APPENDIX
10.7 Paleontological Resources Assessment

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PALEONTOLOGICAL RESOURCES ASSESSMENT REPORT

CLEAN WATER FACTORY PROJECT

City of San Bernardino
San Bernardino County, California

For Submittal to:

City of San Bernardino Municipal Water Department
300 North D Street
San Bernardino, CA 92401
and
United States Bureau of Reclamation
27708 Jefferson Street, Suite 202
Temecula, CA 92509

Prepared for:

RBF Consulting
3210 E. Guasti Road, Suite 100
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Submitted by:

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Michael Hogan, Principal Investigator
Bai "Tom" Tang, Principal Investigator

January 13, 2015

CRM TECH Contract No. 2878P
Approximately 5.24 acres and 120,120 linear feet
San Bernardino North and San Bernardino South, Calif., 7.5' (1:24,000) Quadrangles
Within the Rancho Muscupiabe and Rancho San Bernardino land grants
T1N R4W and T1S R4W, San Bernardino Baseline and Meridian

MANAGEMENT SUMMARY

In December 2014 and January 2015, at the request of RBF Consulting, CRM TECH performed a paleontological resource assessment on the Area of Potential Effects (APE) for the proposed Clean Water Factory Project in the City of San Bernardino, San Bernardino County, California. As proposed by the San Bernardino Municipal Water Department (SBMWD), the project entails the installation of a recycled water pipeline system to connect the Waterman Basins and the East Twin Creek Spreading Grounds, located at the base of the San Bernardino Mountains, to the San Bernardino Water Reclamation Plant, located just north of the confluence of East Twin Creek and the Santa Ana River.

The APE for the project is delineated to encompass the maximum extent of ground disturbance required by the project, including approximately 120,120 linear feet of pipeline right-of-way along four alternative routes, located within various roads and flood channels, and seven potential pump station and storage reservoir sites that total approximately 5.24 acres. Collectively, the APE extends some 6.5 miles north-south and 1.5 miles east-west through a fully urbanized area in the City of San Bernardino, across portions of the Rancho Muscupiabe and Rancho San Bernardino land grants lying within T1N R4W and T1S R4W, San Bernardino Baseline and Meridian.

The study is a part of the environmental review process for the proposed project, as required by the U.S. Bureau of Reclamation (BOR) in compliance with the National Environmental Policy Act (NEPA) and by the SBMWD in compliance with the California Environmental Quality Act (CEQA). The purpose of the study is to provide the BOR and the SBMWD with the necessary information and analysis to determine whether the proposed project would adversely affect any significant paleontological resources, as required by NEPA regulations, and to design a paleontological mitigation program if necessary. In order to identify any paleontological resource localities that may exist in or around the APE, 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 paleontological information repositories, conducted a literature search, and carried out a systematic field survey of the APE in accordance with the guidelines of the Society of Vertebrate Paleontology.

The results of these research procedures indicate that the surface deposits in and near the APE consists of younger alluvium of Holocene age that has a low potential to contain significant, nonrenewable fossil remains, and thus does not require paleontological monitoring during the project. However, older, undisturbed Pleistocene-age sediments may be present in the APE at depths greater than 10-15 feet and are considered high in potential for paleontological resources. Given its limited potential for deep-reaching ground disturbance, which overall is not expected to exceed seven feet in depth, the proposed project appears unlikely to encounter any paleontologically sensitive sediments.

Based on these findings, CRM TECH recommends that earth-moving activities in the APE be limited to 10 feet in maximum depth. If any trenching, excavations, or other earth-moving operations reach beyond the depth of 10 feet, paleontological monitoring will be necessary, along with a program to mitigate impacts to any paleontological resources that might be unearthed.

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INTRODUCTION

In December 2014 and January 2015, at the request of RBF Consulting, CRM TECH performed a paleontological resource assessment on the Area of Potential Effects (APE) for the proposed Clean Water Factory Project in the City of San Bernardino, San Bernardino County, California (Fig. 1). As proposed by the San Bernardino Municipal Water Department (SBMWD), the project entails the installation of a recycled water pipeline system to connect the Waterman Basins and the East Twin Creek Spreading Grounds, located at the base of the San Bernardino Mountains, to the San Bernardino Water Reclamation Plant, located just north of the confluence of East Twin Creek and the Santa Ana River.

