



Figure 4-11: Areas with Potential Archaeological Deposits (Wilshire Blvd. between S. Cochran Ave. and S. Highland Ave.)

WESTSIDE SUBWAY EXTENSION

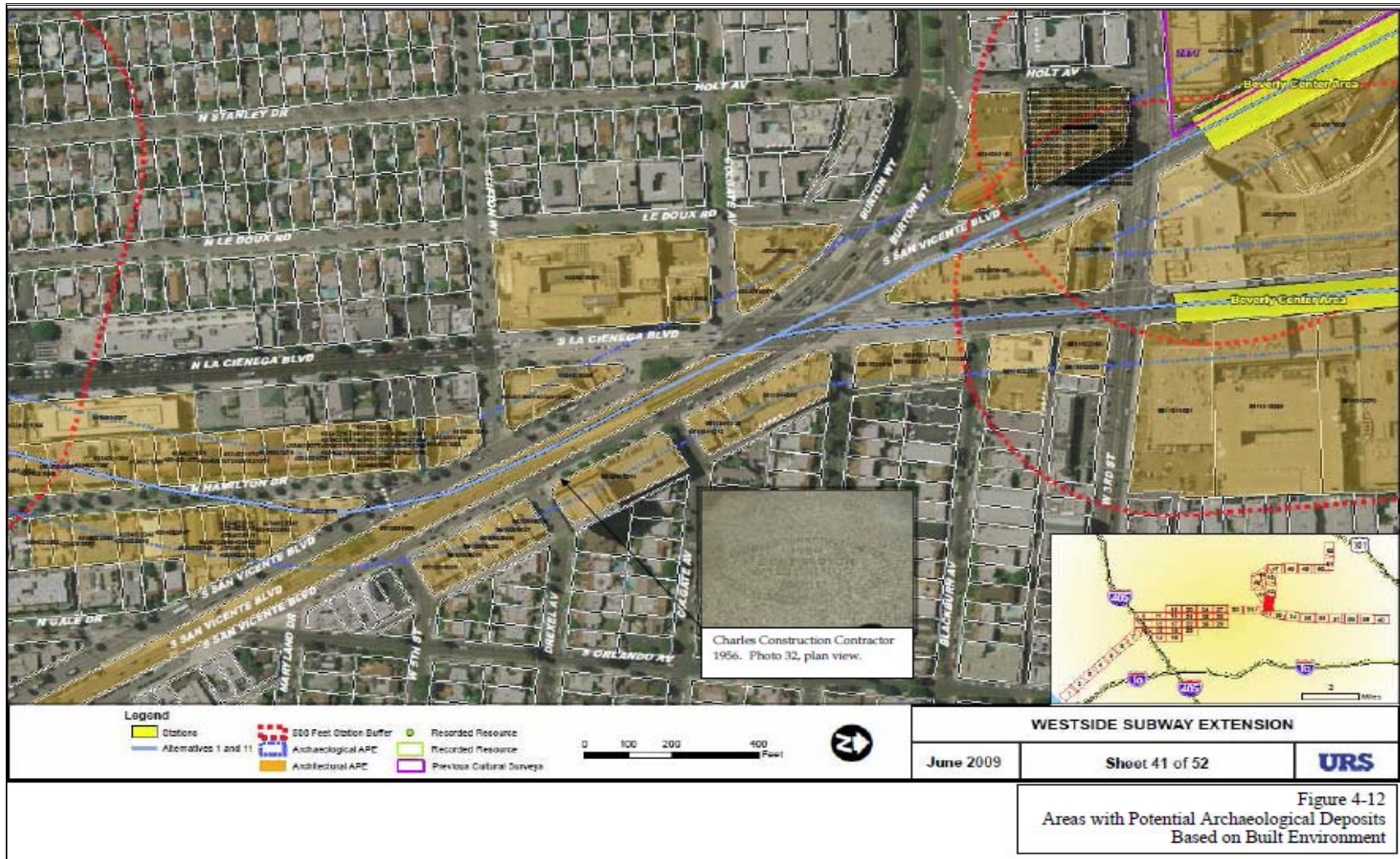


Figure 4-12: Areas with Potential Archaeological Deposits (San Vicente Ave. between N. Gale Dr. and Burton Way)

- In the area of Wilshire Boulevard and Dunsmore, a built date of 1947 indicates a modification to the subsurface environment. While there is a potential for buried deposits, it is less likely that historic period deposits will be identified as significant (Figure 4-10).
- Potential resources could be uncovered on Cloverdale and Wilshire Boulevard based on the sidewalk date stamp of 1928, indicates a potential for historic period archaeological deposits prior to 1928 (Figure 4-11).
- Potential resources could be uncovered on Wilshire Boulevard between Hudson and Rimpau based on the presence of a vacant lot and remnants of brick, indicating the demolition of a brick structure, and therefore a potential for subsurface historic deposits (Figure 4-12).

#### **4.4.1.3 Alternative 2—Westwood/VA Hospital Extension**

As a result of the previous identification of archaeological resources within and adjacent to the proposed APE for Alternative 2 this alternative has the potential to have an effect on cultural resources pertaining to intact archaeological deposits.

Given the historic period nature of the built environment, which often did not disturb more than a few feet of topsoil, there is a potential for construction to encounter subsurface prehistoric and/or historic archaeological deposits in this area.

See analysis for Alternative 1.

#### **4.4.1.4 Alternative 3—Santa Monica Extension**

As a result of the previous identification of archaeological resources within and adjacent to the proposed APE for Alternative 3; this alternative has the potential to have an effect on cultural resources pertaining to intact archaeological deposits.

Given the historic period nature of the built environment, which often did not disturb more than a few feet of topsoil, there is a potential for construction to encounter subsurface prehistoric and/or historic archaeological deposits.

See analysis for Alternative 1. In addition, a higher potential for the presence of buried historic period deposits is likely around proposed 4<sup>th</sup> Street/Wilshire Boulevard Station. These areas have a higher likelihood of having intact deposits based on the age of the built environment. (See Historic Resources Report)

#### **4.4.1.5 Alternative 4—Westwood/VA Hospital Extension plus West Hollywood Extension**

As a result of the previous identification of archaeological resources within and adjacent to the proposed APE for Alternative 4 this alternative has the potential to have an effect on cultural resources pertaining to intact archaeological deposits.

