APPENDIX D
CULTURAL RESOURCES STUDY

This page intentionally left blank.

RECLAMATION
Managing Water in the West

Cultural Report Number: LC-CA-05-01 (P)

A Class III Intensive Archaeological Field Inventory for the Salton Sea Shallow Water Habitat Pilot Project

Imperial County, California

U.S. Department of the Interior
Bureau of Reclamation

August 2005

Cultural Report Number: LC-CA-05-01 (P)

A Class III Intensive Archaeological Field Inventory for the Salton Sea Shallow Water Habitat Pilot Project

Imperial County, California

Tetra Tech, Inc.
180 Howard Street, Suite 180
San Francisco, California 94402
Contract No. 04PE303285

by

Fred E. Budinger, Jr.
Senior Archaeologist

U.S. Department of the Interior
Bureau of Reclamation
Lower Colorado Regional Office
Regional Initiatives and Project Development
Salton Sea Restoration Project
Boulder City, Nevada

August 2005

TABLE OF CONTENTS

Section | Page

APPENDICES

LIST OF FIGURES

Figure Page

EXECUTIVE SUMMARY

On March 17, 2005, Tetra Tech, Inc., under contract to the Bureau of Reclamation of the US Department of the Interior, conducted a Class III intensive archaeological field inventory (nominal 15-meter transect intervals) of approximately 160 acres of Imperial Irrigation District land on the shore of the Salton Sea near Niland, Imperial County, California (Figure 1). This field inventory was conducted as part of Section 106 compliance and in support of required environmental evaluations for the proposed Salton Sea Shallow Water Habitat Pilot Project (the Project).

In order to identify historic properties and historic resources, Tetra Tech procured a cultural resources records check from the Southeast Information Center of the California Historic Resources Information System, queried the Native American Heritage Commission (NAHC) regarding religious, sensitive, or traditional-use properties, and conducted a Class III intensive archaeological field survey. Through this records search and survey, Tetra Tech encountered one historic-era (i.e., older than 50 years) site and determined it to be ineligible for listing on the National Register of Historic Places; therefore, the project would affect no federal historic properties or California historic resources.

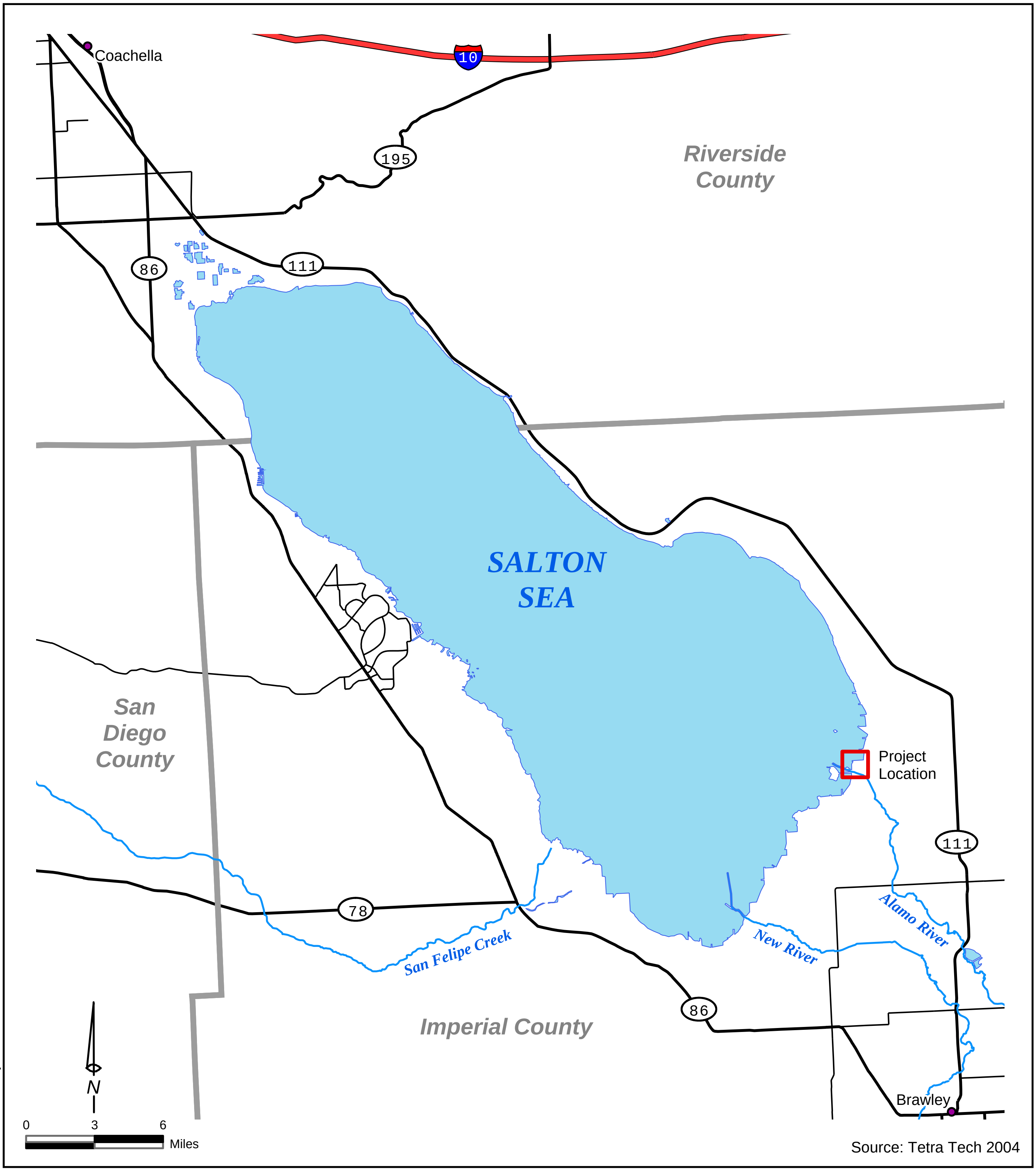
This page intentionally left blank.

CHAPTER 1
INTRODUCTION

This report documents the findings of a cultural resource records search and Class III survey carried out as part of the Bureau of Reclamation's (Reclamation) Section 106 compliance for the Salton Sea Hallow Water Habitat Pilot Project (the Project). The area of potential effect (APE) for the project consists of approximately 160-acres of Imperial Irrigation District (IID) and State land along the southeastern shoreline of the Salton Sea near Niland in Imperial County, California (Figures 1 and 2). Under the Project, four ponds less than a meter deep, would be created within two existing ponds located on the exposed shoreline sediments of the Salton Sea (Figure 3). The objective of the Project is twofold: 1) to evaluate site preparation methods, costs, and durability of maintaining shallow saline water impoundments using Salton Sea sediments and 2) to analyze bird and aquatic invertebrate species, water and sediment chemistries, and the various interactions among these factors for shallow impoundments fed with saline water similar to that from a desalination plant discharge stream. This effort will provide Reclamation and other planners with critical information on how these biological and chemical factors could be used in a restoration plan to maximize uses and minimize risks to wildlife in shallow saline habitats.

Archaeological Inventory and Survey - The purpose of this archaeological study is to provide Reclamation and Imperial County with the necessary information to determine whether the proposed undertaking would have any effect on historic properties or historic resources under the National Historic Preservation Act (NHPA) or the California Environmental Quality Act (CEQA).

Section 106 of the NHPA of 1966 (as amended) requires that federal agencies take into account the effects of their undertakings on historic properties and seek ways to avoid, minimize, or mitigate any adverse effects on such properties (36 CFR 800.1[a]). Similarly, the CEQA requires that jurisdictions in California take into account the effects of their undertakings on historic resources. Per 36CFR800, the regulations for implementing the NHPA, "historic properties" are defined as any "…prehistoric or



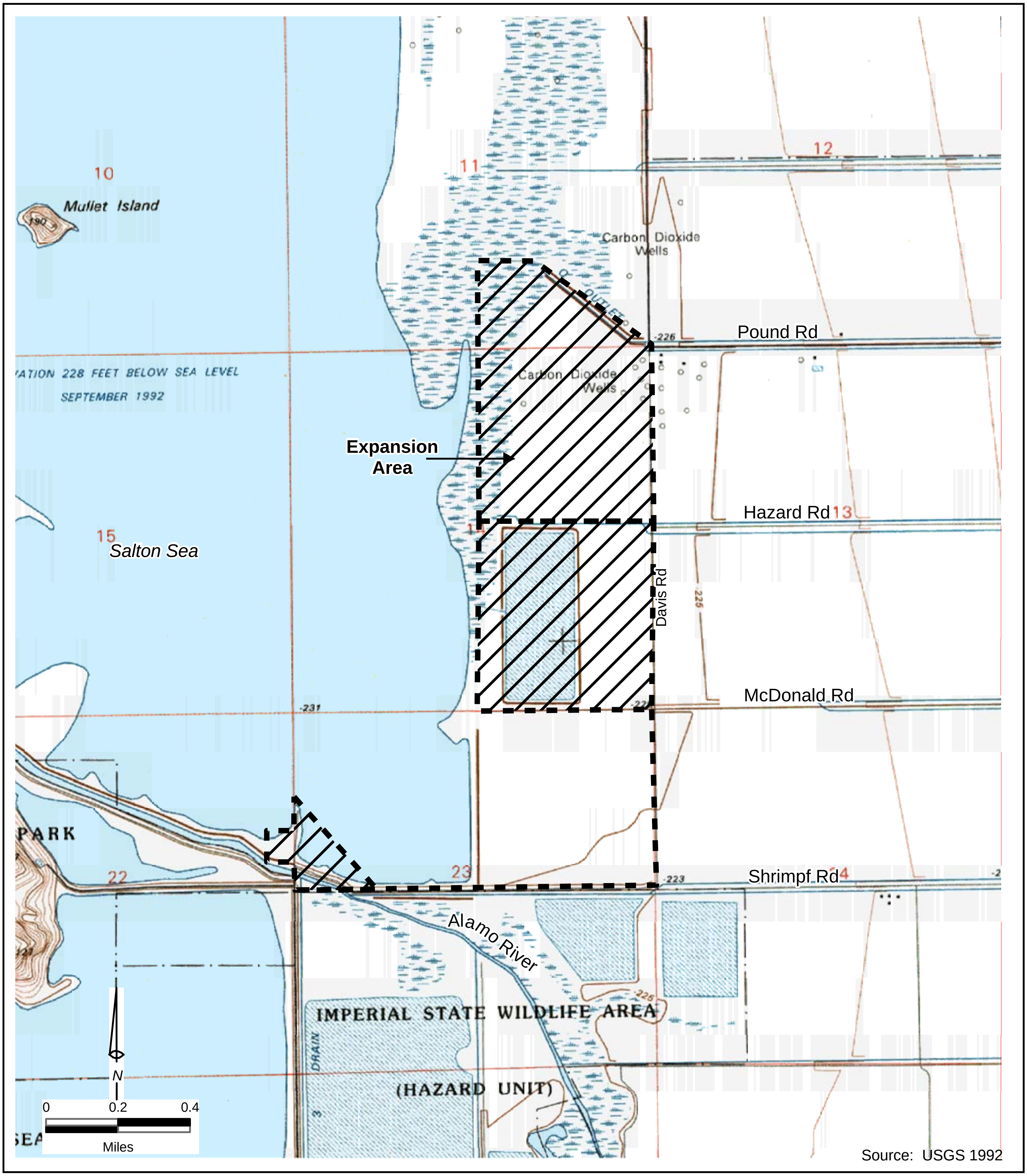
R:\NEW\13516\layouts\Location.mxd - 07/07/05 - YE

