

APPENDIX M

HISTORICAL/ARCHAEOLOGICAL RESOURCES SURVEY REPORT
POSEIDON SEAWATER DESALINATION PLANT PUMP STATION SITE

**Near the City of Newport Beach
Orange County, California**

Submitted to:

Alan Ashimine
RBF Consulting
14725 Alton Parkway
Irvine, CA 92618-2027

Submitted by:

Bruce Love, Principal
Bai "Tom" Tang, Historian
Harry Quinn, Archaeologist
Mariam Dahdul, Archaeologist
CRM TECH
2411 Sunset Drive
Riverside, CA 92506

June 10, 2002

CRM TECH Contract #821
Approx. 7,200 Square Feet
Tustin, California, 7.5' Quadrangle
T6S R9W, SBBM; within the Rancho San Joaquin Land Grant

MANAGEMENT SUMMARY

In May, 2002, at the request of RBF Consulting, CRM TECH performed a cultural resources study on a small parcel of vacant land in an unincorporated area near the City of Newport Beach, Orange County, California. The subject property of the study, measuring approximately 90 feet by 80 feet in size, is located in a resource preservation easement owned by the County of Orange, and consists of a portion of the Rancho San Joaquin land grant lying within T6S R9W, San Bernardino Base Meridian. The study is part of the environmental review process for the construction of a pump station for the proposed Poseidon Seawater Desalination Plant, as required by the City of Huntington Beach, Lead Agency for the project, in compliance with the California Environmental Quality Act (CEQA). The purpose of the study is to provide the City of Huntington Beach with the necessary information and analysis to determine whether the proposed project would cause substantial adverse changes to any historical/archaeological resources that may exist in or around the project area, as mandated by CEQA.

In order to identify and evaluate such resources, CRM TECH conducted a historical/archaeological resources records search, pursued historical background research, and carried out an intensive-level field survey. Through the various avenues of research, this study did not encounter any "historical resources," as defined by CEQA, within or adjacent to the project area. Therefore, CRM TECH recommends that the City of Huntington Beach may reach a finding that the project as currently proposed will have *no effect* on any known historical resources. No further cultural resources investigation is recommended for the project unless construction plans undergo such changes as to include areas not covered by this study. However, if buried cultural materials are encountered during construction, all work in that area should be halted or diverted until a qualified archaeologist can evaluate the nature and significance of the finds.

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INTRODUCTION

In May, 2002, at the request of RBF Consulting, CRM TECH performed a cultural resources study on a small parcel of vacant land in an unincorporated area near the City of Newport Beach, Orange County, California (Fig. 1). The subject property of the study, measuring approximately 90 feet by 80 feet in size, is located in a resource preservation easement owned by the County of Orange, and consists of a portion of the Rancho San Joaquin land grant lying within T6S R9W, San Bernardino Base Meridian (Fig. 2). The study is part of the environmental review process for the construction of a pump station for the proposed Poseidon Seawater Desalination Plant, as required by the City of Huntington Beach, Lead Agency for the project, in compliance with the California Environmental Quality Act (CEQA; PRC §21000, et seq.).

CRM TECH performed the present study to provide the City of Huntington Beach with the necessary information and analysis to determine whether the proposed development would cause substantial adverse changes to any historical/archaeological resources that may exist in or around the project area, as mandated by CEQA. In order to identify and evaluate such resources, CRM TECH conducted a historical/archaeological resources records search, pursued historical background research, and carried out an intensive-level field survey. The following report is a complete account of the methods, results, and final conclusion of the study.

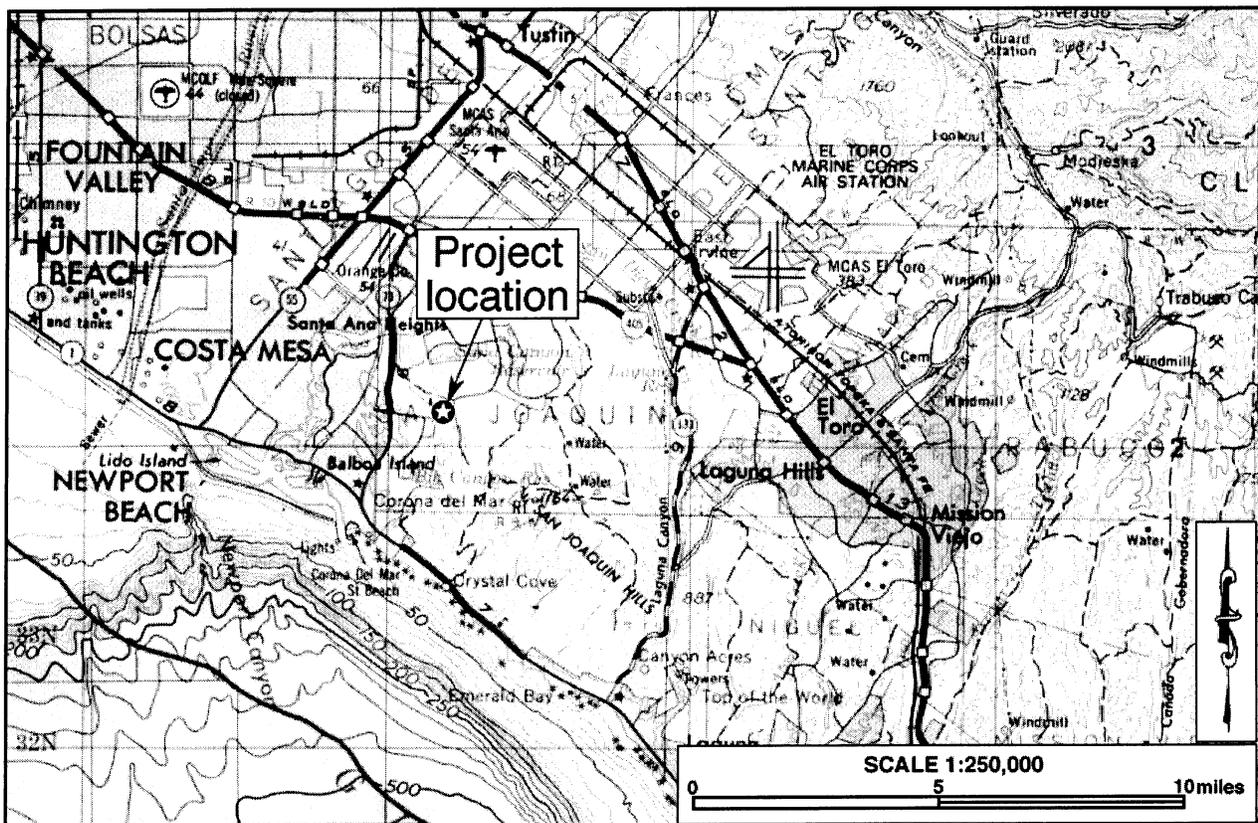


Figure 1. Project vicinity. (Based on USGS Santa Ana, Calif., 1:250,000 quadrangle [USGS 1979])

