recovery reports with LAWA by project paleontologist, as stipulated in the PMTP

LAX MASTER PLAN ALTERNATIVE D
MITIGATION MONITORING & REPORTING PROGRAM

Master Plan Commitments/ Mitigation Measures		Potential Impact Being Addressed	Timing of Implementation	Monitoring Frequency	Actions Indicating Compliance
MM-PA-5 Monitoring Agency: LAWA	**Fossil Preparation.** Fossils shall be prepared to the point of identification and catalogued before they are donated to their final repository.	Loss or destruction of important paleontological resources	Upon discovery of significant fossils by project paleontologist	During grading and excavation activities as identified in the PMTP	Filing of appropriate reports by paleontologist with LAWA, as stipulated in the PMTP
MM-PA-6 Monitoring Agency: LAWA	**Fossil Donation.** All fossils collected shall be donated to a public, nonprofit institution with a research interest in the materials, such as the Los Angeles County Museum of Natural History.	Loss or destruction of important paleontological resources	Upon completion of each project during which fossils were discovered, as outlined in the PMTP	Once, upon completion of grading and excavation activities on a project-by-project basis	Acceptance letter of fossils from accepting repository, or offer letter from LAWA to repository
MM-PA-7 Monitoring Agency: LAWA	**Paleontological Reporting.** A report detailing the results of these efforts, listing the fossils collected, and naming the repository shall be submitted to the lead agency at the completion of the project.	Loss or destruction of important paleontological resources	Upon completion of excavation activities, as outlined in the PMTP	Once, upon completion of excavation activities on a project-by-project basis	Receipt of paleontological report by LAWA. If no resources are found, a report indicating as much should be filed

APPENDIX B

APPENDIX B

Society of Vertebrate Paleontology, Standard Guidelines for the Assessment and Mitigation of Adverse Impacts to Nonrenewable Paleontologic Resources

Prepared by The Committee for Conformable Impact Mitigation Guidelines, Robert E. Reynolds, Committee Chair

ASSESSMENT AND MITIGATION OF ADVERSE IMPACTS TO NONRENEWABLE PALEONTOLOGIC RESOURCES: STANDARD GUIDELINES

INTRODUCTION

Vertebrate Fossils are significant nonrenewable paleontological resources that are afforded protection by federal, state and local environmental laws and guidelines. The potential for destruction or degradation by construction impacts to paleontological resources on public lands (federal, state, county. or municipal) and land selected for development under the jurisdiction of various governmental planning agencies is recognized. Protection of paleontological resources includes: (a) assessment of the potential property to contain significant non renewable paleontological resources which might be directly or indirectly impacted, damaged or destroyed by development, and (b) formulation and implementation of measures to mitigate adverse impacts, including permanent preservation of the site and/or permanent preservation of salvaged materials in established institutions. Decisions regarding the intensity of that Paleontological Resources Impact Mitigation Program (PRIMP) will be made by the Project Paleontologist on the basis of the Paleontologic resources, not on the ability of an applicant to fund the project.

ASSESSMENT OF THE PALEONTOLOGICAL POTENTIAL OF ROCK UNITS

Sedimentary Rock units may be described as having (a) high (or known) potential for containing significant nonrenewable paleontological resources, (b) low potential for containing nonrenewable paleontological resources, or (c) undetermined potential.

It is extremely important to distinguish between archaeological and paleontological (=fossil) resource sites when defining the sensitivity of rock units. The boundaries of archaeological sites define the areal extent of the resource. Paleontological sites, however, indicate that the containing sedimentary rock unit or formation is fossilferous. The limits of the entire rock formation, both areal and stratigraphic, therefore define the paleontologic potential in each case. Paleontologists can thus develop maps which suggest sensitive areas and units that are likely to

contain paleontological resources. These maps form the bases for preliminary planning decisions. Lead Agency evaluation of a project relative to paleontologic sensitivity maps should trigger a "request for opinion" from a state paleontologic clearing house or an accredited institution with an established paleontological repository.

The determination of a site's (or rock unit's) degree of paleontological potential is first founded on a review of pertinent geological ad paleontological literature and on locality records of specimens deposited in institutions. This preliminary review may suggest particular areas of known high potential. If an area of high potential cannot be delimited from the literature search and specimen records, a surface survey will determine the fossilferous potential and extent of the sedimentary units within a specific project. The field survey may extend outside the defined project to areas where rock units are better exposed. If an area is determined to have a high potential for containing paleontologic resources a program to mitigate impacts is developed. In areas of high sensitivity a pre-excavation survey prior to excavation in recommended to locate surface concentrations of fossils, which might need special salvage methods. The sensitivity of rock units in which fossils occur may be divided into three operational categories.