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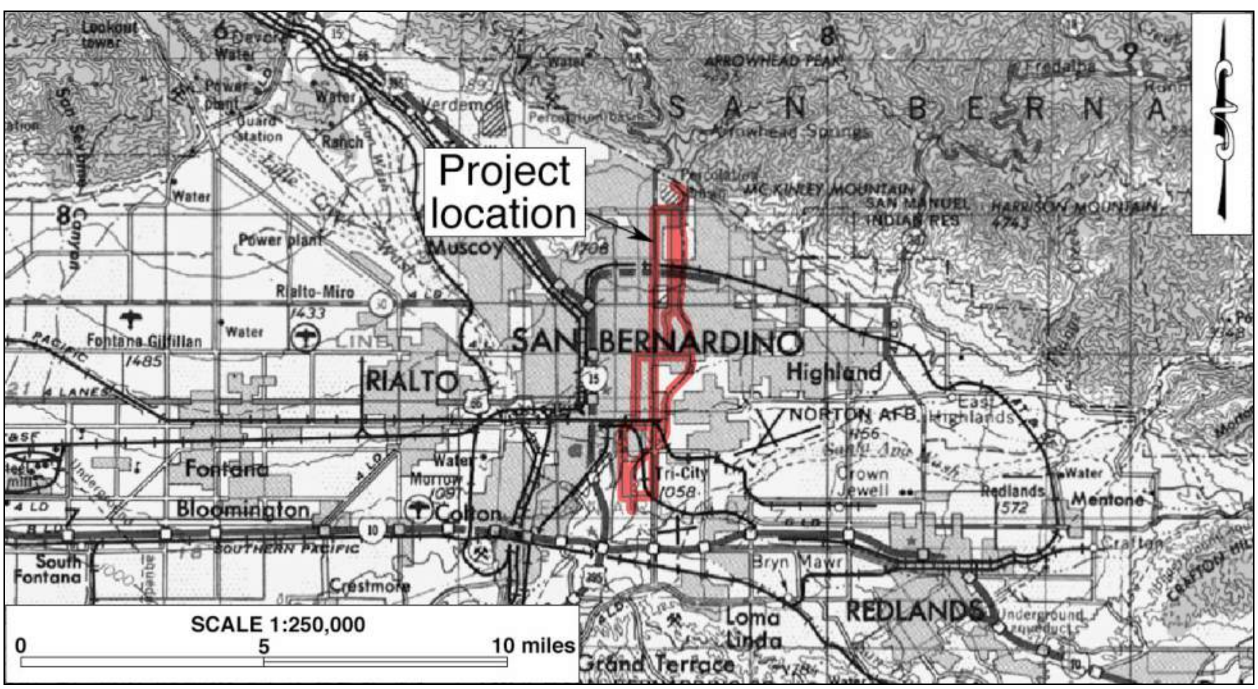

Figure 1. Project vicinity. (Based on USGS San Bernardino, Calif., 1:250,000 quadrangle)

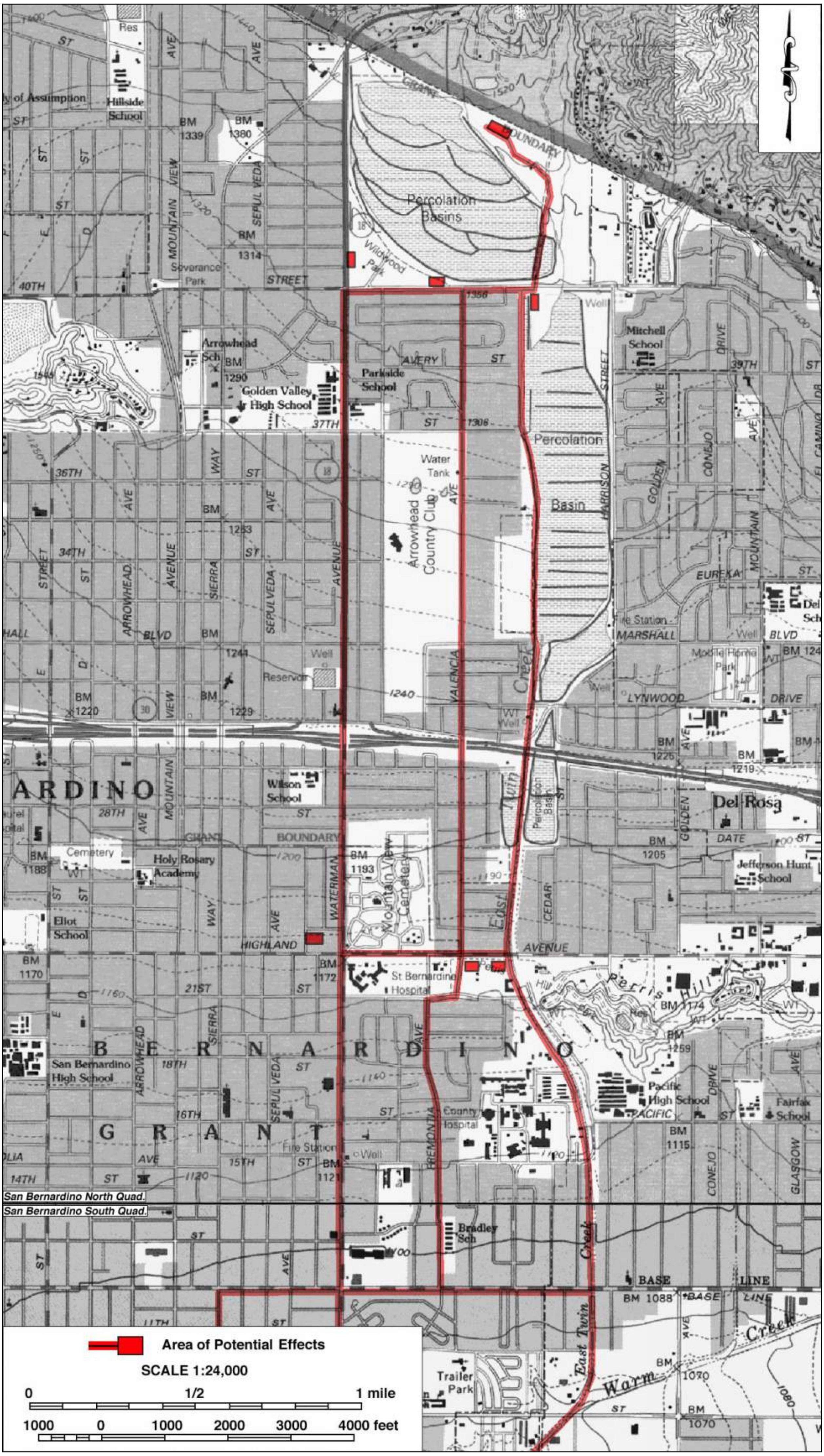

Figure 2a. Area of Potential Effects (northern portion). (Based on USGS San Bernardino North and San Bernardino South, Calif., 1:24,000 quadrangles)