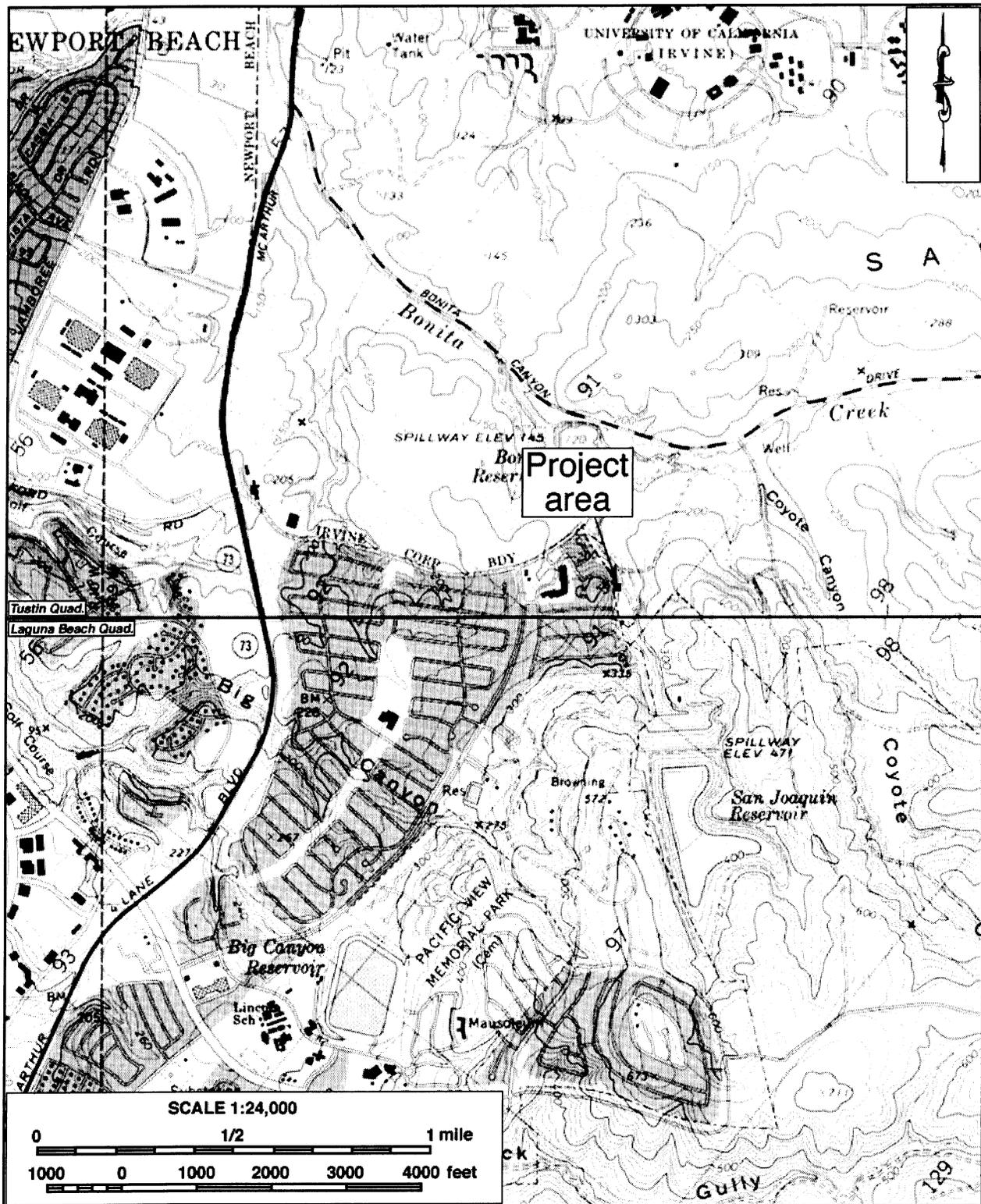


Figure 2. Project area. (Based on USGS Laguna Beach and Tustin, Calif., 1:24,000 quadrangle [USGS 1981a; 1981b])

ENVIRONMENTAL SETTING

The project area is located in the San Joaquin Hills, a part of the greater Los Angeles Basin, at an elevation of approximately 200 feet above sea level. Situated at the bottom of a canyon, the property is covered by a thick growth of vegetation, including willows, tules, pampas grass, toyon, cattails, Mexican fan palms, and scotch broom. A stream flows through the lowest portion of the property (Fig. 3). Soils in the project area consist of recent alluvium, with imported gravel scattered along the eastern edge, where it adjoins a paved road.

A slope extending down towards the western portion of the project area contains a minor growth of wild mustard and grasses. The soil at this particular location is a silty loam with a few scattered cobble size clasts of sandstone and hard siltstone concretion material. Two other clasts of a diabase material were also noted. Based on these findings, it appears that the slope was created as a result of construction activities on an adjacent residential subdivision.

RESEARCH METHODS

RECORDS SEARCH

The South Central Coastal Information Center (SCCIC) at the California State University, Fullerton, provided the records search service for this study. Catherine Wood, SSCIC Staff Archaeologist, checked the Center's records for previously identified historical/



Figure 3. Overview of the current natural setting of the project area.

archaeological resources in or near the project area, and existing cultural resources reports pertaining to the vicinity. Previously identified historical/archaeological resources include properties designated as California Historical Landmarks or Points of Historical Interest, as well as those listed in the National Register of Historic Places, the California Register of Historical Resources, or the California Historical Resource Information System.

HISTORICAL RESEARCH

Historical background research for this study was conducted by CRM TECH historian Bai "Tom" Tang (see App. 1 for qualifications) on the basis of historic maps depicting the project vicinity. Maps consulted during the research included the U.S. General Land Office's (GLO) land survey plat maps dated 1859 and 1865, and the U.S. Geological Survey's (USGS) topographic maps dated 1901, 1948, 1965, and 1972. These maps are collected at the Science Library of the University of California, Riverside, and the California Desert District of the U.S. Bureau of Land Management, also located in Riverside.

FIELD SURVEY

On May 10, 2002, CRM TECH archaeologist Harry M. Quinn (see App. 1 for qualifications) carried out the intensive-level on-foot field survey of the project area. Because of the dense vegetation, Quinn could not survey the property along regular transects, and instead walked the relatively small project area along random lines wherever passable open ground was found. Ground visibility was generally poor.

RESULTS AND FINDINGS

RECORDS SEARCH RESULTS

According to records on file at the South Central Coastal Information Center, a large number of previous cultural resources studies, approximately 50 in total, had been conducted within a half-mile radius of the current project area, including several that covered the project area itself (Fig. 4). No archaeological sites or other cultural resources, however, had been previously recorded within or adjacent to the project area as a result of these studies.

In all, more than 75% of the lands within the half-mile radius had been surveyed (Fig. 4), resulting in the identification of 22 archaeological sites on these lands. All of these sites were prehistoric—i.e., Native American—in nature, and eight of them were determined eligible for listing in the National Register of Historic Places. No historic-era sites or artifacts were recorded within the scope of the records search.

Some of these previously recorded sites were described as village sites with possible human burials, and several others consisted of scatters of groundstone artifacts, various stone tools, and chipping debris from lithic tool production. But the majority of these sites were shell midden deposits, some of which were found in association with stone tools, lithic debris, food remains, bone, and groundstone. A rock shelter was also recorded with deep midden layers and various lithic artifacts, such as cores, stone scrapers, and chipped stone flakes. None of these previously recorded sites was located within or adjacent to the project area; therefore, none of them requires further consideration during this study.

