PALEONTOLOGICAL RESOURCES ASSESSMENT REPORT

ASSESSOR'S PARCEL NO. 380-350-022

City of Wildomar
Riverside County, California

Prepared for:

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Submitted to:

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August 3, 2012

CRM TECH Contract #2627P
Approximately 28.5 acres
Murrieta, Calif., 7.5' (1:24,000) quadrangle
Section 6, T7S R3W, San Bernardino Baseline and Meridian

MANAGEMENT SUMMARY

Between June and August 2012, at the request of Albert A. Webb Associates, CRM TECH performed a paleontological resource assessment on approximately 28.5 acres of undeveloped land in the City of Wildomar, Riverside County, California. The subject property of the study, Assessor's Parcel No. 380-250-022, is located on the southwest corner of Clinton Keith Road and Elizabeth Lane, in the northwest quarter of the northeast quarter of Section 6, T3S R5W, San Bernardino Baseline and Meridian.

The study is part of the environmental review process for the proposed Rancon Medical and Educational Center project and two other commercial developments on the property. The City of Wildomar, 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 of Wildomar with the necessary information and analysis to determine whether the proposed project would potentially impact or adversely affect any significant 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 San Bernardino County Museum and the Natural History Museum of Los Angeles County, conducted a literature search, and carried out a systematic field survey of the project area in accordance with the guidelines of the Society of Vertebrate Paleontology. Based on the findings from these research procedures, the proposed project's potential to impact significant paleontological resources is determined to be high for Pleistocene-age vertebrate fossils.

In order to prevent such impacts or reduce them to a level less than significant, CRM TECH recommends that a paleontological resource impact mitigation program be developed and implemented during the project. As a part of the mitigation program, all grubbing, grading, trenching, excavations, and/or other earth-moving operations within the project area should be monitored for paleontological resources. Because many vertebrate fossils from the Pauba Formation present in the project area are small and might be missed by traditional monitoring, it is further recommended that soil samples be collected periodically during the project and processed. Under these conditions, the proposed project may be cleared to proceed in compliance with CEQA provisions on paleontological resources.

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INTRODUCTION

Between June and August 2012, at the request of Albert A. Webb Associates, CRM TECH performed a paleontological resource assessment on approximately 28.5 acres of undeveloped land in the City of Wildomar, Riverside County, California (Fig. 1). The subject property of the study, Assessor's Parcel No. 380-250-022, is located on the southwest corner of Clinton Keith Road and Elizabeth Lane, in the northwest quarter of the northeast quarter of Section 6, T3S R5W, San Bernardino Baseline and Meridian (Fig. 2).

The study is part of the environmental review process for the proposed Rancon Medical and Educational Center project and two other commercial developments on the property. The City of Wildomar, as the lead agency for the project, required the study in compliance with the California Environmental Quality Act (CEQA; PRC §21000, et seq.). The purpose of the study is to provide the City of Wildomar with the necessary information and analysis to determine whether the proposed project would potentially impact or adversely affect any significant 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 San Bernardino County Museum and the Natural History Museum of Los Angeles County, conducted a literature search, and carried out a systematic field survey of the project area 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.

