APPENDIX B
Cultural Resources Assessment

cogstone
PALEONTOLOGY - ARCHAEOLOGY - HISTORY

CULTURAL AND PALEONTOLOGICAL RESOURCES ASSESSMENT FOR THE AVIATION BOULEVARD AT ARTESIA BOULEVARD SOUTHBOUND TO WESTBOUND RIGHT TURN IMPROVEMENT PROJECT, CITY OF MANHATTAN BEACH, CALIFORNIA

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Cogstone Project Number: 4273
Type of Study: Archaeological and Paleontological Resource Assessment
Cultural Resources: None
Paleontological localities: None within the project area, 23 within 5 miles
USGS 7.5' topographic map: Redondo Beach
Area: 0.96 acres
Key Words: late to middle Pleistocene eolian deposits, negative survey

TABLE OF CONTENTS

LIST OF FIGURES

LIST OF TABLES

SUMMARY OF FINDINGS

The City of Manhattan Beach (City) proposes the Aviation Boulevard at Artesia Boulevard Southbound to Westbound Right Turn Improvement Project (Project). The Project is located within the southeastern portion of Los Angeles County, California. The Project site is approximately 0.8 miles east of the Pacific Coast Highway (Highway 1), approximately 1.65 miles west of State Route 107 (SR-107), and two miles west of Interstate 405 (I-405). Locally, the Project site is located at the intersection of Aviation Boulevard and Artesia Boulevard. The proposed Project would relieve existing and future congestion at the intersection and provide for enhanced traffic operations as compared to existing conditions. These improvements would include: widening the west side of Aviation Boulevard to the north of the intersection at Artesia Boulevard to accommodate a 12.5 foot right turn lane and eight-foot pedestrian walkway; construct a new Americans with Disabilities Act (ADA) pedestrian curb ramp on the northwest corner of the Aviation Boulevard and Artesia Boulevard intersection; re-stripe the north leg of Aviation Boulevard; and provide new crosswalk striping at the west and north legs of the intersection. In addition, the Project proposes to improve the existing storm drain by installing a lateral pipe to connect the new storm drain inlet to the existing storm drain and existing utilities including a fire hydrant will require relocation. A retaining wall will be constructed at the back of the proposed walkway and new landscaping and irrigation will be installed. The City is the lead agency under the California Environmental Quality Act (CEQA).

Maximum depths of excavation for the Project would extend approximately 25 feet below the original ground surface. The surface of the Project is mapped as late to middle Pleistocene older eolian sand dunes between 11,700 and 500,000 years old. Although not mapped, modern artificial fill is present. A search for paleontological records revealed no previously known localities within the Project boundaries but 23 were present within 5 miles of the Project. None of the records list the depositional environments that the fossils were recovered from; however, wind-blown dunes typically do not preserve fossils. Extinct terrestrial mammals encountered include Jefferson's ground sloth, mastodon, mammoth, American lion, camel, llama, diminutive pronghorn, bison, peccary, and horse. Near the coast these terrestrial deposits interfinger with marine deposits from which harbor seal, whale, birds, and fish have been recovered.

The cultural record search indicated a total of two historic built environment resources have been previously documented within the half-mile search radius. No cultural resources have been previously documented within the Project area.

An intensive-level pedestrian survey of the Project area was conducted on September 14, 2018. The Project was entirely hardscaped or landscaped with less than five percent ground visibility, of which was all non-native sediments and landscaped with ornamental shrubs. No cultural or paleontological resources were observed during the survey.

A review of the geotechnical report indicates that brown silty sands consistent with dune sands extended to approximately 13 feet below the surface. All artificial fill is classified as having a very low Potential Fossil Yield (PFYC 1) while the older eolian sand dune deposits are assigned a low sensitivity ranking (PFYC 2). No paleontological monitoring is currently recommended for the Project. If unanticipated fossils are unearthed during construction, work should be halted

in that area until a qualified paleontologist can assess the significance of the find. Work may resume immediately a minimum of 50 feet away from the find.

The potential for discovery of surficial or buried archaeological materials, features, or deposits is considered low. In the event of an unanticipated discovery, all work must be suspended within 50 feet of the find until a qualified archaeologist evaluates it. In the unlikely event that human remains are encountered during project development, all work must cease near the find immediately.

INTRODUCTION

PURPOSE OF STUDY

The purpose of this study is to determine the potential effects to cultural and paleontological resources resulting from the Aviation Boulevard at Artesia Boulevard Southbound to Westbound Right Turn Improvement Project (Project; Figure 1). The City of Manhattan Beach (City) is the lead agency under the California Environmental Quality Act (CEQA) and this study provides environmental documentation as required by CEQA.

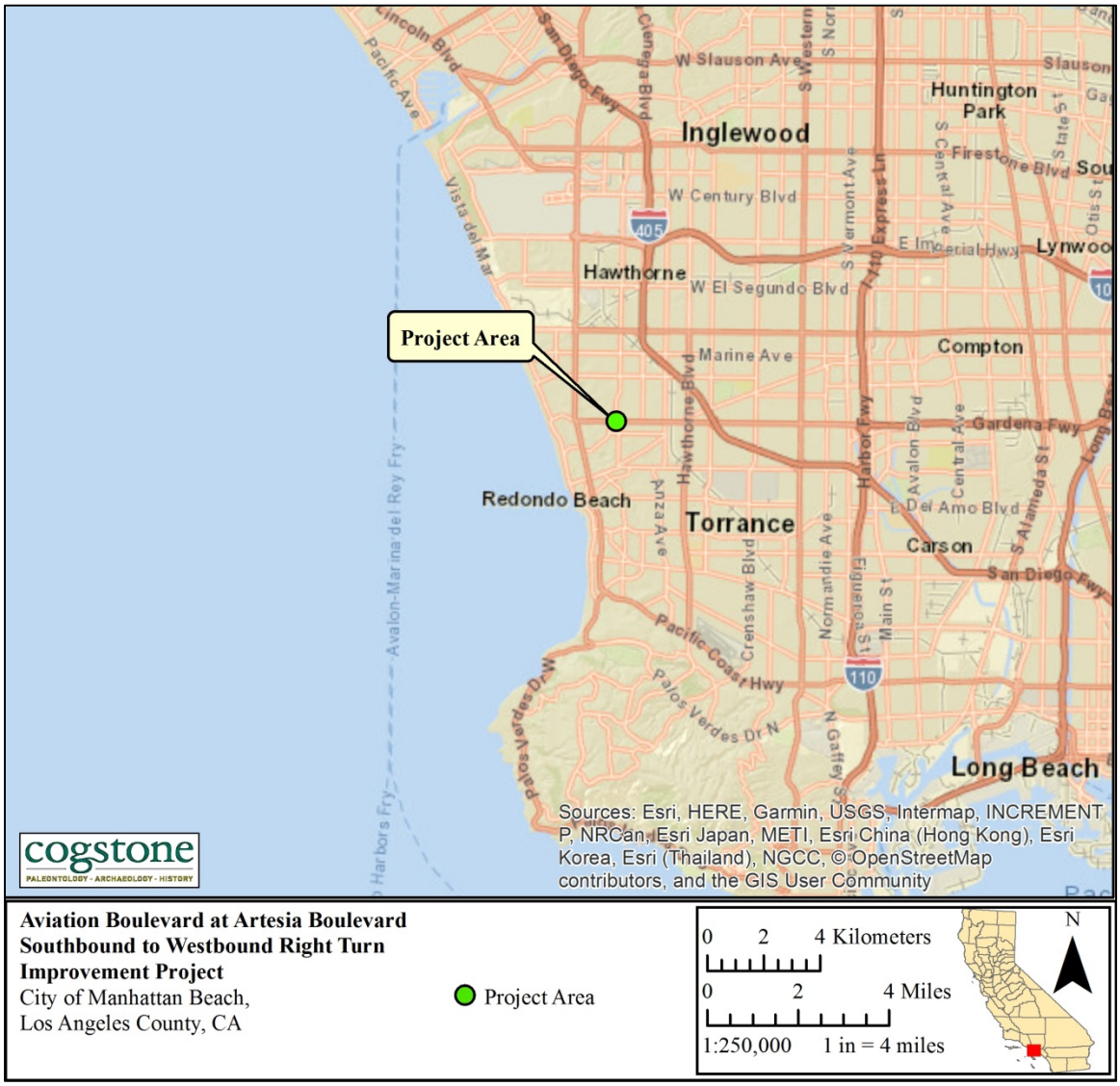

Figure 1. Project Vicinity Map

PROJECT LOCATION AND DESCRIPTION

The Project area is located within the southeastern portion of Los Angeles County, California. The Project site is approximately 0.8 miles east of the Pacific Coast Highway (Highway 1), approximately 1.65 miles west of State Route 107 (SR-107), and two miles west of Interstate 405 (I-405). Locally, the Project site is located at the intersection of Aviation Boulevard and Artesia Boulevard. This 0.96-acre Project is located within Sections 30 and 31 of Township 3 South, Range 14 West of the San Bernardino Base and Meridian. The Project is mapped within the United States Geographic Survey (USGS) Redondo Beach 7.5-minute topographic map (Figure 2).

The City proposes improvements to the existing intersection at Aviation Boulevard at Artesia Boulevard in order to relieve existing and future congestion at the intersection and provide for enhanced traffic operations as compared to existing conditions. These improvements would include: widening the west side of Aviation Boulevard to the north of the intersection at Artesia Boulevard to accommodate a 12.5 foot right turn lane and eight-foot pedestrian walkway; construct a new Americans with Disabilities Act (ADA) pedestrian curb ramp on the northwest corner of the Aviation Boulevard and Artesia Boulevard intersection; Re-stripe the north leg of Aviation Boulevard; and provide new crosswalk striping at the west and north legs of the intersection (Figure 3). In addition, the Project proposes to improve the existing storm drain by installing a lateral pipe to connect the new storm drain inlet to the existing storm drain and existing utilities including a fire hydrant will require relocation. A retaining wall will be constructed at the back of the proposed walkway and new landscaping and irrigation will be installed. Planned maximum depth of excavation will be 25 feet for storm drain improvements and less than 5 feet deep for the rest of the Project.

PROJECT PERSONNEL

Cogstone Resource Management Inc. (Cogstone) conducted the cultural and paleontological resources studies. Qualifications of Cogstone personnel are provided (Appendix A).

Desireé Martinez served as the Task Manager and provided Quality Assurance and Quality Control for this Project. Ms. Martinez has an M.A. in Anthropology from Harvard University, Cambridge, and more than 21 years of experience in southern California archaeology.

Molly Valasik served as the Principal Archaeologist for the Project and reviewed the report. Valasik has an M.A. in Anthropology from Kent State University, a B.A. in Anthropology from Ohio State University, and nine years of experience in southern California archaeology.