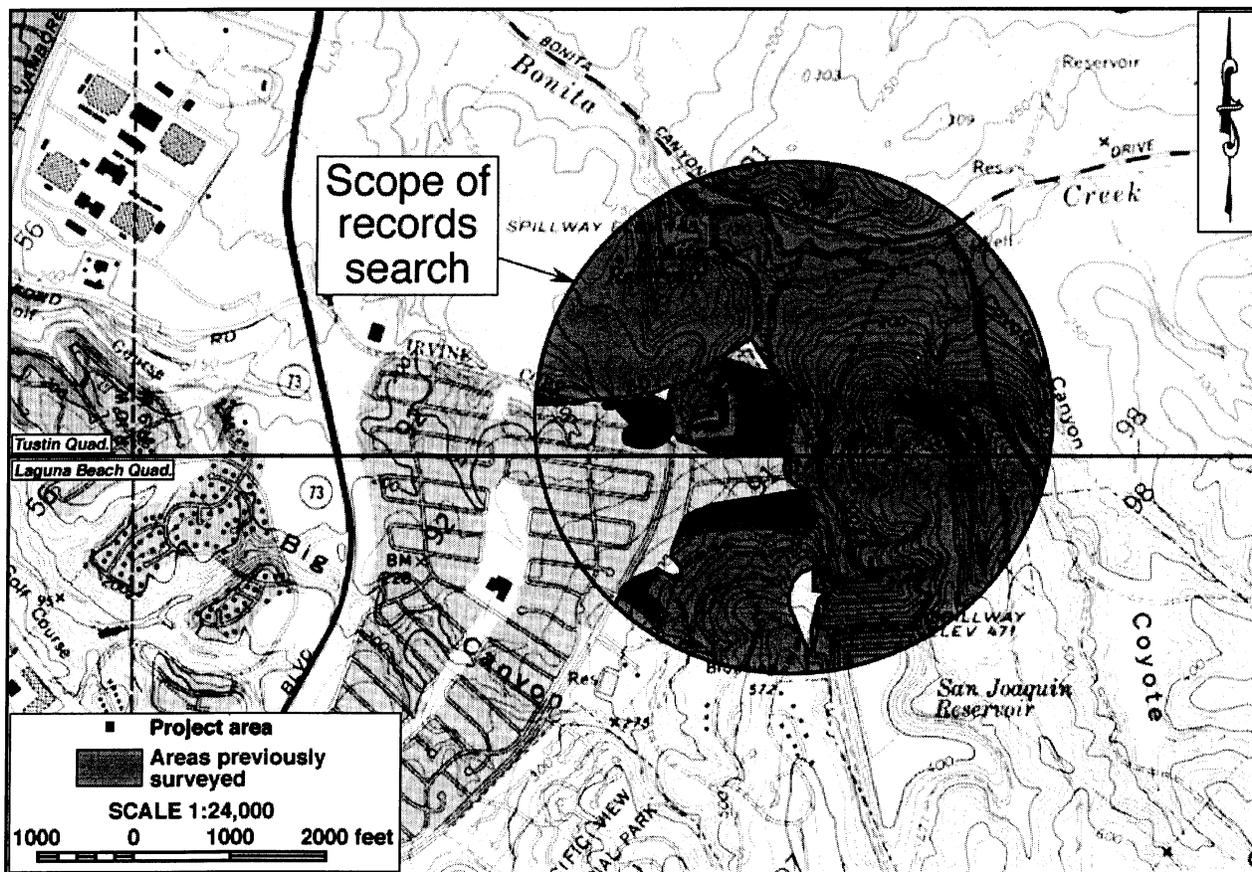


Figure 4. Previous cultural resources studies in the vicinity of the project area. Locations of historical/archaeological sites are not shown as a protective measure.

HISTORICAL RESEARCH RESULTS

Historic maps consulted for this study suggest that the project area appears to be low in sensitivity for cultural resources from the historic period. In the mid- and late 19th century, during several surveys by the U.S. General Land Office and the U.S. Geological Survey, no identifiable evidence of any human activities was noted within more than a mile of the project location (GLO 1859; 1865; USGS 1901 [Fig. 5]). By the mid-20th century, a number of roads had appeared in the vicinity, along with nearby Bonita Reservoir and San Joaquin Reservoir, and a few scattered buildings had sprung up in the San Joaquin Hills (USGS 1948 [Fig. 6]; 1965 [Fig. 7]). During the late 1960s and early 1970s, a residential subdivision was laid out within a half-mile to the west, bringing the forces of urbanization into the surrounding area (USGS 1972 [Fig. 8]). None of these developments, however, occurred within or adjacent to the project area, which has evidently remained vacant and undeveloped to the present time.

FIELD SURVEY RESULTS

The field survey produced completely negative results for potential cultural resources. The ground surface was closely inspected for any evidence of human activities dating to the prehistoric or historic periods, but none was found. No buildings, structures, objects, sites, features, or artifacts more than 50 years of age were encountered during the field survey.

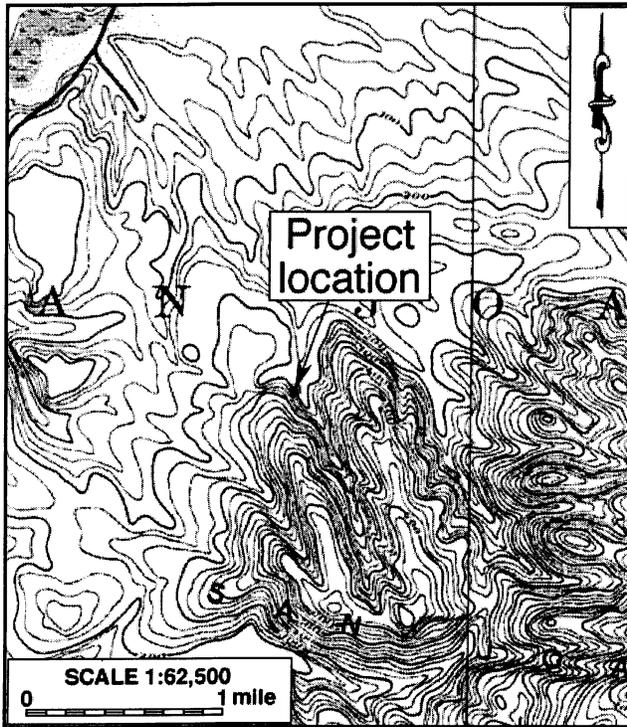


Figure 5. The project area and vicinity in 1894.
(Source: USGS 1901)

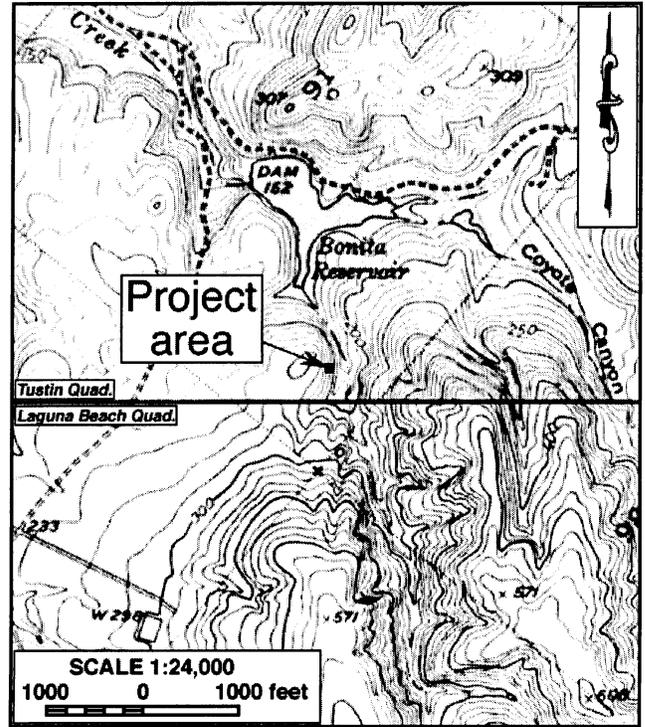


Figure 6. The project area and vicinity in 1946-1948.
(Source: USGS 1948a; 1948b)