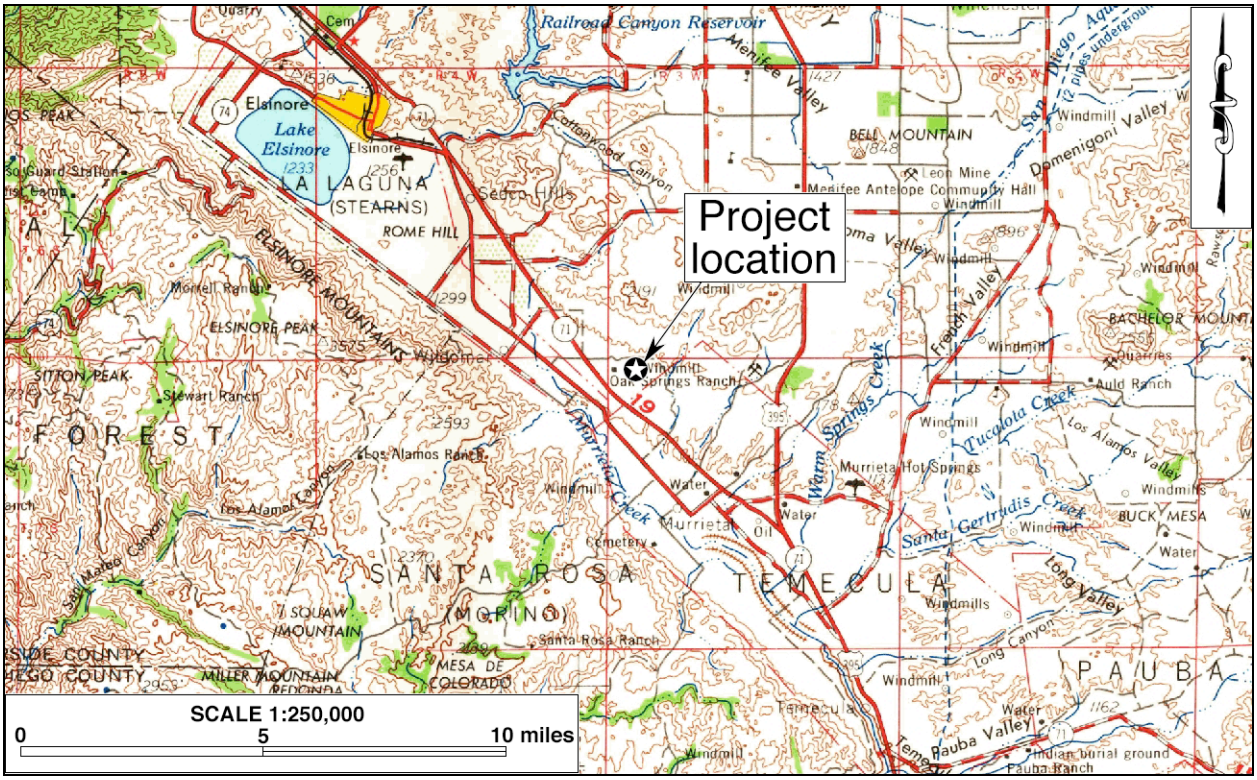

Figure 1. Project vicinity. (Based on USGS Santa Ana, Calif., 1:250,000 quadrangle [USGS 1979])