Given the historic period nature of the built environment which often did not disturb more than a few feet of topsoil, there is a potential for construction to encounter subsurface prehistoric and/or historic archaeological deposits.

See analysis for Alternative 1. In addition, a higher potential for the presence of buried historic period deposits is likely around Highland Avenue and Hollywood Boulevard.

These areas have a higher likelihood of having intact deposits based on the age of the built environment (Figure 4-13 and Figure 4-14). (See Historic Resources Report)

#### **4.4.1.6 Alternative 5—Santa Monica Extension plus West Hollywood Extension**

As a result of the previous identification of archaeological resources within and adjacent to the proposed APE for Alternative 5 this alternative has the potential to have an effect on cultural resources pertaining to intact archaeological deposits.

Given the historic period nature of the built environment, which often did not disturb more than a few feet of topsoil, there is a potential for construction to encounter prehistoric and/or historic archaeological deposits.

See Analysis for Alternative 1. In addition, a higher potential for the presence of buried historic period deposits is likely around Santa Monica Boulevard. These areas have a higher likelihood of having intact deposits based on the early 20<sup>th</sup> century age of the built environment. (See Historic Survey Report, April 2010.)

#### **4.4.1.7 MOS 1—Fairfax Extension**

As a result of the previous identification of archaeological resources within and adjacent to the proposed APE, MOS 1 has the potential to have an effect on cultural resources pertaining to intact archaeological deposits.

Given the historic period nature of the built environment, which often did not disturb more than a few feet of topsoil, there is a potential for construction to encounter subsurface prehistoric and/or historic archaeological deposits.

See analysis for Alternative 1.



Figure 4-13: Areas with Potential Archaeological Deposits (Santa Monica Blvd. between S. Beverly Glen Blvd. to Club view Dr.)

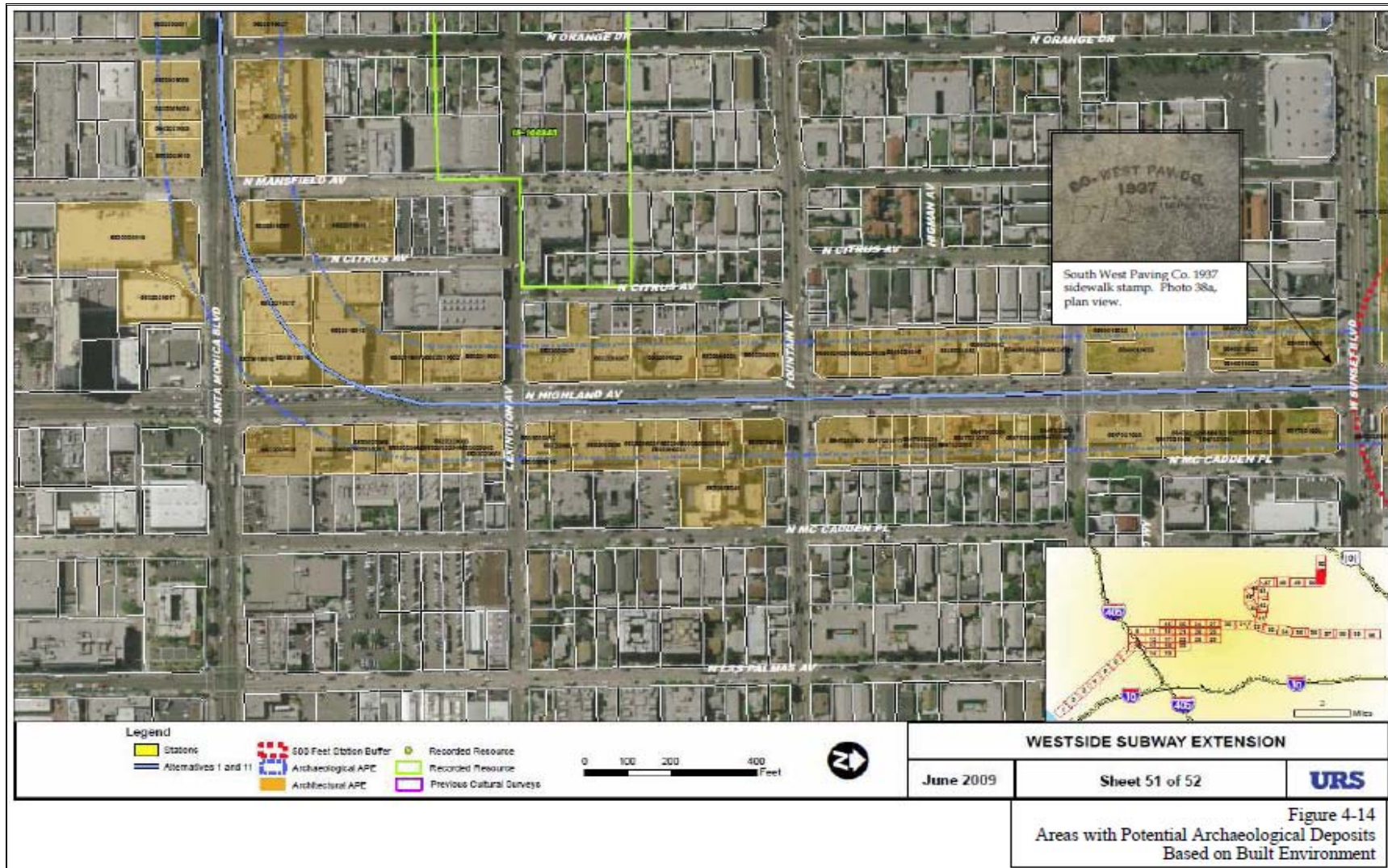


Figure 4-14: Areas with Potential Archaeological Deposits (N. Highland Ave. between Santa Monica Blvd. and W. Sunset Blvd.)