Regional Location Map
Shallow Habitat Project

Southeastern California

Tetra Tech, Inc

Figure 1



R:\NEW13516\layouts\Areao of Potential Effect.mxd - 07/28/05 - YE

Legend

APE

Area of Potential Effect (APE)
Shallow Habitat Project

Township 11S/Range 13E, Southeastern California

Tetra Tech, Inc

Figure 2

Legend

Island

Pipeline

Project Boundary/Existing Berms

Berms to be Constructed

Direction of Flow

Project Detail Map
Shallow Habitat Project

Southeastern California

Figure 3

Tetra Tech, Inc

R:\NEW\13516\layouts\Photo.mxd - 07/07/05 - YE historic district, site, building, structure, or object included in, or eligible for inclusion in, the National Register of Historic Places (NRHP) maintained by the Secretary of the Interior." The National Park Service (NPS) has developed four criteria for determining eligibility for inclusion in the NRHP (36 CFR 60.4):

The quality of significance in American history, architecture, archaeology, engineering, and culture is present in districts, sites, buildings, structures, and objects that possess integrity, design, setting, materials, workmanship, feeling, and association and

A) That are associated with events that have made a significant contribution to the broad patterns of our history; or

B) That are associated with the lives of persons significant in our past; or

C) That embody the distinctive type, period, or method of construction, or that represent the work of a master, or that possess high artistic values, or that represent a significant and distinguishable entity whose components may lack individual distinction; or

D) That have yielded, or that may be likely to yield, information important in prehistory or history.

Historic resources are similarly defined in the CEQA where historic resources are more than 45 years old.

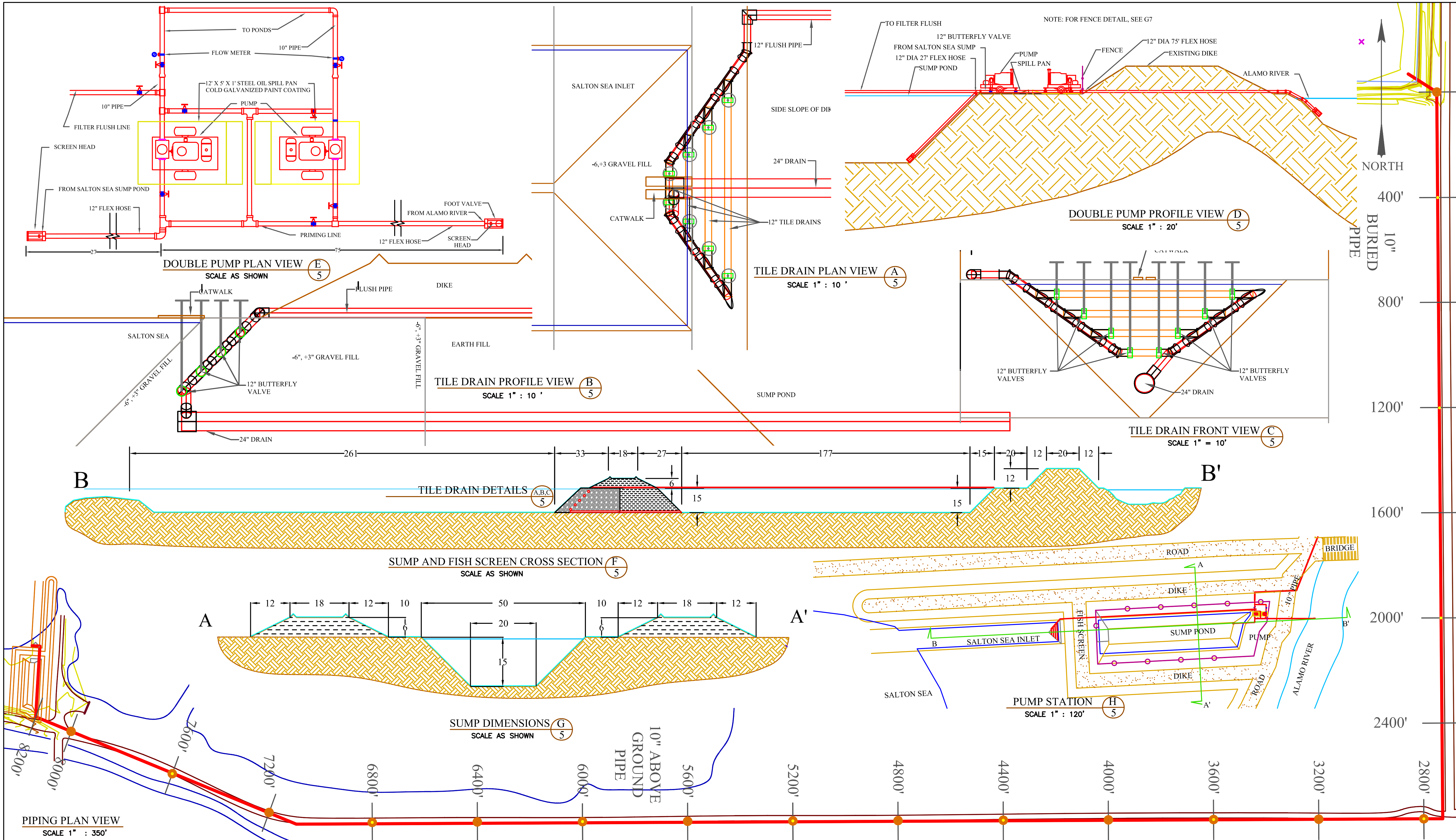
In order to identify such historic properties and historic resources, Tetra Tech procured a cultural resources records check from the Southeast Information Center of the California Historic Resources Information System, queried the Native American Heritage Commission (NAHC) regarding religious, sensitive, or traditional cultural properties (TCPs), and conducted a Class III intensive archaeological field inventory. Although no prehistoric or historic-era cultural artifacts, features, sites, or TCPs were identified through the record searches, several natural features were idenitified, including three mud volcanoes and one "pond of good water." None of these features are within the APE. Tetra Tech did observe several unrecorded mud pots and mud volcanoes, as well as a previously unrecorded 1920s carbon dioxide well field during the Class III survey. Several of the mud pots and mud volcanoes are within the APE, but, being natural features of the landscape and of no cultural significance, they are not considered to be historic resources. The well field would not meet the NRHP eligibility requirements listed above. The project, therefore, would have no effect on federal historic properties or California historic resources.

Proposed Undertaking—The proposed project involves the development of a shallow water habitat system that would be operated and monitored for at least two full breeding seasons. Two existing abandoned ponds would be modified to form four less than 0.6-meter deep ponds on sediments of the Salton Sea. In order to most accurately duplicate a water stream from a desalination plant, this Project would blend water pumped from the Salton Sea with water pumped from the Alamo River, to obtain salinity levels ranging from 15 to 20 parts per thousand in the ponds. The salinity would concentrate through evaporation by flowing sequentially through the series of four ponds. Water from the fourth and most saline pond would be discharged back into the Salton Sea. A possible expansion area lies to the immediate north of the Project area, should more funds become available.

Project infrastructure includes three components: a pumping station to remove water from the Salton Sea and the Alamo River, a pipeline along existing roads and dikes to convey the water to the ponds, and the pond system itself (Figures 3 – 5). The pump station would consist of a sump, an attached ditch conveying water from the Sea through a gravel filter, a low head trash pump, and a suction hose bringing water from the Alamo River to the pump. Installing the sump, ditch, gravel filter, pump and Alamo River intake would involve light dozers and excavators, possibly on mats. The specific techniques used would depend on field soil conditions at the time of construction. Approximately three acres of soil would be disturbed to install the pump system. The actual ditch for the sump is 15 meters wide, and it is 81 meters from the intake to the fish screen and another 54 meters from the fish screen to the end of the ditch where the pump station is located. The ditch running from the sump to the Salton Sea would be approximately 182 meters long and would vary in depth from 4.5 meters at the pump station to about one meter in the Sea itself.

Installation of the pipeline would involve both surface and buried line. The ten-inch surface pipe would be within IID property or along the north IID easement for the N Drain from Black's Bridge (location of the pump station) to Davis Road. This section of the pipeline would be anchored to keep it from moving, but it would not be buried. The easement is 12 meters wide on each side from the center of the drain to the edge of the easement. At Davis Road, the pipeline would be buried and run north along the west side of the road. The entire pipeline along Davis Road would be buried approximately 0.8 meters deep. The surface line would be 1,265 meters long, with earthen anchors every 91 meters. This is a disturbance of about 28 square meters. The buried line would be installed using a backhoe or a small excavator, and a disturbance of approximately 0.26 acres of soil (863 meters of pipeline within a four-foot-wide impact corridor).

All existing dikes would be used for the proposed ponds. There would be one discharge onto the shoreline of the Sea and into the Sea. Sixteen bird nesting islands (four per pond) would be created inside the ponds. Additionally, at least one observation tower may be installed to observe bird use of the islands. Developing the ponds would disturb approximately 117 acres. The entire bottom of each pond would be graded to create level surfaces and to remove sediment that has accumulated from prior use. This process would use light dozers and light excavators, possibly on mats. Additional berms would be created from soil from borrow areas that would be excavated out of the existing pond surfaces (when dry). The proposed berms would be 1,279 meters long and 10 meters wide (toe to toe). A total of 4.47 acres would be disturbed, including the borrow areas, the site occupied by the excavator, and the actual berms. This area of disturbance is included in the overall 117 acres of disturbance for the entire pond area. The berms



THIS DRAWING IS THE PROPERTY OF AGRARIAN RESEARCH AND MANAGEMENT COMPANY LTD. AND IS NOT TO BE REPRODUCED, MODIFIED OR USED FOR ANY OTHER PROJECT OR EXTENSION OF THIS PROJECT EXCEPT BY WRITTEN AGREEMENT WITH AGRARIAN RESEARCH AND MANAGEMENT COMPANY LTD. © 2005