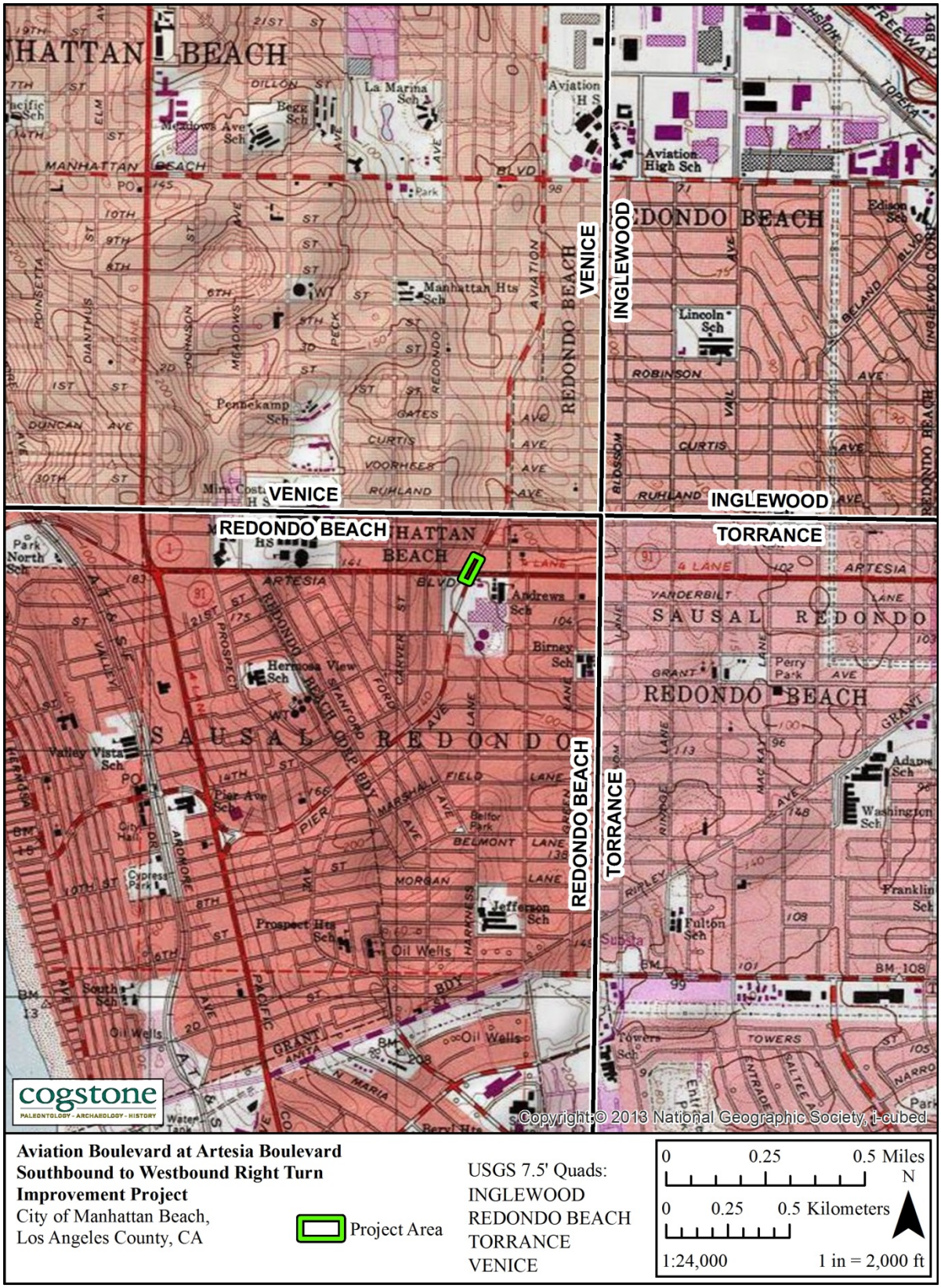

Figure 2. Project Location

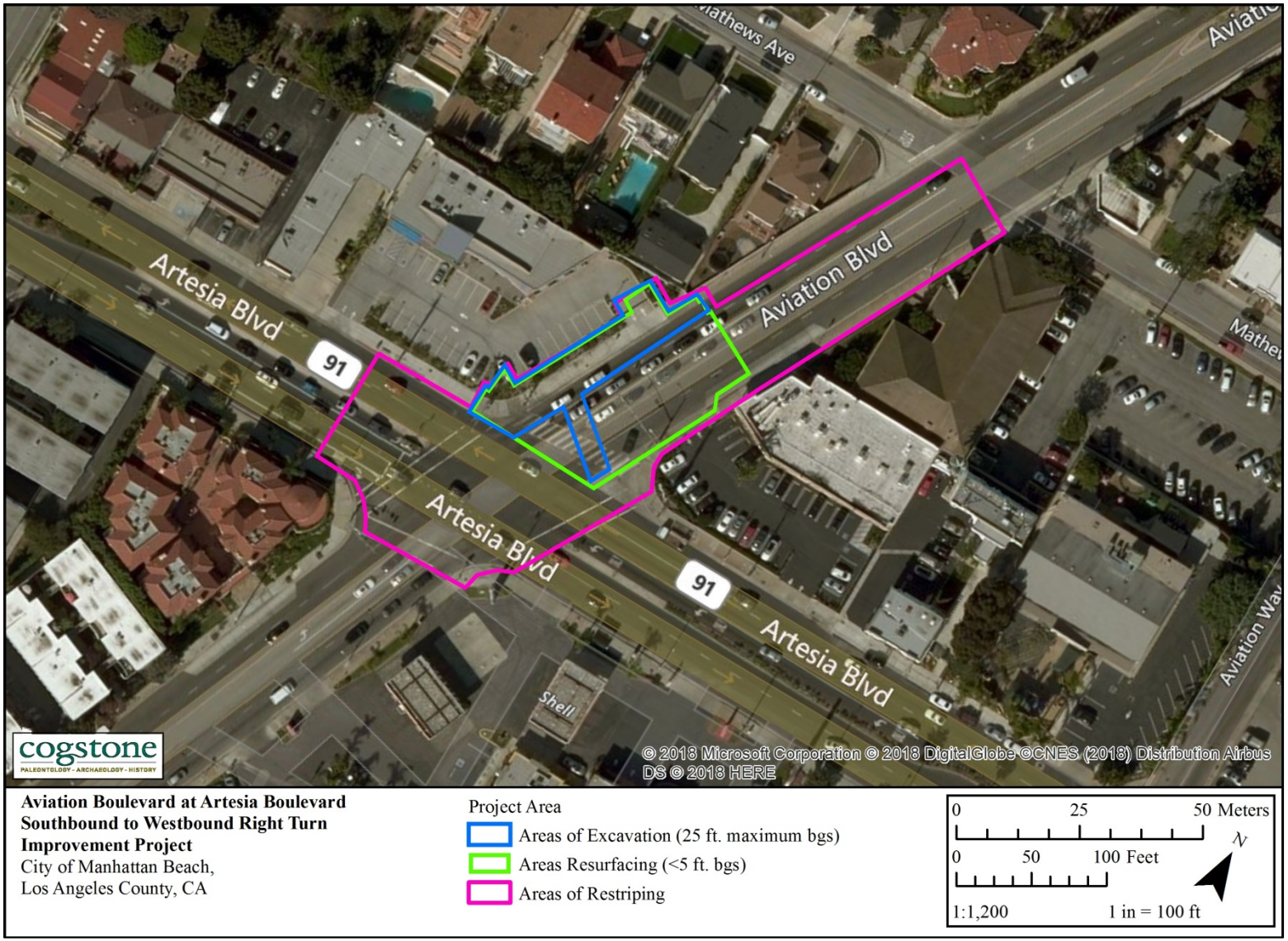

Figure 3. Project Aerial Map

Kim Scott served as the Principal Paleontologist and wrote the paleontological and geological sections of the report. Scott has a M. S. in Biology with an emphasis in paleontology from California State University, San Bernardino, a B.S. in Geology with an emphasis in paleontology from the University of California, in Los Angeles, and over 23 years of experience in California paleontology and geology.

Holly Duke authored portions of the report. Duke has a B.A. in Archaeology and History from Simon Fraser University, British Columbia, Canada and six years of experience in southern California archaeology.

Megan Wilson performed the survey for archaeology and paleontology and prepared the GIS maps. Wilson has a M.A. and B.A. in Anthropology from California State University Fullerton and the University of California, in Los Angeles respectively, a GIS certification, and over seven years of experience in California archaeology and paleontology.

REGULATORY ENVIRONMENT

STATE LAWS AND REGULATIONS

CALIFORNIA ENVIRONMENTAL QUALITY ACT

CEQA states that: It is the policy of the state that public agencies should not approve projects as proposed if there are feasible alternatives or feasible mitigation measures available which would substantially lessen the significant environmental effects of such projects, and that the procedures required are intended to assist public agencies in systematically identifying both the significant effects of proposed project and the feasible alternatives or feasible mitigation measures which will avoid or substantially lessen such significant effects.

CEQA declares that it is state policy to: "take all action necessary to provide the people of this state with...historic environmental qualities." It further states that public or private projects financed or approved by the state are subject to environmental review by the state. All such projects, unless entitled to an exemption, may proceed only after this requirement has been satisfied. CEQA requires detailed studies that analyze the environmental effects of a proposed project. In the event that a project is determined to have a potential significant environmental effect, the act requires that alternative plans and mitigation measures be considered.

Tribal Cultural Resources

As of 2015, CEQA established that “[a] project with an effect that may cause a substantial adverse change in the significance of a tribal cultural resource is a project that may have a

significant effect on the environment" (Pub. Resources Code, § 21084.2). In order to be considered a "tribal cultural resource," a resource must be either:

- listed, or determined to be eligible for listing, on the national, state, or local register of historic resources, or
- a resource that the lead agency chooses, in its discretion, to treat as a tribal cultural resource.

To help determine whether a project may have such an effect, the lead agency must consult with any California Native American tribe that requests consultation and is traditionally and culturally affiliated with the geographic area of a proposed project. If a lead agency determines that a project may cause a substantial adverse change to tribal cultural resources, the lead agency must consider measures to mitigate that impact. Public Resources Code §20184.3 (b)(2) provides examples of mitigation measures that lead agencies may consider to avoid or minimize impacts to tribal cultural resources.

PUBLIC RESOURCES CODE

Section 5097.5: No person shall knowingly and willfully excavate upon, or remove, destroy, injure or deface any historic or prehistoric ruins, burial grounds, archaeological or vertebrate paleontological site, including fossilized footprints, inscriptions made by human agency, or any other archaeological, paleontological or historical feature, situated on public lands (lands under state, county, city, district or public authority jurisdiction, or the jurisdiction of a public corporation), except with the express permission of the public agency having jurisdiction over such lands. Violation of this section is a misdemeanor. As used in this section, "public lands" means lands owned by, or under the jurisdiction of, the state, or any city, county, district, authority, or public corporation, or any agency thereof.

CALIFORNIA REGISTER OF HISTORICAL RESOURCES

The California Register of Historical Resources (CRHR) is a listing of all properties considered to be significant historical resources in the state. The California Register includes all properties listed or determined eligible for listing on the National Register, including properties evaluated under Section 106, and State Historical Landmarks number No. 770 and above. The California Register statute specifically provides that historical resources listed, determined eligible for listing on the California Register by the State Historical Resources Commission, or resources that meet the California Register criteria are resources which must be given consideration under CEQA (see above). Other resources, such as resources listed on local registers of historic registers or in local surveys, may be listed if they are determined by the State Historic Resources Commission to be significant in accordance with criteria and procedures to be adopted by the Commission and are nominated; their listing in the California Register, is not automatic.

Resources eligible for listing include buildings, sites, structures, objects, or historic districts that retain historical integrity and are historically significant at the local, state or national level under one or more of the following four criteria:

1) It is associated with events that have made a significant contribution to the broad patterns of local or regional history, or the cultural heritage of California or the United States;
2) It is associated with the lives of persons important to local, California, or national history;
3) It embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of a master or possesses high artistic values; or
4) It has yielded, or has the potential to yield, information important to the prehistory or history of the local area, California, or the nation.

In addition to having significance, resources must have integrity for the period of significance. The period of significance is the date or span of time within which significant events transpired, or significant individuals made their important contributions. Integrity is the authenticity of a historical resource's physical identity as evidenced by the survival of characteristics or historic fabric that existed during the resource's period of significance.

Alterations to a resource or changes in its use over time may have historical, cultural, or architectural significance. Simply, resources must retain enough of their historic character or appearance to be recognizable as historical resources and to convey the reasons for their significance. A resource that has lost its historic character or appearance may still have sufficient integrity for the California Register, if, under Criterion 4, it maintains the potential to yield significant scientific or historical information or specific data.

