PALEONTOLOGICAL RESOURCES ASSESSMENT REPORT

HORSESHOE LAKE PARK PROJECT

Assessor's Parcel Number 163-240-001
City of Jurupa Valley, Riverside County, California

For Submittal to:

Jurupa Area Recreation and Park District
4810 Pedley Road
Jurupa Valley, CA 92509

Prepared for:

The Altum Group
73-710 Fred Waring Drive, Suite 219
Palm Desert, CA 92260

Prepared by:

Harry M. Quinn, Geologist/Paleontologist
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Michael Hogan, Principal Investigator
Bai "Tom" Tang, Principal Investigator

October 17, 2018

CRM TECH Project No. 3389P
Approximately 13.7 acres
Riverside West, Calif., 7.5' quadrangle
Rancho Jurupa (Stearns) land grant, T2S R6W, SBBM

EXECUTIVE SUMMARY

Between August and October 2018, at the request of the Altum Group, CRM TECH performed a paleontological resource assessment on approximately 13.7 acres of public park land on the southern edge of the City of Jurupa Valley, Riverside County, California. The subject property of the study consists of Assessor's Parcel Number 163-240-001, which is currently occupied by existing facilities of Horseshoe Lake Park, including a walkway, a horse ring, and a desiccated small lake. It is located south of Limonite Avenue, southwest of Van Buren Boulevard, and north of the Santa Ana River, in a portion of the Rancho Jurupa (Stearns) land grant lying within T2S R6W, San Bernardino Baseline and Meridian.

The study is part of the environmental review process for proposed improvements at the park, which include concrete and granite walkways, a horse trail, a bridge, a boardwalk, an exercise station, sport fields, games tables, a covered play area, a picnic shelter, parking stalls, and landscaping renovation (Figure 3). The Jurupa Area Recreation and Park District (JARPD), as the lead agency for the project, required the study in compliance with the California Environmental Quality Act (CEQA). The purpose of the study is to provide the City with the necessary information and analysis to determine whether the proposed project would potentially disrupt or adversely affect any significant, nonrenewable paleontological resources, as mandated by CEQA.

In order to identify any paleontological resource localities that may exist in or near the project area and to assess the possibility for such resources to be encountered in future excavation and construction activities, CRM TECH initiated records searches at the appropriate repositories, conducted a literature search, and carried out a systematic field survey in accordance with the guidelines of the Society of Vertebrate Paleontology. The results of these research procedures indicate that the sensitivity of the project area for paleontological resources ranges from low to high depending on the depth of excavation and the types of soils encountered. Excavations to the depth of three feet in the recent alluvial deposits have a low potential to disturb significant, nonrenewable paleontological resources, but those reaching deeper than three feet in undisturbed sediments may have a high potential to encounter such resources.

Based on these findings, CRM TECH recommends that a paleontological resource impact mitigation program be developed to prevent project impact on significant, nonrenewable paleontological resources or reduce such impact to a level less than significant. As the primary component of the mitigation program, periodic monitoring should be implemented during earth-moving operations above the depth of three feet, and full-time monitoring should be required if earth-moving operations reach the depth of three feet or if paleontologically sensitive sediments are unearthed at shallower depths.

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INTRODUCTION

Between August and October 2018, at the request of the Altum Group, CRM TECH performed a paleontological resource assessment on approximately 13.7 acres of public park land on the southern edge of the City of Jurupa Valley, Riverside County, California (Figure 1). The subject property of the study consists of Assessor's Parcel Number 163-240-001, which is currently occupied by existing facilities of Horseshoe Lake Park, including a walkway, a horse ring, and a desiccated small lake. It is located south of Limonite Avenue, southwest of Van Buren Boulevard, and north of the Santa Ana River, in a portion of the Rancho Jurupa (Stearns) land grant lying within T2S R6W, San Bernardino Baseline and Meridian (Figure 2).