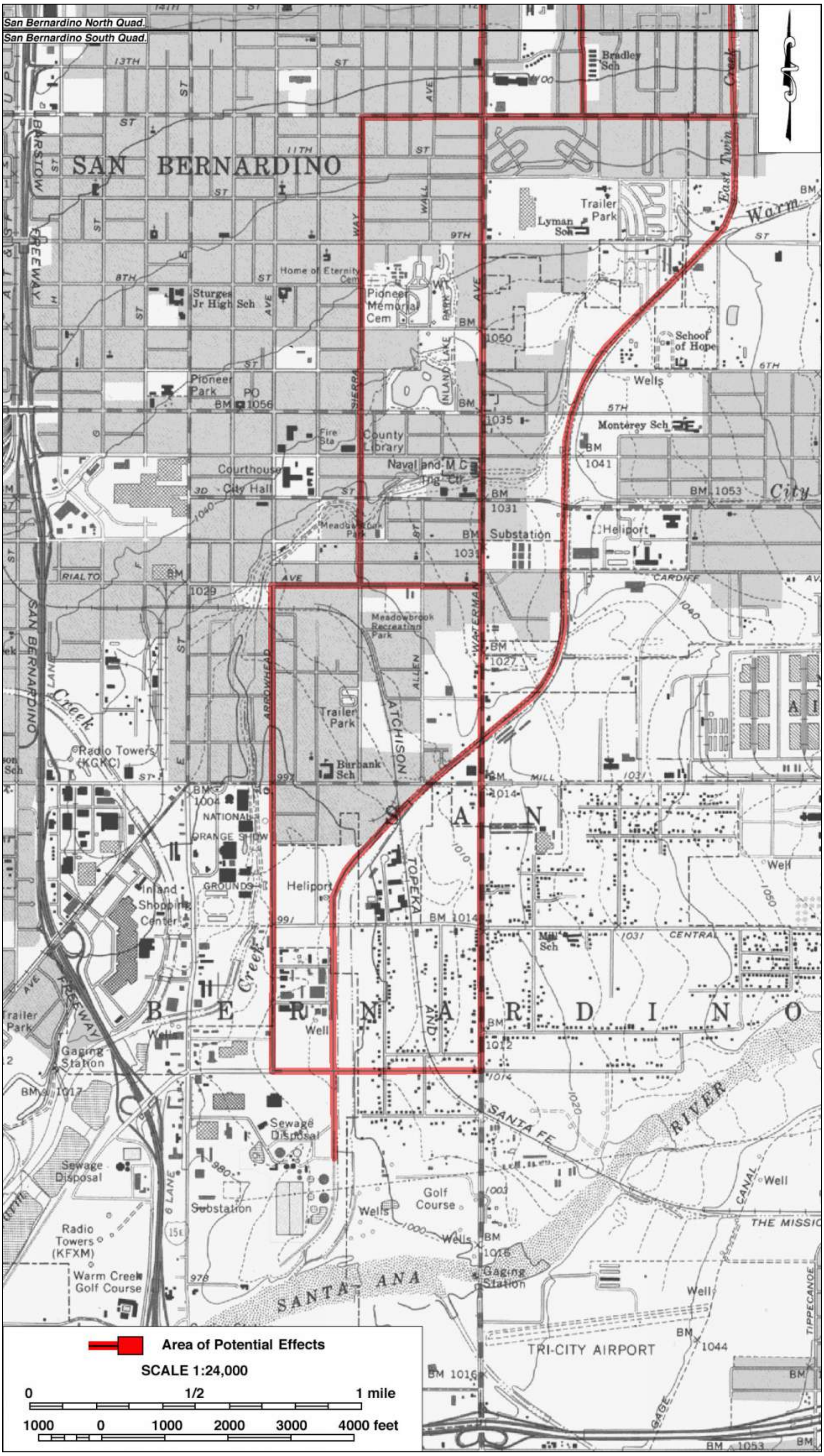

Figure 2b. Area of Potential Effects (southern portion). (Based on USGS San Bernardino North and San Bernardino South, Calif., 1:24,000 quadrangles)

In order to identify any paleontological resource localities that may exist in or near the APE 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 field survey of the APE, 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.