SCALE	1" : 350'
DRAWN	D. JOHNSON
CHECKED	F. STRADLING
APPROVED	
DATE	02/02/05
FILE NAME	

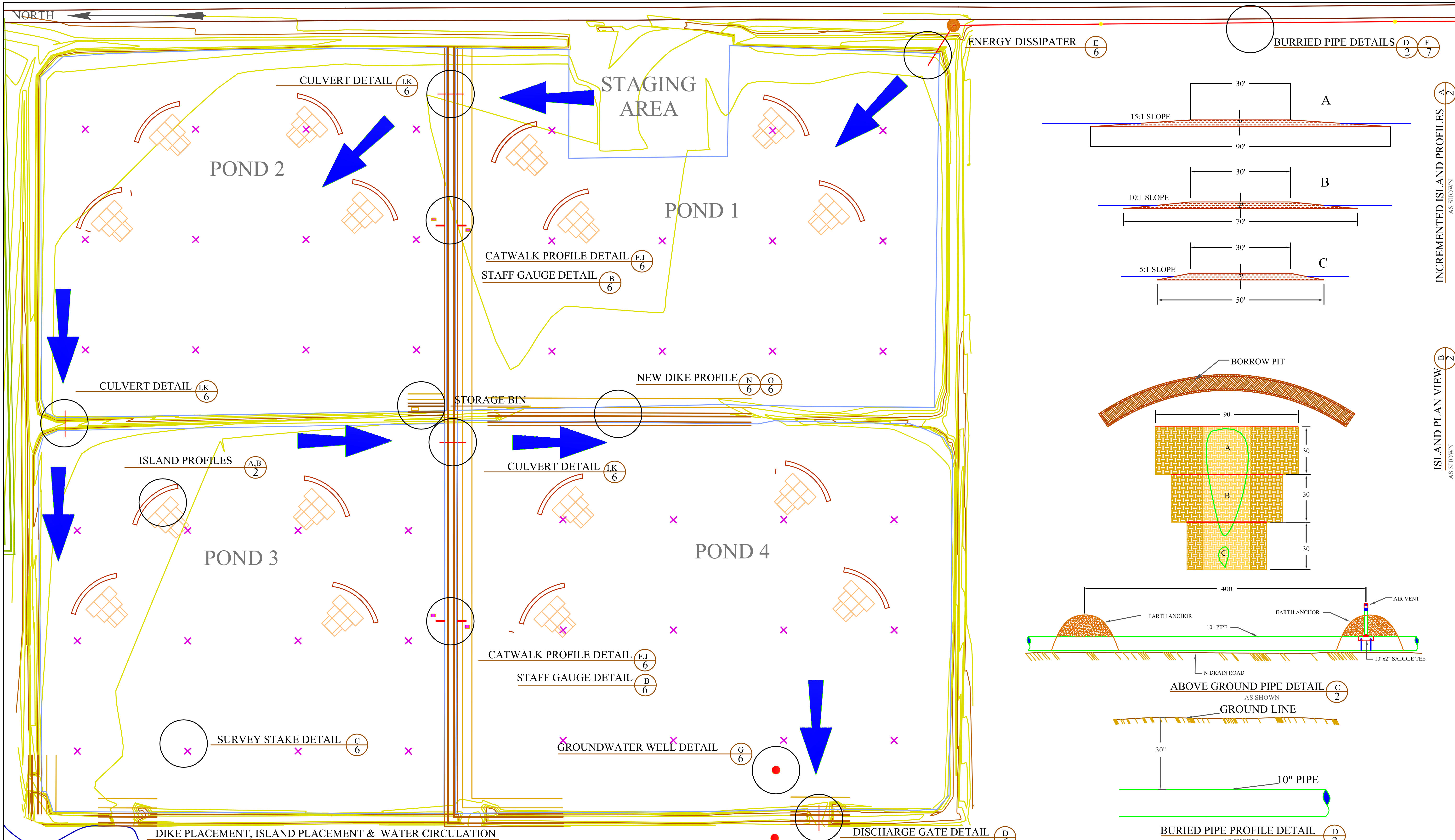
REV #	DATE	DESCRIPTION
01	02/02/05	FINAL PLAN SET

Legend
AIR VENT WITH EARTH ANCHOR
EARTH ANCHOR
FENCE LINE
10" PIPE

AGRARIAN
AGRARIAN RESEARCH AND MANAGEMENT COMPANY LTD.
435 E. 1980 N. PROVO, UT 84604
801-375-3300 •Fax: 801-375-3300
162 E. Line St. Suite E. Bishop Ca. 93514
760-873-0011 • Fax: 760-873-0099

BUREAU OF RECLAMATION
Shallow Habitat Project
Pump and Piping Detail

5
SHEET NO.



SCALE	1":250'
DRAWN	B. JOHNSON
CHECKED	F. STRADLING
APPROVED	
DATE	05/06/05
FILE NAME	Final Pan Set 02/ 02-Alamo Base Map

REV #	DATE	DESCRIPTION
01	05/06/05	FINAL PLAN SET

Legend

- AIR VENT WITH EARTH ANCHOR
- 300' WATER ELEVATION STAKE
- ISLAND EROSION LINE
- GROUND MONITORING WELL
- STAFF GAUGE

NOTE: CONTOUR LINES EQUAL 1 FOOT INTERVALS

AGRARIAN
AGRARIAN RESEARCH AND MANAGEMENT COMPANY LTD.
435 E. 1980 N. PROVO, UT 84604
801-375-3300 • Fax: 801-375-3300
162 E. Line St. Suite E. Bishop Ca. 93514
760-873-0011 • Fax: 760-873-0099

BUREAU OF RECLAMATION

Shallow Habitat Project

Base Map

2
SHEET NO.

themselves would take up 3.27 acres of the ponds and would represent 30,777 cubic yards of fill, all of which would be borrowed from the pond area itself. Berm development would involve a light excavator, probably on mats. The islands would be created from soil derived from borrow pits that would be excavated out of the existing pond surfaces (when dry). Each borrow pit would be 52 meters long and 3 meters wide and would be situated alongside each island location. The combined area of these borrow pits would be approximately 0.62 acres. Islands would be created using a light excavator on mats to excavate soil and a small backhoe for leveling the islands. Creating the inlet into the first pond from the pipeline would involve using a backhoe to cut through the existing road berm in which the delivery pipe is buried to bring the pipe to the level of the pond bottom. Installation of the discharge gate would involve trenching through an existing berm and laying the outlet pipes and their standpipes. Outlet installation would not disturb any dry ground or seabed not already disturbed by berm development. Installation would use a light excavator or a backhoe.

This page intentionally left blank.

CHAPTER 2
LOCATION AND SETTING

The Salton Sea and the APE for the project are in the Colorado Desert, north of the Alamo River and west of Davis Road near Niland, California (Figure 2). The entire APE is in T 11S/R 13E, San Bernardino Base Line and Meridian (SBBM) in Imperial County, California. The ponds will be installed on portions of the east half of Section 14 and, if the project is expanded, portions of the southern half of the southwest quarter of Section 11. The pump station would be constructed in the southeast quarter of the northeast quarter of Section 22. Starting at the pump station at the border of Sections 22 and 23, the pipeline would run the latitudinal midline of Section 23 and then north along the border between Sections 23 and 24. This location is depicted on the Niland, California, US Geological Survey topographic quadrangle (scale 1:24,000). The elevation of the subject property is approximately 69 meters below mean sea level.

2.1 GEOLOGY AND HYDROLOGY

The APE is adjacent to the southeastern edge of the Salton Sea in the Colorado Desert. The region is the large low area of the Salton Sea Basin in the low desert of Southern California. Bounded by the Colorado River on the east and the Peninsular Range on the west, the desert is divided into the Coachella Valley in the north, and the Imperial Valley in the south (Norris and Webb 1976). The Salton Sea occupies the central part of the Salton Basin with water bodies of the Colorado Desert draining into the Salton Sea.

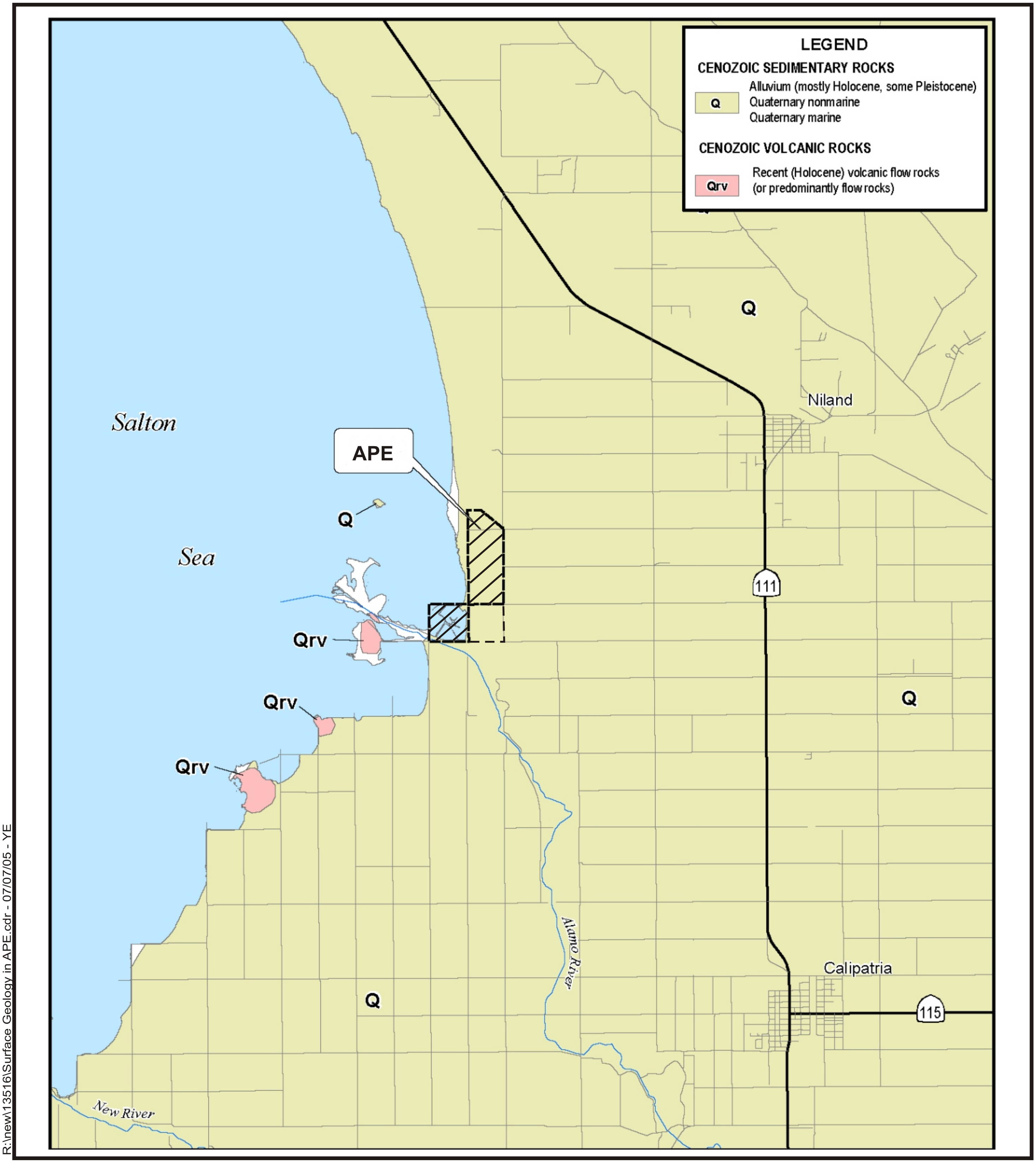
The "Salton Trough" is a large structural depression extending 290 kilometers south of Palm Springs to the head of the Gulf of California. A low divide consisting of sediments of the Colorado River delta separates the trough from the Gulf of California. The rift trough of the Gulf of California has contributed to the tectonic nature of the region. The earth's crust in the basin is thin, creating high heat flow through the crust. Hot springs and volcanism are common in the region (Oakeshott 1976:345). Evidence such as wave-cut shorelines and freshwater shells indicate that the basin was occupied intermittently by freshwater lakes during the Pleistocene and Holocene periods (Oakeshott 1971:343). Lake Cahuilla is the largest of these extinct lakes.