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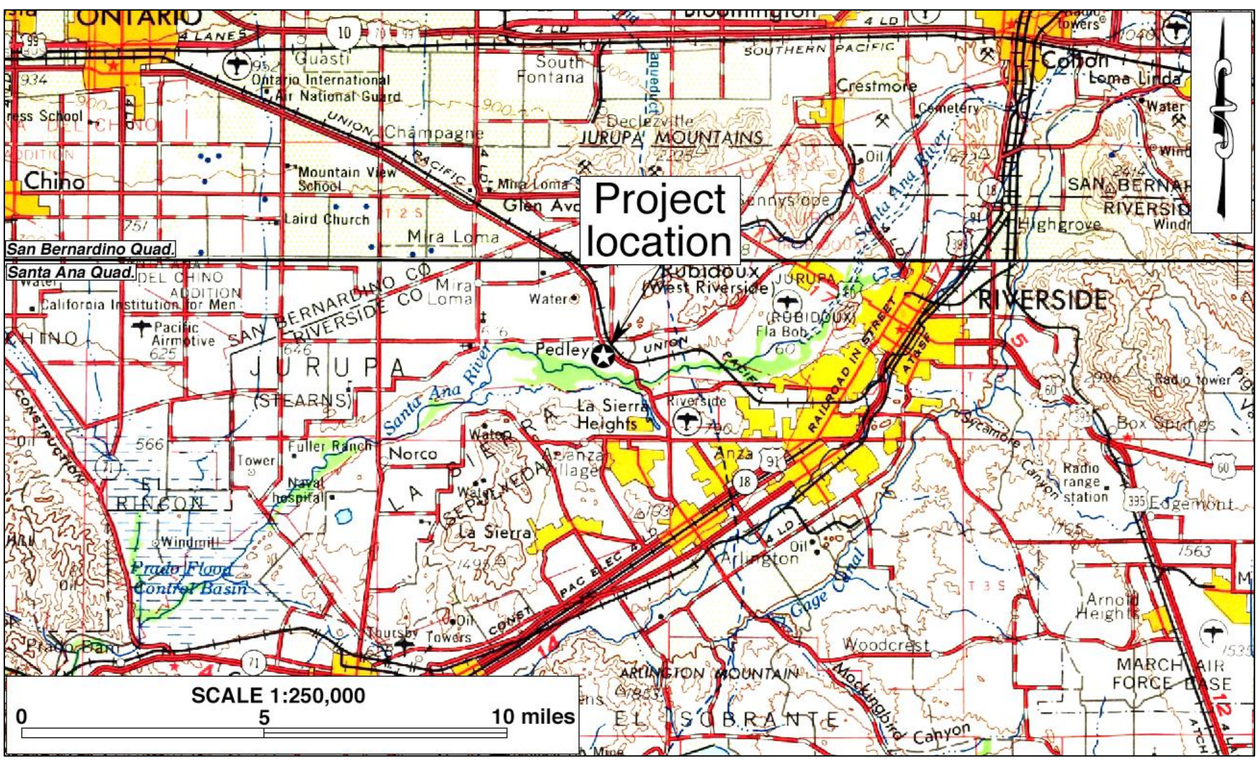

Figure 1. Project vicinity. (Based on USGS San Bernardino and Santa Ana, Calif., 1:250,000 quadrangles, 1969/1979 edition)

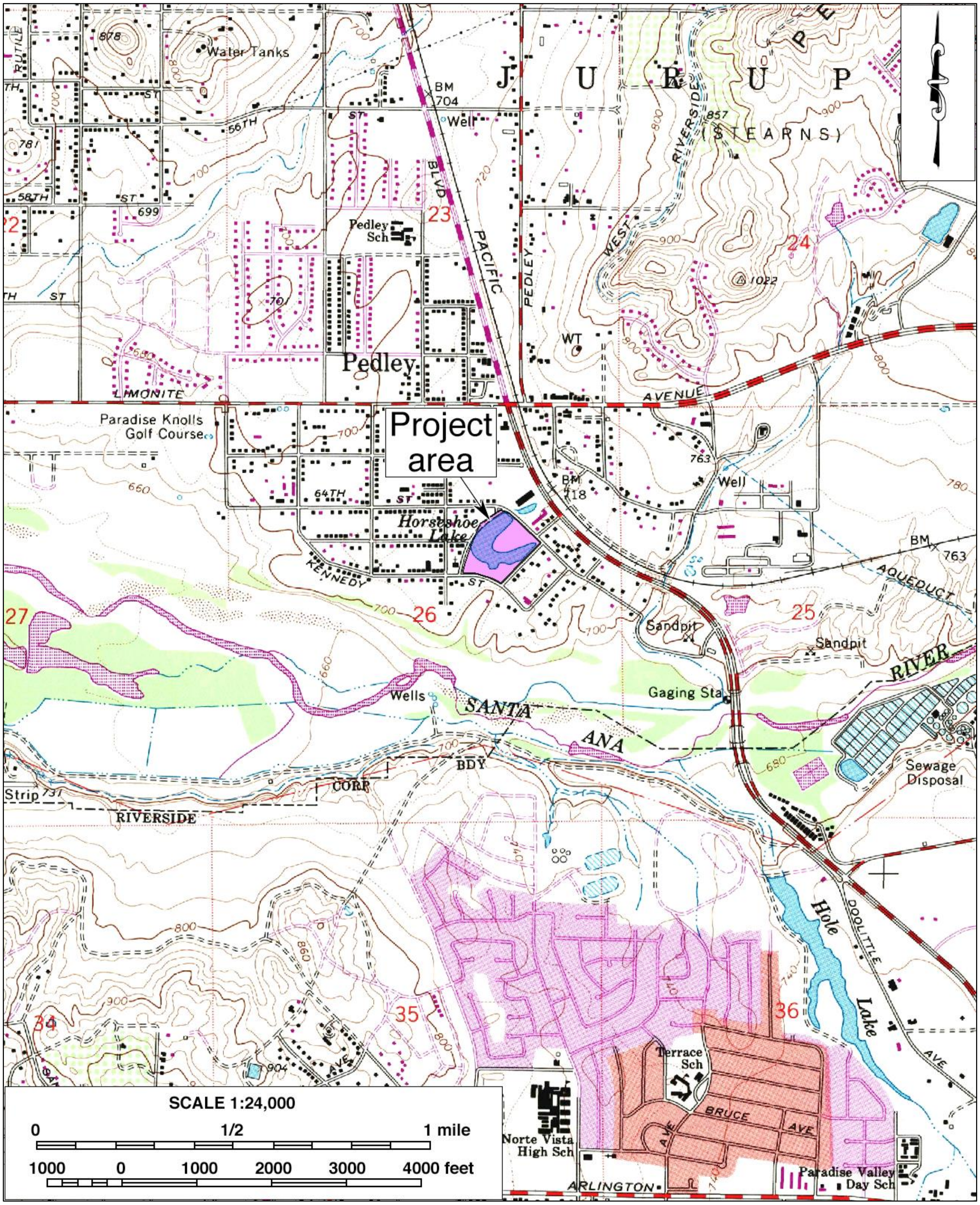

Figure 2. Project area. (Based on USGS Riverside West, Calif., 1:24,000 quadrangle, 1980 edition)