NATIVE AMERICAN HUMAN REMAINS

Sites that may contain human remains important to Native Americans must be identified and treated in a sensitive manner, consistent with state law (i.e., Health and Safety Code §7050.5 and Public Resources Code §5097.98), as reviewed below:

In the event that human remains are encountered during project development and in accordance with the Health and Safety Code Section 7050.5, the County Coroner must be notified if potentially human bone is discovered. The Coroner will then determine within two working days of being notified if the remains are subject to his or her authority. If the Coroner recognizes the remains to be Native American, he or she shall contact the Native American Heritage Commission (NAHC) by phone within 24 hours, in accordance with Public Resources Code Section 5097.98. The NAHC will then designate a Most Likely Descendant (MLD) with respect to the human remains. The MLD then has the opportunity to recommend to the property owner or the person responsible for the excavation work means for treating or disposing, with appropriate dignity, the human remains and associated grave goods.

CALIFORNIA ADMINISTRATIVE CODE, TITLE 14, SECTION 4307

This section states that "No person shall remove, injure, deface or destroy any object of paleontological, archeological or historical interest or value."

CITY OF MANHATTAN BEACH

The City of Manhattan Beach defines its policies towards cultural resources in the Planning and Zoning Ordinance 10.01.030, which states its purpose (amongst others) is to conserve and enhance the City's architectural and cultural resources.

BACKGROUND

GEOLOGIC SETTING

The Project area is situated in the Los Angeles Basin, south of the Santa Monica Mountains. This basin is bounded to the north by the Santa Monica Mountains, to the east by the Santa Ana Mountains and associated hills (Puente/Chino, San Jose, and Repetto), to the south by the San Joaquin Hills and the Pacific Ocean, and to the west by the Palos Verdes Hills and the Pacific Ocean. This area is part of the northernmost Peninsular Ranges, California geomorphic province. The Peninsular Ranges are a series of ranges separated by northwest trending valleys, subparallel to faults branching from the San Andreas Fault which for the most part lies to the east of this geomorphic province.

STRATIGRAPHY

The surface of the Project is mapped as late to middle Pleistocene older wind-blown (eolian) sand dunes (Saucedo et al. 2016). Modern artificial fill is expected near to the surface.

ARTIFICIAL FILL

Modern artificial fill deposits are typically less than 200 years old in California. These deposits overlie the late to middle Pleistocene older eolian sand dunes.

OLDER EOLIAN SAND DUNES

These older eolian sand dunes are between 10,000 and 500,000 years old and were deposited during the late to middle Pleistocene. Sediments consist of poorly consolidated, well sorted, fine- to coarse-grained sand to silty sands (Saucedo et al. 2016).

ENVIRONMENTAL SETTING

The Project area is located near the southern end of Santa Monica Bay approximately 1.5 miles to the east of the Pacific Ocean in the very southeast corner of the City. The Project is located within an urban setting and is fully developed with buildings, parking areas, and roadways. No native vegetation is located within the Project area as it is fully hardscaped.

PREHISTORIC SETTING

Review of archaeological data has resulted in a revised synthesis of cultural change as evidenced by material culture and archaeologically visible cultural practices. A large part of what was previously referred to as the Millingstone Period is now called the Topanga pattern of the Encinitas Tradition (Sutton and Gardner 2010; Table 1). This pattern is replaced in the Project area by the Angeles pattern of the Del Rey Tradition later in time (Sutton 2010; Table 1).

Topanga Pattern groups were relatively small and highly mobile. Sites tend to be along the coast in wetlands, bays, coastal plains, near-coastal valleys, marine terraces, and mountains. The Topanga toolkit is dominated by manos and metates with projectile points scarce (Sutton and Gardner 2010:9).

Table 1. Cultural Patterns and Phases

Pattern	Phase	Material Traits	Other Traits
Encinitas	Topanga I	Abundant manos and metates, many core tools and scraper s, few but large points, charmstones, cogged stones, early discoidals, bone gorge fishhooks, faunal remains rare; Olivella spire/end lopped beads appear	Estuary/lagoon shellfish and sharks/rays common, hunting important, secondary burials under metate cairns (some with long bones only), some extended inhumations, no cremations
	Topanga II	Abundant but decreasing manos and metates, adoption of mortars and pestles, smaller points, cogged stones, late discoidals, fewer scraper planes and core tools, some stone balls and charmstones; inhumations common; Olivella Grooved Rectangular beads introduced	Estuary/lagoon shellfish and sharks/rays common,, addition of acorns, reburial of long bones only, addition of flexed inhumations (some beneath metate cairns), cremations rare
Angeles	Angeles I	Appearance of Elko dart points and an increase in the overall number of projectile points from Encinitas components; beginning of large-scale trade in small steatite artifacts (effigies, pipes, and beads) and *Olivella* shell beads; appearance of single-piece shell fishhooks and bone harpoon points; Coso obsidian becomes important; appearance of donut stones; appearance of Mytilus beads	apparent population increase; fewer and larger sites along the coast; collector strategy; less overall dependence on shellfish but fishing and terrestrial hunting more important; appearance of flexed and extended inhumations without cairns, cremations uncommon

Pattern	Phase	Material Traits	Other Traits
	Angeles II	Continuation of basic Angeles I material culture with the addition of mortuary features containing broken tools and fragmented cremated human bone; fishhooks become more common	Shellfish change to mudflat species, more emphasis on fish, birds and mammals, continuation of basic Angeles I settlement and subsistence systems; appearance of a new funerary complex
	Angeles III	Appearance of bow and arrow technology (e.g., Marymount or Rose Spring points); changes in *Olivella* beads; asphaltum becomes important; reduction in obsidian use; Obsidian Butte obsidian largely replaces Coso	larger seasonal villages; flexed primary inhumations but no extended inhumations and an increase in cremations; appearance of obsidian grave goods
	Angeles IV	Cottonwood points appear; some imported pottery appears; birdstone effigies at the beginning of the phase and "spike" effigies dropped by the end of the phase; possible appearance of ceramic pipes, *Mytilus* shell disks	change in settlement pattern to fewer but larger permanent villages; flexed primary inhumations continue, cremations uncommon
	Angeles V	Trade of steatite artifacts from the southern Channel Islands becomes more intensive and extensive, with the addition or increase in more and larger artifacts, such as vessels and comals; larger and more elaborate effigies; portable mortars and pestles	strengthening of ties, especially trade, with southern Channel Islands; expansion into the northern Santa Ana Mountains and San Joaquin Hills
	Angeles VI	Addition of Euroamerican material culture (e.g., glass beads and metal tools), locally made pottery, metal needle-drilled *Olivella* beads	change of settlement pattern, movement close to missions and ranches; use of domesticated species obtained from Euroamericans; flexed primary inhumations continue; apparent adoption of Chingichngish religion

In Topanga Phase I other typical characteristics were a few mortars and pestles, abundant core tools (scraper planes, choppers and hammerstones), relatively few large, leaf-shaped projectile points, cogged stones, and early discoidals (Table 1). Secondary inhumation under cairns was the common mortuary practice. In Orange County as many as 600 flexed burials were present at one site and dated 6, 435 calibrated radiocarbon years before present (Sutton and Gardner 2010:9, 13).

In Topanga Phase II, flexed burials and secondary burial under cairns continued. Adoption of the mortar and pestle is a marker of this phase. Other typical artifacts include manos, mutates, scrapers, core tools, discoidals, charmstones, cogged stones and an increase in the number of projectile points. In Orange County stabilization of sea level during this time period resulted in increased use of estuary, near shore and local terrestrial food sources (Sutton and Gardner 2010:14-16).

The Angeles pattern generally is restricted to the mainland and appears to have been less technologically conservative and more ecologically diverse, with a largely terrestrial focus and greater emphases on hunting and nearshore fishing. In Angeles Phase I Elko points for atlatls or darts appear, small steatite objects such as pipes and effigies are found, shell beads and

ornaments increase, fishing technologies increase including bone harpoons/fishhooks and shell fishhooks, donut stones appear, and hafted micro blades for cutting/graving wood or stone appear.

In addition, several Encinitas traits, such as discoidals, cogged stones, plummet-like charm stones and cairn burials virtually disappear from the record. Mortuary practices changed to consist of primarily flexed primary inhumations, with extended inhumations becoming less common. Settlement patterns made a shift from general use sites being common to habitation areas separate from functional work areas. Subsistence shifted from mostly collecting to increased hunting and fishing (Sutton 2010).

Angeles Phase I is identified primarily by the appearance of Elko darts and a dramatic increase in the number of projectile points. Trade of steatite artifacts and Olive shell beads becomes common. Mussel beads first appear and obsidian from Coso becomes important.

Angeles Phase II is identified primarily by the appearance of a new funerary complex, with other characteristics similar to Angeles I. The complex features killed (broken) artifacts plus highly fragmented cremated human bones and a variety of faunal remains. In addition to the cremains, the other material also often burned. None of the burning was performed in the burial feature (Sutton 2010).

Angeles III Phase is the beginning of what has been known as the Late Period and is marked by several changes from Angeles I and II. These include the appearance of small projectile points, steatite shaft straighteners and increased use of asphaltum all reflecting adoption of bow and arrow technology, obsidian sources changed from mostly Coso to Obsidian Butte and shell beads from Gulf of California species began to appear. Subsistence practices continued as before and the geographic extent of the Angeles Pattern increased (Sutton 2010).

Angeles Phase IV is marked by new material items including Cottonwood points for arrows, *Olivella* cupped beads and *Mytilus* shell disks, birdstones (zoomorphic effigies with magico-religious properties) and trade items from the Southwest including pottery. It appears that populations increased and that there was a change in the settlement pattern to fewer but larger permanent villages. Presence and utility of steatite vessels may have impeded the diffusion of pottery into the Los Angeles Basin. The settlement pattern altered to one of fewer and larger permanent villages. Smaller special-purpose sites continued to be used (Sutton 2010).

Angeles V components contain more and larger steatite artifacts, including larger vessels, more elaborate effigies and comals. Settlement locations shifted from woodland to open grasslands. The exploitation of marine resources seems to have declined and use of small seeds increased. Inhumations contained grave goods while cremations did not. [Sutton 2010]

The Angeles VI phase reflects the post-contact (i.e., post-A.D. 1542) period. One of the first changes after contact was undoubtedly population loss due to disease, coupled with resulting social and political disruption. Angeles VI material culture is essentially Angeles V augmented by a number of European American tools and materials, including glass beads and metal tools such as knives and needles (used in bead manufacture). The frequency of European American material culture increased through time until it constituted the vast majority of materials used. Locally produced brownware pottery appears along with metal needle-drilled *Olivella* disk beads (Sutton 2010).

The subsistence system was based primarily on terrestrial hunting and gathering, although nearshore fish and shellfish played important roles. Sea mammals, especially whales (likely from beached carcasses), were prized. In addition, a number of European plant and animal domesticates were obtained and exploited (Sutton 2010).

ETHNOGRAPHY

The Project area is part of the traditional territory of the Tongva (Gabrielino). Their territory encompassed a vast area stretching from Topanga Canyon in the northwest, to the base of Mount Wilson in the north, to San Bernardino in the east, Aliso Creek in the southeast, and the southern Channel Islands, in all an area of more than 2,500 square miles (Figure 4, Bean and Smith 1978, McCawley 1996). The Tongva speak a language that is part of the Takic language family. At European contact, the tribe consisted of more than 5,000 people living in various settlements throughout the area. Some of the villages could be quite large, housing up to 150 people.

Their territory encompassed a number of ecological zones (Interior Mountains and Foothills; Prairie, Exposed Coast, Sheltered Coast, and the Southern Channel Islands) which affected their subsistence and settlement patterns (McCawley 1996). The Tongva would supplement the resources gathered near them with resources from other ecological zones by obtaining them either directly or through trade (Bean and Smith 1978).

Tongva life centered on the village; composed of paternally related extended families, lineages, and/or clans, typically numbering 50-100 people. Houses, called *kiiy* in Tongva, were domed and circular with frames made from willow posts (or whale rib bones on the islands and along the coastline) covered with tule reed mats. Coastal *kiiys* had entryways that opened towards the sea with mats covering them. A large *kiiy* could hold up to three or four families and was perhaps 60 feet in diameter. Smaller homes were as little as 12 feet in diameter.