The oldest rocks in the Colorado Desert are Precambrian crystalline gneisses, anorthosites, and schists. Younger plutonic rocks from the late Paleozoic to middle Cenozoic have intruded into these ancient rocks. Most of the sedimentary and volcanic rocks in the desert are Cenozoic and rest atop the surfaces of older rocks. Sediments deposited in extinct Lake Cahuilla during the late Pleistocene and early Holocene form a cap over the exposures of older rocks (Norris and Webb 1976:152). This layer ranges from a few meters to 91 meters thick (ibid.). The Lake Cahuilla beds are soft siltstones and clays readily cut by streams during runoff. The occupation of the basin by various lakes has left thick silt and saline deposits.

The Colorado Desert geomorphic province is characterized by northwesterly structural trends. The San Andreas Fault zone extends along the northeastern side of the Salton Basin from the Coachella Valley to the southeastern end of Imperial County (Norris and Webb 1976:154). Evidence of faulting, including offset streams and truncated alluvial fans, is strongly marked in the Salton Basin. Toward the south of the Colorado Desert province is the Imperial Fault, which was outlined on the surface during an earthquake in 1940. Folding is prominent in the Colorado Desert, particularly in younger rocks close to fault zones (Norris and Webb 1976:156). Thick Cenozoic sedimentary materials underlie the Salton Basin; these are land-laid nonmarine deposits. The surface geology of the region is depicted in Figure 6.

The present day Salton Sea is a large saline lake lying within the Coachella and Imperial Valleys in the northern and southern portions of the Salton Basin, respectively. It is the largest water body in the Colorado River Delta Region, apart from the Gulf of California. The highest surface elevation of the most recent lake was about 60.7 meters below mean sea level (msl) from 1905 to 1907, when the Salton Basin last received the entire flow of the Colorado River as winter floods overran the banks of an earthen diversion channel bringing water from the river into the Imperial Valley. The present day elevation of the Salton Sea is about 69.2 meters below msl. The Salton Sea is approximately 56 kilometers long and nearly 24 kilometers across at its widest point, with a surface area of about 984 square kilometers and a maximum depth of about 15 meters. Water level in this terminal lake is maintained today by equilibrium between agricultural and municipal wastewater inflows and an evaporation rate of about two meters per year. Salinity of the Sea has risen over time, and today the water is about 25 percent saltier than the Pacific Ocean. Major freshwater inflows to the Salton Sea occur from the Whitewater, Alamo, and New Rivers and a number of agricultural drainage canals that terminate mainly in the southern and northern ends of the Salton Sea.

Mud Pots, Carbon Dioxide Vents, and Other Evidence of Volcanic Activity. Mud pots, carbon dioxide vents, and other evidence of volcanic activity have been documented in and near the project APE. A variety of geologic and geomorphic features in the region are indicative of magmatic activity in the vicinity of the southern end of the Salton Sea. The Salton Trough, the structural depression that contains the Salton Sea, is a part of the Gulf of California. As such, it is the landward extension of the East Pacific Rise, a major zone of sea floor spreading. Magmatic activity and lithic metamorphism are characteristic of



R:\new\13516\Surface Geology in APE.cdr - 07/07/05 - YE

Surface Geology in the Vicinity of the APE

Salton Sea, California

Tetra Tech, Inc.

Figure 6

sea floor spreading. In such contexts, new crust is being formed as molten material is brought to the surface of the earth.

The combined Gulf of California/Salton Trough structure is a transition zone between continental crust and oceanic crust (San Diego State University Center for Inland Waters 2005). The magmatic intrusion and regional metamorphism is occurring with limited volcanic activity. It is thought that the basin's Pleistocene and Holocene sediments act as a thermal barrier that confines and insulates the surficial volcanic activity. Features that occur in the Imperial Valley include hot springs, recent volcanic eruptions, mud pots, and carbon dioxide vents. Southwest of Mullet Island in the southern part of the Salton Sea are five small volcanic domes that developed within the last 20,000 years (San Diego State University Center for Inland Waters 2005). These domes, known collectively as Obsidian Butte, rise only about 30.5 to 46 meters from the valley floor. Their composition is rhyolite, pumice, and obsidian.

Geothermal waters result from a complex subsurface heat transfer system. Convection within the earth's mantle provides a continuously renewable source of heat that is transferred by conduction through the thinned crust of the East Pacific Rise. As surface waters migrate downward they are heated to the point that they can dissolve chemical compounds from the rocks undergoing metamorphism. Later they rise by convection back through the water-saturated sediments to the surface.

2.2 CLIMATE

High temperatures, evaporation rates that far exceed precipitation, and extreme variability in the amount, intensity, and spatial distribution of precipitation characterize the climate of the Colorado Desert. Arid conditions and sparse vegetation enhance wind as a major factor in local climates. Humidity is generally very low, usually 15 to 30 percent. Summers are typically hot and dry; winters are mild and dry. Evapotranspiration exceeds precipitation most of the year and falls below the precipitation curve for only a few months during the winter, allowing for soil storage of water.

Descending dry air of the semipermanent subtropical high-pressure cell along the Pacific coast fundamentally influences the climate of the Colorado Desert. Early in winter, the high-pressure cell is disrupted and displaced southward. This allows some storms generated over the Gulf of Alaska to reach southern California. Orographic uplift of moist polar Pacific air across the Coast Ranges and the Sierra Nevada produces periods of low-intensity precipitation between November and March.

When the high-pressure system is reestablished in the spring, it deflects storm tracks to the north, causing the region to generally be dry between April and June. Summer precipitation is convective and results primarily from the influx of moist, unstable air from the Gulf of California and the Gulf of Mexico. Summer conditions feature high temperature, large daily temperature fluctuations, and low humidity.

The overall climate of the study area is characterized by strong seasonal winds and extreme fluctuations of daily temperatures between night and day. Climate data for the nearby town of Brawley records the average maximum temperature as being 31.4° Celsius and the average minimum temperature as being 13.5°C. The average precipitation is 7 centimeters (Western Regional Climate Center 2003).

2.3 VEGETATION

The dominant plants in the Project area are salt cedar *(Tamarix chinensis* or *T. ramossisima),* iodine bush *(Allenrolfea occidentalis),* and common reed *(Phragmites australis)* (Tetra Tech 2005). Salt cedar lines most of the waterways adjacent to the Salton Sea, while slightly higher elevations support iodine bush and saltgrass *(Distichlis spicatta)* (Tetra Tech 2005). The historic distribution of vegetation in the area is depicted in Figure 7.

2.4 FAUNA

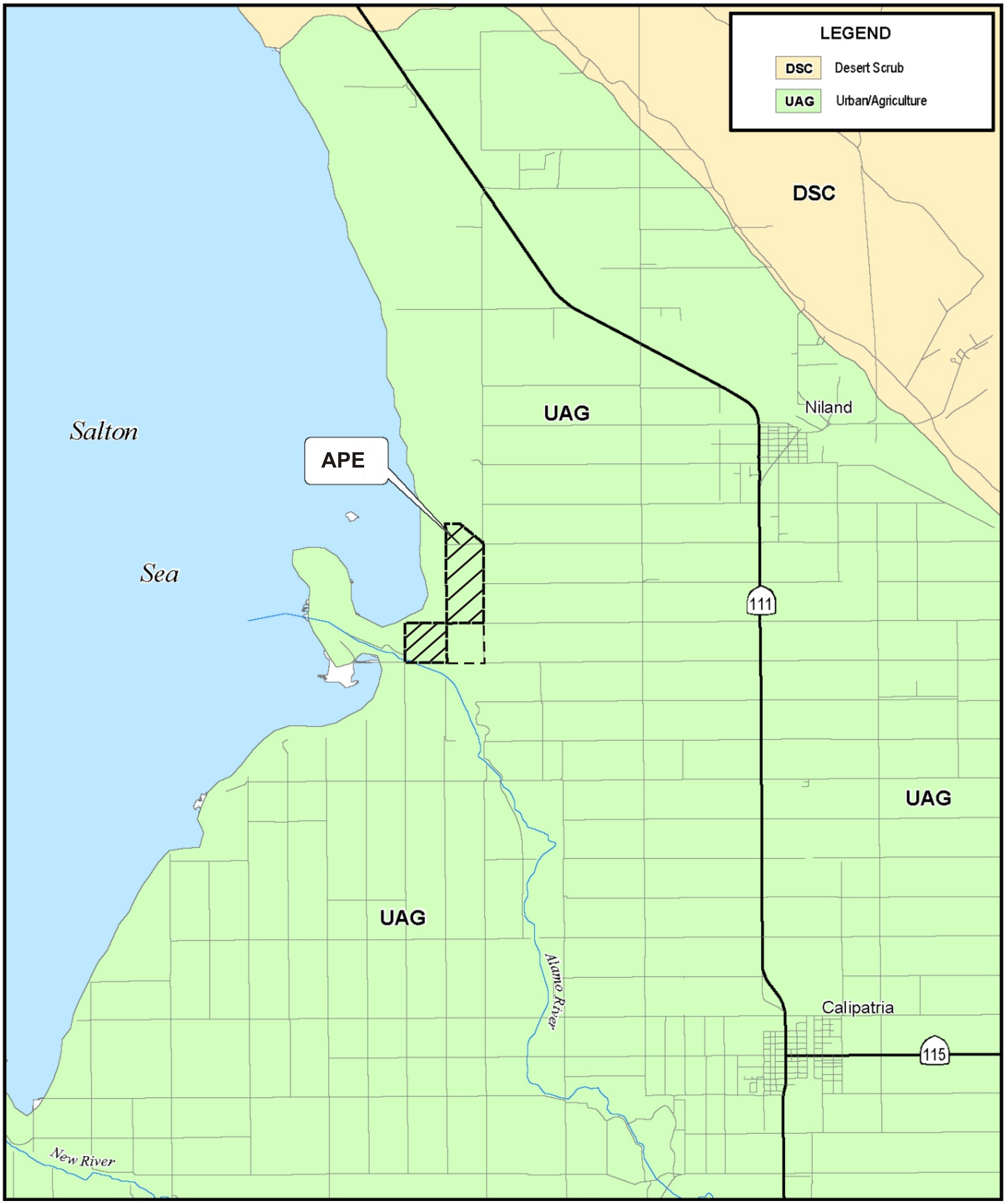
Bird species that Tetra Tech observed during an April 6, 2005, biological resources survey are as follows (Tetra Tech 2005):

Common Name	Scientific Name
American avocet	*Recurvirostra americana*
Black-necked stilt	*Himantopus mexicanus*
Bufflehead	*Bucephala albeola*
Canvasback	*Aythya valsineria*
Forster's tern	*Sterna forsteri*
Gambel's quail	*Callipepla gambelii*
Great blue heron	*Ardea herodias*
Great egret	*Casmerodius albus*
Gulls	*Larus* spp.
Killdeer	*Charadrius vociferous*
Mallard	*Anas platryrhynchos*
Snowy egret	*Egretta thula*
White pelican	*Pelecanus erythrorhynchos*

The original fish fauna of the Salton Sea consisted of freshwater species present in the Colorado River drainage, such as carp *(Cyprinus cario)* and striped mullet *(Mugil cephalus),* which were introduced when the basin was filling from 1905 to 1907. The present day fish community is largely a result of introductions of three marine species: orangemouth corvina *(Cynoscion xanthulus),* bairdiella *(Bairdiella chrysoura),* and sargo *(Anisotremus davidsoni).* Tilapia *(Oreochromis mossambicus)* was introduced later.