Figure 3. Preliminary master plan for the project.

conducted a literature search, and carried out a systematic field survey in accordance with the guidelines of the Society of Vertebrate Paleontology. The following report is a complete account of the methods, results, and final conclusion of this study. Personnel who participated in the study are named in the appropriate sections below, and their qualifications are provided in Appendix 1.

PALEONTOLOGICAL RESOURCES

DEFINITION

Paleontological resources represent the remains of prehistoric life, exclusive of any human remains, and include the localities where fossils were collected as well as the sedimentary rock formations in which they were found. The defining character of fossils or fossil deposits is their geologic age, which is typically regarded as older than approximately 12,000 years, the generally accepted temporal boundary marking the end of the last late Pleistocene (circa 2.6 million to 12,000 years B.P.) glaciation and the beginning of the current Holocene epoch (circa 12,000 years B.P. to the present).

Common fossil remains include marine shells; the bones and teeth of fish, amphibians, reptiles, and mammals; leaf assemblages; and petrified wood. Fossil traces, another type of paleontological resource, include internal and external molds (impressions) and casts created by these organisms. These items can serve as important guides to the age of the rocks and sediments in which they are contained, and may prove useful in determining the temporal relationships between rock deposits from one area and those from another as well as the timing of geologic events. They can also provide information regarding evolutionary relationships, development trends, and environmental conditions.

Fossil resources generally occur only in areas of sedimentary rock (e.g., sandstone, siltstone, mudstone, claystone, or shale). Because of the infrequency of fossil preservation, fossils, particularly vertebrate fossils, are considered nonrenewable paleontological resources. Occasionally fossils may be exposed at the surface through the process of natural erosion or because of human disturbances; however, they generally lay buried beneath the surficial soils. Thus, the absence of fossils on the surface does not preclude the possibility of their being present within subsurface deposits, while the presence of fossils at the surface is often a good indication that more remains may be found in the subsurface.

SIGNIFICANCE CRITERIA

According to guidelines proposed by Eric Scott and Kathleen Springer (2003) of the San Bernardino County Museum, paleontological resources can be considered to be of significant scientific interest if they meet one or more of the following criteria:

- The fossils provide information on the evolutionary relationships and developmental trends exhibited among organisms, living or extinct;
- The fossils provide data useful in determining the age(s) of the rock unit or sedimentary stratum, including data important in determining the depositional history of the region and the timing of geologic events therein;

- The fossils provide data regarding the development of biological communities or the interactions between paleobotanical and paleozoological biotas;
- The fossils demonstrate unusual or spectacular circumstances in the history of life; and/or
- The fossils are in short supply and/or in danger of being depleted or destroyed by the elements, vandalism, or commercial exploitation, and are not found in other geographic locations.

PALEONTOLOGICAL SENSITIVITY

The fossil record is unpredictable, and the preservation of organic remains is rare, requiring a particular sequence of events involving physical and biological factors. Skeletal tissue with a high percentage of mineral matter is the most readily preserved within the fossil record; soft tissues not intimately connected with the skeletal parts, however, are the least likely to be preserved (Raup and Stanley 1978). For this reason, the fossil record contains a biased selection not only of the types of organisms preserved but also of certain parts of the organisms themselves. As a consequence, paleontologists are unable to know with certainty, the quantity of fossils or the quality of their preservation that might be present within any given geologic unit.

Sedimentary units that are paleontologically sensitive are those geologic units (mappable rock formations) with a high potential to contain significant nonrenewable paleontological resources. More specifically, these are geologic units within which vertebrate fossils or significant invertebrate fossils have been determined by previous studies to be present or are likely to be present. These units include, but are not limited to, sedimentary formations that contain significant paleontological resources anywhere within their geographical extent as well as sedimentary rock units temporally or lithologically amenable to the preservation of fossils.

A geologic formation is defined as a stratigraphic unit identified by its lithic characteristics (e.g., grain size, texture, color, and mineral content) and stratigraphic position. There is a direct relationship between fossils and the geologic formations within which they are enclosed and, with sufficient knowledge of the geology and stratigraphy of a particular area, it is possible for paleontologists to reasonably determine the formation's potential to contain significant nonrenewable vertebrate, invertebrate, marine, or plant fossil remains.

The paleontological sensitivity for a geologic formation is determined by the potential for that formation to produce significant nonrenewable fossils. This determination is based on what fossil resources the particular geologic formation has produced in the past at other nearby locations. Determinations of paleontologic sensitivity must consider not only the potential for yielding vertebrate fossils but also the potential of yielding a few significant fossils that may provide new and significant taxonomic, phylogenetic, and/or stratigraphic data.

The Society of Vertebrate Paleontology issued a set of standard guidelines intended to assist paleontologists to assess and mitigate any adverse effects/impacts to nonrenewable paleontological resources. The guidelines defined four categories of paleontological sensitivity for geologic units that might be impacted by a proposed project, as listed below (Society of Vertebrate Paleontology 2010:1-2):

- **High Potential**: Rock units from which vertebrate or significant invertebrate, plant, or trace fossils have been recovered.