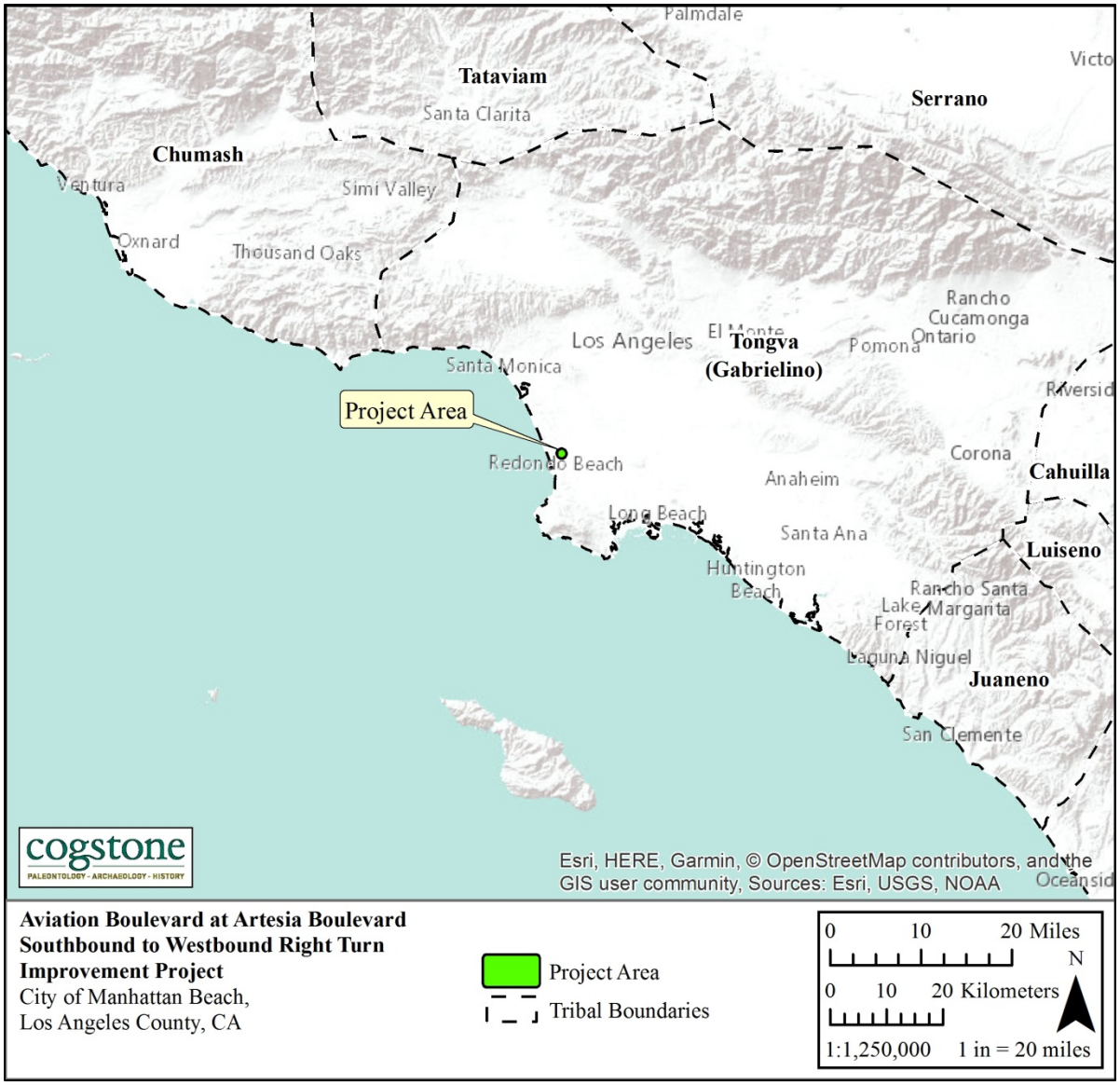

Figure 4. Native American Tribal Territories

Wind screens were usually adjacent to the *kiiy* and were used as open-air kitchens during fair weather. Large acorn granary baskets, sometimes coated with asphaltum and seated upon posted platforms, were also placed near the *kiiys*.

Additional village structures included sweathouses, which were small semi-circular, semi-subterranean earth-covered buildings located near water to provide access for bathing. Menstrual huts were constructed for women but it is not clear if a menstrual hut was also used for birthing (Heizer 1978:29). Ceremonial open-aired enclosures, *yoyovars*, were located near chiefs' houses and near the center of villages.

In addition to the permanent villages, the Tongva occupied temporary seasonal campsites that were used for a variety of activities such as hunting, fishing, and gathering plant resources (McCawley 1996:25). Hunting was primarily for rabbit and deer, while plant collection included acorns, buckwheat, chia, berries, and fruits. Coastal seasonal camps and camps near bays and estuaries were used to gather shellfish and hunt waterfowl.

Tongva life was also organized around the celebration and observance of various rituals and ceremonies. These included rites of passage, village rites, seasonal ceremonies, and participation in the widespread *Chinigchinich* religion (various spellings; Kroeber 1925; McCawley 1996). According to Boscana (1978:32, 33), in versions of the coastal creation story documented from the Juañeno but also applicable to the Tongva, two influential deities, *Ouiot*, the monster-chief, and *Chinigchinich*, the supreme-creator god, emerged, at different times, at the village of *Puvungna* with Ouiot being burned there and *Chinigchinich* dying there (1978:119). *Puvungna* was located on Rancho Los Alamitos where the U.S. Veterans Hospital and California State University, Long Beach exist today. Milliken and Hildebrandt (1997:15) summarize of the roles of Ouiot and Chinigchinich in the origin stories among the Juaneño, Luiseño, and Gabrielino.

Tongva concept of afterlife and burial practices came from Chingichnich's instructions to the Tongva. Upon death, community mourned for three days and the body was wrapped in a hide blanket or mat made of seagrass. After the mourning period, the body was carried to the village burial area. The hands were placed across the breast, and the entire body was bound and burned.

The remains were either interred or disposed of to the east of the village. Grave offerings included seeds, otter skins, baskets, soapstone pots, bone and shell implements, and shell beads. The amount of grave goods reflected the person's status. If the person held a leadership position, an item designating their office might also be placed with their body. Some internments featured dog burials placed above the corpse. The Tongva saw the worlds of the living and the dead to be parallel places; therefore, the items buried or burned with the deceased were intended to accompany that person to the afterworld where their statuses would be recognized by the items that accompanied them. Graves were marked by baskets or stone slabs. The living mourned for a year; the mourning period ended at the annual mourning ceremony conducted for all of those who had died in the past year (Bean and Smith 1978:545–546, Heizer 1978:29–31, McCawley 1998:155–158.)

The Tongva played an important role in the various trade routes that extended throughout the western United States. In the seminal study *Persistence and Power*, Bean and Brakke Vane (1978) discussed the Pacific Ocean-Great Plains trade system and demonstrated that the Tongva, Cahuilla, Panya (Halchidoma), and Northern Pima were trade partners. Gates and Thomas

(2013) describe the Pacific to Rio Grande Trails Landscape that includes three major travel corridors emanating from the Southern California Coast.

Even with the devastating effects of disease, colonization, forced labor, and other genocidal activities perpetrated against them, 2,493 people in California (2,903 nationwide) identified themselves as Tongva or Gabrielino on the 2010 United States Census; a testament to their survival (United States Census, 2013a, 2013b). There are currently seven different Gabrielino bands or organizations that some Tongva community members belong to: the Ti'at Society/Traditional Council of Pimu, the Gabrielino/Tongva San Gabriel Band of Mission Indians, the Gabrielino/Tongva Nation, the Gabrielino-Tongva Indians of California , the Gabrielino Tongva Ancestral Territorial Tribal Nation, the Kizh Nation (aka Gabrieleno Band of Mission Indians), and the Gabrielino-Tongva Tribe; however, some Gabrielino people choose not to belong to any group. None of the groups are recognized by the United States federal government; however, five groups have filed letters of intent to petition for federal recognition with the Office of Federal Acknowledgement (Office of Federal Acknowledgement 2013). In 1994, the California State Assembly and Senate jointly recognized the San Gabriel Band of Mission Indians; however, this recognition did not establish or affirm any rights or privileges to the tribe (Resolution Chapter 146, Statutes of 1994 Assembly Joint Resolution 96).

HISTORY

SPANISH PERIOD (1769-1822)

Juan Cabrillo was the first European to sail along the coast of California in 1542 and was followed in 1602 by Sebastian Vizcaino. In 1769 Gaspar de Portola explored the present-day Los Angeles area in order to open up a land route to the port of Monterey. He established the first Spanish settlement in the area, which they named after the local river Rio de Nuestra Senora la Reina de los Angeles de Porciuncula (River of Our Lady Queen of the Angels of Porciuncula). By 1771, Father Junipero Serra established the Mission San Gabriel Arcángel, which was later moved to the present-day city of San Gabriel (McCawley 1996). The founding of the San Gabriel Mission in 1771 marked a period where the Tongva were brought into the confines of the mission and subjected to religious and occupational re-education. The Tongva population was ravaged by European diseases. The missions held the Tongva lands and utilized them for grazing.

MEXICAN PERIOD (1822-1848)

After Mexico gained independence from Spain in 1822, the Mission lands were secularized under the Secularization Act of 1833, but much of the land was transferred to political appointees. A series of large land grants (ranchos) that transferred Mission properties to private ownership were awarded by the various governors of California. Land grants were also awarded

in the interior to increase the population away from the coastal areas that were settled during the Spanish Period.

The Project area is located within the Rancho Sausal Redondo land grant given by the Mexican Government in 1837 to Antonia Ygnacio Avila (Figure 5). The 25,000 acre Rancho was used as grazing land.

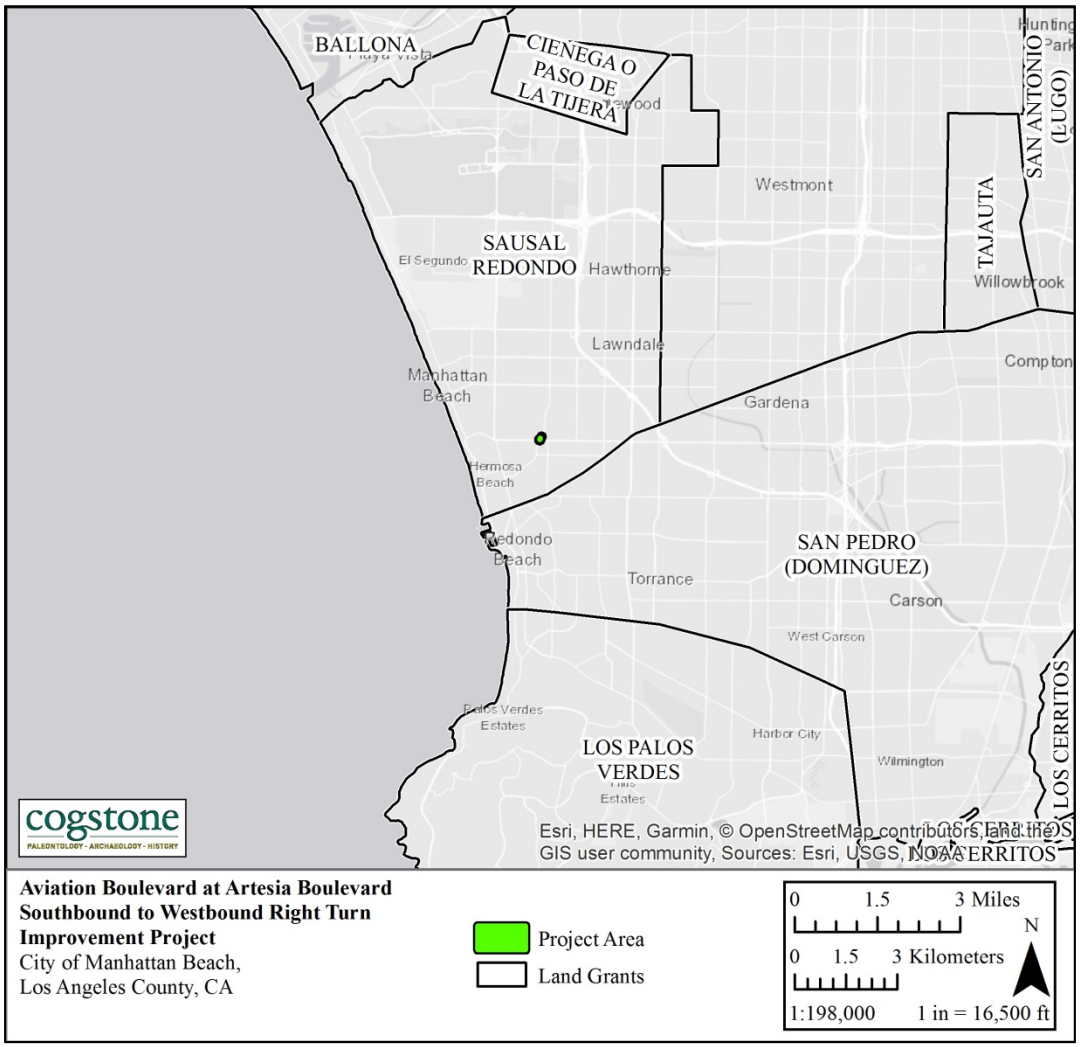

Figure 5. Land Grant Map

AMERICAN PERIOD (1848-PRESENT)