PROJECT DESCRIPTION/AREA OF POTENTIAL EFFECTS

As stated above, the APE for this project is delineated to encompass the maximum extent of ground disturbances. It lies within a project corridor that measures approximately 6.5 miles long and 1.5 miles wide, with the Waterman Basins and the East Twin Creek Spreading Grounds at the northern end and the San Bernardino Water Reclamation Plant at the southern end (Figs. 2a, 2b). The APE consists mainly of three north-south pipeline routes that are connected at least partially by east-west pipeline segments at five points. Collectively, these pipelines represent four project alternatives, all of which are located entirely within existing street rights-of-way or the Twin Creek Flood Channel access road. The alternatives include:

- Alternative Alignment 1: Two pipelines (recycled water and advanced water) in one trench along the Twin Creek Flood Channel.
- Alternative Alignment 2: Two pipelines (recycled water and advanced water) to be installed within 40th Street, Valencia Avenue, Highland Avenue, Crestview Avenue, Baseline Street, Sierra Way, Rialto Avenue, Arrowhead Avenue, and Orange Show Road, and along East Twin Creek.
- Alternative Alignment 3: Two pipelines (recycled water and advanced water) to be installed within 40th Street, Waterman Avenue, Baseline Street, Sierra Way, Rialto Avenue, Arrowhead Avenue, and Orange Show Road, and along East Twin Creek.
- Alternative Alignment 4: Combination of Alternative Alignment 1 for advanced pipeline and Alternative 2 Alignment for recycled water pipeline.

Trenching along the project routes will reach deep enough to allow for the pipelines and up to 48 inches of cover, or about seven feet in total depth, but may go deeper in specific areas to pass beneath existing facilities. Also within the APE are seven potential pump station and storage reservoir sites ranging in size from 0.66 to 1.25 acres, including one at the northeastern edge of the Waterman Basins, one near the northwestern edge of the Twin Creek Spreading Grounds, two in Wildwood Park, two in Perris Hill Park, and one near the southeast corner of East 23rd Street and Leroy Street (Figs. 2a, 2b). All together, the APE totals approximately 5.24 acres plus 120,120 linear feet of pipeline right-of-way.

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.

SETTING

REGIONAL GEOLOGIC SETTING

The City of San Bernardino is located 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; Harms 1996:150). This province consists of a well-defined geologic and physiographic unit occupying the southwest portion of the State of California and extending south to the tip of Baja California (Jahns 1954:29; Harms 1996:130). More specifically, the city lies within the San Bernardino Valley, an alluvial-filled valley associated with the Santa Ana River and its tributaries located on the northern end of the Peninsular Ranges Province (Jenkins 1980; Harms 1996:131, 136). This structurally depressed trough is filled with sediments of Miocene through Recent age (Harms 1996:15).

The San Bernardino Valley, the Jurupa Mountains, and the Chino Basin are among the many tectonically controlled basins and ridges within 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 is considered to have been active since Pliocene time (Woodford et al. 1971:3421). The Pliocene- and Pleistocene-age non-marine sedimentary rocks found filling the valley areas have produced a few vertebrate fossils, as well as a few invertebrate fossil remains (Mann 1955:13).

CURRENT NATURAL SETTING

The current natural environment of the region is characterized by a temperate Mediterranean climate, with the average maximum temperature in July reaching the high 90s (Fahrenheit) and the average minimum temperature in January hovering around 30º. Rainfall is typically less than 20 inches annually. Elevations in the APE incline gradually from south to north, and range between approximately 990 feet and 1,500 feet above mean sea level. The pipeline alignments traverse through residential neighborhoods, commercial corridors, and areas of light industry, while the pump station/reservoir sites are located in open areas within existing parks or other vacant, city-owned lots (Figs. 3, 4). As would be expected in an urbanized setting, the ground surface throughout the APE has been completely altered from its natural state, with the vast majority covered by road pavement and landscaping plants.

METHODS AND PROCEDURES

RECORDS SEARCHES

The records search service for this study was provided by the San Bernardino County Museum in Redlands and the Natural History Museum of Los Angeles County 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 any known paleontological localities within the APE 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).

Figure 3. Typical landscapes along the proposed pipeline alignments. *Clockwise from top left*: along East Twin Creek flood channel, view to the north; Valencia Avenue near 21th Street, view to the north; Waterman Avenue near Rialto Avenue, view to the north; and Orange Show Road at Arrowhead Avenue, view to the north. (Photographs taken on December 26, 2014)

FIELD SURVEY

On December 26, 2014, CRM TECH paleontological surveyor Daniel Ballester (see App. 1 for qualifications) carried out the field survey of the APE under the direction of Harry M. Quinn. In light of the extensively disturbed state and, consequently, reduced paleontological sensitivity of the pipeline routes, the linear portion of the APE was surveyed at a reconnaissance level by driving along the alignments and visually inspecting the surrounding ground surface for any indications of potential paleontological resources.

The potential pump station and storage reservoir sites were surveyed at an intensive level by walking parallel transects spaced 10 meters (approx. 33 feet) apart. Using these methods, the entire APE was systematically 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 poor (0-10%) in most of the APE due to the presence of sod, thick vegetation, and pavement, but was occasionally good (70-80%) in the absence of such ground covers.