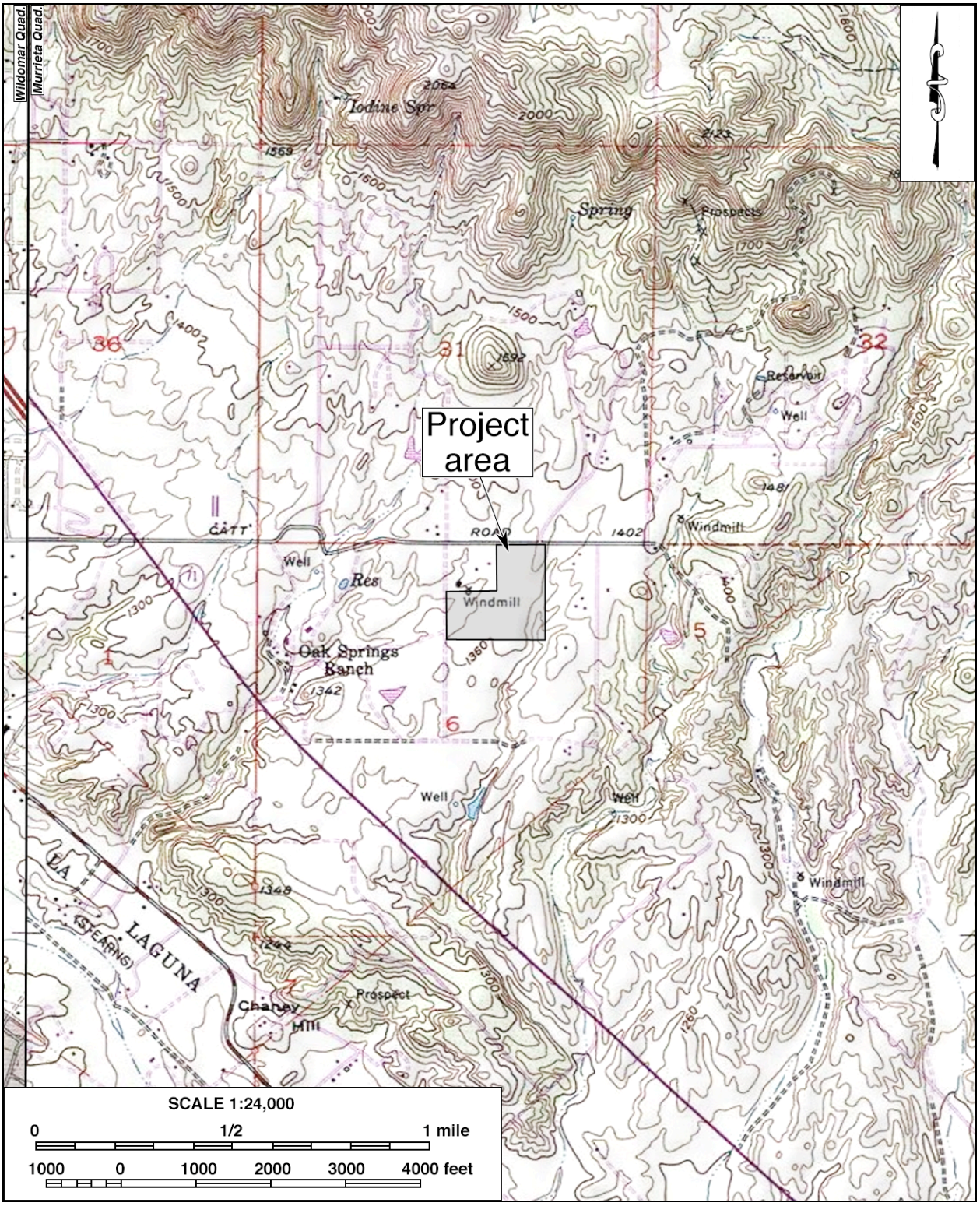

Figure 2. Project area. (Based on USGS Murrieta and Wildomar, Calif., 1:24,000 quadrangles [USGS 1979; 1997])

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 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 10,000 years, the generally accepted temporal boundary marking the end of the last late Pleistocene glaciation and the beginning of the current Holocene epoch. Common fossil remains include marine shells; the bones and teeth of fish, 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.

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 to be nonrenewable paleontological resources. Occasionally fossils may be exposed at the surface through the process of natural erosion or as a result of human disturbances; however, they generally lay buried beneath the surficial soils. Thus, the absence of surface fossils 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 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:

1. The fossils provide information on the evolutionary relationships and developmental trends exhibited among organisms, living or extinct;
2. 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;
3. The fossils provide data regarding the development of biological communities or the interactions between paleobotanical and paleozoological biotas;
4. The fossils demonstrate unusual or spectacular circumstances in the history of life; and/or
5. 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. (Scott and Springer 2003:6)

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 its 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 for a few significant fossils that may provide new and significant taxonomic, phylogenetic, and/or stratigraphic data.

The Society of Vertebrate Paleontology (1995:22-27) issued a set of standard guidelines intended to assist paleontologists to assess and mitigate any adverse effects/impacts to nonrenewable paleontological resources. The Society defined three potential categories of paleontological sensitivity for geologic units that might be impacted by a proposed project. These categories are described below, along with the criteria used to establish their sensitivity.

- **High sensitivity**: Geologic units assigned to this category are considered to have a high potential for significant nonrenewable vertebrate, invertebrate, marine, or plant fossils. Sedimentary rock units in this category contain a relatively high density of recorded fossil localities, have produced fossil remains in the vicinity, and are very likely to yield additional fossil remains.
- **Low sensitivity**: Geologic units are assigned to this category when they have produced no or few recorded fossil localities and are not likely to yield any significant nonrenewable fossil remains.
- **Undetermined sensitivity**: Geologic units are assigned to this category when there is limited exposure of the rock units in the area and/or the rock units have been poorly studied.