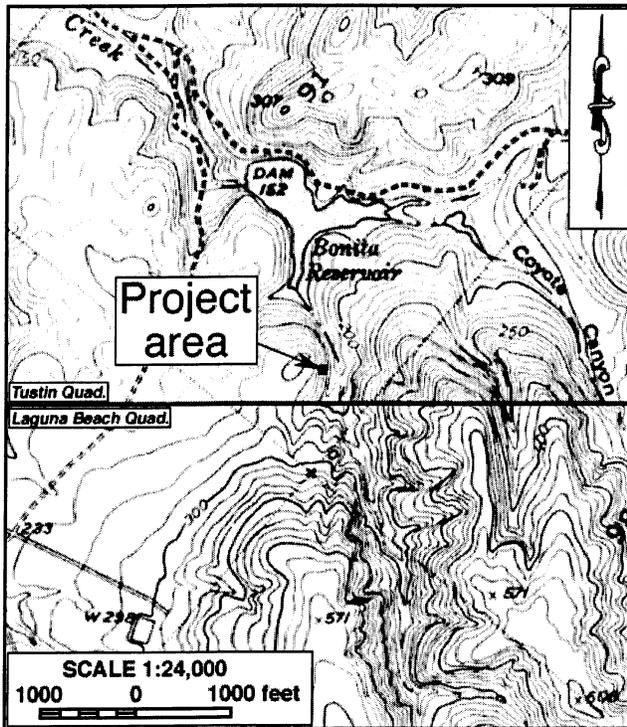


Figure 7. The project area and vicinity in 1963-1965.
(Source: USGS 1965a; 1965b)

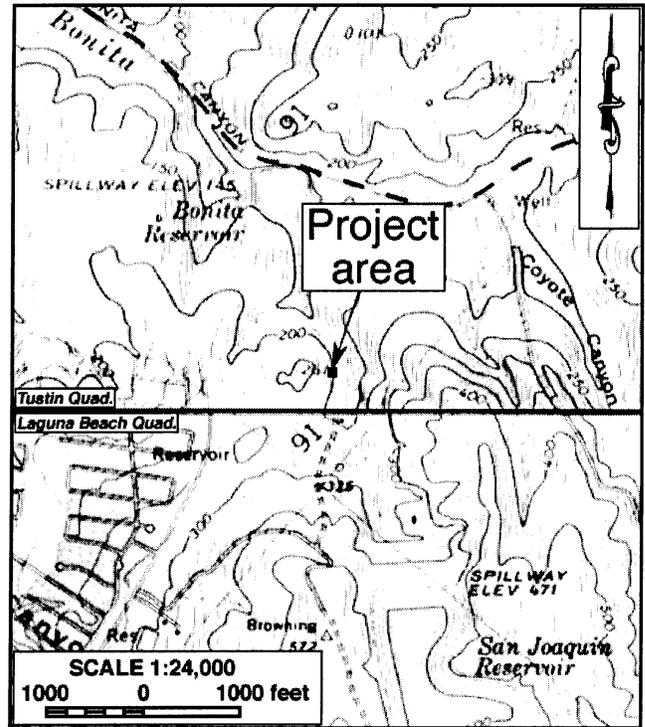


Figure 8. The project area and vicinity in 1972.
(Source: USGS 1972a; 1972b)

DISCUSSION

The purpose of this study is to identify any cultural resources within or adjacent to the project area, and to assist the City of Huntington Beach in determining whether such resources meet the official definitions of "historical resources," as provided in the California Public Resources Code, in particular CEQA.

According to PRC §5020.1(j), "'historical resource' includes, but is not limited to, any object, building, site, area, place, record, or manuscript which is historically or archaeologically significant, or is significant in the architectural, engineering, scientific, economic, agricultural, educational, social, political, military, or cultural annals of California." More specifically, CEQA guidelines state that the term "historical resources" applies to any such resources listed in or determined to be eligible for listing in the California Register of Historical Resources, included in a local register of historical resources, or determined to be historically significant by the Lead Agency (Title 14 CCR §15064.5(a)(1)-(3)).

Regarding the proper criteria for the evaluation of historical significance, CEQA guidelines mandate that "a resource shall be considered by the lead agency to be 'historically significant' if the resource meets the criteria for listing on the California Register of Historical Resources" (Title 14 CCR §15064.5(a)(3)). A resource may be listed in the California Register if it meets any of the following criteria:

- (1) Is associated with events that have made a significant contribution to the broad patterns of California's history and cultural heritage.
- (2) Is associated with the lives of persons important in our past.
- (3) Embodies the distinctive characteristics of a type, period, region, or method of construction, or represents the work of an important creative individual, or possesses high artistic values.
- (4) Has yielded, or may be likely to yield, information important in prehistory or history. (PRC §5024.1(c))

As discussed above, the records search, the historical research, and the field survey have all produced negative results, and no potential "historical resources" were encountered throughout the course of this study. Based on these findings, and in light of the criteria listed above, the present report concludes that *no historical resources exist within or adjacent to the project area.*

RECOMMENDATIONS

CEQA establishes that "a project that may cause a substantial adverse change in the significance of a historical resource is a project that may have a significant effect on the environment" (PRC §21084.1). "Substantial adverse change," according to PRC §5020.1(q), "means demolition, destruction, relocation, or alteration such that the significance of a historical resource would be impaired."

Since no historical resources were encountered during the course of this study, CRM TECH presents the following recommendations to the City of Huntington Beach:

- No historical resources exist within or adjacent to the project area, and thus the project as currently proposed will cause no substantial adverse change to any known historical resources.
- No further cultural resources investigation is necessary for the proposed project unless construction plans undergo such changes as to include areas not covered by this study.
- If buried cultural materials are discovered during construction, all work in that area should be halted or diverted until a qualified archaeologist can evaluate the nature and significance of the finds.

CONCLUSION

The foregoing report has provided background information on the project area, outlined the methods used in the current study, and presented the results of the various avenues of research. Throughout the course of the study, no "historical resources," as defined by CEQA, were encountered within or adjacent to the project area. Therefore, the City of Huntington Beach may reach a finding of *no effect* regarding cultural resources, with the condition that any buried cultural materials unearthed during project-related earth-moving activities be examined and evaluated by a qualified archaeologist prior to further disturbances.

REFERENCES

GLO (General Land Office, U.S. Department of the Interior)

- 1859 Plat of the San Joaquin Rancho (José Sepulveda); surveyed in 1858.
- 1865 Plat map: Township No. 6 South Range No. 9 West, San Bernardino Meridian; surveyed in 1855-1865.