RESULTS AND FINDINGS

RECORDS SEARCHES

The Natural History Museum of Los Angeles County and the San Bernardino County Museum report no known paleontological localities within one mile of the APE, with the closest recorded vertebrate

Figure 4. Overviews of the potential pump station and storage reservoir sites. *Clockwise from top left*: northeastern edge of the Waterman Basins, view to the west; western edge of the East Twin Creek Spreading Grounds, south of 40th Street, view to the southeast; northern side of 40th Street, view to the east; Perris Hill Park, view to the west; vacant lot near the southeastern corner of 23rd Street and Leroy Street, view to the east; Wildwood Park along Waterman Avenue, view to the north. (Photographs taken on December 26, 2014)

fossil specimen, a whipsnake (*Masticophis*), reported some 25 miles to the southwest (McLeod 2015; Scott 2014; see App. 2). According to the museums, surface soils within the APE consist of Quaternary alluvium that is not paleontologically sensitive, but both museums note that these sediments may overlie older Pleistocene alluvium in the subsurface that, if present, and depending upon its lithology, may have a high potential to contain significant fossil vertebrate remains. According to the San Bernardino County Museum, however, excavations that do not reach beyond 15 feet in depth are unlikely to encounter these older sediments (Scott 2014).

LITERATURE REVIEW

The surface geology in the vicinity of the APE was mapped by Dibble (2004) as mostly **Qa**, or alluvium of Holocene age, with some areas of **Qg**, which is identified as alluvium of presently active stream and river channels. Morton and Miller (2003) mapped the surface exposures in the APE as

Qya3 and **Qya5**, or young alluvial valley deposits, and **Qyf3**, **Qyf4**, and **Qyf5**, young alluvial fan deposits dating to the Holocene Epoch, which are overlain and incised in some areas by **Qw**, recent wash alluvium (Figs. 5a, 5b). Holocene sediments such as these have a low potential to contain fossil resources. Bortugno and Spittler (1986) mapped the surface geology in this area as **Qw**, **Qyf**, and **Qow**, representing alluvial deposits of modern washes, younger alluvial fan deposits, and older alluvial deposits of abandoned washes, respectively, all three of which area of Holocene age.

The surface soils in the northern portion of the APE were mapped by Woodruff and Brock (1980:Map Sheet 3) as **SpC**, **TuB**, **TvC**, and **Gr**. The **SpC** type soils belong to the **Soboba Series**, specifically the Soboba stony loamy sand that develop on gently sloping, long, broad alluvial fans (*ibid.*:24).. The **TuB** and **TvC** type soils belong to the **Tujunga Series** and develop on nearly level to gently sloping broad alluvial fans composed mainly of granitic alluvium (*ibid.*:26). The **Gr** type soils belong to the **Grangeville Series**, specifically the Grangeville fine sandy loam and are shown to develop on nearly level alluvial fans (*ibid.*:14). In the southern portion of the APE, Woodruff and Brock (1980:Map Sheet 8) mapped the surface soils as **Gr**, **TvC**, and **HaC**. The **HaC** type soils belong to the **Hanford Series** and develop on nearly level to gently sloping broad alluvial fans composed mainly of granitic alluvium (*ibid.*:15).

FIELD SURVEY

The field survey produced completely negative results for potential paleontologic resources. The entire APE was closely inspected for any surficial evidence of fossilized faunal or floral remains, but none was found. The ground surface in virtually the entire APE has been extensively disturbed. Most of it lies within paved roadways, where the subsurface soils typically consist of highly disturbed fill dirt to the depth of five to six feet, and the rest of the APE has also been impacted by urban development. These past disturbances inevitably reduce the sensitivity of the surface soils and shallow subsurface sediments for intact, potentially significant paleontological remains.

DISCUSSION

As stated above, the surface sediments in the APE are of Holocene age and have been extensively disturbed, and thus have a low potential for containing significant nonrenewable paleontological resources. These younger surface sediments, however, may rest directly on top of older Pleistocene-age alluvium that has a high paleontologic potential. While no fossil localities were reported in the APE or within a one-mile radius, the subsurface lithology that may be present at this location has produced significant fossils of extinct Ice Age animals and plants in other portions of the Inland Empire. The older Pleistocene-age sediments are not expected to be present in sediments above 10-15 feet in depth, but if encountered during the project will require monitoring for possible discovery of paleontological resources. Soil boring logs, if available, may help determined the precise depth at which the Pleistocene-age sediments would be encountered.

CONCLUSION AND RECOMMENDATIONS

In summary of the information and analysis presented above, the surface deposits in and near the APE consists of younger alluvium of Holocene age that has a low potential to contain significant,