ENVIRONMENTAL SETTING

GEOLOGIC SETTING

The project area lies 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 project area is located within the Elsinore trough, a structural depression filled with sediments of upper Pliocene through Recent age (Mann 1955:Plate 1; Kennedy 1977:5). The Elsinore Trough is one of the many tectonically controlled valleys within the valley-and-ridge systems to be found in the Perris Block. English (1926) defined the Perris Block as a region between the San Jacinto and Elsinore-Chino fault zones, 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. This structural block has been active since Pliocene time (Woodford et al. 1971:3421). The project area is located along the northern flank of a ridge system that separates the Elsinore Trough from the adjacent Menifee Valley.

CURRENT NATURAL SETTING

The project area is located in the rolling hills along the northeastern edge of the Elsinore Valley, near where it connects with the Temecula Valley. The environmental setting of the area is dictated by the temperate and arid Mediterranean climate of inland southern California, typically with hot, dry summers and mild, wet winters. Temperatures in the region frequently reach near 100 degrees Fahrenheit in summer, and may occasionally dip below freezing in winter. Annual precipitation averages approximately 11.4 inches.

The project area is bounded on the north by Clinton Keith Road, on the south by open fields, on the east by Elizabeth Lane, and on the west by Yamas Drive, a dirt road. The surrounding area is largely rural in character, consisting of a mix of open land, large residential properties, and some commercial establishments along Clinton Keith Road. Elevations in the project area range between approximately 1,340 feet and 1,390 feet above mean sea level, with a slight incline to the northeast. The terrain is relatively level, with some areas of gently sloping hills (Fig. 3).

The ground surface throughout the project area has been highly disturbed, in part by disking but also from the installation of flood control measures along a natural drainage near the eastern and southern boundaries. These features include pipes, culverts, and three irregularly-shaped, paved access areas enclosed by chain-link fences. A second drainage meanders near the northwestern corner of the property. Vegetation in the project area consists of foxtails, tumbleweeds, stinging meadows, wild mustard, chaparral, buckwheat, oak trees, and small grasses and shrubs. Soils consist of medium and coarse sands mixed with silt and rocks.

Figure 3. Typical landscapes in the project area. *Clockwise from upper left*: an open, level area (view to the southwest); a hilly area (view to the north); a drainage (view to the north); a flood control channel near the northeast corner of the property (view to the northeast). (Photographs taken on July 5, 2012)

METHODS AND PROCEDURES

RECORDS SEARCHES

The records search service was provided by 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 were used to identify known paleontological localities in or near the project area, or in the general vicinity.

LITERATURE REVIEW

In addition to the records searches, a literature search was conducted using materials in the CRM TECH library, including unpublished reports produced during surveys of other properties in the area, and the personal library of CRM TECH geologist/paleontologist Harry M. Quinn, California Professional Geologist #3477 (see App. 1 for qualifications).

FIELD SURVEY

On July 5, 2012, CRM TECH paleontological surveyor Daniel Ballester (see App. 1 for qualifications) conducted the field survey of the project area under the direction of Harry M. Quinn. During the survey, Ballester walked parallel east-west transects spaced 15

meters (approx. 50 feet) apart. The areas enclosed by fencing were inspected from the perimeter. Using these methods, 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. Visibility of the native ground surface was virtually zero where the project area lies under pavement, and varied from fair to good (50-80%) in the open fields, depending on the density of the vegetation.

RESULTS AND FINDINGS

RECORDS SEARCHES

The Natural History Museum of Los Angeles County and the San Bernardino County Museum found no known paleontological localities within the project area (McLeod 2012; Scott 2012; see App. 2). However, numerous paleontological localities have been reported nearby from sediment lithologies similar to those known to occur at this location, namely the Pleistocene-age Pauba Formation and an unnamed sandstone and conglomerate formation (McLeod 2012; Scott 2012; Kennedy 1977).

Based on previous discoveries, the San Bernardino County Museum considers the project vicinity to be an area of high paleontologic sensitivity, with a demonstrated high potential to contain "significant nonrenewable fossil resources present at the surface and in the subsurface" primarily Pleistocene-age vertebrate fossils (Scott 2012:2). The Natural History Museum also notes that the entire project area contains exposures of the Plio-Pleistocene Pauba Formation that may contain significant fossil vertebrate remains (McLeod 2012:1-2). Both of the museums note the presence of small vertebrate fossils in the Pauba Formation and the need, therefore, to collect and process sediment samples to inspect them for small specimens.