USGS (United States Geological Survey, U.S. Department of the Interior)

- 1901 Map: Santa Ana, Calif. (15', 1:62,500); surveyed in 1894.
- 1948a Map: Laguna Beach, Calif. (7.5', 1:24,000); aerial photos taken in 1946, field-checked in 1948.
- 1948b Map: Tustin, Calif. (7.5', 1:24,000); aerial photos taken in 1946, field-checked in 1948.
- 1965a Map: Laguna Beach, Calif. (7.5', 1:24,000); aerial photos taken in 1963, field-checked in 1965.
- 1965b Map: Tustin, Calif. (7.5', 1:24,000); aerial photos taken in 1963, field-checked in 1965.
- 1972a Map: Laguna Beach, Calif. (7.5', 1:24,000); 1965 edition photorevised in 1972.
- 1972b Map: Tustin, Calif. (7.5', 1:24,000); 1965 edition photorevised in 1972.
- 1979 Map: Santa Ana, Calif. (1:250,000); 1959 edition revised.
- 1981a Map: Laguna Beach, Calif. (7.5', 1:24,000); 1965 edition photorevised in 1978.
- 1981b Map: Tustin, Calif. (7.5', 1:24,000); 1965 edition photorevised in 1978.

**APPENDIX 1:
PERSONNEL QUALIFICATIONS**

PRINCIPAL INVESTIGATOR

Bruce Love, Ph.D., RPA (Register of Professional Archaeologists)

Education

- 1986 Ph. D., Anthropology, University of California, Los Angeles.
1981 M.A., Anthropology, University of California, Los Angeles.
1976 B.A., Anthropology, University of California, Los Angeles.
- 1996 "CEQA 101," presented by the Association of Environmental Professionals.
1995 "CEQA Workshop," presented by Association of Environmental Professionals.
1994 "Assessing the Significance of Historic Archaeological Sites," presented by the Historic Preservation Program, University of Nevada, Reno.
1994 "CEQA 1994: Issues, Trends, and Advanced Topics," presented by UCLA Extension.
1990 "Introduction to Federal Projects and Historic Preservation Law," presented by U.S. General Services Administration Training Center.

Professional Experience

- 1993-1990-1993 Owner and Principal, CRM TECH, Riverside.
Director, Archaeological Research Unit, UC Riverside; Coordinator, Archaeological Information Center, UC Riverside.
1989-1990 Coordinator, Archaeological Information Center, UCLA.
1987-1990 Owner and Principal, Pyramid Archaeology, Palmdale, California.
1986-1987 Junior Fellow, Dumbarton Oaks Center for Pre-Columbian Research, Washington, D.C.
1981-1986 Part-time cultural resources management consultant; doctoral student at UCLA.

Memberships

Register of Professional Archaeologists.
Association of Environmental Professionals.
American Planning Association.
Society for American Archaeology.
Society for California Archaeology.
Pacific Coast Archaeological Society.
Coachella Valley Archaeological Society.
Archaeological Survey Association.

PROJECT HISTORIAN

Bai "Tom" Tang, M.A.

Education

- 1988-1993 Graduate Program in Public History/Historic Preservation, UC Riverside.
1987 M.A., American History, Yale University, New Haven, Connecticut.
1982 B.A., History, Northwestern University, Xi'an, China.
- 2000 "Introduction to Section 106 Review," presented by the Advisory Council on Historic Preservation and the University of Nevada, Reno.
1994 "Assessing the Significance of Historic Archaeological Sites," presented by the Historic Preservation Program, University of Nevada, Reno.

Professional Experience

- 1993- Project Historian, CRM TECH, Riverside, California.
1993-1997 Project Historian, Greenwood and Associates, Pacific Palisades, California.
1991-1993 Project Historian, Archaeological Research Unit, UC Riverside.
1990 Intern Researcher, California State Office of Historic Preservation, Sacramento.
1990-1992 Teaching Assistant, History of Modern World, UC Riverside.
1988-1993 Research Assistant, American Social History, UC Riverside.
1985-1988 Research Assistant, Modern Chinese History, Yale University.
1985-1986 Teaching Assistant, Modern Chinese History, Yale University.
1982-1985 Lecturer, History, Xi'an Foreign Languages Institute, Xi'an, China.

Honors and Awards

- 1988-1990 University of California Graduate Fellowship, UC Riverside.
1985-1987 Yale University Fellowship, Yale University Graduate School.
1980, 1981 President's Honor List, Northwestern University, Xi'an, China.

Cultural Resources Management Reports

Preliminary Analyses and Recommendations Regarding California's Cultural Resources Inventory System (With Special Reference to Condition 14 of NPS 1990 Program Review Report). California State Office of Historic Preservation working paper, Sacramento, September 1990.

Numerous cultural resources management reports with the Archaeological Research Unit, Greenwood and Associates, and CRM TECH, since October 1991.

Membership

California Preservation Foundation.

PROJECT ARCHAEOLOGIST

Harry M. Quinn, M.S.

Education

- 1978 Certificate in Archaeology, University of California, Los Angeles.
- 1968 M.S., Geology, University of Southern California, Los Angeles.
- 1964 B.S., Geology, Long Beach State College, Long Beach.
- 1962 A.A., Los Angeles Harbor College, Wilmington.

- 2001 "The Art and Science of Flintknapping," presented by Jeanne D. Binning, Zzyzx.
- 1999 "Certified Local Government Preservation Commission, Board, and Staff Training Program," presented by the California Preservation Foundation, Long Beach and Palm Springs.
- 1998 "Historic Archaeology Workshop," presented by Richard Norwood, Torres-Martinez Indian Reservation.
- 1997 "Native American Archaeology," presented by Russell Kaldenberg, College of the Desert, Palm Desert.
- 1996-1998 "Project Archaeology," presented by BLM and DOE, North Palm Springs.
- 1996 "Mojave Desert Heritage Interagency Workshop," Palm Springs.
- 1996 "Cultural Resources and CEQA: Your Responsibility," presented by the Association of Environmental Professionals, Hemet.
- 1991 "Ceramic Workshop," presented by Jerry Schaefer, Palm Springs.
- 1990 "Introduction to Coachella Valley Archaeology," presented by Anne Duffield, Palm Desert.
- 1989 "Prehistoric Rock Art and Archaeology of the Southern California Deserts," presented by Anne Duffield, UC Riverside Extension, Palm Springs.

Professional Experience

- 1998- Project Archaeologist/Field Director, CRM TECH, Riverside.
- 1994-1996 Environmental Geologist, E.C.E.S., Inc., Redlands.
- 1992-1998 Independent Geological/Archaeological/Environmental Consultant, Pinyon Pines.
- 1988-1992 Project Geologist/Director of Environmental Services, STE Associates/Soil and Testing Engineers, San Bernardino.
- 1966-1988 Geologist/Senior Geologist, Texaco, Inc., Los Angeles; Tenneco Oil Exploration and Production, Englewood, Colorado; Loco Exploration, Inc., Aurora, Colorado, Jirsa Environmental Services, Norco.

Memberships

Society for American Archaeology; Society for California Archaeology; Archaeological Survey Association of Southern California; Coachella Valley Archaeological Society (President, 1993-1994, 2000; Vice President, 1992, 1995-1999, 2001; Basic Archaeology Training Course Instructor, 1996-2000; Environmental Assessment Committee Chair, 1997-1999); Coachella Valley Historical Society; Malki Museum; Southwest Museum; El Paso Archaeological Society; Ohio Archaeological Society; West Virginia Archaeological Society; Museum of the Fur Trade; Cahokia Mounds Association.

Publications in Archaeology and History

More than 55 articles in the publications of the Southwest Museum, the American Rock Art Research Association, The Colorado Archaeological Society, the Utah Rock Art Research Association, the Coachella Valley Archaeological Society, Anza Valley Outlook, and the Coachella Valley Historical Society. Co-author of more than 100 CRM reports.