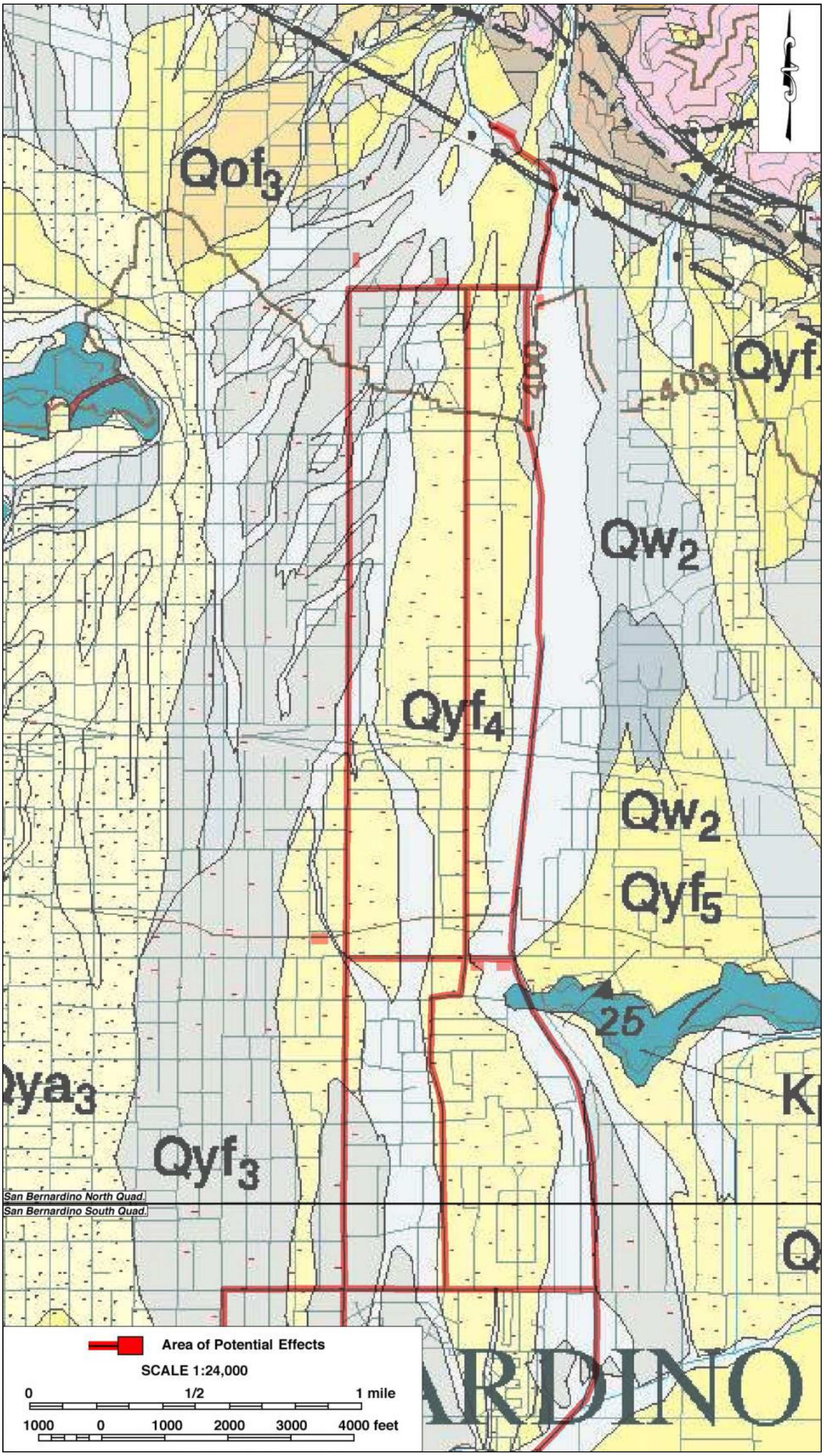

Figure 5a. Geologic map of the APE (northern portion).