- **Undetermined Potential**: Rock units for which little information is available concerning their paleontological content, geologic age, and depositional environment.
- **Low Potential**: Rock units that are poorly represented by fossil specimens in institutional collections, or based on general scientific consensus only preserve fossils in rare circumstances.
- **No Potential**: Rock units that have no potential to contain significant paleontological resources, such as high-grade metamorphic rocks and plutonic igneous rocks.

SETTING

REGIONAL GEOLOGIC SETTING

Geologically, the City of Jurupa Valley is situated in the northern portion of the Peninsular Ranges province, which is bounded on the north by the Transverse Ranges province, on the northeast by the Colorado Desert province, and on the west by the Pacific Ocean (Jenkins 1980:40-41; Harms 1996:150). The Peninsular Ranges province extends southward to the southern tip of Baja California (Jahns 1954).

More specifically, the area is a part of the San Bernardino Valley, a structurally depressed trough filled with sediments of Miocene through Recent age (Clarke 1978-1979). The valley is one of the many tectonically controlled valleys within the valley-and-ridge systems in the Perris Block, which was defined by English (1926) as a region between the San Jacinto and Elsinore-Chino fault zones. The block is bounded on the north by the Cucamonga (San Gabriel) Fault and on the south by a vaguely delineated boundary near the southern end of the Temecula Valley (*ibid.*). It is considered to have been active since Pliocene times (Woodford et al. 1971:3421). The Plio-Pleistocene-age nonmarine sediments filling the valleys have produced a few vertebrate fossils as well as invertebrate fossil remains (Mann 1955:13).

CURRENT NATURAL SETTING

The project area lies upon the alluvial deposits of the San Bernardino Valley floor, approximately 1,000 feet north the Santa Ana River. The natural landscape in the region features broad valleys divided by groups of rolling hills and rocky knolls. The general environment is characterized by its temperate Mediterranean climate, with seasonal average temperatures ranging between 35 and 90 degrees Fahrenheit. Rainfall is typically less than 20 inches annually.

The project area coincides with the existing perimeters of Horseshoe Lake Park, a municipal park that remains largely undeveloped except for a gravel-line walkway and a horse ring, both of which are evidently of recent vintage. It is bounded by Lakeview Avenue on the northeast, Studio Place on the southeast, Kennedy Street on the southwest, and Kelsey Avenue to the northwest. The surrounding land use features primarily suburban and semirural residential neighborhoods, with a commercial corridor along Van Buren Boulevard to the northeast.

The terrain in the project area is relatively level with a slight undulation centered around the dry lakebed, and the elevations range approximately from 715 feet to 745 feet above mean sea level. The ground surface has recently been disked and grubbed (Figure 4), and the remaining vegetation

Figure 4. Current natural setting of the project area. (Photograph taken on September 7, 2018; view to the north)

consists of scattered growth of typical weeds and a cluster of trees in the lakebed, which apparently serves as an intermittent drainage. The surface soil consists of a brown clayey-silty loam. Much of the property is littered sporadically with recently dumped refuse, which is mixed with shells on the surface of the lakebed.

METHODS AND PROCEDURES

RECORDS SEARCH

The records search service for this study was provided by the Regional Paleontological Locality Inventory located at the San Bernardino County Museum (SBCM) in Redlands and the Natural History Museum of Los Angeles County (NHMLAC) in Los Angeles. These institutions maintain files of regional paleontological localities as well as supporting maps and documents. The records search results are used to identify known previously performed paleontological resource assessments as well as known paleontological localities within a one-mile radius of the project area. In addition, the Riverside County Land Information System was also consulted for information on the County's overall paleontological sensitivity assessment of the project location.

LITERATURE REVIEW

In addition to the records searches, CRM TECH geologist/paleontologist Harry M. Quinn, California Professional Geologist #3477, pursued a literature review on the project area. Sources consulted during the part of the research include primarily topographic, geologic, and soil maps of the surrounding area, published geologic literature pertaining to the project location, and other materials in the CRM TECH library, including unpublished reports produced during similar surveys in the vicinity.

FIELD SURVEY

On September 7, 2018, CRM TECH paleontological surveyor Salvadore Boites carried out the field survey of the project area under the direction of Harry M. Quinn. The survey was completed by walking a series of parallel northeast-southwest transects spaced 15 meters (approximately 50 feet) apart. In this way, the ground surface in the entire project area was systematically and carefully examined to determine the soil types, to verify the geological formations, and to look for any indications of paleontological remains.

RESULTS AND FINDINGS

RECORDS SEARCHES

The records search results identified no recorded fossil localities within the project area or within a one-mile radius (McLeod 2018:1; Gilbert 2018:2; see Appendix 2). Records indicate that the nearest known fossil localities were found approximately five to six miles to the north, west, and southwest of the project area, but from sediment lithologies that are similar to those present at the project location (*ibid*.). In addition, the County of Riverside's Paleontological Resource Sensitivity Map indicates the project area to be lying upon sedimentary rocks that have a high potential (High Sensitivity A) for fossil resources (Gilbert 2018:2). Therefore, both the SBCM and the NHMLAC assign a high paleontological sensitivity to the older and finer-grained Quaternary deposits in the project area, especially those at depth (*ibid*.; McLeod 2018:1-2).