PROJECT ARCHAEOLOGIST

Mariam Dahdul, B.A.

Education

2002 (Exp.) M.A., Anthropology, California State University, Fullerton.
1993 B.A., Geography, California State University, Fullerton.

Professional Experience

2000- Project Archaeologist, CRM TECH, Riverside.

Laboratory and Field Experience

2001 Archaeological field school under the direction of Dr. Brian Byrd. Test excavations of sites at the San Elijo Lagoon Reserve, including flotation of soil samples and sorting and cataloguing of artifacts.

2000 Archaeological field class under the direction of Dr. Claude Warren. Excavated units at Soda Lake in the Mojave Desert and produced lake bottom stratigraphic profiles.

1999-2000 Assisted in the catalogue of artifacts at the CSU, Fullerton archaeology laboratory.

1999 Field survey course under the direction of Dr. Phyllisa Eisentraut; surveyed and mapped prehistoric site in the Mojave Desert.

PALEONTOLOGICAL RESOURCES ASSESSMENT REPORT
POSEIDON SEAWATER DESALINATION PLANT PUMP STATION SITE

**Near the City of Newport Beach
Orange County, California**

Submitted to:

Alan Ashimine
RBF Consulting
14725 Alton Parkway
Irvine, CA 92618-2027

Submitted by:

Harry M. Quinn, Geologist/Paleontologist
CRM TECH
2411 Sunset Drive
Riverside, CA 92506

Bruce Love, Principal

June 10, 2002

CRM TECH Contract #822
Approx. 7,200 Square Feet
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T6S R9W, SBBM; within the Rancho San Joaquin Land Grant

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The purpose of the study is to provide the City of Huntington Beach with the necessary information and analysis to determine whether the proposed development would potentially disrupt or adversely affect any paleontological resources, as mandated by CEQA, and to design a paleontological salvage program for the project, if necessary. 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 field survey of the project area in accordance with the guidelines of the Society of Vertebrate Paleontology.

Based on the results of these research procedures, the proposed project's potential impact on paleontological resources is determined to be potentially "significant" for middle-Miocene invertebrate fossils and "less than significant" for middle-Miocene vertebrate and Pleistocene invertebrate and vertebrate fossils. A paleontological resource recovery program for Miocene invertebrate (microfossils) fossils is therefore recommended for the proposed project.

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INTRODUCTION

In May, 2002, at the request of RBF Consulting, CRM TECH performed a paleontological resource assessment on a small parcel of vacant land in an unincorporated area near the City of Newport Beach, Orange County, California (Fig. 1). The subject property of the study, measuring approximately 90 feet by 80 feet in size, is located in a resource preservation easement owned by the County of Orange, and consists of a portion of the Rancho San Joaquin land grant lying within T6S R9W, San Bernardino Base Meridian (Fig. 1). The study is part of the environmental review process for the construction of a pump station for the proposed Poseidon Seawater Desalination Plant, as required by the City of Huntington Beach, Lead Agency for the project, in compliance with the California Environmental Quality Act (CEQA; PRC §21000, et seq.).

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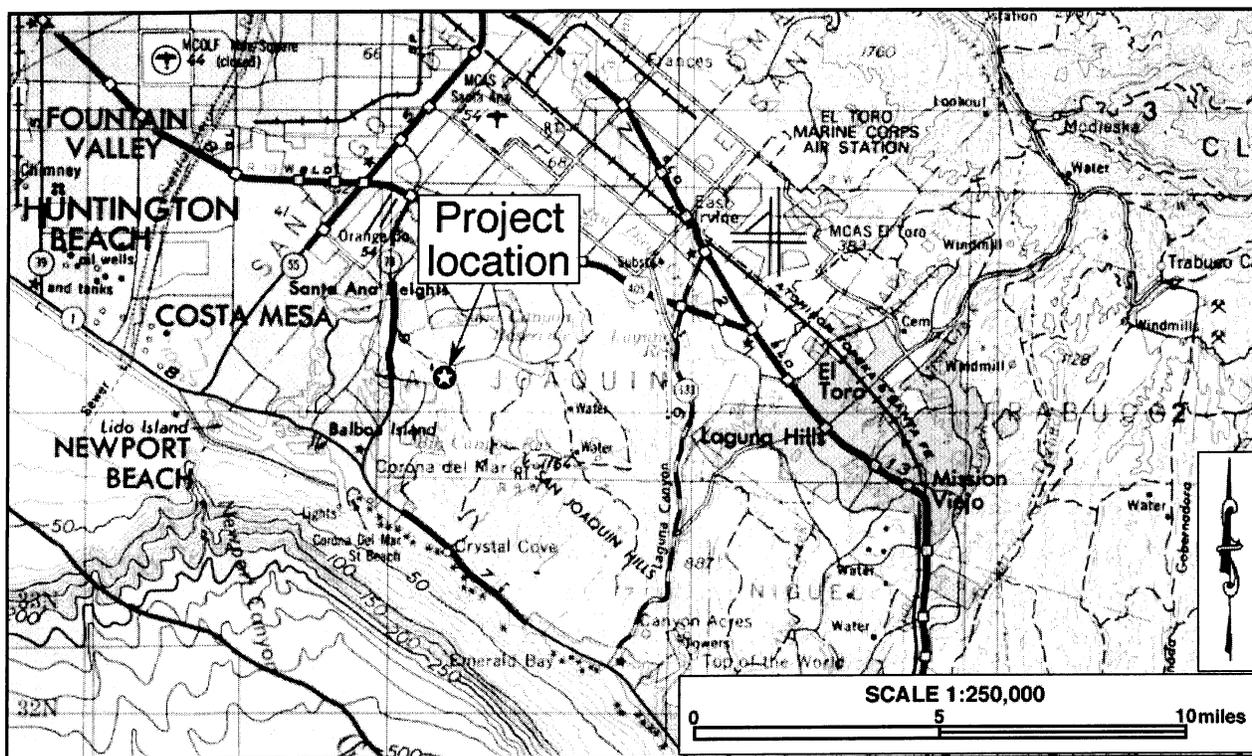


Figure 1. Project vicinity. (Based on USGS Santa Ana, Calif., 1:250,000 quadrangle [USGS 1979])