**4.4.1.8 MOS 2—Century City Extension**

As a result of the previous identification of archaeological resources within and adjacent to the proposed APE, MOS 2 has the potential to affect cultural resources pertaining to intact archaeological deposits.

Given the historic period nature of the built environment, which often did not disturb more than a few feet of topsoil, there is a potential for construction to encounter subsurface prehistoric and/or historic archaeological deposits.

See analysis for Alternative 1.

**4.4.1.9 Maintenance and Operation Facility Sites**

As a result of the previous identification of archaeological resources within and adjacent to the proposed APE for the Maintenance and Operation Facility Sites; this alternative has the potential to affect cultural resources pertaining to intact archaeological deposits.

Given the historic period nature of the built environment, which often did not disturb more than a few feet of topsoil, there is a potential for construction to encounter subsurface prehistoric and/or historic archaeological deposits.

A historic period archaeological deposit was identified during the URS Class 1 field survey and was recorded as MTA-TEMP-1. This deposit consisted of historic brick and historic period glass fragments. The resource is not considered eligible for listing on the NRHP, because it is not (a) associated with events that have made a significant contribution to the broad patterns of history, (b) associated with the lives of persons significant, (c) embody distinctive characteristics of a type, period or method of construction, or (d) yielded or may be likely to yield important information about prehistory or history. Therefore, this resource is not considered eligible for listing on the NRHP.

A historic period streetscape was identified approximately 5 meters west of MTA-TEMP-1 and identified as MTA-TEMP-2. MTA-TEMP-2 was located directly adjacent to the one of the foundation pillars of the 6<sup>th</sup> Street Viaduct. The resource is not considered eligible for listing on the NRHP, because it is not (a) associated with events that have made a significant contribution to the broad patterns of history, (b) associated with the lives of persons significant, (c) embody distinctive characteristics of a type, period or method of construction, or (d) yielded or may be likely to yield important information about prehistory or history. Therefore, this resource is not considered eligible for listing on the NRHP. (See Appendix B)

**4.4.2 CEQA Determination**

Pursuant to California Environmental Quality Act (CEQA), impact would be considered significant if the APE has the potential to:

- Cause a substantial adverse change in the significance of an archaeological resource pursuant to Section 15064.5
- Disturb any human remains, including those interred outside of formal cemeteries

While no eligible resources were identified during the pedestrian survey given the nature of the built environment, the Build Alternatives have the potential to cause direct effects to the significance of an archaeological resource and to result in a significant direct impact to archaeological resources (PRC Section 5020.1[q] and CEQA Guidelines Section 15064.5[b]) due to the possibility of the existence of buried subsurface resources. However, none of the alternatives are expected to disturb any human remains, including those interred outside of formal cemeteries. Due diligence through the retention of an archaeologist and appropriate site monitors will be maintained. All of the Build Alternatives, except for MOS 1 and 2, occur in the vicinity of the Los Angeles National Cemetery, but will not impact the cemetery.

## 4.5 Mitigation Measures

### 4.5.1 All Build Alternatives

- **AR-1**—Metro shall implement a mitigation monitoring program and shall retain a qualified archaeologist to monitor all ground disturbing activities where sub-surface soils will be exposed and examination of these deposits are feasible. The areas to be examined will be determined based on project plans and in consultation with construction staff and the qualified archaeologist during pre-construction meetings and as needed throughout the construction process. If subsurface resources are identified by the monitor during construction, all construction activities in the area of identified archaeological resources shall be temporarily halted so that the archaeologist may quickly document and remove any resources (as may be necessary). All resources shall be documented on California Department of Parks and Recreation (DPR) 523 Series Forms. At the completion of archaeological monitoring for the project, an archaeological resources monitoring report shall be prepared and submitted, along with any DPR forms, to the South Central Coastal Information Center (SCCIC) to document the results of the monitoring activities and summarize the results of subsurface resources encountered, if any.
- **AR-2**—Metro shall ensure that impacts to cultural resources related to the unanticipated discovery of human remains are reduced to less than significant by ensuring that, in the event that human remains are encountered, construction in the area of the find shall cease, and the remains will remain *in-situ* pending definition of an appropriate plan to adequately address the resources. The Los Angeles County Coroner shall be contacted to determine the origin of the remains. In the event the remains are Native American in origin, the NAHC shall be contacted to determine necessary procedures for protection and preservation of the remains, including reburial, as provided in the State of California Environmental Quality Act (CEQA) Guidelines, Section 15064.5(e), “CEQA and Archaeological Resources,” CEQA Technical Advisory Series.

### 4.5.2 Impacts Remaining After Mitigation

Implementation of the above measures (AR-1 and AR-2) will reduce potential impacts to cultural resources to a less than significant level.





## 5.0 PALEONTOLOGICAL RESOURCES

### 5.1 Introduction

#### 5.1.1 Federal

The Antiquities Act of 1906 has been used as the basis for federal protection of paleontological resources on federal lands. The Antiquities Act of 1906 authorizes the government to regulate any disturbance of objects of antiquity on federal lands through the responsible managing agency and to prosecute unauthorized damage or removal.

The National Environmental Policy Act of 1969 (NEPA) requires that important aspects of our national heritage be considered in assessing the environmental consequences of any proposed project. The Federal Transportation Administration (FTA) is the lead agency under NEPA. Identify and remain consistent with FTA policies that are applicable to paleontological resources with regard to this proposed project.

The Paleontological Resources Preservation Act (PRPA) of 2009 codifies the existing practice of requiring that vertebrate fossils and other rare and scientifically significant fossils be collected only by qualified researchers who obtain a permit. Permittees must agree to deposit the fossils in public institutions, which will ensure their future availability to researchers and the public.

#### 5.1.2 State

The California Environmental Quality Act (CEQA) applies to projects within California. The legislation does not specifically address paleontological resources, but the Guidelines for the Implementation of CEQA, as amended in 2004, include a standard checklist that requires proponents and regulators to determine whether the proposed project will directly or indirectly destroy a unique paleontological resource or site. A paleontological investigation is mandated if the answer to the question of the presence of paleontological resources is “yes” or “possibly”.