LITERATURE REVIEW

Rogers (1965) mapped the surface geology at the project location as **Qc**, or Pleistocene-age nonmarine sediments. Morton and Cox (2001) mapped the geology at the project location as **Qof**, or old alluvial fan deposits from late to middle Pleistocene Epoch. These sediments are known to be indurated to slightly indurated sandy alluvial fan deposits that are slightly to moderately dissected and reddish brown in color (*ibid*.). The area also contains discontinuous surface layers of Holocene-age alluvial fan deposits (*ibid*.). Morton and Miller (2006) mapped the geology at the project location as **Qof**, or alluvium of Pleistocene age (*ibid*.).

Knecht (1971:Map Sheet 10) mapped the surface soils in the project area as mainly **MaB2** and **TeG** with some **DaD2**. The **MaB2** soils belong to the Madera Series, specifically the Madera fine sandy loam, 2-5 percent slopes, eroded (*ibid*.:44). These soils are found on dissected terraces and old alluvial fans where the alluvium is mainly developed from granitic materials (*ibid*.). The **TeG** soils are more recently deposited alluvium found on terraces and barrancas and near the bottom of escarpments (*ibid*.:60). The **DaD2** soils belong to the Delhi Series, specifically the Delhi fine sand, 2-15 percent slopes, wind-eroded (*ibid*.:27). This type of soil is found on gently sloping to rolling dune sands and alluvial fans (*ibid*.).

FIELD SURVEY

The field survey yielded negative findings for potential paleontological resources, and no surficial indications of any fossil remains were observed within or adjacent to the project area. Due to past construction and landscaping activities at Horseshoe Lake Park, the ground surface in the project area has clearly been disturbed to some extent.

DISCUSSION

The research results presented above indicate that the project area is situated upon exposures of older alluvium that is mostly of late Pleistocene origin with some of Holocene origin. The Holocene alluvium has a low potential for containing fossil remains, but the undisturbed Pleistocene alluvium has a high potential. While no fossil localities have been discovered within or adjacent to the project boundaries, any earth-moving activities that penetrate the surface alluvial soils at this location could potentially disrupt or adversely affect paleontological resources. Meanwhile, excavations in the Holocene alluvial soils, to the estimated depth of approximately three feet, are considered to have a low potential for encountering significant, nonrenewable paleontological resources.

CONCLUSION AND RECOMMENDATIONS

CEQA guidelines (Title 14 CCR App. G, Sec. V(c)) require that public agencies in the State of California determine whether a proposed project would “directly or indirectly destroy a unique paleontological resource” during the environmental review process. The present study, conducted in compliance with this provision, is designed to identify any significant, nonrenewable paleontological resources that may exist within or adjacent to the project area and to assess the possibility for such resources to be encountered in future excavation and construction activities.

Based on the study results presented above, the sensitivity of the project area for paleontological resources appears to range from low to high depending on the depth of excavation and types of soils encountered. Excavations to the depth of three feet in the recent alluvial deposits have a low potential to disturb significant, nonrenewable paleontological resources, but those reaching deeper than three feet in undisturbed sediments may have a high potential to encounter such resources. Therefore, CRM TECH recommends that a paleontological resource impact mitigation program be developed to prevent project impact on significant, nonrenewable paleontological resources or reduce such impact to a level less than significant.

As the primary component of the mitigation program, periodic monitoring should be implemented during earth-moving operations above the depth of three feet, and full-time monitoring should be required if earth-moving operations reach the depth of three feet or if paleontologically sensitive sediments are unearthed at shallower depths. The mitigation program should be developed in accordance with the provisions of CEQA (Scott and Springer 2003) as well as the proposed guidelines of the Society of Vertebrate Paleontology (2010), and should include but not be limited to the following components:

- Excavations in sediments identified as likely to contain fossil remains should be monitored by a qualified paleontological monitor. The monitor should be prepared to quickly salvage fossils as they are unearthed to avoid construction delays, and should collect samples of sediments that are likely to contain fossil remains of small vertebrates or in vertebrates. However, the monitor must have the power to temporarily halt or divert grading equipment to allow for the removal of abundant or large specimens.

- Collected samples of sediment should be processed to recover small fossils, and all recovered specimens should be identified and curated at a repository with permanent retrievable storage.
- A report of findings, including an itemized inventory of recovered specimens, should be prepared upon completion of the procedures outlined above. The report should include a discussion of the significance of the paleontological findings, if any. The report and the inventory, when submitted to the Jurupa Area Recreation and Park District, would signify completion of the program to mitigate potential impacts on paleontological resources.

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APPENDIX 1

PERSONNEL QUALIFICATIONS

PROJECT GEOLOGIST/PALEONTOLOGIST
Harry M. Quinn, M.S., California Professional Geologist #3477

Education

1968 M.S., Geology, University of Southern California, Los Angeles, California.
1964 B.S, Geology, Long Beach State College, Long Beach.
1962 A.A., Los Angeles Harbor College, Wilmington, California.

- Graduate work oriented toward invertebrate paleontology; M.S. thesis completed as a stratigraphic paleontology project on the Precambrian and Lower Cambrian rocks of Eastern California.