The Mexican-American War followed on the heels of the Bear Flag Revolt of June 1846 (Ohles 1997). General Andrés Pico and John C. Frémont signed the Articles of Capitulation in December 1847, and with the signing of Treaty of Guadalupe Hidalgo in February 1848, hostilities ended and Mexico relinquished California to the United States. Under the treaty,

Mexico ceded the lands of present-day California, New Mexico and Texas to the U.S. for $15 million (Fogelson 1993:10). Within two years following the treaty, California applied for admission as a state.

Gold was discovered in 1848 on the American River at Sutter's Mill near Coloma. One year later, nearly 90,000 people had journeyed to the gold fields of California. California became the 31st state in 1850, and three years later the population of the state exceeded 300,000. Thousands of new settlers and immigrants poured into the state after the transcontinental railroad was completed in 1869, spurring California's economic growth.

As California became part of the United States, the Mexican land grants were challenged in the courts at the same time as the territory suffered a long drought. Many Californios incurred debt and were forced to sell their lands.

The Rancho Sausal Redondo was sold by Avila's heirs in 1868 to pay the probate costs, despite the land being patented to Avila in 1855. Rancho Sausal Redondo was sold to Sir Robert Burnett who used the land to raise sheep and cattle. Burnett combined his newly acquired land with Rancho Aguaje de la Centinela and called it Centinela Ranch.

Burnett did not receive the title to the lands until 1873, when a U.S. District Court upheld Burnett's purchase against a claim filed by Avila's heir Tomas Avila Sanchez. Burnett chose to lease his lands to a Canadian, Daniel Freeman, in 1873 and returned to his home in Scotland. Freeman moved his family to the ranch and increased livestock and planted citrus trees. After the drought in 1875, Freeman changed from raising livestock to dry farming. He was able to purchase all of Rancho Sausal Redondo in 1885 for $140,000 and was the last person to own it in its entirety.

MANHATTAN BEACH HISTORY

John Merrill bought the southern portion of Rancho Sausal Redondo in 1901 and named it after his previous home in New York City. He and George Peck, who owned a section of the town to the north were unable to agree on what to call the town and flipped a coin to determine the name. Manhattan won. The first building downtown was built by Merrill in 1901, which was later used for city offices. Two piers were also constructed in 1901, one of which was at Center Street and one was at Marine Avenue. The Center Street pier had a wave motor to generate power for the Strand lighting system. By December 2, 1912 the City was officially incorporated. In 1927 "Beach" was added to the City's name at the request of the postmaster (City of Manhattan Beach N.D.).

The majority of land in Manhattan Beach consisted of sand dunes and the sand was exported in the 1920s and 1930s by the Kuhn Brothers Construction Company as they leveled the uneven dunes. The sand was exported to Waikiki, Hawaii to convert their reef and rock beach into a

sandy beach and also used to build the Los Angeles Coliseum and portions of the Pacific Coast Highway (City of Manhattan Beach N.D.).

A large population growth came after World War II due to the pleasant year-round living conditions. Many servicemen who visited during the war returned to live in Manhattan Beach and the development of the defense industry brought many other people to live in the area. Lands east of Sepulveda Boulevard were developed into residential areas to house the influx of people (City of Manhattan Beach N.D.).

PROJECT AREA HISTORY

The earliest USGS topographic map depicting the Project area is the 1896 15-minute Redondo Beach map that shows Artesia Boulevard, then named Gould Avenue, and Aviation Boulevard, previously named Pier Street ending at Gould Avenue. The 1924 USGS 7.5-minute Torrance topographic map shows a grid-like pattern of roads surrounding the Project area and the Grant School is prominently labeled. The 1934 USGS 7.5-minute Torrance topographic map shows increased development surrounding the area.

The 1962 aerial shows Aviation Boulevard, still named Pier Street, intersecting Artesia Boulevard - now a divided highway, continuing through to the northeast. In 1962, the northeast quadrant is developed, the south east quadrant has a baseball field on it, and the west side of the intersection is undeveloped. By 1972 the area surrounding the intersection is completely developed. The 1972 USGS 7.5-minute Redondo Beach topographic map shows Aviation Boulevard intersecting Artesia Boulevard and continuing to the northeast.

RECORDS SEARCH

PALEONTOLOGICAL RECORD SEARCH

A search for paleontological records was completed at the Natural History Museum of Los Angeles County (LACM; McLeod 2018; Appendix B). Online records from the Natural History Museum of Los Angeles County Department of Invertebrate Paleontology (LACMIP 2018), the Paleobiology Database (PBDB 2018), and the University of California Museum of Paleontology (UCMP 2018) were searched for fossil records as well as print sources (Jefferson, 1991a, 1991b).

The record search indicated that there are no paleontological records within one mile of the Project area. Twenty-three localities are known within a five mile radius of the Project from

Pleistocene deposits (Table 2). The shallowest fossil recovered came from a depth of five feet in Compton.

None of the records list the depositional environments that the fossils were recovered from; however, wind-blown dunes typically do not preserve fossils. Extinct terrestrial mammals encountered include Jefferson's ground sloth (†[1] *Megalonyx jeffersonii*), mastodon († *Mammut* sp.), mammoth († *Mammuthus* sp.), American lion († *Panthera* sp. cf. *P. atrox*), camels († *Camelops* sp., † Camelidae), llama († *Hemiauchenia* sp.), diminutive pronghorn († *Capromeryx* sp.), bison († *Bison* sp.), peccary († *Platygonus* sp.), and horse († *Equus* sp.). Small extant animals include long-tailed weasel (*Mustela* sp. cf. *M. frenata*), hare (*Lepus* sp.), California ground squirrel (*Otospermophilus beecheyi*), and indeterminate rodent (Rodentia).

Near the coast these terrestrial deposits interfinger with marine deposits from which harbor seal (*Phoca* sp. cf. *P. vitulina*), whales (Cetacea), birds, and speckled sanddab (*Citharichthys stigmaeus*) have been recovered. The birds from Playa del Rey are especially important as birds are rare in the fossil record. Great northern loon (*Gavia* sp. aff. *G. immer*), western grebe (*Aechmophorus occidentalis*), short-tailed albatross (*Phoebastria albatrus*), shearwaters (*Puffinus griseus, P. opisthomelas*), ducks († *Chendytes lawi*, Anatidae), common murre (*Uria aalge*), and common raven (*Corvus corax*) have been recovered there. This locality is also the type locality for the Playa del Rey booby († *Sula reyana*).

No fossils of scientific value are known from artificial fill deposits.

[1] † - the species or the species that would have been present in the area at the time is extinct

Table 2. Pleistocene fossil localities near to the Project

Common Name	Taxon	Depth below surface	Locality	Location	Reference
mammoth	† *Mammuthus* sp.	30 feet	LACM 1165	Carson: Alameda St. or Sepulveda Blvd.	Jefferson 1991b
camel	† Camelidae	24 feet	LACM 4129	Carson: Alameda St. or 223rd St.	McLeod 2017
mammoth	† *Mammuthus* sp.	5 feet	LACM 3382	Compton: west of the I-710, east of Wilmington Ave., north of Artesia Blvd.	Jefferson 1991b
mammoth	† *Mammuthus* sp.	8-10 feet	LACM 1643	Dominguez Hills: near 190th and Annalee Ave.	Jefferson 1991b, McLeod 2017
mammoth	† *Mammuthus* sp.	10 feet	LACM 1919	Dominguez Hills: west of Wilmington Ave., south of 223rd St.	McLeod 2017
mammoth	† *Mammuthus* sp.	unknown	LACM 2035	El Segundo: near the intersection of Prairie Ave. and 139th St.	Miller 1971, Jefferson 1991b, McLeod 2018
mammal	Mammalia	unknown	LACM 1203	El Segundo: Hyperion Tunnel	Jefferson 1991b
long-tailed weasel	*Mustela* sp. cf. *M. frenata*	unknown	LACM 1170	Inglewood: Edward Vincent Junior Park	Miller 1971, Jefferson 1991b, McDonald 1996
diminutive pronghorn	† *Capromeryx* sp.				
Jefferson's ground sloth	† *Megalonyx jeffersonii*				
American lion	† *Panthera* sp. cf. *P. atrox*				
peccary	† *Platygonus* sp.				
hare	*Lepus* sp.	13-16 feet deep	LACM 1180, LACM 4942	Los Angeles: Manchester Blvd. and Airport Blvd.	Miller 1971, McLeod 2015
mastodon	† *Mammut* sp.				
mammoth	† *Mammuthus* sp.				
horse	† *Equus* sp.				
bison	† *Bison* sp.				
mammoth	† *Mammuthus* sp.	unknown	LACM 1668	Los Angeles: Manchester Blvd. and Vermont Blvd.	Jefferson 1991b
horse	† *Equus* sp.				
elephant	† Proboscidea	25 feet	LACM 3264	Los Angeles International Airport, Tom Bradley International Terminal	McLeod 2015
mammoth, baby	† *Mammuthus* sp.	40 feet	LACM 7332	Los Angeles: West 98th St. west of Bellanca Ave.	McLeod 2015
mammal	Mammalia	unknown	LACM 3266	Los Angeles: Ainsworth and Athens	Jefferson 1991b

Common Name	Taxon	Depth below surface	Locality	Location	Reference
				streets near 110 & 105 freeways	
CA ground squirrel	*Otospermophilus beecheyi*	unknown	LACM 1344	Los Angeles: Harbor Freeway I-110, Athens	Miller 1971, Jefferson 1991b
diminutive pronghorn	† *Capromeryx* sp.				
mammoth	† *Mammuthus* sp.				
mammoth	† *Mammuthus* sp.	unknown	LACM 4250	Playa del Rey (= in part to Outfall Sewer): Ballona Creek Wash	Hay 1927, Jefferson 1991b
horse	† *Equus* sp.				
camel	† *Camelops* sp.				
great northern loon	*Gavia* sp. aff. *G. immer*	unknown	LACM 1024	Playa del Rey: Del Rey Hills, Lincoln Ave (Lincoln Blvd)	Hay 1927 Howard 1936; Miller and DeMay 1942; Barnes and Mitchell 1975; Jefferson 1991a, 1991b
western grebe	*Aechmophorus occidentalis*				
short-tailed albatross	*Phoebastria albatrus*				
sooty shearwater	*Puffinus griseus*				
black-vented shearwater	*Puffinus opisthomelas*				
Playa del Rey booby	† *Sula reyana* (type locality)				
flightless sea duck	† *Chendytes lawi*				
duck	Anatidae				
common murre	*Uria aalge*				
common raven	*Corvus corax*				
harbor seal	*Phoca* sp. cf. *P. vitulina*				
whale	Cetacea	unknown	LACM 1254, LACM 3064	Redondo Beach: Redondo Steam Generating Plant	Miller 1971, Jefferson 1991b
llama	† *Hemiauchenia* sp.				
horse	†*Equus* sp.	15 feet	LACM 4444	Torrance: Mobil Oil Refinery just west of Crenshaw Blvd. and just south of 190th St	McLeod 2018
whale	Cetacea				
horse	† *Equus* sp.	35 feet	LACM 1839	Torrance: near the intersection of Crenshaw Blvd. and 236th St.	Miller 1971, Jefferson 1991b, McLeod 2018
whale	Cetacea	unknown	LACM 65118	Torrance Sand and Gravel Company, Crenshaw and Pacific Coast Hwy.	Jefferson 1991b
rodent	Rodentia	14 feet	LACM 3789	Westchester: 8734 Bellanca Ave. south of Manchester Ave.	McLeod 2015, Jefferson 1991b
mammoth	† *Mammuthus* sp.				
speckled sanddab	*Citharichthys stigmaeus*				

† - indicates that the species or the species that would have been present in the area at the time is extinct.