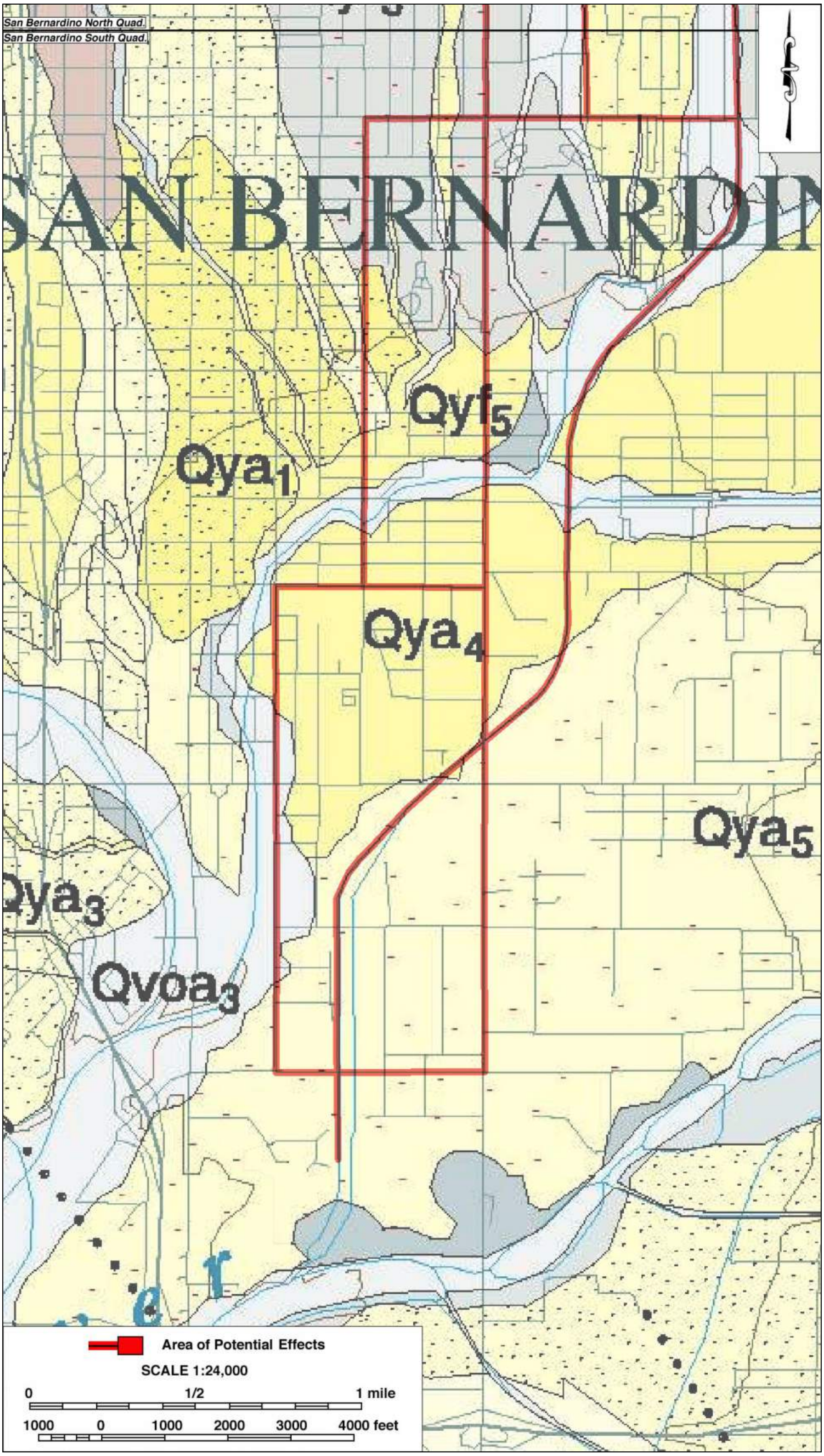

Figure 5b. Geologic map of the APE (southern portion).

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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.

PALEONTOLOGICAL SURVEYOR
Daniel Ballester, M.S.

Education

2013	M.S., Geographic Information System (GIS), University of Redlands, California.
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.
1999-2002	Project Archaeologist/Field Paleontologist, CRM TECH, Riverside, California.
1998-1999	Field Crew, K.E.A. Environmental, San Diego, California.
1998	Field Crew, A.S.M. Affiliates, Encinitas, California.
1998	Field Crew, Archaeological Research Unit, University of California, Riverside.

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

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SAN BERNARDINO COUNTY

Museum

Leonard X. Hernandez
Interim Museum Director

30 December 2014

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

re: **PALEONTOLOGY LITERATURE AND RECORDS REVIEW, SAN BERNARDINO CLEAN WATER FACTORY PROJECT, CITY AND COUNTY OF SAN BERNARDINO, CALIFORNIA**

Dear Ms. Gallardo,

The Division of Geological Sciences of the San Bernardino County Museum (SBCM) has completed a records search for the above-referenced property in the City of San Bernardino, San Bernardino County. The proposed study corridor traverses portions of sections 14, 23, 26, and 35 (all projected), Township 1 North, Range 4 West, as well as portions of sections 2, 10, 11, 14, and 15 (all projected), Township 1 South, Range 4 West, San Bernardino Base and Meridian, as seen on the San Bernardino North, California and the San Bernardino South, California 7.5' United States Geological Survey topographic quadrangle maps (1967 editions, photorevised 1980).

Previous geologic mapping of the region including the proposed study area (Bortugno and Spittler, 1986; Miller and others, 2001; Morton and Miller, 2003) indicates that the various proposed project alignments cross surface exposures of young alluvial valley deposits (= units $\mathbf{Qya_3}$ and $\mathbf{Qya_5}$) and young alluvial fan deposits (= $\mathbf{Qyf_3}$, $\mathbf{Qyf_4}$, and $\mathbf{Qyf_5}$) dating to the Holocene Epoch, overlain and incised in some areas by recent wash alluvium (= **Qw**). These Holocene sediments have low potential to contain fossil resources, and so are assigned low paleontologic sensitivity. These sediments may overlie Pleistocene older alluvium in the subsurface; if present, and depending upon its lithology, this older alluvium may have high potential to contain significant nonrenewable paleontologic resources, and so would be assigned high paleontologic sensitivity. Pleistocene alluvium elsewhere throughout inland Riverside and San Bernardino Counties and the Inland Empire has been repeatedly demonstrated to have high paleontologic sensitivity (Jefferson, 1991; Reynolds and Reynolds, 1991; Anderson and others, 2002; Scott and Cox, 2008; Springer and others, 2009, 2010; Scott, 2010). Fossils recovered from these Pleistocene sediments represent extinct taxa including mammoths, mastodons, ground sloths, dire wolves, sabre-toothed cats, large and small horses, large and small camels, and bison (Jefferson, 1991; Reynolds and Reynolds, 1991; Anderson and others, 2002; Scott and Cox, 2008; Springer and others, 2009, 2010; Scott, 2010).

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 previously - known paleontologic resource localities are recorded from along the proposed project corridor, nor within at least one mile in any direction.

Recommendations

The results of the literature review and the check of the RPLI at the SBCM demonstrate that excavation in conjunction with development has low potential to cause significant adverse impacts to nonrenewable paleontologic resources. Holocene alluvial sediments present at the surface are too young geologically to have potential to contain significant fossil resources. No program to mitigate impacts to resources is therefore recommended for excavation in the Holocene sediments.