Professional Experience

2000-	Project Paleontologist, CRM TECH, Riverside/Colton, California.
1998-	Project Archaeologist, CRM TECH, Riverside/Colton, California.
1992-1998	Independent Geological/Geoarchaeological/Environmental Consultant, Pinyon Pines, California.
1994-1996	Environmental Geologist, E.C E.S., Inc, Redlands, California.
1988-1992	Project Geologist/Director of Environmental Services, STE, San Bernardino, California.
1987-1988	Senior Geologist, Jirsa Environmental Services, Norco, California.
1986	Consulting Petroleum Geologist, LOCO Exploration, Inc. Aurora, Colorado.
1978-1986	Senior Exploration Geologist, Tenneco Oil E & P, Englewood, Colorado.
1965-1978	Exploration and Development Geologist, Texaco, Inc., Los Angeles, California.

Previous Work Experience in Paleontology

1969-1973 Attended Texaco company-wide seminars designed to acquaint all paleontological laboratories with the capability of one another and the procedures of mutual assistance in solving correlation and paleo-environmental reconstruction problems.

1967-1968 Attended Texaco seminars on Carboniferous coral zonation techniques and Carboniferous smaller foraminifera zonation techniques for Alaska and Nevada.

1966-1972, 1974, 1975 Conducted stratigraphic section measuring and field paleontological identification in Alaska for stratigraphic controls. Pursued more detailed fossil identification in the paleontological laboratory to establish closer stratigraphic controls, mainly with Paleozoic and Mesozoic rocks and some Tertiary rocks, including both megafossil and microfossil identification, as well as fossil plant identification.

1965 Conducted stratigraphic section measuring and field paleontological identification in Nevada for stratigraphic controls. Pursued more detailed fossil identification in the paleontological laboratory to establish closer stratigraphic controls, mainly with Paleozoic rocks and some Mesozoic and Tertiary rocks. The Tertiary work included identification of ostracods from the Humboldt and Sheep Pass Formations and vertebrate and plant remains from Miocene alluvial sediments.

Memberships

Society of Vertebrate Paleontology; American Association of Petroleum Geologists; Association of Environmental Professionals; Rocky Mountain Association of Geologists, Pacific Section; Society of Economic Paleontologists and Mineralogists; San Bernardino County Museum.

Publications in Geology

Five publications in Geology concerning an oil field study, a ground water and earthquake study, a report on the geology of the Santa Rosa Mountain area, and papers on vertebrate and invertebrate Holocene Lake Cahuilla faunas.

PALEONTOLOGICAL SURVEYOR
Salvadore Boites, M.A.

Education

2013	M.A., Applied Anthropology, California State University, Long Beach.
2003	B.A., Anthropology/Sociology, University of California, Riverside.
1996-1998	Archaeological Field School, Fullerton Community College, Fullerton, California.

- Cross-trained in paleontological field procedures and identifications by CRM TECH Geologist/Paleontologist Harry M. Quinn.

Professional Experience

2014-	Project Archaeologist, CRM TECH, Colton, California.
2010-2011	Adjunct Instructor, Anthropology, Everest College, Anaheim, California.
2003-2008	Project Archaeologist, CRM TECH, Riverside/Colton, California.
2001-2002	Teaching Assistant, Moreno Elementary School, Moreno Valley, California.
1999-2003	Research Assistant, Anthropology Department, University of California, Riverside.

REPORT WRITER
Ben Kerridge, M.A.

Education

2014	Archaeological Field School, Institute for Field Research, Kephallenia, Greece.
2010	M.A., Anthropology, California State University, Fullerton.
2009	Project Management Training, Project Management Institute/CH2M HILL.
2004	B.A., Anthropology, California State University, Fullerton.

Professional Experience

2015-	Project Archaeologist/Report Writer, CRM TECH, Colton, California.
2015	Teaching Assistant, Institute for Field Research, Kephallenia, Greece.
2009-2014	Publications Delivery Manager, CH2M HILL, Santa Ana, California.
2010-	Naturalist, Newport Bay Conservancy, Newport Beach, California.
2006-2009	Technical Publishing Specialist, CH2M HILL, Santa Ana, California.

APPENDIX 2

RECORDS SEARCH RESULTS

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

tel 213-763-3466
nhm.org

Vertebrate Paleontology Section
Telephone: (213) 763-3325

e-mail: smcleod@nhm.org

NATURAL HISTORY MUSEUM LOS ANGELES COUNTY

7 September 2018

CRM Tech
1016 East Cooley Drive, Suite B
Colton, CA 92324

Attn: Nina Gallardo, Project Archaeologist

re: Paleontological resources for the proposed Horseshoe Lake Park Project, CRM Tech No. 3389P, in the City of Jurupa Valley, Riverside County, project area

Dear Nina:

I have conducted a thorough search of our paleontology collection records for the locality and specimen data for the proposed Horseshoe Lake Park Project, CRM Tech No. 3389P, in the City of Jurupa Valley, Riverside County, project area as outlined on the portion of the Riverside West USGS topographic quadrangle map that you sent to me via e-mail on 24 August 2018. We do not have any vertebrate fossil localities that lie directly within the proposed project area boundaries, but we do have localities nearby from the same sedimentary deposits that occur in the proposed project area, either at the surface or at depth.