I. HIGH POTENTIAL Rock units from which vertebrate or significant invertebrate fossils or significant suites of plant fossils have been recovered are considered to have a have potential for containing significant non renewable fossilferous resources. These units include but are not limited to, sedimentary formations and some volcanic formations which contain significant nonrenewable paleontological resources anywhere within their geographical extent, and sedimentary rock units temporally or lithologically suitable for the preservation of fossils. Sensitivity comprises both (a) the potential for yielding abundant or significant vertebrate fossils or for yielding a few significant fossils, large or small, vertebrate. invertebrate, or botanical and
(b) the importance of recovered evidence for new and significant taxononic, phylogenetic, ecologic, or stratigraphic data. Areas which contain potentially datable organic remains older than Recent, including deposits associated with nests or middens, and areas which may contain new vertebrate deposits, traces, or trackways are also classified as significant.

II. UNDETERMINED POTENTIAL. Specific areas underlain by sedimentary rock units for which little information is available are considered to have undetermined fossilferous potentials. Field surveys by a qualified vertebrate paleontologist to specifically determine the potentials of the rock units are required before programs of impact mitigation for such areas may be developed.

III. LOW POTENTIAL. Reports in the paleontological literature or field surveys by a qualified vertebrate paleontologist may allow determination that some areas or units have low potentials for yielding significant fossils. Such units will be poorly represented by specimens in institutional collections. These deposits generally will not require protection or salvage operations.

MEASURES TO MITIGATE ADVERSE IMPACTS RESULTING PROM DEVELOPMENT

Measures for adequate protection or salvage of significant nonrenewable paleontological resources are applied to areas determined to have a high potential for containing significant fossils. Specific mitigation measures generally need not be developed for areas or low paleontological potential. Developers and contractors should be made aware, however, that it is necessary to contact a qualified paleontologist if fossils are unearthed in the course of excavation. The paleontologist will then salvage the fossils and assess the necessity for further mitigation measures, if applicable.

Areas of High Potential

In area determined to have a high potential for significant paleontological resources, an adequate program for mitigating the impact of development should include:

(1) a preliminary survey and surface salvage prior to construction:
(2) monitoring and salvage during excavation;
(3) preparation, including screen washing to recover small specimens (if applicable), and specimen preparation to a point of stabilization and identification;
(4) identification, cataloging, curation, and storage; and
(5) a final report of the finds and their significance after all operations are completed

All phases of mitigation are supervised by a professional paleontologist who maintains the necessary paleontological collecting permits and repository agreements. The Lead Agency assures compliance with the measures developed to mitigate impacts of excavation during the initial assessment. To assure compliance from the start of the project, a statement that confirms the site's potential sensitivity confirms the repository agreement with an established institution, and describes the program for impact mitigation, should be deposited with the Lead Agency and contractors before work begins. The program will be reviewed and accepted by the Lead Agency's designated vertebrate paleontologist. If a mitigation program is initiated early during the course of project planning, construction delays due to paleontologic salvage activities can be minimized or avoided.

RECOMMENDED GENERAL GUIDELINES

These guidelines are designed to apply to areas of high paleontological potential.

Assessment Before Construction Starts.

Preconstruction assessment will develop an adequate program or mitigation. This may include a field survey to delimit the specific boundaries of sensitive areas and pre-excavation meetings with contractors and developers. In some cases it may be necessary to conduct field survey and/or a salvage program prior to grading to prevent damage to known resources and to avoid delays to construction schedule. Such a program may involve surface collection and/or quarry excavations. A review of the initial assessment and proposed mitigation program by the Lead Agency before operations begin will confirm the adequacy of the proposed program.

Adequate Monitoring.

An excavation project will retain a qualified project paleontologist. In areas of known high potential, the project paleontologist may designate a paleontologic monitor to be present during 100% of the earth-moving activities. If, after 50% of the grading is completed, it can

be demonstrated that the level of monitoring should be reduced, the project paleontologist may so amend the mitigation program.

Paleontologists who monitor excavations must be qualified and experienced in salvaging fossils and authorized to temporarily divert equipment while removing fossils. They should be properly equipped with tools and supplies to allow rapid removal of specimens.

Provisions should be made for additional assistants to monitor or help in removing large or abundant fossils to reduce potential delays to excavation schedules. If many pieces of heavy equipment are in use simultaneously but at diverse locations, each location may be individually monitored.