LITERATURE REVIEW

The project area has been mapped by Mann (1955:Plate 1) as *Qp*, namely the Pauba Formation of Pleistocene age, and *Qfa*, the Temecula Arkose of probable Pleistocene age. Rogers (1965) maps it as *Qc*, or nonmarine sedimentary rocks of Pleistocene age. Kennedy (1977:Plate 1) maps the surface geology at this location as *Qps*, the sandstone portion of the Pauba Formation, with some *Kgdd*, or Granodiorite, in the northern portion. The Pauba Formation is assigned a late Pleistocene age and the Granodiorite a Mesozoic age (*ibid*.:6).

Hill et al. (1991:Plate 1B) also map the surface geology in the project area as *Qps* with some *Kgd* in the northern portion. The *Qps* represents the sandstone member of the Pleistocene-age Pauba Formation, described as "light-brown, moderately well indurated sandstone and siltstone facies," and the *Kgd* is described as granodiorite of Cretaceous age (*ibid*.). Kennedy and Morton (2003) map the surface geology at the project location as *Qpfs*, which is defined as the sandstone member of the Pauba Formation, with *Kpvg*, or monzogranite to granodiorite, in the northern portion. Based on the mapping, the project area is located on an uplifted block north of the Wildomar Fault (Mann 1955:Plate 1; Rogers 1965; Kennedy 1977:Plate 1; Hill et al. 1991:Plate 1B).

Knecht (1971:Sheet 144) maps the surface soils as *AtC2*, *AtD2*, *MmB*, *MnD2*, *MnE3*, *PlD*, *RnD2*, and *RnE3*. The *AtC2* and *AtD2* soil belong to the Arlington and Greenfield Series. These soils are found on terraces and ridges and in concave areas where dissected terraces and alluvial fans merge and are commonly eroded (*ibid.*). The *MmB*, *MnD2*, and *MnE3* soils belong to the Monserate Series, which form on terraces and old alluvial fans composed predominantly of granitic material (*ibid.*:46-47). The *PlD* soils belong to the Placentia Series. They develop on alluvial fans and terraces in alluvium derived mainly from metasedimentary sandstones (*ibid.*:51-52). The *RnD2* and *RnE3* soils belong to the Ramona and Buren Series. These soils form on old dissected terrace deposits (*ibid.*:55).

FIELD SURVEY

The field survey produced negative results for any indication of paleontological resources, and no surficial evidence of fossil remains or potentially fossiliferous sediments were encountered. As mentioned above, the surface soils in most of the project area have been disturbed in the past by disking and various construction activities. Consequntly, no intact paleontological deposits are likely to survive in the surface soils, and none were observed.

DISCUSSION

The results of the records searches and the literature research indicate that the project area is located upon outcrops of the Pleistocene-age Pauba Formation, which has uplifted along the north flank of the Wildomar Fault Zone. Sediments of this group have produced a number of vertebrate and some invertebrate fossils during construction monitoring on properties located approximately 3-5 miles to the southeast of the project area and throughout the region. Based on these findings, the project area is assigned a high potential to contain nonrenewable paleontological remains.

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, non-renewable 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.

In summary of the research results presented above, the proposed project's potential to impact paleontological resources has been determined to be high, especially for Pleistocene-age vertebrate fossils. Therefore, CRM TECH recommends that a paleontological resource impact mitigation program be developed and implemented during the project to prevent such impacts or reduce them to a level less than significant.

As a part of the mitigation program, all grubbing, grading, trenching, excavations, and/or other earth-moving operations within the project area should be monitored for paleontological resources. Because many vertebrate fossils from the Pauba Formation are

small and might be missed by traditional monitoring, it is further recommended that soil samples be collected periodically during the project and processed. In addition, the monitor(s) should watch for the presence of any ash bed that might be exposed, since it could be used to provide relative dates for sediments both above and below it.