CALIFORNIA HISTORIC RESOURCES INVENTORY SYSTEM

A search for archaeological and historical records was completed at the South Central Coastal Information Center (SCCIC) of the California Historic Resources Inventory System (CHRIS) located at California State University, Fullerton on August 28, 2018 by Megan Wilson, a Cogstone staff archaeologist. The record search covered a half-mile radius around the Project area boundary.

The results of the records search indicate a total of ten cultural resources investigations have been conducted within a half-mile radius of the Project area (Table 3). Of these, one cultural resource study included a portion of the Project area.

Table 3. Previous Cultural Resource Studies

Report No.	Author(s)	Title	Year	Distance from PA	Quad Maps
LA-02499	McKenna, Jeanette A.	Results of a Standard Prehistoric Archaeological Records Check, City of Redondo Beach, Los Angeles County, California - General Plan Eir	1991	0.25-0.5	Inglewood, Venice
LA-02904	Stickel, Gary E.	Draft Report a Phase I Cultural Resources Literature Search for the West Basin Water Reclamation Project	1993	Within	Inglewood, Redondo Beach
LA-03265	Hatheway, Roger G.	Cultural Resources Assessment of the General Plan and Zone Changes for the Hermosa Beach School District Properties Hermosa Beach, California	1983	0.25-0.5	Redondo Beach
LA-07922	Bonner, Wayne H. and Kathleen A. Crawford	Cultural Resources Records Search and Site Visit Results for Cingular Wireless Candidate El-0152-02 (Mira Costa High), 701 South Peck Avenue, Manhattan Beach, Los Angeles County, California	2006	0.25-0.5	Redondo Beach
LA-10068	Carmack, Shannon and Judith Marvin	Cultural Resources Assessment Hermosa Valley High School Gymnasium and Classrooms Project City of Hermosa Beach, Los Angeles County, California	2004	0.25-0.5	Redondo Beach
LA-10132	Johnson, Ken	Fun, Frustration and Fulfillment an Historical Study of the City of Redondo Beach	1965	0.25-0.5	Inglewood, Redondo Beach, Torrance, Venice
LA-11086	Wlodarski, Robert J.	Aviation/Artesia - LAR090 1765 Artesia Boulevard, Manhattan Beach, CA 90266	2009	0.25-0.5	Redondo Beach
LA-12432	Bonner, Wayne and Crawford, Kathleen	Cultural Resources Records Search and Site Visit results for T-Mobile West, LLC Candidate LA02642A (LA237 Ski & Surf) 1765 Artesia Boulevard, Manhattan Beach, Los Angeles County, California	2013	0-0.25	Redondo Beach

Report No.	Author(s)	Title	Year	Distance from PA	Quad Maps
LA-12509	Johnson, Brent	Cultural Resources Records Search and Site Visit, AT&T Mobility, LLC Site: LA0558/Blossom ROW, 1587 Blossom Lane Redondo Beach CA	2012	0.25-0.5	Torrance
LA-12594	Bonner, Wayne and Crawford, Kathleen	Cultural Resources Records Search and Site Visit Results for T-Mobile West, LLC Candidate LA02642A (LA237 Ski & Surf), 1765 Artesia Boulevard, Manhattan Beach, Los Angeles County, California	2013	0-0.25	Redondo Beach

The results of these studies indicated that no cultural resources are located within the Project area. A total of two cultural resources have been previously documented within the half-mile search radius, both historic built environment resources (Table 4).

Table 4. Cultural Resource Sites

Primary No. (P-19-)	Address	Resource Type	Resource Description	Date Recorded	Distance from PA (in miles)	NRHP Status Code
186927	1645 Valley Dr.	Historic Resource	Education building, Modern-style, "Valley Vista School": 1952	2004	0.25-0.5	7R
190634	1765 Artesia Blvd.	Historic Resource	1-3 story commercial building, Modern-style: 1941	2013	0-0.25	6Z

OTHER SOURCES

In addition to the records at the SCCIC, Megan Wilson consulted a variety of sources in August 2018 to obtain information regarding the cultural context of the Project Area (Table 5). Sources included the National Register of Historic Places (NRHP), the California Register of Historic Resources (CRHR), California Historical Resources Inventory (CHRI), California Historical Landmarks (CHL), and California Points of Historical Interest (CPHI). Specific information about the Project area, obtained from historic maps and aerial photographs, is presented in the Project Area History section above.

Table 5. Additional Sources Consulted

Source	Results
National Register of Historic Places (NRHP; 1979-2002 & supplements)	Negative
Historic USGS Topographic Maps	The earliest topographic map depicting the Project area is the 1896 15' Redondo Beach topographic map that shows Artesia Boulevard, then named Gould Avenue, and Aviation Boulevard, previously named Pier Street, ending at Gould Avenue. The 1924 7.5' Torrance topographic map shows a grid-like pattern of roads surrounding the Project area and the Grant School is prominently labeled. The 1934 7.5' Torrance topographic map shows increased development in the area. The 1972 7.5' Redondo Beach topographic map shows Aviation Boulevard intersecting Artesia Boulevard and continuing to the northeast.
Historic US Department of Agriculture Aerial Photographs	The earliest historic aerial dates to 1952 and shows Aviation Boulevard, formerly Pier Street, ending at Artesia Boulevard, formally Gould Avenue. The area around the intersection appears to be undeveloped. The 1962 aerial shows Aviation Boulevard, still named to Pier Street, intersecting Artesia Boulevard - now a divided highway, continuing through to the northeast. In 1962, the northeast quadrant is developed, the south east quadrant has a baseball field on it, and the west side of the intersection is undeveloped. By 1972 the area surrounding the intersection is completely developed.
California Register of Historical Resources (CRHR; 1992-2014)	Negative
California Historical Resources Inventory (CHRI; 1976-2014)	Negative
California Historical Landmarks (CHL; 1995 & supplements to 2014)	Negative
Manhattan Beach Historical Society	Negative
California Points of Historical Interest (CPHI; 1992 to 2014)	Negative
Bureau of Land Management (BLM) General Land Office Records	Antonio Ygnacio Avila (Abila), 1875, Spanish/Mexican Grant

NATIVE AMERICAN CONSULTATION

The City of Manhattan Beach is conducted Native American consultations to meet the requirements of Assembly Bill 52.

SURVEY

METHODS

The survey stage is important in a project's environmental assessment phase to verify the exact location of each identified cultural or paleontological resource, the condition or integrity of the resource, and the proximity of the resource to areas of cultural or paleontological resources. For paleontology, an additional purpose is to confirm that field observations conform to the geological maps of the Project area. All undeveloped ground surface areas within the ground disturbance portion of the Project area were examined for fossils or sediments that are favorable for the preservation of fossils, artifacts (e.g., flaked stone tools, tool-making debris, stone milling tools or fire-affected rock), soil discoloration that might indicate the presence of a cultural midden, concentrations of cultural debris associated with human occupation, soil depressions and features indicative of the former presence of structures or buildings (e.g., postholes, foundations), or historic-era debris (e.g., metal, glass, ceramics). Existing ground disturbances (e.g., cutbanks, ditches, animal burrows, etc.) were intensely inspected. Photographs of the Project area, including ground surface visibility and items of interest, are taken with a digital camera.

RESULTS

Cogstone archaeologist and cross-trained paleontologist, Megan Wilson, completed an intensive pedestrian survey of the entire Project area on September 14, 2018. The Project area was entirely hardscaped or landscaped with less than five percent ground visibility, of which was all non-native sediments and landscaped with ornamental shrubs. No artifacts or fossils were observed during the survey (Figures 6 and 7).

Figure 6. North side of Aviation Boulevard, View Southwest

Figure 7. Southwest Quadrant of Intersection, Project Area Overview, View Northeast

PALEONTOLOGICAL SENSITIVITY

A multilevel ranking system was developed by professional resource managers within the Bureau of Land Management (BLM) as a practical tool to assess the sensitivity of sediments for fossils. The Potential Fossil Yield Classification (PFYC) system (BLM 2008; Appendix C) has a multi-level scale based on demonstrated yield of fossils. The PFYC system provides additional guidance regarding assessment and management for different fossil yield rankings.

Fossil resources occur in geologic units (e.g., formations or members). The probability for finding significant fossils in a project area can be broadly predicted from previous records of fossils recovered from the geologic units present in and/or adjacent to the study area. The geological setting and the number of known fossil localities help determine the paleontological sensitivity according to PFYC criteria.

Sediments that are close to their basement rock source are typically coarse; those farther from the basement rock source are finer. The chance of fossils being preserved greatly increases once the average size of the sediment particles is reduced to 5 mm in diameter or less. Moreover, fossil preservation also greatly increases after natural burial in rivers, lakes, or oceans. Remains left on the ground surface become weathered by the sun or consumed by scavengers and bacterial activity, usually within 20 years or less. So the sands, silts, and clays of rivers, lakes, and oceans are the most likely sediments to contain fossils.

Using the PFYC system, geologic units are classified according to the relative abundance of vertebrate fossils or scientifically significant invertebrate or plant fossils and their sensitivity to adverse impacts within the known extent of the geological unit. Although significant localities may occasionally occur in a geologic unit, a few widely scattered important fossils or localities do not necessarily indicate a higher PFYC value; instead, the relative abundance of localities is intended to be the major determinant for the value assignment.

Based on other recorded localities, Pleistocene fossils typically begin appearing about 8 to 10 feet deep in alluvial sediments of southern California valleys. Holocene remains less than 11,700 years old may be present at shallower depths. Nearer to areas of uplift, faulting, and folding fossils may appear at the surface or at shallow depths due to sediment removal and a lack of deposition. Fossils from Pleistocene alluvium near to areas of uplift can be found less than five feet deep in some areas of southern California (Jefferson 1991b, E. Scott and K. Scott pers. comm.).

One locality near to the Project area produced the fossil of a mammoth from 5 feet below the original ground surface. While none of the records list the depositional environments that the 23

localities near to the project were recovered from, wind-blown dunes typically do not preserve fossils. A review of the geotechnical report (Hushmand and Associates 2017) indicated that brown silty sands consistent with dune sands extended to approximately 13 feet below the surface.

All artificial fill is assigned very low sensitivity ranking (PFYC 1) while the older eolian sand dune deposits are assigned a low sensitivity ranking (PFYC 2).

STUDY FINDINGS AND RECOMMENDATIONS

PALEONTOLOGICAL RESOURCES

All artificial fill is assigned very low sensitivity ranking (PFYC 1) while the older eolian sand dune deposits are assigned a low sensitivity ranking (PFYC 2). One locality near to the Project area produced the fossil of a mammoth from 5 feet below the original ground surface. While none of the records list the depositional environments that the 23 localities near to the project were recovered from, wind-blown dunes typically do not preserve fossils. A review of the geotechnical report indicated that brown silty sands consistent with dune sands extended to approximately 13 feet below the surface. All artificial fill is assigned very low sensitivity ranking (PFYC 1) while the older eolian sand dune deposits are assigned a low sensitivity ranking (PFYC 2).