2.5 PRESENT LAND USE AND LAND DISTURBANCE

The subject parcel contains a series of earthern berms, created some time after 1976 according to USGS topographic quadrangles of the area. There are no records to indicate who built them or for what use. Today the ponds formed by these berms are abandoned and are generally dry except for pooling of seasonal rainfall. Modern trash and debris are scattered throughout the surface.



R:\new\13516\Historic Vegetation in APE.cdr - 07/07/05 - YE

Historic Vegetation in the Vicinity of the APE

Salton Sea, California

Tetra Tech, Inc.

Figure 7

CHAPTER 3
CULTURAL SETTING

3.1 PREHISTORY OF THE COLORADO DESERT

The archaeological record of the Colorado Desert indicates that cultural systems responded to changing environmental conditions, especially heat and available water resources, through time with a variety of hunter-gatherer subsistence and settlement strategies. The following describes the cultural sequence archaeologists have established for the prehistory of the Colorado Desert.

Paleoindian/San Dieguito (pre-9000 BC)—The Paleoindian adaptation in this region is termed the San Dieguito cultural pattern. It was an adaptation that featured small, mobile bands differentially exploiting large and small faunal resources and seasonally available floral resources (Schaefer 1994). Seeds and nuts were probably not used to any significant degree; milling equipment is lacking in the record. Most archaeological sites are cleared circles, rock rings, geoglyphs, and percussion-made lithic artifacts. Sites are found near places where water was available seasonally, often on mesas and terraces. Some archaeologists believe the San Dieguito adaptation was primarily to the resources of the Colorado River floodplain rather than to the arid desert *per se*. Away from the floodplain, logistically organized groups may only have visited desert habitats to collect special resources (Schaefer 1994).

Early Archaic (9000-6000 BC)—Like those of the Paleoindian period, sites dating to the Early Archaic are rare. Rock circles and chipped stone artifacts dating to this period are sparse on the Colorado Desert landscape.

Middle Archaic (6000-4000 BC)—Middle Archaic adaptations in California's Colorado Desert were probably similar to those in western Arizona (Schaefer 1994). Arizona sites, features, and artifacts of this period suggest population increases and use of both forager and collector settlement and subsistence strategies.

Late Archaic (4000 BC-AD 500)—Sites of the late Pinto period and the Gypsum Period are ascribed to the Late Archaic, extending from roughly 4,000 to 1,500 years ago. Subsistence strategies included opportunistic hunting and trapping of large and small fauna and milling of seasonally available nuts and seeds by low population density hunters and gatherers (Schaefer 1994).

Late Prehistoric/Ethnohistoric (post-AD 500)—There is more evidence of cultural activities in the Late Prehistoric and ethnohistoric periods, especially those activities associated with the collections of resources found in and around fresh water Lake Cahuilla (Schaefer 1994:65). The Late Prehistoric adaptation in this region is termed the Patayan cultural pattern. It featured dispersed seasonal settlements by mobile groups exploiting both riparian and other desert resources. It is thought to have originated about 500 AD, from late Archaic patterns that had been influenced by the agriculture-based Hohokam culture on the upper Gila River in Arizona (Schaefer 1994:65). Patayan groups living along the lower Colorado River likely relied on agriculture to varying degrees. Patayan material cultural remains include clay figurines and pipes; small side-notched and serrated projectile points; manos, metates, mortars, and pestles; arrowshaft straighteners; abraders; shell beads; worked bone tools; and both buff ware (from lowland clays) and brownwares (of upland micaceous clays). Also present are examples of rock art, geoglyphs, and cremation burials. People used jacal structures, semi-subterranean houses, and simple armadas (Schaefer 1994:66). All groups used ceramic ollas for food storage and the more sedentary groups used elevated granaries (Schaefer 1994:66).

The many trail systems in the Colorado Desert that date to this period are indicative of trade, travel to special resource collecting areas, and possibly warfare. Such trails often have associated trail shrines, pot-drops, rock art, or other evidence of short-term activities. The wide distribution of obsidian derived from the outcrop at Obsidian Butte near the southern end of the Salton Sea is another good indication of the exchange systems that operated during this period (Schaefer 1994:66).

3.2 GEOARCHAEOLOGICAL CONTEXT OF THE COLORADO DESERT

The structure of the delta of the Colorado River usually channels drainage directly to the Gulf of California. About 1,200 years ago flow patterns altered slightly and the river cut through the deltaic sediments and flooded large portions of the Imperial and Coachella valleys. The resulting lake measured approximately 184 km by 54-km, had its shoreline at about 12 meters above mean sea level, and was about 96 meters deep. Lake edge habitats supported a great diversity of food and material resources including fish, shellfish, and cattails and attracted peoples from the Colorado River, Mojave Desert, and the Peninsular Range. Geoarchaeological evidence indicates at least four major lacustrine periods, each of 100-250 years duration, punctuated by drying periods. River water was switched back to the Gulf of California about 1580 AD and by sometime between 1540 and 1600 AD the drying, isolated lake became saline and subsequently dried completely. Lake edge resources were no longer attractive and cultural adaptations shifted to rivers, springs, and areas where potable water could be derived by digging walk-in wells.

Investigators differ in their interpretations of the archaeological record associated with the various stands of Lake Cahuilla. Wilke (1978) interpreted his recovery of Colorado River fish remains (e.g., striped mullet, bonytail chub, and humpback sucker), *Anadonta* sp. freshwater mussel shells; aquatic bird bones (e.g., mudhens and eared grebes); other faunal resources (such as rabbits, rodents, and tortoises), and a variety of floral resources (e.g., tules, cattails, screwbean and honey mesquite, various species of cactus, and grasses) as indicating that such lakeside sites represented year-round residential bases.

Weide (1974) did not view lake levels and the attendant shoreline habitats as having been stable. He cited as evidence recessional and progressional shorelines, complex beach structures, and complex lake stratigraphy. In Weide's view, spring-fed streams and other desert riparian habitats would have hosted more reliable plant resources than fluctuating shorelines and that settlement was only in small, seasonal, temporary camps. Unstable lake edge habitats, in his view, could not support permanent habitation on a long-term basis nor would it have caused permanent population shifts.

Sites associated with Lake Cahuilla tend to be found along embayments and sandy spits, especially near stands of mesquite trees. Fish traps tend to be found on the west side of the lake in places where alluvial fans extended all the way down to the fluctuating shoreline. The northwest end of the lake was able support larger and more closely space sites than other parts of the lake. This was especially true of the Myoma Dunes, Indian Wells, and La Quinta areas. Sites on the southern and eastern sides of the lake were scattered, seasonal, temporary camps.

Subsequent to 1600 AD there was a population influx in the Colorado Desert. A major residential base was even established on the now-dry bed of the former Lake Cahuilla. Late sites are often associated with springs and stands of mesquite.

3.3 ETHNOHISTORICAL CONTEXT

The area around the southern part of the APE was occupied historically by the Tipai, who called themselves Kumeyaay (Luomala 1978). The Cahuilla historically occupied the area around the northern part of the Salton Sea (Bean 1978). Both groups probably interacted often and made common forays into each other's territory. As such, both groups are discussed in further detail below.

Historically, the Yuman speaking groups on the Colorado River (the Mohave on the north and the Quechan and Cocopah on the south) also made forays into the Salton Basin, especially during times when there was a resurgence of Lake Cahuilla. Proto-Yuman people from the Colorado River likely made similar forays into the basin during prehistoric times.

Tipai—The Mission Indians of southern California included the Dieguenos (Luomala 1978). Diegueno was an eighteenth century Spanish collective name for bands of aboriginal people living near the Mission and Presidio of San Diego de Alcala, established in 1769 as the first of a coastal chain of Franciscan missions. The name

Diegueno became extended to culturally and linguistically-related bands south and east of the mission (Luomala 1978).

In the 1950s anthropologists renamed the Diegueno the Tipai (Luomala 1978). Today the people prefer to be called Kumeyaay. Prior to contact, the Tipai subsisted on wild plants, supplemented with more small than large game, and, in places, fish. Luomala (1978) reports that they existed as autonomous, seminomadic bands of over 30 patrilineal, named clans (some hostile to one another). In general, they lacked organized social and political unity. The archaeological record of these people includes baskets, manos and metates, and flaked projectile points (both dart and arrow points). The Tipais in the Imperial Valley occupied primarily a Lower Sonoran Life Zone. Subsistence plants included primarily opuntias, yuccas, agave, and other dry landscape plants Pole-and-brush huts and caves were used for shelter.

The language of these people is still designated as Diegueno. It is classified in the Yuman language family, Hokan stock, and is distinguished from speakers of different Yuman languages flanking them west of the Colorado River and those of the Takic language family bordering them in northern San Diego County (Luomala 1978).

After 1000 BC, local adaptations to severe desert conditions developed in Arizona and spread into adjacent parts of California (Luomala 1978). Later to be incorporated into historically known Tipai-Ipai culture were new types of mortars and metates, deeper floors for huts, and cremation. Around AD 600, two great changes modified the collecting and hunting traditions. Lower Colorado River people, influenced by the Hohokam people to the east, began to plant maize, beans, and gourds in floodplains, and, later, to make pottery (Luomala 1978). Attenuated, these two practices reached southeastern California, although trade had perhaps brought pottery earlier.

In the Imperial Valley, ancestral Kumeyaay people practiced field cultivation after the drying of Lake Cahuilla. Many other Patayan groups did not adopt agriculture until historic times (Schaefer 1994:67). Patayan period sites in upland areas include residential sites, rockshelters, storage caches, and resource procurement areas. Lowland sites along the Alamo and New Rivers were destroyed when the modern floods of 1905-1906 (the flood that created the Salton Sea) and by subsequent agricultural activities.

By AD 1000 these lower Colorado River tribes, who were possibly Yuman speakers, wandered east from the southern Californian coast into the Mojave region. From there they spread south along the river. A few, dislocated perhaps by Lake Cahuilla's evaporation, turned west over the mountains either to rejoin remaining bands or to form the nucleus of later Tipai-Ipai groups. Evidence depends on scanty archaeological data and comparison of languages, mythology, and legends recorded only after 1540 when Spaniards arrived at the river and the historic period began (Luomala 1978). Of all the Mission Tribes in California, the Tipais and Ipais provided the most stubborn and violent opposition to Missionization (Luomala 1978).