The mitigation program should be developed in accordance with the provisions of CEQA as well as the proposed guidelines of the society of Vertebrate Paleontology, and should include but not be limited to the following:

1. The excavation of areas identified as likely to contain paleontologic resources, such as the undisturbed Pauba Formation and any undisturbed subsurface older alluvium, should be monitored by a qualified paleontological monitor. The monitor should be prepared to quickly salvage fossils, if they are unearthed, to avoid construction delays, but must have the power to temporarily halt or divert construction equipment to allow for removal of abundant or large specimens.
2. Samples of sediments should be collected and washed to recover small invertebrate and vertebrate fossils.
3. Recovered specimens should be identified and curated at a repository with permanent retrievable storage that would allow for further research in the future.
4. A report of findings, including, when appropriate, an itemized inventory of recovered specimens and a discussion of their significance, should be prepared upon completion of the steps outlined above. The report and inventory, when submitted to the appropriate lead agency, would signify completion of the program to mitigate impacts on paleontologic resources.

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Rogers, Thomas H.
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Scott, Eric
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Scott, Eric, and Kathleen B. Springer
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APPENDIX 1

PERSONNEL QUALIFICATIONS

PROJECT GEOLOGIST/PALEONTOLOGIST
Harry M. Quinn, M.S.

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 North Palm Springs, 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.
l998- 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; Canadian Society of Petroleum Geologists; 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
Daniel Ballester, B.A.

Education

1998	B.A., Anthropology, California State University, San Bernardino.
1997	Archaeological Field School, University of Las Vegas and University of California, Riverside.
1994	University of Puerto Rico, Rio Piedras, Puerto Rico.

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

Professional Experience

2002-	Field Director, CRM TECH, Riverside/Colton, California. • Report writing, site record preparation, and supervisory responsibilities over all aspects of fieldwork and field crew.
1999-2002	Project Archaeologist/Field Paleontologist, CRM TECH, Riverside, California. • Survey, testing, data recovery, monitoring, and mapping.
1998-1999	Field Crew, K.E.A. Environmental, San Diego, California. • Two and a half months of excavations on Topomai village site, Marine Corp Air Station, Camp Pendleton.
1998	Field Crew, A.S.M. Affiliates, Encinitas, California. • Two weeks of excavations on a site on Red Beach, Camp Pendleton, and two weeks of survey in Camp Pendleton, Otay Mesa, and Encinitas.
1998	Field Crew, Archaeological Research Unit, University of California, Riverside. • Two weeks of survey in Anza Borrego Desert State Park and Eureka Valley, Death Valley National Park.

REPORT WRITER
Terri Jacquemain, M.A.

Education

2004 M.A., Public History and Historic Resource Management, University of California, Riverside.
- M.A. thesis: Managing Cultural Outreach, Public Affairs and Tribal Policies of the Cabazon Band of Mission Indians, Indio, California; internship served as interim Public Information Officer, Cabazon Band of Mission Indians, June-October, 2002.

2002 B.S., Anthropology, University of California, Riverside.
2001 Archaeological Field School, University of California, Riverside.
1991 A.A., Riverside Community College, Norco Campus.

Professional Experience

2003- Historian/Architectural Historian/Report Writer, CRM TECH, Riverside/Colton, California.
- Author/co-author of legally defensible cultural resources reports for CEQA and NHPA Section 106;
- Historic context development, historical/archival research, oral historical interviews, consultation with local communities and historical organizations;
- Historic building surveys and recordation, research in architectural history; architectural description

2002-2003 Teaching Assistant, Religious Studies Department, University of California, Riverside.
2002 Interim Public Information Officer, Cabazon Band of Mission Indians.
2000 Administrative Assistant, Native American Student Programs, University of California, Riverside.
1997-2000 Reporter, *Inland Valley Daily Bulletin*, Ontario, California.
1991-1997 Reporter, *The Press-Enterprise*, Riverside, California.

Membership

California Preservation Foundation.

APPENDIX 2

RECORDS SEARCHES RESULTS

19 July 2012

CRM Tech
attn: Nina Gallardo
1016 E. Cooley Drive, Suite "B"
Colton, CA 92324

re: **PALEONTOLOGY LITERATURE AND RECORDS REVIEW, PARCEL MAP #34552, CITY OF WILDOMAR, RIVERSIDE COUNTY, CALIFORNIA**

Dear Ms. Gallardo,

The Division of Geological Sciences of the San Bernardino County Museum (SBCM) has completed a literature review and records search for the above-named 28.5-acre project in the City of Wildomar, Riverside County, California. The study area is located in the northeastern quadrant of section 6, Township 7 South, Range 3 West, San Bernardino Base and Meridian, as seen on the Murrieta, California 7.5' United States Geological Survey topographic quadrangle map (1953 edition, photorevised 1979).