Project cut depths are anticipated to be a maximum of 25 feet deep for storm water improvements and less than 5 feet deep for the rest of the Project.

No paleontological monitoring is currently recommended for the Project. If unanticipated fossils are unearthed during construction, work should be halted in that area until a qualified paleontologist can assess the significance of the find. Work may resume immediately a minimum of 50 feet away from the find.

CULTURAL RESOURCES

Identification efforts by Cogstone for this assessment included a review of existing literature and historic maps on the Project area and vicinity, a records search conducted at the SCCIC, and an intensive pedestrian survey. The records search and pedestrian survey were both negative for cultural resources within the Project area. The potential for discovery of surficial or buried archaeological materials, features, or deposits is considered low.

In the event of an unanticipated discovery, all work must be suspended within 50 feet of the find until a qualified archaeologist evaluates it. In the unlikely event that human remains are encountered during project development, all work must cease near the find immediately.

In accordance with California Health and Safety Code Section 7050.5, the County Coroner must be notified if potentially human bone is discovered. The Coroner will then determine within two working days of being notified if the remains are subject to his or her authority. If the Coroner recognizes the remains to be Native American, he or she shall contact the Native American Heritage Commission (NAHC) by phone within 24 hours, in accordance with Public Resources Code Section 5097.98. The NAHC will then designate a Most Likely Descendant (MLD) with respect to the human remains. The MLD then has the opportunity to recommend to the property owner or the person responsible for the excavation work means for treating or disposing, with appropriate dignity, the human remains and associated grave goods. Work may not resume in the vicinity of the find until all requirements of the health and safety code have been met.

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2017 Vertebrate Paleontology Records Check for paleontological resources for the proposed MUST Facility Project, Cogstone Project # 3993, in the City of Long Beach, Long Beach, Los Angeles County, California, project area. On file with Cogstone, Orange, CA.
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APPENDIX A. QUALIFICATIONS

cogstone
PALEONTOLOGY - ARCHAEOLOGY - HISTORY

DESIREÉ RENEÉ MARTINEZ
Task Manager/Quality Assurance

EDUCATION

1999 M.A., Anthropology (Archaeology), Harvard University, Cambridge

1995 B.A., Anthropology, University of Pennsylvania, Philadelphia

SUMMARY QUALIFICATIONS

Ms. Martinez is a qualified archaeologist with 21 years of experience in archaeological fieldwork, research, and curation. She has expertise in the planning, implementation, and completion of all phases of archaeological work and has participated in archaeological investigations as a crew member, tribal monitor, and principal researcher. She meets national standards in archaeology set by the Secretary of Interior's *Standards and Guidelines for Archaeology and Historic Preservation*. Her experience also includes compliance with CEQA, NEPA, NHPA Sec 106, NAGPRA, SB 18, AB 52 and other cultural resource laws. In addition, Ms. Martinez has vast experience in lab analysis and museum collections management. Ms. Martinez also has extensive experience consulting with Native American leaders and community members in a variety of contexts.

SELECTED PROJECTS

SR 138 Crowder Canyon Realignment Data Recovery, Caltrans District 8, Hesperia, San Bernardino County, CA. The project involves realignment of a ~2 segment of SR 138 including construction of three bridges, one lane in each direction, drainage construction and demolition of the existing segment. Cogstone participated in data recovery at two archaeological sites. All work was performed in compliance with the Caltrans SER and NEPA, CEQA, and Section 106 of NHPA. Tasks included Native American coordination, manual and mechanical excavation, backfilling, and controlled destruction. Sub to Applied Earthworks. Project Manager. 2016-2018

Whittier Boulevard / Three Intersection Improvements, Whittier, Los Angeles County, CA. Cogstone conducted intensive-level cultural resources surveys and prepared technical studies for improvements proposed for three intersections at Colima Road, Santa Fe Springs Road and Painter Avenue in a disturbed urban environment. Managed records search, Sacred Lands search, NAHC consultation, and APE mapping. Sub to Michael Baker. Project Manager. 2016-2018

Fisher House and Golf Course, Mechanized Archaeology Survey, Veterans Affairs Long Beach Healthcare System, Long Beach, Los Angeles County, CA. The project was preconstruction testing and monitoring for two new constructions projects. In compliance with the Historic Property Treatment Plan preconstruction work included ground penetrating radar and magnetometry, truck mounted auger testing and mechanical excavation units. One historic refuse area was defined and recorded. Monitoring recovered additional cultural materials. Co-author of compliance reports. Principal Investigator. 2015-2017

High Desert Corridor/ SR-138 Widening Project, Caltrans District 7 On-Call (07A3145)/LA Metro, Los Angeles and San Bernardino Counties, CA. Co-Principal Investigator. This project proposed by Caltrans and Metro involves construction of a new, approximately 63-mile long, east-west freeway/expressway and rail line between SR-14 in Los Angeles County and SR-18 in San Bernardino County. Phase II/III testing and data recovery at the three sites that will be directly impacted by the project. Analyzed lithic material. Compliance with Section 106 of the NHPA and CEQA are required. Sub to Parsons Transportation Group. 2015

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PALEONTOLOGY - ARCHAEOLOGY - HISTORY

MOLLY VALASIK
Principal Investigator for Archaeology

EDUCATION

2009 M.A., Anthropology, Kent State University, Kent, Ohio
2006 B.A., Anthropology, Ohio State University, Columbus, Ohio

EXPERIENCE

Ms. Valasik is a Registered Professional Archaeologist with more than 9 years of experience. She is a skilled professional who is well-versed in the compliance procedures of CEQA and Section 106 of the NHPA and regularly prepares cultural resources assessment reports for a variety of federal, state, and local agencies throughout California. She has managed numerous transportation-related projects and task orders for Metro, Caltrans, OCTA, SANDAG, and other transit agencies and municipalities. She meets the qualifications required by the Secretary of the Interior's *Standards and Guidelines for Archaeology and Historic Preservation* and is accepted as a principal investigator for prehistoric archaeology by the State Office of Historic Preservation's Information Centers.

SELECTED PROJECTS

Whittier Boulevard / Three Intersection Improvements, Whittier, Los Angeles County, CA. Cogstone conducted intensive-level cultural resources surveys and prepared technical studies for improvements proposed for three intersections at Colima Road, Santa Fe Springs Road and Painter Avenue in a disturbed urban environment. Managed records search, Sacred Lands search, NAHC consultation, and APE mapping. Sub to Michael Baker. Principal Investigator. 2018

Reseda Skate Facility, City of Los Angeles, Los Angeles County, CA. The project involved an archaeological assessment for a proposed skate facility including an ice rink with locker rooms, office space, and concessions; an outdoor roller rink with shade structure, indoor office space and storage; as well as numerous parking spaces within the community of Reseda. Services included records search, Sacred Lands File search, intensive-level pedestrian survey, and preparation of an assessment report. Sub to ICF. Principal Investigator. 2017

SR-138 Palmdale Boulevard Improvements (Sierra Highway), Caltrans District 7 Palmdale, Los Angeles County, CA. The project involves widening and modifying three southbound lanes on Sierra Highway to Avenue R at the railroad crossing. Managed a cultural resources assessment to support the Project environmental documents (IS/MND) in compliance with NEPA and CEQA. Services for this Local Assistance Project, on behalf of the City of Palmdale, included records search, Sacred Lands File search, Tribal consultation, intensive-level field survey, finalization of the APE map in concurrence with Caltrans District 7, and preparation of an ASR technical report. Sub to Parsons. Principal Investigator. 2016

On-Call Cultural Resources Services, Sanitation Districts of Los Angeles County, Long Beach, Los Angeles County, CA. Managed cultural resources assessments for four task orders including: Joint Outfall "A" Unit 6 Trunk Sewer Rehabilitation, Long Beach; Joint Outfall "B" Units 1A Trunk Sewer Rehabilitation, Carson; Joint Outfall "D", Units 7 and 8 Trunk Sewer Rehabilitation, Long Beach; and Anaheim Street Trunk Sewer Rehabilitation Project TAF 10, Long Beach. To meet compliance with NHPA Section 106 and CEQA, the assessments included a records search, sacred lands search, pedestrian survey, and Native American consultation. Principal Investigator. 2015-2016

Arlington Avenue Widening, Caltrans District 8, City of Riverside Public Works, Riverside County, CA. The City proposed widening Arlington Avenue one linear mile in order to construct safety improvements. Managed cultural studies including record search, Sacred Lands File search, Native American consultations, and intensive-level pedestrian archaeological survey of the 5-acre site with negative results, as well as coordinated approval by District 8 of an APE map. Co-author of the Archaeological Survey Report and Historic Properties Survey Report. Sub to Michael Baker. Project Manager/Co-Principal Investigator. 2015

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PALEONTOLOGY - ARCHAEOLOGY - HISTORY

KIM SCOTT
Principal Investigator for Paleontology

EDUCATION

2013 M.S. Biology with paleontology emphasis, California State University San Bernardino
2000 B.S., Geology with paleontology emphasis, University of California, Los Angeles

SUMMARY QUALIFICATIONS

Ms. Scott has more than 20 years of experience in California paleontology and geology. She has extensive survey, monitoring, and fossil salvage experience throughout the desert communities of Southern California. She has special skills in fossil preparation (cleaning and stabilization), in the preparation of stratigraphic sections, locality mapping and other documentation for fossil localities. Scott serves as company safety officer and is the author of the company safety and paleontology manuals. Additionally she trains all field crew members in paleontological salvage techniques and data recording. She is a Member of the Society of Vertebrate Paleontology and Geological Society of America.

SELECTED PROJECTS

Purple Line Extension (Westside Subway) Construction Management, Segment 1, Metropolitan Transportation Authority, Los Angeles County, CA (#2068, 2604). The project involves construction of seven stations from the existing Purple Line at Wilshire/Western Avenue along Wilshire Boulevard to the Veterans Administration Hospital in Westwood for 8.6 miles. Federal Transit Authority (FTA) is the lead agency for the project. Supervised paleontological monitoring and fossil recovery of the Ogden shaft excavations and fossil preparation in the lab. Prepared a monitoring report of the over 1,000 fossils recovered. Currently serving as the paleontological consultant for the construction management team's oversight of the design-build of three stations from Western to La Cienega. Sub to Parsons Brinkerhoff and sub to WEST JV. Principal Paleontologist/Report Co-author. 2013-present

Barren Ridge Renewable Transmission Project, Los Angeles Department of Water and Power, Los Angeles and Kern Counties, CA. Managing paleontological preconstruction surveys and monitoring of project alignment within the Angeles National Forest and Mojave Desert areas of Southern California on National Forest System lands and Bureau of Land Management managed public lands. Sub to Aspen Environmental Group. Principal Paleontologist/Field and Laboratory Director/Report Co-author. 2015-present

Long Beach Municipal Urban Stormwater Treatment (MUST) Project, Los Angeles County. Prepared an assessment for an 8 mile segment of the Los Angeles River. The project is intended to improve the water quality of existing urban runoff to the Los Angeles River, and ultimately to the Long Beach Harbor. Sub to Michael Baker International. Principal Paleontologist. 2017

Little Tujunga Canyon Bridge Project, Angeles National Forest, Los Angeles County. Prepared an assessment for the replacement of the Little Tujunga Canyon Road Bridge**.** The proposed bridge replacement is over Buck Canyon Creek in order to meet current bridge design and seismic safety standards, and improve the safety for pedestrians, bicyclists, and vehicle users. Sub to Michael Baker International. Principal Paleontologist. 2017

Park Place Project, City of El Segundo, Los Angeles County. Prepared an assessment for extension of Park Place from Allied Way to Nash Street with a railroad grade separation to implement a critical project improving traffic and circulation in the project area**.** Sub to Michael Baker International. Principal Paleontologist. 2015

Coto de Caza EIR Subdivision, Coto de Caza, Orange County, CA. The project proposes the subdivision of an existing large estate for development of 28 new residential lots on approximately 50-57 acres of land. Proposed residential lots will be a minimum of one acre in size. Prepared a Paleontological Assessment Report. Contracted to Bill Lyon. Co-Principal Paleontologist/Report Co-author. 2015.