Surficial deposits in the entire proposed project area consist of older Quaternary alluvial fan deposits derived from the Pedley Hills immediately to the north. Our closest fossil vertebrate locality from older Quaternary deposits is LACM 7811, just north of due west of the proposed project area along Sumner Avenue just south of the San Bernardino County line, that produced a fossil specimen of whipsnake, *Masticophis*, at a depth of 9 to 11 feet below the surface. Our next closest vertebrate fossil locality from older Quaternary deposits is LACM 1207, south-southwest of the proposed project area between Corona and Norco, that produced a fossil specimen of deer, *Odocoileus*.

Shallow excavations in the older Quaternary Alluvium exposed throughout the proposed project area may not uncover significant vertebrate fossils. Deeper excavations there that extend down into older and perhaps finer-grained Quaternary deposits, however, may well encounter significant fossil vertebrate remains. Any substantial excavations in the sedimentary deposits in the proposed project area, therefore, should be monitored closely to quickly and professionally recover any fossil remains while not impeding development. Also, sediment samples should be collected and processed to determine the small fossil potential in the proposed project area. Any fossils collected should be placed in an accredited 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

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SAN BERNARDINO COUNTY

San Bernardino County Museum
Division of Earth Sciences

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15 September, 2018

CRM TECH
Attn: Nina Gallardo
1016 E. Cooley Drive
Colton, CA 92324

PALEONTOLOGY LITERATURE / RECORDS REVIEW, Horseshoe Lake Park Project; Assessor's Parcel Number 163-240-001 (CRM TECH No. 3389P)

Dear Ms. Gallardo,

The Division of Earth Sciences of the San Bernardino County Museum (SBCM) has completed a literature review and records search for the above-named project in Riverside County, California. The proposed project is located in the City of Jurupa Valley, at the southwest corner of Lakeview Avenue and Studio Place, just north of the Santa Ana River (APN 163-240-001), within the Jurupa (Stearns) Land Grant, Township 2 South, Range 6 West, San Bernardino Baseline and Meridian, as shown on the Riverside West, California, United States Geological Survey (USGS) 7.5 minute topographic quadrangle map (1967 edition – Photorevised, 1980).

Previous geologic mapping (Morton and Miller, 2006) indicates that the study area is situated upon surface exposures of middle Pleistocene-aged Old Alluvial-Fan Deposits, Unit 1a (= $\mathbf{Qof_{1a}}$) (fig. 1). Pleistocene-aged lithologic units elsewhere in inland southern California, particularly in Riverside and San Bernardino Counties of the Inland Empire, have been reported to yield significant fossils of plants and extinct vertebrate animals (Jefferson, 1991; Reynolds and Reynolds, 1991; Woodburne, 1991; Springer and Scott, 1994; Scott, 1997; Springer et al., 1998, 1999, 2007, 2009, 2010; Anderson et al., 2002). Fossils recovered from these Pleistocene-aged sediments represent extinct taxa including mammoth, mastodon, ground sloths, dire wolf, short-faced bear, sabre-toothed cat, large and small horses, large and small camels, and bison (Jefferson, 1991; Reynolds and Reynolds, 1991; Woodburne, 1991; Scott, 1997; Springer et al., 2009). For this reason, Pleistocene-aged lithologic units in this region have demonstrated high potential to yield significant nonrenewable paleontological resources subject to adverse impact during development related excavation, and are therefore assigned high paleontological sensitivity.

For this review, I conducted a search of the Regional Paleontological Locality Inventory (RPLI) at the SBCM and a literature search through the SBCM Earth Sciences library. The results of this search indicate that no recorded paleontological resource localities are present within the proposed project boundaries, nor within a one-mile radius of the proposed project in any direction. However, one paleontological resource locality (SBCM 5.1.11) is located about five (~5) miles north of the proposed study area. This locality yielded Pleistocene-aged fauna that included a saber-toothed cat (*Smilodon* sp.). This paleontological resource locality was collected at a depth of around five (~5) feet within sediment lithologies mapped (Morton and Miller, 2006) as similar (**Qyf_5**) to those within the boundaries of the proposed property.

Riverside County's Paleontological Resource Sensitivity Map (RCPTSM) indicates that the project is located on sedimentary rocks that have high potential (High Sensitivity A) to adversely impact fossil resources. High sensitivity includes not only the potential for yielding abundant vertebrate fossils, but also for production of fossils that may provide new and significant data.

Recommendations

The results of the literature review, RPLI at the SBCM, and search of the RCPTSM demonstrate that the proposed development project in the City of Jurupa Valley, CA, has high potential to impact significant nonrenewable paleontological resources. A qualified vertebrate paleontologist must therefore be retained to develop a paleontological resource impact mitigations program (PRIMP) to mitigate impacts to such resources. This mitigation program must include curation of recovered resources (Scott et al., 2004) and be consistent with the provisions of the California Environmental Quality act (CEQA) (Scott and Springer, 2003), as well as with regulations currently implemented by the County of Riverside, CA, and the proposed guidelines of the Society of Vertebrate Paleontology. This program should include, but not be limited to:

1. Monitoring of excavation in areas identified as likely to contain paleontological resources by a qualified paleontological monitor. Paleontological monitors should be equipped to salvage fossils as they are unearthed to avoid construction delays and to remove samples of sediments which are likely to contain the remains of small fossil invertebrates and vertebrates. Monitors must be empowered to temporarily halt or divert equipment to allow removal of abundant or large specimens. Monitoring may be reduced if the

potentially-fossiliferous units described herein are not present, or if present, are determined upon exposure and examination by qualified paleontological personnel to have low potential to contain fossil resources.