Cahuilla—The traditional territory of the Cahuilla Indians was approximately 2,400 square miles of desert territory in south central California. It is thought the Cahuilla arrived in the region between 2,000 and 3,000 years ago (Bean 1978).

The Cahuilla were Uto-Aztecan speaking hunters and gatherers, a Cupan sub-group of the Takic language family extending from the Great Basin. The term Cahuilla is thought to have originated from the tribe's own word to "master' or "masters."

The Cahuilla cultural area was topographically and ecologically complex encompassing tall mountains, deep valleys, rocky canyons, passes, and arid desert land. Elevations ranged from 83 meters below msl at the Salton Basin, to over 3,353 meters above msl in the San Bernardino Mountains. The San Bernardino Mountains bound the cultural area on the north, Borrego Springs and the Chocolate Mountains on the south, the Orocopia Mountains on the east, and the Palomar Mountains on the west (Bean 1978). Most Cahuilla settlements were located in canyon areas during the hot times of the year. In winter, such locations were warmed somewhat by local wind flow patterns. As with many hunting and gathering peoples, the Cahuilla exploited the seasonal round of resource exploitation through a complex pattern of socio-economic adaptation.

The Cahuilla were divided into independent politico-religious kin groups known as clans. Clans owned large tracts of land, each of which included several ecological zones. Clans were sub-divided into several lineages that were also corporate bodies that owned specific areas of land and rights to land for hunting, gathering, and ritual purposes. Subsistence activity was undertaken at individual, family, and lineage levels of organization. Villages were usually made up of one or two exogamous lineages (Bean 1978). Cahuilla houses were rectangular thatched structures that often had walls that were plastered with mud or adobe. Less permanent dwellings in the mountains were smaller.

Although primarily hunters and gatherers, the Cahuilla did practice agriculture of corn, beans, and squash in the more permanent settlements prior to European contact (Bean 1978). Those Cahuilla who settled around the northern and western shores of Lake Cahuilla developed a lacustrine economy. When the Colorado River changed its course approximately 500 years ago and no longer fed the lake, water levels slowly fell. The Cahuilla adapted to this change by moving their villages to the Santa Rosa Mountains. The varied elevations of their territory provided a diversity of seasonal floral and faunal resources. Both near the lake and in the mountains, villages were located at optimum distances from resources at both low and high elevations. Such patterns facilitated long term occupations and the development of complex social, political, and trade relations.

The Cahuilla exploited several hundred different plant and animal species for food, medicine, and manufacturing (Bean 1978). Food plants provided a significant portion of their overall nutritional base. Foods were often dried and stored for future use in large basket granaries and ollas. Placing food resources in storage vessels or pottery and sealing with pine pitch or beeswax facilitated preservation. Numerous techniques were developed by the Cahuilla for transforming otherwise inedible plant resources into nutritious, palatable, and eatable products. The most common processing method was grinding. Hard seeds, difficult to cook because of kernel density, were ground into flour, which cook easily and rendered digestible. Grinding acorns and dried berries was done with wooden and stone pestles. Stone manos were pushed on stone metates to mash softer food such as pinyon nuts. Wooden pestles pounded in wooden mortars pulverized soft mesquite. Baskets were used for sifting flour-like materials. Parching on open basketry or pottery containers holding hot coals was done to alter taste and chemical properties of seeds. Grinding, bleaching, sun drying, par-boiling were daily food preparation activities undertaken by women. A few foods such as berries, fruits, and dates were eaten fresh.

The mammalian faunal resources exploited included badgers, chipmunks, cottontails, six species of mice, mule deer, raccoon, three species of kangaroo rats, bighorn sheep, and three species of squirrel. Numerous birds, amphibians, insects, and fish were also exploited, particularly at lakeshore villages. Hunting was exclusively the work of adult men. Hunting blinds, bows and arrows, clubs, fire, traps, nets, snares, and spear-throwers were used (Bean 1978).

Away from Lake Cahuilla, and during times when the lake dried up, the Cahuilla dug walk-in wells where the ground water was relatively close to the surface (Bean 1978). These could reach a depth of 8 meters. These wells are seen to represent a significant technological adaptation, by hunter - gather peoples, to a harsh desert environment. Walk - in wells were the principal sources of water in the Lower Coachella Valley, and were confined to the bed of ancient Lake Cahuilla. A number of explorers describe a complex system of reservoirs, ditches and adobe walls used for the purposes of irrigation prior to European contact.

In general, the Spanish, Mexican, and early American presence did not greatly affect the Cahuilla, who soon developed economic and political strategies to deal with Hispanic immigrants by taking the form of confederations of clans.

3.4 HISTORIC PERIOD

The historical record in the Colorado Desert begins in 1774 when Don Juan Bautista de Anza led a large expedition through the area on the way to the missions of San Gabriel (Salton Sea Authority 2005). This expedition was the first to encounter the Cahuilla people. American trappers, miners, and settlers passed through the area using the San Gorgonio pass for access to California destinations. Fur trappers, including such noted explorers as Kit Carson, Jedediah Smith, and William Wolfskill, started making trips into the region of the lower Colorado River and the Salton Basin in 1825.

The Americanization of the Indians began after the Mormons settled in San Bernardino around 1852. Several American families settled the San Gorgonio Pass region. William Bradshaw blazed the first road through Riverside County in 1862, as an overland stage route beginning at San Bernardino and ending at La Paz (now Ehrenberg), Arizona. The Bradshaw Trail was used extensively between 1862 and 1877 to haul miners and other passengers to the gold fields at La Paz. Until the Southern Pacific Railroad was completed east to Santa Fe, New Mexico, the Bradshaw trail was the main means of communication between southern California and the eastern part of the United States. During the last years of the Civil War it was the only stage route operating into and out of southern California. By the 1880s, however, passenger coaches were discontinued and commerce took the form predominantly of express and mail contracts carried by mule trains and freight wagons. The Bradshaw Trail was used as a freight route until the 20th century, and even accommodated automobile and truck travel until the highway that eventually became Interstate 10 was built, farther to the north.

Southern Pacific Railroad tracks reached the San Gorgonio Pass by the end of 1875. By March of 1876, the railroad was in Whitewater and was completed to Seven Palms in May. By August, the first train had reached Indian Wells (Indio) (Tetra Tech 2003). Regular service to Dos Palmas, near what would later be the northeastern shore of the Salton Sea, was in operation by March of 1877 and on May 23, the tracks finally extended to the California side of the Colorado River.

In 1891, Colorado River flooding was recorded in the Salton Basin, forming a 100,000-acre lake (Salton Sea Authority 2005). Explorers discovered the mouth of the Alamo River, which connected the Gulf of California and the Colorado River.

The Imperial Valley was recognized in 1853 as a potential agricultural area if it could be adequately irrigated (Salton Sea Authority 2005). In 1901, the Imperial Canal began transporting water from the Colorado River to the Imperial Valley (Salton Sea Authority 2005). By 1904 silt blocked the Imperial Canal and prevented it from supplying water to the valley. So, in 1905 a temporary diversion of the Colorado River by workers of the Southern Pacific Railroad was constructed to replace the water from the blocked canal. When this new diversion was breached by Colorado River floodwaters, the course of the river was changed and water started flowing into the Salton Basin (the area that had once held Ancient Lake Cahuilla). Floodwaters continued to fill the Salton Sea until early 1907. In February 1907, crews from the Southern Pacific Railroad finally closed the river breach. That same year sport fishing was first promoted at the Salton Sea.

In 1909, thinking the Salton Sea would dry up by the 1920s, the US government set aside an additional 10,000 acres of land beneath the waters of the Salton Sea as reserves in trust for the Torres-Martinez Band of Cahuilla Indians (Salton Sea Authorty 2005).

The IID was formed in 1911 with the purpose of acquiring properties of the bankrupt California Development Company. Distribution canals into the Imperial Valley were in operation by 1922 under management by IID using what had been thirteen mutual water companies. By the middle of that decade, water was being delivered to about 500,000 acres in Imperial County.

The potential for the development of geothermal energy resources in the southern Salton Sea region was first recognized in the mid-1920s (San Diego State University Center for Inland Waters 2005). However, the first commercial well was not drilled until 1961. It reached a depth of more than 1,432.5 meters. Today there are several experimental geothermal developments from the south shore of the Salton Sea to the Cerro Prieto Volcano in Mexico.

In 1924, President Coolidge issued an executive order setting aside lands under the Salton Sea as a permanent drainage reservoir. In 1928, Congress authorized construction of Boulder Dam and the All American Canal. Completion of the Boulder (now Hoover) Dam in 1935 resulted in controlling the Colorado River and eliminating flooding (Salton Sea Authority 2005). In 1930, the Salton Sea Wildlife Refuge was established to protect waterfowl and shore birds. Construction began on the All American Canal in 1934 and Coachella Canal in 1938. Since 1942, water has been brought into the area via the All American Canal from the Colorado River. During World War II (1941-1945), when German submarines made ocean fishing hazardous, commercial fishermen fished the Salton Sea to supply mullet to the Pacific fisheries (Salton Sea Authority 2005).

Carbon dioxide produced as a byproduct of magmatic activity at depth was mined from a small field near Niland between 1933 and 1954 (San Diego State University Center for Inland Waters 2005). The gas was recovered from pockets 61 to 213 meters deep and was converted to dry ice for refrigeration, primarily for railroad refrigerator cars. In 1954, new refrigeration technology made carbon dioxide mining unprofitable and the field was abandoned. When the Salton Sea rose in the early 1980s the carbon dioxide mine field was flooded. Nothing remains today except a few timbers sticking out of the water (San Diego State University Center for Inland Waters 2005).

In 1944 and 1945 B-29s from the US Army's 393rd Heavy Bombardment Squadron, commanded by Lt. Col. Paul Tibbets, made regular but highly secret practice flights from Wendover Air Base in Utah (Salton Sea Authority 2005). Their planes dropped dummies of a new type of bomb into the Salton Sea. On August 6, 1945, Tibbets and his crew in the Enola Gay dropped the first Atomic Bomb over Hiroshima, Japan.

Mud pots are vents where steam, carbon dioxide, and hydrogen sulfide come to the surface through old lake sediments and were once popular tourist sights near Mullet Island. The island, originally an arm of land extending into the sea, was also partially submerged by the high waters in the early 1980s (San Diego State University Center for Inland Waters 2005).

CHAPTER 4
METHODS

This report was prepared in accordance with guidance provided by the NHPA, NEPA, CEQA, and the California Office of Historic Preservation.

4.1 ARCHAEOLOGICAL INFORMATION CENTER

The Southeastern Information Center, part of the California Historic Resources Information System in Ocotillo, California, conducted a cultural resources records check for the APE and a one-mile buffer radius.