#### 5.1.3 Regional

SCAG serves as the Metropolitan Planning Organization (MPO) for the region. The SCAG *Regional Transportation Plan (RTP)*, updated in 2008, and the *Regional Comprehensive Plan and Guide (RCPG)*, currently being updated, are tools used for identifying the transportation priorities of the Southern California region.<sup>2829</sup> The cultural resources mitigation program of the Transportation Section of the RTP includes a measure for monitoring construction activity in areas with moderate to high potential to support paleontological resources and overseeing salvage operations of paleontological resources. (design and siting measures that policies and goals of the RTP and RCPG focus on the need to identify and treat paleontological resources within the region will be described.)

<sup>28</sup> SCAG. 2008. Regional Transportation Plan (RTP).

<sup>29</sup> SCAG. 2008. Regional Comprehensive Plan and Guide (RCPG).

#### 5.1.4 Local

##### 5.1.4.1 City of Los Angeles

Identify paleontological resource objectives and programs within the City of Los Angeles. Identify and refer to City of Los Angeles zones of paleontological sensitivity.

The Conservation Element of the City of Los Angeles General Plan (City of Los Angeles, 2001) recognizes that the city is rich in paleontological sites and provides guidelines for developers to address paleontological resources. The General Plan states that one of its objectives is to protect the city's paleontological resources for historical, cultural, research and/or educational purposes. The stated policy is to continue to identify and protect significant paleontological sites and/or resources known to exist or that are identified during land development, demolition, or property modification activities.<sup>30</sup>

##### 5.1.4.2 City of West Hollywood

The City of West Hollywood General Plan has no provisions for paleontological resources, but the City is in the process of updating their General Plan.

##### 5.1.4.3 City of Beverly Hills

The existing City of Beverly Hills General Plan has no provision for paleontological resources, but the city is in the process of updating the General Plan. Multiple elements have been created from the current Conservation Element (City of Beverly Hills, 1979), including a proposed Historic Preservation Element. An updated version, including the Historic Preservation Element, was adopted on January 21, 2010. However, the revision has yet to be incorporated and signed. Goal 1 of the pending Historic Preservation Element states that 1 of the pending Historic Preservation Element states that

*"Value and Preserve Significant Cultural Resources. A community with well-preserved and maintained historic and cultural resources that provide a sense of permanence foster civic pride and stewardship, and contribute to the unique identity and character of the City."*

Policy HP1.9 states,

*"Paleontological Resources Unearthed During Construction Activities. In the event that excavation reveals any paleontological resources, suspend earth disturbing work until the resource is evaluated. Allow work to resume only after the find has been appropriately mitigated. (Imp2.2)"<sup>31</sup>*

##### 5.1.4.4 City of Santa Monica

The Conservation Element (City of Santa Monica, 1975) of the City of Santa Monica General Plan has no provisions for paleontology. Likewise, there are no provisions for paleontology in the other elements.<sup>32</sup>

<sup>30</sup> City of Los Angeles. 1980. General Plan, Land Use Element and Conservation Element.

<sup>31</sup> City of Beverly Hills. 1979. General Plan, Conservation Element.

<sup>32</sup> City of Santa Monica. 1975. General Plan, Conservation Element.

**5.1.4.5 County of Los Angeles**

The Land Use Element (1980) of the current County of Los Angeles General Plan recognizes paleontological resources as cultural heritage resources. The Element mandates a paleontological literature search for the initial study of any public or private project. It also make provisions for site surveys, conditions of approval, and disposition of paleontological resources recovered from such projects. The Conservation Element (1980) of the current County of Los Angeles General Plan does not mention paleontological resources.

The Conservation and Open Space Element of the Draft General Plan (2008) states that sites of paleontological significance are nonrenewable and irreplaceable cultural heritage resources. It lists two policies applicable to paleontological resources regarding the county's cultural heritage resources:

- Policy C/OS 12.1: Support an inter-jurisdictional collaborative system that protects and enhances the County's cultural heritage resources.
- Policy C/OS 12.4: Promote public awareness of the County's cultural heritage resources.

The Draft Conservation and Open Space Element also offers eight guidelines for a Model Project in paleontological and other cultural resources. These include a literature search, a professional assessment, notification of the County Historical Landmarks Commission, mitigation of all significant effects, maintaining significant historical features and sightlines, consideration of appropriate setbacks, and donation of materials collected to appropriate institutions.<sup>33</sup>

**5.1.4.6 Specific Plans**

There are no specific plans within the study area that refer to paleontological resources.

**5.2 Professional Standards**

The Society of Vertebrate Paleontology (SVP) is an international scientific organization of professional vertebrate paleontologists. The Society has established standard guidelines (SVP, 1995, 1996) that outline acceptable professional practices in the conduct of paleontological resource assessments and surveys, monitoring and mitigation, data and fossil salvage, sampling procedures, specimen preparation, identification, analysis, and curation. Most practicing professional paleontologists in the nation adhere closely to the SVP's assessment, mitigation, and monitoring requirements as specifically addressed in its standard guidelines. The SVP's standard guidelines were approved by a consensus of professional paleontologists and are the standard against which all paleontological monitoring and mitigation programs are judged. Many federal and California state regulatory agencies have either formally or informally adopted the SVP's "standard guidelines" for the mitigation of construction-related adverse impacts on paleontological resources as a measure of professional practice.

<sup>33</sup> Draft Conservation and Open Space Element. 2008.

### 5.3 Methodology

This study utilized multiple sources of information to assess the known and potential paleontological sources that lie along the possible routes of the Westside Extension. These include

- A Paleontological Record Search through the Natural History Museum of Los Angeles County which includes the records of the Page Museum of La Brea Discoveries
- Published Geologic maps
- Published documents describing area geology and paleontological resources
- Previously prepared unpublished environmental documentation for related Metropolitan Transit Authority and Southern California Rapid Transit District Metro Rail projects
- Unpublished documents prepared for other various planned and constructed projects in the vicinity of the possible routes of the Westside Extension
- Field Investigation

#### 5.3.1 Field Investigation Methodology

Given the densely built environment throughout most of the corridor and alternatives alignments, only limited information can be gained through a field survey. Aerial photos of the route and adjacent areas were scrutinized for areas where surficial geology might be observed. A pedestrian survey was conducted along both sides of alternatives alignment, with a focus on finding areas—either through current construction activities or through existing geologic exposures, where indications of native (natural) geologic units could be observed. The results of geotechnical investigations of the alternatives supplied the most reliable information in areas where no surface exposures were present were also used to assist in the analysis.