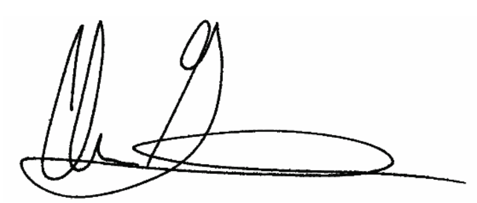
2. Preparation of recovered specimens to a point of identification and permanent preservation, including screen-washing of sediments and microscopic examination of residual materials to recover small invertebrates and vertebrates (Scott et al., 2004).

3. Identification and curation of specimens into a professional, accredited museum repository with permanent retrievable storage. The paleontologist should have a written repository agreement in hand prior to the initiation of mitigation activities. Mitigation of adverse impacts to significant paleontological resources is not complete until such curation into an established museum repository has been fully completed and documented.

4. Preparation of a report of findings with an appended itemized inventory of specimens. This report and inventory, when submitted to the appropriate Lead Agency along with confirmation of the curation of recovered specimens into an established, accredited museum repository, would signify completion of the program to mitigate impacts to paleontological resources.

Please do not hesitate to contact us with any further questions that you may have.

Sincerely,



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Figures (CONFIDENTIAL)

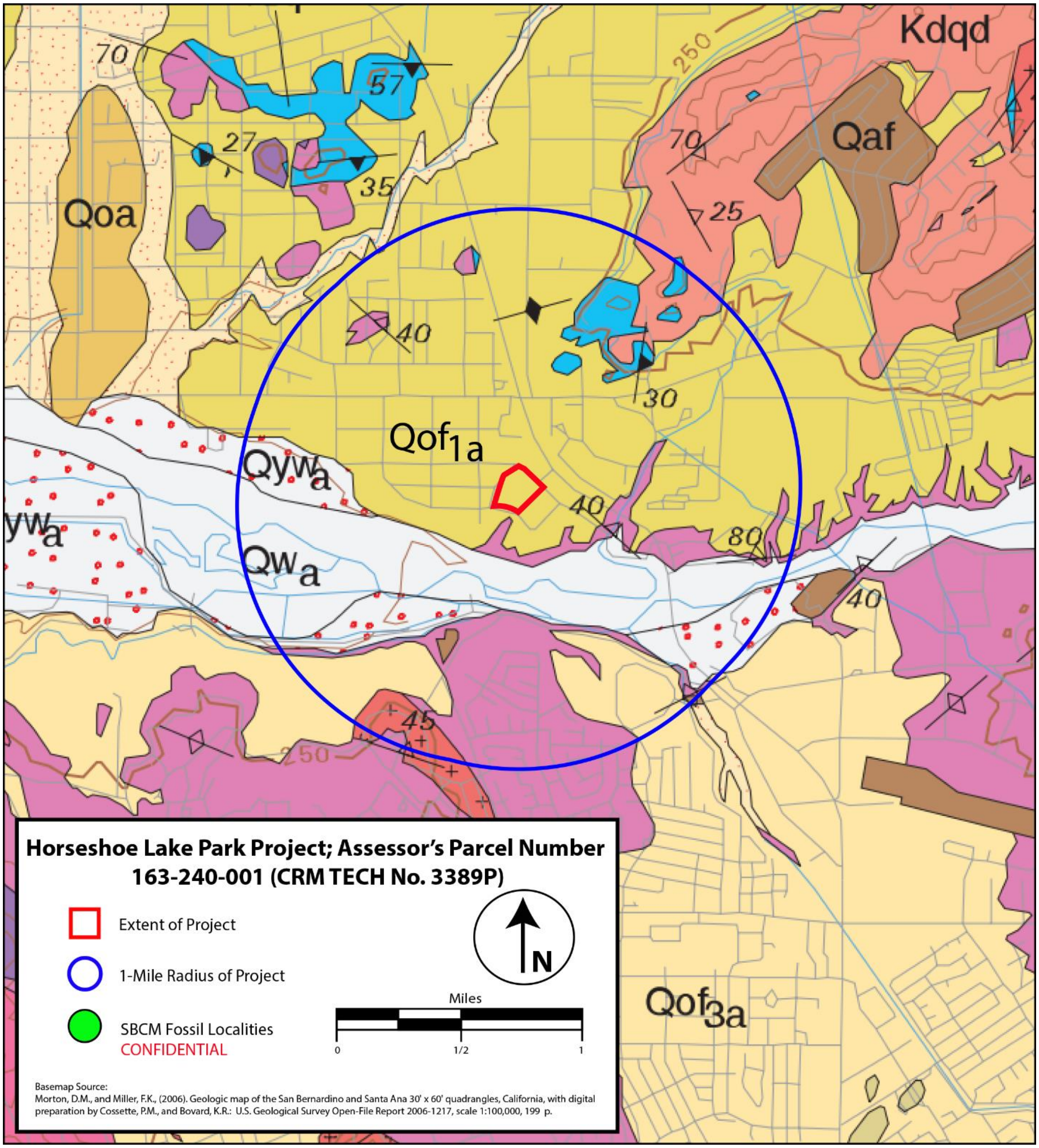

Figure 1.