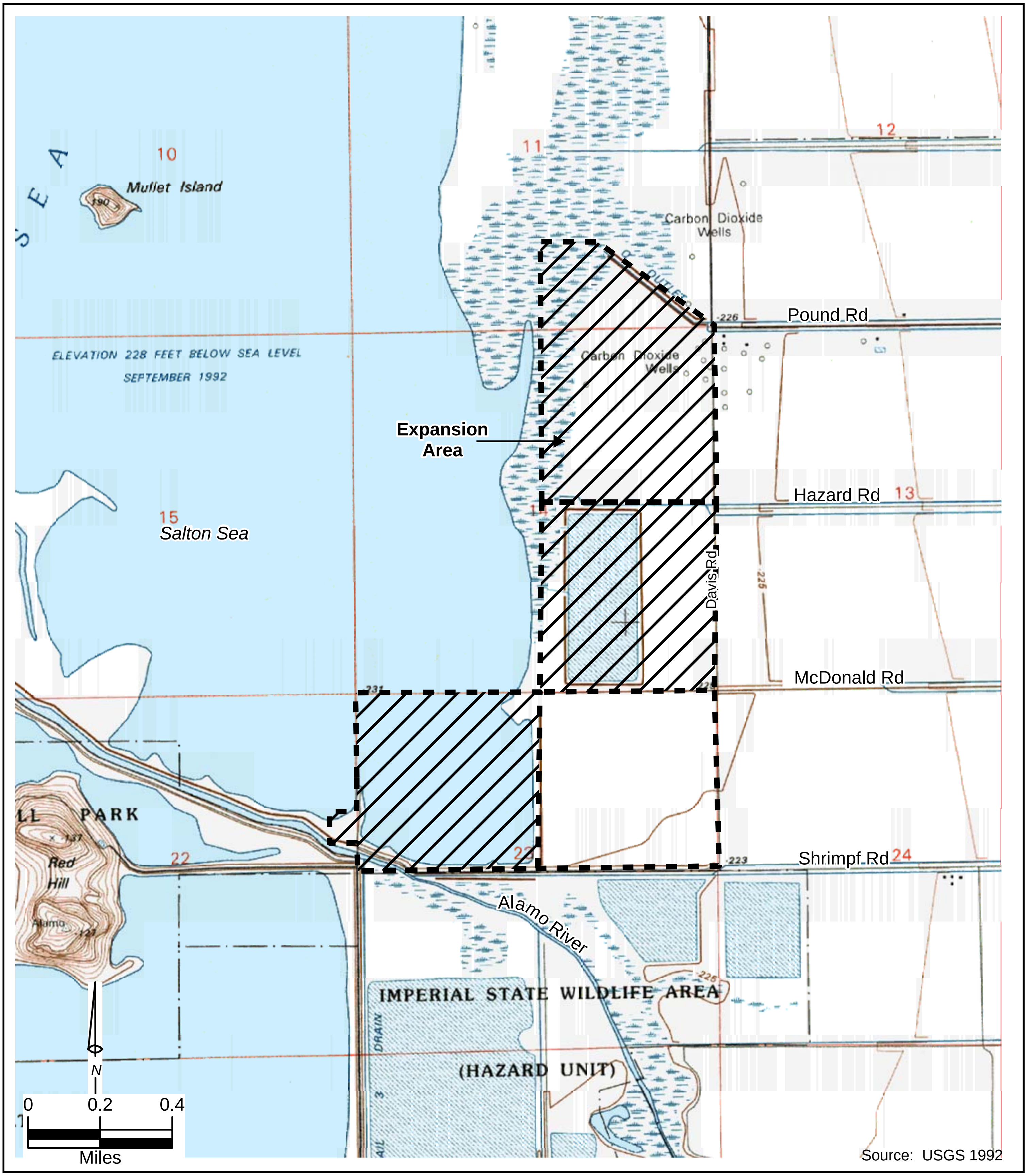
4.2 NATIVE AMERICAN CONSULTATION

Tetra Tech sent a query to the California Native American Heritage Commission (NAHC), in Sacramento, requesting that the NAHC check its files to determine whether any traditional cultural properties (TCPs) important to Native Americans, such as religious sites, vision quest sites, and traditional resource procurement areas, were recorded in their database as being on or near the APE to date.

4.3 CLASS III INTENSIVE ARCHAEOLOGICAL FIELD INVENTORY

A Class III intensive archaeological field inventory of the APE was conducted on March 17, 2005 by Fred E. Budinger, Jr., Tetra Tech Senior Archaeologist (Figure 8). Mr. Budinger meets and exceeds *The Secretary of the Interior's Standards and Guidelines* for conducting Section 106 cultural resources studies.

The proposed pond area, expansion area, pump station, and pipeline that make up the APE were surveyed at 15-meter transects. Work was conducted in accordance with standards established by the California Office of Historic Preservation. Previously unrecorded sites were recorded on California Department of Parks and Recreation primary and site record forms (DPR 523).



R:\NEW13516\layouts\Survey Coverage.mxd - 07/28/05 - YE

Legend

Surveyed Areas

Survey Coverage
Shallow Habitat Project

Township 11S/Range 13E, Southeastern California

Tetra Tech, Inc

Figure 8

CHAPTER 5
RESULTS AND FINDINGS

5.1 CULTURAL RESOURCES RECORDS CHECK

The cultural resources records check (Appendix A) indicated that no surveys had been conducted within the boundaries of the APE. No prehistoric archaeological sites or historic era properties are known to exist within the boundaries of the APE. However, one prehistoric archaeological site and four historic sites have been previously recorded within the one-mile buffer zone.

The prehistoric site is CA-IMP-8176, an obsidian outcrop on Red Hill that exhibits evidence of quarrying, including blanks, flakes, and hammerstones. Red Hill is located about one mile west-southwest of the APE and would not be affected by project activities.

The four historic sites are of natural historic interest and are as follows:

- CA-IMP-3251, described in 1856 as a pond of good water measuring .6 meter by 2 meters;
- CA-IMP-3256, described in 1856 as a field of mud volcanoes some 181 meters across;
- CA-IMP-3257, described in 1856 as a field of mud volcanoes some 59 meters across; and
- CA-IMP-3258, described in 1856 as a field of mud volcanoes (dimensions not listed).

None of these natural features are within the APE and would therefore not be affected by the project.

5.2 NATIVE AMERICAN HERITAGE COMMISSION RESULTS

The query directed to the California NAHC failed to reveal the presence or proximity of any TCPs (See Appendix B). It was suggested that Reclamation directly contact local

Native Americans to obtain any information that may not be recorded in the NAHC database. The following tribes were informed of the project via a letter dated April 18, 2005 (see Appendix B):

Campo Band of Mission Indians	La Posta Band of Mission Indians
Cocopah Tribe	Manzanita Band of Mission Indians
Cuyapaipe Band of Mission Indians	Santa Rosa Band of Mission Indians
Fort Yuma Quechan Tribe	Santa Isabel Band of Mission Indians
Inaja-Cosmit Band of Mission Indians	Sycuan Band of Mission Indians
Jamul Indian Village	Torres Martinez Desert Cahuilla Indians
Kumeyaay Cultural Repatriation Committee	Viejas Band of Kumeyaay Indians

Only the Cocopah Tribe responded within 30 days and requested a site visit. Patricia Hicks, Regional Archaeologist for Reclamation, contacted Lisa Wanstall of the Cocopah Tribe on May 31, 2005. Ms. Wanstall said the Cocopah were concerned that there might be fish weirs in the project area. Ms. Hicks explained the physical context of the project area and that it was unlikely there were any weirs in the area given the existing dikes and ponds. Ms. Wanstall was still interested in a site visit and was referred to Cheryl Rodriguez (Reclamation Environmental Protection Specialist) and Mike Walker (Reclamation Program Manager, Salton Sea Restoration Project) to arrange a date and time for the visit. Both Ms. Rodriguez and Mr. Walker attempted to contact Ms. Wanstall numerous times over a 30-day period from the time Ms. Hicks was able to contact Ms. Wanstall, but could only leave messages for her. As of publication, the Cocopah Tribe had not yet established a date for this visit and consultation.

Andrew Gentile of Tetra Tech made follow-up phone calls between June 7 and 10, 2005, to the tribes who did not respond to the initial consult letters. The Cuyapaipe Band of Mission Indians, the Kumeyaay Cultural Repatriation Committee, the Santa Isabel Band of Mission Indians, and the Viejas Band of Kumeyaay Indians had no comment on the proposed project. The Santa Rosa Band of Mission Indians also had no comment on the proposed project but requested that all future communications be directed to their Cultural Department. The Campo Band of Mission Indians, the Fort Yuma Quechan Tribe, the Jamul Indian Village, the La Posta Band of Mission Indians, and the Sycuan Band of Mission Indians did not respond to messages. The lack of response was assumed to mean the group had no concerns regarding the proposed project. The Inaja-Cosmit Band of Mission Indians, the Manzanita Band of Mission Indians, and the Torres Martinez Desert Cahuilla Indians could not be reached due to incorrect or disconnected phone numbers.

5.3 FIELD SURVEY RESULTS

The Class III intensive archaeological field inventory did not detect the presence of any NRHP-eligible prehistoric or historic-era artifacts, features, or sites within the APE. The original survey was conducted shortly after the record rains of late January and early

February 2005. As such, despite a lack of vegetation in most of the survey area, ground visibility in some areas was very poor (less than 25 percent visibility) due to accumulated rain water. Some areas were inaccessible due to excessive muddiness of the ground surface. During a second site visit by Tetra Tech archaeologists on August 2, 2005, to record a historic well field within the APE (see below), these areas of poor visibility were reinspected. No additional historic or prehistoric resources were observed at that time.

The existing ponds and adjacent dikes and roads were littered with shotgun casings and other modern nonhistoric trash. This included aluminum beer and soda cans, fast food containers and wrappings, miscellaneous paper and cardboard, nails and nuts and bolts, and miscellaneous metal objects.

There are no records to indicate the age or nature of origin of the existing berms and ponds within the APE. The parcels within which the existing berms are situated came into IID ownership during the economic depression of the 1930s from a private landowner who defaulted on his property taxes (Gray 2005). IID has no record of the condition of the property at the time of acquisition. Tetra Tech staff made several attempts to access other resources in order to identify the age and origin of the berms. This included phone discussions with local residents and local agency personnel as well as examination of past USGS topographic quadrangles.

Al Kalin, a long-time local resident, provided two possibilities for the origin of the berms (Kalin 2005). One possibility is that the berms were for early duck hunting clubs. In the early part of the 1920s, several duck hunting clubs occupied the shores of the Salton Sea, particularly near the APE along the historic delta and marshes of the Alamo River that existed before today's managed river outflow. Mr. Kalin said that most duck club owners went broke in the 1930s, and the sites were then abandoned. However, Mr. Kalin believed that it was more likely the berms were built in the 1960s to create settling ponds for geothermal fluids prior to the geothermal industry's use of reinjection (Kalin 2005).

Vince Signorotti, Director of Real Estate at Cal Energy, another property owner for other parcels within the APE, provided a more definitive identification of the berms' origins. Mr. Signorotti told Tetra Tech staff that, based on real estate records held by his company, the pond parcels had probably been used by Morton Salt Company Development during the late 1960s/early 1970s for salt production (Signorotti 2005).