Macro Fossil Salvage.
Many specimens recovered from paleontological excavations are easily visible to the eye and large enough to be easily recognized and removed. Some may be fragile and require hardening before moving. Others may require encasing within a plaster jacket for later preparation and conservation in a laboratory. Occasionally specimens encompass all or much of a skeleton and will require moving either as a whole or in blocks for eventual preparation. Such specimens require time to excavate and strengthen before removal and the patience and understanding of the contractor to recover the specimens properly. It is thus important that the contractors and developers are fully aware or the importance and fragility of fossils for their recovery to be undertaken with the optimum chances of successful extraction. The monitor must be empowered to temporarily halt or redirect the excavation equipment away from the fossils to be salvaged.

Microfossil Salvage.
Many significant vertebrate fossils (e.g.. small mammal, bird, reptile, or fish remains) are too small to be visible within the sedimentary matrix. Fine grained sedimentary matrix and paleosols most often contain such fossils. They are recovered through concentration by screen washing. If the sediments are fossiliferous, bulk samples are for taken later processing to recover any fossils. An adequate ample comprises 12 cubic meters (6,000 lbs or 2,500 kg) of matrix for each site horizon or paleosol, or as determined by the supervising paleontologist. The uniqueness of the recovered fossils may dictate salvage of larger amounts. To avoid construction delays, samples of matrix should be removed from the site and processed elsewhere.

Preservation of Samples
Oriented samples must be preserved for paleomagnetic analysis. Samples of fine matrices should be obtained and stored for pollen analysis. Other matrix samples may be retained with the samples for potential analysis by later workers, for clast source analysis, as a witness to the source rock unit and possibly for procedures that are not yet envisioned.

Preparation.
Recovered specimens are prepared for identification (not exhibition) and stabilized. Sedimentary matrix with microfossils is screened washed and sorted to identify the contained fossils. Removal of excess matrix during the preparation process reduces storage space.

Identification.
Specimens are identified by competent qualified specialists to a point of maximum specificity. Ideally, identification is of individual specimens to element, genus, and species. Batch identification and batch numbering (e.g., "mammals, 75 specimens") should be avoided.

Analysis.
Specimens may be analyzed by stratigraphic occurrence, and by size, taxa, or taphonomic conditions. This results in a faunal list, a stratigraphic distribution of taxa, or evolutionary, ecological, or depositional deductions.

Storage.
Adequate storage in a recognized repository institution for the recovered specimens is an essential goal of the program. Specimens will be cataloged and a complete list will be prepared of specimens introduced into the collections or a repository by the curator of the museum or university. Adequate storage includes curation of individual specimens into the collection of a recognized, nonprofit paleontologic specimen repository with a permanent curator, such as a museum or a university. A complete set of field notes, geologic naps, and stratigraphic sections accompany the fossil collections. Specimens are stored in a fashion that allows retrieval of specific, individual specimens by researchers in the future.

Site Protection.
In exceptional instances the process of construction may reveal a fossil occurrence of such importance that salvage or removal is unacceptable to all concerned parties. In such cases, the design concept may be modified to protect and exhibit the occurrence within the project's design, e.g., as an exhibit in a basement mall. Under such circumstances, the site may be declared and dedicated as a protected resource of public value. Associated fragments recovered from such a site will be placed in an approved institutional repository.

Final Report.
A report is prepared by the project paleontologist including a summary of the field and laboratory methods, site geology and stratigraphy, faunal list, and a brier statement of the significance and relationship of the site to similar fossil localities. A complete set of field notes, geological maps, stratigraphic sections and a list of identified specimens accompany the report. The report is finalized only after all aspects of the program are completed. The Final Report together with its accompanying documents constitute the goals of a mitigation project. Full copies of the Final Report are deposited with the Lead Agency and the repository institution.

A LEAD AGENCY is the agency responsible for addressing impacts to nonrenewable resources that a specific project might generate.

PALEONTOLOGICAL POTENTIAL is the potential for the presence of significant nonrenewable paleontological resources. All sedimentary rocks, some volcanic rocks, and some metamorphic rocks have potential air the presence of significant nonrenewable paleontological resources. Review of available literature may further refine the potential of each

rock unit formation, or facies.

PALEONTOLOGIC SENSITIVITY is determined only after a field survey of the rock unit in conjunction with a review of available literature and paleontologic locality records. In clues where no subsurface data are available sensitivity may be determined by subsurface excavation.