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PALEONTOLOGY - ARCHAEOLOGY - HISTORY

HOLLY DUKE
Archaeologist/Report Writer

EDUCATION

2009 B.A., Archaeology/History, Simon Fraser University, Canada

SUMMARY QUALIFICATIONS

Ms. Duke is a qualified archaeologist with over five years of experience in pedestrian survey, monitoring, excavation and burial recovery, as well as the identification of human and faunal skeletal remains. Duke is a Supervisor for several projects. She is proficient in the preparation of cultural resources assessment reports for a variety of state and local agencies throughout California. Duke is responsible for the organization of field data, lab supervision and organization, as well as identifying and cataloging prehistoric and historic artifacts. She also has experience with preparing artifact collections for curation at a variety of different repositories as well as fossil preparation and stabilization.

SELECTED PROJECTS

TetraGro Lancaster Project, City of Lancaster, Los Angeles County, California. The project consisted of a cultural resources assessment for the construction of a 22,000 square foot medical cannabis cultivation center with a clean anodized aluminum façade. Provided task management and supervised all work for the project which included a records search and an intensive pedestrian survey. Authored the Cultural Resources Assessment Report. Task Manager. 2018

West Bastanchury Residential Subdivision Project, City of Yorba Linda, Orange County, California. The project consisted of a cultural and paleontological resources assessment for the creation of a tentative tract map to subdivide a 13-acre City-owned lot into 23 residential lots. Provided task management and supervised all work for the project which included a records search and an intensive pedestrian survey. Authored the Cultural Resources Assessment Report. Task Manager. 2017

Upper Berryessa Flood Channel Improvements Project, City of Milpitas, Santa Clara County, California. The project consisted of numerous flood channel improvements along Berryessa Creek within an approximately 2.1 mile alignment on behalf of the U.S. Army Corps of Engineers in association with the Santa Clara Valley Water District. Conducted burial recovery for a total of nine in-situ burials and conducted archaeological monitoring of ground disturbing activities within the site. Responsible for the completion of all paperwork and drafted portions of the Burial Recovery and Archaeological Monitoring Compliance Report. Archaeologist. 2017

Longboat Solar Photovoltaic, EDF Renewable Energy, Cities of Barstow and Lenwood, San Bernardino County, California. The project involved construction of a solar energy facility within an approximately 234 acre property. Cogstone conducted cultural resources Phase I and Extended Phase I studies. Tasks included archaeological and paleontological resources records search, Sacred Lands search, Native American consultation. Identified and cataloged all artifacts recovered, delivered artifacts to tribes for repatriation. Sub to Environmental Intelligence. Archaeologist/Lab and Data Manager. 2015-2017

Crowder Canyon, Caltrans District 8, San Bernardino County, California. The project consisted of the realignment of SR-138. Participated in the archaeological testing and data recovery of two archaeological sites near Hesperia. Conducted excavation and data recovery of more than six prehistoric features. Sub to Applied Earthworks. Archaeologist. 2016

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PALEONTOLOGY - ARCHAEOLOGY - HISTORY

MEGAN PATRICIA WILSON
GIS Manager/Archaeologist

EDUCATION

2014 M.A. Anthropology, California State University, Fullerton *cum laude*
2013 GIS Certificate, California State University, Fullerton
2006 B.A., Anthropology, University of California, Los Angeles *cum laude*

SUMMARY QUALIFICATIONS

Ms. Wilson is a Registered Professional Archaeologist (RPA) and cross-trained paleontologist. Ms. Wilson regularly conducts records searches, tribal consultations, completes DPR site records, and gathers historic building information, and assists in drafting archaeological assessment reports. She meets the qualifications required by the Secretary of the Interior's *Standards and Guidelines for Archaeology and Historic Preservation*. Further, she is certified in Geographic Information Systems (GIS) and specializes in ArcGIS software. She regularly prepares maps in coordination with Caltrans, as well as contributing to technical reports. Ms. Wilson is responsible for supervising GIS data collection and management, geospatial analysis, and the production of GIS maps and databases for large and small-scale projects. Ms. Wilson has 7 years of experience in southern California archaeology.

SELECTED PROJECTS

Newport Crossing, Newport Beach, Orange County, California. Completed archaeological/paleontological records search, pedestrian survey, GIS maps and drafted Cultural Resources Assessment Report on behalf of the City of Newport Beach. Sub to Michael Baker International. Archaeologist. 2018

I-5 Jeffrey Open Space Trail (JOST) Segments 1 & 2, Irvine, Orange County, California. Conducted records search and survey to support an Archaeological Survey Report (ASR), Historic Property Survey Report (HPSR), and Paleontological Identification Report (PIR) for a bike trail and bridge project on behalf of the City of Irvine. Sub to Michael Baker. Archaeologist. 2018

Laguna Beach Village Entrance Project, Laguna Beach, Orange County, California. Completed archaeological/paleontological records search, pedestrian survey, NAHC consultation, GIS maps and drafted Cultural Resources Assessment Report for the City of Laguna Beach, CA. Archaeologist. 2017

Park Place Extension and Grade Separation EIR EA, Caltrans District 7, El Segundo, Los Angeles County, California. Conducted a pedestrian survey to record and evaluate cultural resources within the archaeological and architectural APEs for a ~0.5-mile project along NBSF and UPRR rail lines and spur tracks on behalf of the City of El Segundo for HPSR/ASR/HRER and paleontological reports. Seven built-environment resources were identified, evaluated, and DPR 523 forms were prepared. Archaeologist/GIS Supervisor. 2017

Whittier Boulevard / I-605 Arterial Hot Spot Improvements, Environmental Clearance and Preliminary Engineering for Three Intersection Improvements, Whittier, Los Angeles County, California. Conducted an intensive-level cultural resources survey to support cultural and paleontological resources technical studies for improvements proposed for three intersections in a disturbed urban environment. Drafted APE maps, records search, Sacred Lands search, and NAHC consultation for intersections at Colima Road, Santa Fe Springs Road and Painter Avenue. Archaeologist/GIS Supervisor. 2016

Hidden Oaks Country Club Specific Plan and TT 18869, Chino Hills, San Bernardino County, California. Prepared report maps, conducted cultural and paleontological resources assessments and assisted the City with SB 18 compliance. Services included records search, drafting project maps, Sacred Lands search, NAHC consultation, field survey, and mitigation recommendations. Cogstone responded to the cultural section of the project EIR comment for this proposed 537-acre residential project. Archaeologist/GIS Supervisor. 2015-2016

APPENDIX B. PALEONTOLOGICAL RECORD SEARCH

Natural History Museum
of Los Angeles County
900 Exposition Boulevard
Los Angeles, CA 90007

tel 213.763.DINO
www.nhm.org

Vertebrate Paleontology Section
Telephone: (213) 763-3325

e-mail: smcleod@nhm.org

11 September 2018

Cogstone Resource Management, Inc.
1518 West Taft Avenue
Orange, CA 92865-4157

Attn: Megan Wilson, Archaeologist & GIS Technician

re: Vertebrate Paleontology Records Check for paleontological resources for the proposed Aviation Boulevard Project, Cogstone Project # 4273, in the City of Manhattan Beach, Los Angeles County, project area

Dear Megan:

I have conducted a thorough search of our paleontology collection records for the locality and specimen data for the proposed Aviation Boulevard Project, Cogstone Project # 4273, in the City of Manhattan Beach, Los Angeles County, project area as outlined on the portion of the Redondo Beach USGS topographic quadrangle map that you sent to me via e-mail on 28 August 2018. We have no vertebrate fossil localities that lie directly within the boundaries of the proposed project area, but we do have localities somewhat nearby from sedimentary deposits similar to those that occur at depth in the proposed project area.

In the entire proposed project area the surface deposits consist of older Quaternary dune sands. These types of deposits typically do not contain significant vertebrate fossils in the uppermost layers, but in older sedimentary deposits at depth they may well contain significant fossil vertebrate remains. Our closest vertebrate fossil locality older Quaternary deposits is LACM 4444, east-southeast of the proposed project area at the Mobil Oil Refinery property just west of Crenshaw Boulevard and just south of 190th Street, that produced fossil specimens of both terrestrial horse, *Equus*, and marine whale, Cetacea, at a depth of 15 feet below the surface. Our next closest vertebrate fossil locality from older Quaternary deposits is LACM 2035, northeast of the proposed project area near the intersection of Prairie Avenue and 139th Street,

that produced fossil mammoth bones at an unrecorded depth. Further south-southeast of the proposed project area, near the intersection of Crenshaw Boulevard and 236th Street, our older Quaternary locality LACM 1839 produced a fossil specimen of horse, *Equus*, at a depth of about 35 feet below the surface.

Grading or shallow excavations in the uppermost few feet of the older Quaternary Dune Sands in the proposed project area are not likely to uncover significant fossil vertebrate remains. Deeper excavations in the proposed project area that extend down into older Quaternary deposits, however, may well encounter significant vertebrate fossils. Any substantial excavations in the proposed project area below the uppermost layers, therefore, should be closely monitored to quickly and professionally collect any specimens without impeding development. Also, sediment samples should be collected and processed to determine the small fossil potential in the proposed project area. Any fossils recovered during mitigation should be deposited in an accredited and permanent scientific institution for the benefit of current and future generations.

This records search covers only the vertebrate paleontology records of the Natural History Museum of Los Angeles County. It is not intended to be a thorough paleontological survey of the proposed project area covering other institutional records, a literature survey, or any potential on-site survey.

Sincerely,

Samuel A. McLeod

Samuel A. McLeod, Ph.D.
Vertebrate Paleontology

enclosure: invoice

APPENDIX C. PALEONTOLOGIC SENSITIVITY RANKING CRITERIA

PFYC Description (BLM 2008)	PFYC Rank
Very Low. The occurrence of significant fossils is non-existent or extremely rare. Includes igneous or metamorphic and Precambrian or older rocks. Assessment or mitigation of paleontological resources is usually unnecessary.	1
Low. Sedimentary geologic units that are not likely to contain vertebrate fossils or scientifically significant nonvertebrate fossils. Includes rock units too young to produce fossils, sediments with significant physical and chemical changes (e.g., diagenetic alteration) and having few to no fossils known. Assessment or mitigation of paleontological resources is not likely to be necessary.	2
Potentially Moderate but Undemonstrated Potential. Units exhibit geologic features and preservation conditions that suggest fossils could be present, but no vertebrate fossils or only common types of plant and invertebrate fossils are known. Surface-disturbing activities may require field assessment to determine appropriate course of action.	3b
Moderate Potential. Units are known to contain vertebrate fossils or scientifically significant nonvertebrate fossils, but these occurrences are widely scattered and of low abundance. Common invertebrate or plant fossils may be found. Surface-disturbing activities may require field assessment to determine appropriate course of action.	3a
High. Geologic units containing a high occurrence of significant fossils. Fossils must be abundant per locality. Vertebrate fossils or scientifically significant invertebrate or plant fossils are known to occur and have been documented, but may vary in occurrence and predictability. If impacts to significant fossils can be anticipated, on-the-ground surveys prior to authorizing the surface disturbing action will usually be necessary. On-site monitoring or spot-checking may be necessary during construction activities.	4
Very High. Highly fossiliferous geologic units that consistently and predictably produce vertebrate fossils or scientifically significant invertebrate or plant fossils. Vertebrate fossils or scientifically significant invertebrate fossils are known or can reasonably be expected to occur in the impacted area. On-the-ground surveys prior to authorizing any surface disturbing activities will usually be necessary. On-site monitoring may be necessary during construction activities.	5