Two different versions of the USGS Niland quadrangle were examined by Tetra Tech Reclamation staff to try to better determine when the berms were constructed. It became apparent that they were built subsequent to 1976 based on these maps. On a 1956 (revised 1976) map, the ponds are not depicted, but a diagonal waterway is shown in the APE where the project ponds will be created. The waterway cuts across Section 14 from the southeast corner to the middle of the Section where it combines with the drainage that parallels Hazard Road. On the more recent 1992 map, the diagonal waterway is gone from Section 14, but the western existing ponds are depicted (Figure

2). Aerial photographs (Figure 3) show only the southeasterly half of the diagonal waterway. It appears it has been cutoff by the currently north-south trending berm that creates the existing ponds.

Therefore, since the berms are not present on the USGS Niland quadrangle, but are present on the 1992 quadrangle, it assumed that they were constructed after 1976 and are less than 50 years old. Additionally, the evidence provided by Mr. Kalin and Mr. Signorotti would also suggest the berms are not more than 45 years of age. As such, the berms are not considered to be cultural resources for the purposes of this project.

The mud pots and mud volcanoes observed during the Class III survey are not considered to be cultural resources for the purposes of the report either. These features were observed to be mostly within the northern expansion area, as well as the nearby surrounding areas. Those within the APE are in the northeast corner of Section 14, within the expansion area, and are noted on the 1956 Niland USGS quadrangle. Although mud pots had been previously recorded during the 1850s, as evidenced by the site record search (Appendix A), the decision was made to leave these observed locations unrecorded. While they may be considered significant geologic features, their documentation is unlikely to yield information important in Salton Sea regional culture history. Additionally, they would not meet the NRHP eligibility criteria or criteria considerations discussed in Section 1 of this report. They are not associated with any events that have made a significant contribution to the broad patterns of our national history or the lives of any person significant in the country's past. Likewise, they do not embody a distinctive style of architecture or construction and are not part of a larger entity that does embody such a style or construction method.

In the same area as the observed mud pots and mud volcanoes is a carbon dioxide well field that was associated with an adobe dry ice plant that used to exist on the southeast corner of Davis Road and Pound Road (Cain 2005), outside of the APE. The well field and dry ice plant were constructed by Cardex Western Company during the 1920s or 1930s (Koon 2005). Cardex Western ceased operations at this location sometime before 1955. After Cardex Western closed their ice house, the building and land southeast of the intersection of Davis Road and Pound Road was purchased by a local eccentric who constructed a hot mineral water spa during the 1970s (Koon 2005). The main dry ice plant building was refurbished for guest services and concrete soaking tubs, similar to Roman baths, were installed around the main building. The spa venture was unsuccessful in the long run and the complex was abandoned in the 1970s or 1980s.

During the Class III field survey, no evidence was observed to suggest that the dry ice plant/spa facilities maintained any association with the carbon dioxide well field. The adobe structure that became the main mineral spa building shows evidence of a fire and a large amount of modern trash (i.e., desks, chairs, mechanical washers) was observed inside. Appendix C contains photos of the structure. No industrial piping or refrigeration facilities were observed. The adobe walls appeared poorly constructed and some had already collapsed or were notably leaning to one side. It was decided that this structure would not qualify as a cultural resource for the purposes of this project due to the lack of evidence to associate the building with the 1920s carbon dioxide well field and the more prominent modern modifications made to the structure to facilitate the mineral spa operations.

Tetra Tech returned to the project area on August 2, 2005, to record the remnant 1920s carbon dioxide well field. The site was recorded on California Department of Parks and Recreation site record forms (DPR 523) and given the temporary site number Tt-05-08-02-01 (Appendix D). The wells are considered cultural resources due to historic nature of 70+ years of age, but they lack the qualities necessary for NRHP eligibility. The site is a triangular area measuring 183 meters along its north-south axis and 122 meters along its east-west axis, the northern tip of which is located approximated 76 meters South-Southwest of the center of the intersection of Davis Road and Pound Road. The total area of the site is 1,115 square meters. It consists of the remnants of five carbon dioxide wells recorded as Features 1 through 5. These carbon dioxide wells were installed between 1934 and 1944 by the Cardex Western Company for the retrival of carbon dioxide gas for the production of dry ice (frozen carbon dioxide). Carbon dioxide gas, recovered from pockets 61 to 213 meters deep, was converted to dry ice for refrigeration (San Diego State University Center for Inland Waters 2005). Much of the production was supplied to the railroads for icing refrigerator cars. The project was abandoned in 1954 when other refrigeration technology became available. The wells represent a local industry within the Salton Basin, but are not associated with events that have made a significant contribution to the broad patterns of our national history nor are they associated with the lives of persons significant in our past. They do not embody the distinctive type, period, or method of construction, represent the work of a master, possess high artistic values, or represent a significant and distinguishable entity whose components may lack individual distinction. Futhermore, they are unlikely to yield information not yet known regarding our prehistory or history.

Other than the NRHP-ineligible carbon dioxide wells, no cultural resources are present within the APE. As such, no federal or state historic properties are within the APE. Due to the effects of the Alamo River's flooding between 1905 and 1907, to modern and historic modifications to the landscape, and to the continuing active nature of the Salton Sea shoreline, the likelihood of archaeological remains to be present within the APE is considered minimal.

This page intentionally left blank.

CHAPTER 6
CONCLUSIONS

None of the prehistoric or historic sites identified through the record search or Class III survey meet the NRHP eligibility requirements discussed in Chapter 1 of this report. They are not associated with events that have made significant contribution to the broad patterns of our country's history, they are not associated with the lives of persons significant in the country's past, they do not embody distinctive architecture, construction, or artistic value, and they are unlikely to yield information important to our cultural prehistory or history. As such, no federally historic properties or California historic resources have been identified within the APE and none would be affected by the project as proposed. The NAHC and 14 local Native American groups were contacted to ascertain the presence of TCPs in or near the APE. None were identified by the NAHC or the groups, with the exception of the Cocopah Tribe, whose representative was concerned that fish weirs may be present along the Salton Sea shoreline and requested a site, which that has not yet occurred. Additionally, the likelihood for archaeological remains to occur within the APE is minimal due to periodic flooding of the Alamo River between 1905 and 1907, the active nature of the modern shoreline, and the historic and modern modifications that have been made to the landscape. Therefore, at this time it has been determined that no federal or state historic properties or TCPs would be affected by the proposed undertaking as defined in this report.

6.1 RECOMMENDATIONS

Given these observations and deductions, Tetra Tech, Inc., recommends the following mitigations be implemented as part of the proposed undertaking:

- Additional cultural resources investigations would be conducted if the proposed undertaking or APE plans undergo such changes as to include areas not covered by this investigation.
- If buried cultural materials are identified during construction, all work in that area should be halted or diverted until a qualified archaeologist (one meeting the Secretary of the Interior's Standards and Guidelines) can evaluate the nature and significance of the finds.

- If human remains are discovered in the course of boring or during construction, all work in that area should be halted or diverted until the Imperial County Coroner's Office is notified and that office offers an opinion of disposition. The appropriate county coroner shall be notified within 24 hours of discovery.

CHAPTER 7
CERTIFICATION

I hereby certify that the statements furnished above and in the attached exhibits present the data and information required for this archaeological report, and that the facts, statements and information presented are true and correct to the best of my knowledge and belief. I also certify that I am a qualified California archaeologist who meets the Secretary of the Interior's Standards and Guidelines (Appendix E).

Signed: Eric M. King FOR **Date:** 8/18/2005

Fred E. Budinger, Jr.
Senior Archaeologist
Tetra Tech, Inc.
348 West Hospitality Lane, Suite 100
San Bernardino, California
Phone: (909) 381-1674
FAX (909) 889-1391
e-mail fred.budinger@tetratech.com

This page intentionally left blank.

CHAPTER 8
REFERENCES

Bean, L.J. 1978. Cahuilla. In: *Handbook of North American Indian,* pp.575-591, edited by Robert F. Heizer (William C. Sturtevant, General Editor), Smithsonian Institution, Washington, DC.

Brown, John S. 1923. The Salton Sea Region, California: A Geographic, Geologic, and Hydrologic Reconnaissance with a Guide to Desert Watering Places. U.S. Geological Survey Water - Paper 497.

Cain, Dan. 2005. Senior Administrative Analyst, Salton Sea Authority. Personal communication with Andrew Gentile and Erin King, Tetra Tech, Inc. June 28, 2005.

Gray, Randy. Real Estate Section, Imperial Irrigation District. Personal communication with Andrew Gentile. Tetra Tech. May 23, 2005.

Kalin, Al. 2005. Local resident. Personal communication with Andrew Gentile, Tetra Tech, Inc. June 15, 2005.

Koon, Kenneth. 2005. Librarian, Niland Branch of the Imperial County Free Library. Personal communication with Fred Budinger, Jr., Tetra Tech, Inc. August 3, 2005.

Kroeber, W. A. 1925. *Handbook of American Indians of California.* Washington: Bureau of American Ethnology Bulletin 78.

Luomala, K. 1978. Tipai-Ipai. In: *Handbook of North American Indian,* pp.592-609, edited by Robert F. Heizer (William C. Sturtevant, General Editor), Smithsonian Institution, Washington, DC.

McDonald, Allison Meg. 1992. Indian Hill Rockshelter and Aboriginal Cultural Adaptation in Anza-Borrego Desert State Park, Southeastern California. Unpublished Ph.D. dissertation, University of California, Riverside.

Norris, R. M., and Webb, R. W. 1976. *Landscapes of California*. John Wiley & Sons Inc., Santa Barbara. Pp. 169-189.

Oakeshott, Gordon B. 1971. *California's Changing Landscapes.* McGraw-Hill Book Company. Pp. 339-351.

Redlands Institute, University of Redlands and ESRI Press. 2002. *Salton Sea Atlas*. University of Redlands and ESRI Press.

Salton Sea Authority. 2005. http://www.saltonsea.ca.gov/histchron.htm. Accessed May 16, 2005.

San Diego State University Center for Inland Waters 2005. www.sci.sdsu.edu/salton/VolcanicActivity.html. Accessed July 21, 2005.

Schaefer, Jerry. 1994. The Challenge of Archaeological Research in the Colorado Desert: Recent Approaches and Discoveries. *Journal of California and Great Basin Anthropology* 16(1):60-80.

Signorotti, Vince. 2005. Director of Real Estate, Cal Energy, Imperial County, California. Personal communication with Andrew Gentile and Erin King, Tetra Tech, Inc. June 20 and 27, 2005.

Tetra Tech, Inc. 2003. Class I Cultural Resources Inventory – Wetlands and Sedimentation basin Sites, New and Alamo Rivers Project, Imperial County, California, prepared by Kevin T. Doyle, Jay von Werlhof, and Fred E. Budinger, Jr.

---------. 2005. Biological Report for the Shallow Water Habitat Project, prepared by David Munro, Senior Biologist, Tetra Tech, Inc.

Weide, David. 1978. Regional Environmental History of the Yuha Desert Region. In *Background to Prehistory of the Yuha Desert Region*, pp. 4-15, edited by Margaret L. Weide, James P. Barker, and Philip J. Wilke. Riverside, California Bureau of Land Management.

Western Regional Climate Center. 2005. http://www.wrcc.dri.edu/ Accessed March 15, 2005.