#### 5.3.2 Agency Coordination

Pertinent entities that are consulted concerning paleontological resources in a metropolitan setting are limited to museums and city planning departments. Knowledgeable individuals can add supplementary information. Metropolitan Transit Authority representatives met with paleontologists from the Natural History Museum of Los Angeles County and from the Page Museum of La Brea Discoveries, which is a satellite museum of the former institution. Construction strategies and methods of recovering paleontological resources were discussed. Dr. Samuel McLeod of the Natural History Museum performed a paleontological records search for the possible routes for the Project. Planning departments of all municipalities within the APE were consulted. Agency contact persons and dates contacted are provided in Table 5-1.

**Table 5-1: Contacted Government Agencies**

Agency	Contact Person	Date(s) Contacted
Natural History Museum of Los Angeles County	Dr. Samuel A. McLeod	3-18-09, 4-24-09, 4-30-09, 3-2-10
Natural History Museum of Los Angeles County	Dr. John M. Harris	3-18-09, 1-25-10, 2-5-10, 2-10-10
Natural History Museum of Los Angeles County	Christopher Shaw	3-18-09, 4-30-09, 7-13-09, 2-5-10, 2-10-10
Natural History Museum of Los Angeles County	Aisling Farrell	5-4-09, 6-8-09, 6-9-09, 7-8-09, 7-20-09
Natural History Museum of Los Angeles County	Victoria Brown	11-23-09, 12-02-09
City of Santa Monica	Colleen Stoll	2-24-10
City of Los Angeles	Ken Bernstein	3-1-10
City of Beverly Hills	Peter Noonan	3-22-10
City of West Hollywood	John Keho	3-24-10
City of West Hollywood	Bianca Siegel	3-24-10

### 5.3.3 Other Coordination Efforts

Additional coordination efforts involved consultation with paleontological experts for the study area. These individuals included James Quinn, M.A., Robin Turner, M.A., and Richard Reynolds, M.A. who were also consulted for their expertise in the paleontology and stratigraphy of the asphalt deposits in the vicinity of the Rancho La Brea Tar Pits. Data obtained from consultation efforts assisted in preparation of the paleontological analysis presented in this report.

## 5.4 Affected Environment

### 5.4.1 Geologic Setting

This section will present a description of geologic setting of the project area. Information about documented paleontological locations and geologic formations that potentially may contain sensitive paleontological resources of study area will be provided.

The single event that had the greatest effect on the current physiography, geology, and topography of the Study Area was the process that led to the formation of the San Andreas Fault System. Prior to 30 million years ago, the western edge of the North American Plate in California was overriding the Farallon Plate. At this point, the spreading ridge that separated the Pacific Plate from the Farallon Plate became involved in this subduction process. Ultimately, spreading ridge segments created the Gulf of California, and a very long transform fault (the San Andreas Fault) connected this spreading ridge with the \_\_\_ ridge in the eastern Pacific Ocean. What had been our part of the North American Plate thus became part of the Pacific Plate. Since then, the majority of smaller faults in southern California trend northwest-southeast, and the general movement of lands between these faults is to the northwest, relative to the rest of North America.

The study area is situated within the Los Angeles Basin at the northern edge of the Peninsular Ranges Physiographic Province, and just outside the southern edge of the Transverse Ranges Physiographic Province. The Study Area lies at the northern edge of the Los Angeles Basin. The Santa Monica Mountains define the northern edge of the

study area. Like other parts of the Transverse Ranges, these mountains run east-west, which is dissimilar to most mountain chains in western North America. These mountains are of recent origin, and are the result of north-south compression and shortening of the region. The Santa Monica Mountains have been described as an uplifted peneplain. The complex interplay of fluctuating global sea level and progressive uplift of coastal California has resulted in considerable variations in what parts of the basin were inundated or emergent at any given period. Even into early Pleistocene times, much of the Los Angeles Basin was an embayment of the Pacific Ocean.

The La Brea Plain forms a slightly elevated surface at the foot of the Santa Monica Mountains along their southern edge. Its uppermost sediments are alluvial fans resulting from the erosion of these mountains. Ballona Creek drains this area. A ridge extending from the Cheviot Hills to the Santa Monica foothills crosses the project near the 405 Freeway. This is related to the Newport-Englewood uplift. West of the Cheviot Hills lies the Sawtelle Plain, and beyond that the Santa Monica Plain.

Complex tectonic forces have warped parts of the Los Angeles Basin upward, and other parts downward. These interactions have produced petroleum traps. Those most exploited in the Study Area are the Beverly Hills, Cheviot Hills, San Vicente, and Salt Lake oil fields. The last of these includes petroleum seeps that produced the Rancho La Brea Tar Pits, discussed below.

#### **5.4.1.1 Geologic units within the Study Area**

This section relies on the mapping of the surficial geologic units within the study area published by Dibblee and Ehrenspeck (1991a, 1991b, and 1992).<sup>34</sup>

#### **5.4.1.2 Younger Alluvium**

The lithologic distinction between Younger Alluvium and Older Alluvium is rather subtle. The Younger Alluvium consists of silts, sands, clays, and gravel. The Younger Alluvium tends to be less consolidated than the Older Alluvium. The Younger Alluvium is of Holocene age (less than 10,000 years). Remains of less than 5,000 years are not considered to be significant paleontological resources (SVP, 1994).<sup>35</sup> Younger Alluvium is mapped along Wilshire Boulevard from Western Avenue to Norton Avenue and from a bit west of Fairfax Avenue to Santa Monica Boulevard. Along Santa Monica Boulevard, it is mapped from Overland Avenue to Sepulveda Boulevard. Along Sepulveda Boulevard, it is mapped from Santa Monica Boulevard to Wilshire Boulevard. Along Wilshire Boulevard, it is mapped from Sepulveda Boulevard to the Veterans Administration campus west of the 405 Freeway. It is mapped along Glendon Avenue — from Wilshire Boulevard to Santa Monica Boulevard, and along Santa Monica Boulevard from La Cienega Boulevard to Wilshire Boulevard.