Previous geologic mapping of the Wildomar region (Rogers, 1965; Kennedy, 1977; Kennedy and Morton, 2003) indicates that the proposed project property is located primarily upon surface and subsurface exposures of the sandstone member of the Pauba Formation (= unit **Qpfs**) overlying sediments of an unnamed sandstone and conglomerate formation (= **QTsw**). The latter formation also occurs at the surface in the westernmost portion of the property. Both of these rock units are highly fossiliferous throughout their extent, and are therefore assigned high paleontologic sensitivity.

The unnamed sandstone and conglomerate formation of Kennedy (1977) has been demonstrated to be highly fossiliferous throughout the Murrieta, Wildomar, and Temecula regions. Vertebrate fossils recovered from the sandstone member of this formation include mammoths, mastodons, ground sloths, dire wolves, short-faced bears, tapirs, horses, camels and llamas, along with abundant (and in many cases temporally-diagnostic) small vertebrates and invertebrates (Reynolds and others, 1991; Scott and Cox, 1993; Pajak and others, 1996). The formation also yielded remains of the extinct giant teratorn *Aiolornis incredibilis*, the largest flying bird known from North America (Campbell and others, 1999). The unnamed sandstone formation has been dated in part to the Blancan North American Land Mammal Age (NALMA) (= later Pliocene Epoch and early Pleistocene Epoch) and in part to the Irvingtonian NALMA (= middle Pleistocene Epoch) (Scott and Cox, 1993; Pajak and others, 1996). A kaolin deposit interstratified with exposures of this sandstone has been correlated with the widespread Bishop Tuff (Kennedy, 1977). The Bishop Tuff has been radiometrically dated to the middle Pleistocene Epoch, ± 0.768 million years before present (Crowley and others, 2007).

Like the unnamed sandstone formation, the Pauba Formation has also been demonstrated to be highly fossiliferous throughout the Murrieta and Temecula regions. Vertebrate fossils recovered from the sandstone member of this formation include mammoths, mastodons, ground sloths, sabre-toothed cats, tapirs, horses, camels and llamas, along with abundant small vertebrates and invertebrates (Reynolds and others, 1991; Pajak and others, 1996). The fossiliferous Pauba Formation unconformably overlies the Temecula Arkose and the unnamed sandstone formation, and has been dated (Mann, 1955; Pajak and others, 1996) to the middle Pleistocene Epoch on the basis of its stratigraphic position and the vertebrate fossils recovered from the formation.

For this review, I conducted a search of the Regional Paleontologic Locality Inventory (RPLI) at the SBCM. The results of this search indicate that no paleontologic localities are recorded within the boundaries of the study area. However, localities SBCM 5.6.325 - 5.6.336 are located approximately ½ mile south of the project property. These localities have yielded fossil remains of extinct horse (*Equus*) as well as small vertebrate and invertebrate fossils from both the Pauba Formation and the underlying unnamed sandstone. Additionally, more than 400 paleontologic resource localities are known from the Pauba Formation and the underlying unnamed sandstone formation elsewhere in the Murrieta and Temecula areas. These localities have produced fossil vertebrates including two species of ground sloth, mammoth, mastodon, two species of horse, tapir, camel, llama, pronghorn, dire wolf, short-faced bear and sabre-toothed cat. The deposits have also yielded important small vertebrate fossils including rodent, rabbit, bat, shrew, bird, lizard, turtle and tortoise.

Recommendations

The results of the literature review and the check of the RPLI at the SBCM demonstrate that excavation within the boundaries of the proposed study area would have high potential to impact significant nonrenewable fossil resources present at the surface and in the subsurface. This project property is therefore assigned high paleontologic sensitivity. Excavation into undisturbed sediments of the fossiliferous Pauba Formation and/or the underlying unnamed sandstone of Kennedy (1977) will require a qualified vertebrate paleontologist to develop a program to mitigate impacts to nonrenewable paleontologic resources. This program must be consistent with the provisions of the California Environmental Quality Act (Scott and Springer, 2003), as well as with regulations currently implemented by the County of Riverside. The mitigation program should include, but not be limited to:

1. Prior to the initiation of excavation activities, a field reconnaissance of the entire project property shall be conducted, to assess paleontologic sensitivity in more detail and to recover any exposed paleontologic remains.