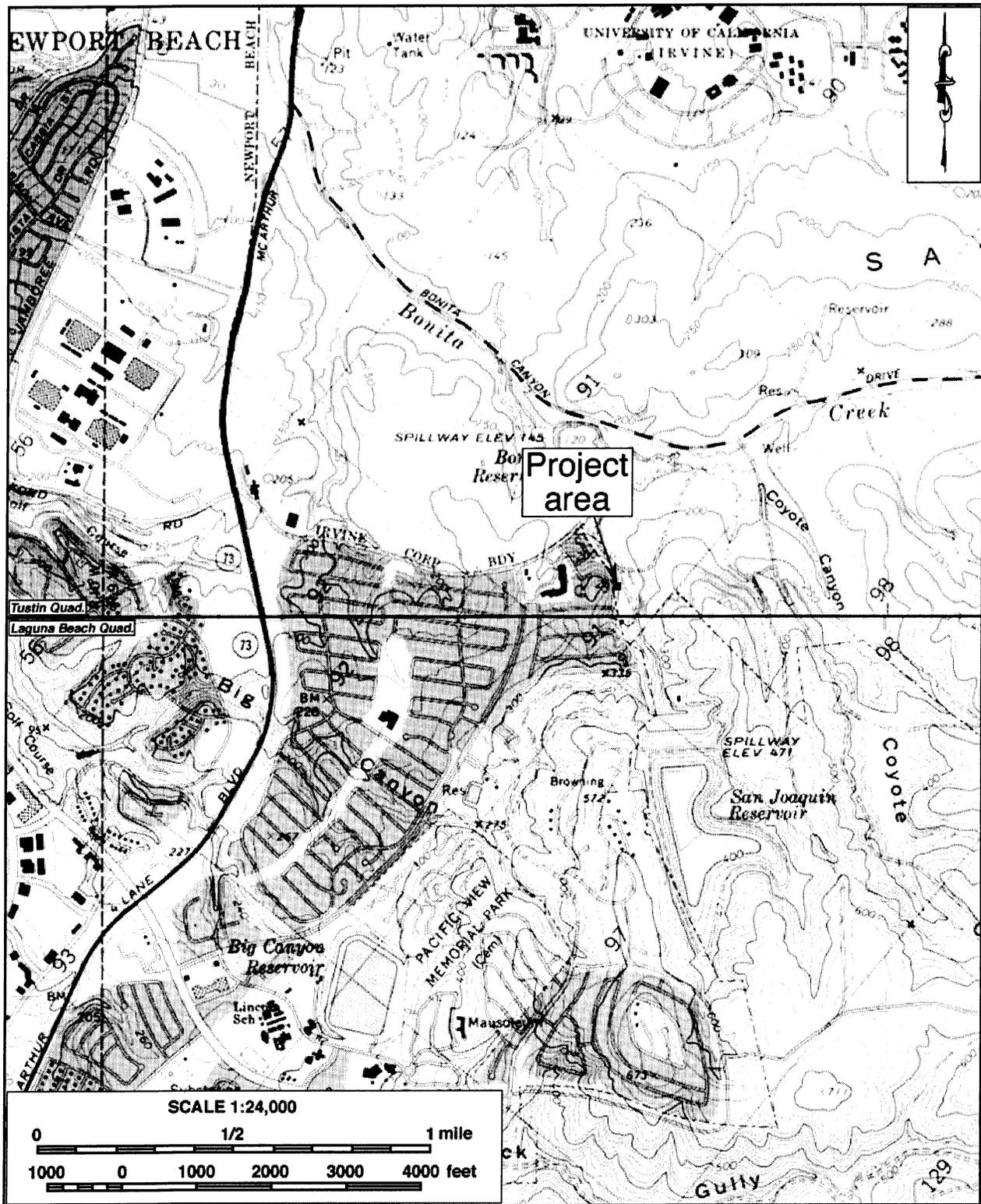


Figure 2. Project area. (Based on USGS Laguna Beach and Tustin, Calif., 1:24,000 quadrangles [USGS 1981a; 1981b])

REGIONAL SETTING

The project area is located in the San Joaquin Hills within the Los Angeles Basin, a structural basin developed on the northwestern end of the Peninsular Ranges province (Morton and Miller 1981:Plate 1; Yerkes et al. 1965:A5; Jenkins 1980:40-41). This portion of the Peninsular Ranges is bounded on the north by the Transverse Ranges and extends off shore under the Pacific Ocean (*ibid.*). At its deepest point, the Los Angeles Basin is filled by more than 20,000 feet of Miocene and later sedimentary rock (Woodford et al. 1954:65; Yerkes et al. 1965:A4).

METHODS AND PROCEDURES

RECORDS SEARCHES

The paleontological records search service was provided by the Regional Paleontologic Locality Inventory located at 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 site records as well as supporting maps and documents. The records search results are used to identify previously performed paleontological resource assessments and known paleontological localities near the project area. In addition, a literature search was conducted using materials in the CRM TECH library and the personal library of the author, including unpublished reports produced from surveys of other properties in the vicinity.

FIELD SURVEY

On May 10, 2002, CRM TECH geologist/paleontologist Harry M. Quinn (see App. 1 for qualifications) conducted the on-foot field survey of the project area. A thick growth of vegetation covered most of the subject property making it difficult to systematically survey the area. Quinn walked through this heavy vegetation looking for areas of open ground but the ground visibility was very poor throughout. The results of the survey are discussed below.

RESULTS AND FINDINGS

RECORDS SEARCHES RESULTS

The records searches conducted by the San Bernardino County Museum and Natural History Museum of Los Angeles County indicate that no paleontological localities have been discovered within the project area, or within a one-mile radius, although some localities have been found elsewhere in the same sedimentary units as are exposed in the project area (Scott 2002; McLeod 2002). The closest known paleontological locality is a Pleistocene-age vertebrate fossil site from terrace deposits several miles to the northwest (McLeod 2002). The San Bernardino County Museum considers all of the Topanga Formation to be highly sensitive for marine invertebrate and vertebrate fossils, and both museums agree that the project area has a potential for the recovery of fossil remains during earth-moving operations (Scott 2002; McLeod 2002).

REGIONAL GEOLOGY

The San Joaquin Hills are located in the southeastern end of what is mapped as the Central Block portion of the greater Los Angeles Basin (Yerkes et al. 1965:A5). These hills contain the Shady Canyon fault that offsets middle Miocene rocks by as much as 5,000 feet (*ibid.*:A52). The hills were also intruded by diabasic rocks during the middle Miocene (*ibid.*). Based on the above data, the San Joaquin Hills appear to be an uplifted set of fault blocks probably associated with the Newport-Inglewood Fault system. Well data indicates that the San Joaquin Hills contain rocks of pre-Tertiary through Recent age (Yerkes et al. 1965:Plate 2; Vedder et al. 1957; Vedder et al. 1974:Sheet 4).

Rogers' (1965) geologic map of the area shows the project area to be located within the middle Miocene marine sediments and the Miocene volcanics. Unfortunately, Rogers (*ibid.*) does not map the three members of the middle Miocene age Topanga Formation that are present within the San Joaquin Hills (Miller and Tan 1976:Plate 1; Morton and Miller 1981:Plate 1; Vedder et al. 1957; Vedder et al. 1974:Sheet 4). Because of this oversight, the San Bernardino County Museum has considered the entire Topanga Formation within the San Joaquin Hills to be shallow-water marine sandstone sediments.

In the area of the San Joaquin Hills, the Topanga Formation is commonly subdivided into three distinctive members (Miller and Tan 1976:Plate 1; Morton and Miller 1981:Plate 1; Vedder et al. 1974:Sheet 4). The lower Bommer Member consists mainly of shallow marine sandstones and gravelly sandstones containing a Middle Miocene invertebrate megafossil fauna characterized by the gastropods *Turritella ocoyana* and *Territella temblorensis* and the pelecypods *Lyropecten crassicardo* and *Pecten vanvlecki* (Miller and Tan 1976:23). The middle Los Trancos Member was deposited in a more open marine environment and contains siltstones, shales, and sandstones that are characterized by a foraminifera fauna consisting of *Valvulineria depressa*, *Bolivina advena* var., and *Baggina cancriformis* (*ibid.*:22). This foraminifera faunal assemblage places it within the upper Saucian to middle Relizian stages of the Middle Miocene (Kleinpell 1938:Plate IX). The upper Paularino Member was deposited in what is probably an even more open marine environment than the middle member and consists of sandstones, siltstones, shales, and some volcanic flows and breccias (Miller and Tan 1976:21). This upper unit is shown to contain an abundant foraminifera fauna consisting of *Siphogenerina* cf. *hughesi* and *Valvulineria californica* (*ibid.*). This foraminifera assemblage again places it within the upper Saucian to middle Relizian stages of the Middle Miocene (Kleinpell 1938:Plates IX, X).