#### **5.4.1.3 Older Alluvium**

The Older Alluvium consists of silts, sands, clays, gravel, and asphaltic sands. It tends to be more consolidated than the Upper Alluvium. The Older Alluvium can have a basal layer of marine fossiliferous sand in and near sea cliffs (McGill, 1989). The Older

<sup>34</sup> Dibblee and Ehrenspeck. 1991a, 1991b, and 1992.

<sup>35</sup> SVP. 1994.

Alluvium is dated from the Holocene/Pleistocene boundary (approximately 10,000 years ago) to over one million years. Older alluvium is mapped along Wilshire Boulevard from Norton Avenue to west of Fairfax Avenue, along Santa Monica Boulevard from Century Park East to Midvale Avenue, along Westwood Boulevard from Santa Monica Boulevard to Wilshire Boulevard, along Wilshire Boulevard from just west of the 405 freeway to the western terminus of the Project, along Santa Monica Boulevard from La Cienega Boulevard to Highland Avenue, and along Highland Avenue from Santa Monica Boulevard to Hollywood Boulevard. It produces Pleistocene vertebrate fossils, mostly of mammals. However, in the vicinity of Hancock Park Rancho La Brea Tar Pits, it has produced more than one million vertebrate fossils and perhaps two million invertebrate fossils. Appendix D provides more than 500 scientific papers published on the paleontological resources produced by these asphaltic deposits.

#### 5.4.1.4 San Pedro Sand

The San Pedro Sand is not exposed at the surface anywhere within the Study area, but in the subsurface along the Study area, its lithology is primarily of fine-grained sand and silty sand, some interbeds of medium- to course-grained sand, some asphaltic sand, and local areas of gravely sand and shell fragments. Use of "mya" and "bya" is deprecated in modern geophysics, the recommended usage being "Ma" and "Ga" for dates Before Present, but "m.y." for the duration of epochs.<sup>36,37</sup> This ad hoc distinction between "absolute" time and time intervals is somewhat controversial amongst members of the Geological Society of America (Time Units Geological Society of America. <http://www.geosociety.org/TimeUnits/>. Retrieved 17 February 2010).<sup>38</sup> A number of marine units less than 1 million years old (ma) have been identified in borings within Hancock Park. The latest marine sediments in the sequence are thought to be correlatives of the Bent Springs Amino-Acid Assemblage Zone, dated at approximately 320 thousand years old (ka) (Quinn et al., 2000). Also identified below that zone are the Lava Creek Ash (665 ka), the Bishop Ash (770 ka), the Brunhes/Matuyama boundary (780 ka), and the Jaramillo paleomagnetic chron (0.986-1.053 ma)(Quinn et al., 2000). All these are treated here as parts of the San Pedro Sand. The lowest San Pedro Sand unit in the Hancock Park area rests directly on sediments of the Puente Formation (5.5- 7.45 MA)(Quinn et al., 2000).<sup>39</sup> In the Study area the San Pedro Sand has produced horse, coyote, turtle, fish, shark, and invertebrate fossils. The San Pedro Sand has a high sensitivity for producing significant paleontological resources.

#### 5.4.1.5 Fernando Formation

The Fernando Formation is not exposed at the surface anywhere within the Study Area. It occurs in the subsurface along Crenshaw Boulevard westward to the City of Santa Monica along Alternative 3 (Mactec, 2010).<sup>40</sup> Its lithology there consists predominantly of massive siltstone and claystone with a few sandstone interbeds. The Fernando Formation may be encountered along Alternatives 1 through 3 and MOS1 and 2 between South

<sup>36</sup> American Geophysical Union. 2007. AGU Editorial Style Guide for Authors.

<sup>37</sup> North American Commission on Stratigraphic Nomenclature. 2005. North American Stratigraphic Code.

<sup>38</sup> Geological Society of America. 2010. Time Units.

<sup>39</sup> Quinn et al. 2000. Geological investigations of Quaternary deformation and implications for blind fault activity, northern Los Angeles Basin. Final Technical Report NEHRP 1434-HQ-98-GR-00025.

<sup>40</sup> Mactec. 2010. Draft geotechnical and environmental report, task 10.02.



Rimpau Boulevard and South McCadden Place in the Hancock Park area (*Draft Geotechnical and Hazardous Materials Technical Report, Metro, April 2010*).<sup>41</sup> It has not produced any paleontological resources in the Study area, but elsewhere in the Los Angeles Basin, it has produced numerous invertebrate species, several fish species, and a few birds and mammals. The Fernando Formation has a high sensitivity for producing significant paleontological resources.

#### **5.4.1.6 Puente Formation**

The Puente Formation is not exposed at the surface anywhere within the Study Area. Given preliminary profile elevations, the Project will not impact the Puente Formation. The top of the Puente Formation beneath Hancock Park falls within an interval dated at 5.5—7.45 MA (Quinn et al., 2000).<sup>42</sup> The Puente Formation has produced numerous significant paleontological resources, ranging from plants to invertebrates to vertebrates, including numerous types of fish and a few reptiles, birds, and mammals. The Puente Formation has a high sensitivity for producing significant paleontological resources (Figure 5-1).

### **5.4.2 Summary of Paleontological Resources by Alternative**

#### **5.4.2.1 No Build Alternative**

Under the No Build Alternative, no construction would take place. As a result, paleontological resources would not be affected by this alternative.

#### **5.4.2.2 Transportation System Management (TSM) Alternative**

Under the Transportation System Management Alternative, no construction would take place. Therefore, no paleontological resources would be impacted or adversely affected.