2. Monitoring of excavation in areas identified as likely to contain paleontologic resources by a qualified paleontologic monitor is required for all excavation. Based upon the results of this review, monitoring should be conducted throughout all excavation into undisturbed sediments of the Pauba Formation and the unnamed sandstone, both at the surface and in the

subsurface. Paleontologic monitors must be equipped to salvage fossils as they are unearthed, to avoid construction delays, and to remove samples of sediments that 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.

3. Preparation of any recovered specimens to a point of identification and permanent preservation, including washing of sediments to recover small invertebrates and vertebrates. Preparation and stabilization of all recovered fossils are essential in order to fully mitigate adverse impacts to the resources (Scott and others, 2004).

4. Identification and curation of specimens into an established, accredited museum repository with permanent retrievable paleontologic storage. These procedures are also essential steps in effective paleontologic mitigation (Scott and others, 2004) and CEQA compliance (Scott and Springer, 2003). The paleontologist must have a written repository agreement in hand prior to the initiation of mitigation activities. Mitigation of adverse impacts to significant paleontologic resources is not complete until such curation into an established museum repository has been fully completed and documented.

5. Preparation of a report of findings with an appended itemized inventory of specimens. The 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, will signify completion of the program to mitigate impacts to paleontologic resources.

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Please do not hesitate to contact us if we can be of further assistance.

Sincerely,

Eric Scott, Curator of Paleontology
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1 August 2012

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Attn: Nina Gallardo

re: Paleontological resources for the proposed Tentative Parcel Map 34552 Project, CRM Tech # 2627 Clinton Keith Elizabeth Paleo, in the City of Wildomar, 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 Tentative Parcel Map 34552 Project, CRM Tech # 2627 Clinton Keith Elizabeth Paleo, in the City of Wildomar, Riverside County, project area as outlined on the portion of the Murrieta USGS topographic quadrangle map that you sent to me via e-mail on 28 June 2012. We do not have any vertebrate fossil localities that lie directly within the proposed project boundaries, but we do have localities nearby from the same deposits that occur in the proposed project area.

The entire proposed project area has exposures of the terrestrial Plio-Pleistocene Pauba Formation. Our closest fossil vertebrate localities to the proposed project area from the Pauba Formation are LACM 5447, 5891 and 5892. These localities are all southeast of the proposed project area east of the Temecula Valley Freeway (I-15) around Winchester Road (Route 79). Locality LACM 5447 is situated along Ynez Road north of Winchester Road and Santa Gertrudis Creek. LACM 5891 and 5892 are situated along Margarita Road south of Winchester Road and Santa Gertrudis Creek. All three localities produced specimens of fossil horses, Equidae.

Further southeast of the proposed project area but still in the Pauba Formation we have several vertebrate fossil localities. Southeast of the proposed project area in Temecula east of the Temecula Valley Freeway (I-15), west of Ynez Road, between Long Valley Road and Santiago Road, locality LACM 5789 produced more specimens of fossil horse, *Equus*. Farther southeast south of Long Canyon, locality LACM 5904 produced specimens of fossil rabbit, Leporidae and fossil pocket gopher, *Thomomys*. More fossil horse, *Equus*, material was recovered from the Pauba Formation locality LACM 5893, in the hills between the confluence of the Temecula and Pauba Valleys east of the Temecula Valley Freeway (I-15).

Any substantial excavations in the proposed project area may well encounter significant vertebrate fossils from the Pauba Formation deposits, and thus should be monitored closely to quickly and professionally recover any fossil remains discovered while not impeding development. It should be noted, however, that in the Pauba Formation many of the vertebrate fossils are relatively small and would be missed during typical paleontological monitoring. We recommend that sediment samples from any excavations in the Pauba Formation be collected and processed to assess their small vertebrate fossil potential. 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