However, Pleistocene older alluvium may be present at depth. If present, this alluvium may have high paleontologic sensitivity, depending upon its lithology and depositional context. It cannot be determined a priori from the available geologic mapping at what depths such Pleistocene sediments might be encountered; for the purposes of this report, it is inferred that such sediments may be present at depths in excess of 15' below the existing ground surface. If excavation is restricted to depths of approximately 15' below the existing ground surface, or less, then older Pleistocene sediments are not expected to be encountered. At these depths, no program to mitigate adverse impacts to paleontologic resources is recommended at this time.

In the event that excavation is expected to exceed 15' below the existing ground surface in depth, a qualified vertebrate paleontologist must be retained to develop a program to mitigate impacts to such resources, including full curation of recovered significant resources (see Scott and others, 2004). This mitigation program should 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 San Bernardino and the proposed guidelines of the Society of Vertebrate Paleontology.

The County of San Bernardino (Development Code §82.20.040) defines a qualified vertebrate paleontologist as meeting the following criteria:

<u>Education:</u> An advanced degree (Masters or higher) in geology, paleontology, biology or related disciplines (exclusive of archaeology).

<u>Professional experience:</u> At least five years professional experience with paleontologic (not including cultural) resources, including the collection, identification and curation of the resources.

The County of San Bernardino (Development Code §82.20.030) requires that paleontologic mitigation programs include, but not be limited to:

(a) <u>Field survey before grading</u>. In areas of potential but unknown sensitivity, field surveys before grading shall be required to establish the need for paleontologic monitoring.

(b) Monitoring during grading. A project that requires grading plans and is located in an area of known fossil occurrence, or that has been demonstrated to have fossils present in a field survey, shall have all grading monitored by trained paleontologic crews working under the direction of a qualified professional, so that fossils exposed during grading can be recovered and preserved. Paleontologic monitors shall 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 shall be empowered to temporarily halt or divert equipment to allow removal of abundant or large specimens. Monitoring is not necessary if the potentially-fossiliferous units described for the property in question are not present, or if present are determined upon exposure and examination by qualified paleontologic personnel to have low potential to contain fossil resources.

(c) Recovered specimens. Qualified paleontologic personnel shall prepare 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 is essential in order to fully mitigate adverse impacts to the resources.

(d) Identification and curation of specimens. Qualified paleontologic personnel shall identify and curate specimens into the collections of the Division of Geological Sciences, San Bernardino County Museum, an established, accredited museum repository with permanent retrievable paleontologic storage. These procedures are also essential steps in effective paleontologic mitigation and CEQA compliance. 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 considered complete until curation into an established museum repository has been fully completed and documented.

(e) Report of findings. Qualified paleontologic personnel shall prepare a report of findings with an appended itemized of specimens. A preliminary report shall be submitted and approved before granting of building permits, and a final report shall be submitted and approved before granting of occupancy permits. The report and inventory, when submitted to the appropriate Lead Agency along with confirmation of the curation of recovered specimens into the collections of the San Bernardino County Museum, will signify completion of the program to mitigate impacts to paleontologic resources.

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

Sincerely,

Eric Scott, Curator of Paleontology
Division of Geological Sciences
San Bernardino County Museum

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of Los Angeles County
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6 January 2015

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

Attn: Nina Gallardo

re: Paleontological resources for the proposed San Bernardino Clean Water Factory Project, CRM Tech Contract # 2878P, in the City of San Bernardino, San Bernardino 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 San Bernardino Clean Water Factory Project, CRM Tech Contract # 2878P, in the City of San Bernardino, San Bernardino County, project area as outlined on the portions of the San Bernardino North and San Bernardino South USGS topographic quadrangle maps that you sent to me via e-mail on 6 December 2014. We do not have any vertebrate fossil localities that lie directly within the proposed project area, but we do have localities farther afield from sedimentary deposits similar to those that may occur subsurface in the proposed project area.

In the immediate channels of the East Twin Creek and Warm Creek along the eastern border and in the very southern portion of the proposed project area the surface deposits consist of coarse gravels and sands that almost certainly will not contain any significant vertebrate fossils in the uppermost layers. Otherwise surface deposits in the proposed project area are composed of younger Quaternary Alluvium, derived as alluvial fan deposits from the San Gabriel Mountains to the north, with fluvial contributions from East Twin Creek and Warm Creek in the eastern portion and from the Santa Ana River just to the south. These deposits typically do not contain significant vertebrate fossils, at least in the uppermost layers, but they may be underlain at relatively shallow depth by older sedimentary deposits that do contain significant fossil vertebrate remains. Our closest fossil vertebrate locality from similar older Quaternary deposits is LACM 7811, west-southwest of the proposed project area west of Mira Loma along Sumner Avenue, that produced a fossil specimen of whipsnake, *Masticophis*, at a depth of 9 to 11 feet below the surface. Further to the southwest between Corona and Norco our vertebrate fossil locality LACM 1207 produced a fossil specimen of deer, *Odocoileus*.

Shallow excavations in the younger Quaternary gravels exposed in the active East Twin Creek and Warm Creek channels in the proposed project area almost certainly will not uncover any significant vertebrate fossils. Shallow excavations in the younger Quaternary Alluvium exposed in most of the proposed project area are unlikely to encounter significant vertebrate fossils. Deeper excavations throughout the proposed project area that extend down into older Quaternary deposits, however, may well encounter significant remains of fossil vertebrates. Any substantial and deep excavations 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