#### **5.4.2.3 Alternative 1—Westwood/UCLA Extension**

Just east of the existing Wilshire/Western station, construction of the Purple Line produced a specimen of mammoth near the intersection of Wilshire Boulevard and Serrano Avenue. A mammoth tooth is illustrated in Figure 5-2. North of that station (Western Avenue and Council Street), a mastodon fossil was recovered. East of La Brea Avenue and south of Wilshire Boulevard, three localities produced Late Pleistocene vertebrate fossils (mastodon, shrub ox, and camel) in asphalt deposits at shallow depths.

<sup>41</sup> Draft Geotechnical and Hazardous Materials Technical Report.

<sup>42</sup> Quinn et al. 2000. Geological investigations of Quaternary deformation and implications for blind fault activity, northern Los Angeles Basin. Final Technical Report NEHRP 1434-HQ-98-GR-00025.



From La Brea Boulevard to La Cienega Boulevard are a large number of Pleistocene fossil localities, particularly in and around the Rancho La Brea Tar Pits in Hancock Park. These localities occur in asphaltic sands and silts and those deposits producing extinct organisms dated from 11,000 to 38,000 years old. These occur from ground surface to perhaps 40 feet deep. Some sources judge that these constitute the densest accumulation of vertebrate fossils in the world. Their location, accessibility, and continuing productivity (see Turner, 2006) in a major urban setting make them truly unique.<sup>43</sup>

Along La Cienega, both north and south of where the San Vicente part of the West Hollywood Extension crosses La Cienega Boulevard, are vertebrate fossil localities. These have produced mastodon, horse, deer, and bison fossils from the Older Alluvium.

On Wilshire Boulevard both east and west of Beverly Drive, the Older Alluvium has produced horse and artiodactyl fossils. A site in Century City, between the Century City/Santa Monica Boulevard and Century City/Constellation Boulevard segments, produced turtle, rodent, coyote, horse, fish, shark, and invertebrate fossils from the San Pedro Sand. A locality on Santa Monica Boulevard at the intersection of the Century City/Santa Monica Boulevard and Century City/Constellation Boulevard segments (near Wilshire Boulevard and Thayer Avenue), produced horse, kangaroo rat, wood rat, vole, and gopher fossil from the Older Alluvium (Figure 5-2 and Figure 5-3).

#### **5.4.2.4 Alternative 2—Westwood/VA Hospital Extension**

This alternative does not include any known paleontological resources beyond those identified under Alternative 1.

This alternative adds the Santa Monica Boulevard extension to the existing Metro Red Line. There are no known paleontological localities adjacent to the Santa Monica Boulevard extension that are not mentioned in the Wilshire Boulevard Alignment. However, there would be extensive disturbance of Older Alluvium that would not be included in the latter. Thus, there would be greater likelihood of impacting paleontological resources under this alternative.

#### **5.4.2.5 Alternative 3—Santa Monica Extension**

This alternative includes all the known paleontological resources of Alternative 1 plus one locality in Santa Monica. Between Olympic and the Interstate 10 Freeway at Cloverfield, a locality produced a fossil of the American lion from the Older Alluvium. This is not far south of the Santa Monica extension.

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<sup>43</sup> Turner, R. D. 2006. Archaeological and paleontological monitoring report, LACMA Transformation Project, Los Angeles, California.



Figure 5-2: Rancho La Brea Saber Tooth Cat (*Smilodon*) Pelvis



Figure 5-3: Rancho La Brea Saber Tooth Cat (*Smilodon*) Skull

- 5.4.2.6 Alternative 4—Westwood/VA Hospital Extension plus West Hollywood Extension**  
This alternative includes all the known paleontological resources of Alternative 1. There are no additional known paleontological resources along the West Hollywood Extension.
- 5.4.2.7 Alternative 5—Santa Monica Extension plus West Hollywood Extension**  
This alternative includes all known paleontological resources of Alternative 3 plus alternative 4.
- 5.4.2.8 MOS 1—Wilshire Boulevard HRT Subway from Wilshire/Western to Fairfax**  
MOS 1 encounters all the Older Alluvium sites from the existing Wilshire/Western Station to the Wilshire/Fairfax Station. This includes the extensive paleontological resources in and around Hancock Park (Rancho La Brea Tar Pits).
- 5.4.2.9 MOS 2—Wilshire Boulevard HRT Subway from Wilshire/Western to Century City**  
MOS 2 encounters all the known paleontological resources of MOS1 plus known paleontological resources along La Cienega Boulevard, along Wilshire Boulevard near Beverly Drive, near Century City (San Pedro Sand), and at Wilshire and Thayer.
- 5.4.2.10 Maintenance and Operation Facility Sites**  
The sediments here are Younger Alluvium. The disturbance will be minimal, and the area has been extensively developed. This alternative would have a less than significant effect on paleontological resources.

## **5.5 Environmental Impacts/Environmental Consequences**

Pursuant to NEPA and CEQA, impacts would be considered significant if the proposed project has the potential to result in either direct, indirect, or cumulative significant effect on paleontological resources.

### **5.5.1 Summary of Impacts by Alternative**

#### **5.5.1.1 No Build Alternative**

Under the No Build Alternative, no construction would take place. Therefore, no paleontological resources would be impacted or adversely affected.

#### **5.5.1.2 Transportation System Management (TSM) Alternative**

Under the Transportation System Management Alternative, no construction would take place. Therefore, no paleontological resources would be impacted or adversely affected.

#### **5.5.1.3 Alternative 1—Westwood/UCLA Extension**

Excavations up to 40 feet in parts of this alternative would have an adverse effect on paleontological resources, unless mitigation measures are employed. Mitigation measures could reduce the adverse impact to a less than significant level.

#### **5.5.1.4 Alternative 2—Westwood/VA Hospital Extension**

Excavations up to 40 feet in parts of this alternative would have an adverse effect on paleontological resources, unless mitigation measures are employed. Mitigation measures could reduce the adverse impact to a less than significant level.

**5.5.1.5 Alternative 3—Santa Monica Extension**

Excavations up to 40 feet in parts of this alternative would have an adverse effect on paleontological resources, unless mitigation measures are employed. Mitigation measures could reduce the adverse impact to a less than significant level.

**5.5.1.6 Alternative 4—Westwood/VA Hospital Extension plus West Hollywood Extension**

Excavations up to 40 feet in parts of this alternative would have an adverse effect on paleontological resources, unless mitigation measures are employed. Mitigation measures could reduce the adverse impact to a less than significant level.