SITE GEOLOGY

The on-site bedrock geology has been mapped as diabase intrusives (Td) and the Los Trancos Member-Topanga Formation (Ttlt), which are both considered to be middle Miocene in age (Miller and Tan 1976:22-24; Morton and Miller 1981:Plate 1). The bedrock sequence is shown to be overlain by Quaternary age terrace deposits in some portions of the project area (*ibid.*). These terrace deposits have been mapped as Qt and Qac/Qtm by Morton and Miller (1981:Plate 1). The Qac/Qtm is shown as Holocene age alluvium and colluvium (Qac) developed from Pleistocene age marine terrace deposits (Qtm) by Morton and Miller (1981:Plate 1). The Qt is described as Pleistocene age non-marine terrace deposits (*ibid.*). This is most likely the terrace deposits referred to by McLeod (2002) in his paleontological resources review.

The terrace deposits have been mapped as Qsw and Qtm by Miller and Tan (1976:Plate 1). The Qsw is described as slopewash consisting of Holocene age soil developed from bedrock sources (Miller and Tan 1976:15). The Qtm is described as marine terrace deposits consisting of fine to coarse-grained sands and gravels with some silt (*ibid.*:18). These deposits locally contain a late Pleistocene age invertebrate macro fossil assemblage consisting of *Trachycardium procerum*, *Petricola parallela*, and "*Nassa*" *cerritensis* (*ibid.*).

The Los Trancos Member of the Topanga Formation consists mainly of marine siltstones and sandstones that contain a middle Miocene microfauna consisting of foraminifera described as *Valvulineria depressa*, *Bolovina advena* var., and *Baggina cancriformis* (Miller and Tan 1976:22). Kleinpell (1938:Plate IX; 1980:66) places this microfossil fauna in the upper Saucelian to middle Relizian stages of middle Miocene age. The microfossils present suggest that these sediments were deposited in an offshore marine environment, a depositional environment which is not known for containing invertebrate macro fossils or vertebrate fossil remains. The marine mammals listed by the San Bernadino County Museum generally float after death, so are more commonly found in shallow, near shore depositional environments, such as that indicated for the lower Bommer Member of the Topanga Formation and less commonly found in open marine environments as that indicated for the middle Los Trancos Member (Miller and Tan 1976:23).

Miller and Tan (1976:24) describe the diabase intrusives "vertical to subvertical dikes and flat to moderately dipping sill-like bodies." These dikes and sills range in thickness from just a few feet to several hundred feet (*ibid.*). The diabase intrusives are shown to have intruded into the Topanga Formation, but not the overlying Monterey Shale (Yerkes et al. 1965:Plate 2; Vedder et al. 1974:Sheet 4). Thus, they are considered to be middle Miocene in age (*ibid.*). As pointed out by McLeod (2002), intrusive rocks are not known for containing fossils of any kind.

FIELD SURVEY RESULTS

The field survey conducted on May 10, 2002, found the project area to be situated at the bottom of a canyon and covered by a thick growth of vegetation. These include willows, tules, pampas grass, toyon, cattails, *Washingtonia robusta*, and scotch broom. A stream flows through the lowest portion of the property. Soils in the small open areas are identified as recent alluvium. The area along the west side of a paved road, situated along the eastern boundary of the property, is also recent alluvium with a scattering of commercial gravel. Many of the gravel clasts appear to be andesite with possibly a few pieces of rhyolite. This gravel is not natural to this location and is assumed to have been imported.

Based on the field survey, there are no undisturbed Tertiary diabase or Pleistocene terrace deposits associated with the project area. The canyon appears to have been eroded into the Los Trancos Member of the Topanga Formation and then backfilled by Recent alluvium. If excavation at the project area is scheduled to be greater than 5 feet, it may get into the underlying bedrock. No fossil remains were found on the surface in or around the project area.

DISCUSSION

The field survey results, supported by existing records at the at the San Bernardino County Museum and the Natural History Museum of Los Angeles County, indicate that the project area contains sediments deposited during the middle Miocene. The middle Miocene Topanga Formation has produced both vertebrate and invertebrate fossils in Los Angeles and Orange Counties. There were potentially some Pleistocene terrace deposits in the mapped in area, but these have been removed from the project site by the formation of the canyon in which the project area lies. The present surface soils in the project area are Recent alluvium. However, at some unknown depth below this alluvium there should be sediments of the middle-Miocene-age Los Trancos Member of the Topanga Formation (Miller and Tan 1976:Plate 1). This member is shown to contain a prominent foraminiferal fauna of middle Miocene age (*ibid.*)

Based on the results of these research procedures, the proposed project's potential impact on paleontological resources is determined to be potentially "significant" for middle-Miocene invertebrate fossils and "less than significant" for middle-Miocene vertebrate and Pleistocene invertebrate and vertebrate fossils.

RECOMMENDATIONS

Based on the study results presented above, a paleontological resource recovery program for Miocene invertebrate (microfossils) fossils is recommended for the proposed project. Therefore, earth-moving activities that will remove more than 5 feet of material from the site should be monitored for paleontological resources and a program to mitigate impacts to potential paleontological resources that might be exposed or unearthed during all such excavations is recommended. Such a program should be developed in accordance with the provisions of CEQA as well as with the proposed guidelines of the Society of Vertebrate Paleontology, and should include, but not be limited to the following, as outlined by Scott (2002):

- Monitoring of excavation in areas identified as likely to contain paleontologic resources by a qualified paleontologic monitor. The monitor 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. The monitor must be empowered to temporarily halt or divert equipment to allow removal of abundant or large specimens. Monitoring maybe reduced if the potentially-fossiliferous units described herein are not encountered, or upon exposure are determined following examination by qualified paleontologic personnel to have low potential to contain fossil resources.
- Preparation of recovered specimens to a point of identification and permanent preservation, including washing of sediments to recover small invertebrates and vertebrates.
- Identification and curation of specimens into a museum repository with permanent retrievable storage. The paleontologist should have a written repository agreement in hand prior to the initiation of mitigation activities.

- Preparation of a report of findings with an appended itemized inventory of specimens. The report and inventory, when submitted to the appropriate Lead Agency, would signify completion of the program to mitigate impacts to paleontologic resources.

CONCLUSION

CEQA Appendix G provides that "a project may be deemed to have a significant effect on the environment if it will . . . disrupt or adversely affect a . . . paleontological site except as a part of a scientific study." The present study, conducted in compliance with this provision, was 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.

Based on the results of the records search, literature research and field inspection, the proposed project's potential impact on paleontological resources is determined to be potentially "significant" for middle-Miocene invertebrate fossils and "less than significant" for middle-Miocene vertebrate and Pleistocene invertebrate and vertebrate fossils. A paleontological resource recovery program for Miocene invertebrate (microfossils) fossils is therefore recommended for the proposed project.

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APPENDIX 1:
PERSONNEL QUALIFICATIONS

PROJECT GEOLOGIST/PALEONTOLOGIST

Harry M. Quinn

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-Present Project/Field Paleontologist, CRM TECH, Riverside, California.
1998-Present Project/Field Archaeologist, CRM TECH, Riverside, 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

- 1969-73 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.