**5.5.1.7 Alternative 5—Santa Monica Extension plus West Hollywood Extension**

Excavations up to 40 feet in parts of this alternative would have an adverse effect on paleontological resources.

**5.5.1.8 MOS 1—Wilshire Boulevard HRT Subway from Wilshire/Western to Fairfax**

Excavations up to 40 feet in parts of MOS 1 would have an adverse effect on paleontological resources, unless mitigation measures are employed.

**5.5.1.9 MOS 2—Wilshire Boulevard HRT Subway from Wilshire/Western to Century City**

Excavations up to 40 feet in parts of MOS 2 would have an adverse effect on paleontological resources, unless mitigation measures are employed. .

**5.5.1.10 Maintenance and Operation Facility Sites**

The minimal excavations in this developed area would not have an adverse effect on paleontological resources.

**5.5.2 CEQA Determination**

Pursuant to CEQA, an impact to paleontological resources would be considered significant has the potential to directly or indirectly destroy a unique paleontological resource or site or unique geologic feature. The Build Alternatives, including MOS 1 and MOS 2, are expected to encounter paleontological resources, including those resources in and around Hancock Park (Rancho La Brea Tar Pits). Excavations up to 40 feet would have a significant effect on paleontological resources. Implementation of mitigation measures PA-1 through PA-9 will reduce the impact; however, the impact is still considered significant. Cemetery, but will not impact the cemetery.

**5.5.3 Cumulative Effects**

Some of the projects identified for the cumulative effects analysis consist of the updates of municipal general plans (i.e. West Hollywood and Santa Monica). These projects do not include construction or ground-disturbing activities. Therefore, these projects, when considered with the project alternatives, would not result in cumulative impacts to paleontological resources within the Project area.

**5.6 Mitigation Measures**

Construction impacts to paleontological resources could come from two types of sediment disturbance. One is from trenching, excavation of stations, and similar actions directed downward from ground level. There is much that can be done in such settings to

reduce the impacts of such actions. The listed measures address those impacts. The second type of sediment disturbance is the result of horizontal boring between station excavations. The technology involved in this boring is a closed-face mechanism. There is no way to see the face been cut, and any paleontological resources that might be in the path of the borer. Most of paleontological resources encountered through such actions would be pulverized. There is no feasible method to mitigate such effects. Therefore it is essential that the boring along Wilshire Boulevard in the vicinity of Hancock Park be deep enough that it avoids the asphaltic fossil deposits. The deposits encountered in the more than 100 years of exploration of the area are in the upper 40 feet of sediment. Therefore, the boring plans have been modified to avoid these resources. Geotechnical investigations have demonstrated that the asphaltic sands plunge to deeper levels south and west of the intersection of Fairfax and Wilshire. These older sediments are covered by a wedge of younger sediment that becomes correspondingly thicker to the south and west of that intersection (Quinn et al., 2000). Whether any of the deeper asphalt deposits in that area contain paleontological resources is unknown. No geotechnical investigations to date have indicated any paleontological resources in those horizons. If any were to exist at such depths, they will not be encountered by excavations contemplated for the alternatives, and they would probably never be accessed and recovered by conventional excavations.

### 5.6.1 Wilshire Boulevard, Wilshire/Santa Monica Boulevard and MOS Alternatives

These measures apply to all alternatives, but would be applied in a different fashion in the Hancock Park area, because of the unusual nature of the asphaltic deposits.

### 5.6.2 Mitigation for Operational Impacts

- **PA-1**—Metro shall coordinate with the Page Museum of La Brea Discoveries and the Natural History Museum of Los Angeles County concerning any maintenance activities that might impact paleontological resources.

### 5.6.3 Mitigation for Construction Impacts

- **PA-2**—Metro shall retain the services of a qualified paleontologist to oversee execution of Mitigation Measures. The areas to be examined will be determined based on project plans and in consultation between construction staff and the qualified paleontologist during pre-construction meetings and as needed throughout the construction process. If subsurface resources are identified by the monitor during construction, all construction activities in the area of identified paleontological resources shall be temporarily halted so that the paleontologist may quickly document and remove any resources (as may be necessary). At the completion of paleontological monitoring for the project, a paleontological resources monitoring report shall be prepared and submitted to the Page Museum of La Brea Discoveries and the Natural History Museum of Los Angeles County to document the results of the monitoring activities and summarize the results of any paleontological resources encountered.
- **PA-3**—Metro shall develop a Paleontological Resources Monitoring and Mitigation Plan (PRMMP) acceptable to the collections manager of the Vertebrate Paleontology

Section of the Natural History Museum of Los Angeles County and the collection manager of the Page Museum of La Brea Discoveries.

- **PA-4**—Metro shall implement the PRMMP during construction.
- **PA-5**—Metro shall prepare to the level of identification all vertebrate fossils and the significant invertebrate and plant fossils recovered during the monitoring process. For any Brea deposits encountered near the Hancock Park area, all fossils detected during excavation of the asphalt masses shall be prepared and conserved, the remaining matrix degreased, and the resultant concentrate inspected for vertebrate, invertebrate, and plant fossils by a qualified paleontologist.
- **PA-6**—Metro shall prepare a report detailing the paleontological resources recovered, their significance, and arrangements made for their curation at the conclusion of the monitoring effort.
- **PA-7**—Metro shall provide the resources necessary to curate the identified and prepared fossils in a manner that meets the standards published by the Society of Vertebrate Paleontology and the federal PRPA. Those fossils collected near the Page Museum of La Brea Discoveries shall be curated at this institution. All other fossils shall be curated at the Natural History Museum of Los Angeles County.
- **PA-8**—Station excavation design at or near potential fossil deposits (Wilshire/Fairfax and Wilshire/La Brea Stations) will be designed to facilitate fossil recovery.
- **PA-9**—Metro will seek early approval to begin fossil recovery in advance of construction.

#### 5.6.4 Effects Remaining After Mitigation

If the mitigation plan is implemented, no significant impacts would remain after mitigation.





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